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NEW MEXICO COPPER CORPORATION

NEW MINE PERMIT No. SI027RN

UPDATED MINING OPERATION AND RECLAMATION PLAN

FOR ITS

COPPER FLAT MINE

SUBMITTED TO

NEW MEXICO MINING & MINERALS DIVISION PURSUANT TO

19.10.6.602.D.(15) and 19.10.6.603 NMAC

OCTOBER 2016

PREPARED BY

VEMS INC

Velasquez Environmental Management Services Inc.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

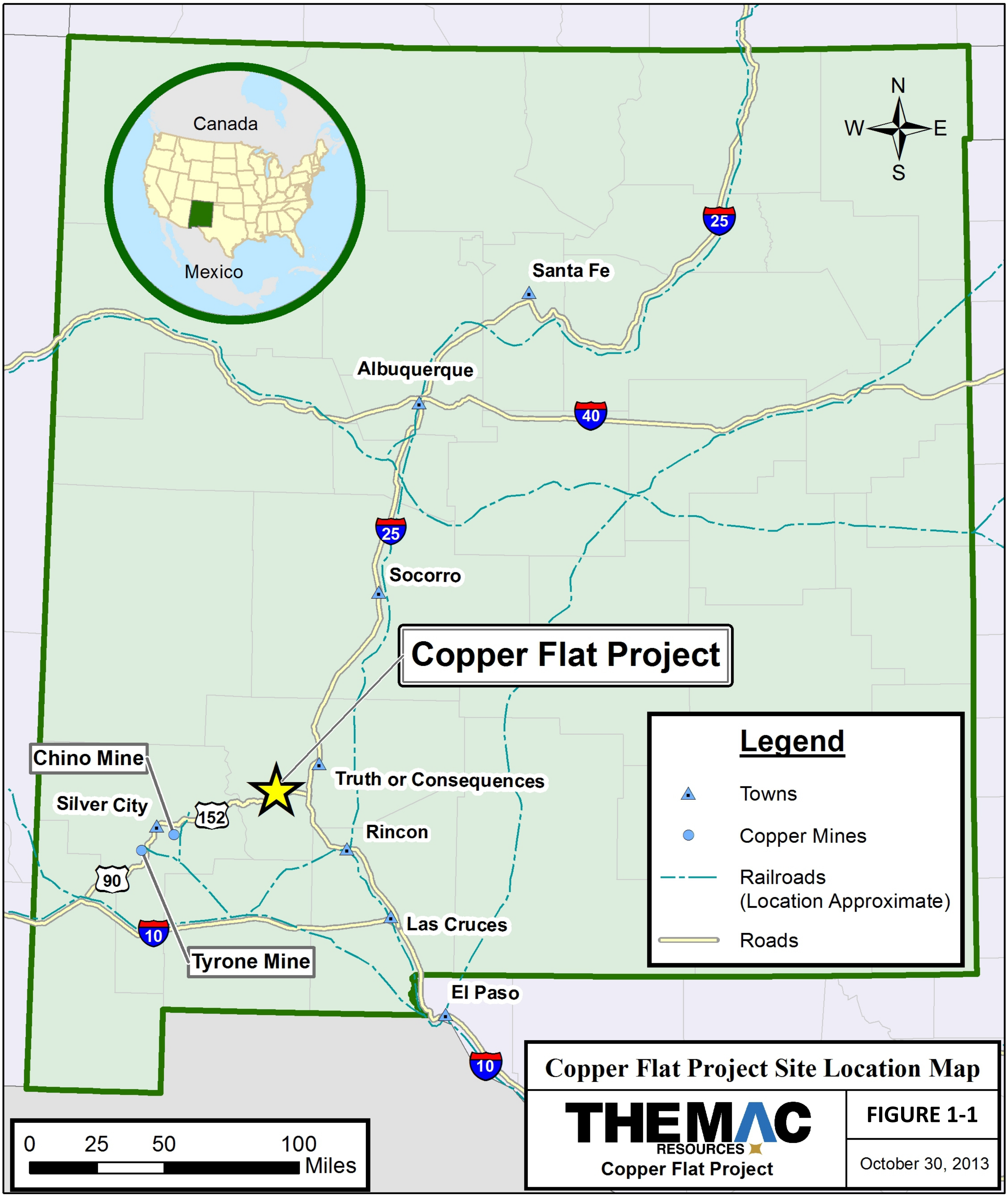
1.0 INTRODUCTION

New Mexico Copper Corporation (NMCC) is developing the Copper Flat Mine located approximately 150 miles south of Albuquerque, New Mexico and 20 miles southwest of Truth or Consequences, NM, north of NM State Highway 152 between the communities of Caballo to the east and Hillsboro to the west in Sierra County, as shown on Figure 1-1. NMCC has proposed to mine approximately 125 million tons of copper ore. Over the life of the mine, it will produce approximately 113 million tons of ore and 33 million tons of waste rock. The mine life for the current reserve is estimated at 11 to 12 years.

On July 18, 2012 NMCC submitted its Permit Application Package (PAP) to the New Mexico Mining and Minerals Division (MMD), including the Mining Operation and Reclamation Plan (MORP) for its Copper Flat Mine Project in Sierra County, NM. On February 18, 2013 the MMD provided comments on NMCC's PAP, including NMCC's Baseline Data Report (BDR) and the MORP. In the intervening time NMCC and MMD have resolved all of MMD's comments related to the BDR with the exception of a determination of the hydrologic consequences of the operation and reclamation on the permit and affected areas as required by 19.10.6.602.D.(13)(g)(v) of the Mining Act regulations. NMCC will submit a revised hydrologic consequences analysis in response to MMD's request under separate cover as an addendum to the BDR when it becomes available.

This document updates NMCC's MORP submittal of July 18, 2012, in particular with respect to Sections 3.15 through 4.8 of the 2012 MORP document. This update addresses proposed mine operations and reclamation and closure of the Copper Flat Project and provides the most recent information available consistent with the information contained in NMCC's Discharge Permit (DP) application submitted to the New Mexico Environment Department (NMED) in December2015 and revised in June 2016, currently undergoing technical review. The information herein is also consistent with the information contained in the Bureau of Land Management's (BLM) draft Environmental Impact Statement (DEIS) published for public comment in November 2015, in particular, with regard to Alternative 2 as described in the DEIS and designated by the BLM as the preferred alternative. This document also takes into account MMD's February 18, 2013 comments and provides more detailed information that may resolve or render a specific comment moot.

This MORP update is organized in a manner that allows the reviewer to compare subsection of 19.10.6.602.D.(15), Description of the Proposed Mine Operation and Reclamation Plan, and 19.10.6.603, Performance and Reclamation Standards and Requirements, of the Mining Act regulations to see how NMCC proposed operations and reclamation of Copper Flat will comply with MMD's Mining Act regulations. Section 2.0 presents NMCC's Mine Operation Plan for Copper Flat and Section 3.0 presents its Reclamation and Closure Plan. The contents of this



Canada
Mexico
N
W
E
S
Santa Fe
Albuquerque
Socorro
Copper Flat Project
Truth or Consequences
Rincon
Las Cruces
El Paso
Chino Mine
Silver City
Tyrone Mine
25
40
10
152
90
Legend
Towns
Copper Mines
Railroads
(Location Approximate)
Roads
0
25
50
100
Miles
Copper Flat Project Site Location Map
THEMAC RESOURCES
Copper Flat Project
FIGURE 1-1
October 30, 2013

MORP update are also supported by the appended documents included herewith as well as the other documents included as part of the MORP update by reference herein.

As indicated above, NMCC submitted its DP application to the NMED for review and approval. The DP application was determined administratively complete in December 2015 and is currently undergoing technical review. NMED provided a set comments and a request for additional information in March 2016. NMCC submitted the requested information in June 2016, including a commitment to submit the information contained in this document in response to NMED's request for a more detailed Closure Plan. This MORP update is consistent with and includes much of the same information as was provided to NMED in its DP application. NMCC considers that the Reclamation Plan as contained herein is also the Closure Plan required by the NMED Copper Rules. The DP application as revised in June 2016 is, therefore, included in this MORP by reference.

NMED's requirements for ground water protection during operation of Copper Flat and subsequent reclamation at the end of the project are tied to each other through the New Mexico Mining Act regulations and the New Mexico Water Quality Control Act Copper Rules (NMED Copper Rules) regulatory approval process for the mine. The objective of the Reclamation and Closure Plan is to reclaim and close the facility in a manner protective of ground water in conformance with the NM Copper Rules, meet the reclamation requirements of the New Mining Act and return the mine area to conditions similar to those present before reestablishment of the mine. Reclamation of the site will re-establish the post-mining land uses consistent with the land uses of the site and the surrounding area, i.e., wildlife habitat, grazing, mining and recreation as identified by the Bureau of Land Management in its approved Land Use Management Plan (BLM 1986).

2.0 MINE OPERATIONS PLAN - 19.10.6.602.D.(15)

This Section provides a detailed description of the NMCC's proposed construction and operation of the Copper Flat Project. It is organized to provide the information requested in Sections 19.10.602.D.(15)(a) through (f) of the New Mexico Mining Act regulations and how the operation will meet the performance standards and requirements of 19.10.6.603 NMAC.

2.1 Type & Methods of Mining - 19.10.6.602.D.(15)(a) & (b)

This Section describes the type and method of mining and the engineering techniques proposed at the Copper Flat mine. It contains the required maps and describes the approximate time table and general sequence to be followed in constructing and operating the mine, including the number of acres of land anticipated to be disturbed.

NMCC proposes to construct an open pit mine at its Copper Flat Project. This new facility will entail the expansion of an existing open pit previously developed and operated for a short time in 1982 by Quintana Minerals Corporation (Quintana). A portion of the ore body at Copper Flat is exposed at and near the surface and will be mined by conventional truck and shovel open pit methods. Figure 2-1 is a map of the site as it currently exists, showing the various existing facilities as constructed by Quintana when it operated the mine. Figure 2-2 provides a map of the proposed site facility showing the location of the various features of the project described in more detail later herein. These maps provide the reviewer the ability to differentiate between what currently exists as a disturbance on-site as compared to NMCC's proposed activities.

NMCC proposes to re-establish and expand the previous Quintana mining activities conducted at Copper Flat in 1982. The facilities will be similar to those of the previous operator, including an open pit mine, concentrate production facilities, waste rock stockpiles (WRSPS) and a tailings storage facility (TSF). Upon receiving the required permit approvals the project will begin site preparation and construction for approximately 2 years. The operating life of the project ("life of mine") is anticipated to be 11 to 12 years. Thereafter, the site will be closed and reclaimed per an approved reclamation and closure plan. Table 2-1 provides an approximate timetable indicating development, construction, operation and reclamation of the Copper Flat Project beginning from the time NMCC obtains all of the required permissions and approvals.

NMCC will mine approximately 113 million tons of ore and 45 million tons of waste rock during the operating life of the mine (158 million tons). Annually, the mining operation will supply 8.9 million 10.8 million tons of copper ore to the mill for processing (an average rate of approximately 25.5 to 29.6 thousand tons per day) depending on operational conditions in the concentrator. Table 2-2 shows the estimated annual mine and process production schedule for Copper Flat. Waste rock production will be highest in the early years of

NOTES:

CONCRETE FOUNDATIONS SHOWN REFLECT PLANS BY QUINTANA MINERALS CORPORATION FROM 1981 AND MOST RECENT SURVEY CONDUCTED.

SITE PLAN

SCALE: 1" = 500'

500 250 0 500 1000

SCALE IN FEET

CONTOUR INTERVAL = 10'

DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1"= 500'		DATE
DESIGNED BY	JPN	OCT 15
DRAWN BY	JPN	OCT 15
CHECKED BY		
PROJECT MGR	RKZ	
CLIENT APPR.		

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COPPER FLAT PROJECT

SITE GENERAL CIVIL MINE SITE EXISTING CONDITIONS

JOB NO. M3 PN-120085

DWG NO. **FIGURE 2-1**

REV NO. P2 DATE 20 NOV 15

EWRSP = EXISTING WASTE ROCK STOCKPILE
WRSP = WASTE ROCK STOCKPILE

SITE PLAN
SCALE: 1:500

500' 250' 0' 500' 1000'
1" = 500'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 500'		DATE
DESIGNED BY	SAM	DEC12
DRAWN BY	SAM	DEC12
CHECKED BY	TDL	JAN13
PROJECT MGR	RKZ	
CLIENT APPR.		

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PROJECT AREA
PROPOSED SITE PLAN

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-2**
REV NO. P18
DATE 16 NOV 15

VEMS INC.

TABLE 2-1
COPPER FLAT DEVELOPMENT SEQUENCE AND SCHEDULE

Project Build Out Sequence					Project Reclamation Sequence	
		Disturbed Acres				
Year	Project Activity	Facility	Cumulative	19.10.1602.D(15)(c) Reference	Year	Reclamation Activity
	Mobilize Construction	0.00	0.00	Other Facility or Structures (c)xiii		
	Plant Site Grading	84.41	84.41	Other Facility or Structures (c)xiii		
	TSF Phase 1	451.50	535.91	Tailings Storage Facility (c)vii		
	Top Dressing Stockpile 1	29.33	565.24	Topsoil & Topdressing Stockpiles (c)xi		
	Construct Mill	8.51	573.75	Mills (c)viii		
	Construct Ancillary Facilities	8.89	582.64	Other Facility or Structures (c)xiii		
	Storage Areas	3.22	585.86	Storage Areas (c)x		
1	EWRSP 1	15.34	601.20	Waste Rock Stockpiles (c)xii	1	
	EWRSP 2A	8.33	609.53	Waste Rock Stockpiles (c)xii		
	EWRSP 2B	12.73	622.26	Waste Rock Stockpiles (c)xii		
	EWRSP 3	19.54	641.80	Waste Rock Stockpiles (c)xii		
	EWRSP 4	18.10	659.90	Waste Rock Stockpiles (c)xii		
	Mine Haul Roads	5.97	665.87	Waste Rock Stockpiles (c)xii		
	Impoundments : TSF; Proc; SW A	12.92	678.79	Impoundments (c)ii		
	Collection Ditches: SW A	1.38	680.17	Impoundments (c)ii		
	Top Dressing Stockpile 2	31.55	711.72	Topsoil & Topdressing Stockpiles (c)xi		
	Top Dressing Stockpile 3	3.53	715.25	Topsoil & Topdressing Stockpiles (c)xi		
	Construct Ancillary Facilities	21.10	736.35	Other Facility or Structures (c)xiii		
	Open Pit	82.66	819.01	Open Pit (c)vi		
	WRSP 1	3.97	822.98	Waste Rock Stockpiles (c)xii		Reclaim EWRSP 1
2	WRSP 2	2.44	825.42	Waste Rock Stockpiles (c)xii	2	Reclaim EWRSP 2A
	WRSP 3	6.07	831.49	Waste Rock Stockpiles (c)xii		Reclaim EWRSP 2B
	Mine Haul Roads	11.03	842.52	Waste Rock Stockpiles (c)xii		
	EWRSP 4	4.52	847.04	Waste Rock Stockpiles (c)xii		
	Ore Stockpile	2.07	849.11	Ore Stockpiles (c)i		
	Impoundments : Surge; SW B; SW C	8.99	858.10	Impoundments (c)ii		
	Collection Ditches: SW B; SW C	4.42	862.52	Impoundments (c)ii		
	Top Dressing Stockpile 3	10.58	873.10	Topsoil & Topdressing Stockpiles (c)xi		
	Open Pit	66.13	939.23	Open Pit (c)vi		
3	WRSP 1	27.80	967.03	Waste Rock Stockpiles (c)xii	3	
	WRSP 2	4.88	971.91	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	990.11	Waste Rock Stockpiles (c)xii		
	TSF Phase 2	28.22	1,018.33	Tailings Storage Facility (c)vii		
	WRSP 1	7.94	1,026.27	Waste Rock Stockpiles (c)xii		
4	WRSP 2	19.51	1,045.78	Waste Rock Stockpiles (c)xii	4	
	WRSP 3	18.20	1,063.98	Waste Rock Stockpiles (c)xii		
	TSF Phase 3	28.22	1,092.20	Tailings Storage Facility (c)vii		
	Open Pit	8.27	1,100.47	Open Pit (c)vi		
5	WRSP 2	14.63	1,115.10	Waste Rock Stockpiles (c)xii	5	
	WRSP 3	18.20	1,133.30	Waste Rock Stockpiles (c)xii		
	TSF Phase 4	28.22	1,161.52	Tailings Storage Facility (c)vii		
	Open Pit (buildout complete)	8.27	1,169.79	Open Pit (c)vi		
6	WRSP 1	0.00	1,169.79	Waste Rock Stockpiles (c)xii	6	
	WRSP 2	4.88	1,174.67	Waste Rock Stockpiles (c)xii		
	WRSP 3	18.20	1,192.87	Waste Rock Stockpiles (c)xii		
	WRSP 2, 3	2.44	1,195.31	Waste Rock Stockpiles (c)xii		
7	WRSP 3	18.20	1,213.51	Waste Rock Stockpiles (c)xii	7	
	TSF Phase 5 (buildout complete)	28.22	1,241.73	Tailings Storage Facility (c)vii		
8	WRSP 3	18.20	1,259.93	Waste Rock Stockpiles (c)xii	8	
9 - 11	WRSP 3 (buildout complete)	6.07	1,266.00	Waste Rock Stockpiles (c)xii	10 - 11	WRSP 3 Contour
12					12	WRSP 3 Contour, TSF Draindown - Active Evaporation
13					13	Pit Rapid Fill, WRSP 2-Upper Lift Contour, WRSP 1-Contour, TSF Draindown - Active Evaporation
14	Mining and Processing Ends				14	Rapid Fill, WRSP-2 Upper Lift Contour, WRSP 1 - Contour, Fill & Contour, WRSP 3, 2, 1, EWRSP 4 Cover & Seed, TSF Draindown - Active Evaporation
15					15	Process Area Demo, Fill & Contour, WRSP 3, 2, 1, EWRSP 3 & 4 Contour, Cover & Seed, Pit Area Contour, TSF Contour, Draindown - Active Evaporation
16					16	Process Area Fill & Contour, WRSP 3, , 2, 1, EWRSP 3 & 4 Contour, Cover, Seed, TSF Contour, Draindown - Active Evaporation
17					17	TSF Contour, Draindown - Active Evaporation
18	Evaporation Pond Construction (Project Buildout Complete)	24.05	1,290.05	Impoundments (c)ii	18	TSF Contour & Cover, Draindown - Active Evaporation, Passive Evaporation
19					19	TSF Contour, Cover, Draindown - Passive Evaporation
20 - 21					20 - 21	TSF Contour, Cover, Seed, Draindown - Passive Evaporation
22 - 38					22 - 38	TSF Draindown - Passive Evaporation
39					39	TSF Evaporation Pond Fill, Cover & Seed

TABLE 2-2
Copper Flat Project
Estimated Mine & Process Scheduler

Period	Ore Annual Kton	WRSP 1 Annual Kton	WRSP 2 Annual Kton	WRSP 3 Annual Kton	Total WRSP Annual Kton	Total Mined Annual Kton	Strip Ratio	Mine Avg TPD	Process Annual Kton	Process Avg TPD
Preproduction	360,000	32,000	30,000	48,000	110,000	470,000	0.31	7,380	0	0
Year 1	8,940,000	2,073,000	1,346,000	5,141,000	8,560,000	17,500,000	0.96	47,950	9,300,000	25,480
Year 2	10,800,000	1,055,000	2,544,000	3,312,000	6,700,000	17,500,000	0.62	47,950	10,800,000	29,590
Year 3	10,800,000	0	1,756,000	4,156,000	6,700,000	17,500,000	0.62	47,950	10,800,000	29,590
Year 4	10,800,000	0	628,000	4,944,000	6,700,000	17,500,000	0.62	47,950	10,800,000	29,590
Year 5	10,800,000	0	0	6,072,000	6,700,000	17,500,000	0.62	47,950	10,800,000	29,590
Year 6	10,250,000	0	0	5,924,000	5,924,000	15,949,000	0.59	43.700	10,025,000	27,470
Year 7	9,900,000	0	0	2,491,000	2,491,000	12,391,000	0.25	33,950	9,900,000	27,120
Year 8	9,900,000	0	0	718,000	718,000	10,618,000	0.07	29,090	9,900,000	27,120
Year 9	9,900,000	0	0	71,000	71,000	9,971,000	0.01	27,320	9,900,000	27,120
Year 10	9,900,000	0	0	3,000	3,000	9,903,000	0.00	27,130	9,900,000	27,120
Year 11	9,900,000	0	0	1,000	1,000	9,901,000	0.00	27,130	9,900,000	27,120
Year 12	1,059,000	0	0	4,000	4,000	1,063,000	0.00	26,580	1,059,000	26,480
Total	113,084,000	3,160,000	8,637,000	32,885,000	44,682,000	157,766,000	0.40	38,340	113,084,000	27,890

production while the mine is developed, i.e., 8.5 million tons in the first year to 2.5 million tons in the seventh year. Thereafter, waste rock production will decrease significantly, i.e., 718,000 tons in year eight to as little as 4,000 tons in year twelve.

The area inside the proposed permit area boundary is 2,190 acres. NMCC's proposed Copper Flat Project will disturb approximately 1,290 acres within the permit area, 910 acres of which were originally disturbed by previous mining operations. There may also be some additional acreage disturbance on lands outside of the permit area boundary related to ancillary facilities such as the well field, the substation and power line, and the water pipeline.

Table 2-3 summarizes the approximate number of acres disturbed by the Copper Flat Project at the end of mine life. The total amount of acreage to be reclaimed is discussed in Section 3.0.

TABLE 2-3
Copper Flat Project Disturbed Acreage

Project Area	Associated 19.10.6.602.D.(15)(c) Requirement	Acres Disturbed
Crushed Ore Stockpile	Ore Dumps & Stockpiles - (c)i	2
Ponds & Surface Impoundments	Impoundments - (c)ii & iii	52
Mine Pit	Pits - (c)vi	165
Tailings Storage Facility	Tailings Disposal Facilities - c)vii	565
Concentrator	Mills - (c)viii	9
Laydown Yard & Fuel Station	Storage Areas - (c)x	3
Growth Media Stockpiles	Topsoil and Top Dressing Stockpiles - (c)xi	75
Waste Rock Stockpiles (existing & proposed)	Waste Rock Stockpiles - (c)xii	305
Administration/Warehouse/Other Facilities	Other Facilities or Structures - (c)xiii	114
Total		1290

2.1.1 Existing Open Pit

Quintana created the existing open pit shown in Figure 2-1 in 1982 when they brought the property into production as an open pit mine and mineral processing plant. The initial mine stripping required to expose the ore body occurred during the four- to six-month period immediately preceding startup of the mineral processing plant. Following startup the open pit and processing plant were in commercial production for three and a half months. At that time, all operations were halted due to a significant decline in copper prices. Approximately 3 million tons of overburden material and 1.2 million tons of ore were mined from the open pit by Quintana. No commercial mining has occurred at this open pit since 1982.

The elevation of the bottom level of the existing Quintana pit is 5,400 feet above mean sea level (amsl), approximately 100 feet beneath the original pre-mining ground surface. The existing open pit encompasses approximately 80 acres of existing disturbance. The bottom benches of the existing pit are flooded, forming a small 5 acre water body. The water level fluctuates with the season in response to precipitation year over year. The depth of the water varies with the underlying open pit and ranges from 10 feet deep to 35 feet deep. The pit currently contains approximately 80 acre-feet (AF) of water.

2.1.2 Proposed Open Pit

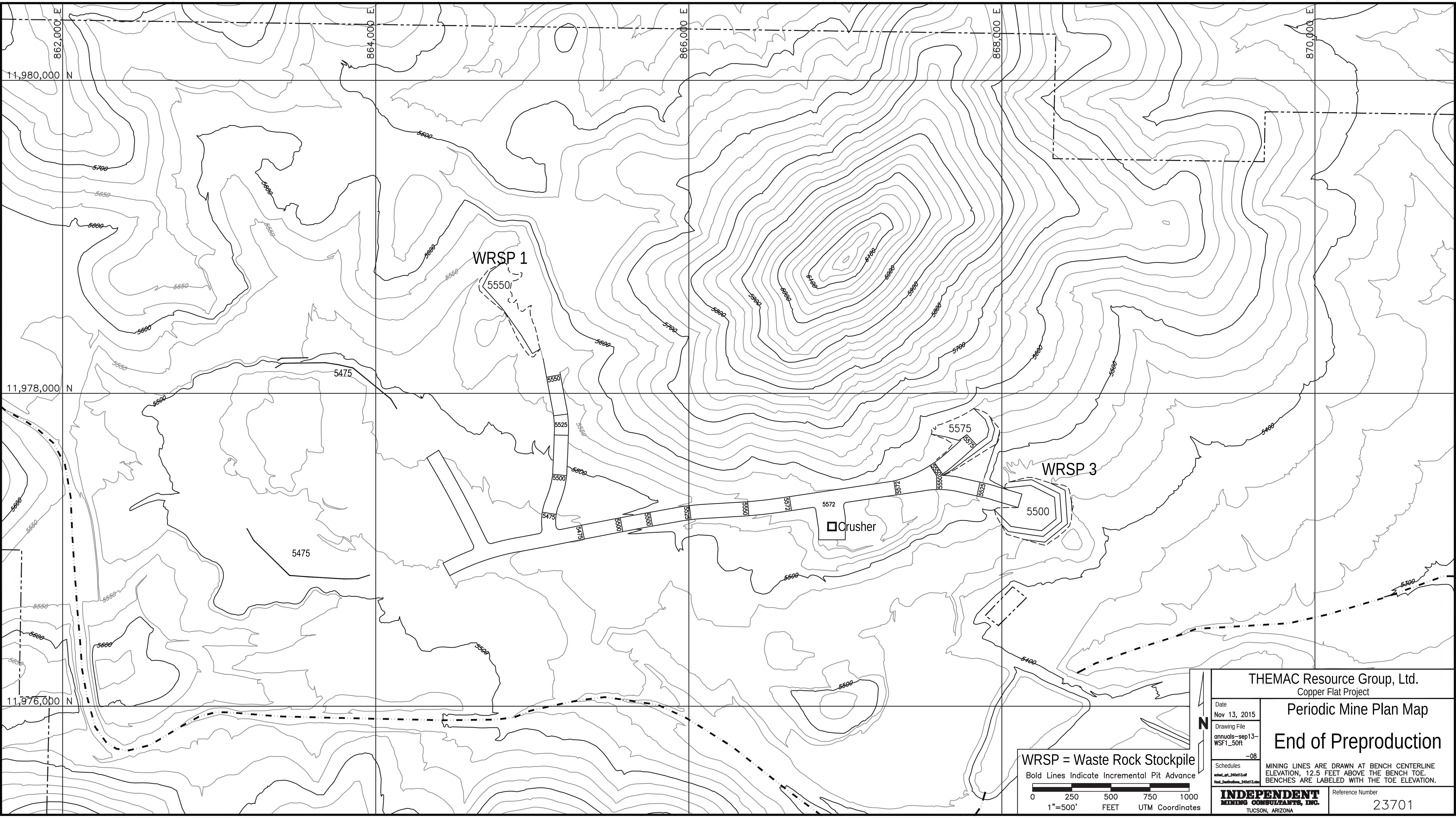
As shown in Figure 2-2, NMCC's proposed open pit will be created through the expansion of the existing open pit to a total of approximately 166 acres, Including the pit, explosives magazine and magazine access road. A multiple bench, open pit mining method will be used to mine the Copper Flat ore body. The pit material will be drilled, blasted, and excavated, creating benches approximately 25 ft. high. The blasted material will be loaded by wheel loader to haul trucks where it will be hauled either to the waste rock piles for storage or as ore to the primary crusher where it will be fed, crushed and conveyed to the mill for processing. A description of the process is provided in more detail later herein. Figures 2-3 through 2-11 depict expansion of the pit over time.

Over the 12-year life of the mine, approximately 113 million tons of copper ore and 45 million tons of waste rock will be mined and removed from the open pit. The proposed mining activities will enlarge the open pit over time to a diameter of approximately 2,800 feet. The open pit will reach a depth of approximately 4,650 feet above sea level, which will be approximately 850 to 900 feet beneath the original pre-mining ground surface. The area of the pit will be expanded to approximately 165 acres. The existing diversions of Grayback Arroyo, shown on Figure 2-1, constructed by Quintana during its operation of the mine will provide diversion of water around the pit and will not be affected by the proposed pit expansion (see Figure 2-2).

2.1.3 Waste Rock Stockpiles (WRSPs)

Waste rock will be hauled from the mine pit and placed in designated stockpile areas shown on Figure 2-2 and described in more detail later herein. These new WRSPs will be constructed in an area of the site that is completely underlain by andesite bedrock, a geologic formation that has a transmissivity of less than 10^{-6} centimeters per second (cm/sec) (SRK, May 2013), thus providing a natural liner. These WRSPs will be constructed as units segregated by the grade of copper contained in the waste rock material so as to maximize its potential to be processed as ore in the future. WRSP-1 is located inside the post-mining open pit surface drainage area and will contain the highest non-ore grade material. WRSP-2 will contain the next highest non-grade material. WRSP-3 will contain all the remaining material.

These new WRSPs will cover approximately 221 acres, including haul roads. They will be built generally to a configuration of 3 horizontal to 1 vertical slope angles (18.4 degrees) to help facilitate reclamation at the end of the mine life. Each lift within the stockpile will be


862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP 1
5550
5475
5475
5575
WRSP 3
5500
Crusher
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
End of Preproduction
Date
Nov 13, 2015
Drawing File
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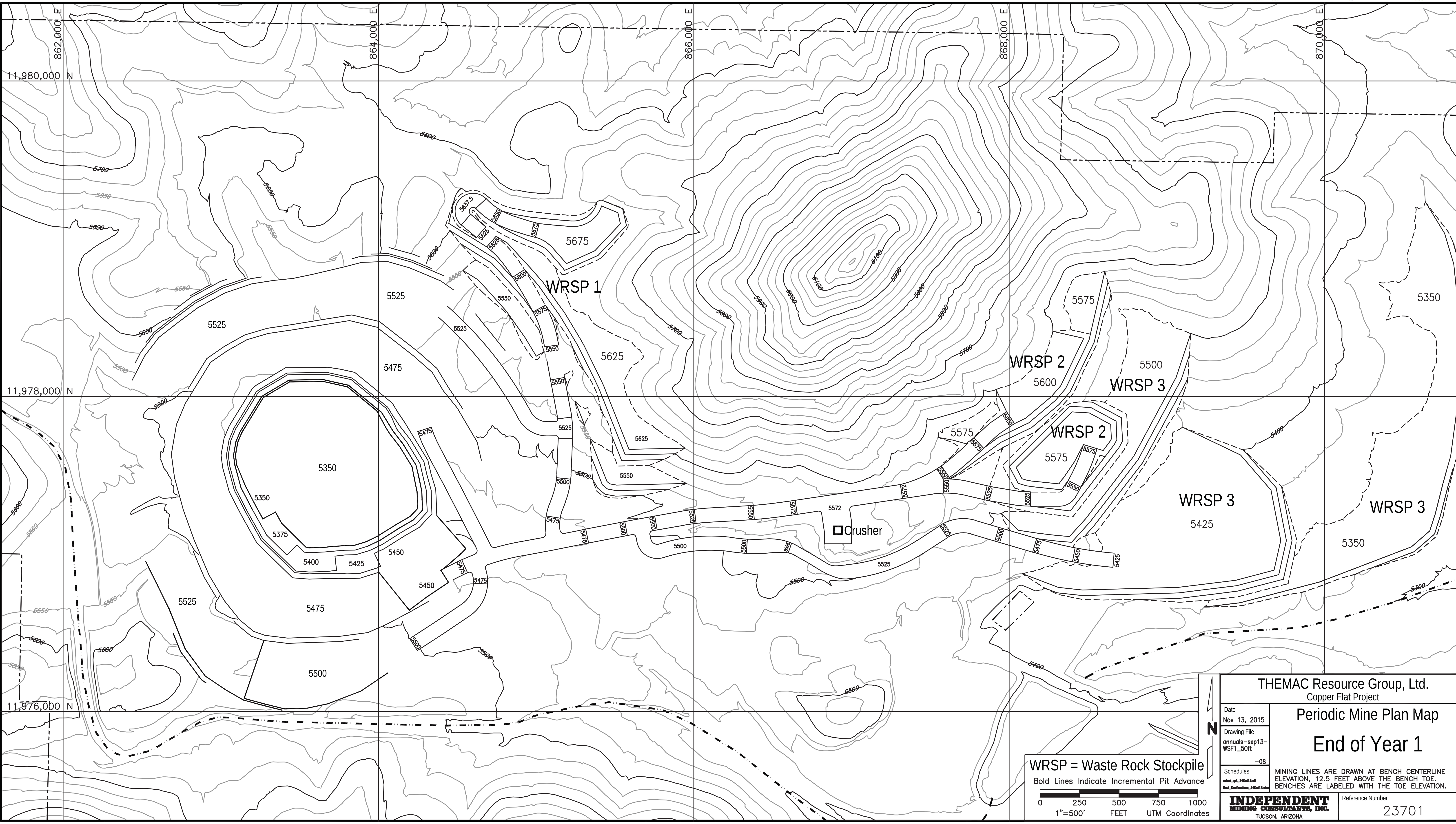
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701

FIGURE 2-3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11,976,000 N
WRSP 1
WRSP 2
WRSP 3
WRSP 2
WRSP 3
WRSP 3
Crusher
5350
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WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
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THEMAC Resource Group, Ltd.
Copper Flat Project
Date
Nov 13, 2015
Drawing File
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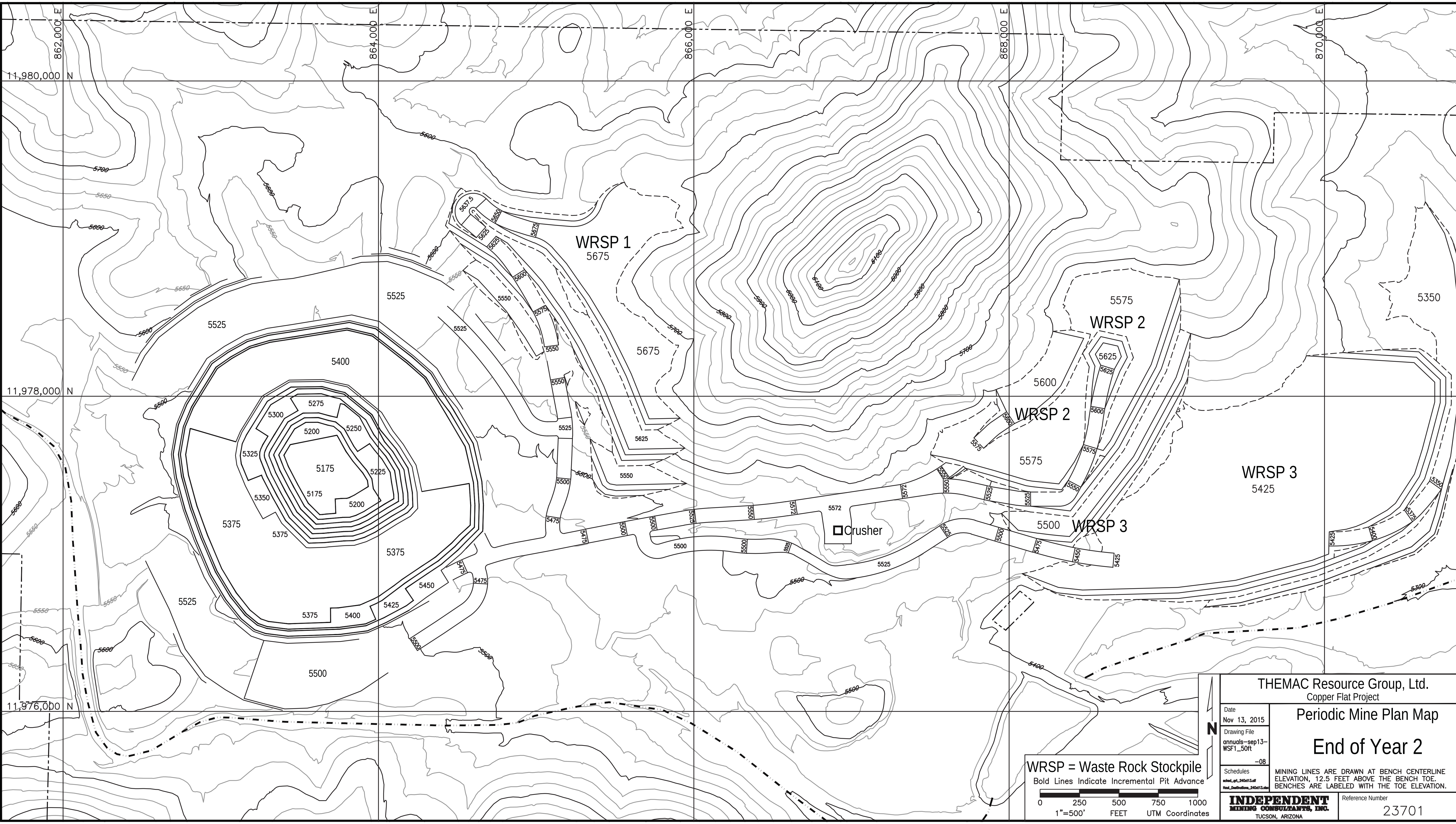
-08
Schedules
Periodic Mine Plan Map
End of Year 1
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701

FIGURE 2-4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WRSP 1
5675
WRSP 2
5575
WRSP 3
5425
Crusher
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
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23701
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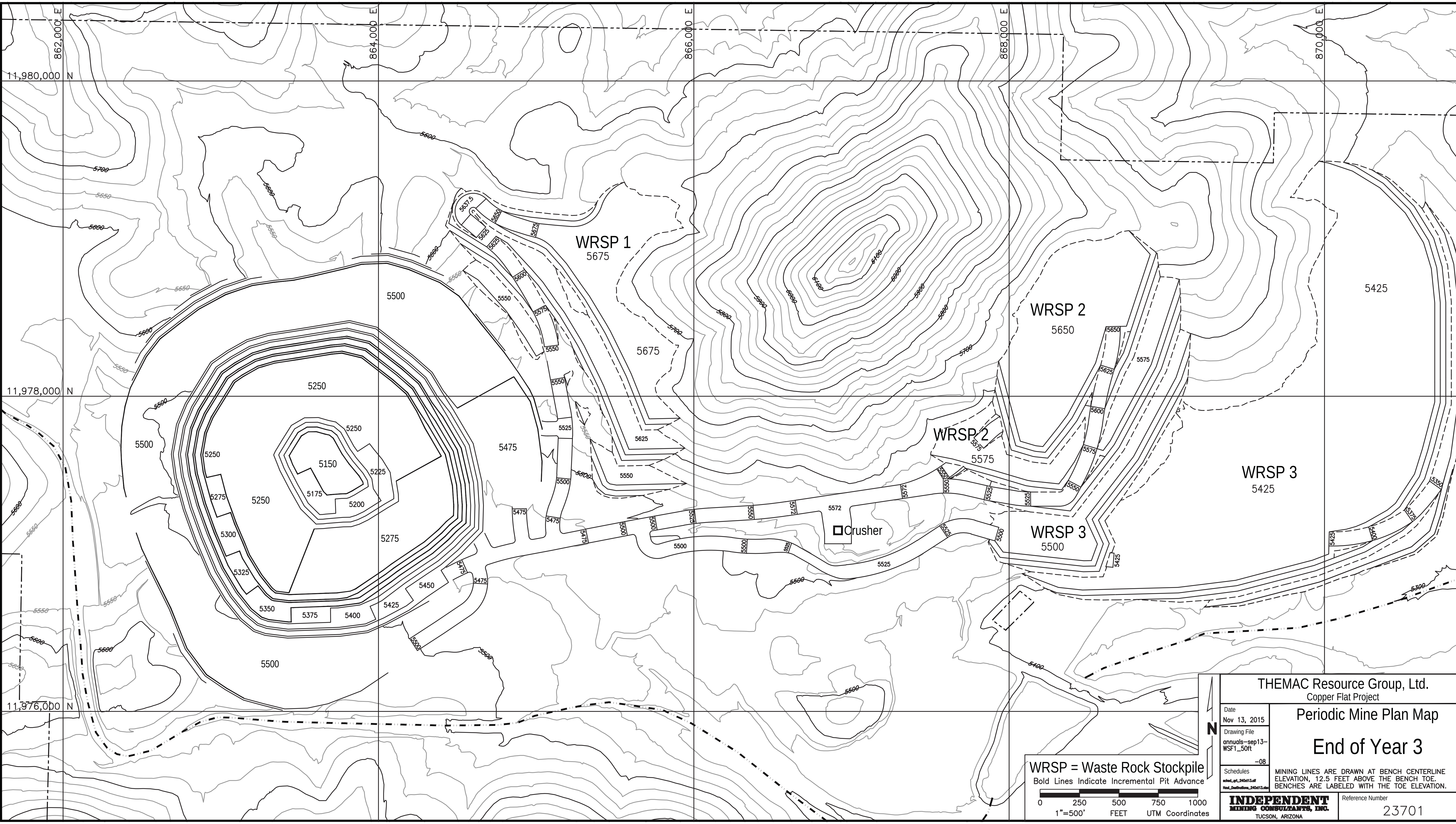
FIGURE 2-5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866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP 1
5675
WRSP 2
5650
WRSP 2
5575
WRSP 3
5425
WRSP 3
5500
Crusher
5500
5250
5150
5475
5275
5425
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
End of Year 3
Date
Nov 13, 2015
Drawing File
annuals-sep13-WSF1_50ft -08
Schedules
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N

FIGURE 2-6

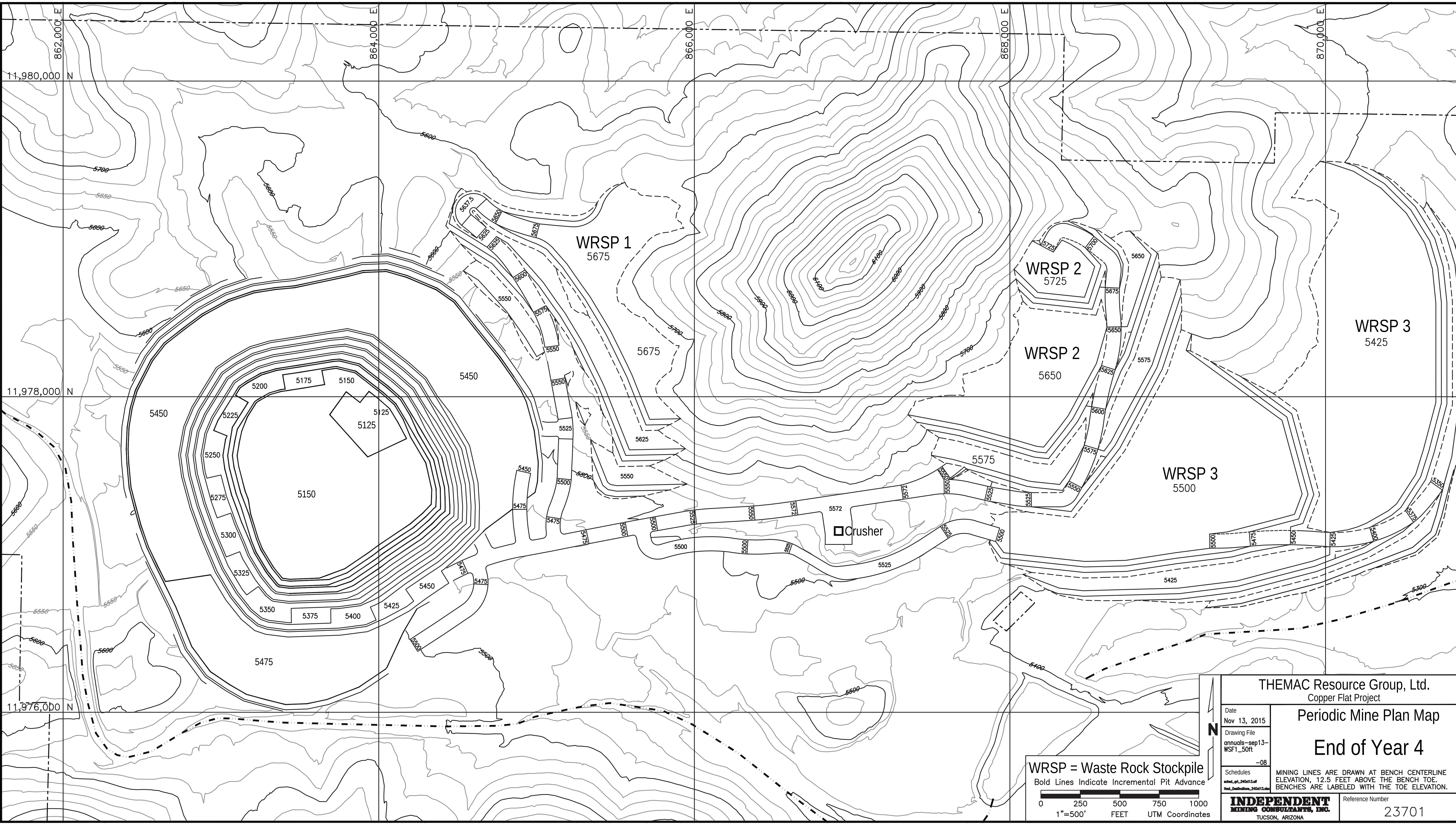
862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP 1
5675
WRSP 2
5725
WRSP 2
5650
WRSP 3
5425
WRSP 3
5500
5575
Crusher
5150
5450
5475
5125
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
End of Year 4
Date
Nov 13, 2015
Drawing File
annuals–sep13–WSF1_50ft –08
Schedules
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N

FIGURE 2-7

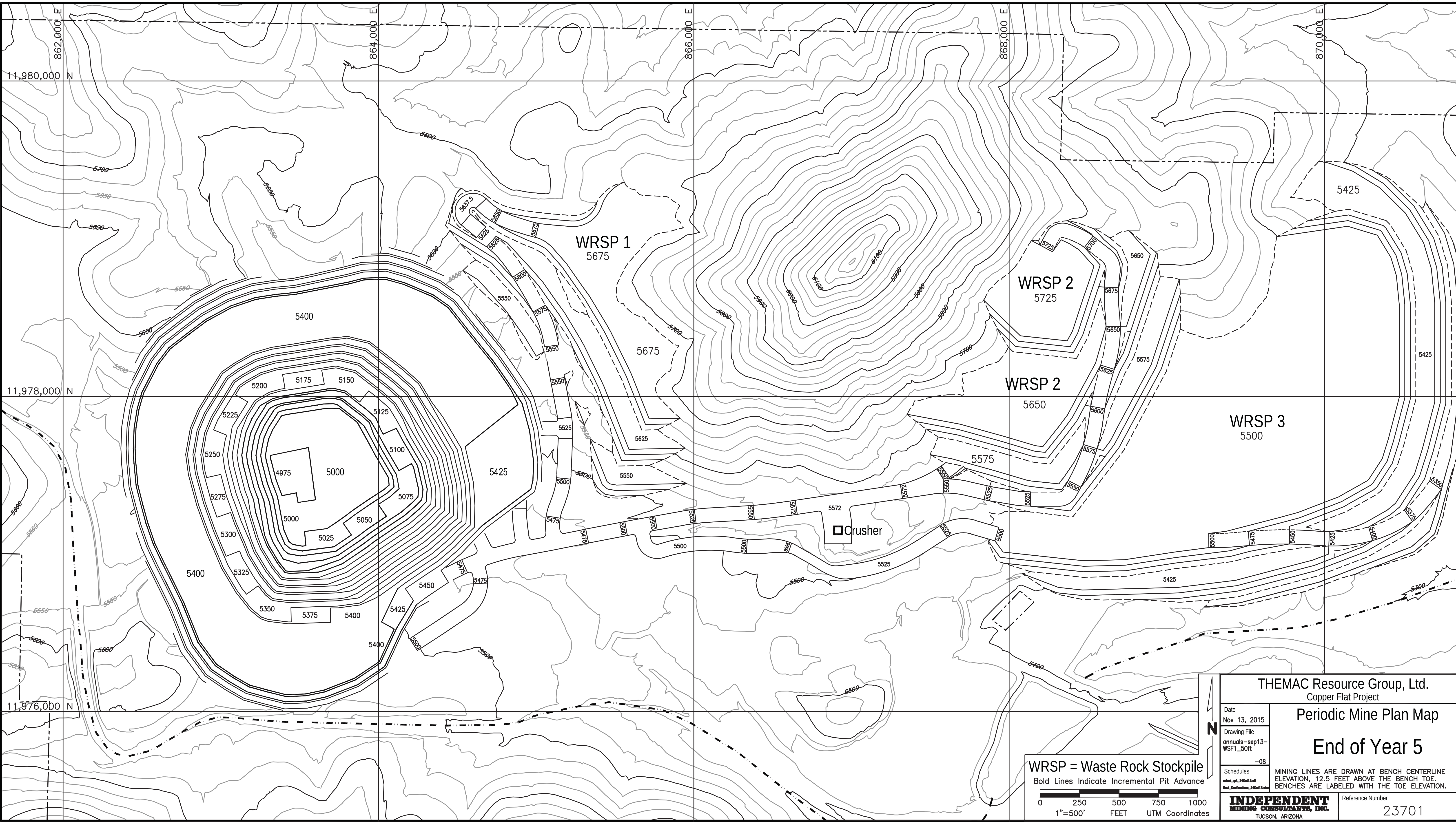
WRSP 1
5675
WRSP 2
5725
WRSP 2
5650
WRSP 3
5500
5425
5400
5000
Crusher
862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N
THEMAC Resource Group, Ltd.
Copper Flat Project
Date
Nov 13, 2015
Drawing File
annuals–sep13–WSF1_50ft –08
Schedules
Periodic Mine Plan Map
End of Year 5
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701

FIGURE 2-8

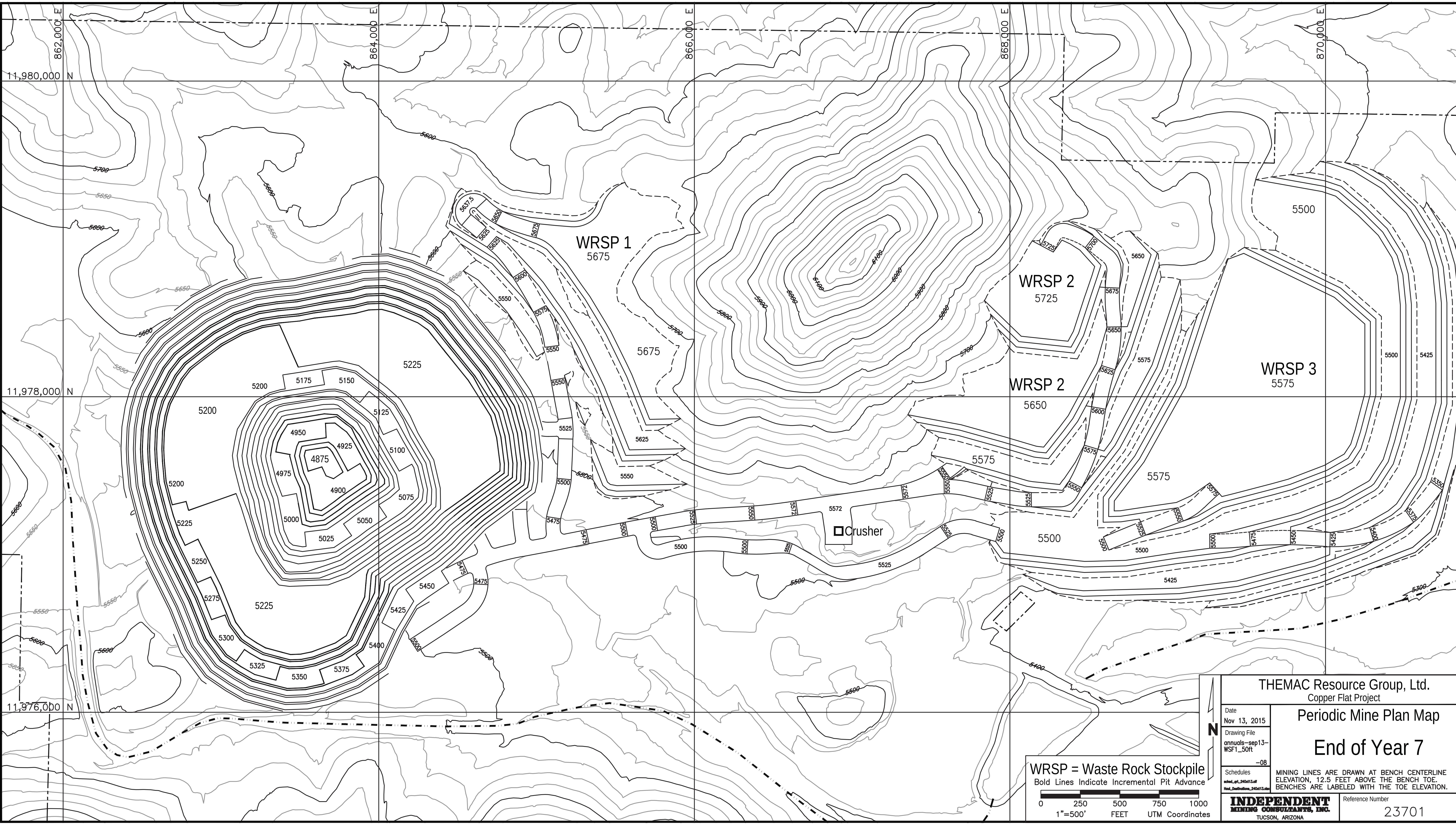
862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP 1
5675
WRSP 2
5725
WRSP 2
5650
WRSP 3
5575
5500
Crusher
4875
5225
5200
THEMAC Resource Group, Ltd.
Copper Flat Project
Date
Nov 13, 2015
Drawing File
annuals-sep13-WSF1_50ft
-08
Schedules
Periodic Mine Plan Map
End of Year 7
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N

FIGURE 2-9

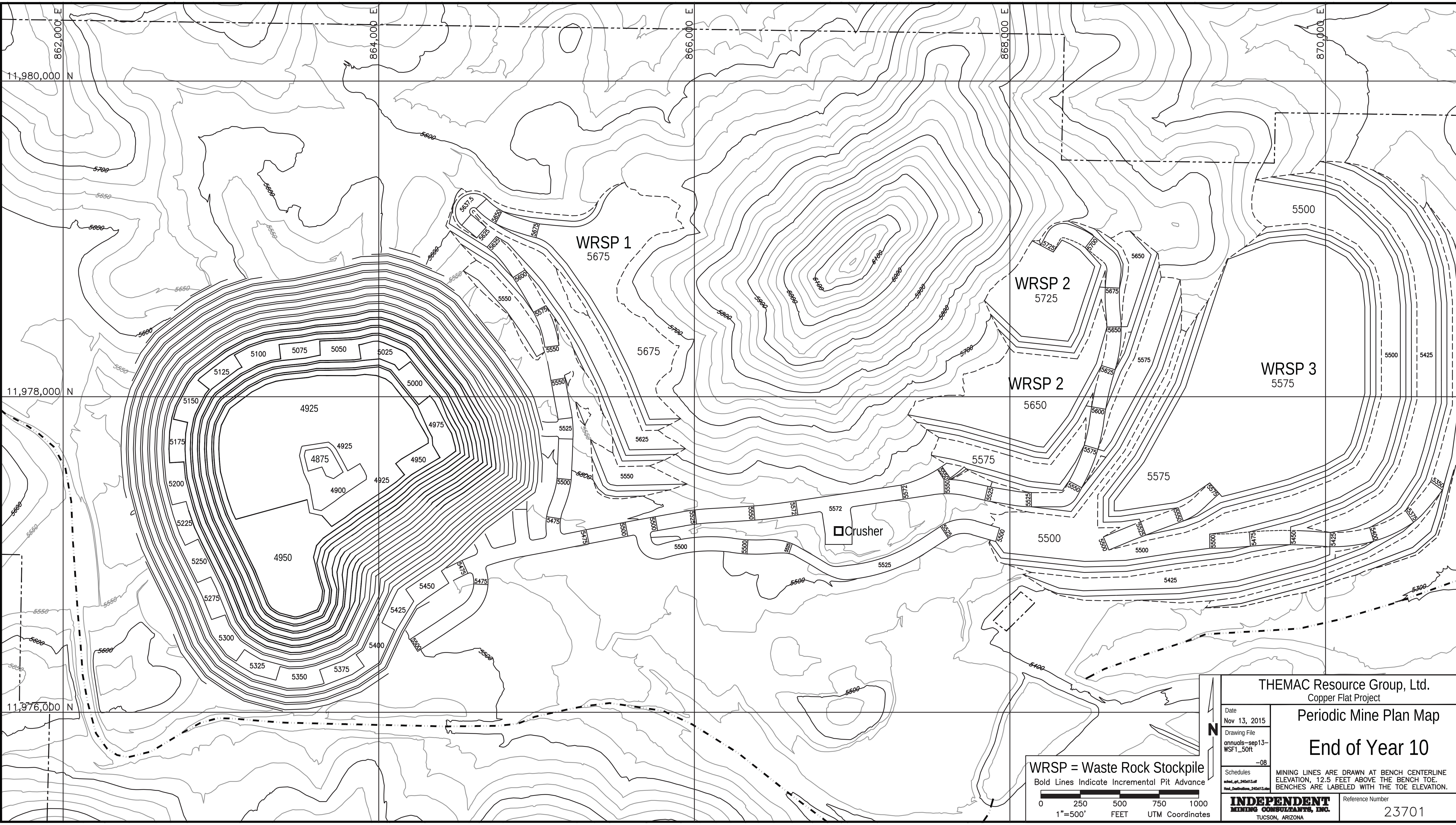
862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N
WRSP 1
5675
WRSP 2
5725
WRSP 2
5650
WRSP 3
5575
5500
5575
5575
5500
4925
4875
4900
4950
Crusher
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
End of Year 10
Date
Nov 13, 2015
Drawing File
annuals-sep13-WSF1_50ft
-08
Schedules
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC.
TUCSON, ARIZONA
Reference Number
23701
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N

FIGURE 2-10

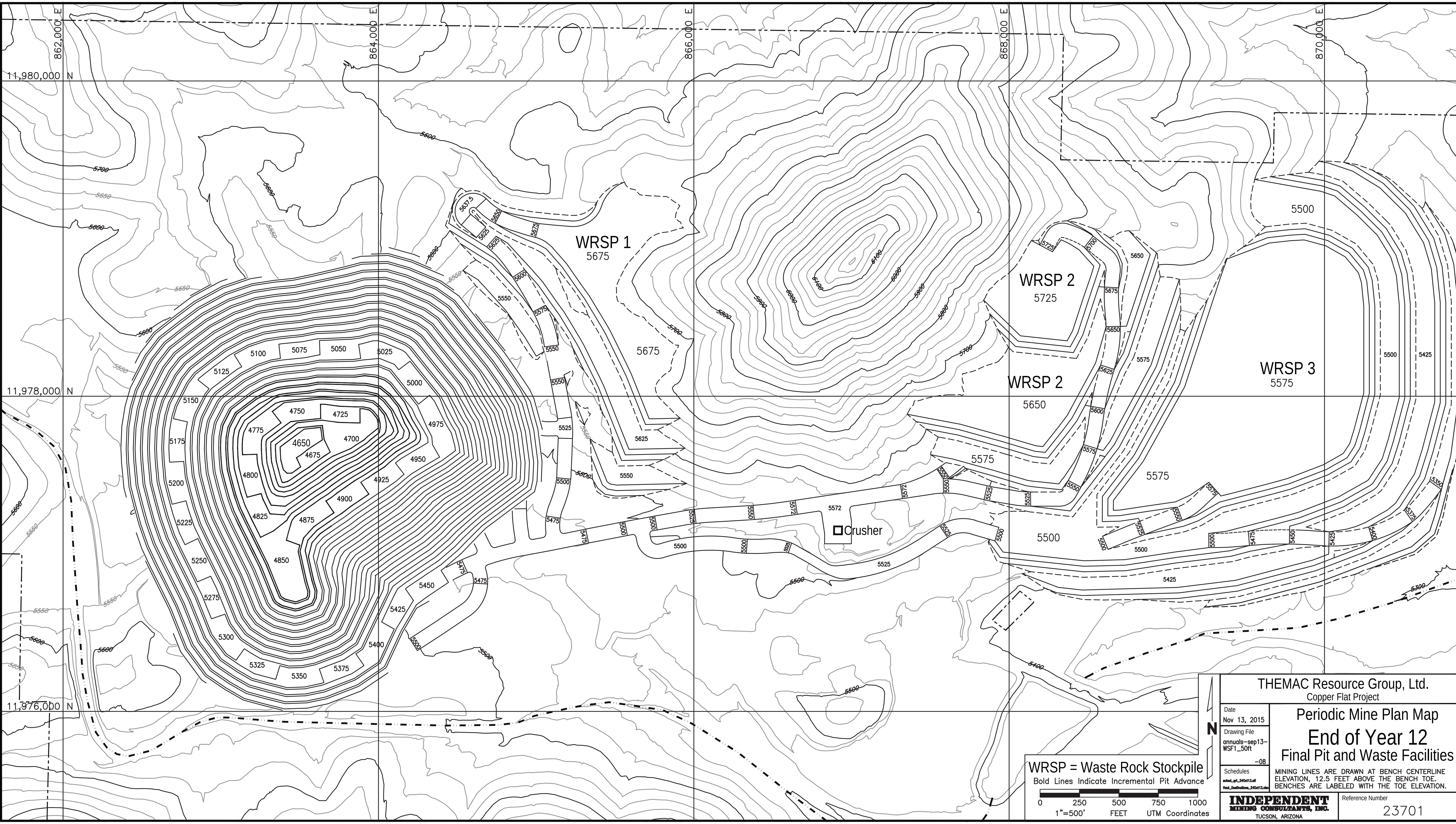
THEMAC Resource Group, Ltd.
Copper Flat Project
Periodic Mine Plan Map
End of Year 12
Final Pit and Waste Facilities
Date Nov 13, 2015
Drawing File annuals-sep13-WSF1_50ft -08
Schedules
MINING LINES ARE DRAWN AT BENCH CENTERLINE ELEVATION, 12.5 FEET ABOVE THE BENCH TOE. BENCHES ARE LABELED WITH THE TOE ELEVATION.
INDEPENDENT MINING CONSULTANTS, INC. TUCSON, ARIZONA
Reference Number 23701
WRSP = Waste Rock Stockpile
Bold Lines Indicate Incremental Pit Advance
0 250 500 750 1000
1"=500' FEET UTM Coordinates
N
WRSP 1
5675
WRSP 2
5725
WRSP 2
5650
WRSP 3
5575
Crusher
862,000 E
864,000 E
866,000 E
868,000 E
870,000 E
11,980,000 N
11,978,000 N
11,976,000 N

FIGURE 2-11

approximately 75 ft. high and be placed at angle of repose (35.54 degrees) with benches sufficiently wide enough between lifts to maintain the 3 to 1 overall angle for the stockpile. Interceptor trenches will be constructed above each waste rock stockpile to limit storm water run-on. Surface water runoff collection trenches will be constructed to collect and route runoff from the proposed stockpiles to storm water impoundments. The collection trenches will be constructed into the andesite bedrock to prevent water from entering the alluvial surface material down-gradient of the WRSP and in a manner to maximize positive flow while minimizing the potential for ponding and erosion.

In addition to the proposed WRSPs, there are also four existing waste rock stockpiles (EWRSP) on-site generated by the previous Quintana mining activities. These EWRSPs, identified in Figure 2-1, represent an additional 84 acres of disturbance. EWRSP-1 and EWRSP-2B are located in the open pit surface drainage area. EWRSP-2A is located largely coincident with the location of proposed WRSP-1. EWRSP-3 is located in the plant process area next to the primary crusher. EWSRP-4 is also located in the plant process area and will be utilized during operations as a storage area.

2.1.4 Ore Processing Facility

The ore will be processed through a conventional sulfide flotation concentrator, using standard crushing, grinding and flotation technologies. It will be trucked from the open pit to the plant area, crushed and temporarily stored at a stockpile before being processed through a copper sulfide flotation mill, using a flowsheet very similar the Quintana operation (see Figure 2-2). The mill will process ore at an average throughput rate of 27,890 tons per day over the life of the operation. Milling will also include a molybdenum processing circuit and a gravity gold recovery circuit. The processing facility will be located on approximately 128 acres, including the crushed ore stockpile, concentrator, laydown yard and fuel station, process water reservoir and the administration, warehouse, and other facilities. A detailed discussion of the concentration plant process is provided later herein.

The copper concentrate will be shipped in bulk form by truck to an off-site smelter or rail loadout facility. Molybdenum concentrate will be filtered, dried, packaged and shipped by truck to purchasers for further refining. Coarse gold concentrate recovered from the gravity gold circuit will be shipped to a refinery for further processing.

2.1.5 Tailings Storage Facility (TSF)

NMCC will construct a new tailings storage facility (TSF) which will include a lined tailings impoundment with an associated underdrain collection system and underdrain collection pond for the impoundment and the dam. The tailings impoundment and dam will encompass approximately 604 acres of the site, including the footprint of the tailings dam and impoundment, the cyclone plant and surge tank and the surge pond, associated pipeline trenches and a future evaporation pond constructed after the end of life of the project to provide evaporation of drain-down water from the TSF long-term.

Whole tailings will be transported from the processing facility to the TSF cyclone plant via pipeline where the coarse tailings fraction, i.e., the sand, will be separated from the fines fraction. The sand fraction will be utilized to construct the tailings embankment dam in phases during operations. The fines fraction will be disposed of in the TSF impoundment behind the embankment dam. The TSF impoundment will be equipped with a water reclaim or recycle system to maximize water reuse. A water reclaim barge will be installed within the impoundment to recycle water from the impoundment back to the process facility.

The TSF includes an underdrain collection system constructed at the bottom of the TSF impoundment above the liner as well as a dam embankment underdrain blanket constructed under the dam. These features will collect free water that drains from the impoundment and the dam into an underdrain collection pond and route it back to the process facility for re-use. The dam blanket drain will provide the mechanism that will drain water within the dam out of the structure and allow the dam to become consolidated and stable as it is continually constructed during operations as the sand fraction of tailings is emplaced on the dam. The tailings impoundment underdrain system will allow free water in the impoundment to be drained out of the impoundment from underneath the impoundment to the underdrain collection pond and also be recycled to the processing facility. The TSF underdrain collection pond will also serve to capture surface water runoff routed from the downstream face of the tailings dam via runoff control ditches to the pond.

The tailings delivery from the process plant will have an associated surge pond that will be part of the cyclone plant located at the TSF. The purpose of the surge pond will be to capture and temporarily retain tailings materials in the event of a temporary upset in the cyclone plant or the process facility.

Appendix A, Feasibility Level Design, 30,000 TPD Tailings Storage Facility and Tailings Distribution and Water Reclaim Systems, Copper Flat Project, Sierra County, New Mexico, November, 2015, prepared by Golder Associates Inc. (Golder), provides the technical design detail for the TSF. This document is also an appendix to NMCC's Discharge Permit application.

2.1.6 Cover Material Stockpiles

In addition to the facilities described above, three cover material stockpiles, identified as growth media stockpiles (GMSP) in various documents that will be developed from soils material that will be salvaged from the WRSP and TSF construction footprints. The location of these GMSPs is shown in Figure 2-2. These stockpiles will total approximately 75 acres in size and will be utilized as cover material for the various disturbed areas of the mine site at closure and reclamation. Sections 2.2.10 and 4.5 provide a discussion on the use of the terms cover materials, topsoil, topdressing and growth media materials. Section 3.0 provides the details of the use of cover material in NMCC's Reclamation and Closure Plan.

2.1.7 Off-Site Ancillary Facilities

The Copper Flat Project also includes several off-site facilities that are integral to the project, including an electrical substation located on land owned by the State of New Mexico, nine separate 5-acre mill-site claim sites, and an approximate 8-mile long fresh water pipeline. The mill sites are associated with the well field and utilized as support facilities for the pipeline. Figure 2-12 identifies the location of these ancillary facilities relative to the mine.

2.1.8 Closure and Reclamation

NMCC has prepared a Reclamation and Closure Plan as described in Section 3.0 and Appendix E. Section 3.0 provides a description of NMCC's plans for reclamation, including a detailed description of how the disturbed area will be reclaimed to meet the requirements of Section 69-36-7H of the Mining Act (see 19.10.6.602.D.(15)(g) NMAC of the Mining Act regulations). The objective of the Reclamation and Closure Plan is to reclaim and close the facility in a manner protective of ground water in conformance with the NM Copper Rules, meet the reclamation requirements of the New Mexico Mining Act, and return the mine area to conditions similar to those present before NMCC's reestablishment of the mine (BLM DEIS 2015, p. 2-34). The Copper Flat facility will be reclaimed to restore the land to its current use. The Mining Operation Plan and the Reclamation Plan has been designed to use the most appropriate technology (MAT) and best management practices (BMPs) to assure protection of human health and safety, the and the environment.

Section 4.0 provides the description of how the Reclamation and Closure Plan will meet the performance standards required in 19.10.6.603 NMAC. Appendix E presents the detailed design of the Reclamation and Closure Plan. Sections 3.0, 4.0 and Appendix E, together, also provide the information required by Section 20.6.7.11.T of the NMED Copper Rules.

2.2 Maps and Plans for the Mine Facility – 19.10.6.602.D.(15)(c)

This Section provides the maps and plans and other details, including the location, size, and capacities for each unit of the Copper Flat Project facilities described below. Additional details are provided in the various appended documents that contain design documentation and analyses that support the design.

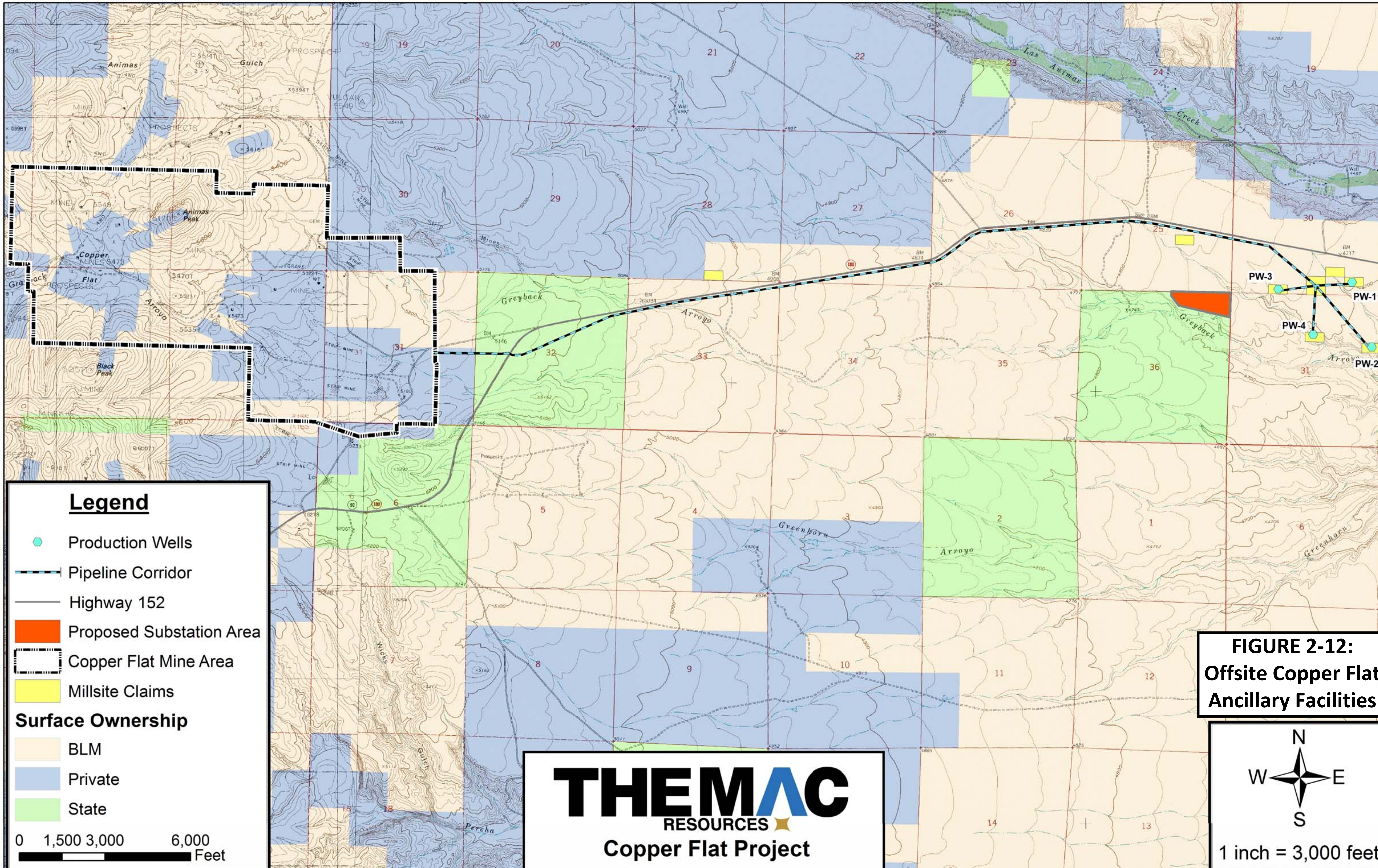

FIGURE 2-12: Offsite Copper Flat Ancillary Facilities

2.2.1 Leach pads, heaps, ore dumps and stockpiles-19.10.6.602.D.(15)(c)(i)

The Copper Flat Project does not propose to construct and operate any leach pads or heaps. This section discusses the coarse ore stockpile located near the primary crusher in the plant process area as shown on Figure 2-2.

Figure 2-13 is a schematic diagram of the processing plant that shows that ore will be hauled from open pit in trucks and fed directly to the primary crusher for the first stage of crushing to produce a coarse ore stockpile (called the crushed ore stockpile in Figure 2-2). The crusher will size the run-of-mine rock to a nominal 8 inches in diameter or less. A small, temporary run-of-mine ore stockpile may be located adjacent to the crusher only when ore trucked from the open pit cannot be fed directly into the primary crusher; for example, when the crusher is temporarily out of service. Typical operating procedure will be to feed ore directly into the crusher from the open pit. Material contained in the temporary run of mine stockpile by the crusher will be fed into the crusher when direct feed from the open pit is not available.

The crushed rock will be fed by an apron feeder onto the stockpile feed belt conveyor for transport to the coarse ore stockpile where it will be temporarily stored prior to being fed into to the grinding mill. The belt conveyor will include a stacker for placing the coarse ore into the stockpile as seen on Figure 2-13. The coarse ore stockpile will have a design capacity of approximately 75,000 tons.

Ore will be drawn from the coarse ore stockpile and transported by belt conveyor passing through a reclaim tunnel located beneath the stockpile to feed the SAG mill in the grinding circuit. The conveyor system will be equipped with two variable speed apron feeders that will feed the reclaim conveyor. Ore handled through this part of the process will be relatively dry. Water associated with this part of the process will include:

- Moisture associated with the ore;
- Water spray used to control dust within the primary crusher pocket and at the stockpile feed stacker; and
- Water used for housekeeping purposes.

The primary crusher and the coarse ore reclaim equipment will be located below ground level in reinforced concrete structures. These concrete structures are existing structures from the Quintana operation and have concrete sumps built into the structures to contain excess water. Water collected in these sumps will be reused within the ore processing circuit via a pumping and recycling system that will be installed during the construction phase of the project. Water used for housekeeping purposes will be confined to use within the concrete structures where it will be contained and recycled via the sump collection and recycle system.

REFERENCES		REFERENCES		REVISIONS						REVISIONS								
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	SCALE: NONE		DATE
																DESIGNED BY	EA	JUL 11
																DRAWN BY	FC	JUL 11
																CHECKED BY		
																PROJECT MGR		
																CLIENT APPR.		

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COPPER FLAT PROJECT

PROCESSING PLANT OVERALL FLOW SHEET 30,000 TPD CONVENTIONAL TAILINGS

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-13**
REV NO. P6 DATE 18 MAR 13

Water spray used for dust control at the stockpile feed stacker will be exterior to the concrete structures. The sprays will only be used when necessary to control dust and will be controlled to minimize excess moisture. During normal operations, water from these sprays will evaporate once the ore reaches the coarse ore stockpile, although some residual moisture will remain below the surface of the pile. In the event of an upset condition, any excess water from these sprays will be contained in the storm water impoundment that will control runoff from the plant facility area. The entire plant facility area will be contoured to control and capture precipitation falling onto the plant area in a lined impoundment. The captured water will be recycled for use in the process.

2.2.2 Impoundments and ponds – 19.10.6.602.D.(15)(c)(ii) & (iii)

NMCC will construct several impoundments and ponds at Copper Flat, including:

- Three impacted storm water impoundments to manage runoff;
- A process water reservoir to store and condition recycle water and process makeup water;
- A surge pond to manage upset conditions;
- A tailings impoundment to store tailings and produce water for recycle;
- An underdrain collection pond to capture free tailings liquids from the impoundment and the dam; and
- An evaporation pond (coincident with the underdrain collection pond) to capture and evaporate residual water that the tailings impoundment may continue to produce long-term after site closure.

Details of the design of the impacted storm water impoundments and the process water reservoir are provided in Appendix B, Impoundment Design Report, Copper Flat Project, November, 2015, prepared by M3 Engineering & Technology Corporation (M3). Details of the design of the underdrain collection pond and surge pond are provided in Appendix A. This Subsection discusses the impacted storm water impoundments and the process water reservoir. The tailings impoundment and associated underdrain collection pond and the surge pond are discussed in detail in Subsection 2.2.6, below. The evaporation pond is discussed in Section 3.0 and Appendix E.

IMPACTED STORM WATER IMPOUNDMENTS AND PROCESS WATER RESERVOIR

NMCC proposes to construct a process water reservoir and three (3) impacted storm water impoundments shown on Figure 2-2. The nomenclature of “impacted storm water impoundment” is derived from the NMED Copper Rules. However, the purpose of these impoundments can and will provide water management capabilities beyond just storm water, as discussed herein. The process water reservoir, located in the center of the plant process area, will hold water from several sources including reclaimed water from the TSF, captured storm water, and fresh make-up water from the off-site well field.

Two of the storm water impoundments will capture surface water runoff from the waste rock stockpiles and drainage from under the waste rock stockpile areas. The third will capture surface water runoff from the process plant area. Appendix B provides the technical design details for the impoundments and the process water reservoir. Appendix B is also an Appendix to NMCC's Discharge Permit application.

Figure 2-14 shows the various watershed areas that NMCC will develop on-site by grading and contouring the areas to manage and capture surface water runoff. The developed watershed areas shown are as follows:

- Watershed area A (WS A) wherein the process facilities and ancillary plant areas, including the ore stockpile, will be located. EWRSP-3, as shown in Figure 2-14, also called the low-grade ore stockpile in earlier documents, is also located within WS A;
- Watershed area B (WS B) is a portion of the open pit surface drainage area (OPSDA) wherein the proposed new Waste Rock Stockpile no. 1 (WRSP-1) will be located. EWRSP-2A, as shown in Figure 2-14, also called the north waste rock disposal facility in earlier documents is located at the northern edge of WS B;
- Watershed area C (WS C), wherein the proposed new Waste Rock Stockpiles no. 2 and 3 (WRSP-2 and WRSP-3) will be located;
- Watershed area D (WS D) is a portion of the open pit surface drainage area wherein the open pit is located. Existing waste rock stockpiles EWRSP-1, also called the west waste rock disposal facility in earlier documents, EWRSP-2B, also called the north waste rock stockpile in earlier documents, and EWRSP-4, also called the south waste rock stockpile in earlier documents, shown in Figure 2- 14, are located within WS D; and
- Watershed E (WS E) represents the footprint of the process water reservoir, the impoundment that holds process water prior to it being introduced into the process circuit. WS E is depicted as a watershed to indicate that the reservoir will not collect any storm water runoff from the plant site. Only precipitation that falls directly on the reservoir will be collected therein.

Storm water impoundments will be constructed within watershed areas A, B, and C at locations shown in Figure 2-14 to manage and capture storm water runoff from each area and water that may flow from the interface between the bottom of the WRSPs and the andesite bedrock. Impacted storm water impoundment A is designed to capture and manage surface water runoff from WS A, i.e., the plant area. Impacted storm water impoundment B is designed to capture

WATERSHED SUMMARY		
WATERSHED ID	AREA (AC)	Q100 (CFS)
WS A	93.16	167.25
WS B	93.04	204.58
WS C	196.39	312.15
WS D	255.59	543.69
WS E	1.80	9.54

LEGEND:

- FLOW ARROW
- WATERSHED BOUNDARY
- RUNOFF CONCENTRATION POINT
- DRAINAGE SWALE

PLAN VIEW
SCALE: 1" = 300'

300 150 0 300 600
SCALE IN FEET
CONTOUR INTERVAL = 5FT
DO NOT SCALE 11x17 DRAWINGS

EWRSP = EXISTING WASTE ROCK STOCKPILE
WRSP = WASTE ROCK STOCKPILE

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

DWG. NO.	TITLE
0000-CI-021	IMPACTED STORMWATER IMPOUNDMENT A PLAN VIEW
0000-CI-023	IMPACTED STORMWATER IMPOUNDMENT B PLAN VIEW
0000-CI-025	PROCESS WATER RESERVOIR PLAN VIEW
0000-CI-027	IMPACTED STORMWATER IMPOUNDMENT D PLAN VIEW

SCALE:	1" = 300'	DATE
DESIGNED BY	SAM	NOV 12
DRAWN BY	SAM	NOV 12
CHECKED BY	TDL	NOV 12
PROJECT MGR	RKZ	NOV 12
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
MINE AREA
DEVELOPED WATERSHED AREAS

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-14**
REV NO. P12
DATE 24 AUG 16

and manage water from WS B which contains WRSP 1. Impacted storm water impoundment C is designed to capture and manage water from WS C which contains WRSP 2 and WRSP-3.

As noted above, developed WS B and D are sub-watersheds of the larger open pit surface drainage area. The entire area naturally drains to the mine pit, with the exception of the EWRSP-4 area, which will be re-contoured during operations to drain to the pit. NMCC has opted to develop these two sub-watersheds separately in order to provide control of the amount of water that will report to the mine pit under normal operating conditions. Surface water runoff from WS D will flow directly to the bottom of the pit as shown in Figure 2-14. As such, no additional impoundment is needed at that location. Water contributed from WS B will be diverted to flow into Impacted Storm water Impoundment B as shown on Figure 2-14.

As described in more detail in Appendix B, Impacted Storm water Impoundment B will be constructed at the lower southwestern corner of developed WS B to capture water from the proposed new WRSP-1 under normal operating conditions. However, should overflow from this impoundment occur as a result of an extraordinary precipitation event, it will flow over the spillway and into the open pit via a culvert, as shown in Figure 2-14 and discussed in Appendix B. This will allow NMCC to control the flow of water into the pit while maximizing the harvesting of storm water for use as process water.

The process water reservoir, i.e., WS E, is designed to hold all of the water recycled from the tailings storage facility, process makeup water and water transferred from the impacted storm water impoundments for introduction into the process circuit. It is designed so that only precipitation that falls directly on the footprint of the reservoir will be captured by the reservoir. Water captured in impoundments A, B and C will be transported to the process water reservoir within 30 days for use as an additional source of make-up process water. Water recycled from the TSF will be continually pumped from the TSF to the process water reservoir.

Liner system design

Appendix B provides the details of the liner design for the impacted storm water impoundments and process water reservoir. The impacted storm water impoundment liner design is consistent with the requirements of the NMED Copper Rules for impoundments that will store impacted water for less than 30 days. It will consist of a compacted liner bedding fill layer, overlain with a 60 mil high density polyethylene (HDPE) geomembrane or equivalent. The liner bedding will be a minimum of six inches of sand or fine soil.

The process water reservoir will be double-lined with a lower 60 mil, or equivalent, HDPE geomembrane and a 60 mil, or equivalent, upper HDPE geomembrane liner. An HDPE geonet will be placed between the liners to serve as the pond leak collection and recovery system

(LCRS) and to minimize pressure on the lower pond liner. This design is in accordance with the requirements of the NMED Copper Rules.

Size and storage capacity

The design storage capacity for each of the impacted storm water impoundments is driven by the size of the watershed, required storm intensity and duration, and freeboard. Table 2-4 provides the storage capacity for each storm water impoundment and the process water reservoir.

TABLE 2-4
Impoundment Storage Capacity

Impoundment	Size (Acres)	Capacity (Gal)
Impacted storm water impoundment A	2.90	7,307,000
Impacted storm water impoundment B	2.69	5,598,000
Impacted storm water impoundment C	4.44	10,514,000
Process Water Reservoir	2.12	5,434,000

Design capacity of the impoundments is based on anticipated normal operating conditions at the site plus prevention of overflow resulting from a 100-year, 24-hour return interval storm event while maintaining two feet of freeboard. The process water reservoir is sized to contain the water that will be pumped from the water reclaim system and the underdrain collection pond at the TSF plus capacity for necessary process makeup water pumped from the freshwater off-site well field or the impacted storm water impoundments.

2.2.3 Diversions - 19.10.6.602.D.(15)(c)(iv)

This Subsection requires that the applicant provide maps and plans indicating location, size and capacities for the mine facility diversions. A diversion is defined in 19.10.1.7.D.(3) as a channel, embankment, ore other manmade structure constructed to divert water from one area to another. Diversions at the Copper Flat facility include the following:

- The Grayback Arroyo diversion and other diversion structures constructed to divert surface water around and away from the site;
- Diversions at the TSF to impoundments and/or ponds; and
- Diversion channels, ditches swales, curbs, contours and other manmade surface water control features constructed to manage and divert surface water off of waste rock stockpiles and the plant site.

Grayback Arroyo Diversion

With regard to the Grayback Arroyo and other diversion structures, NMCC will utilize some existing water diversion structures, as discussed in more detail below, at the Copper Flat

Project. NMCC's consulting engineers, M3, performed a peak discharge and volume analysis of the drainage areas contributing to Grayback Arroyo at the site. The report is included as Appendix D. The purpose of the analysis was to evaluate the existing diversions and water conveyance features existing at the Copper Flat site as to their adequacy in conveying flows from storm events and protecting the site from flooding. The return periods analyzed were the 100-year, 200-year, and 500-year 24 hour storms. The capability of certain existing culverts within Grayback Arroyo to safely pass those storms without overtopping the proposed facility roadway or pipeline corridor was also analyzed. Appendix D provides the information required by the Mining Act regulations and the results of the analysis. Following is a synopsis of the results. This document is also an appendix to NMCC's Discharge Permit application.

Figure 2-15 shows the location of the Copper Flat Project permit area boundary within the Greenhorn Arroyo drainage basin watershed. It shows the Greenhorn Arroyo watershed as it existed prior to any mining. As shown in Figure 2-15, the site is located in the head of the basin. Figure 2-16 provides a closer view of the headwater drainage of the watershed in relation to the mine permit area boundary. Grayback Arroyo and its tributaries naturally begin as the headwaters of the drainage basin and converge at the western side of the site, transecting the mine permit area draining from west to east. The main-stem of Grayback Arroyo enters the western boundary of the site; several small unnamed arroyos, tributary to Grayback Arroyo, enter the site at the northwest and southwest corners of the site. As seen on Figure 2-15, Hunkidori Gulch begins at the eastern edge of the site down-gradient of the operations and drains to the east, away from the site. Greenhorn Arroyo begins off of the southeast corner of the site down-gradient from the operations and also drains east. Hunkidori and Greenhorn Arroyos have no impact upon the Copper Flat facility as they are located down-gradient of the mine. Only Grayback Arroyo and its unnamed arroyos, which enter the site from the west, need be the subject of consideration with respect to surface water run-on and runoff management.

Preproduction site preparation activities conducted by Quintanain the early 1980's included the construction of diversion structures to Grayback Arroyo and unnamed arroyos to divert drainage around the site. These structures are shown in Figure 2-17. Diversion structures were constructed to divert the headwaters of Grayback arroyo and its western tributaries as they entered the western site boundary to the south around the open pit. Another diversion structure, similar in purpose but smaller in size, was constructed at the northwest corner of the site to divert drainage from small tributaries to Grayback Arroyo, diverting them to the north east around Animas Peak away from the site into a sub-watershed that joins Grayback Arroyo east of the of the site boundary.

In addition to the diversion structures, Quintana installed large diameter culverts, as shown on Figure 2-18, where the tailings transport pipeline and the access road cross over Grayback Arroyo. These structures are still in place and will be used to control storm water passing

LEGEND

DRAINAGE BASIN BOUNDARY	
MINE PROPERTY BOUNDARY	
GRAYBACK ARROYO	
FLOWLINE	

SITE PLAN

SCALE: 1" = 2500'

2500 1250 0 2500 5000

SCALE IN FEET
CONTOUR INTERVAL = 50'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	1" = 2500'	DATE
DESIGNED BY	JPN	OCT 15
DRAWN BY	JPN	OCT 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
GREENHORN ARROYO
PRE-MINING WATERSHED BASIN

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-15**
REV NO. P2
DATE 20 NOV 15

LEGEND

- DRAINAGE BASIN BOUNDARY
- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- FLOWLINE

SITE PLAN

SCALE: 1" = 1000'

1000 500 0 1000 2000
SCALE IN FEET
CONTOUR INTERVAL = 20 FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 1000'	DATE
DESIGNED BY JPN	OCT 15
DRAWN BY JPN	OCT 15
CHECKED BY	
PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

GENERAL SITE
COPPER FLAT SITE
EXISTING HYDROLOGY
PRE-QUINTANA MINING

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-16**
REV NO. P1
DATE 20 NOV 15

LEGEND

- DRAINAGE BASIN BOUNDARY
- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- FLOWLINE

SITE PLAN

SCALE: 1" = 1000'

1000 500 0 1000 2000

SCALE IN FEET
CONTOUR INTERVAL = 20 FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 1000'	DATE
DESIGNED BY JPN	OCT 15
DRAWN BY JPN	OCT 15
CHECKED BY	
PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

**GENERAL SITE
COPPER FLAT SITE
EXISTING HYDROLOGY
POST QUINTANA MINING**

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-17**
REV NO. P1
DATE 20 NOV 15

SITE PLAN
SCALE: 1:500

500' 250' 0' 500' 1000'
1" = 500'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THE MAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	1" = 500'	DATE
DESIGNED BY	JPN	OCT 15
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CHECKED BY		
PROJECT MGR	RKZ	
CLIENT APPR.		

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
GRAYBACK ARROYO DIVERSION THROUGH NMCC PROJECT SITE

JOB NO. M3 PN-120085
DWG NO. FIGURE 2-18
REV NO. P1
DATE 20 NOV 15

13996

through the site. Figure 2-18 also shows these structures in relation NMCC's proposed Copper Flat Project facilities. The pre-mine development natural topography and drainage pattern of the site is shown in Figure 2-19. Sixteen (16) sub-basin watersheds naturally contributed to Grayback Arroyo. The upstream drainages merged in the central portion of the current Copper Flat Project area and passed through to the eastern boundary via Grayback Arroyo.

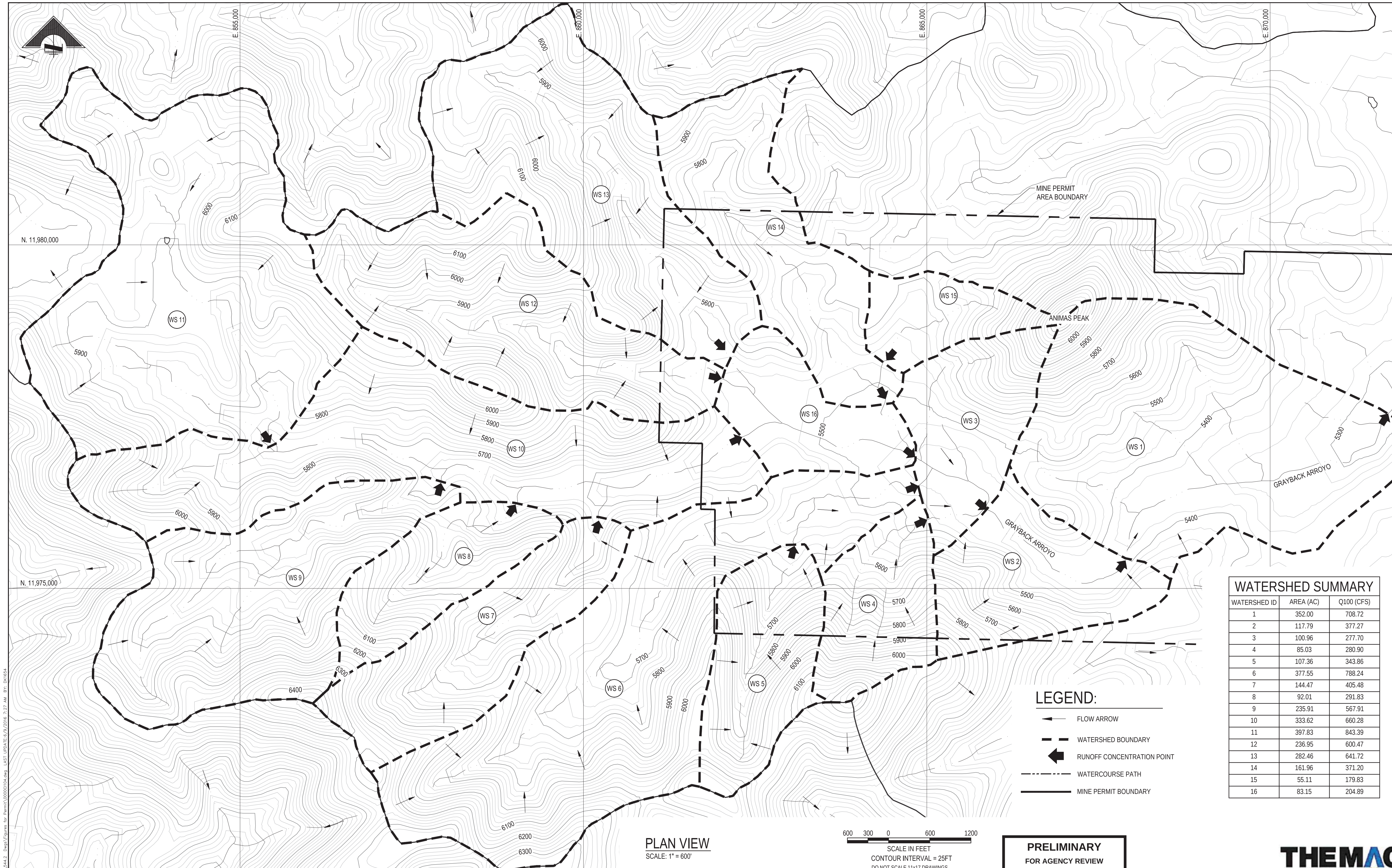
M3's analysis evaluated the diversions and culverts to determine their adequacy in conveying flows from storm events and protecting the site from flooding. Peak discharge and volume analyses for a 100-year, 200-year and 500 year 24-hour storm event was performed for drainage areas contributing to Grayback Arroyo located within the Copper Flat site area. Culvert and channel capacity analysis for the two culvert crossings was conducted for Grayback to determine water surface elevations during the design storm events. Peak flows were analyzed for each sub-basin contributing flow upstream of the site. Figure 2-20 shows the upstream sub-basins in relation to the site.

Diversion of surface drainages away from the mining area was accomplished by Quintana when they developed the site by constructing the diversions described above. Future development of the site by NMCC will result in changes to watersheds shown on Figure 2-19 in the area of the site. Watershed areas no. 15 and 16 will be completely within open pit surface drainage area and will be eliminated as tributaries to Grayback Arroyo. Portions of watersheds 1, 2, 3 and 14 will be incorporated into the site storm water control area of the site and will no longer contribute directly to Grayback Arroyo. These differences can be seen by comparing Figure 2-19 to 2-20.

M3 evaluated the storm flows in the Grayback Arroyo drainage for the 100-year, 200-year, and 500-year 24-hour storm events for the pre-Quintana, i.e., natural conditions in comparison to Post-Quintana NMCC proposed site conditions. The results demonstrate that the existing diversion structures and culverts provide appropriate surface water management of the drainage that is protective of the site.

TSF Diversions

With regard to diversions and other control features at the TSF, Section 6.6, Surface Water Management, of Appendix A, the TSF design report, contains a discussion of the design features of the diversion structures planned to manage surface water runoff at this location. Diversion ditches will be constructed as shown on Figure 2-21, to divert run-on away from the impoundment. The TSF will be built in phases, as shown in Figure 2-21, requiring a series of ditches to be constructed through phase 3 of dam construction to divert run-on to the TSF. When subsequent phases are constructed in the later years of the project, the footprint of the TSF will be such that there will be no run-on of surface water to the TSF as seen on Figure 2-22. The design details for these ditches are contained in Appendix A.



WATERSHED SUMMARY

WATERSHED ID	AREA (AC)	Q100 (CFS)
1	352.00	708.72
2	117.79	377.27
3	100.96	277.70
4	85.03	280.90
5	107.36	343.86
6	377.55	788.24
7	144.47	405.48
8	92.01	291.83
9	235.91	567.91
10	333.62	660.28
11	397.83	843.39
12	236.95	600.47
13	282.46	641.72
14	161.96	371.20
15	55.11	179.83
16	83.15	204.89

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

SCALE:	1" = 600'
DESIGNED BY	AJE — OCT 15
DRAWN BY	AJE — OCT 15
CHECKED BY	
PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
PRE QUINTANA
EXISTING WATERSHED AREAS

JOB NO. M3 PN-120085
DWG NO. **FIGURE 2-19**
REV NO. P2
DATE 09 JUN 16

WATERSHED SUMMARY

WATERSHED ID	AREA (AC)	Q100 (CFS)
1	28.21	117.20
2	106.56	363.66
3	34.99	129.54
4	75.02	259.92
5	124.19	342.49
6	331.22	774.13
7	144.47	411.06
8	92.01	291.83
9	235.91	567.91
10	330.41	663.73
11	397.83	843.39
12	227.42	588.30
13	275.51	649.87
14	79.97	243.90

PLAN VIEW
SCALE: 1" = 600'

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES	
DWG. NO.	TITLE
0000-CI-006	DEVELOPED WATERSHED AREAS

SCALE:	1" = 600'	DATE
DESIGNED BY	AJE	OCT 15
DRAWN BY	AJE	OCT 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

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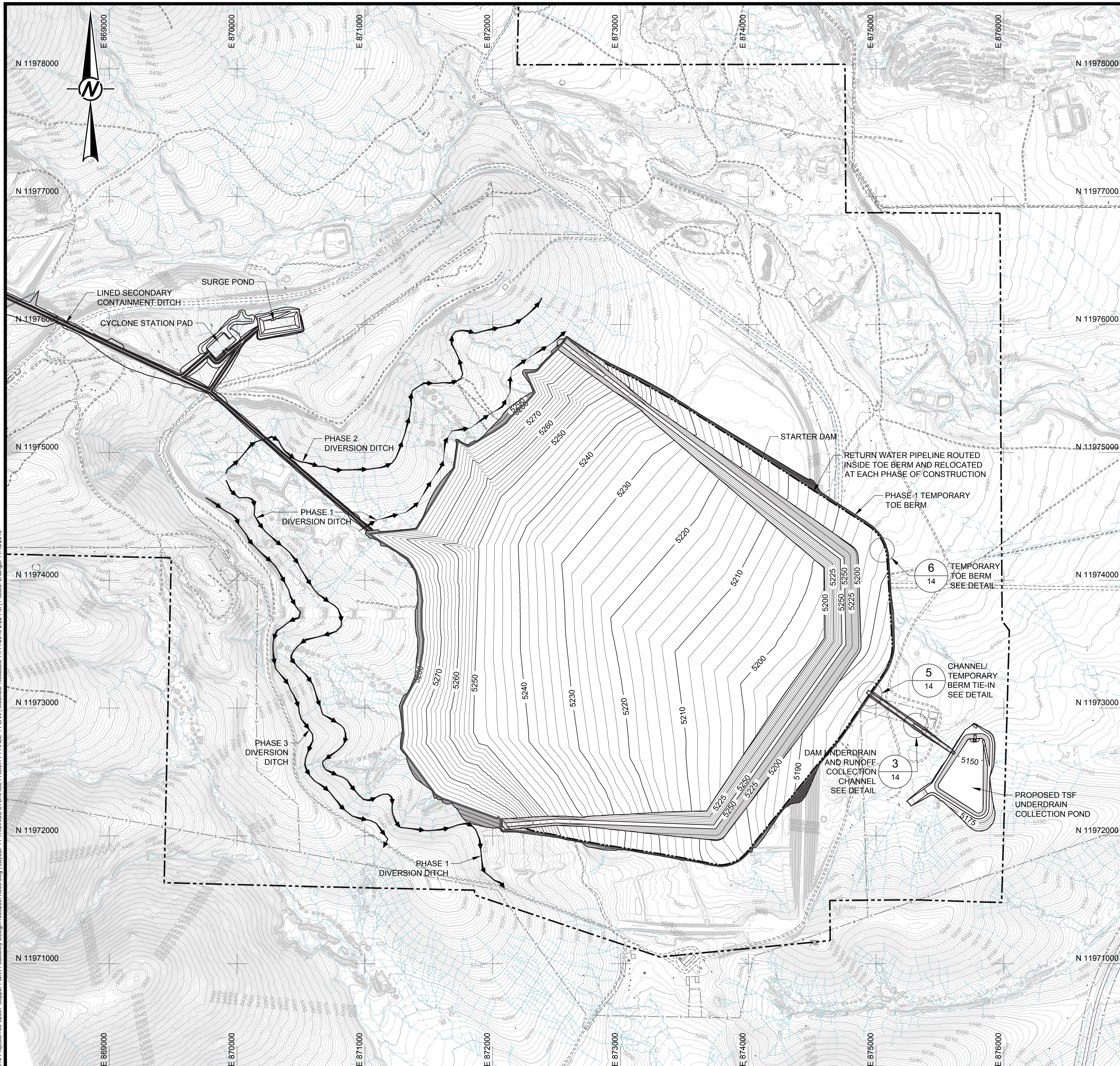
COPPER FLAT PROJECT

JOB NO. M3 PN-120085

GENERAL SITE
CIVIL
POST QUINTANA
EXISTING WATERSHED AREAS

DWG NO. FIGURE 2-20
REV NO. P1
DATE 20 NOV 15

13999



K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K006.dwg | Layout: 11 TAILINGS STORAGE FACILITY PHASE 1 PLAN | Modified: nlocascio 11/11/2015 2:22 PM | Plotted: JRangel 11/13/2015

LEGEND

- 3600 EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 REGRADED CONTOURS (ft -MSL)
- TEMPORARY TOE BERM CENTERLINE
- PHASE 1 PHASE BOUNDARY
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% GRADE INDICATOR
- 1 / 14 DETAIL CALLOUT — DETAIL ID — DRAWING SHEET LOCATION
- A / 13 CROSS-SECTION CALLOUT — SECTION ID — DRAWING SHEET LOCATION

SCALE 0 400 800 1200 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

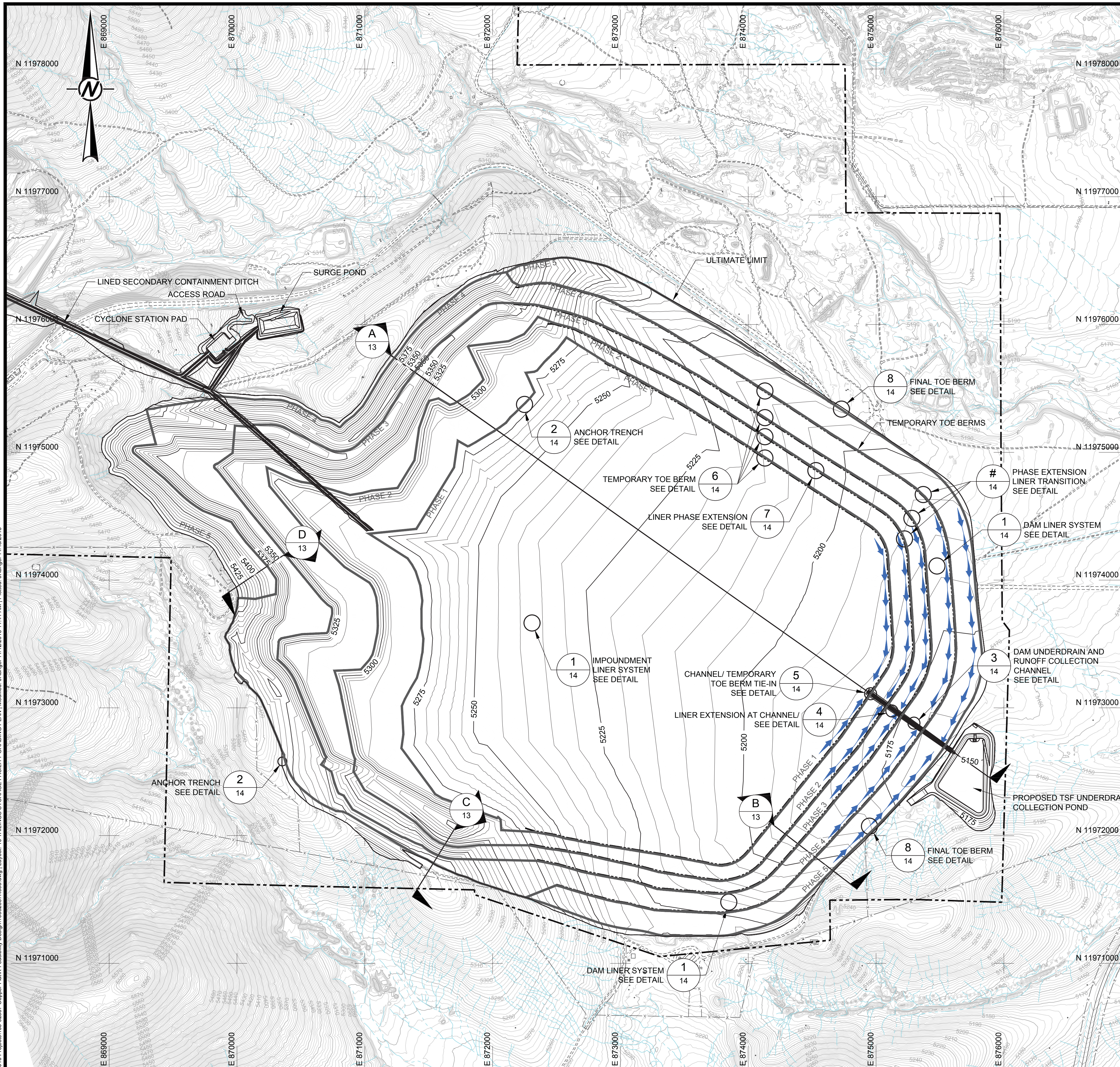
TITLE

TAILINGS STORAGE FACILITY DIVERSION DITCH LOCATIONS

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K006
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	11
REVIEW	DAK	2013-07-17	

FIGURE 2-21



LEGEND

- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 — REGRADED CONTOURS (ft -MSL)
- TEMPORARY TOE BERM CENTERLINE
- PHASE 1 — PHASE BOUNDARY
- GRADE BREAK
- DRAINAGE
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- DETAIL CALLOUT (1 / 14): DETAIL ID, DRAWING SHEET LOCATION
- CROSS-SECTION CALLOUT (A / 13): SECTION ID, DRAWING SHEET LOCATION

SCALE 0 400 800 1200 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES / NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

TAILINGS STORAGE FACILITY DAM LIFT PHASES

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K005
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		10
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K005.dwg | Layout: 10 TAILINGS STORAGE FACILITY GRADING PLAN | Modified: JRangel 11/12/2015 11:41 AM | Plotted: JRangel 11/13/2015

FIGURE 2-22

Other Diversion Structures
With respect to diversion channels, ditches swales, curbs, contours and other manmade surface water control features constructed to manage and divert surface water off of waste rock stockpiles and the plant site, Appendix B contains a discussion of the design features incorporated into the design of the stockpiles and plant site to manage surface water runoff from these areas.

2.2.4 Disposal Systems – 19.10.6.602.D.(15)(c)(v)

Disposal systems contemplated at the Copper Flat facility include:

- Waste Rock Stockpiles,
- Tailings Disposal Facilities,
- Sewage disposal,
- Solid waste disposal, and
- Hazardous and chemical waste disposal.

Information regarding the waste rock stockpile disposal system is contained in Subsection 2.2.9 below. Information regarding the TSF disposal system is contained in Subsection 2.2.6 below.

Sewage Disposal
With respect to sewage disposal, NMCC will not use a septic tank and leach field treatment system for disposal of domestic wastes at the Copper Flat Mine. Disposal of domestic wastes generated will be accomplished by installing a single packaged wastewater treatment plant to serve the majority of employees and visitors at the mine. Individual portable toilet facilities for outlying areas of the operation will be utilized, as needed.

The packaged wastewater treatment plant will receive and treat domestic wastes from buildings located in the administration, concentrator, and mine shop areas. The packaged system will be sized for a load based on the number of mine employees and visitors expected at the mine during a 24-hour period and applying an average water use of 50 gallons per day per person. Breaking down the employee headcount for the mine by the planned rotation schedule indicates 160 employees per day will be using facilities connected to the package plant. An additional 40 persons per day are assumed to account for visitors and contractors. Based on these figures, a 10,000 gallon per day plant has been selected for Copper Flat Mine. The plant will be located on a pre-existing concrete slab near the main gate as shown in Figure 2-2. The plant will generate effluent treated to secondary treatment levels. Treated effluent from the plant will be piped to the tailings storage facility for disposal in the impoundment. System specifications and installation will conform to State and local regulations. Individual portable toilet facilities will be provided for employees working in outlying areas of the operation such as the pit, mine stockpile areas, the primary crusher, and the TSF. The portable toilets will be maintained by a licensed contractor on a regular basis.

Solid Waste Disposal

Solid non-hazardous waste generated at the site will include paper, wood, scrap metal and domestic trash. These materials will be disposed of in a permitted on-site Class III sanitary landfill on private land permitted by the State of New Mexico, or by other methods approved by the State and Sierra County. When recycling services are available, scrap paper, wood, and scrap metal will be sold for recycling to a dealer and transported off-site. Electronics will be held onsite and recycled appropriately as sufficient quantities are generated.

Hazardous and Non-Hazardous Waste Disposal

The Copper Flat facility will be a small generator of hazardous waste as defined in 40 CFR 260.10. Small quantity generators generate more than 100 kilograms, but less than 1,000 kilograms of hazardous waste per month. Management of hazardous waste materials at Copper Flat will comply with all applicable Federal, State and local requirements. All hazardous waste generated at Copper Flat will be managed and transported off-site by a licensed contractor for disposal in accordance with state and federal regulations.

2.2.5 Pits – 19.10.6.602.D.(15)(c)(vi)

NMCC proposes to construct an open pit mine at its Copper Flat project as shown in Figure 2-2 and discussed in detail in Section 2.1.2. This new facility will entail the expansion of an existing open pit previously developed and operated for a short time in 1982 by Quintana. A portion of the ore body at Copper Flat is exposed at the surface and the ore body is proposed to be mined solely by conventional truck and shovel open pit methods. The proposed mining activities will enlarge the open pit over time to a diameter of approximately 2,800 feet. The area of the pit will be expanded to approximately 165 acres. All material mined will be drilled and blasted and loaded into mine haul trucks for removal from the open pit. Ore will be hauled to the primary crusher and then conveyed to the mill as described below. Waste rock will be placed in designated stockpile areas as described in Section 2.2.11.

2.2.6 Tailings Disposal Facilities – 19.10.6.602.D.(15)(c)(vii)

NMCC will construct a tailings storage facility (TSF) which will include, a lined tailings impoundment with an associated underdrain collection system and underdrain collection pond for the impoundment and the dam, and a water reclaim or recycle system to maximize water reuse. The TSF will also include a cyclone plant to separate the tailings coarse and fine fractions and a surge pond to handle potential upset conditions at its Copper Flat Project. Appendix A provides the technical design detail for the TSF. As indicated previously, this document is also part of NMCC's Discharge Permit application.

The footprint of the proposed new TSF and related facilities shown in Figure 2-2 will be approximately 604 acres in size at full capacity. As described in Appendix A, a centerline construction method using tailings sand produced from the underflow of the cyclone plant for construction of the dam will be utilized. A starter dam will be constructed using borrow material to provide initial storage capacity and to provide a location for initial discharge of tailings. The centerline construction method allows construction of a stable, drained tailings dam using coarse tailings sands while reducing the quantity of fill material required for dam construction. The design for the new TSF will comply with the design and dam safety guidelines of the New Mexico Office of the State Engineer (OSE) Dam Safety Bureau.

The tailings impoundment is designed to store the tailings produced through processing 113 million tons of ore over approximately 11 years. Tailings deposition will occur continuously from ore processing at an annual average rate of approximately 27,890 tons per day. The tailings impoundment will be lined with an 80-mil HDPE, or equivalent liner, placed on a minimum 12-inch thick liner bedding fill material. In the initial phases of construction the bedding material will consist of recovered sand from the old Quintana starter dam. Later phases of construction will require the use of selected crushed and screened native materials or selected local soil be utilized. Bedding material will comply with agency approved specifications.

The TSF will have two separate underdrain systems; a dam underdrain underlying the dam to collect draining water from the coarse sands used to construct the dam, and an impoundment underdrain system overlying the impoundment liner to collect draining water that is collected behind the dam. The liner will extend from the impoundment under the dam and through the drainage collection ditch which will form a lined conveyance to the underdrain collection pond. Both underdrain systems will overlie the liner. The detail of their design is contained in Appendix A.

The dam underdrain will provide the mechanism that will drain water within the dam, out of the structure to the underdrain collection pond. This will allow the dam to become consolidated and stable as it is continually constructed during operations as the sand fraction of tailings is emplaced on the dam. The tailings impoundment underdrain system will allow free water in the impoundment to be drained out from underneath the impoundment to the underdrain collection pond. Water collected in the underdrain collection pond will be recycled to the processing facility. The underdrain, together with the impoundment synthetic liner, will provide significant mitigation against the potential for seepage from the impoundment. It will also contribute to the ability to recycle water from the system to the process facility while contributing to the stability of the TSF.

The drained water will be collected in the collection trench and be routed to the underdrain collection pond. Collected water will be pumped back to the process facility for reuse. The TSF collection trench and underdrain collection pond will also serve to capture surface water runoff routed from the downstream face of the tailings dam via runoff control ditches to the pond.

The TSF underdrain collection pond will be double-lined with a 60 mil, or equivalent, HDPE geomembrane liner. An HDPE geonet will be placed between the liners to serve as the LCRS and to minimize pressure on the lower pond liner. The pond is sized to contain 24 hours of underdrain flow at maximum estimated drainage rates from the dam and impoundment underdrains, as well as runoff from the 100-year, 24-hour storm event of 3.73 inches incident on the downstream dam face. The pond capacity is approximately 12.24 million gallons with 2 feet of freeboard. Design details are contained in Appendix A.

The TSF will also be equipped with a water reclaim system to collect water forming on the surface of the tailings impoundment for return to the processing facility. The water reclaim system will consist of a floating barge located within the tailings impoundment containing pumps to remove water from the impoundment, a pipeline to transport the reclaimed water to the process water reservoir.

The TSF will also have an associated surge pond that will be part of the cyclone plant located at the TSF. The purpose of the surge pond is to capture and temporarily retain tailings materials in the event of a temporary upset at the cyclone plant. It will also provide temporary storage in the event that an upset occurs in the tailings circuit. The surge pond liner will consist of a compacted liner bedding fill layer, overlain with a 60 mil HDPE geomembrane or equivalent. The liner bedding will be a minimum of six inches of sand or fine soil. It is designed to retain tailings and other process water that is not diverted directly to the tailings impoundment in the event of temporary upset conditions.

Under normal operating conditions the surge pond will be empty. It is designed to receive tailings materials and process water on a temporary basis. Feasibility level design capacity of the surge pond is 1.6 million gallons, sufficient to handle the volume of upset conditions plus direct precipitation from a 100-year 24 hour precipitation event with at least 2 feet of freeboard. This design capacity conservatively assumes that an upset would occur during a maximum precipitation event and that the cyclone plant is running at maximum design rates, allowing time for operators to react to the situation. In addition, the pond will be equipped with dedicated pumps and water level actuators to automatically begin pumping materials to the TSF. The pumps will be tied into the site emergency power grid. The process control room will be equipped with emergency alarms that notify the operator of an upset condition immediately to allow the operator to make necessary adjustments in the process, as needed.

2.2.7 Mills (Process Facilities) – 19.10.6.602.D.(15)(c)(viii)

The Copper Flat ore processing facilities will be constructed at the site of the original Quintana processing plant site which is located southeast of the existing open pit as shown in Figure 2-2. The plant facilities will be approximately 128 acres in size. Ore processing will consist of a conventional sulfide flotation plant to extract copper, a molybdenum processing circuit, and a gravity gold recovery circuit. No smelting, refining or SX/EW operations will be conducted at the Copper Flat site. The plant will produce copper and molybdenum concentrates as well as a small amount of coarse gold concentrate. Figure 2-13 is a conceptual flow diagram of the process. The ore will be fed to the primary crusher and crushed and ground to a fine particle size and then processed through mineral flotation circuits. Ore processing activities will continue 24 hours per day, seven days per week, 365 days per year. The plant will process approximately 11 million tons per year at an average rate of 27,890 tons per day over the life of the project. An overview of the process area is provided herein, including preliminary isometric drawings, to aid the reader in visualizing how the ore is processed.

The process selected for recovering the copper and molybdenum minerals is considered "conventional." The sulfide ore is crushed and ground to a fine size and processed through mineral flotation circuits. The following items summarize the process operations required to extract copper and molybdenum from the Copper Flat sulfide ore. The major equipment for the mineral processing plant is discussed below.

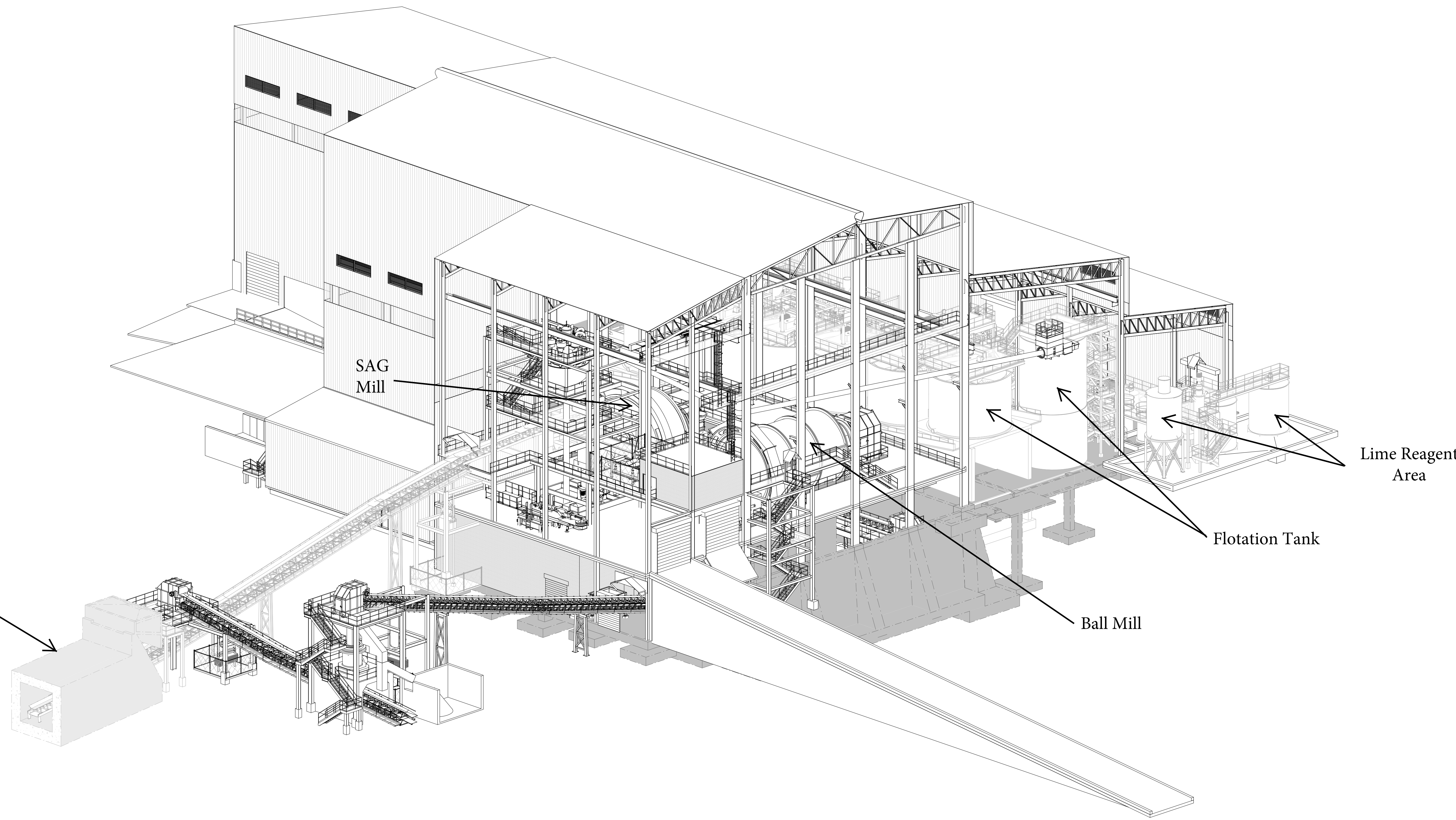
Primary Crushing and Coarse Ore Stockpile

As shown on Figure 2-13, run-of-mine ore will be trucked from the mine to the primary crusher where it will be dumped directly into the crusher dump pocket that feeds a gyratory crusher. A rock breaker will be installed at the dump pocket for use on oversized material. Primary crushed ore will be withdrawn from the crusher discharge pocket by a variable speed, crusher discharge apron feeder. The crusher discharge feeder will feed the coarse ore conveyor that will discharge to coarse ore stockpile. The crushing production rate will be monitored by a belt scale mounted on the conveyor. Tramp iron will be removed using a self-cleaning magnet that will be located at the transfer point between the crusher discharge feeder and the stockpile feed conveyor.

As seen on Figure 2-23, an existing reclaim tunnel is beneath the stockpile location. Ore will be withdrawn from coarse ore reclaim stockpile by variable speed apron feeders. The feeders will discharge to a conveyor belt that feeds the SAG mill in the grinding circuit. Fugitive dust will be controlled with water sprays at the discharge of the stockpile feed conveyor. Dust control in the coarse ore stockpile area will be by dry dust collector systems installed as part of the crushing area.

Crushing and Grinding

Ore from the coarse ore stockpile will be fed through the reclaim tunnel as shown on Figure 2-23 to the SAG mill. Ore will be ground to final product size in a SAG mill and ball mill grinding circuit. The SAG mill will operate in closed circuit with SAG mill discharge screen and pebble



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THEMAC RESOURCES

COPPER FLAT PROJECT

GRINDING GENERAL ARRANGEMENT CONCENTRATOR ISOMETRIC

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FIGURE 2-23

crusher. The SAG mill discharge screen undersize will flow by gravity to the primary cyclone feed sump and the screen oversize will be transported by conveyors to the pebble crusher. Pebble crushing will be conducted in a short-head cone crusher. The SAG mill discharge screen oversize can bypass the pebble crusher via diverter gate ahead of the pebble crusher. The bypassed screen oversize will feed a second diverter gate which will either feed the pebble crusher conveyor that transports crushed pebble to the SAG mill or dump pebbles to the pebble stockpile. Tramp iron, and broken media will be removed using a self-cleaning belt magnet that will be installed over the SAG mill oversize conveyor ahead of the pebble crusher.

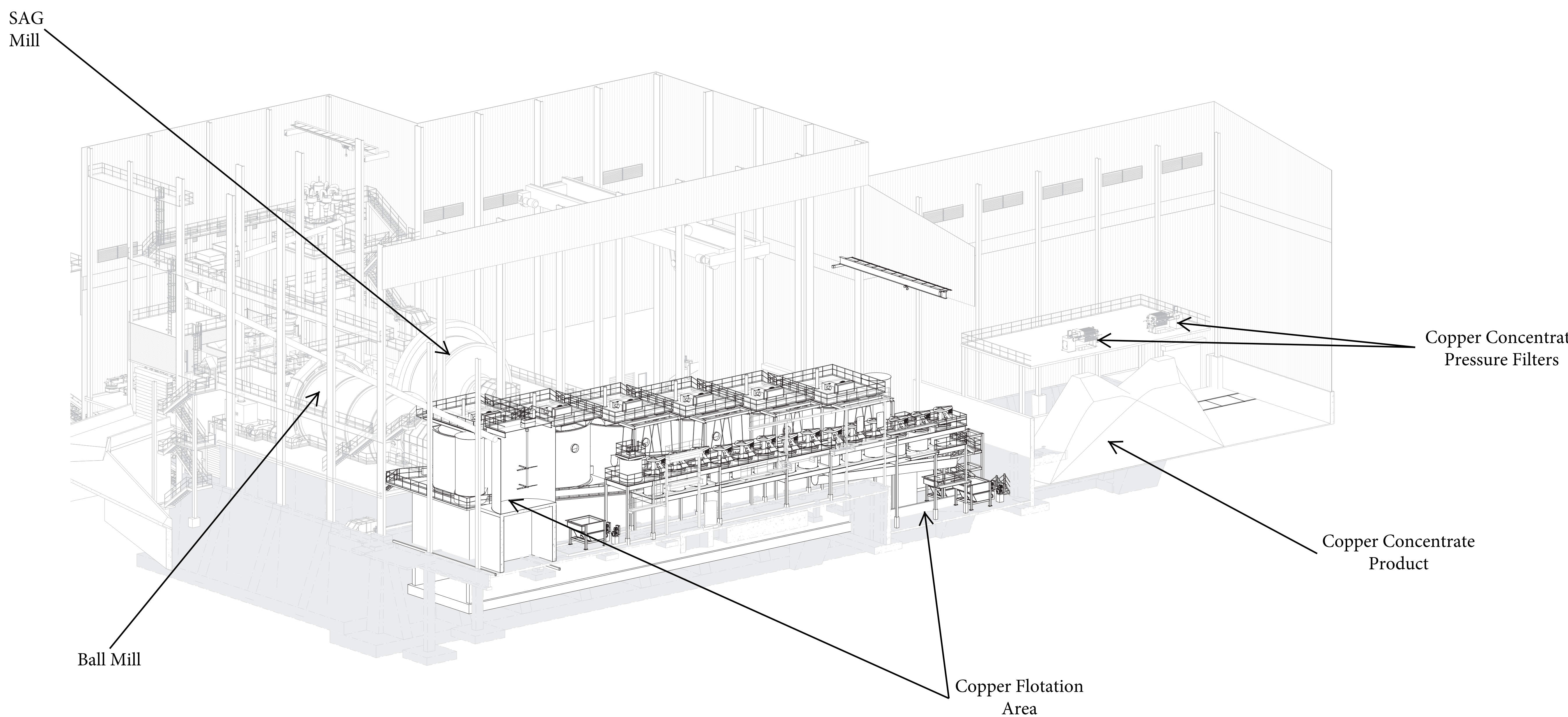
Secondary grinding will be performed in a ball mill which will operate in closed circuit with a cluster of hydrocyclones. The ball mill will discharge into a cyclone feed sump. The contents of the sump will be transferred using a slurry pump to a hydrocyclone cluster. Most of the hydrocyclone underflow slurry will report to the ball mill, but a portion of the underflow will be taken through a Knelson-type gravity concentrator circuit to collect gravity recoverable gold. The gravity separation circuit will consist of two Knelson-type concentrators, each of which will have an upstream scalping screen to remove oversize material. The gravity concentrates will pass through magnetic separators for removal of tramp iron and broken grinding media. The tailings from the gravity concentrators will be pumped back to the cyclone feed sump.

Hydrocyclone overflow (final grinding circuit product) will flow by gravity to the rougher flotation conditioning tank ahead of the rougher flotation cells. The overflow slurry will be sampled and analyzed for metallurgical control prior to flotation.

Grinding balls will be added to SAG mill and ball mill using ball loading systems. Lime slurry will be added to the SAG mill and ball mill feed to adjust the pH of the slurry. If needed, lime slurry may also be added to the primary grinding sumps. In addition, fuel oil will be added to the SAG mill feed to aid in molybdenite collection.

Flotation

Primary grinding hydrocyclone overflow will flow by gravity to the bulk flotation circuit (see Figures 2-23 and 2-24). The bulk flotation circuit will consist of a conditioning tank, one row of rougher flotation cells, a rougher concentrate vertical regrind mill, one row of first cleaner/cleaner-scavenger flotation cells and two second cleaner column flotation cells. The rougher flotation row will consist of six tank type rougher flotation cells with a drop between each cell. Flotation reagents will be added to the hydrocyclone overflow in the rougher flotation conditioning tank where the slurry will be agitated to allow the reagents to react with the ore particles before feeding to the rougher flotation cells. The flotation concentrate from the last four rougher flotation cells will be transported by gravity to the rougher concentrate regrind sump. Tailing from the rougher flotation cell will be sampled and transported to the tailings treatment facility. Rougher flotation tailings will be sampled for metallurgical control.



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COPPER FLAT PROJECT

FLOTATION GENERAL ARRANGEMENT CONCENTRATOR ISOMETRIC

PROJECT NO. M3-PN120085

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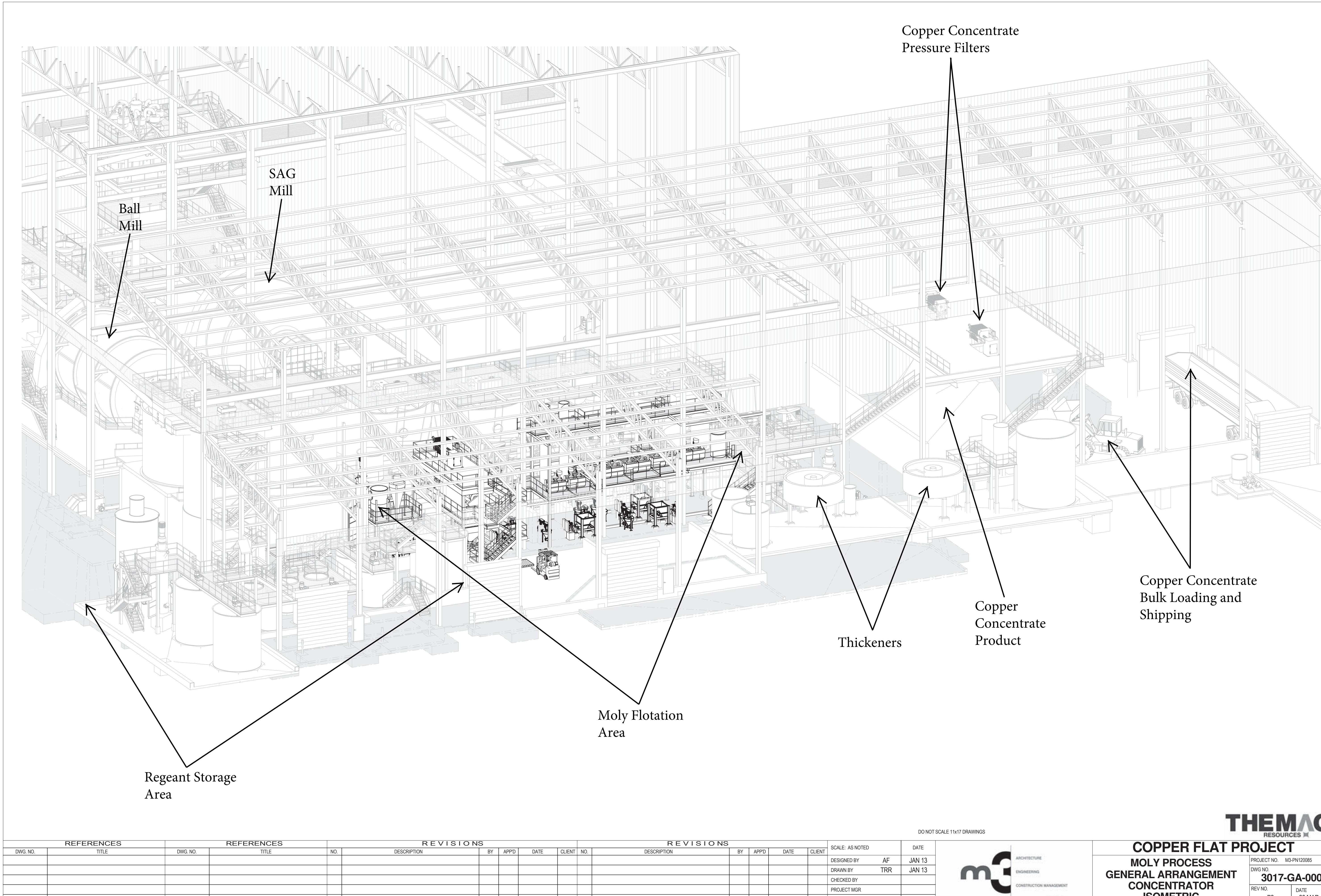
FIGURE 2-24

Concentrate from the last four rougher flotation cells, combined with first cleaner-scavenger concentrate and regrind cyclone underflow, will be pumped from the copper regrind cyclone feed pump box to copper regrind cyclone cluster. Copper regrind cyclone underflow will flow by gravity to the copper regrind mill. The copper regrind mill will operate in closed circuit with hydrocyclone.

Molybdenite Flotation

Figure 2-25 identifies the location of the molybdenum circuit. Regrind cyclone overflow, final regrind circuit product, will flow by gravity to an agitated conditioning tank. Second cleaner tailing and flotation reagents will also be added into this tank. Conditioning tank discharge will flow by gravity to the first cleaner/cleaner-scavenger flotation cells. The first cleaner flotation will consist of eight tank type flotation cells. Concentrate from the first cleaner flotation cells will be pumped to the concentrate distribution box. Tailing from the first cleaner flotation cells will flow by gravity to the first cleaner-scavenger cells. The first cleaner-scavenger flotation circuit will consist of six tank type rougher flotation cells. Concentrate from the cleaner-scavenger cells will be returned to the bulk concentrate regrind circuit sump using a froth pump. Tailing from the cleaner-scavenger cells will be pumped back to the rougher flotation circuit. Cleaner-scavenger tailing may be sent to the final tailing sump. Two discharge ports in the concentrate distribution box will direct the slurry to the feed inlets for the second cleaner column cells operated in parallel. Second cleaner tailing slurry will be pumped from the two columns to the first cleaner conditioning tank from where it will be pumped to the first cleaner flotation cells. The second column cleaner concentrate slurry will be pumped to the copper-moly concentrate thickener. A blower will supply air to bulk second cleaner column cells to the bulk mechanical rougher, first cleaner/cleaner-scavenger and second cleaner bulk flotation tank cells. Flotation reagents will be added at several points in the bulk flotation circuit. Flotation reagents will be added at several points in the bulk flotation circuit.

Bulk second cleaner concentrate will be transported to the copper-moly concentrate thickener. Thickener overflow will be pumped by a horizontal centrifugal pump from an overflow sump to the plant reclaim water storage tank. Copper-moly thickener underflow will be pumped by a slurry pump to the molybdenite flotation circuit. The molybdenum flotation circuit will consist of one row of copper-moly separation (rougher) flotation cells, one row of molybdenite first cleaner flotation cells, a moly regrind circuit, one molybdenite second cleaner flotation cell, and one molybdenite third cleaner flotation cell. The copper-moly separation (rougher) flotation row will consist of eight mechanical rougher flotation cells. Concentrate from the copper-moly separation (rougher) cells will be pumped by froth pump to the molybdenite first cleaner flotation cells. Tailing from the copper-moly separation cells will flow by gravity to the copper concentrate thickener. The molybdenite first cleaner flotation row will consist of four mechanical cells. Concentrate from the molybdenite first cleaner cells will be pumped by froth pump to the feed sump of the molybdenite concentrate regrind circuit. Tailing from the


Copper Concentrate
Pressure Filters
SAG
Mill
Ball
Mill
Copper Concentrate
Bulk Loading and
Shipping
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Concentrate
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Thickeners
Moly Flotation
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FIGURE 2-25

molybdenite first cleaner flotation cells will flow by gravity to the feed launder of the copper concentrate thickener. Concentrate from the moly first cleaner cells will be sampled. Molybdenite concentrate regrinding will be performed in a vertical mill. Molybdenite first cleaner flotation concentrate will feed the vertical mill which will discharge into the moly regrind discharge pump box and pumped to the moly second cleaner column cell.

Slurry will be pumped by the second moly cleaner feed pump to the molybdenite second cleaner flotation column cell. Tailing from the molybdenite second cleaner column cell will be pumped to the moly first cleaner flotation cells. Molybdenite second cleaner concentrate will be pumped to the moly third cleaner column cell. Concentrate from the molybdenite third cleaner column cell will be pumped to the agitated moly filter feed tank that feeds the moly filtering and drying circuit. Tailing from the molybdenite third cleaner column cell will be pumped to the molybdenite regrind cyclone feed sump. A blower will supply air to the second and third moly cleaner column cells.

Flotation reagents will be added at several points in the molybdenite flotation circuit. Molybdenite circuit process streams will be sampled for metallurgical control. Sample points include: concentrate from the copper-moly separation (rougher) flotation row, concentrate from molybdenite first cleaner flotation row, and concentrate from molybdenite third cleaner column cell.

Copper Concentrate Dewatering

Final copper concentrate will be a combination of tailings from copper-moly separation flotation and moly first cleaner flotation cells. Each tailing stream will be sampled before being transported to the copper concentrate thickener feed box from where the combined tailings will be fed to the copper concentrate thickener. Thickener overflow will be pumped from the overflow pump box by a horizontal centrifugal pump to the copper-moly concentrate thickener feed box. Thickener underflow will be pumped by variable speed horizontal centrifugal slurry pump to the copper concentrate stock tank from which it will be pumped to the copper concentrate filters. Horizontal centrifugal pumps will transport copper concentrate slurry from agitated concentrate stock tank to two automatic plate-and-frame pressure filters. The filters will discharge batches of filter cake to a copper concentrate stockpile at the east end of the mill building. Filtrate and filter wash water will be returned to the feed box of the copper-moly concentrate thickener. A front-end loader will fill highway haulage trucks with copper concentrate on a built-in truck scale. A wheel wash system for the concentrate haulage trucks will ensure that concentrate will not be carried out of the load out area.

Molybdenite Concentration

Molybdenite concentrate from the molybdenite third cleaner column cell will flow by gravity to the moly filter feed tank. Concentrate from the agitated tank will be pumped to a disc filter for dewatering. Filter cake will discharge to a conveyor that feeds a Holoflite-type hot oil dryer. The dryer will discharge via a screw conveyor to the molybdenite concentrate storage bins. Filtrate will be pumped to the copper-moly thickener.

Tailings Dewatering

Tailings from the bulk rougher flotation row will flow by gravity to a tailings separation facility where hydrocyclones will be used to separate the coarser sands to build the dam. Underflow sands will be pumped to the crest of the tailings storage facility (TSF). Cyclone overflow fines will be pumped to the TSF and spigotted to the interior of the impoundment. Further settling of the fines produces a supernatant water pond at the back (upstream) of the impoundment that will be reclaimed and pumped to the Reclaim Reservoir. Drainage from the tailings materials will be captured by a synthetic liner and conveyed via a drainage system to a underdrain collection pond. Collected seepage water will be pumped to the Process Water Reservoir.

Reagent Storage and Mixing

Reagents requiring handling, mixing, and distribution system include:

- Potassium Amyl Xanthate (PAX, collector)
- Methyl Isobutyl Carbinol (MIBC, frother)
- Sodium Hydrosulfide (NaHS), copper mineral depressant)
- Flocculant
- Pebble Lime (CaO, pH modifier)
- Fuel oil (molybdenite collector)
- Butyl dithiophosphate
- Antiscalant

Figure 2-26 identifies the general reagent area.

Process Water Handling and Disposal

All water used in the processing of ore will be either be contained within the ore processing circuit, discharged to the TSF, or be in the copper and molybdenum concentrates as moisture content. The plant water system will consist of a lined process water reservoir and a plant process water storage tank. Both will be located near the plant site. Water will be delivered to the reservoir via pipelines. Water reporting to the reservoir includes the following:

- Recycled process water from the TSF;
- Makeup water from the fresh water tank (water from the well field);
- Copper/molybdenum concentrate thickener and copper concentrate thickener; overflows; and
- Storm water from the impacted storm water impoundments.

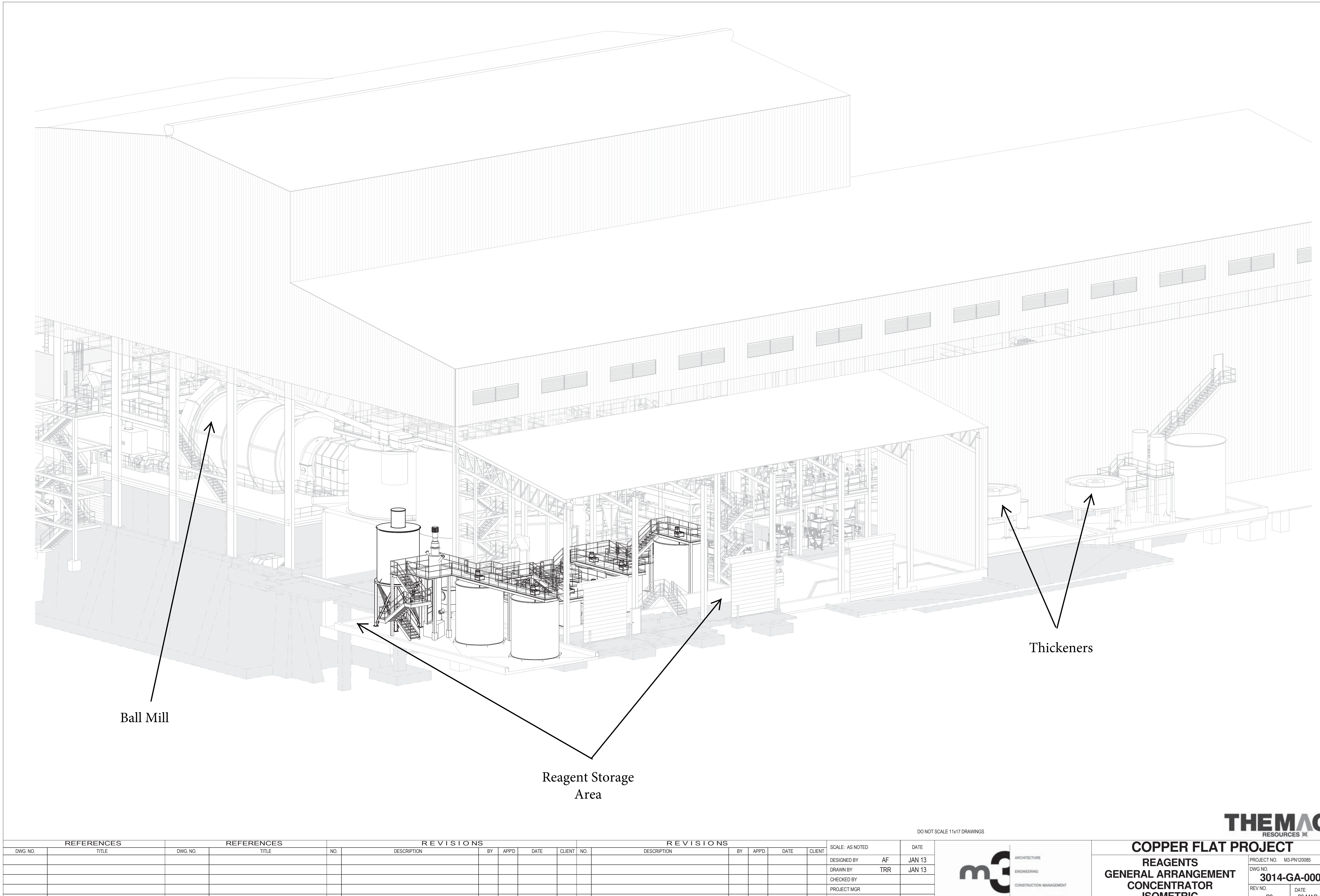
Ball Mill
Reagent Storage Area
Thickeners
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FIGURE 2-26

Water from the process water reservoir will be pumped to the plant process water tank. The tank will deliver water the processing areas for use as needed a via gravity-flow pipeline. Approximately 73 percent of the water required for processing ore will be provided by recycling water back from the TSF and storm water harvesting. Approximately 23 percent of the water used for processing ore will remain entrained within the tailings. The remaining 4 percent will be lost to evaporation or as moisture in the concentrates. The amount of water in the concentrates will be less than 1 percent of the total water used for processing ore.

2.2.8 Water Treatment Facilities - 19.10.602.D.(15)(c)(ix)

The Copper Flat Project is designed to prevent water discharge into the environment. Therefore, no water treatment facilities other than the packaged waste water treatment facility discussed in Section 2.2.4, above, are planned.

2.2.9 Storage Areas - 19.10.6.602.D.(15)(c)(x)

Planned storage areas for equipment, vehicles, chemicals and solutions at Copper Flat will all be located within the area described as the plant facilities as shown in Figure 2-2. All equipment and vehicles will be utilized and maintained within the confines of the mine permit area. There will be areas specified during operations for parking of mine equipment and vehicles when not in use such that any leakage and/or potential spillage from them will be captured within contained and curbed areas of the facility and not released off-site.

As shown in Figure 2-14 and discussed in Section 2.2.2, all surface runoff is managed so that it reports either to the open pit or an impacted storm water impoundment. Appendix C provides a discussion of the various containment areas designed within the process area to contain the chemicals and solutions utilized at the site to ensure that all potential releases are managed and contained. Appendix C was produced, in part, to address the NMED's Copper Rule with respect to describing proposed sumps, tanks, pipelines and truck and equipment wash units, including information for each unit regarding its location purpose construction material, dimensions and capacity. Appendix C also provides the information requirements of 19.10.6.602.D.(15)(c)(x) of the Mining Act Rules. For example, Drawing No. 0000-CI-008 in Appendix C is a scaled map of the location of the various process facility containment areas. Drawing No. 0000-GA-050 is a scaled map of the concentrator area identifying the containment arrangement for all of the process tanks, including the locations of the sumps and tanks. Drawing No. 1010-AR-012 is a scaled map of the truck shop tank farm showing the location of the tanks and sump. Drawing No. 1010-GA-010 is a scaled map of the fuel station showing the location of the tanks and sumps. Drawing No. 1010-GA-001 is a scaled drawing showing the location of the Truck Wash and its sumps or settling tanks.

2.2.10 Topsoil & Topdressing Stockpiles – 19.10.6.602.D.(15)(c)(xi)

Figure 2-2 identifies the location of three topsoil and topdressing stockpiles (also called Growth Media Stockpiles) that will be developed as part of the site development and construction phases of operation. The general term growth media is used rather than a more specific term such as topsoil, because various natural materials would be stockpiled during construction of the mine for use as growth media during reclamation. Primary considerations for selection of growth media are the quantity required to support reclamation and the available water holding capacity of the materials (BLM DEIS November 2015, p. 3-140). The GMSPs will be made up of soils and underlying suitable unconsolidated alluvial and colluvial materials salvaged from areas where the TSF and waste rock stockpiles will be constructed as discussed in the Golder Supplemental Soils Investigation of July 8, 2013, submitted to the MMD and NMED. The report was submitted as part of NMCC's Copper Flat Mine Baseline Data Report Addendum dated July 17, 2013 (NMCC 2013) as Appendix C, Supplemental Soils Investigation.

Golder collected soil samples during a geotechnical investigation conducted in December 2012 and January 2013 as part of their studies conducted in designing the TSF (see Appendix A). The soils investigation provided sufficient information to develop additional insight about the presence of potential cover materials on-site for reclamation and quantify soil resources available. As shown in Figure 2-2, GMSP No. 1 will be located at the southwest corner of the TSF. GMSP No. 2 will be located north of the TSF north of Grayback Arroyo. GMSP No. 3 will be located east of WRSP-3.

Golder's supplemental soils investigation provides the soils data gathered, including sample and field descriptions of soils in and around the footprint of the proposed TSF and WRSP-3. The information has been utilized to develop salvage strategies for the GMSPs in conjunction with construction of the TSF and WRSP-3 and the Reclamation and Closure Plan (see Appendix E). Section 3.0 of Appendix C of Golder's soils investigation discusses the soil resource characterization conducted, including physical and chemical properties, and reclamation suitability. Section 4.0 of the investigation provides estimates of cover material available.

2.2.11 Waste Rock Stockpiles 19.10.6.602.D.(15)(c)(xii)

NMCC will construct three new waste rock stockpiles (WRSP) in conjunction with operation of its Copper Flat Project as discussed previously in Section 2.1.3. NMCC considers that all material excavated from a mine facility that is not ore or clean topsoil is waste rock. Figure 2-2 shows the location of each of the WRSPs relative to the mine and the process area. Figures 2-3 through 2-11 show the design and construction sequencing for the mine pit and the new proposed WRSPs beginning at the preproduction stage through the life of the mine. As indicated in Section 2.1.3, the proposed WRSPs will be built generally to a configuration of 3 horizontal to 1 vertical slope. This design consideration is an example of NMCC's commitment to "operating for closure", or "design for closure", as it facilitates reclamation at the end of the mine life. Each lift within the stockpile will be approximately 75 ft. high and be placed at angle of repose (1.5 horizontal to 1 vertical) with bench setbacks left between lifts sufficiently wide enough to maintain the 3 horizontal to 1 vertical 1 overall angle for the stockpile.

Surface water runoff collection trenches will be constructed, as needed, to collect and route runoff from the proposed stockpiles to the storm water impoundments describe above. These trenches will be constructed into the andesite bedrock to prevent water from entering the alluvial surface material down-gradient of the WRSP and in a manner to maximize positive flow while minimizing the potential for ponding and erosion.

The planned storage or disposal capacity of the proposed new WRSPs over the life of the mine is as follows:

- WRSP-1 – 3.16 million tons
- WRSP-2 – 8.64 million tons
- WRSP-3 – 32.89 million tons

In addition to the proposed new stockpiles, there exist four small waste rock stockpiles at the site (i.e., EWRSP-1, EWRSP-2A and 2B, EWRSP-3, and EWRSP-4) and generated by the previous Quintana operation. Their location is shown on Figure 2-1. EWRSP-1 is located at the western edge of the open pit surface drainage area (OPSDA) and contains approximately 486,000 tons of material. EWRSP-2A and 2B are located at the northwest side of the site within the OPSDA and contain approximately 760,050 tons of material in total. EWRSP-3 is located next to the primary crusher within the plant facility area and contains approximately 333,300 tons of material. Approximately 123,000 tons of this material consists of unprocessed ore remaining on-site at the end of Quintana's operations, 24,000 tons of which is a small amount of unprocessed run-of-mine ore, 44,000 tons of which is crushed ore contained in the coarse ore stockpile area, and 55,000 tons of which was removed from the coarse ore stockpile and utilized to backfill the process building foundations. EWRSP-4 is located southeast of the mine pit and contains approximately 1.0 million tons of material. As discussed later herein in the Reclamation and Closure Plan, the EWRSPs will be reclaimed either during operations as part of NMCC's contemporaneous reclamation or at the end of the life of mine at closure.

2.2.12 Other Facilities and Structures – 19.10.6.602.D.(15)(c)(xiii)

In addition to the Copper Flat facilities described above within the permit area boundary, there are several other ancillary facilities and structures, located off-site, existing and proposed, that will contribute to the project. These facilities are located within nine mill site claims held by NMCC east of the Copper Flat site as seen on Figure 2-12. These mill site claims are on federal land managed by the Bureau of Land Management (BLM). Seven mill site claims are clustered together in the southern half of Section 30, T5S, R5W and the northern half of Section 31, T5S, R5W, south of State Highway 152. An eighth mill site claim is located in the southeast quarter of Section 28, T15S, R6W, north of Highway 152, and the ninth mill site claim is located in the southeast quarter of Section 25, T15S, R6W, just south of the highway. Each mill site is five acres in size. Portions of these sites have been previously developed and disturbed during installation of the water wells, pipeline and access roads installed by Quintana in the late 1970's or early 1980's to provide water for their operations at Copper Flat. NMCC will operate these wells to provide water for the process facilities. The mill sites will also be utilized for other water-related infrastructure uses such as staging and storage areas for booster tanks, pumps and electrical equipment, maintenance, and monitoring. Access to the mill sites will be along existing unpaved roads. The land is also grazed by cattle.

In addition to the mill site claims controlled by NMCC, Figure 2-12 also shows the location of the proposed substation site in the northeast corner of Section 36, T15S, R6W, land owned by the State of New Mexico and managed by the New Mexico State Land Office (SLO). This 30 acre area is the proposed location of a proposed 10 acre power substation that will be installed and tied into an existing high voltage power line in order to provide the power needed to operate the mine. Access to the substation will be along an existing unpaved road.

2.3 Wildlife Impacts Contingency Plan – 19.10.6.602.D.(15)(d)

Impacts to wildlife from operation of the Copper Flat Project are not expected to be significant (BLM DEIS Nov. 2015, p. 2-95). At the completion of mining activities, the site will be restored to conditions and standards that meet approved post-mining land uses. These uses will include native plant communities similar to surrounding undisturbed areas for wildlife habitat, and grazing land potentially suitable for livestock. Once reclamation is successfully completed, wildlife populations would be expected to return to existing (i.e., pre-mining operation) levels (BLM DEIS Nov. 2015, p. 3-137 and 138).

The Mining Act regulations require that a contingency plan be developed for mitigating impacts to wildlife when there has been an emergency or accidental discharge of a toxic substance that may impact wildlife. It is highly unlikely that there will be any emergency or accidental discharge of toxic substances from the Copper Flat facilities. All process chemicals, diesel fuel, gasoline, hydraulic oils, lubricants, antifreeze and other such liquids will all be stored in such a manner so as to protect them from accidental discharge. All tanks, reagent storage areas and process areas have been designed to provide secondary containment per regulatory requirements. In addition, the processing facility and its related storage areas where toxic substances could be housed is designed such that accidental spills or other upset conditions that may occur will be routed to sumps and/or lined secondary containment ditches that will transport those materials to a surge pond for collection and then pumped either back to the process facility or directly to the TSF. The design of these sumps and ditches is discussed in the various design documents of the appendices.

Borrow areas will be kept free of steep walls and will be sloped and stabilized to allow for safe wildlife entry and exit and prevent erosion. NMCC will construct BLM-approved fencing to prevent livestock from entering the pit, WRSPs, and TSF. Fences of appropriate height will be constructed around water and solution ponds to keep out larger wildlife such as deer and antelope. In areas where a higher level of security or safety is needed, such as the mine substation, chain-link fences suitable for wildlife exclusion will be erected. Gates or cattle guards will be installed along roadways within the proposed mine area as appropriate. NMCC will monitor the fences on a regular basis and repairs will be made, as needed. In the event that livestock manage to enter the proposed mine area via a gate or opening in a fence, the grazing permittee will be contacted immediately. NMCC will assist, as requested, in moving these animals out of the proposed mine area.

The use of avian exclusion devices will be employed, as needed, to prevent deleterious exposure of birds to toxic chemicals or conditions used or created by mining and mineral processing operations.

NMCC's operations Spill Prevention, Control and Countermeasure Plan (SPCC) will provide contingencies to mitigate potential impacts from emergency or accidental releases of petroleum substances, including safeguards and quick clean-up measures to prevent detrimental impacts to humans and wildlife. All other potentially toxic materials will be stored in secured facilities that will exclude wildlife entry.

2.4 Sediment Control – 19.10.6.602.D.(15)(e)

The Copper Flat facility is designed to be a zero discharge facility. As such, sediment control is an important design feature at the site. As described in Appendix D, Grayback Arroyo and its tributaries up-gradient of the site have been diverted entirely around the site. Therefore, the only sedimentation that will be potentially produced will be from surface water runoff from several on-site sources including the mine pit area, the waste rock stockpiles, the process plant facilities and the TSF.

A Storm Water Pollution Prevention Plan (SWPPP) will be developed for construction and maintained during operation. Sediment control will be achieved by the use of BMPs including regrading, seeding and mulching, silt fences, straw bale dams, diversion ditches with energy dissipaters, and rock check dams at appropriate locations during construction and operation. Diversion structures, including existing structures, will divert run-on away from disturbed areas. All sediment control structures will be monitored and maintained on a regular basis. During operations, all runoff from the plant site will be directed into impacted storm water impoundments and other ponds, as discussed below. During reclamation, all ponds will be backfilled, re-contoured and graded, surfaces covered with top dressing, and vegetated.

2.4.1 Open Pit

The open pit surface drainage area is a closed basin that will capture all surface runoff at the bottom of the pit. As such, sediments from this area will be managed entirely within the OPSDA and will not contribute sediments to surface water drainages during operations or upon reclamation. The water collected at the bottom of the pit during operations will all be utilized to control dust within the OPSDA and, to the extent allowed, elsewhere in the operation.

2.4.2 Waste Rock Stockpiles

Sediments produced from the waste rock stockpiles will be managed by constructing surface water trenches as may be necessary during operations to capture, route, and divert runoff into impacted storm water impoundments. Appendix B provides the details of the design of these impoundments and associated trenches, including the criteria for their size, dimension, and capacity.

Runoff from proposed WRSP-1, 2, and 3, as seen on Figures 2-2 and 2-14, will be managed by routing it to Impacted Storm Water Impoundments B and C. Runoff from existing waste rock stockpiles EWRSP-1, EWRSP-2B and EWRSP-4 will be captured in the OPSDA as shown in Figure 2-14. In addition, as discussed in the Reclamation and Closure Plan, EWRSP-1 and EWRSP-2B will be reclaimed during operations, further reducing sediment production. Runoff from the area of EWRSP-2A will be captured in Impacted Storm Water Impoundment B as EWRSP-2A will be incorporated into proposed WRSP-1 during operations. EWRSP-4 will be re-contoured to route runoff into the OPSDA as part of the site preparation process. The area will be utilized as an equipment laydown area during operations. The southern out-slopes of this stockpile will be reclaimed as discussed in the Reclamation and Closure Plan to protect against potential sediments being introduced into Grayback Arroyo from that location. Runoff from EWRSP-3 will be captured in Impacted Storm Water Impoundment A, which will manage runoff from the plant facilities.

2.4.3 Process Plant Facilities

As shown on Figures 2-2 and 2-14, runoff from the process plant facilities will be managed by contouring the plant site footprint to route runoff to Impacted Storm Water Impoundment A. Runoff from all of the facilities located in this area including the primary crusher, crushed ore stockpile, concentrator, fuel station, reagent storage area, administration building, parking lot, EWRSP-3, and all of the associated ancillary areas will be captured in Impacted Storm Water Impoundment A. Runoff from the laydown area containing EWRSP-4 will be routed to the open pit during operations.

An additional impoundment, i.e., the process water reservoir, can also be seen on Figures 2-2 and 2-14. It should be noted that no runoff from the process plant facilities area will be directly captured by this impoundment. However, the process water reservoir is designed such that all runoff water captured in the Impacted Storm Water Impoundments will be transferred to the process water reservoir for use in the process.

2.4.4 Tailings Storage Facility

The location of the TSF is shown on Figure 2-2. Appendix A contains detailed discussion of the design of the TSF. Potential sediment contribution from runoff at the TSF will be from the outer slopes of the dam. Table 6 (page 20) of Appendix A contains the storm water diversion design criteria utilized. The TSF dam will be constructed in phases using the coarse tailings sand from the process as shown in Figure 2-22. Storm water will be diverted around and away from the footprint of the dam as shown in Figure 2-21 via diversion ditches. As such, all precipitation that falls within the footprint of the tailings impoundment from the crest of the dam inward will remain within the impoundment. Precipitation that may fall up-gradient of the impoundment will be diverted around and away from the impoundment. Therefore, the only opportunity for sediment production at the TSF will be from precipitation runoff from the outer slopes of the embankment. As shown on Figure 2-22, a lined runoff collection trench will be constructed at the toe of the dam at each phase of construction to capture surface water runoff from the outer slopes of the dam and route it to the underdrain collection pond located at the southeastern corner of the TSF as seen in the Figure cited above. The purpose of the underdrain collection pond, in addition to capturing and managing storm water runoff from the tailings dam, is to capture water from the dam underdrain and impoundment underdrain collection systems of the TSF. The collected water will be pumped to the process water reservoir discussed above for use in the process.

2.4.5 Sediment Management at Construction & Reclamation

BMPs will be used to limit erosion and reduce sediment in runoff from the Project facilities and disturbed areas during construction, operations, and reclamation. Sections 3.0 of the updated MORP and Section 5.0 of the Reclamation and Closure Plan discuss structural and operational BMPs that will be used to minimize erosion and control sediment. Disturbance will be limited to preserve existing vegetation to the maximum extent possible. Following construction activities, areas such as cut and fill embankments and GMSPs will be seeded as soon as practicable and safe. Revegetation of disturbed areas will reduce the potential for wind and water erosion. Concurrent reclamation will be utilized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures will be inspected periodically and repairs performed as needed. Additional details regarding BMPs will be included in the SWPPP permit required for mine construction and operation.

2.4.6 Non-Point Source Sediment Monitoring

As indicated above, Copper Flat is designed to be a zero discharge facility. As such, there are no non-point discharges that NMCC anticipates will require monitoring. However, NMCC will manage non-point sources to the extent they may occur during construction or reclamation with the use of BMPs including such things as seeding and mulching of disturbed areas, silt fences, straw bale check dams, diversion ditches with energy dissipaters, and rock check dams, as necessary. NMCC has submitted a proposed monitoring plan to the NMED (see Appendix E of the DP Application), pursuant to the requirements of the NMED Copper Rules and its proposed Discharge Plan. This plan has a surface water monitoring component proposed that NMCC will incorporate into this MORP update. Figure 2-27 identifies five (5) surface water quality sampling locations that will be monitored per the plan. NMCC believes this component of the DP monitoring plan will provide the information required by the Mining Act regulations.

The following mitigations address potential non-point source charge management as identified in the BLM DEIS for Copper Flat (BLM DEIS November 2015, p. 3-46):

- Prior to initiation of mine construction or other surface disturbing activities, NMCC will obtain a Multi-Sector General Permit for Storm water Discharges Associated with Industrial Activity and comply with all requirements of that permit.
- Prior to initiation of mine construction or other surface disturbing activities, NMCC will provide final designs for storm water diversion structures and other associated BMPs for review.
- The SWPPP and all associated inspection and maintenance records will be available for inspection upon request.

Because non-point source pollution is regulated by existing laws and regulations and NMCC must comply with those laws, potential effects to water quality from non-point source discharge of sediments are not considered to be significant.

2.5 Post-mining Land Use – 19.10.6.602.D.(15)(f)

The New Mexico Mining Act rules define Post-Mining Land Use (PMLU) as;

> "*a beneficial use or multiple uses which will be established on a permit area after completion of a mining project. The PMLU may involve active management of the land. The use shall be selected by the owner of the land and approved by the Director [of MMD]. The uses, which may be approved as PMLUs, may include agriculture, commercial or ecological uses that would ensure compliance with Federal, State or local laws, regulations and standards and which are feasible." 19.10.1.7. P. (5) NMAC.*

The Copper Flat Project will be developed and operated on a combination of federal land administered by the BLM and private land owned by NMCC. The current land uses of federal lands administered by the BLM in the area of the Copper Flat facility have been identified

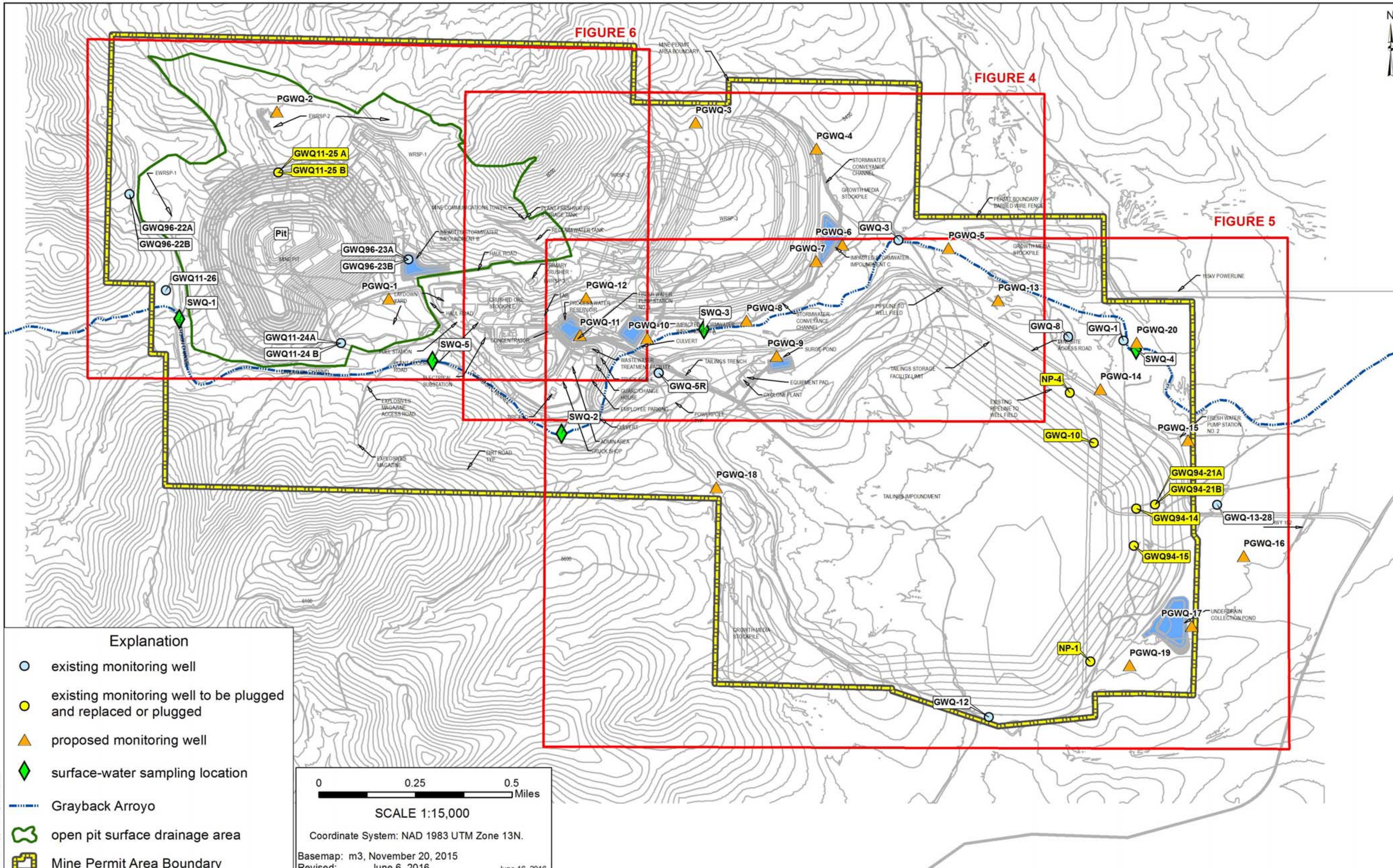


FIGURE 2-27: Proposed surface water quality monitoring locations.

previously in BLM's 1986 White Sands Resource Management Plan (BLM 1986), e.g., grazing, wildlife habitat, recreation and mining.

Land use in the project area will not change from pre-mining approved purposes and the project area will continue to support these approved uses. As described in Appendix E, reclamation and closure of the disturbed area will result in post-mining land uses at Copper Flat that will be sustainable and in keeping with uses currently approved and in use. Mining, grazing, recreation and wildlife habitat are the designations consistent with the surrounding land uses of the Copper Flat site and are appropriate for the site upon reclamation. The Reclamation and Closure Plan is designed to re-establish grazing in the area and allow for long-term use of the reclaimed areas by wildlife known to historically use the area without affecting the potential for other uses such as mining and recreation.

At completion of mining activities, the site will be reclaimed to establish a native plant community similar to the surrounding area. NMCC's reclamation of the site will establish an enhanced native plant community in the area as much of the surrounding area not disturbed by the Copper Flat Project has been significantly disturbed by other historic activities. NMCC's reclamation will result in the development of an early-stage grass/shrub community that will provide a locally-important increase in plant community diversity. Establishment of native vegetation on reclaimed areas at Copper Flat will result in increased erosion protection and direct habitat improvement relative to current conditions.

While the aerial extent of the mine pit will be increased from its current size and, therefore, physically result in permanent loss of some grazing area and wildlife habitat, the vegetation enhancement resulting from reclamation of currently disturbed areas will greatly increase grazing potential and wildlife habitat. As such, there is expected to be a net gain for the land use of the area once reclaimed. In addition, the pit walls created by mining and the pit lake that will form over time upon mine closure will provide enhanced avian wildlife habitat and a water source for transient wildlife. The pit water is known to be devoid of aquatic life and would not be expected to be a future source for aquatic habitat and in any case remain closed to the public as it will remain private land after mine closure.

With respect to the need to obtain approval from the landowner(s) of a post-mining land use, NMCC believes that no such approval is required in this case. The only two landowners of concern at Copper Flat are the federal government and the company. The company is committed to a reclamation and closure plan that re-establishes grazing and wildlife habitat land use of the site at closure. The BLM has approved land uses in its Resource Management Plan for the area. Approval of the Mine Operations Plan required by the BLM for NMCC's mining activities will constitute the approval by the BLM of NMCC's Reclamation and Closure Plan and its goal to return the land to its pre-mining use.

3.0 PROPOSED RECLAMATION PLAN – 19.10.6.602.D.(15)(g)

Appendix E, Mine Reclamation and Closure Plan, Copper Flat Mine, October 2016, prepared by Golder, provides the detailed description of how the disturbed area will be reclaimed to meet the requirements of 69-36-7(H)4 and the performance and reclamation standards and requirements of the Mining Act regulations. This Section of the MORP update is organized to provide the information requested in Sections 19.10.602.D.(15)(h) through(k) of the New Mexico Mining Act regulations and how the Reclamation and Closure Plan will meet the reclamation standards and requirements of 19.10.6.603 NMAC. The Reclamation and Closure Plan and associated design criteria conform to the reclamation requirements described 19.10.6.602.D.(15) NMAC and 19.10.6.603 NMAC, the closure requirements in the Copper Mine Rules (*Subsection A of 20.6.7.18 NMAC, 20.6.7.33 NMAC, 20.6.7.34 NMAC and 20.6.7.35 NMAC*) and applicable mine reclamation regulations set forth by the Bureau of Land Management (BLM) (3809.401(b)(3) and 3809.420(b)(3).

The objective of the Reclamation and Closure Plan is to reclaim and close the facility in a manner protective of ground water in conformance with the NM Copper Rules, meet the reclamation requirements of the New Mining Act and return the mine area to conditions similar to those present before reestablishment of the mine (BLM DEIS 2015, p. 2-34). Reclamation of the site will re-establish the post-mining land uses consistent with the land uses of the site and the surrounding area, i.e., wildlife habitat, grazing, mining and recreation as identified by the BLM in its approved Land Use Management Plan (BLM 1986).

The Reclamation and Closure Plan has been prepared to address the actions that will be undertaken to reclaim the Copper Flat site at the end of the life of the mine as a result of disturbance created by the previous mine operation conducted by Quintana and those caused by NMCC mining operations. Golder has identified the general setting of the Copper Flat Mine area as they currently exist (see Figure E2 of Appendix E) and the configuration of the site at the end of mine life (see Figure E3 of Appendix E). These figures provide the basis for the reclamation design presented in Appendix E. The reclamation designs are depicted in the drawing set provided in Attachment E1 of Appendix E. This Reclamation and Closure Plan describes contemporaneous reclamation that will be conducted, to the extent practicable, during mine operations, facilities to be reclaimed and closed following cessation of mining operations, and the components of the site that will remain post-closure, following completion of reclamation.

The plans and methods developed and presented in the Reclamation and Closure Plan represent detailed designs for reclamation of the facilities sufficient for agency review and approval. Construction design documents and construction quality assurance/construction quality control (CQA/CQC) plans will be prepared by NMCC for submittal to and approval by the

State of New Mexico within 180 days of submission of a notice of intent to implement the closure plan per the NMED Copper Rules (20.6.7.34.B, NMAC). The CQA/CQC plan will provide a detailed description of the work proposed to be performed to close the site and the final reclamation designs for the facilities to be closed. Post-closure monitoring activities will be conducted in accordance with Section 20.6.7.35 NMAC, and post-closure monitoring and maintenance requirements that may be contained in the Copper Flat Mine Permit.

3.1 Reclamation Schedule & Sequence – 19.10.6.602.D.(15)(h)

Section 4.0 of Appendix E provides the anticipated reclamation schedule and sequence for the Copper Flat Mine. In addition, Table 2-1 of this MORP update includes a summary of the sequence and schedule presented in Appendix E. The schedule is based on consideration of practical phasing of the reclamation projects to account for the anticipated labor, equipment and other resources that would be necessary to complete these projects based on current conditions, sequential closure of facilities in a phased cost efficient manner, and total annual acreages that would be reclaimed over this period. The anticipated durations for reclamation presented include earthwork and reseeding. The reclamation schedule is based on the number of years and months from the time NMCC obtains permit approvals to begin operations. Contemporaneous reclamation of EWRSP-1, EWRSP-2, and portions of EWRSP-4 will begin during the initial mine preproduction period.

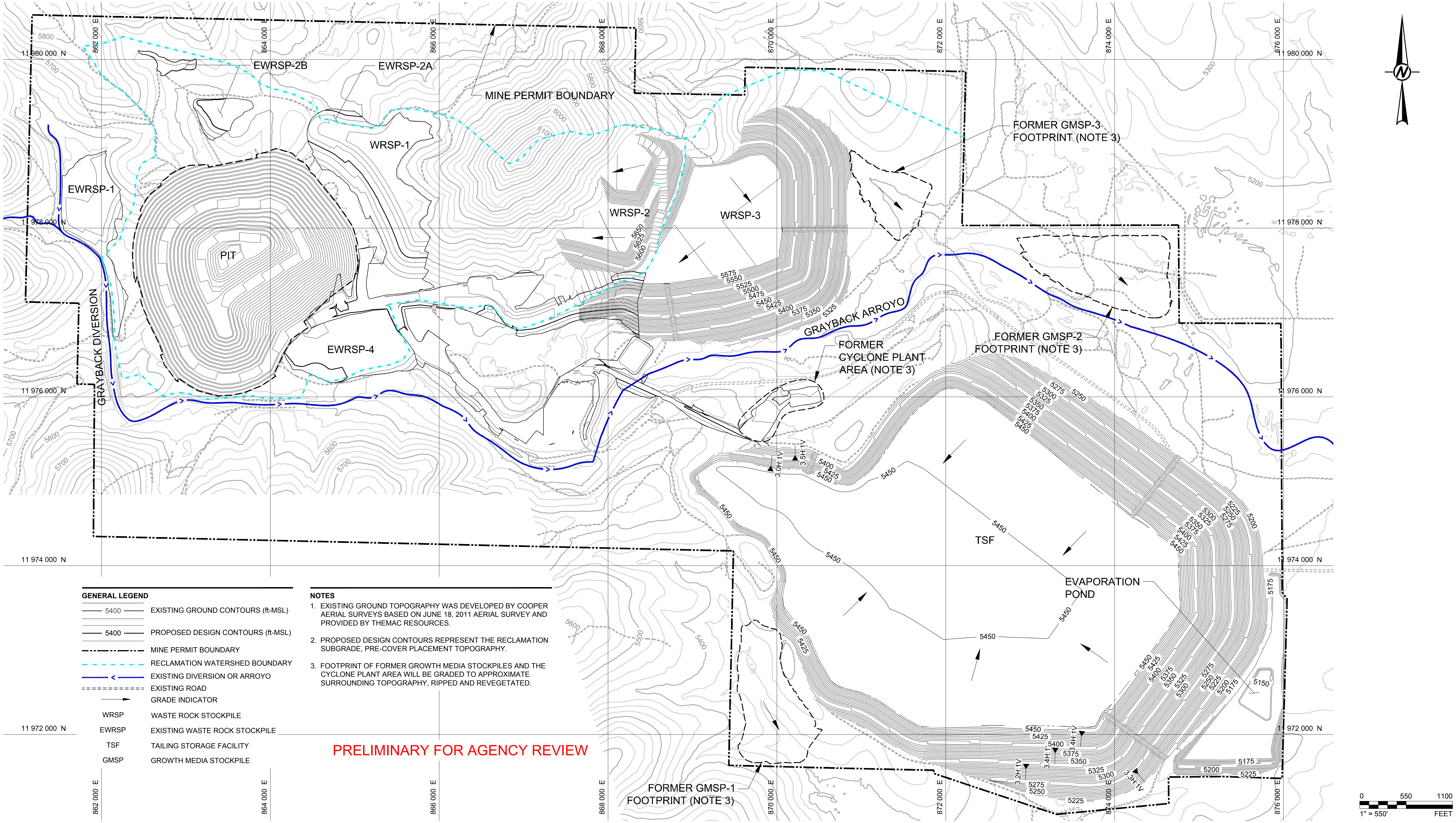
3.2 Reclamation Topographic Map(s) – 19.10.6.602.D.(15)(i)

Figure 3-1 presents the anticipated surface configuration of the permit area upon the completion of reclamation and closure operations. Appendix E contains a drawing package that provides additional detailed depictions of the reclaimed surface various facility units.

3.3 PAG after Reclamation – 19.10.6.602.D.(15)(j)

Generation of acid or other toxic drainage from overburden and waste materials following reclamation that could cause federal or state standards to be exceeded is very unlikely because of the manner in which the overburden and waste will be characterized and disposed of during operations, combined with the reclamation and closure measure that will be implemented as described in more detail in Appendix E. A description of NMCC's waste characterization and handling plan that will be utilized during operations is provided below. These operations practices have been taken into account in the Reclamation and Closure Plan design to ensure that acid generation or other toxic drainage from the site does not occur after reclamation.

NMMC submitted a proposed Mine Plan of Operations (MPO) for the Copper Flat Project in December, 2011 to the Las Cruces, NM office of the Bureau of Land Management (NMCC 2010).



GENERAL LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
5400	PROPOSED DESIGN CONTOURS (ft-MSL)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
GMSP	GROWTH MEDIA STOCKPILE

NOTES

1. EXISTING GROUND TOPOGRAPHY WAS DEVELOPED BY COOPER AERIAL SURVEYS BASED ON JUNE 18, 2011 AERIAL SURVEY AND PROVIDED BY THEMAC RESOURCES.
2. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.
3. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILES AND THE CYCLONE PLANT AREA WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.

PRELIMINARY FOR AGENCY REVIEW

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-09-30	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	TS
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

SEAL

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT
FINAL RECLAMATION TOPOGRAPHY

PROJECT NO.	CONTROL	REV.		FIGURE
1531453	0500	C	4 of 25	3-1

This document, revised in June, 2011, was also provided to the NM MMD and the NMED for review and comment as part of the Environmental Impact Statement (EIS) that is currently being prepared by the BLM for the Copper Flat Project. Appendix C of the MPO contains a Mine Waste Management Plan for the waste rock which includes a plan for waste characterization and handling. MPO Appendix C also contains results of waste characterization work performed by SRK Consulting U.S. Inc. (SRK) in 1997 in support of an EIS that was being prepared at the time for mining activities proposed by Alta Gold Corporation.

In the intervening time since the MPO was first proposed by NMCC in 2010, the waste characterization portion of the plan was implemented. The results of this work have been submitted and discussed with the NM MMD and the NMED and is utilized in the design of the WRSPs described in the MORP update as well as NMCC's DP application.

NMCC will initiate the materials handling plan contained in Appendix C of the MPO, as ultimately approved by the BLM, NMED and other constituent agencies. Implementation of this plan will result in preventing the release of acid generating materials and other toxic drainage that cause federal or state standards to be exceeded following reclamation.

3.3.1 Waste Characterization

SRK performed extensive geochemical characterization studies in support of NMCC's proposed Copper Flat Project (SRK 2013). The resulting report and additional documentation requested by the NMED upon review of SRK's report represent NMCC's material characterization efforts to date and are incorporated into this application by reference.

SRK conducted a mine waste characterization program for the Copper Flat Project. The geochemical testing of mine waste materials provided the characterization required to determine the potential for Acid Rock Drainage and Metal Leaching (ARDML) from mining facilities. This provided the basis for a quantitative risk assessment and evaluation of the options for design, construction, operation, reclamation and closure of the tailings and waste rock disposal facilities.

The Copper Flat mine waste characterization program was designed to investigate the potential for ARDML due to exposure and oxidation of sulfide minerals, such as pyrite, that are unstable under atmospheric conditions. Upon exposure to oxygen and water, sulfide minerals will oxidize, releasing metals, acidity and sulfate. SRK's geochemical characterization investigated the potential for rock that will be exposed in the Copper Flat waste rock disposal facility and pit walls to generate acid and leach when exposed to the atmosphere. The results of the characterization program were used in quantitative numerical predictions to assess the potential future leachate chemistry associated with the mine facilities, specifically the waste rock stockpiles and the TSF.

SRK's investigation concluded that with respect to waste rock, acid generation is not anticipated to occur for most of the un-weathered waste rock materials during operations. SRK concluded that the acid generating potential of the Copper Flat materials, i.e., acid rock drainage (ARD), is largely dependent on the sulfide mineral content and that the sulfide concentrations in the material varied from less than analytical detection limits to a maximum of 2.52 weight percent (wt%) that was highest in the transitional waste material. Transitional material is the oxidized and partially oxidized surface rock material that overlies the fresh rock material below the surface. Where oxidation of this overlying material is complete, waste rock produced from it will be inert with respect to acid generation. Partially oxidized material occurs in a transition zone beneath the oxidized cover and the underlying un-oxidized material. This transitional material has been exposed to oxidizing conditions over geologic time. Such material will typically exhibit a low paste pH and high paste conductivity, and will be generally acid generating. Examples of this condition can be found in the exposed pit walls and where transitional waste material was deposited on the existing waste rock stockpiles.

SRK determined that 96% of the waste rock that will be produced at Copper Flat will consist of sulfide, non-oxidized Quartz Monzonite/Breccia waste, which typically exhibits either non-acid forming characteristics or a low potential for acid generation. Samples collected by SRK in their investigation from the surface of the existing waste rock stockpiles and pit walls indicated that there is some potential for acid generation from material mined by previous mining operations and exposed to natural weathering conditions. However, as indicated previously, most of the existing waste rock stockpiles will be reclaimed and the existing pit walls will be mined by NMCC's proposed operation.

3.3.2 Material Handling Plan

NMCC's proposed material handling plan is based, in part, on SRK's recommendations to minimize the potential for acid leaching from the waste rock stockpiles and tailings. Based on SRK's findings the materials that will be generated will have only a low potential for acid leaching, NMCC anticipates that it will, generally, not be necessary segregate waste rock. As described in Appendix C of the MPO, most of the waste rock produced by the operation will be low and high sulfide material with only small amounts of oxide and transitional material produced near the surface of the proposed pit expansion. Additionally, it should be noted that the terms "high sulfide" and "low sulfide" are terms relative to specific conditions at Copper Flat and, therefore, to each other. That is, at Copper Flat low sulfide material is defined as material having less than 0.5% sulfide and high sulfide material will have 0.5% sulfide or more. It is further noted that the Copper Flat ore body is a very low sulfide ore body in relation to other ore bodies in the region. The waste produced at Copper Flat will be primarily quartz monzonite and andesite and the ore will be primarily breccia. NMCC will implement a waste material classification program as described in Section 2.5 of the MPO. It is anticipated that the waste rock generated will oxidize very slowly and may only, potentially, produce acid over some period of time. The acid rock ARD potential associated with un-oxidized waste rock is relative in the long-term. SRK determined that the waste rock can be considered as being inert with respect to ARD for a timeframe in the order approximately 20 years. Therefore, the vast majority of the waste material, i.e., about 96%, that will be generated at Copper Flat will generally have a low ARD potential. As indicated above, the transitional materials that have been exposed to oxidizing conditions over time have the most potential for acid generation.

Waste Material Classification

Section 2.6.2 of the MPO generally describes the general material handling approach the will be implemented at Copper Flat. The subsequent work conducted by SRK and presented in its May, 2013 Geochemical Characterization Report confirms the approach to be utilized. However, while the approach is generally the same as described in Appendix C of the MPO, there will be some aspects of material handling that may differ from the information provided therein as supported by the later findings of SRK's material characterization studies.

The overarching approach to waste rock material handling to control ARD will be to control the movement of water through the waste rock stockpiles, in combination with continual diligent monitoring and characterization of the waste materials produced to confirm SRK's conclusion that the majority of the material has a low ARD potential. As discussed in more detail below, NMCC believes that depositing the small amounts of material with high ARD potential; i.e., the transitional waste, when encountered, along with the large amounts of non-ARD materials will further reduce the potential for the ARD materials to create acid. The buffering capacity of the large volume non-transitional waste will neutralize the small volume transitional waste. Should field characterization reveal that more ARD materials than anticipated are being generated the materials handling plan will be adjusted to consider isolation, encapsulation and other means of treatment to mitigate the potential for acid generation. The non-transitional waste will be used as base material in any areas where it has been determined in the field that transitional material should be segregated. However, as a practical matter, under normal circumstances large volumes of non-transitional waste will typically be placed below, above, and all around the transitional waste produced.

SRK recommended in its May 2013 report that, during proposed operations, specific controls would be needed to collect storm water runoff from the waste rock stockpiles and that storm-water diversions would be required to prevent run-on. SRK also recommended that covering the waste rock stockpiles with a re-vegetated 36-inch cover at the end of mine life would reduce infiltration of water and flux of oxygen into the facility, and thus, limit oxidation of sulfide minerals. SRK also noted that migration of seepage from the waste rock stockpiles into the underlying bedrock would be anticipated to be very small, or nil, because of the low permeability of the andesite underlying the area. These recommendations have been incorporated into NMCC's design of its waste rock stockpiles.

Figure 3-2 describes process that will be utilized in the NMCC's proposed waste classification program during operations. Following the evaluation path shown in Figure 3-2, a determination will be made as to classification, and periodic confirmation testing will be conducted. Confirmation testing will include a field testing program for representative samples of the cuttings, as determined by the qualified geologist or technician. The tests conducted will include paste pH, saturated paste conductivity, and acid base accounting testing (total sulfur, sulfate sulfur, and NP testing).

As described in more detail in Section 2.6.2.5 of Appendix C of the MPO, prior to blasting active benches in the open pit, the drill cuttings from each drill blasthole will be inspected. Blasthole drill cuttings will be visually inspected by a qualified geologist or trained technician prior to blasting and removal of the material from the pit. The rock type, color, degree of oxidation, sulfide content and other pertinent features will be noted and transferred to the bench plan maps. All material characterized as oxide or low sulfide waste will be sampled for confirmation testing. Material classified as low sulfide rock will be subject to periodic confirmation testing at a frequency initially on one confirmation test for each five blastholes designated as oxide waste rock. This frequency will be adjusted as ongoing testing and field observation continues to demonstrate consistent reproducible results supporting visual waste classification. NMCC anticipates a frequency of confirmation testing in the longer term to be one test for every 20 holes. Confirmation testing will be performed on-site using a Leco Furnace to evaluate the classification determinations made.

Waste Rock Flagging and Routing

Waste rock from the open pit will be examined as benches are mined to identify sulfide bearing transition material that may represent ARD potential. Specific procedures will be established by the mine operations team when preparing for startup. However it is anticipated that the procedures employed by the operation will be similar to the following description, which follows standard mine geology practices and methods. The operations team will develop full details after the team is assembled to begin startup of the mine. As requested by the state regulatory agencies, NMCC will meet with them as plans develop to discuss the plan and receive input prior to implementation.

The mine waste rock identification, flagging, and routing process will be similar to mine ore control procedures and the two processes will be completed simultaneously. Identification, digging plan design, field identification for operations, determination of destination and placement, and routing of ore and waste materials will be the responsibility of the mine technical services team, which typically includes geology engineering, and surveying disciplines.

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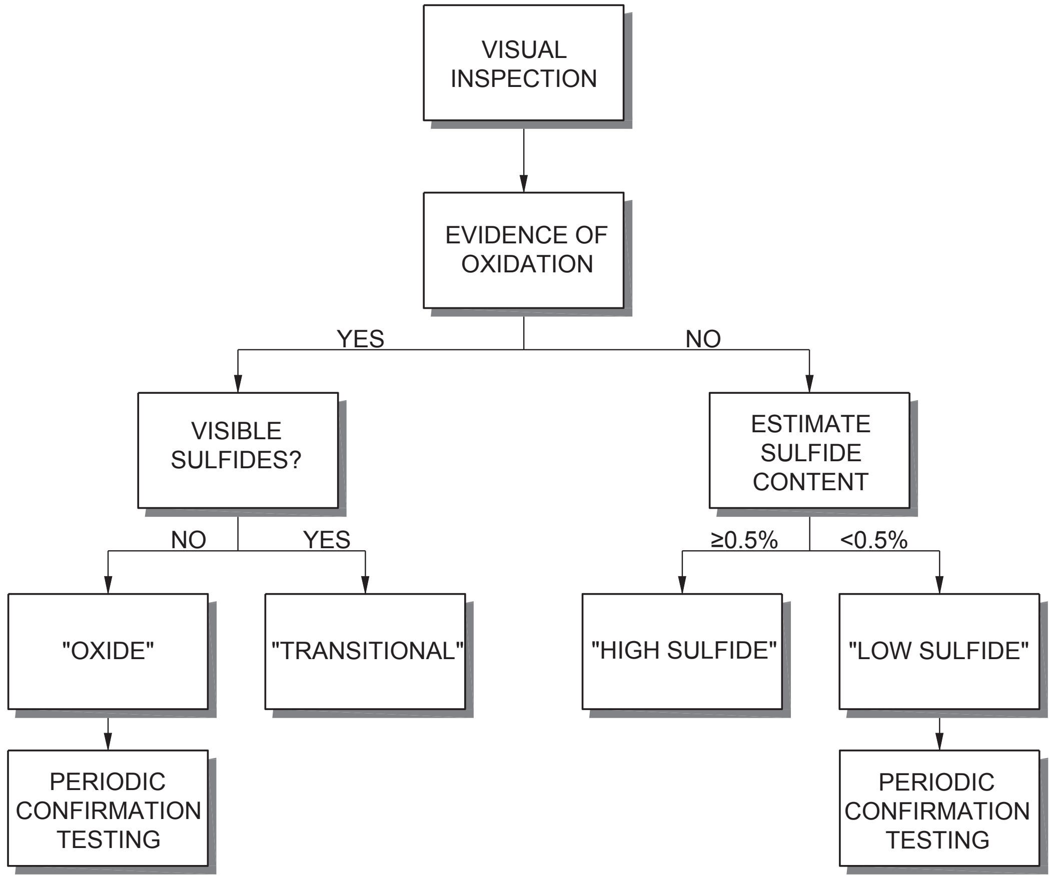

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YYYY-MM-DD	2016-06-15
PREPARED	CM
DESIGN	XXX
REVIEW	TS
APPROVED	XXX

PROJECT

NEW MEXICO COPPER CORPORATION
COPPER FLAT PROJECT
SIERRA COUNTY, NEW MEXICO

TITLE

WASTE CLASSIFICATION FLOWCHART

PROJECT No.	PHASE	Rev.	FIGURE
153-1453	0006	1	3-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

The mining and ore/waste classification cycle begins with blasthole drilling. At Copper Flat, all benches mined will require blasting; therefore all areas mined will be drilled on a regular grid pattern across the full width and length of each bench. Each blasthole will be assigned a unique identification number (ID) for data tracking, and each will be surveyed and plotted onto a blasthole location map that is spatially tied to a three dimensional (3D) model of the mine geology. As holes are drilled and surveyed, the ID and survey coordinates of each blasthole will be logged into a blasthole data base. After drilling, and before blasting, the geology of the bench surfaces and exposed mine faces will be examined for key geologic parameters and the geology mapped to the same scale as the blasthole maps. The blasthole cuttings will be visually examined to determine rock type, sulfide content, and oxidation level and samples taken for laboratory analysis. Data from field examinations will be logged into the blasthole data base and plotted onto the blasthole map, with the analytical results added to the maps and the database upon receipt from the laboratory. When the geologic and analytical data for a specific area is complete, the technical services team will develop ore and waste zone boundaries and identify material types that are subject to a specific routing plan, such as for ore transport or transport of potential ARD material to the WRSP. The boundaries and material designations will be transferred back to the blasthole maps and survey coordinates produced for identifying material boundary lines in the field.

After blasting, and before excavation begins, the material boundary lines will be established on the top of the broken rock by survey, and the broken rock visually examined again to determine if any field adjustment in classification is needed. Field adjustments will be transferred to the blasthole maps for record keeping. Even after having been blasted, the area will be closed to excavation and material removal until all data is received and the “dig plan” is finalized by the technical services team. When an area is opened for excavation of material, the specific ore and waste boundary lines will be visually identified on the top of the broken rock and specific material types designated with color coded flagging. Copies of the blasthole maps showing the corresponding material types and boundaries will be provided to the mine equipment operators for reference during material removal.

As excavation proceeds, the loader operators will selectively excavate specific ore or waste material types following the dig plan established by the technical services team. Each haul truck will be loaded with only the one type of material designated. After loading, the loader operator will communicate the material type to the truck operator through an established signal system. The material type loaded into the truck will designate a pre-determined destination for the load. The truck operator will track loads by material type and destination and the load information will be compiled and maintained by mine staff for reporting.

Transitional Waste Material Disposal

Section 2.6.2.2 of Appendix C of the MPO provides that material classified as "transition waste" will be isolated in a waste rock stockpile area and covered with a minimum of six feet of "non-transition" material. SRK's investigation determined that the transitional material to be excavated will be less than 4% of the total volume of waste produced from the operation. SRK's analysis was performed prior to development of the mine plan proposed in this MORP update for Copper Flat, NMCC's DP application and Alternative 2 of the DEIS. Review of the most recent geologic model and the mine plan indicates that transitional material will still be produced at the same ratio relative to non-transition waste as determined during the SRK investigation.

NMCC anticipates that the transitional waste will be produced in the first 8 years of operation (approximately 5.4 million tons), with about half of it produced in the first 2 years. Some of this material will be disposed of in WRSP-1, which located in the OSPDA. The remainder will be disposed of in WRSP-2 and 3. During the same two years as much as 5.2 million tons of non-transitional acid neutralizing waste material, will also be produced. Some of this acid neutralizing material will be used as neutralizing material for those areas where transitional material may be deposited. NMCC will lay a minimum 10 ft. of base of non-transitional waste underlying the area where transitional material will be deposited in the WRSPs and ensure that at least 10 feet of non-transitional waste surrounds the transitional waste in such a manner that the transitional waste is not exposed to oxidation.

The remaining approximate 2.6 million tons of transitional material will be produced over years 3 through 8 at an average rate of approximately 433 thousand tons per year while at the same time about 27.6 million tons, an average of 4.6 million tons of acid neutralizing non-transitional waste will be produced. As such, the greatest volume of waste material generated, by far, will be classified as un-oxidized high sulfide and/or un-oxidized low sulfide waste. As confirmed by SRK's waste rock characterization investigations, this material poses a low level, short-term risk for ARD. While NMCC considers it unnecessary, and perhaps to some extent, contrary to the desire to minimize potential acid generation, to isolate and concentrate that material in one area, NMCC will continue to identify potential ARD generating waste during operations and take steps to establish disposal areas within the WRSPs for this material ensuring that a minimum of 10 ft. of non-transitional acid-neutralizing waste surrounds the transitional waste within the WRSPs where the potential ARD generating material will be deposited. As a practical matter, NMCC will ensure that non-transitional material is placed below, above and all around the transitional material wherever possible, providing a thick neutralizing "blanket" around the transitional material.

Quality assurance testing will also be performed in addition to the daily field sampling. Up to 10 archived blasthole samples will be randomly selected and subjected to paste pH, saturated paste conductivity, and acid base accounting testing (total sulfur, sulfate sulfur, and NP testing). The testing will be performed by a third-party independent state approved laboratory. The samples will be classified with respect to ARD potential on the basis of NP/AP ratio. The samples will be located on the appropriate bench plan maps and the quality assurance test classifications will be compared to the operational waste classification designations.

SRK has performed significant kinetic testing of waste materials since the time of submittal of the MPO. Humidity cell testing results were first reported to NMED in SRK's May, 2013 report. Continued and more extensive humidity cell results were reported to NMED in February, 2014 in an SRK report titled "Humidity Cell Termination Report for the Copper Flat Project, New Mexico." These documents are included in this MORP update by reference. As indicated earlier in this document, these studies provide the basis for NMCC's mine waste characterization and handling plans.

At the end of the mine life the waste rock stockpiles will be reclaimed in accordance with the approved Reclamation and Closure Plan. As determined by SRK the majority of the waste rock materials can be categorized as being inert from the standpoint of acid generation for about twenty years before beginning to develop ARD potential if left uncovered. The anticipated life of the mine is 11 years. The waste rock stockpiles will be covered with a minimum of 3 ft. of soil. Therefore, covering the waste rock stockpiles with a minimum of 3 ft. of soil will mitigate the potential for acid generation and impacts to groundwater.

3.4 Contemporaneous Reclamation – 19.10.6.602.D.(15)(k)

The concept of operating for closure and contemporaneous reclamation are means by which NMCC will strive to reduce erosion, provide early impact mitigation, limit costs and reduce final reclamation work. NMCC is committed to maximizing these concepts at the Copper Flat Project where feasible. It has designed mine facilities to employ contemporaneous reclamation to the extent appropriate and practicable. Re-contouring, placement of cover materials and revegetation will be implemented, where and when operational conditions permit in areas where mine operation activities are discontinued.

Contemporaneous reclamation is integrated into the design and construction of the Copper Flat facilities, in particular, the WRSPs. The WRSPs will be constructed in their final configurations with the first lift built to occupy the projected footprint of each stockpile. All sequential lifts will be set back to facilitate final out-slope grading and accommodate inter-bench slopes and cross bench drainages as discussed in more detail in the Reclamation and Closure Plan. As each lift is completed, any portion not needed for access to other lifts will be regraded, covered and revegetated as soon as practicable. The top surface of each lift of the WRSPs will also be constructed to a minimum final grade of 1 percent to minimize the final grading operations and achieve positive drainage.

As discussed earlier, at Copper Flat there are several existing waste rock stockpiles (EWRSP-1, 2A and 2B, 3 and 4, see Figure 2-14, that were generated by Quintana during previous operations. NMCC has incorporated these EWRSPs into its contemporaneous reclamation efforts. EWRSP-1 and 2B will be reclaimed during operations as discussed previously and described in the Reclamation and Closure Plan.

EWRSP-2A will be incorporated into new WRSP-1 during operations as it is constructed.WRSP-1 will be reclaimed per the Reclamation and Closure Plan. EWRSP-3 will be incorporated into the process plant facility during operations. As such, it will be reclaimed along with WRSP-1 at the end-of-life of the project. EWRSP-4 will be re-contoured and utilized as a laydown area during operations and will be reclaimed at the end of mining. However, the side-slopes of EWRSP-4 will be reclaimed during operations as described in the Reclamation and Closure Plan to mitigate against potential surface water impacts to Grayback Arroyo.

Opportunities for contemporaneous reclamation of the TSF are limited as they could interfere with operations and could jeopardize dam safety. However, during operation of the TSF, management of tails deposition while constructing the embankment will assist in achieving the desired outslope grade to accommodate final reclamation grading. Also, in the later operational period of tailings deposition, discharge of tailings from selected locations will be used to relocate the supernatant pool to a location adjacent to the location of what will be the post-closure spillway. This will reduce grading requirements and limit earthmoving operations in areas where working conditions can be more challenging due to the presence of soft and saturated tailings. Tailings discharge may also be used to create nominal surface topography on the final top surface that will assist with developing a final drainage pattern.

NMCC may also decommission some access roads and other ancillary facilities prior to final mine closure when determined to be no longer needed for mine operations.

4.0 PERFORMANCE & RECLAMATION STANDARDS & REQUIREMENTS – 19.10.6.603

The Reclamation and Closure Plan described above and in Appendix E has been developed to meet the site-specific characteristics of the mining operation and the site. As indicated herein previously, the current land uses in the area of the Copper Flat facility have been identified by the BLM to include activities such as grazing, wildlife habitat and mining. Reclamation of the disturbed area will result in post-mining land uses at Copper Flat that will be sustainable and in keeping with previous historic uses. Aside from mining, grazing, wildlife habitat, and recreation are the designations consistent with the surrounding land uses of the Copper Flat site and are appropriate for the site upon reclamation. The Reclamation and Closure Plan is designed to re-establish grazing in the area and allow for long-term use of the reclaimed areas by wildlife known to historically use the area without affecting the potential for other uses such as mining and recreation. This section describes how the Copper Flat operation will meet the performance and reclamation standards and requirements of the Mining Act rules and the NMED Copper Rules closure requirements.

4.1 Most Appropriate Technology and Best Management Practices-19.10.603.A

NMCC has designed its operations and reclamation plans to protect human health and safety, the environment, wildlife and domestic animals using Most Appropriate Technology (MAT) and Best Management Practices (BMPs). MAT in mine operations is understood as the selection and application of the most suitable mining technology to achieve the intended purpose while reducing impacts to the environment. The selection of a MAT is typically accomplished in mine feasibility studies that evaluate mining technologies, processes and operating methods. The Copper Flat Project has been designed and will be operated using both MAT and BMPs based on site-specific technical and economic feasibility. Mining technologies, processes and operating methods proposed by NMCC are provided in Section 2.0.

BMPs are defined as any program, technology, process, siting criteria, operating method, measure or device, which controls, prevents, removes or reduces impacts to the environment. BMPs are accepted, effective and practical methods including structural or engineered control devices, systems and materials as well as operational or procedural practices used to prevent or reduce environmental impacts of ground disturbing activities. NMCC will meet or exceed applicable state and federal reclamation requirements through application of MAT and BMPs. NMCC has designed its operations and reclamation plans to use the most appropriate technology for an open pit mine operation. Structural BMPs will be used to limit erosion and reduce sediment in precipitation runoff from proposed Project facilities and disturbed areas during construction, operations and reclamation. These structural BMPs will include:

- Surface stabilization measures such as dust control, regrading, mulching, riprap, temporary and permanent revegetation/reclamation and placing growth media;
- Run-on and runoff control and conveyance measures such as hardened channels, runoff diversions; and
- Sediment traps and barriers such as check dams, grade stabilization structures, sediment detention, sediment/silt fence and straw bale barriers and sediment traps.
- Apply water to control dust on haul roads and other disturbance areas;
- Interim seeding of stockpiles and surface disturbance areas;
- Use of certified weed-free seed and mulch;
- Cleaning heavy equipment before entering the mine area; and
- Noxious weed monitoring and treatment.

BMPs will be employed at appropriate locations during mine construction, operation and reclamation phases of the project and structures will be inspected periodically, with repairs performed as needed. NMCC will limit disturbance and preserve existing vegetation to the maximum extent possible. Additional details regarding structural and operational BMPs will be included in the SPCC plan and the SWPPP permit required for mine operation.

4.1.1 Hydrologic Investigations at Copper Flat

Utilization of MAT and BMP to protect ground water and surface water is the dominant theme in design, operation and reclamation at Copper Flat as it is the medium of greatest concern with respect to potential for environmental impact. As such, all facets of the operation have been designed to ensure water resource protection during operations and following reclamation.

NMCC and its water resource consultant, John Shoemaker & Associates (JSAI), have conducted extensive hydrologic investigation of the Copper Flat site and the surrounding area in support of NMCC's permitting activities for the project. These activities include supplementing the NMCC Abatement Plan previously submitted to NMED and the BDR submitted to NMED and NM MMD, providing detailed analysis for the BLM EIS and supporting various requests for information by the NM OSE.

NMCC has previously submitted to the various agencies, including NM MMD and NMED, JSAI's document titled "Model of Groundwater Flow in the Animas Uplift and Palomas Basin, Copper Flat Project, Sierra County, New Mexico, August 2014" (JSAI 2014c). This document, the subsequent review documentation provided by NMCC and JSAI are, therefore, incorporated into this MORP update by reference. The following information is a synopsis of the volumes of information provided in the groundwater model documentation in an effort to provide specifics as required by the NMED Copper Rules and NMCC's Discharge Plan application and has been utilized in determining MAT for the site.

General Hydrogeologic Setting

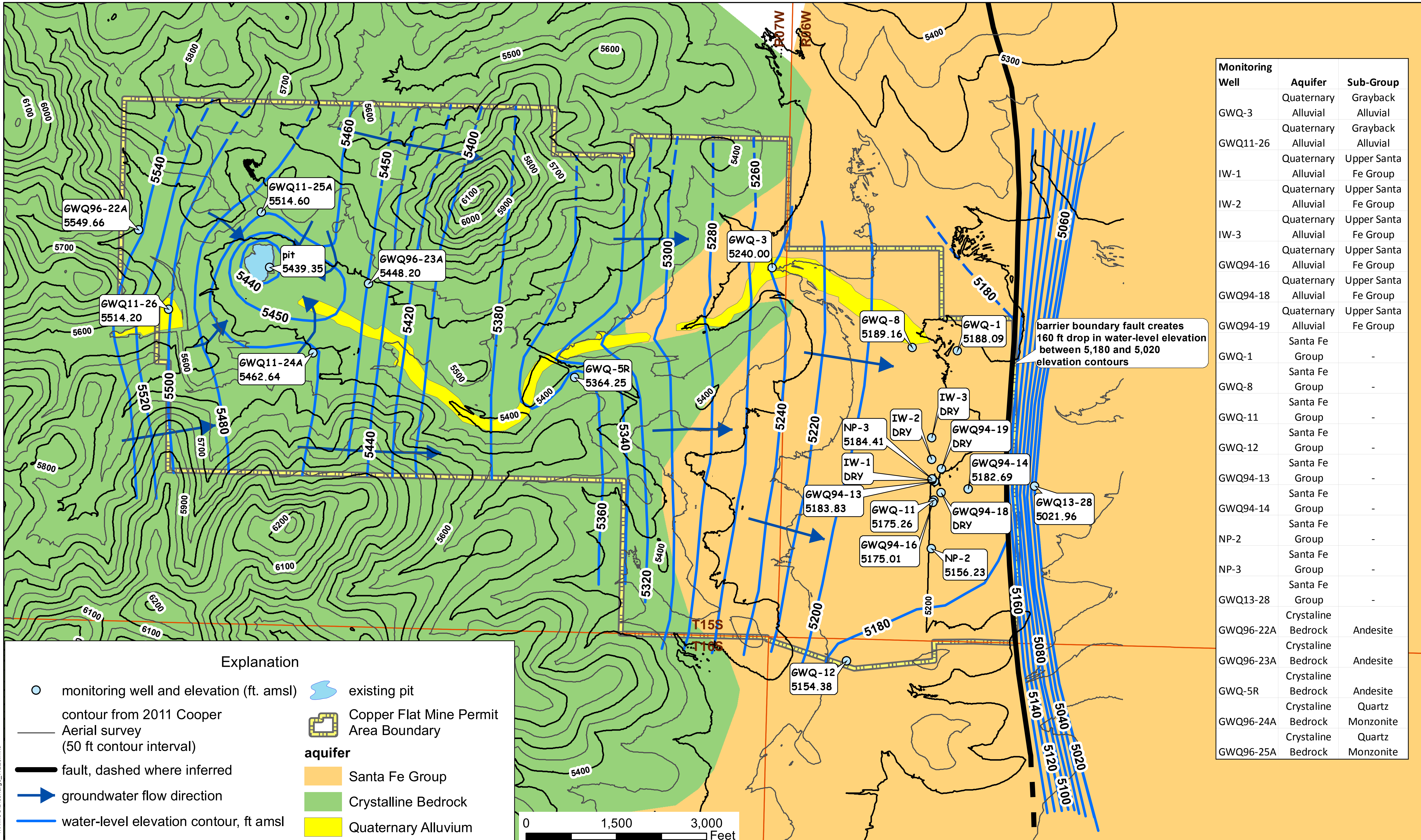
The Copper Flat facility will be located in area that includes the following water-bearing formations within the Animas Uplift: crystalline bedrock (andesite and quartz monzonite) in the western part of the mine permit area, Santa Fe Group sedimentary deposits in the eastern part of the mine permit area, and alluvium of upper Grayback Arroyo overlying the crystalline bedrock and Santa Fe Group in the mine permit area. Figure 4-1 presents the water-bearing formations at the facility, potentiometric surface contours and direction of groundwater flow, selected monitoring wells, and topography. Figure 4-2 presents a geologic map of the facility and surrounding area, and transects of hydrogeologic cross-sections.

Groundwater flow is mainly from west to east in the mine permit area, with groundwater discharging from the crystalline bedrock as subsurface flow across the contact with the Santa Fe Group, and as evaporation from the open pit. Monitoring wells designated as "dry" in Figure 4-1 are shallow wells installed to depths of less than 60 ft. in the Upper Santa Fe Group.

The potentiometric surface contours in the vicinity of the existing open pit shown in Figure 4-1 demonstrate the open pit to be hydraulic sink. Cross-sections PA-PA' and PX-PX' presented in Figures 4-2, 4-3 and 4-4 show groundwater flow in the crystalline bedrock in the vicinity of the open pit. Hydrogeologic cross-sections presented in Figure 4-2 (i.e., TA-TA' and TB-TB') and Figures 4-5 and 4-6 depict the Upper Santa Fe Group in the mine permit area. The crystalline bedrock at the facility is relatively impermeable and groundwater recharge from local precipitation to the crystalline bedrock is limited by low hydraulic conductivity. The groundwater system at the facility conducts little water, and the eastern mine permit boundary generally coincides with the East Animas Fault, shown in Figures 4-1 and 4-2, which acts as a barrier to groundwater flow.

A portion of the original Grayback Arroyo watershed within the mine permit area now drains to and includes the open pit. Grayback Arroyo is an ephemeral drainage in the mine permit area. However, groundwater levels are close to the surface, and there can be base flow discharge to Grayback Arroyo following wet periods. The cross-section A-A', presented in Figures 4-2 and 4-7, show the alluvium of upper Grayback Arroyo overlying the crystalline bedrock and Santa Fe Group in the mine permit area.

The Copper Flat porphyry copper-molybdenum deposit is hosted by the Cretaceous quartz monzonite in the western part of the mine permit area (Figure 4-2). Faults to the north and south of the mine permit boundary juxtapose the andesite with older, Paleozoic sedimentary rocks. The eastern mine permit boundary generally coincides with the East Animas Fault, which



Monitoring Well	Aquifer	Sub-Group
GWQ-3	Quaternary Alluvial	Grayback Alluvial
GWQ11-26	Quaternary Alluvial	Grayback Alluvial
IW-1	Quaternary Alluvial	Upper Santa Fe Group
IW-2	Quaternary Alluvial	Upper Santa Fe Group
IW-3	Quaternary Alluvial	Upper Santa Fe Group
GWQ94-16	Quaternary Alluvial	Upper Santa Fe Group
GWQ94-18	Quaternary Alluvial	Upper Santa Fe Group
GWQ94-19	Quaternary Alluvial	Upper Santa Fe Group
GWQ-1	Santa Fe Group	-
GWQ-8	Santa Fe Group	-
GWQ-11	Santa Fe Group	-
GWQ-12	Santa Fe Group	-
GWQ94-13	Santa Fe Group	-
GWQ94-14	Santa Fe Group	-
NP-2	Santa Fe Group	-
NP-3	Santa Fe Group	-
GWQ13-28	Santa Fe Group	-
GWQ96-22A	Crystaline Bedrock	Andesite
GWQ96-23A	Crystaline Bedrock	Andesite
GWQ-5R	Crystaline Bedrock	Andesite
GWQ96-24A	Crystaline Bedrock	Quartz Monzonite
GWQ96-25A	Crystaline Bedrock	Quartz Monzonite

FIGURE 4-1: Water bearing formations, Copper Flat Mine, Sierra County New Mexico.

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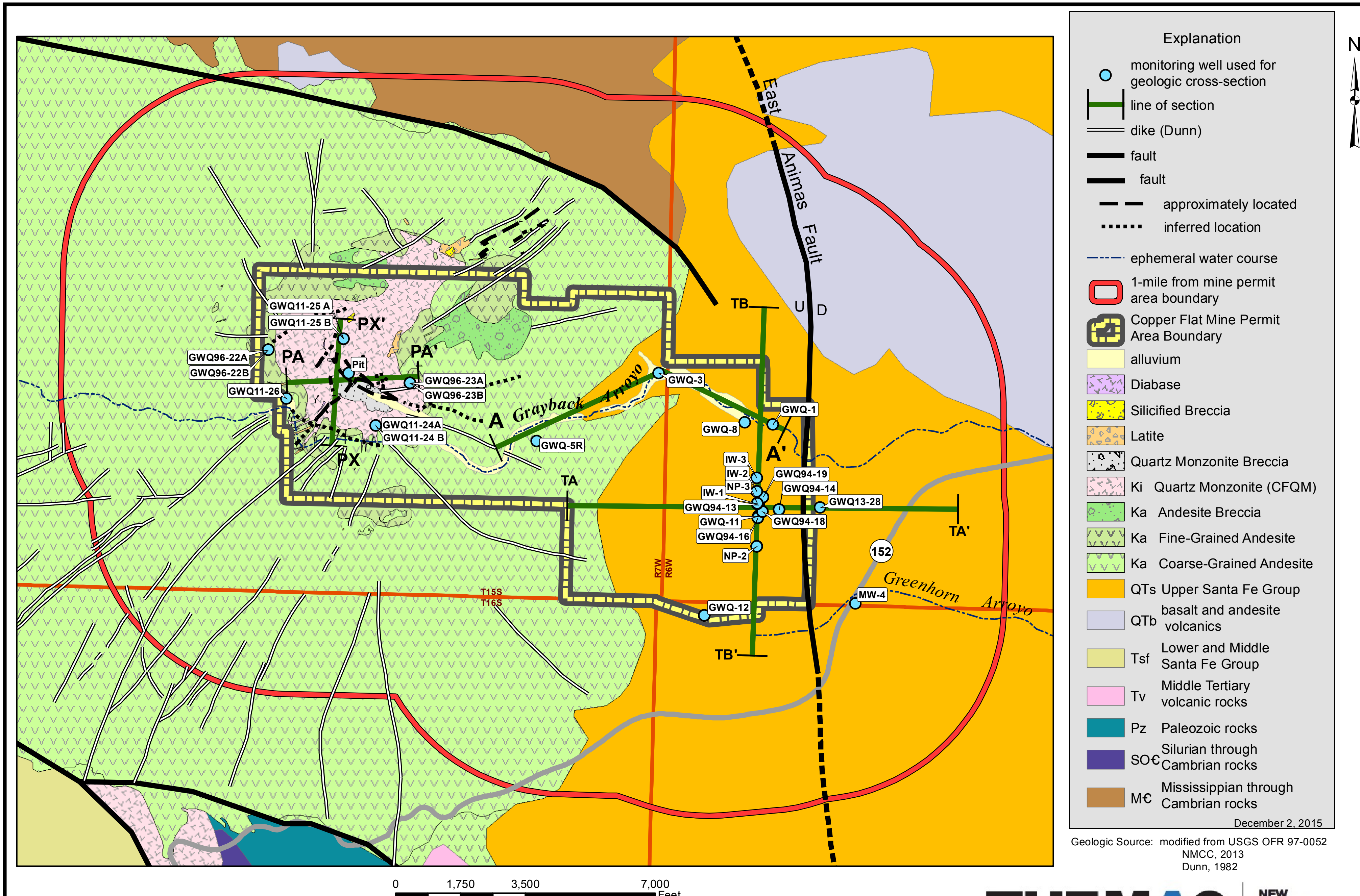

Geologic Source: modified from USGS OFR 97-0052
NMCC, 2013
Dunn, 1982

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FIGURE 4-2: Mine site geologic map,
Sierra County, New Mexico.

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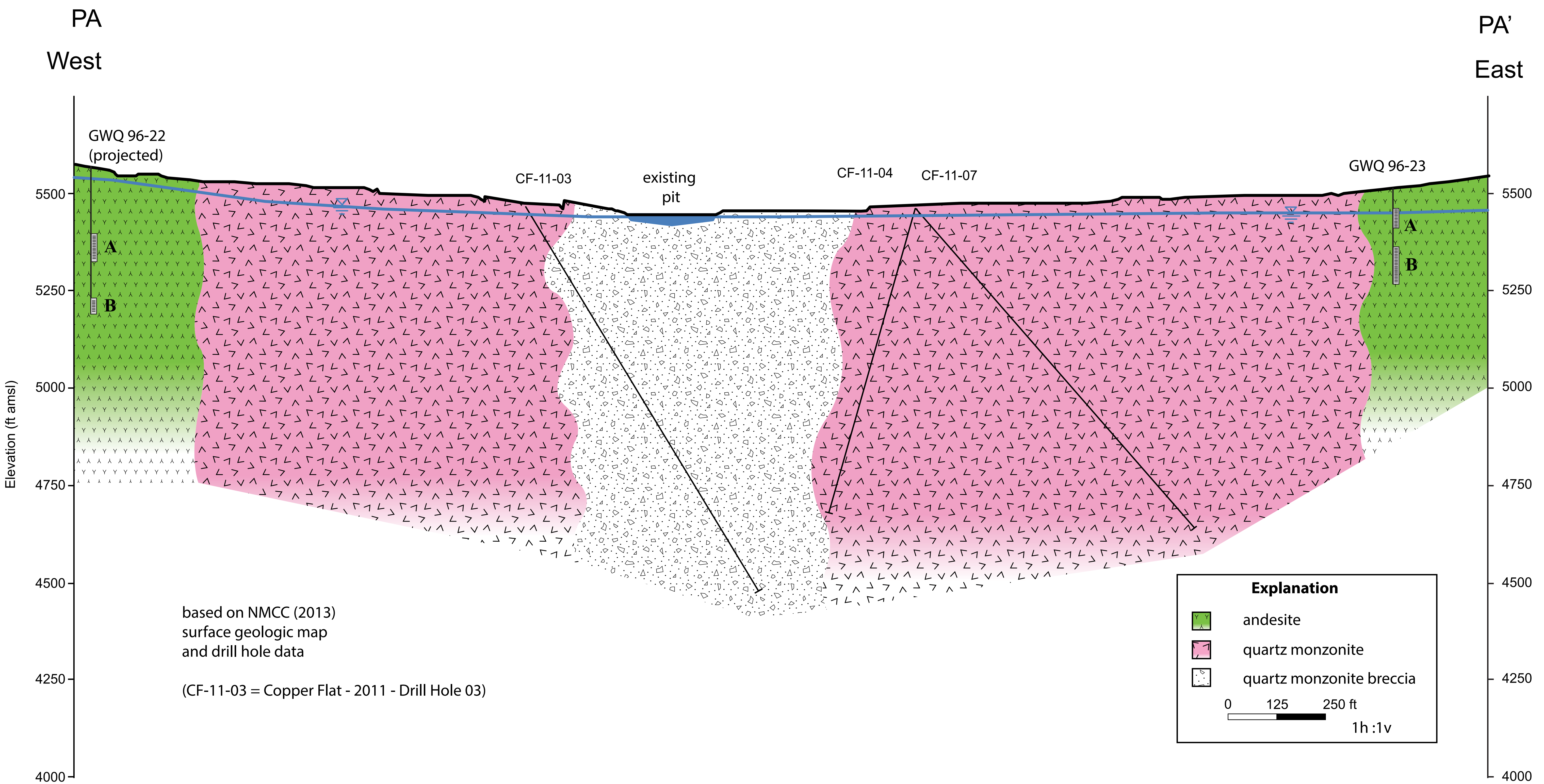

FIGURE 4-3: Hydrogeologic cross- section PA-PA'. Copper Flat Mine, Sierra County, New Mexico. (Reference Figure 4-2)

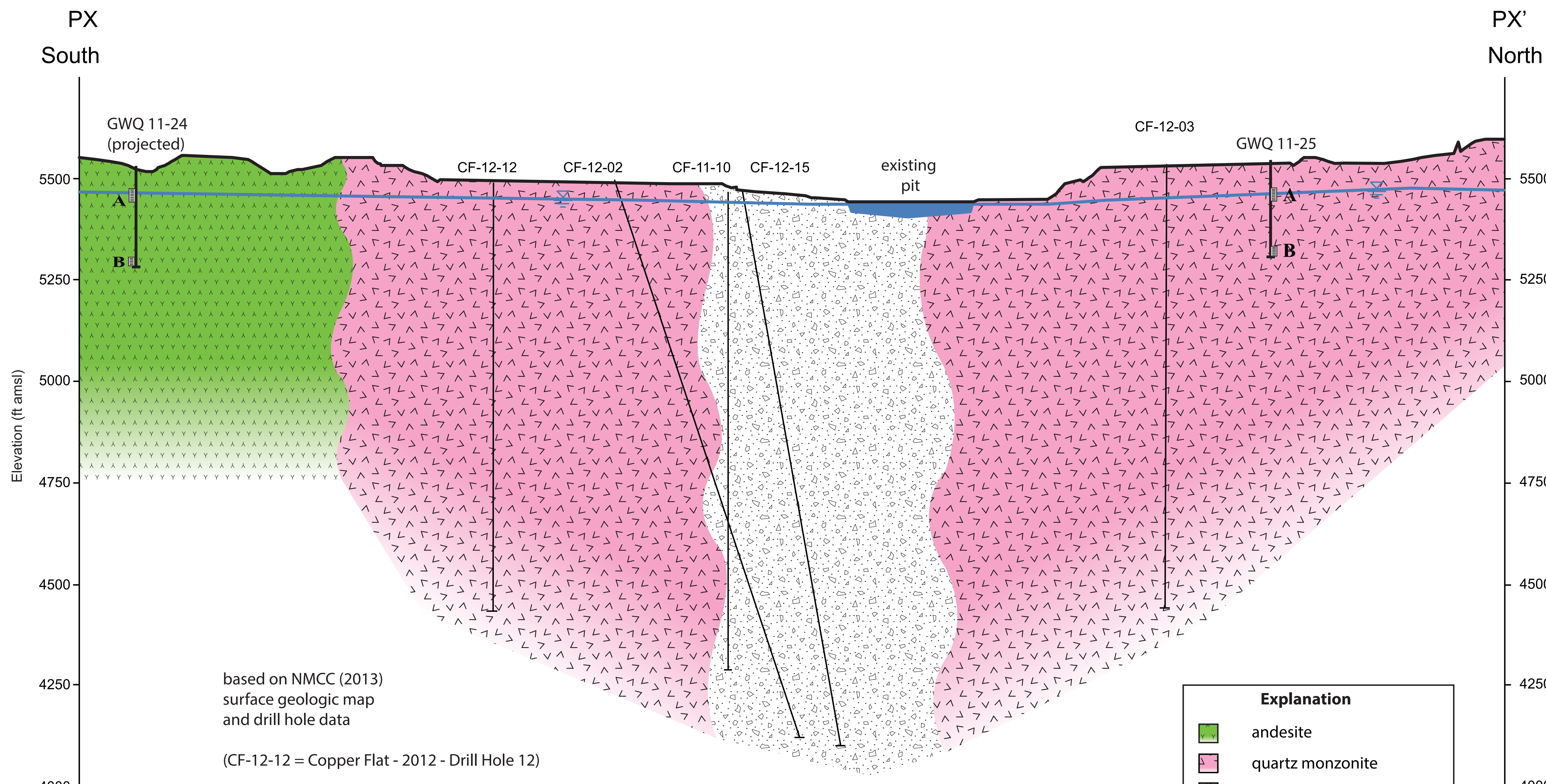

FIGURE 4-4: Hydrogeologic cross-section PX-PX’. Copper Flat Mine, Sierra County, New Mexico.
(Reference Figure 4-2)

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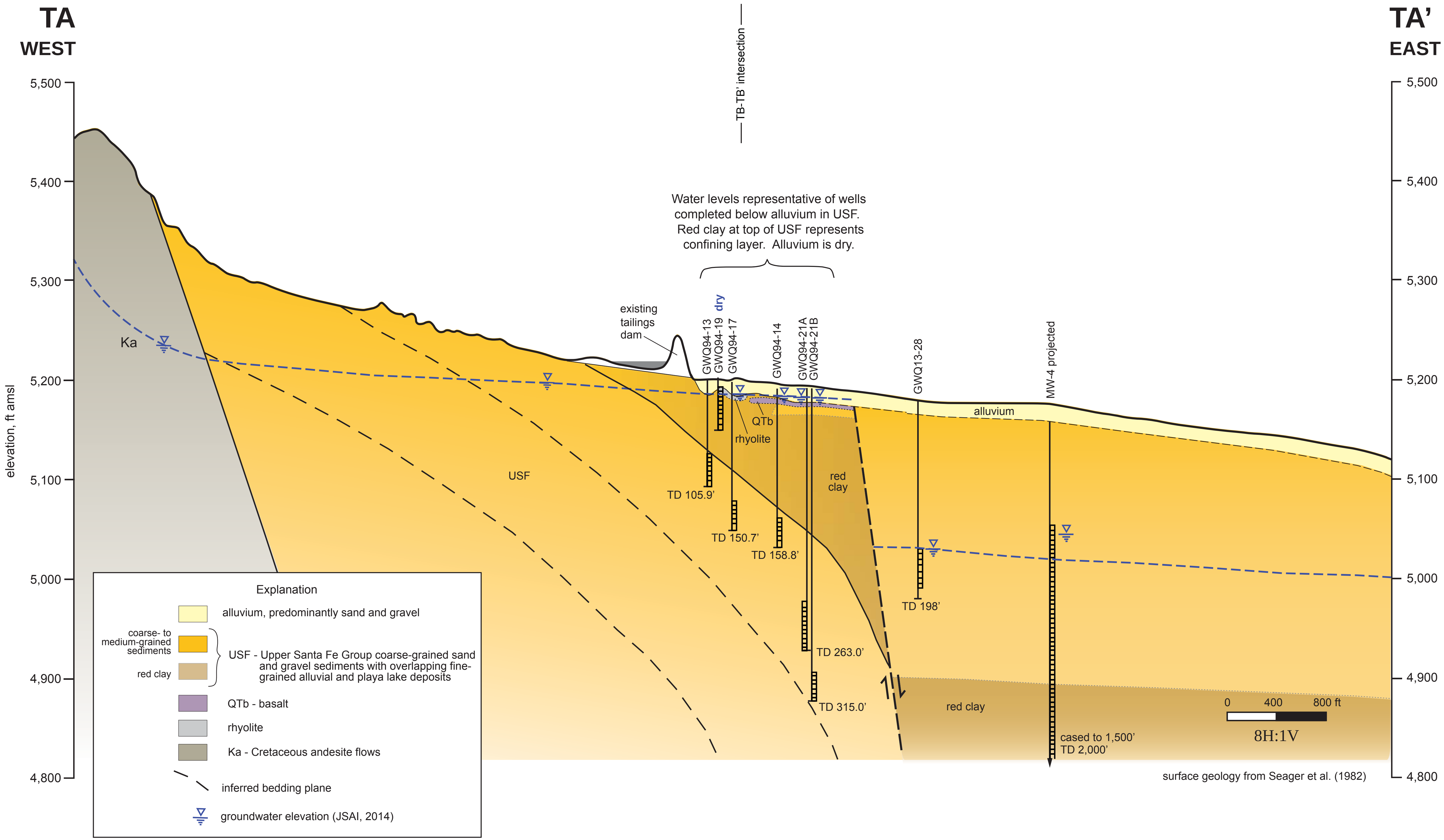

FIGURE 4-5: West to east geologic cross-section TA-TA' through the tailings storage facility (TSF) area, Copper Flat Mine, Sierra County, New Mexico. (Reference Figure 4-2)

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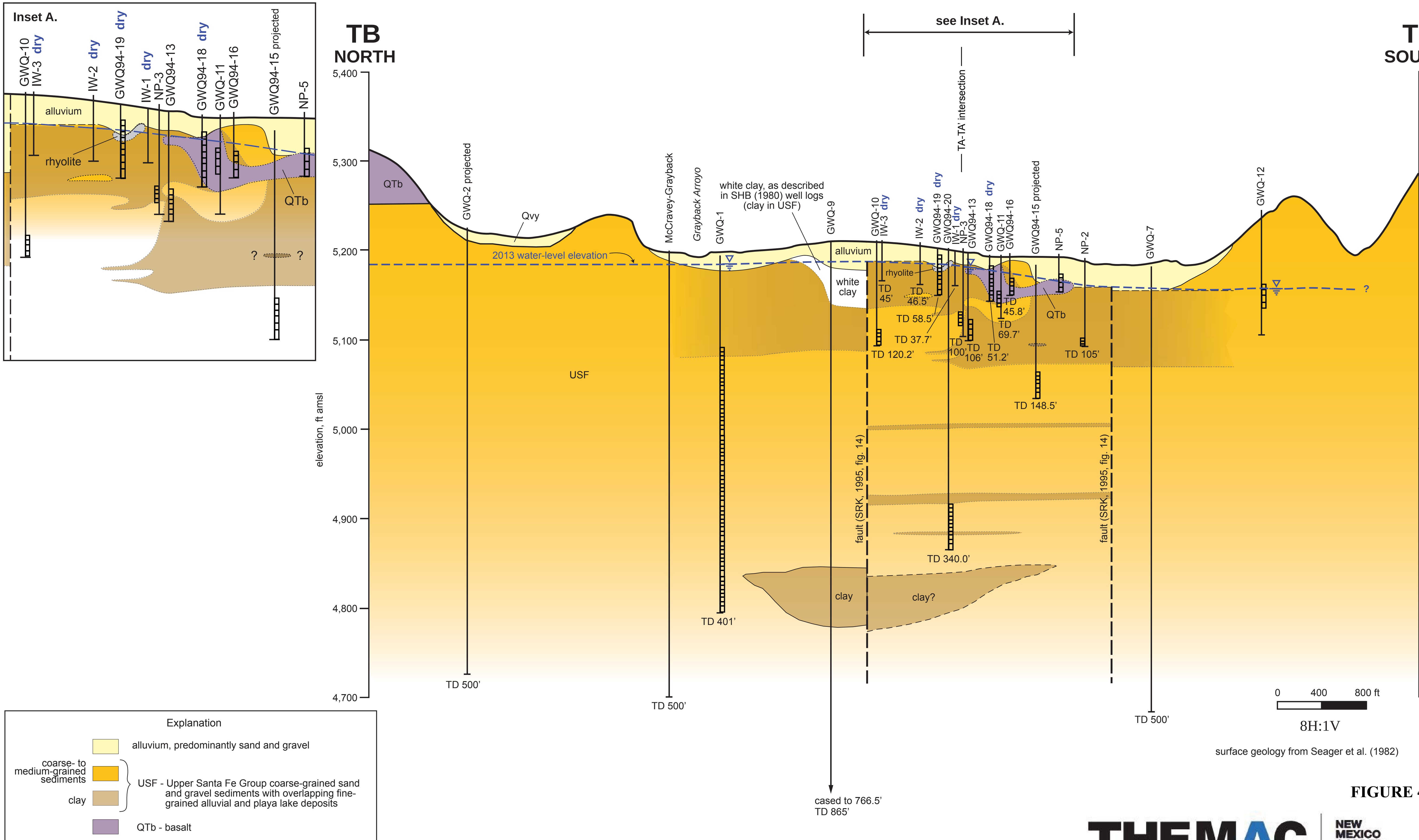

FIGURE 4-6

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FIGURE 4-6: North to south geologic cross-section TB-TB' through the tailings storage facility (TSF) area, Copper Flat Mine, Sierra County, New Mexico. (Reference Figure 4-2)

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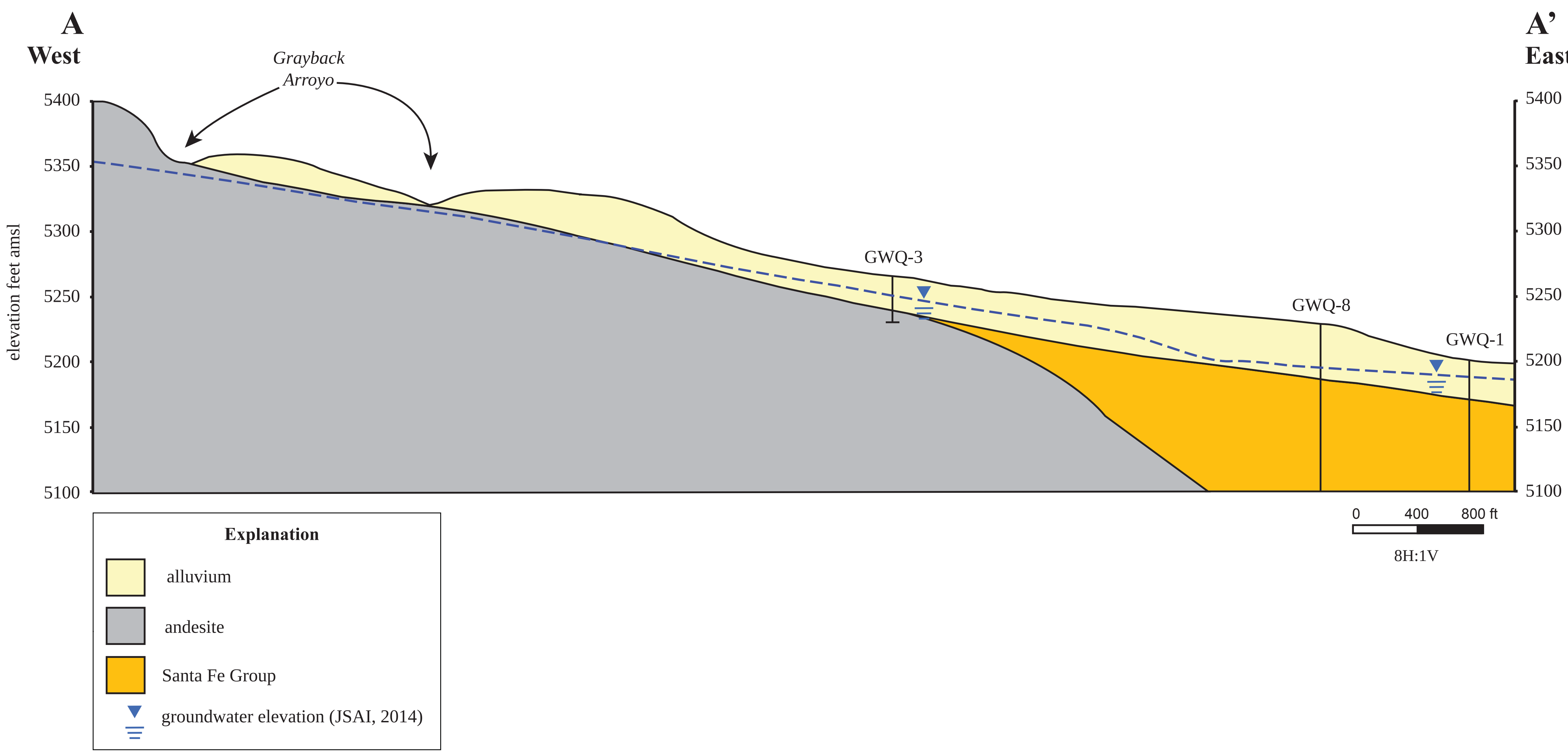

FIGURE 4-7: West to east geologic cross-section along Grayback Arroyo, Copper Flat Mine, Sierra County, New Mexico. (Reference Figure 4-2)

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defines the eastern edge of the Animas Uplift. The Santa Fe Group deposits in the mine permit area are located west of the East Animas Fault. As indicated above, Figures 4-5 through 4-7 present hydrogeologic cross-sections showing geologic formations, water-bearing formations, and groundwater depths.

Most of the precipitation that recharges the groundwater system at the facility originates in the upper part of the watersheds to the west of the mine permit area. The main groundwater systems in the region are found in Santa Fe Group sedimentary deposits downstream of the mine permit area, with groundwater conveyed through more permeable Paleozoic sedimentary rocks located to the north and south of the facility. Runoff from Grayback Arroyo infiltrates the Santa Fe Group sedimentary deposits downstream of the mine permit area.

4.1.2 Implementation of MAT and BMPs at Copper Flat

Table 4-1 presents a summary of the potential sources of water constituents, discharge types, and locations at Copper Flat. Figures 2-2 and 2-14 show the locations of the potential sources during operations. The potential pathways for migration of constituents to ground water identified in Table 4-1 could potentially source from direct infiltration into the water bearing formations, release of fluids to the surface, or run-on and runoff of precipitation through and off of the site. NMCC has designed the Copper Flat facilities to maximally incorporate MAT and BMPs to protect human health and the environment based on site-specific technical and economic feasibility as discussed below.

Tailings Storage Facility (TSF)

The TSF will be a lined impoundment with an associated underdrain collection system and underdrain collection pond for the impoundment and the dam. It will also include a water reclaim or recycle system to increase water reuse. The TSF also includes a cyclone plant to separate the tailings coarse and fine fractions and a surge pond to handle potential upset conditions at its Copper Flat Project. The location of the proposed new TSF is shown in Figure 2-2. Appendix A provides the technical design detail for the TSF. The TSF will be constructed using the coarse tailings sands materials produced from processing the ore for its mineral content. Whole tailings material will be transported via a pipeline from the processing facility to the TSF and delivered to the cyclone plant where sands and slimes fractions will be separated. The coarse or sand fraction of the tailings, or cyclone underflow, will then be pumped to the TSF for use in construction of the dam. The slimes or fines fraction of the tailings, or cyclone overflow, will be pumped to the TSF and deposited in the impoundment that will form behind the dam. Storm water run-on will be diverted around the tailings impoundment as shown in Figure 2-21. The diversion ditches are designed to be able to safely pass the peak flow generated by the 100-year storm event. The tailings impoundment will be lined with an 80-mil HDPE, or equivalent liner, placed on a minimum 12-inch thick liner

TABLE 4-1
Potential Sources of Water Constituents, Discharge Types, and Locations

Potential Source	Discharge Type	Source Location
Tailings Storage Facility (TSF)	Tailings, process water and impacted storm water	Southeast area of site
TSF cyclone plant surge pond	Tailings	Southeast area north of TSF
Tailings slurry pipeline conveyance	Tailings	Process Area to TSF Permit Area Boundary
TSF water recycle system-under-drain collection pond	process water and impacted storm water	Eastern edge of site
TSF water recycle system pipeline conveyances	Process water and impacted storm water	TSF area to process water reservoir
Process water reservoir	Process water and impacted storm water	East-central area of plant site
Impacted storm water impoundment A	Impacted storm water and process water	Plant site Area
Impacted storm water impoundment B	Impacted storm water	Southwest corner of WS B
Impacted storm water impoundment C	Impacted storm water	Southeast corner of WS C
Waste Rock Stockpile (WRSP)-1	Impacted storm water	Western side of Watershed (WS) A
WRSP-2	Impacted storm water	Western portion of WS B
WRSP-3	Impacted storm water	Eastern portion of WS B
Open Pit	Impacted storm water, mine water	Western side of site
Material handling and processing-primary crushing	Process water	Central portion of site within WS A
Material handling and processing-crushing and grinding	Process water	Central portion of site within WS A
Material handling and processing-flotation and concentration	Process water	Central portion of site within WS A
Plant site sumps, tanks, pipelines and truck and equipment wash units	Process water	Central portion of site within WS A
Packaged water treatment plant	Influent sanitary waste, treated effluent water to the TSF	Central portion of site within WS A
Mobile Equipment Fuel Station	Petroleum Products-Diesel, Gasoline, Oil	Central portion of site within WS A

bedding fill material. An underdrain collection system will be installed on top of the liner as described in Appendix A to collect free water that drains from the contents of the impoundment. The collected water will drain via a collection gallery into an underdrain collection pond constructed at the foot of the impoundment dam outside of the dam structure as shown in Figure 2-2 and the design document.

A blanket underdrain collection system will also be installed under the dam to collect and water that drains from the tailings sands used to construct the dam. As the dam drains its free water, it will consolidate the sand material and add stability to the dam. The water captured by the blanket underdrain will also be collected in the undrain collection pond. The underdrain collection pond itself will have a double liner of 60-mil HDPE, or equivalent, and will be equipped with a leakage collection system to detect and collect any leakage through the primary liner layer.

The underdrain collection pond will also provide the collection point for surface water runoff from the down-slope face of the dam. As shown in Figure 2-22, the dam will be constructed in several phases. The dam will be constructed using an engineered material placement technique known as "centerline" construction. During reclamation, inter-benches will be cut into the face of the dam that will provide the location for the placement of runoff collection ditches to capture runoff and route it to the runoff collection trench at the toe of the dam. The runoff collection trench will be lined with 60-mil HDPE as described in Appendix A.

Water from the runoff collection trench will be routed to the underdrain collection pond. The water from the pond will continually be pumped back to the process water reservoir for reuse in processing. The pipeline that transports this water back to the process facility from the underdrain pond will be installed within the lined runoff collection trench, around the TSF as shown in Figure 4-8 and described in Appendix A. Should there be any leakage or spillage from the pipeline, it will simply run back via gravity to the underdrain pond. The underdrain collection pond will be sized to contain 24 hours of underdrain flow at maximum estimated drainage rates from the dam and impoundment underdrains, as well as runoff from the 100-year, 24-hour storm event of 3.73 inches incident on the downstream dam face. The pond capacity will be approximately 12.22 million gallons with 2 feet of freeboard.

The TSF will be equipped with a floating water reclaim barge located in the pond within the impoundment. The purpose of the barge is to pump as much free water as possible gathered within the impoundment back to the process water reservoir for reuse in the process. The water reclaimed from the tailings impoundment will be transported back to the process facility through a pipeline located within a trench lined with 60-mil HDPE that will provide secondary containment in the event of a spill or leak in the line. This lined trench will also contain the tailings pipeline that will transport whole tailings from the processing facility to the cyclone plant describe above. The pipeline from the underdrain collection pond to the process facility will combine with the barge reclaim water pipeline up-gradient of the TSF as shown in Figure 4-8.

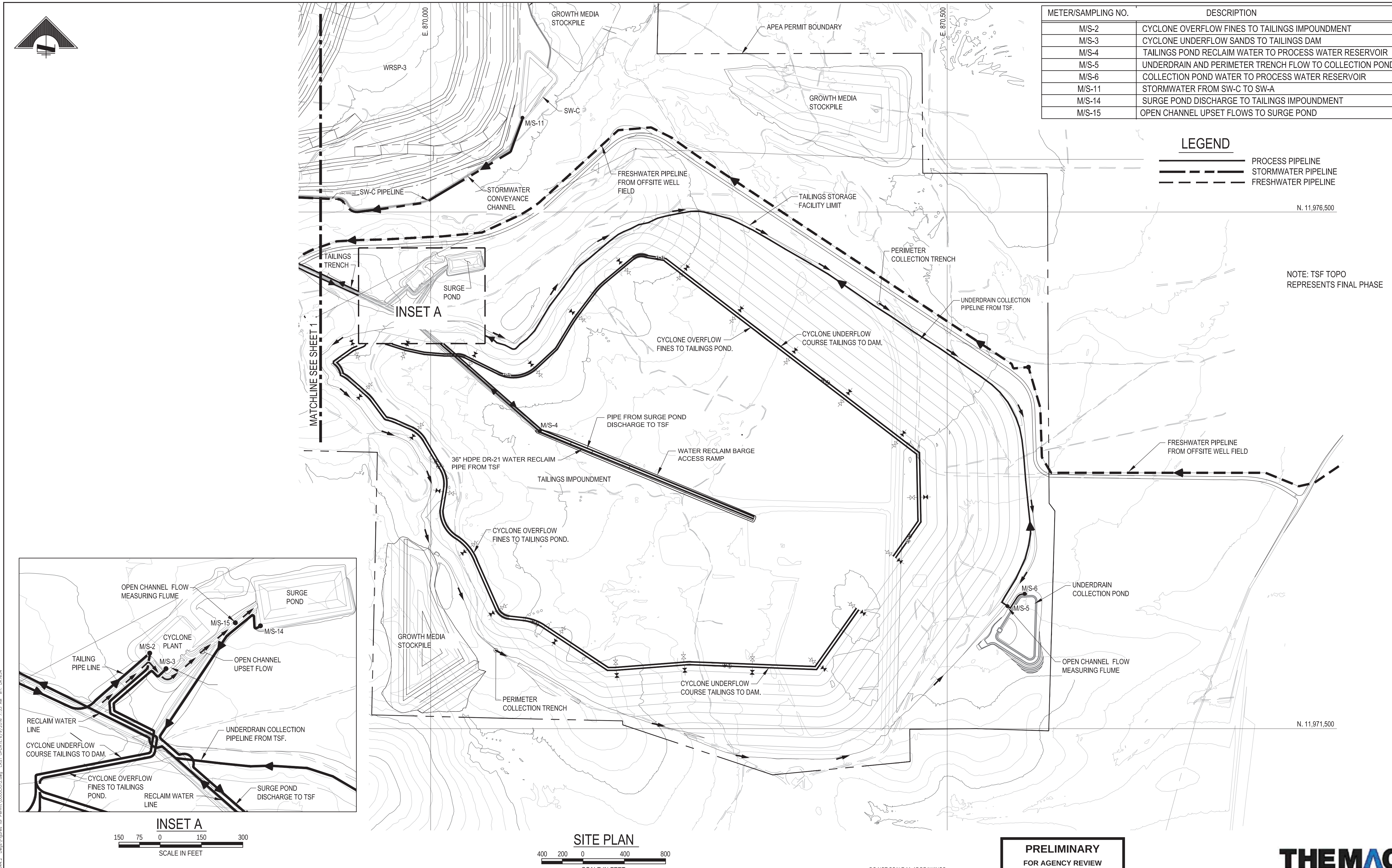
The TSF will also have an associated surge pond locate at the cyclone plant. The purpose of the surge pond will be to capture and temporarily retain tailings materials in the event of a

METER/SAMPLING NO.	DESCRIPTION
M/S-2	CYCLONE OVERFLOW FINES TO TAILINGS IMPOUNDMENT
M/S-3	CYCLONE UNDERFLOW SANDS TO TAILINGS DAM
M/S-4	TAILINGS POND RECLAIM WATER TO PROCESS WATER RESERVOIR
M/S-5	UNDERDRAIN AND PERIMETER TRENCH FLOW TO COLLECTION POND
M/S-6	COLLECTION POND WATER TO PROCESS WATER RESERVOIR
M/S-11	STORMWATER FROM SW-C TO SW-A
M/S-14	SURGE POND DISCHARGE TO TAILINGS IMPOUNDMENT
M/S-15	OPEN CHANNEL UPSET FLOWS TO SURGE POND

LEGEND

- PROCESS PIPELINE
- STORMWATER PIPELINE
- FRESHWATER PIPELINE

NOTE: TSF TOPO REPRESENTS FINAL PHASE



DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

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REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: AS NOTED	DATE
DESIGNED BY SAM	FEB 13
DRAWN BY SAM	FEB 13
CHECKED BY TDL	FEB 13
PROJECT MGR RKZ	FEB 13
CLIENT APPR.	

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COPPER FLAT PROJECT

SITE GENERAL CIVIL PIPELINES AND FLOWMETER LOCATIONS SHEET 1

JOB NO. M3 PN-120085
DWG NO. **FIGURE 4-8**
REV NO. P2 DATE 09 JUN 16

temporary upset in the cyclone plant and provide temporary storage in the event that an upset occurs in the cyclone circuit. The surge pond will be lined with a 60-mil HDPE liner. Under normal operating conditions the surge pond will be dry. However, it has been designed so that it can hold flows for one-half hour from maximum upset conditions that occur at the process facility plus maximum upset conditions at the cyclone plant both occurring during a 100-year, 24 hour precipitation event plus two feet of freeboard, all happening at the same time. Dedicated pumps will begin to evacuate the surge pond to the TSF at a pre-determined capacity of the pond within a half-hour of such an event occurring. In addition, the pumps will be tied into the emergency diesel power system located on-site in case of power is lost to the facility.

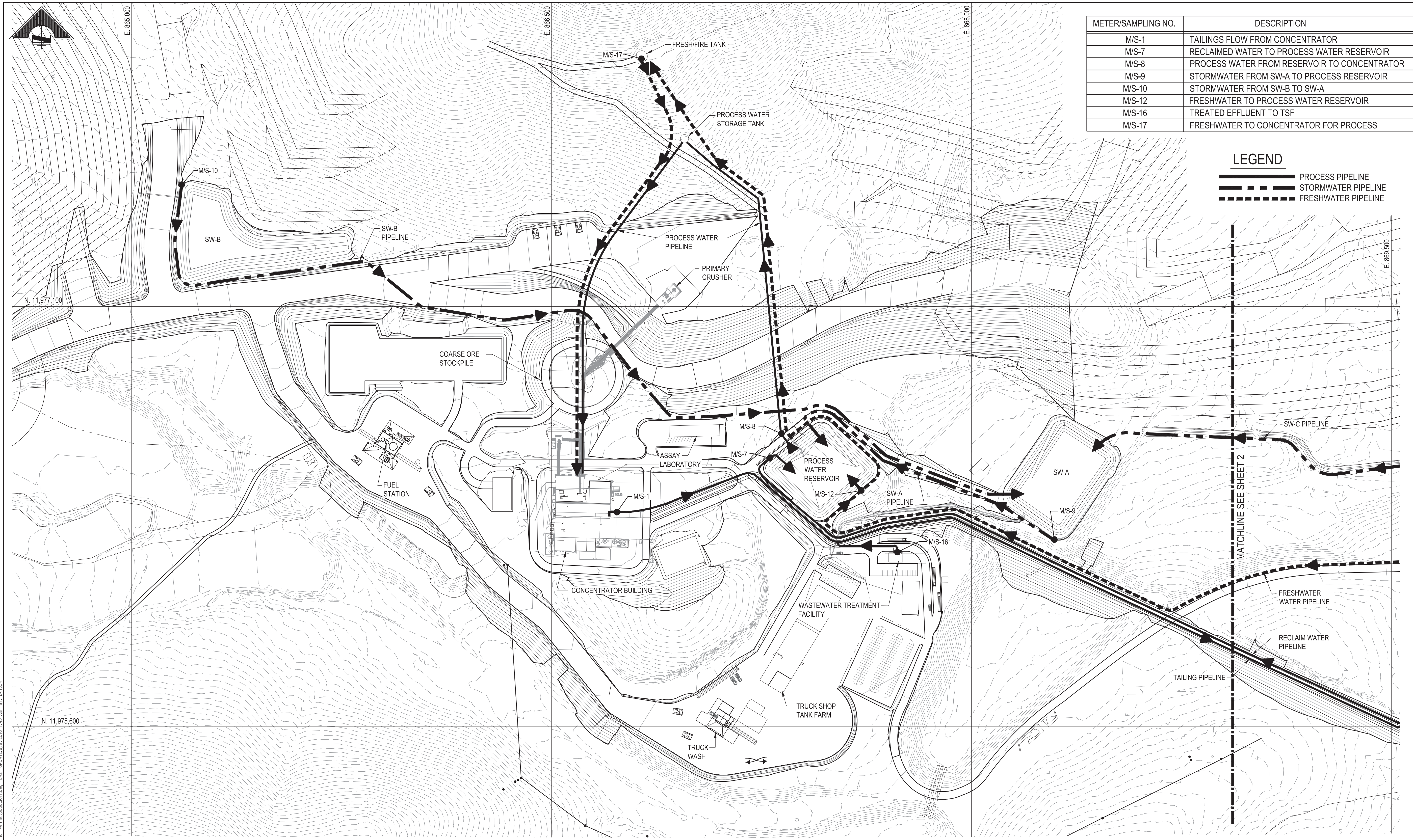
The use of MAT and BMPs at Copper Flat will extend to reclamation and closure of the TSF as described in detail in the Reclamation and Closure Plan. Surface re-grading of the tailings impoundment at closure will be performed that will provide a stable configuration to minimize ponding and promote conveyance of surface water. The final grade of the top surface of the re-contoured impoundment will be at least 1.0% after accounting for the magnitude and location of large-scale settlement of tailings.

Re-grading and contouring of the TSF to its post-mining configuration will begin at the end of the project life after it has been determined that sufficient water has been removed by the underdrain system. Because the Copper Flat TSF will be constructed with an engineered underdrain system, prior to conducting final grading activities NMCC will ensure that adequate drainage of the impoundment has occurred to ensure that large-scale settlement following grading is minimized. Consolidation drainage into the underdrain system is anticipated to continue at declining rates for a period following the cessation of tailings discharge operations. Underdrain water collected will be pumped from the underdrain collection pond and disposed of via evaporation utilizing active and passive systems as described in the TSF Post-Operations Water Management Plan, Attachment E2, of Appendix E.

A 36-inch topdressing soil cover will be placed on the top surfaces of the tailings impoundment and embankment out-slopes as described in Appendix E. The cover area will be seeded. Riprap and other erosion control structures will be placed as necessary in the drainage channels.

Other Impoundments, ponds and reservoirs

All of the impoundments, ponds and reservoirs will be lined with synthetic liner materials as described in more detail above and in Appendix B. In brief, the three impacted storm water impoundments and the surge pond will be lined with 60 mil HDPE liners. The process water reservoir will be double-lined with 60 mil HDPE liners and a leak collection system. There will also be a number of runoff collection trenches and water conveyance ditches constructed at Copper Flat to collect and convey water to the various water retaining structures as shown in Figures 4-8 and 4-9 and described in Appendix A and B. The trenches will have a 60 mil HDPE



METER/SAMPLING NO.	DESCRIPTION
M/S-1	TAILINGS FLOW FROM CONCENTRATOR
M/S-7	RECLAIMED WATER TO PROCESS WATER RESERVOIR
M/S-8	PROCESS WATER FROM RESERVOIR TO CONCENTRATOR
M/S-9	STORMWATER FROM SW-A TO PROCESS RESERVOIR
M/S-10	STORMWATER FROM SW-B TO SW-A
M/S-12	FRESHWATER TO PROCESS WATER RESERVOIR
M/S-16	TREATED EFFLUENT TO TSF
M/S-17	FRESHWATER TO CONCENTRATOR FOR PROCESS

SITE PLAN

150 75 0 150 300
SCALE IN FEET
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1"= 150'		DATE
DESIGNED BY	SAM	FEB 13
DRAWN BY	SAM	FEB 13
CHECKED BY	TDL	FEB 13
PROJECT MGR	RKZ	FEB 13
CLIENT APPR.		

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PIPELINES AND FLOWMETER LOCATIONS
SHEET 2

JOB NO. M3 PN-120085
DWG NO. **Figure 4-9**
REV NO. P2
DATE 09 JUN 16

liner, with exception of those trenches located at the WRSPs that are constructed into the impermeable bedrock as discussed earlier herein. The use of this MAT and BMPs will significantly mitigate against the potential for these structures being a pathway for migration. All of the impoundments, ponds, reservoirs, and conveyance ditches are designed to eliminate run-on and capture runoff to the maximum extent possible and contain storm events in accordance with the requirements of the NMED Copper Rules as described in the NMCC DP application during operations.

At reclamation/closure the impoundments, ponds and reservoirs will be decommissioned, the liners ripped and buried in place and the areas regraded, re-contoured, covered with top dressing and vegetated. The details of the reclamation/closure actions to be taken are described in Appendix E.

Waste Rock Stockpiles

As discussed in more detail above, the waste rock stockpiles will be constructed over bedrock that has a permeability of 10^{-6} cm/sec. As such, these areas will not require lining. While the waste rock stockpiles represent a potential source of migration on constituents to ground water, that potential is significantly mitigated by the natural barrier to migration that exists. The waste rock stockpiles also represent sources of potential pathways for migration of constituents to surface water. However, as discussed in detail above, each of the waste rock stockpile areas will be constructed within a developed watershed designed to eliminate run-on, control and capture runoff in a lined impoundment.

Surface water diversion ditches and swales will be constructed within the waste rock stockpile areas to divert water to the impoundments at a controlled rate while reducing the potential for ponding and infiltration. In addition, the WRSPs have been designed and will be constructed in a manner to promote contemporaneous reclamation to the extent practicable such that 3 feet of cover materials will begin to be placed on them, as discussed in Sections 3.4 and 4.2, and Appendix E.

These MATs and BMPs utilized at the WRSPs will provide appropriate protection of human health and safety, the environment, wildlife and domestic animals. During operations the waste rock stockpiles will be constructed to facilitate re-grading during reclamation such that inter-bench slope faces will be 3H:1V or flatter and shaped to enhance runoff and prevent infiltration and ponding. Inter-bench slopes lengths will be no longer than 200 ft. The composite overall slope, which includes the inter-bench slopes and benches, will be 3H:1V or flatter.

All of the WRSPs will be reclaimed in accordance with the approved Reclamation and Closure Plan. The side-slopes will be reconfigured, as needed to meet the requirements of the NMED

Copper Rules and the Mining Act regulations. The details of the reclamation/closure actions to be taken are described in Appendix E.

As discussed above, waste rock will be managed during operations based on NMCC's operations material characterization program and predictive geochemical modeling. Contemporaneous reclamation to the extent practicable, materials management and surface water control measures will be used to maximize runoff, reduce infiltration, and reduce contact with the air, thus minimizing the potential for acid generation. The top surfaces of the waste rock stockpiles will be designed and constructed to a minimum final grade of 1%. The potential for ponding on the final surface will be reduced by careful contouring of the surface.

The waste rock stockpiles will be reclaimed at the end of the life of operations by re-grading re-contoured, as necessary, and a 36-inch soil cover will be placed over the stockpiles, unless NMCC can demonstrate a thinner cover will resist erosion, sustain vegetation and be equally protective of groundwater considering site-specific reclamation plans for the facility in conformance with the NMED Copper Rules. The cover area will be seeded thereafter as soon as practicable. The top surfaces of the stockpiles will be graded to promote positive drainage to storm water conveyance channels. These channels and hydraulic structures will be designed to control erosion on the top surfaces and out-slopes and safely convey storm-water off of the stockpile areas. Cross bench drainages will be trapezoidal and constructed to safely convey storm-water off reclaimed slopes for a 100-year precipitation event that results in the peak discharge. Longitudinal slopes for these drainages will be 1 to 5 percent. Energy-dissipation structures will be constructed at channel outlets to reduce erosive velocities where necessary. Where possible, channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock, which will promote long-term integrity of the structures. The final designs will be adjusted for local conditions. Temporary erosion control measures will be provided during the reclamation construction and early vegetation establishment periods. These control measures include mulch, straw bales, silt fences and minor corrective re-grading, as necessary.

Process Area

The process area also represents a source of potential migration of constituents to ground water and surface water. With respect to ground water, the potential pathways for migration exist largely in the form of process water handling within the process, in particular at sumps that hold and transfer water from one part of the process to another. The sumps in the process area, including the crushing and grinding and flotation and concentrating areas, are designed and will be constructed using MAT techniques such as water-stops and single monolithic pours to reduce the likelihood of release.

With respect to the potential for release to surface water, the process area will be constructed within a developed watershed that will be graded such that run-on will be eliminated and runoff will be controlled and captured in the lined impacted storm water impoundment A, as shown in Figure 4-9. Water from all of the process facilities, material handling areas, parking areas, storage areas, chemical and fuel inventory areas and pipeline surface areas will be routed to the impoundment.

Also, as noted above, tailings from the process facility will be transported through a pipeline to the cyclone plant. The tailings pipeline will be laid within the same trench as described above that will contain the water reclaim line from the TSF to the process water reservoir. This trench, shown in Figures 4-8 and 4-9, will provide secondary containment for all process water in the event of an upset condition in the process area and/or a significant precipitation event that may cause the process water reservoir to overflow. As discussed in detail in Appendix C, the process area has been designed such that all process water can be captured into this "secondary containment trench" and routed to the surge pond described above. From the surge pond, captured process fluids will be pumped to the TSF.

4.2 Contemporaneous Reclamation – 19.10.6.603.B

The concept of contemporaneous reclamation, operating-for-closure, or "designing for closure", is a means by which NMCC will reduce erosion, provide early impact mitigation, limit costs and reduce final reclamation work. NMCC is committed to maximizing this type of reclamation at the Copper Flat Project where feasible. It has designed mine facilities to employ contemporaneous reclamation to the extent appropriate and practicable. Section 3.4 of this MORP update and the Reclamation and Closure Plan contain a detailed discussion of the contemporaneous reclamation activities that NMCC will undertake to take maximal advantage of site-specific conditions accomplish optimal closure of the site at the end of the mine's life.

4.3 Assure Protection – 19.10.603.C

NMCC has designed its Operations and its Reclamation and Closure Plan to assure protection of human health and safety, the environment, wildlife and domestic animals. Mine development and operation activities will also be implemented to assure that protection.

4.3.1 Signs, Markers and Safeguarding – 19.10.6.603.C.(1)

NMCC will implement and maintain safeguarding measures such as signs, markers, fences and barricades to protect the public, wildlife and domestic animals from potentially dangerous areas associated with the Project. Access to the permit area will be controlled at all times during mining operations and reclamation phase to protect the public from possible injury due to operating conditions such as heavy equipment and truck traffic. All personnel entering the site will be checked in, receive site-specific safety training and will be escorted by trained personnel.

Shafts, Adits or Tunnels – 19.10.603.C.(1)(a)
This Section does not apply to the Copper Flat Project as no underground workings are proposed. However, some historic underground mine workings exist within the permit area and will remain at closure. These historic workings have been and remain the responsibility of federal government. Nonetheless, because the existence of these workings have the potential to attract interest as a result of the increased activity at the site, NMCC will work with the BLM to ensure that they are appropriately safeguarded from unauthorized entry.

Warning Signs – 19.10.6.603.C.(1)(b)
NMCC will comply with the specific standards and regulations with respect to warning signage for mine operations and visitors as required by MSHA. Appropriate warning signs will be posted at strategic locations at the Copper Flat Project site around the perimeter and across the mine permit area beginning with the initial construction period, through mine operations until the completion of reclamation, as appropriate. Other markers or signs may be posted based on the facilities or activities at specific times.

Access Restriction to Hazardous Areas – 19.10.6.603.C.(1)(c)
All hazardous areas within the perimeter of the proposed permit area, such as ponds, electrical installations, power lines, reclaimed areas, explosives storage areas, etc., will be fenced and posted with appropriate warning signs.

Permit Area Boundaries – 19.10.6.603.C.(1)(d)
The mine permit boundary will be fenced and posted with signs warning of unauthorized entry and stating the appropriate hazard warning. A single public access point will be established at the main entrance to the mine site. Fences and locked gates will be placed at all secondary road entrances to the proposed permit area.

Main Entrance Signage – 19.10.6.603.C.(1)(e)
The main entrance to the site will have a security guard in a gatehouse to stop and check in personnel and visitors. Signs will be posted at the main entrance identifying the Project, the operator and a telephone number and other contact information in the event of emergencies related to the mining operation.

4.3.2 Wildlife Protection – 19.10.6.603.C.(2)

Construction, operations and reclamation phases of the Project will not impact critical habitat for wildlife based on wildlife studies conducted on site. Physical disturbances will be limited to only those areas needed for mine facilities and access, minimizing impacts to surrounding habitat that may be used by wildlife. Construction activities such as land clearing and surface disturbance will be conducted, to the extent practicable, in a manner to minimize disturbance to active bird nests and/or birds' young, if possible, and to prevent habitat destruction whenever possible. The services of qualified biological consultants will be retained to provide assistance to NMCC in evaluating areas prior to the occurrence of construction disturbances to provide recommendations on the manner to proceed in the event of the presence of active nests during construction. Reasonable attempts will be made to minimize disturbances to active nests and/or mating bird pairs. Electric transmission or physical power poles will be constructed in a manner to protect raptors from potential electrocution hazards.

NMCC will take measures to minimize adverse impacts on wildlife and important habitat, including the installation of fencing around the perimeter of the permit area boundary to restrict humans and livestock entry to the Project area. Special wildlife exclusion fencing will be used in specific high hazard areas such impoundments, electrical substations and reagent areas. Gates and/or cattle guards will be installed along roadways within the proposed permit area, as appropriate. Because all of the impoundments and ponds are lined with HDPE it will be necessary to make every effort to deter access by wildlife and domestic animals and keep them off of the liner in order to protect its integrity and minimize the potential of puncture. At more remote locations at the site where there is less human activity and wildlife and domestic animals may be more likely to be enticed, it may be necessary to provide additional barriers such as individual exclusionary fencing to deter trespass. All of the ponds and impoundments (with the exception of the tailings impoundment) have been designed with an escape ramp so that an animal that may find its way into the pond may be able to get out.

Reclamation of the site will be performed with the goal of re-establishing the land use of the site as grazing and wildlife habitat, as it is today. Grading, re-contouring, covering and re-establishing vegetation at the site in accordance with the approved Reclamation and Closure Plan will allow NMCC to meet this goal.

4.3.3 Cultural Resources – 19.10.6.603.C.(3)

NMCC conducted cultural resource investigations as part of its baseline data gathering efforts to develop the information needed to assess the potential impacts of the proposed project on cultural resources and to meet compliance requirements for applicable State and Federal regulations, particularly Section 106 of the National Historic Preservation Act as part of its baseline data gathering efforts (Intera 2012). These investigations were conducted in accordance with State and Federal standards, and included survey and tribal consultation. Section 3.13 of the BLM DEIS contains a detailed discussion of the cultural resource considerations applicable to the Copper Flat Project.

In its evaluation in the DEIS, the BLM determined that there would be a significant impact to historic properties from development of the Copper Flat Project that would result in an adverse effect to historic properties. The majority of these impacts would occur due to facility construction, surface activities at the mine area, removal of mineralized ore, and traffic. BLM has determined that prior the commencement of any mine development activities that it will complete Section 106 consultation with the Advisory Council on Historic Preservation, State Historic Preservation Office (SHPO), Tribes, and NMCC. The purpose of the consultation will be to develop measures to avoid, minimize, or mitigate the adverse effects to historic properties. A Programmatic Agreement (PA) will be developed for signature by the parties, which will document the measures to be implemented. The following measures to avoid, minimize, or mitigate adverse effects are examples that may be considered and included in the PA:

- Conducting data recovery excavations of archaeological sites;
- Fencing of sites and activity areas to prevent impacts;
- Implementing a monitoring program to ensure avoidance measures are effective, and to modify such measures if not effective;
- Implementing standard best management practices during construction and operations activities to control erosion and changes to erosion patterns;
- Training of NMCC construction, operations, and reclamation personnel and contractors to recognize when archaeological resources or human remains have been discovered, to recognize when inadvertent damage has occurred to a resource, to halt ground disturbing activities in the vicinity of the discovery, and to notify appropriate personnel; and
- Educating NMCC personnel and contractors on the importance of cultural resources, the laws and regulations protecting cultural resources, the need to stay within defined work zones, and the legal implications of vandalism and looting.

The PA will describe the processes to be followed in the event that previously unknown cultural resources or human remains are discovered during construction or operation of the selected alternative, and will address processes to be followed in the event that inadvertent physical damage to an historic property occurs. While the effects to the resources will remain, the PA and the measures contained within it will resolve these effects and reduce the significance of the impacts. The PA will address all effects to historic properties, and will document NMCC's, the BLM's, and other regulatory agencies' commitment to ensure that the mitigation measures are implemented.

NMCC is committed to this PA process. Roads and project facilities at Copper Flat will be sited as much as possible to avoid cultural resource impacts. If avoidance is not possible or is not adequate to prevent adverse effects, NMCC will undertake data recovery from such sites. Development of a treatment plan, data recovery, archeological documentation and report preparation will be based on the Secretary of the Interior's "Standards and Guidelines for

Archeology and Historic Preservation," 48 CFR § 44716 (September 29, 1983), as amended or replaced. If an unevaluated site cannot be avoided, additional information will be gathered and the site evaluated. If the site does not meet eligibility criteria as defined by the New Mexico SHPO, no further cultural work will be performed. If a site meets eligibility criteria, a data recovery plan or appropriate mitigation will be completed.

An archaeologist will be consulted prior to and during construction to advise NMCC and its contractors and to issue clearances, as necessary, for construction activities and provide guidance and expertise to ensure the protection of cultural properties. The appropriate agency will be notified immediately if additional cultural sites are discovered during these activities. Mitigation strategies will be developed in consultation with the agency.

4.3.4 Hydrologic Balance – 19.10.6.603.C.(4)

NMCC has planned and designed operations of the Copper Flat facility in such a manner to minimize change to the hydrologic balance in the permit area and potentially affected areas. As discussed in Section 3, above, the resulting post-mining reclamation hydrologic balance will be similar to the pre-mining hydrologic balance. The following discussion addresses the methods by which NMCC will ensure this balance occurs.

Non-point Source Surface Releases of Acid or Other Toxic Substances – 19.10.6.603.C.(4)(a)

NMCC has designed and will operate the Copper Flat facility such that no releases of acid or other toxic substances will occur. To the extent that unanticipated releases may occur, all such releases will be contained within the permit area. Because the design of the facility contemplates retaining all surface flows in impoundments and/or ponds with no release of surface flows from the disturbed area, no treatment will be required. Sources of potential non-point source surface water drainage at Copper Flat include; the mine pit, the process plant area, the WRSPs and the TSF. All of these areas and their surface water protection features have been discussed earlier herein.

Surface water drainage in the area of the open pit is into the OPSDA. As such, no non-point source or releases off of the permit area from this location can or will occur as the open pit will act as a hydrologic sink for surface and ground water during and after operations.

The likelihood of acid generation from waste rock is very small (as discussed in Section 3.3, above); therefore, its release as a non-point source to the surface unlikely. NMCC has designed waste handling and disposal plans for the WRSPs as discussed in Sections 2.2.11 and 3.3.2. Surface water runoff and surface water that may manifest itself as a "seep" in the WRSP that could result from percolation of precipitation through the stockpile will be captured in runoff collection trenches and routed to lined impoundments. Water captured in these impoundments will, in turn, be evacuated to the double-lined process water reservoir located in the process plant area, within thirty days of capture (per the NMED Copper Rules) for use in the process. Therefore, non-point source releases from the WRSPs will not occur.

In addition to the WRSPs that will be constructed per NMCC's proposal, there are four existing waste rock stockpiles on-site, i.e., EWRSP-1, EWRSP-2A and 2B, EWSRP-3 and EWRSP-4 as shown in Figure 2-2. EWRSP-1 and EWRSP-2B are located in the OPSDA and, as such, will not contribute non-point source releases during operations. EWRSP-2A is located in the area where WRSP-1 will be constructed and will be incorporated into it during operations. Thus, it will not contribute non-point source releases during operations. However, currently the westernmost edge of EWRSP-1 and the northernmost edge of EWSRP-2A may be contributing surface water runoff away from the site. NMCC will reclaim these areas as described in the Reclamation and Closure Plan so that no non-point source releases occur from them.

As shown in Figure 2-21, the TSF is designed so that no non-point source releases occur from the facility. Run-on into the location of the TSF will be diverted around and away from the TSF. Tailings water will be retained in the lined impoundment behind the dam and will be recycled utilizing a floating water reclaim barge in the impoundment and an underdrain collection system at the bottom of the impoundment. Drainage collection trenches will be constructed on the out-slope side of the tailings dam to capture and direct runoff to the lined underdrain collection pond. An underdrain collection system will also be placed under the dam to collect water that drains from the dam and routed to the pond. The water in the pond will be pumped back to the process water reservoir for reuse in the process. Therefore, there will be no non-point source releases from the TSF.

Surface water runoff from the process plant area will be captured in a lined impoundment. That water will also be pumped to the process water reservoir for use in the process. Sources of potential non-point source releases in this area include the primary crusher and ore storage pile, the grinding and concentrator facilities, the reagent storage areas and two existing waste rock stockpiles, EWRSP-3 and EWRSP-4. . All surfaces will be graded to drain into contained area or impoundment. Therefore no non-point source releases will occur from plant area.

EWRSP-4 will be graded and contoured to be utilized as an equipment lay-down area. Runoff from EWRSP-4 will be routed to the mine pit during operations. The southern exterior of EWRSP-4 will be reclaimed during operations as described in the Reclamation and Closure Plan to ensure that no non-point source surface releases of acid or other toxic substances occur.

Control of Suspended Solids – 19.10.6.603.C.(4)(b)

Sediment control will be achieved by the use of BMPs to stabilize the site and ensure that the permit area does not contribute suspended solids above background levels, or if applicable above the Water Quality Control Commission's standards, to intermittent and perennial streams. All of the water courses in the permit area and the potentially affected areas are ephemeral, flowing only in response to precipitation events. This condition notwithstanding, the following types of BMPs may be utilized and maintained, as needed during construction, operation and reclamation/closure of the facilities:

- Fiber rolls (waddles)
- Ditches/swales
- Diversion channels
- Energy dissipaters
- Slope drains
- Sediment traps and fences
- Stilling basins
- Impoundments and ponds

A SWPPP will be developed for the permit area that outlines the mechanisms to control storm water run-on and runoff from disturbed areas. The SWPPP will be based on the final mine design. Mine employees will be trained to its requirements prior to commencement of construction and/or mining operations.

Roads will be constructed with a center crown to direct storm water to the side ditches. The ditches will have sediment control features such as water bars, fiber rolls or other traps to reduce sediment if the water enters an arroyo. These sediment control devices will be placed around construction or operational areas for temporary surface disturbance activities. Grading, revegetation, where appropriate and/or necessary and concurrent or contemporaneous reclamation will also be utilized as sedimentation control mechanisms.

Background Surface Water Quality – 19.10.6.603.C.(4)(c)
As part of the baseline study previously submitted, NMCC installed a surface water sampler where Grayback Arroyo enters the proposed mine permit boundary. The sampler is designated as SWQ-1 in Figure 8-7 of the BDR. This sampler was dry on each quarterly sampling event during the baseline study. However, continued sampling has continued since that time and any results that become available will be reported to establish background surface water quality.

Diversions of Overland Flow – 19.10.6.603.C.(4)(d)
NMCC's design of the Copper Flat facility includes several diversion structures to control overland flow of water at the site including runoff control and diversion ditches at the WRSP facilities, in the plant process area and at the TSF. The design specifications for these structures can be found in the various Appendices included in this MORP update. These structures have been designed and will be constructed and maintained to minimize adverse impacts to the hydrologic balance and assure public safety in accordance with the requirements of the

performance and reclamation standards and requirements of the Mining Act regulations and the requirements of the NMED Copper Rules.

Slope stability is of utmost importance in construction and operation of the Copper Flat facility. None of these structures will be located so as to increase the potential for landslides. All of the structures are designed to safely pass the peak runoff from a 100 year, 24 hour precipitation event and have been certified by a professional engineer registered in New Mexico as having been designed in accordance with 19.10 NMAC and the NMED Copper Rules. A complete set of diversion design documents will be kept on-site for inspection by the Director or his designee. When no longer needed, upon completion of reclamation/closure of the site, temporary diversions will be removed.

4.3.5 Stream Diversions – 19.10.6.603.C.(5)

NMCC does not propose to construct any stream diversions at the Copper Flat facility. There is a permanent existing diversion of Grayback Arroyo, an ephemeral watercourse that transects the site from west to east that will be maintained to continue to divert water safely around and through the site. NMCC has performed a diversion analysis to determine the ability of this diversion to protect the site. The report of this analysis is contained in Appendix D of the MORP update. The 24-hour storm flows for 100-year, 200-year and 550-year return periods were evaluated for the existing diversion structure. The report concludes that the existing diversion structure is protective of the site. The report also recommended minor repair and maintenance of the upstream inlets of the culverts located at the roadway and pipeline crossing (see Drawing 0000-CI-103 in Appendix D). NMCC will conduct said repair and maintenance at the beginning of construction.

4.3.6 Impoundments – 19.10.6.603.C.(6)

NMCC's design of the Copper Flat facility includes several impoundments, reservoirs and ponds, as shown on Figures 2-2 and 2-14, including three impacted process water impoundments, one process water reservoir, one tailings storage impoundment, one underdrain collection pond and one surge pond. The design specifications for these structures can be found in Appendix A and B. In addition, there will be an evaporation pond constructed after the end-of-life of the mine to provide long-term passive capture and evaporation of residual fluids that may be produced from the tailings impoundment. This pond will be constructed essentially as an extension of the underdrain collection pond, expanding its size and capacity as described in Appendix E. The liner system of the underdrain collection pond will extended to the constructed evaporation pond. As such, the design of the pond is the same as that for the underdrain collection pond, except that it will be more shallow in depth as described in Appendix E. The design of the underdrain collection pond is described in Appendix A.

These impoundments have been designed and will be constructed and maintained to minimize adverse impacts to the hydrologic balance, protect adjoining property and assure the safety of the public in accordance with the requirements of the performance and reclamation standards and requirements of the Mining Act regulations and the requirements of the NMED Copper Rules.

As shown in the design documents provided herewith, all of the impoundments, ponds and reservoirs (except the tailings impoundment) meet or exceed the design requirements of Section 19.10.6.603.C.(6)(a)(i through ix). The tailings impoundment meets or exceeds the design requirements specified by the OSE. When no longer required, the impoundments, ponds and reservoirs will be reclaimed in accordance with the Reclamation and Closure Plan.

4.3.7 Minimization of Mass Movement – 19.10.6.603.C.(7)

All slopes, embankments and the stockpiles will be designed, constructed and maintained to prevent the potential for mass movement both during operations and following closure. Details of the WRSP and TSF designs are presented in Section 2.

4.3.8 Riparian and Wetland Areas – 19.10.603.C.(8)

Disturbance to riparian and wetland areas at Copper Flat will be minimal. The Copper Flat Project area is primarily a terrestrial habitat with limited riparian and wetland habitats. The primary riparian areas are associated with the Grayback Arroyo and the established diversion. Arroyo areas within the proposed permit area boundary occur along Grayback Arroyo, the diversion channel, and pit lake. The arroyo vegetative cover has the highest woody plant density within the proposed mine area. The majority of vegetation within this land cover consists of shrubs, with Emory's baccharis (*Baccharis emoryi*) being the most abundant. Burro bush (*Hymenoclea monogyra*) is also frequent in Grayback Arroyo. Grasses make up 24 percent of the relative vegetation cover, with vine mesquite (*Panicum obtusum*) being the most abundant. Other vegetation found in Grayback Arroyo includes desert willow (*Chilopsis linearis*), Goodding's willow (*Salix gooddingii*), cottonwood, four wing saltbush (*Atriplex canescens*), and salt cedar (*Tamarix* spp.) (BLM DEIS 2015, Section 3.11.1.1, pg 3-142,143). This variety and distribution of vegetation in this area of the arroyo is quite typical of the riparian habitat throughout the area in the arroyos in the vicinity of the site.

NMCC operations will not change the existing surface water flow conditions and will maintain the existing hydrologic conditions that support the riparian areas. All riparian areas will be managed appropriately according to state and federal requirements.

Mining operations will involve the drawdown of groundwater from the pumping of water from the fresh water well field that will provide a portion of the water required for processing. However, none of the hydric soils at the mine site or elsewhere in the potentially affected area will be affected by that drawdown. Hydric soils in the wetlands along the arroyos and other water courses in the area do not rely on groundwater. They have an alternative source of water, such as flooding from surface water runoff or a perched water table.

The BDR (Intera 2012) indicates that during mine area surveys, two locations within the proposed mine area boundary appeared to meet wetland conditions as defined by the Clean Water Act (i.e., dominance byhydrophytic vegetation, hydric soils, and wetland hydrology). One of these areas is a small cattail wetland adjacent to the pit lake. The second wetland area, a patch dominated by Goodding's Willow, is estimated to be 1.5 acres in size. It is located within the mine at the bottom of Grayback Arroyo just below the culvert where the pit access road crosses Grayback Arroyo. Seep willow (*Baccharis salicifolia*) also occurs here (BLM 2015 DEIS, Section 3.11.1.1, pg 3-145).

Hydric soils of the small cattail wetland adjacent to the pit lake will be removed at the outset of operations since pumping of the pit lake will be necessary prior to mining and continuously throughout the life of the mine. This small wetland will be mined out when the pit is deepened so no surface soils will remain. As discussed in Appendix E, this small wetland will be replaced with the addition of two small water retention basins east of EWRSP-1. The second wetland area near the main mine entrance will not be affected by drawdown associated with activities at Copper Flat because it will be outside of the drawdown area. This area overlies the andesite bedrock of the Animas Uplift. As a result, there is no aquifer underlying the surface (BLM DEIS, November 2015, Section 3.8.2.1.1, page 3-110).

Engineering designs provided in the Reclamation and Closure Plan have set a minimum 50-foot set-back from Grayback Arroyo for the final reclamation footprints for GMSP-2, GMSP-3, WRSP-2, and WRSP-3 footprints and a 25-foot set-back for EWRSP-1. Riparian areas delineated at the plant area will not be disturbed and the land bridge will remain which will be protective of the Gooding's Willow community in Grayback Arroyo east of the mine entrance.

4.3.9 Roads – 19.10.6.602.C.(9)

For the most part, existing haul roads will be utilized to haul material to the crusher, stockpiles and WRSPs. Some minor realignment of these roads may be necessary and road widths will vary. Roads will be constructed and maintained to control erosion. Drainage control structures will be used, as necessary, to control runoff and minimize erosion, sedimentation and flooding. Drainage facilities will be installed as road construction or extension progresses and will be capable of passing a 10-year, 24 hour precipitation event. Culverts and drainage pipes will be constructed and maintained to avoid plugging, collapsing or erosion.

Haul roads are not expected to create new disturbances, as they will be constructed on previously disturbed land. Mined material will be hauled to the WRSPs and the mill using conventional mining haul trucks. The on-site service roads will be designed for easy access and traffic movement within the operations area. No roads will be constructed that cross intermittent or perennial streams. Access to the project area is via an existing county road (Gold Dust Rd./Co. Rd. Bo27) which will remain following closure. Prior to final closure, the State of New Mexico and the BLM will determine which other roads will be made permanent in the project area to conduct post-closure monitoring or provide adjacent landowner access. A number of pre-1981, primitive roads currently exist within the proposed project boundary. Some of these roads will not be utilized during the proposed operations and will remain.

4.3.10 Subsidence Control – 19.10.6.603.C.(10)

No underground or in situ mining are proposed to be conducted at Copper Flat. Therefore, subsidence control is not a consideration for the Copper Flat Project.

4.3.11 Explosives Blasting – 19.10.6.603.C.(11)

Blasting will be conducted in a manner to prevent injury to persons or damage to property not owned by the operation. The generation of fly rock will be minimized to ensure that it is confined to the permit area. Blasting will be limited to the daylight hours and performed by trained and certified blasters. Safe seismic disturbance and air blast limits will be established to prevent damage to buildings.

Blasting agents and explosives such as ammonium nitrate and diesel fuel will be stored onsite in bins and tanks. Detonators, detonating cords, boosters, caps and fuses will be stored in two separate magazines. Ammonium nitrate will be stored in a 75-ton capacity, 3,000 ft^3 silo. All explosive materials will be stored away from the plant site in compliance with MSHA, New Mexico State Mine Inspector's regulations, Bureau of Alcohol, Tobacco and Firearms (BATF), and U.S. Department of Homeland Security requirements. The magazines will be situated away from occupied buildings in compliance with the BATF and each magazine will be secured with two locks (see Figure 2-2).

Appropriate warning signs will be placed in such a way that a bullet passing through the sign will not strike the magazines. NMCC employees who use and handle explosives will do so in accordance with MSHA regulations and will meet all BATF, MSHA and state qualification and certification requirements. All transportation of explosives will meet MSHA and state requirements. An inventory will be kept of all explosives received into and distributed out of the magazines.

4.4 Site Stabilization & Configuration – 19.10.6.603.D

The permit area will be stabilized to minimize future impact to the environment and protect air and water resources. The final surface configurations of the disturbed areas subject to reclamation/closure will be suitable to achieve the post-mining land uses in accordance with the approved Reclamation and Closure Plan. Contemporaneous reclamation actions undertaken at Copper Flat during operations will have a positive impact on site stabilization, configuration, and final reclamation. Contemporaneous reclamation is discussed in more detail in Section 3.4. Appendix E contains a more detailed discussion of the steps to be taken to stabilize and configure the site so as to achieve the post-mining land use. These steps are summarized below.

4.4.1 Final Slopes and Drainage Configuration – 19.10.6.603.D.(1)

The final slopes and drainage configuration of the reclaimed areas are designed to be compatible with the post-mining land use. The reclamation design is driven by the requirements of the NMED Copper Rules as well as the Mining Act regulations to promote slope and drainage stability. Consideration will be given to providing a diversity of topographic relief that assists in promoting vegetation diversity within the prescriptive context of the NMED Copper Rules thus providing a geomorphic component to the design. For example, the topographic disturbances, slopes, and other aspects of the disturbed project areas will be contoured to blend in with the surrounding topography to the extent practicable within the constraints of the NMED Copper Rule. Final slopes will be 3H:1V or shallower and will be restructured to resemble existing topography to the extent practicable. A few areas may have steeper slopes and would be stabilized by physically with coarser materials to add to general diversity and stability. Flatter disturbed areas (slopes of 4H:1V or less) will be minimally regraded to restore an appropriate drainage system and revegetated. Re-grading will be completed to direct water away from out-slopes, particularly on the WRSPs and the TSF. Where possible, the size and shape of new channels will approximate former drainages. All drainage channels, ditches and earthen water control structures will be revegetated and/or protected from erosion by riprap, sediment traps or other BMPs.

4.4.2 Backfilling – 19.10.6.603.D.(2)

The impoundments, ponds and reservoirs constructed at the site will be backfilled with embankment materials and re-contoured and reclaimed to blend into the natural topography. Because the Copper Flat deposit must be mined sequentially from top to bottom, NMCC will not backfill the pit.

4.4.3 Minimizing Mass Movement – 19.10.6.603.D.(3)

All reconstructed slopes and embankments of the WRSPs and TSF are designed and will be constructed and maintained to prevent the potential for mass movement. The Reclamation and Closure Plan contains the design details in Section 2 of Appendix E.

4.4.4 Acid and other Toxic Drainage Formation – 19.10.6.603.D.(4)

Section 3.3 provides a discussion of the measures that will be taken to reduce, to the extent practicable, the formation of acid and other toxic drainage that may otherwise occur following closure to prevent releases that cause federal or state standards to be exceeded. NMCC's waste characterization efforts confirm that the likelihood of the formation of acid from the Copper Flat Project is very small (SRK 2013). NMCC's material handling, waste classification, waste rock flagging and routing and transitional waste materials disposal plans, as discussed in Section 3.3, to be implemented during operations, will prevent the formation of acid and other toxic drainage following reclamation/closure.

4.4.5 Non-Point Source Releases – 19.10.6.603.D.(5)

Section 4.3.4 provides a discussion of the measures that will be taken to ensure that there will be no non-point source surface releases of acid or other toxic substances during operations.

4.5 Topsoil (Topdressing or Cover Material) – 19.10.6.603.E

An important feature of "topsoil" is the presence of decomposed organic matter and bacterial, fungi, and other organisms that make the topsoil biologically active. These organisms are important to critical soil processes such as decomposition of organic matter and rendering nitrogen and other nutrients into plant-available forms. The alluvial sediments that will be stockpiled at Copper Flat for use in reclamation are unlikely to contain sufficient organic matter, nutrients and biological activity to support reclamation at the time of stockpiling but they are likely to contain adequate fine grained sediments (i.e., silts and clay) to provide water holding capacity when used as growth media (BLM DEIS page 3-41). As such, the discussion of "topsoil" in the context of salvaging materials for use in reclamation of the Copper Flat site reflects the nature of the materials available to stockpile. It is, therefore, more appropriate to refer to the materials utilized as cover material for reclamation and closure of the site as "topdressing" or "growth media." Additional information regarding the cover growth material requirements for reclamation is provided in Section 3.1 and 5.5 of Appendix E.

4.5.1 Topdressing Suitability – 19.10.603.E.(1)

The suitability of topdressing/cover materials is based on the material's ability to provide erosion control, sustain vegetation, and reduce net infiltration. In general, soils and underlying colluvial and alluvial materials in the permit area are considered suitable and have no chemical limitations for growth of native and adapted reclamation species.

The NMED Copper Rules, 20.6.7.33.F.(2) NMAC, require that the proposed soil cover system be designed to limit net-percolation by having the capacity to store at least 95 percent of the long-term average winter (December, January and February) precipitation or at least 35% of the long-term average summer (June, July and August) precipitation, whichever is greater as determined by utilizing field or laboratory test results or published estimates of available water capacity. The suitability of topdressing cover materials to meet this standard is discussed in detail in Section 5.5.1 of Appendix E.

The available water capacity (AWC) for the salvageable growth media within the limits of the TSF and WRSP-2 and -3 were estimated utilizing the laboratory results of soils samples taken during Golder's Supplemental Soils Investigation at Copper Flat (see Subsection 3.3.1 and Table 3, Golder, 2013). These estimates show an average AWC of approximately 0.9 inches of water per 1 foot of soil for the salvageable growth media within the footprint of WRSP-2 and -3, with a range of between 0.6 and 1.3 inches of water per 1 foot of soil. The AWC estimates for the salvageable growth media within the footprint of the TSF show an average AWC of approximately 1.2 inches of water per 1 foot of soil, with a range of between 0.4 and 2.2 inches of water per 1 foot of soil.

While the actual water retention of the salvaged soils will vary based on the types of soil materials that are placed in the GMSPs, the range of materials identified as suitable cover at the site indicates that the proposed cover system at Copper Flat will meet the storage requirements of the NMED Copper Rules.

4.5.2 Topdressing Salvage – 19.10.603.E.(2)

NMCC will salvage as much material as can be safely and practicably recovered and safely stored in the planned stockpiles. As part of the proposed operations, NMCC will bulk salvage suitable soils and near-surface alluvial materials from within the TSF, WRSP-2 and WRSP-3 footprints. Topdressing materials will be carefully recovered and stockpiled during the preproduction phase of the Project. Surficial soil materials will be salvaged in association with the construction of the plant, pipeline corridor, access roads and ancillary facilities. The salvaged growth media in these locations will be windrowed for local redistribution during final reclamation of the site. Suitable soils and other suitable cover materials including unconsolidated subgrade materials, colluvium and overburden will be salvaged to meet the volumetric requirements for final cover construction at closure as discussed in Section 3.1 and 5.5.2 of Appendix E.

4.5.3 Topdressing Stockpiling - 19.10.603.E.(3)

Salvaged reclamation cover materials will be stored in the three GMSPs shown in Figure 2-2. The GMSPs are located so as not to be disturbed or impacted by mining operations. The surfaces of the stockpile will be shaped after construction with overall slopes of 3H:1V or shallower to minimize soil loss. To further minimize erosion and the establishment of undesirable weeds, the GMSPs will be seeded with the interim seed mix Additional information regarding stockpiling of growth media is contained in Section 5.5.3 of Appendix E.

4.5.4 Topdressing Re-Distribution - 19.10.603.E.(4)

Topdressing will be distributed in a manner to establish and maintain vegetation. Details regarding the manner in which it will be distributed and applied on regraded areas during for reclamation are discussed in Section 3.1, Growth Media Placement, of Appendix E.

4.5.5 Topdressing Stabilization - 19.10.603.E.(5)

Cover materials will be stabilized after distribution. Seedbed preparation, including scarification and disking along the contour, will be performed prior to seeding and mulching operations as described in the Section 3.0 of Appendix E.

4.5.6 Topdressing Amendment - 19.10.603.E.(6)

As discussed in Section 5.5.1 of Appendix E, most semi-arid native plants have adapted to low to moderate soil fertility conditions and are relatively unresponsive to increased soil fertility compared to crop plants. Fertilizer additions have been shown to have negative impacts in reclamation including increases in weedy annuals, shifts in species composition and decreases in drought, disease and pest resistance. Topdressing amendment requirements are discussed in Section 5.5.6 of Appendix E.

4.6 Erosion Control – 19.10.6.603.F

Reclamation activities described in Sections 3.0 and 5.6 of Appendix E will stabilize disturbed areas to a condition that protects against erosion. All disturbed areas will be regraded and shaped to a final contour that achieves positive drainage, reconstructs slopes with lengths and gradients that will provide long-term stability and seeded and mulched to establish a vegetative cover. Storm water will be diverted away from facilities. Drainage channels will be designed to regulate the velocity of water and minimize the potential for channel erosion. BMPs for storm water diversions, drainage and other water conveyance channels may include lining the channel with rock, riprap, vegetation or other geotechnical materials.

4.7 Revegetation – 19.10.6.603.G

As discussed in Section 2.5 of this updated MORP, NMCC's Copper Flat Project will take place on a combination of federal land administered by the BLM and private land owned by NMCC (by virtue of patented mining claims). The current land uses of federal lands administered by the BLM in the area of the Copper Flat facility have been identified previously in BLM's 1986 White Sands Resource Management Plan (BLM 1986); e.g., grazing, wildlife habitat, recreation and mining.

Revegetation of the site will be consistent with the requirements of 19.10.6.603.G.(3) NMAC; i.e., the previously accepted historic post-mining land uses as identified by the BLM in its land management plan consistent with the surrounding land uses of the Copper Flat site. The Reclamation and Closure Plan is designed to re-establish grazing in the area and allow for long-term use of the reclaimed areas by wildlife known to historically use the area without affecting the potential for other uses such as mining and recreation. Revegetation success is discussed in Section 5.7 of Appendix E.

4.8 Perpetual Care – 19.10.6.603.H

The Copper Flat facility will be reclaimed in conformance with the Reclamation and Closure Plan, as approved. The Plan is designed to meet all of the applicable environmental requirements of the Act, 19.10.6 NMAC, the NMED Copper Rules and other laws following closure. As indicated above, NMCC will reclaim the disturbed areas consistent with the BLM's land management plan as currently approved. The lands surrounding the site are currently self-sustaining and do not require perpetual care. After the lands disturbed by NMCC's mining activities are reclaimed, the land will return to being self-sustaining requiring no perpetual care following closure.

5.0 REFERENCES

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Appendix A

Feasibility Level Design, 30,000 TPD Tailings Storage Facility
And
Tailings Distribution and Water Reclaim Systems

Copper Flat Project

Sierra County, New Mexico

Golder Associates Inc.

Revised, June 2016

Appendix A is contained in a separate volume binder, submitted with this Mine Operating and Reclamation Plan and the Copper Flat Mine Discharge Permit Application, dated December 2015, and revised June 2016.

Appendix B

Impoundment Design Report

M3 Engineering & Technology Corp.

November, 2015

Appendix B is contained in a separate volume binder, submitted with this Mine Operating and Reclamation Plan and the Copper Flat Mine Discharge Permit Application, dated December 2015.

Appendix C

Copper Flat

Process Facility Containment Report

M3 Engineering & Technology Corporation

December, 2015

Appendix C is contained in a separate volume binder, submitted with this Mine Operating and Reclamation Plan and the Copper Flat Mine Discharge Permit Application, dated December 2015.

Appendix D

Copper Flat

Site Diversion Analysis

M3 Engineering & Technology Corporation

Revised, June 2016

Appendix D is contained in a separate volume binder, submitted with this Mine Operating and Reclamation Plan and the Copper Flat Mine Discharge Permit Application, dated December 2015, and revised June 2016.

Appendix E

Mine Reclamation and Closure Plan

Copper Flat Mine

Golder Associates Inc.

October, 2016

FEASIBILITY LEVEL DESIGN REPORT

FEASIBILITY LEVEL DESIGN, 30,000 TPD TAILINGS STORAGE FACILITY

COPPER FLAT PROJECT
SIERRA COUNTY, NEW MEXICO

Submitted To: New Mexico Copper Corporation
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Submitted By: Golder Associates Inc.
5200 Pasadena Ave. NE, Suite C
Albuquerque, NM 87113

November 30, 2015 1531453

This report documents the feasibility level design of the tailings storage facility (TSF) for the Copper Flat Project, located near Hillsboro, New Mexico in Sierra County. The design included herein was developed at a level consistent for agency review. Development of this report and associated TSF design was conducted under the oversight of the following Golder staff:

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David A. Kidd, PE — Date
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12-10-15

Todd Stein, PG — Date
(Preparation of Feasibility Level Design,
30,000 TPD Tailings Storage Facility Report)

Table of Contents

List of Tables

List of Figures

List of Drawings (See Appendix J)

List of Appendices

List of Acronyms

1D	one dimensional
3D	three dimensional
ASTM	American Society of Testing and Materials
cm/sec	centimeters per second
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FOS	factor of safety
ft-bgs	feet below the ground surface
ft-msl	feet above mean sea level
gpm	gallon per minute
HDPE	high density polyethylene
HSA	hollow stem auger
kg	kilograms
LCRS	leakage collection and recover system
MAG	Mineral Advisory Group
MDE	Maximum Design Earthquake
mm	millimeter
NMCC	New Mexico Copper Corporation
NMDSB	Dam Safety Bureau
NMED	New Mexico Environment Department
NOAA	National Oceanic and Atmospheric Administration
OSE	New Mexico Office of the State Engineer
PCPE	polyethylene pipe
pcf	pounds per cubic foot
PGA	peak ground acceleration
PI	plasticity index
PMP	probable maximum precipitation
PSD	particle size distribution curve
psi	pound per square inch
SPT	standard penetration test
TPD	tons per day
TPH	tons per hour
TPY	tons per year
TSF	tailing storage facility
USCS	Universal Soil Classification System
wt%	percent by total weight
yd^3	cubic yard

1.0 INTRODUCTION

1.1 Scope

Golder Associates Inc. (Golder) has been contracted by the New Mexico Copper Corporation (NMCC) and its parent company THEMAC Resources Group Ltd (THEMAC), to complete the feasibility level design of the tailings storage facility (TSF) for the Copper Flat Project, located near Hillsboro, New Mexico in Sierra County. The TSF design presented herein has been completed in support of an overall Copper Flat project feasibility study as well as to support the various regulatory processes leading to permit approval of NMCC's project.

The TSF feasibility study report addresses geotechnical aspects of the project and presents the feasibility-level design of the TSF and tailings distribution and water reclaim systems. The individual components of the TSF feasibility study include: (1) the TSF design; (2) whole tailings delivery and distribution systems from the process plant and cyclone plant areas; (3) tailings delivery systems on the TSF; (4) underdrain collection system beneath the TSF; (5) TSF underdrain collection pond designs; (6) surge pond designs; (7) tailings reclaim water collection and delivery systems; and (8) systems for handling potential upset flow conditions (including secondary containment).

The location of the proposed facility is shown on Drawing 1 (Appendix J). Copper Flat is a proposed porphyry copper mining operation at a property that was briefly operated by Quintana Resources in 1981 and 1982. During the former mining operation, open pit pre-stripping was completed and a TSF with a design capacity of approximately 60 million tons was constructed and operated. Shortly after mining operations started, the mine was closed due to adverse economic conditions and depressed copper prices. In Drawing 2, which shows existing site conditions, the remains of the starter dam and splitter dike from the Quintana mining operation can be seen.

A new TSF will be constructed at Copper Flat in the same location as the former (old) Quintana Resources facility. The new TSF will extend approximately 1,000 feet to the east of the old starter dam (the tailings expansion area) as shown on Drawing 2.

A centerline construction method using cycloned tailings sand (cyclone underflow) for tailings dam construction will be utilized. A starter dam will be constructed using borrow material to provide initial storage capacity and to provide a location for initial discharge of tailings. The centerline approach allows construction of a stable, drained tailings dam using the cyclone underflow (i.e., tailings sand), while reducing the quantity of fill material required for dam construction. Tailings slimes (cyclone overflow) will be discharged into the interior of the TSF impoundment. The use of sand tailings for dam construction are such that the cyclone plant will be operated continually to produce the construction material.

The new TSF design will comply with the design and dam-safety guidelines and regulations of the New Mexico Office of the State Engineer (OSE) Dam Safety Bureau (NMDSB, 2010). Stormwater that cannot be diverted will be accommodated inside the impoundment by maintaining a dam crest elevation that provides adequate freeboard for containment of direct precipitation and run on.

The Mining and Environmental Compliance Section of the Ground Water Quality Bureau of the New Mexico Environment Department (NMED) will be the permitting authority for the groundwater discharge permit. NMED has provided guidance on anticipated design requirements for the TSF's liner system, which have been incorporated in this feasibility level design. Golder has also provided the feasibility level design of the tailings distribution and water reclaim systems.

Design drawings (Appendix J) to be read in conjunction with this report include the following:

Drawing 1	Title Sheet and Location Map
Drawing 2	Existing Conditions and Proposed Facilities Plan
Drawing 3	Site Exploration Plan and Geologic Cross Section Locations
Drawing 4	Geologic Cross Section A-A'
Drawing 5	Geologic Cross Section B-B'
Drawing 6	Geologic Cross Section C-C'
Drawing 7	Geologic Cross Section D-D'
Drawing 8	Geologic Cross Section E-E'
Drawing 9	Geologic Cross Section F-F'
Drawing 10	Tailings Storage Facility Grading Plan
Drawing 11	Tailings Storage Facility Grading Plan Phase1
Drawing 12	Tailings Storage Facility at Final Build-Out
Drawing 13	Tailings Storage Facility Cross-Sections
Drawing 14	Tailings Storage Facility Details
Drawing 15	Dam and Impoundment Underdrain Plan
Drawing 16	Underdrain System Details (1 of 2)
Drawing 17	Underdrain System Details (2 of 2)
Drawing 18	TSF Underdrain Collection Pond Plan
Drawing 19	TSF Underdrain Collection Pond Details (1 of 2)
Drawing 20	TSF Underdrain Collection Pond Details (2 of 2)
Drawing 21	Cyclone Plant Area General Arrangement Plan
Drawing 22	Surge Pond Plan Cross-Section and Details
Drawing 23	General Process Flow Diagram
Drawing 24	Tailing Delivery and Distribution Piping Plan
Drawing 25	Tailing Distribution Plan and Profile (1 of 2)
Drawing 26	Tailing Distribution Plan and Profile (2 of 2)
Drawing 27	Water Reclaim System Piping Plan
Drawing 28	Water Reclaim System Details
Drawing 29	Secondary Containment Details and Sections

1.2 Terminology/Definitions

In this report, the TSF is described as consisting of the impoundment and the tailings embankment or dam. The impoundment refers to the interior tailings storage area located upstream of the embankment or dam. Tailings with different gradations will be placed inside the impoundment and on the dam.

Whole tailings refer to the process tailings delivered to the cyclone plant from the flotation plant outlet. At the cyclone plant, the tailings will be separated into cyclone underflow and cyclone overflow. The cyclone underflow, which consists primarily of the coarse sand fraction of the tailings, will be used to construct the dam. The cyclone overflow, which consists primarily of the fine fraction of the tailings, will be placed in the impoundment. Each of these tailings products will be transported and discharged as a slurry, with varying concentrations of tailings solids suspended in process water.

The cyclone overflow discharged into the impoundment will form a surface that gently slopes away from the point of discharge. The beach refers to the area near the point of discharge where the coarsest particles in the cyclone overflow will tend to settle. The slimes refer to the finer fraction of the cyclone overflow, which will flow down the beach with the majority of the process water to the distal portion of the impoundment surface and settle in the vicinity of the free water pond.

The TSF will have two separate underdrain systems. The dam underdrain will underlie the dam and overlie the dam liner and collect drainage from the cyclone underflow. The impoundment underdrain will overlie the impoundment liner and will collect drainage from the tailings beach and slimes (cyclone overflow).

2.0 SITE DESCRIPTION

2.1 Topography

Existing surface conditions at Copper Flat are shown on Drawing 2. The starter dam, splitter dike, and approximately 1.2 million tons of tailings from the Quintana Resources operation remain on the property.

The TSF site consists of a broad, shallow basin located at the head of a natural drainage that discharges to Grayback Arroyo. Elevation ranges from 5,170 to 5,435 feet above mean sea level (ft-msl) within the proposed TSF footprint. Topography is gently sloping over most of the site with the steepest slopes located around the west and southwest periphery of the facility. Because the site is near the head of a natural basin, requirements to divert water from upstream catchment areas will be minimal. Surface water diversion is discussed in Section 6.6.

2.2 Climate

The property is located within an arid, high desert area in the Basin and Range physiographic province subject to hot summers and relatively mild winters. Maximum summer temperatures can exceed 100 degrees Fahrenheit (F) while the average maximum daily temperature during winter months is approximately 40 degrees F. Average annual rainfall is approximately 13 inches and the property receives snow periodically.

Most rainfall occurs in July through September and is associated with high intensity, short duration, convective storms and moisture from the Gulf of Mexico. Winter precipitation is associated with west to east moving Pacific frontal storms. These storms typically produce less intense precipitation over a longer duration.

Based on the National Oceanic Atmospheric Administration Atlas 14 (NOAA, 2006), the 100-year, 24-hour storm event is estimated to be approximately 3.73 inches. Hydrometeorological Report 55A (US Department of Commerce, 1988), which provides probable maximum precipitation (PMP) estimates for areas located between the continental divide and the 103rd meridian, indicates a 72-hour PMP depth of 26 inches.

2.3 TSF Area Subsurface Conditions

2.3.1 Geology

The proposed TSF site is located in Sierra County, within the southern Basin and Range physiographic province (Parsons, 1995). The Basin and Range province is described as a broad, highly extended terrain that extends from Canada, through the western United States, and across much of Mexico (Parsons, 1995). The name is derived from the type of extensional block-faulting that left the characteristic pattern of alternating basins and ranges across the province.

The site lies near the eastern edge of the Black Range, on the Piedmont slopes of the Palomas Basin. The Black Range is a Late Cretaceous to early Tertiary (Laramide) volcanic-plutonic arc (Oniell et al, 2002). The Basin and Range province in this region is cut by the Rio Grande Rift zone. The property sits in the westernmost basin of the Rio Grande rift zone, which is made up of three parallel north-trending basins separated by intra-rift horsts (Chapin, 1971).

The Palomas Valley is a relatively narrow flood plain flanked on the east by the piedmont slopes of the Caballo Mountains and on the west by the long gentle slopes ascending to the base of the Hillsboro-Animas Hills (Hawley, 1965).

Detrital material derived from the erosion of the adjacent slopes fills the Rio Grande valley to a depth of up to 9,000 feet (Harley, 1934). Much of this material is gravel, which consists of boulders and pebbles of quartzite, limestone, granite, rhyolite, andesite, and basalt, derived from the surrounding rock complex. They are coarser along the valley sides, grading to finer material toward the middle of the basins. In the higher regions, as in the sides of the valley between Fairview and Hillsboro and at Hermosa and elsewhere, alluvial deposits of Quaternary age are comprised of boulders and pebbles in a finer matrix of the same material, loosely cemented into a firm hard conglomerate known as Palomas gravel (Harley, 1934). Younger sand and gravel deposits, which form some of the intermediate terraces, represent a filling of channels eroded in the older deposits of Santa Fe and Palomas age (Harley, 1934).

The principal fan in the district is that formed by the drainage toward the east out of Copper Flat, principally through Grayback Arroyo, but in part through Dutch Gulch. The basal part of the original fan is composed of fine to coarse fragments of rhyolite derived from the late flows that once covered the Animas Hills. The intermediate part of the fan is composed principally of andesite and latite fragments. The topmost portion of the fan is composed of basalt, andesite, and latite fragments (Harley, 1934).

The Animas Hills consists predominantly of andesite flows and breccias of Late Cretaceous age with minor interbeds of sandstone. The andesites and sandstone are intruded by a stock of quartz monzonite of Late Cretaceous age centered at Copper Flat, and by quartz latite dikes radial to the stock (Segerstrom et al, 1975).

Upper Cenozoic basin fill in the Rio Grande rift is generally referred to as the Santa Fe Formation or Group. The Santa Fe Group (middle Pleistocene to uppermost Miocene), is comprised of multiple formations including the Camp Rice, Fort Hancock, Palomas, Sierra Ladrones, Arroyo Ojito, Ancho, Puye, and Alamosa Formations.

The Santa Fe consists of basal conglomerate and interbedded sand and clay beds. The cobbles and boulders are mainly andesite. Thickness is variable but generally in tens of feet in the subject area. Two facies in the study area include: 1) the piedmont facies consisting of brown, poorly sorted, weakly stratified fanglomerates and fan gravels and brown sandy silt, conglomerate and clay; and 2) the axia-river facies of cross-stratified sandstone, sand, pebble conglomerate, gravel, and clay lenses. The piedmont facies comprises the major portion of the Palomas Formation. It rests in angular unconformity on bedrock of varying lithologies along the major uplifts bordering the basins. However, in many central basin areas the piedmont facies appears to grade downward into coarse-grained deposits of the lower Santa Fe Group (Lozinsky, 1986).

2.3.2 Site Observations

The site geotechnical investigation program details are shown on Drawing 3. Drawings 4 through 9 contain TSF area geologic cross-sections developed on the basis of the recent drill holes and test pits, supplemented with subsurface information reported by Sergent, Hauskins, and Beckwith (SHB,1980).

Drill hole logs indicate that the foundation in the tailings area consists primarily of alluvial deposits that includes silt, sand and gravel underlain by clay. In the northwestern waste rock stockpile area, borings indicated the presence of gravelly silts and sands overlying conglomerate consisting primarily of andesite. The conglomerate is underlain by unweathered andesite.

Silts, sands, and gravels that occur in the proposed TSF area have been identified as piedmont alluvium and the older deposits of the Santa Fe Group (SHB, 1980) on which the piedmont alluvium was deposited. The Santa Fe Group is reported to consist of interfingered alluvial fan (gravel) and clay facies. Basalt flows are reported to occur in channels and arroyos cut into the piedmont and Santa Fe sediments. Basalt outcrops have been identified in an arroyo in the center of the TSF and locally around the site.

Drilling logs and geologic cross-sections indicate a high degree of variability in near surface materials both vertically and laterally, within the impoundment area and beneath the proposed dam. Silty/clayey horizons alternating with gravelly sand layers could potentially represent either the interfingering of the Santa Fe Group facies, or the more recent effects of local erosion and deposition.

In general, the interior of the impoundment is underlain by silty, clayey and gravelly sand, and cemented gravelly sand with a near surface layer of silty, wind-blown material. Eastward, toward the future dam site, interbedded clays and silts occur at depths typically greater than 20 feet; however, the composition of the foundation remains highly variable with interfingered, silty, sandy and clayey gravel units.

Groundwater is typically encountered at depths greater than 50 feet below ground surface (ft-bgs) in the vicinity of the TSF. A small zone of perched water has been identified in the vicinity of the old Quintana dam; however, recent drill holes completed in the perched water area to a depth of 50 ft-bgs did not intercept water. Groundwater and local perched water are not anticipated to impact the design and operation of the TSF.

3.0 SITE INVESTIGATIONS

3.1 Previous Site Studies

Portions of the TSF site were investigated by Sergent, Hauskins, and Beckwith (SHB, 1980) prior to construction of the Quintana Resources TSF. The SHB investigation focused on the dam alignment for a 60 million ton facility, which does not coincide with the alignment currently proposed for the over 1 million ton facility. SHB coverage of the potential borrow areas in the impoundment interior was relatively extensive.

3.2 Site Geotechnical Investigation Program Description

Golder conducted a site geotechnical investigation between December 2012 and January 2013 to expand the coverage of the former SHB site investigation to include the new dam alignment. The field investigation consisted of 31 test pit excavations and 28 drill holes. Drawing 3 illustrates test pit and drill hole locations, and the location of geologic cross-sections developed to show the geology of the dam foundation.

Test pits were excavated with a Case CX210B or Terex 7606 hydraulic backhoe to depths up to 20 feet. Test pits were logged and photographed. Soil samples collected from test pits included bulk 5-gallon bucket and bag grab samples. Bulk samples are suitable for geotechnical soil classification, strength, consolidation, compaction and permeability testing. Bag samples are suitable for soil classification and moisture content testing. Test pit logs are contained in Appendix A.1.

Most of the drilling was completed with a track mounted CME 75 drill rig using hollow stem augers (HSA). The rig was equipped for conversion to diamond core drilling if bedrock was encountered. The drill hole target depth was 50 ft-bgs. Due to the presence of cemented gravels that were not amenable to drilling by either HSA or diamond core methods, down-hole percussion (Tubex) equipment was also used.

Standard penetration testing (SPT) was carried out at 5-foot intervals during HSA drilling. When percussion drilling was required, SPT test frequency was reduced to about 10 feet. Samples collected during drilling included bulk 5-gallon bucket cuttings samples from auger drilling, bagged Tubex rig cuttings samples, and bagged samples recovered from the SPT split-spoon sampler. Drill hole logs are contained in Appendix A.2.

3.3 Geotechnical Testing

Bulk and bag samples collected during site exploration were shipped to Golder's geotechnical laboratory in Lakewood, Colorado for soil classification, compaction, permeability, consolidation, and strength testing. Laboratory reports for the various tests are contained in Appendix A.3. Soils were classified according to the Universal Soil Classification System (USCS). All geotechnical tests were completed in accordance with applicable American Society of Testing and Materials (ASTM) standards. No undisturbed samples were collected during the site exploration. Geotechnical strength, consolidation, and permeability tests were conducted on remolded samples.

3.3.1 Soil Classification

3.3.1.1 Tailings Impoundment Interior

Within the interior, central and western portions of the impoundment area, site soils consist predominantly of clayey sand with gravel (SC), well-graded silty sand with gravel (SW-SM) with lesser clayey and well-graded silty gravel (GC, GW-GM). Silty and clayey soils (CL-ML) also occur locally. The fine fraction (finer than 75 microns or the material passing the No. 200 standard sieve) in sandy samples from the impoundment interior ranges from 8 to 29 percent and averages 20 percent. Plasticity indices (PI) average 17 percent. The specific gravity of interior area soils ranged from 2.67 to 2.75.

Four composite samples of near surface sandy, gravelly soils were prepared to evaluate materials potentially available for the construction of processed (crushed and screened) drainage material. Each composite sample was composed of two to three 5-gallon bucket samples of near surface materials. Composite samples were initially crushed to 100 percent finer than 1 inch to simulate material that would be suitable for placement against a geomembrane liner. Three of the four composites were classified as clayey sand (SC), while the other was classified as well graded silty gravel (GW-GM). The fine fraction in the crushed composite samples ranged from 8 to 20 percent and the average PI was 17 percent. It is anticipated that screening will be required to reduce the fines content of this material if it is to be used for highly permeable, manufactured drain fill adjacent to critical drainage pipes.

3.3.1.2 North Cell Tailings

The north cell of the old Quintana TSF contains tailings from mining conducted in the early 1980s. Old tailings samples were classified as silty sand (SM) and low plasticity silt (ML). The sample classified as sand was located adjacent to the old dam and presumably, near the point of discharge. It contained a minus 75-micron fine fraction of 49 percent and was non plastic. The silty sample was obtained from the center of the north cell and had a minus 75-micron fraction of 71 percent and a PI of 5 percent. Differences in old tailings properties are presumed to be the result of tailings segregation on the former tailings beach. Moisture content in the old tailings samples ranged from 6.0 to 11.3 percent.

3.3.1.3 Tailings Dam Footprint

Soils encountered in the footprint of the proposed dam are highly variable. Clayey sand and gravel (SC,GC) generally occur at shallow depth with interbedded high and low plasticity clays (CH,CL) and silts (ML,MH) occurring at depths below 20 ft-bgs. Clay intercepts indicate that the clay occurs in discontinuous lenses or in eastward dipping strata. The fine fraction in the sandy and gravelly soils ranges from 17 to 39 percent and the PI averages 17 percent.

3.3.2 Foundation Strength Testing

Foundation samples were subjected to consolidated undrained triaxial testing with pore pressure measurement to determine effective shear strength for use in supporting stability analyses. Confining pressures were selected to represent anticipated foundation pressures associated with tailings embankment construction. Granular foundation materials are assumed to be cohesionless. Strength data reported below represent the effective internal friction angle. Triaxial test reports are contained in Appendix A.3.

It is anticipated that the old tailings will be placed beneath the new TSF geomembrane liner as a liner bedding fill layer. A 12-inch by 12-inch direct shear test was conducted to evaluate the interface friction at the TSF liner interface. The direct shear set-up included a layer of compacted old tailings from Test Pit 10 in the center of the north cell, a textured 80-mil high density polyethylene (HDPE) geomembrane, and a layer of material from the drainage composite samples 1 through 4. Tailings underlying the liner were placed at optimum moisture content based on ASTM D698 compaction testing and maintained in an unsaturated state during shearing. The over-liner drainage materials were wetted prior to testing but maintained in an unsaturated state during the test. The test was conducted in a manner that allows the failure through the lower strength interface (i.e., liner against old tailings or liner against drain fill). Direct shear test results are contained in Appendix A.3.

Table 1 summarizes the strength test samples, test objectives and strength test results.

Table 1: Summary of Strength Test Results

Sample	Material, Objective, Test Method	Internal Friction Angle
TP-10-3-13	Old tailings, strength of liner bedding triaxial CU[(1)]	34 degrees
TP-10-3-13	Old tailings, liner interface shear strength, direct shear[(2)]	26.5 degrees
Composite 1-4	TSF Interior borrow for structural fill and drain material, triaxial CU	40 degrees
BH-16-0-8.5	Clayey Gravel, structural fill borrow and embankment foundation strength, triaxial CU	28 degrees[(3)]
BH-25-0-12.5	Clayey Gravel, structural fill borrow and embankment foundation strength, triaxial CU	43.5 degrees
BH-10-0-14.5	Clayey sand, structural fill and embankment foundation strength, triaxial CU	32 degrees

Notes:
(1) CU = consolidated, undrained
(2) Liner interface testing included old tailings and drain material in contact with textured, 80-mil HDPE geomembrane.
(3) Sample was 91 percent finer than ¾ inch. Represents a matrix shear strength and does not account for interlocking of the coarse fraction.
No undisturbed samples were collected during site exploration. Tests were conducted on remolded samples.

3.3.3 Drainage Material Permeability Testing

Drainage material permeability testing was performed to support the design of the impoundment and dam underdrains. Testing was completed on composite samples 1 through 4, which represent the near surface materials that will be available for preparation of drainage material. Equal volumes of composite samples 1 through 4 were blended to prepare a sample for permeability testing. Samples were tested in a 10-inch diameter rigid wall cell with a 150-pound-per-square-inch (psi) load applied to simulate loading under field conditions. Permeability test reports are contained in Appendix A.3.

Two drainage materials are considered in the TSF design. These include crushed and screened materials with reduced fines content for the dam underdrain and primary drains in the impoundment interior (primary drain fill), and material obtained from selective borrowing of sandy soils within the TSF footprint (select native drain fill). Processing of the select native drain fill is anticipated to be limited to crushing to reduce the maximum particle size. No washing to reduce the fines content is anticipated to be required to produce suitable drainage materials.

3.3.3.1 Primary Drain Fill

A primary drain fill sample was prepared for testing the performance of the dam underdrain. The minus No. 40 standard sieve fraction of the sample was removed to simulate a prepared drainage material with low fines content that is filter compatible with the cyclone underflow sand. The hydraulic conductivity of the primary drain fill sample was 9.1×10^{-2} centimeters per second (cm/sec).

3.3.3.2 Select Native Drain Fill

The composite sample was tested without additional modification to estimate the permeability of the sandy site soils. As tested, the minus 75-micron fraction in the composite samples was 9 percent. The hydraulic conductivity of the select native drain fill sample was 3.8×10^{-5} cm/sec.

3.3.4 Foundation Sample Consolidation Testing

Selected foundation samples were subjected to conventional one-dimensional consolidation testing to support estimation of settlement potential in the proposed dam foundation. Samples were selected to evaluate silty and clayey horizons where changes in loading conditions could result in additional consolidation. Samples were remolded to dry densities ranging from 88 to 95 pounds per cubic foot (pcf) at natural moisture content to reflect in-situ density estimated from standard penetration tests. Foundation sample consolidation test reports are contained in Appendix A.3. Foundation settlement potential is discussed in Section 11.0.

4.0 TAILINGS TESTING

4.1 Program Description

The TSF embankment proposed in this feasibility study is to be constructed by the centerline raise method using cyclone underflow. Whole tailings from the flotation plant will be routed to a cyclone plant where the tailings will be separated into underflow (sand) and overflow (slimes) fractions. The cyclone underflow will be routed to the dam centerline and used to construct the tailings dam. The overflow will be discharged into the impoundment interior.

Primary considerations for effective centerline sand dam construction include adequate drainage and compaction of the cyclone underflow sand. Drainage requirements are typically met by:

- Producing a relatively free draining sand material. This is usually achieved when the minus 75-micron fraction of the underflow does not exceed 20 percent by weight.
- Having the hydraulic conductivity of the material placed in the dam two orders of magnitude greater than the material placed in the impoundment.

These two conditions generally result in a well-drained structure. A fixed cyclone station maintains optimum and consistent conditions at all cyclones and facilitates meeting gradation objectives. A blanket drain will be placed beneath the embankment to facilitate collection of cyclone sand drainage and minimize saturated conditions at the base of the embankment.

Industry experience at operating mines utilizing cyclone sand for dam construction indicates that hydraulic placement and self-weight compaction is generally sufficient to minimize liquefaction potential in cyclone sand dams located in regions with low seismic risk, such as at Copper Flat. Where it is required, compaction to a relative density of 60 percent (equivalent to approximately 90 percent of ASTM D698 maximum dry density) will result in low potential for liquefaction under static and seismic loading conditions (CANMET, 1977). At Copper Flat, tailings placed on the dam crest will be compacted. Some compaction of tailings placed on the dam out-slope will occur as a result of dozer spreading operations.

An initial cyclone test was conducted on a 55-kilogram (kg) tailings sample to determine the quantity and quality of sand available for dam construction, and produce samples of future tailings products for geotechnical testing. The initial cyclone test sample was produced by Metcon Research in September 2011. The sample was run through a 4-inch cyclone at the FL Smidth-Krebs (Krebs) facility in Tucson, Arizona. On the basis of the initial 4-inch cyclone test, Krebs, utilizing proprietary software, predicted that a gMAX15U-20 (15-inch) cyclone could recover 46 percent of the whole tailings stream with a minus 75-micron fraction of less than 20 percent. The quantity and quality of the cyclone underflow predicted on the basis of the 4-inch cyclone test were consistent with industry guidelines for sand dam construction. The quantity of sand recovered met anticipated construction requirements.

An additional pilot scale metallurgical study was conducted by the Mineral Advisory Group (MAG). Approximately 255 kg of tailings solids (whole tailings) were provided by MAG in five sealed 55-gallon steel drums. Drums were delivered to Krebs in July 2012 and the tailings were passed through a gMAX15U-20 cyclone in the Krebs laboratory on August 4, 2012. The sand recovery was 41 percent and the minus 75-micron fraction was under 16 percent. Cyclone underflow, and cyclone overflow produced during the test, and residual whole tailings were shipped to Golder's geotechnical laboratory in Lakewood, Colorado for testing.

Appendix B.1 contains Krebs analysis of the August 2012 cyclone run and the simulation (prediction) of full field scale cyclone performance. The cyclone plant is estimated to have a recovery of 45 percent with a minus 75-micron fraction of 18 percent.

4.2 Tailings Test Program Description

Table 2 contains a test matrix for the tailings products produced during the cyclone test. Gradation analyses were completed on the cyclone underflow, cyclone overflow and whole tailings. The cyclone overflow and whole tailings were subjected to flume testing to simulate discharge into the impoundment. Flume testing involves the discharge of tailings slurry at the field anticipated solids content into a 12-inch flume at low velocity. The tailings flow down and settle in the flume. Samples are collected at various flume locations to evaluate changes in gradation and solids content. Gradation and slurry consolidation tests were conducted on samples from the head and tail of the flume to evaluate the characteristics of tailings found on the beach and in the interior of the impoundment (slimes). Laboratory data sheets for tailings tests are contained in Appendix B.

Table 2: Test Matrix for Cyclone Underflow, Cyclone Overflow and Whole Tailings

Test Method	Underflow	Overflow	Whole Tailings
Gradation and Atterburg Limits (ASTM D4221, D4318)	1	2 (1)	2 (2)
Specific Gravity (ASTM D854)			1
Compaction Test (ASTM D-698)	1		
One-Dimensional Consolidation (ASTM D2435)	1		
Flume Test (flumes samples taken from head and tail of flume to evaluate segregation and settling) (specialty test)		1	1
Column Settling Test (single drain) (specialty test)		1	1
Slurry Consolidation Test (specialty test)		2 (1)	2 (2)
Permeability (ASTM D2434)	1		
Triaxial Shear Strength, Consolidated-Undrained (ASTM D2850)	1	1	

Notes:
(1) Testing completed on head and tail section samples from the flume to simulate properties of the beach and slimes fraction of the cyclone overflow.
(2) Testing completed on head and tail section samples from flume to simulate properties of the beach and slimes fraction of the whole tailings.

4.3 Test Results

4.3.1 Material Classification

Table 3 summarizes the characteristics of the tailings prior to and following cyclone separation. Gradation test results for the whole tailings cyclone feed, cyclone underflow and cyclone overflow are contained in Appendix B.2.

Table 3: Summary of Tailings Properties, Pre- and Post-Cyclone Separation

Material	P_{80} (microns)[1]	Minus 75-micron Fraction (percent)[2]	USCS Classification
Whole Tailings (feed)	110	59	SM (silty sand)
Underflow (sand)	150	17.9	SM (silty sand)
Overflow (slimes)	5.7	90	ML (low plasticity silt)

Notes:
[1]P_{80} is the particle size for which 80 percent of the material is finer
[2]The minus 75-micron fraction is the percentage of clay and silt sized particles

Based on the gradation test results, the whole tailings sample produced in the MAG metallurgical study is slightly coarser than the flotation tailings that will be produced during operations (P_{80}=110 microns versus the design P_{80} of 105 microns).

4.3.2 Cyclone Underflow Testing

Cyclone underflow sand will be delivered to the dam at a solids content of approximately 70 percent based on cyclone test results and cyclone performance predictions. Cyclone underflow sand discharged on the dam crest will be spread and compacted. Moisture density testing (ASTM D698) indicates a cyclone underflow maximum dry density of 97 pcf and an optimum moisture content of 16.8 percent. The moist weight of the compacted cyclone underflow will be on the order of 110 pcf. Underflow compaction test data are contained in Appendix B.2.

Cyclone underflow samples were subjected to one-dimensional consolidation and consolidated-undrained triaxial shear strength testing. A cyclone underflow sample compacted to within 5 percent of maximum dry density exhibited an effective internal friction angle of 40 degrees. Consolidation and triaxial test reports are contained in Appendix B.3.

4.3.3 Cyclone Overflow and Whole Tailings Testing

Flume tests were conducted on cyclone overflow and whole tailings in a 12-inch wide by 24-foot long test flume. The primary purpose of the flume tests is to provide data to support estimation of post deposition density. Samples were collected from the head and tail sections of the flume for gradation, settling and slurry consolidation testing. Test data were used to develop input parameters for one-dimension numerical consolidation modeling and impoundment filling rate studies. Flume test gradation, settling and slurry consolidation test reports are contained in Appendix B.4. Tailings consolidation modeling is discussed in Section 5.0.

To support stability analyses, a sample of cyclone overflow collected from the head of the test flume (beach material) was subjected to consolidated-undrained triaxial shear strength testing. The sample was tested at a dry density of approximately 94 pcf and a moisture content of 27 percent. The measured effective internal friction angle was 37 degrees. The triaxial test report is contained in Appendix B.4.

5.0 TAILINGS CONSOLIDATION ANALYSES

5.1 Approach

Consolidation calculations were performed using the computer program FSConsol (GWP Software, 1999). FSConsol performs a one-dimensional (1D), large-strain consolidation analysis using finite strain consolidation theory as presented in Gibson (1967). For modeling purposes, the non-linear relationships used to express permeability and compressibility are those proposed by Abu-Hejleh and Znidarcic (1994 and 1996), and defined by Equations 5.1 and 5.2, which are used in the consolidation and desiccation numerical model.

$$k = C e^{D} \qquad \text{Equation 5.1}$$

$$e = A(\sigma' + Z)^{B} \qquad \text{Equation 5.2}$$

When using FSConsol model, Equation 5.1 remains the same; however, Equation 5.2 is rewritten by the modified power law form to represent compressibility, as shown in Equation 5.3.

$$e = A(\sigma')^{B} + M \qquad \text{Equation 5.3}$$

Where:
e = void ratio of the tailings
σ’ = the effective confining stress
k = the hydraulic conductivity of the tailings
A, B, M (or Z), C, and D are material parameters determined from laboratory slurry consolidation and column settling tests

Five material parameters, *A, B, C, D,* and *M,* were determined by fitting constitutive relationships to laboratory data, as shown in Figures 1 and 2. Fitted parameters are shown in Tables 4 and 5. Data are based on slurry consolidation testing of cyclone overflow samples derived from the head and tail sections of the test flume discussed in Section 4.3.3.

Table 4: Permeability Input Parameters for Cyclone Overflow

Sample	C (centimeters per second)	D (dimensionless)[1]
Slimes	1.380×10^{-7}	3.353
Overflow Beach	1.523×10^{-6}	3.035

Table 5: Compressibility Input Parameters for Cyclone Overflow

Sample	A (1/kilopascals)^{B}	B (dimensionless)[1]	M (dimensionless)[1]
Slimes	3.144	-0.1952	-0.1424
Overflow Beach	1.787	-0.2983	0.5224

Note:
[1] B, D, and M are dimensionless and valid for English, International, and centimeter-gram-second units

The tailings impoundment was modeled by running analyses on single tailings columns or volumes filled with materials representing either the beach or slimes components of cyclone overflow. Under the proposed mining plan, the operator will be required to maximize use of the cyclone plant to generate sufficient sand to construct the dam. Therefore, whole tailings discharge will have little impact on the filling rate of the TSF or the characteristics of tailings placed in the TSF.

In each model run, the modeled component is assumed to represent 100 percent of the inflow to the model storage volume. Models were run until the modeled storage volume reached capacity, or the entire mass of tailings was input. The storage volume requirement for the TSF impoundment is estimated by applying FSConsol (1999) calculated densities (adjusted for errors as discussed in Section 5.3) from the final void ratio profile of each tailings component to obtain an overall dry density that is weighted based on laboratory grain size distribution mass balance results, as discussed in Section 5.2.

5.2 Tailings Beach versus Tailings Slimes Split

Grain size distribution tests were performed by the Golder soils laboratory in the Denver, Colorado, on beach and slimes samples from laboratory flume tests and on a cyclone overflow head sample discharged into the test flume. From the grain size distributions, the percent by weight of sand versus fines (silt and/or clay) can be used to approximate the weight or mass percentage of the beach and slimes that will report to the respective areas within the TSF impoundment. To determine the split, the percentage summation of sand and fines from the beach and slimes samples should equate to the percentage of sand and fines in the original cyclone overflow head sample. Table 6 depicts the results of the laboratory gradation tests and the split calculation, which results in an approximate ratio of 60:40 (beach versus slimes) by weight or mass.

Table 6: Laboratory Grain Size Distribution and Beach to Slimes Split Calculation

Sample	Grain Size Distribution		Split Calculation		
	Sand (%)	Fines (%)	% Solids Recovered	% Sand recovered from overflow	% Fines recovered from overflow
Beach	15.64	84.36	59.7	9.33	50.34
Slimes	0.74	99.26	40.3	0.3	40.03
Cyclone Overflow Head Sample	9.63	90.37	100	9.63	90.37

5.3 Consolidation Modeling Results

FSConsol model output and a detailed description of modeling procedures and interpretation are contained in Appendix C. If 100 percent of the inflow into the TSF impoundment is represented by the tail section flume sample (i.e., the finest fraction of the tailings), FSConsol predicts that the final dry density of the slimes fraction over the modeled profile will average approximately 33.5 pcf. With 100 percent of the inflow representative of tailings overflow beach materials, FSConsol predicts a final average tailings dry density of 78.6 pcf

The consolidation model constructed in FSConsol is 1D, and does not accurately take into account the overall bowl shaped geometry of the TSF, and the fact that the mass and volume quantities are larger towards the top than at the bottom of the TSF. The average dry density of each tailings component is corrected based on the average of the calculated percent error between 1D checks of the height of solids, the volume of solids, and the mass of solids. Based on the TSF geometry, calculated material properties, and the anticipated rate of rise, Golder calculated the 1D modeling error to range between 1 to 14 percent with an average error ranging between 2.7 and 5.4 percent. Based on Golder's experience, 1D analyses resulting in less than a 15 percent average error reasonably depict expected consolidation in the field; therefore, the three-dimensional (3D) impoundment geometry can be accounted for by reducing the 1D results of estimated average dry density values by the average percent error calculated for the following checks: height of solids, volume of solids, and mass of solids.

In addition, the FSConsol results were submitted to error checking to determine that solids and water inputs calculated by FSConsol were consistent with the delivery rates of the various components. After accounting for 3D characteristics of the impoundment geometry and errors, the predicted dry density of the beach and slimes components are 74.6 and 31.7 pcf, respectively.

5.4 TSF Capacity

Based on model results and corrections based on error checking, 31.7 and 74.6 pcf have been assumed, respectively, for the average dry density of the cyclone overflow slimes and beach at the end of filling. The capacity of the TSF interior is 96.9 million cubic yards (yd^3) with a crest elevation of 5,460 ft-msl and a maximum tailings surface elevation of 5,450 ft-msl. While the beach and slimes components are predicted to represent 60 and 40 percent, respectively, of the mass of cyclone overflow to be discharged into the TSF interior based on the mass balance as discussed in Section 5.2, these components will represent approximately 40 and 60 percent, respectively, of the storage volume. At the estimated densities predicted with FSConsol, the required storage capacity is 93.4 million yd^3. This assumes near constant operation of the cyclone plant. With approximately 96.5 percent utilization of the cyclone plant, available storage capacity will equal required storage capacity.

Without consideration of managed deposition effects, there is a small excess in available storage volume. The estimated weighted dry density of tailings within the TSF impoundment is 48.4 pcf, which is low in comparison to copper industry experience. Managed deposition such as cycling discharge locations to promote desiccation and controlling the size of the free water pond can be expected to increase the post deposition dry density and reduce storage volume requirements. In addition, the FSConsol modeling runs for slimes inflow were run for a time period of 7.9 years. The slimes can reasonably be expected to continue to consolidate and increase in dry density through the remainder of the 11.1-year mine life. Only a slight increase in the dry density of the slimes over the remainder of the mine life will result in an increase in storage capacity.

The inflow rate for cyclone overflow assumes near constant operation of the cyclone plant to produce sufficient sand to construct the dam to the elevation of 5,460 ft-msl. As such, the mill should not be operated unless the cyclone plant is operating, and maintenance of the cyclone plant should be performed concurrently with mill maintenance. The cyclone overflow distribution system has two operating legs that will facilitate near constant operation. During operations, filling rates and tailings post deposition dry density should be regularly monitored to evaluate consolidation characteristics. If the rate of consolidation is better than predicted, utilization of the cyclone plant could potentially be reduced, the final dam crest could be lowered, and a corresponding reduction in the amount of sand required to construct the dam could be realized.

6.0 FEASIBILITY LEVEL DESIGN

Table 6 summarizes key design criteria assumed in feasibility level design of the new TSF.

Table 6: Feasibility Study Design Criteria

Regional Design Factors	
Precipitation/ Evaporation	Based on NOAA weather data for Hillsboro and Caballo Dam, New Mexico
Design Storm Events	100 percent of the 72-hour general storm probable maximum precipitation (PMP), 26 inches
Stability FOS	Minimum 1.5 for static conditions and 1.1 for seismic loading conditions
Seismicity PGA	USGS MDE, 2475-year return period, 0.13 times gravitational acceleration (0.13g)
TSF Design Factors	
Storage Capacity	112 million tons (THEMAC)
Production/Delivery Schedule	1,333 tons per hour (TPH) net tailings to the TSF year 1-5, 1,222 TPH years 6 to 11.1, 125,000 tons per year (TPY) (THEMAC), post concentrate recovery
Mill utilization	92.5 percent (M3)
Operating Life	11.1 years (THEMAC)
Tailings Specific Gravity	2.64 (Golder test)
Tailings Solids Content (wt%)	29.2 percent solids by weight (whole tailings to cyclone plant). Tailings diluted in outlet sump as needed to optimize cyclone performance.
Production Rate	Varies, Net tailings to the TSF from 9,182 to 10,704 kiltons per year (25,156 to 29,326 tons per day) (NMCC)
Tailings post-deposition dry density	31.7 and 74.6 pounds per cubic foot (pcf) dry weight assumed for post-deposition cyclone overflow slimes and beach, respectively, 92 pcf dry weight for the cyclone underflow fraction. (Golder estimate)
Embankment Construction	Phase 1 earthen starter dam to an elevation of 5,250 ft-msl. Post Phase 1 peripheral earthen dam extension constructed to 10 feet above grade. Centerline raise construction using cyclone underflow sand. Cyclone underflow on dam crest compacted to minimum of 90 percent of American Society for Testing and Materials (ASTM) D698, relative density > 60 percent
Liner System	From bottom to top: Prepared foundation, 12-inch liner bedding fill, 80-mil HDPE geomembrane, overliner drainage collection layer with internal drainage pipe network beneath the tailings embankment and continuous beneath impoundment

TSF Design Factors (cont.)	
Earthworks Slopes (assumed)	Soil cut slopes = 1.5H:1V (1.5 horizontal to 1 vertical) Rock cut slopes = 1H:1V Fill slopes = 2H:1V Lined slopes = 3H:1V to 2.5H:1V max Embankment out-slope = 3H:1V nominal Starter Dam, 2.5H:1V inner, 2H:1V outer
Drainage/TSF Underdrain Collection Pond	Double-lined pond with LCRS to contain dam and impoundment under drainage and surface water runoff. Pond to be constructed as an OSE non-jurisdictional facility.
Collection Pond Reclaim	Submersible turbine pumps with 4,000-gallon per minute (gpm) capacity
Collection Pond Capacity	Normal inventory, 24 hours reserve capacity for underdrain for reclaim pump system upset, 100-year, 24-hour event (3.73 inches) stormwater storage capacity for runoff contributing areas
Tailings Management	Tailings routed through eighteen 15-inch cyclones at 83 TPH feed rate per cyclone. 45.2 to 45.6 percent underflow solids recovery (Krebs), 18.2 to 18.4 minus 200 fraction in underflow (Krebs). Cyclone overflow discharged from the dam crest into the impoundment interior.
Supernatant Reclaim	Floating barge with 12,978-gpm capacity
TSF Water Storage and Stormwater Diversion Design Factors	
Dam Safety Hazard Ranking	Significant, due to environment risks associated with a release of tailings (OSE)
TSF Pond Design Freeboard	As required to accommodate wave run-up and provide minimum freeboard for design storm
TSF Pond Required Stormwater Storage	Contain flows from 1.0 times the 72-hour PMP storm event plus normal inventory of supernatant water
Hydrology Runoff Curve Numbers	100 - Impounded tailings and lined areas 50 - Tailings embankment sand shell 92 - Native ground surfaces
Stormwater Diversion	Divert runoff from undeveloped areas inside ultimate footprint where feasible. Divert exterior area runoff where feasible.
Underdrain System	Continuous underdrain layer beneath dam and TSF interior. Collected water will be returned to the process via TSF underdrain collection pond reclaim pump system
TSF Water Pond Surface Area	40 percent of tailings impoundment interior or a maximum of 40 acres assumed for feasibility level water balance calculations
TSF Water Pond Surface Evaporation	75 percent of average Pan evaporation
Tailings Surface Evaporation	50 percent of average Pan evaporation

Notes:
FOS = factor of safety
MDE = maximum design earthquake
PGA = peak ground acceleration
HDPE = High density polyethylene

The following sections describe the various construction components of the TSF feasibility level design.

6.1 Earthworks

TSF construction activities will require borrowed structural fill for starter dam and toe berm construction, drain fill for constructing underdrain layers, and liner bedding fill material. Due to permit boundary and land ownership conditions, the majority of the construction materials must be derived from within the TSF footprint. Meeting fill, reclamation topdressing salvage, and reclamation cover material requirements for construction will necessitate stockpiling selected materials early in the life of the TSF because the borrow sources for these materials will be buried as the TSF footprint expands. Initial Phase 1 grading and liner installation will cover approximately 60 percent of the ultimate TSF footprint and much of the area available for borrowing construction material and reclamation cover.

The Phase 1 liner bedding fill material will be derived from the existing tailings produced during the Quintana Resources operation. All existing tailings lie within the Phase 1 construction footprint. Liner bedding fill needed for Phase 2 through Phase 5 construction will be derived from soil borrow areas.

Drain fill material will be produced by crushing and screening native soils and gravels. Drain fill material will be placed in contact with geomembrane liners. To meet drainage and liner compatibility requirements, a minus 1-inch gradation is assumed. The fine rejects (undersized) from drain fill material production will be suitable for liner bedding fill. Because Phase 1 liner bedding fill requirements will be met by using the existing tailings, the undersized materials produced in Phase 1 will be stockpiled for use as liner bedding fill in Phases 2 and 3. Liner bedding fill stockpiled in Phase 1 will be supplemented with additional material produced during construction. Approximately 100,000 cy^3 of undersized material will be stockpiled in Phase 1.

6.1.1 Site Grading

The TSF grading plan for Phases 1 through 5 is illustrated on Drawing 10. The topographic surface shown on the grading plan reflects the over-excavation/removal of borrow materials required for cover material stockpiling and TSF construction. The approximate construction limits by phase are also indicated on Drawing 10. Drawing 11 illustrates the Phase 1 grading plan and Phase 1 construction. Site grading will include removal of the old starter dam and splitter dike for use as structural fill in the new starter dam and toe berm. Additional structural fill and drainage material will be borrowed from within the TSF footprint. In general, gravelly sands suitable for drain material lie on the interior impoundment slopes to the west of the dam. Materials suitable for structural fill are exposed on the surface over most of the TSF footprint. Borrow areas developed during phased construction will extend across construction phase limits but will lie within the ultimate TSF footprint.

6.2 Toe Berm and Starter Dam

The Phase 1 toe berm and starter dam are illustrated on Drawing 11. The TSF at final build-out is shown on Drawing 12, and the toe berm and dam sections and details are shown on Drawings 13 and 14.

A temporary toe berm will be constructed around the downslope TSF periphery in Phase 1. The temporary toe berm will be removed and reconstructed as the liner is extended outward and downslope in Phases 2 through 4. In Phase 5, a permanent toe berm will be constructed.

The primary purpose of the temporary toe berm is to contain runoff and sediment from the dam face, and direct dam drainage to the underdrain collection system and then to the TSF underdrain collection pond. Both the temporary toe berms and permanent toe berm will be constructed with structural fill and a geomembrane “flap” draped over the perimeter berm. The temporary berm liner flap will be anchored in a temporary perimeter anchor trench on the top of the berm. To relocate the temporary toe berm, the geomembrane flap will be folded inward over sandbags to divert drainage away from the temporary berm while it is removed. Once the temporary toe berm is removed, the liner extension will be installed and the original liner will be laid back over the liner extension. The seam between the two liners will then be extrusion welded in accordance with industry standards. This method will ensure that the liner seam is located in the downgradient flow direction for tailing drainage. At final build-out, a permanent toe berm will be constructed to contain runoff and sediment, buttress the dam toe and establish the limit for reclamation cover placement. The return water pipeline from the TSF underdrain collection pond will also run along the upstream side of the toe berm and above the geomembrane liner. The return water pipeline will be relocated in conjunction with the reconstruction of the temporary toe berms during Phases 2 through 4. In Phase 5, the return water pipeline will be placed in its final location along the upstream side of the permanent toe berm and above the geomembrane liner.

The Phase 1 starter dam will be constructed to an elevation of 5,250 ft-msl, with a 2.5H:1V inner slope and a 2H:1V outer slope. The purpose of the starter dam is to provide initial containment of tailing material, and to aid in tailings distribution from the dam crest. In the early stages of the operation, impounded water may periodically come in contact with the upstream face of the starter dam. The upstream face of the Phase 1 starter dam will be lined with an extension of the TSF geomembrane liner. The purpose of the liner extension is to prevent tailing drainage into the starter dam fill. The liner extension is illustrated on Drawing 13.

The starter dam will be constructed over the impoundment liner and underdrain collection systems. In Phases 2 through 5, starter dam extensions will be constructed to a height of 10 feet over the liner surface along the south, west and north boundaries.

6.3 TSF Liner System

Liner system details are shown on Drawing 14. The liner will consist of an 80-mil HPDE liner placed on a 12-inch thick liner bedding fill layer. In Phase 1, the liner bedding fill will consist of a minimum of 12 inches of tailings recovered from the north cell of the old starter dam. After Phase 1, liner bedding fill will consist of a 12-inch layer of crushed and screened native material, or selected local soil.

6.4 Tailings Drainage

Drainage from future tailings will be collected in two separate underdrain systems and transported to the TSF underdrain collection pond. Drainage from the TSF impoundment interior will be collected in a continuous underdrain (impoundment underdrain) constructed over the geomembrane liner. A separate blanket drain will underlie the tailings dam (dam underdrain). The layout of the underdrain systems is shown on Drawing 15. Underdrain details are shown on Drawings 16 and 17.

6.4.1 Drain Description

The impoundment underdrain system will consist of a system of primary 10-inch diameter drainage pipes placed in drainage channels, and a system of 4-inch diameter lateral drain pipes that cover the remainder of the TSF interior floor. Two types of drain fill will be used for the impoundment underdrain. These include primary drain fill placed as an envelope around primary drain pipes, and a continuous minimum 18-inch thick layer of selected native drain material that covers the impoundment liner and contains the lateral pipe network. The primary drain fill will be produced by processing native gravelly sand to reduce its content of fine sand, silt and clay sized particles. The native drain fill material will consist of selected site soils (gravelly sand).

Scour protection will be placed at points of cyclone overflow discharge to protect the impoundment underdrain system. The scour protection will consist of locally derived coarse material cover over the underdrain, or the incorporation of energy dissipation measures on discharge spigots. Scour protection details are provided in Drawing 29. The specific number and type of scour protection required will be determined based on estimated cyclone overflow discharge volumes and flow velocities.

The dam underdrain system will consist of a minimum 18-inch thick layer of primary drain fill material and a network of 4-inch diameter internal drainage pipes.

6.4.1.1 Impoundment Underdrain

Pipes in the impoundment and dam underdrains will be placed at a spacing that maintains minimum hydraulic head on the geomembrane liner and reduces the potential for leakage through the geomembrane liner. Pipe spacing is a function of the rate at which tailings drainage reports to the underdrain and the hydraulic conductivity of the drain fill.

Tailings placed in contact with the impoundment underdrain can be expected to rapidly consolidate and form a low permeability layer over the drain fill. Slurry consolidation tests indicate that the cyclone overflow that will be deposited in the impoundment interior will exhibit post-consolidation hydraulic conductivities ranging from $5x10^{-7}$ cm/sec for material deposited on the tailings beach, to $5x10^{-8}$ cm/sec for cyclone overflow slimes. Assuming a unit hydraulic gradient and an average tailings beach and slimes hydraulic conductivity of $2.75x10^{-7}$ cm/sec ($9x10^{-9}$ feet/second), the rate of drainage through the tailings and into the drain layer will be on the order of $7.8x10^{-4}$ feet/day/ft^2. At final build-out with an impoundment floor area of 321 acres, total drainage collected in the impoundment underdrain will be on the order of 66 gallons per minute (gpm).

The drain pipe spacing is set to maintain a drain layer water depth and liner head that is less than the drain layer thickness of 1.5 feet. Because drainage into the impoundment underdrain will occur at a very low rate, the drain layer fill hydraulic conductivity can be relatively low and still maintain drainage and low liner head. Using the mound equation (Masada, 1988) and a hydraulic conductivity of $3.8x10^{-5}$ cm/sec for the native material drain fill layer, a spacing of 35 feet between impoundment lateral drain pipes will result in a maximum liner head of 1.33 feet. The spacing calculation assumes a 1 percent grade between drain pipes, which is the minimum grade on the TSF floor. Steeper slopes between drain pipes will reduce the head on the liner. Drainage mound and pipe spacing calculations are contained in Appendix D.1.

6.4.1.2 Dam Underdrain

The dam underdrain constructed beneath the cyclone underflow sand fill will be subject to different conditions. The sand will be relatively permeable and the drainage rate will be variable because sand deposition locations will change frequently. The water in the cyclone underflow will be delivered to the dam at an average flow rate of approximately 1,042 gpm. In order to determine dam underdrain pipe spacing, the following assumptions were used to estimate drain inflow rates:

- Approximately 42 percent of the water deposited with the cyclone overflow will be retained in the tailings pore space. The remainder (approximately 58 percent) will either drain through the sand dam and report to the drain, or be lost to evaporation. Approximately 15 percent of the underflow water is assumed to be lost to evaporation. The resulting maximum flow of approximately 448 gpm will report to the dam underdrain.
- Dam construction is assumed to occur over an area of approximately 100 by 600 feet (60,000 square ft^2).
- The slope between drain pipes is one percent.
- The dam underdrain fill (primary drain fill) will be a relatively clean fill, with approximately 20 percent finer than the No. 4 standard sieve, produced by crushing and/or screening of native gravelly sand. It is assumed to have a hydraulic conductivity of $1x10^{-1}$ cm/sec. A permeability test of prepared drain fill material with 50 percent finer that the No. 4 sieve exhibited a hydraulic conductivity of $9.1x10^{-2}$ cm/sec.

Based on these assumptions, the rate of application of cyclone drainage to the dam underdrain will be approximately 5.42×10^{-4} cm/sec (1.5 feet/day/ft^2). Using the mound equation, a pipe spacing of 45 feet will result in a maximum head of 1.41 feet on the geomembrane liner. Drain layer thickness will be a minimum of 1.5 feet.

6.4.2 Drain Fill and Tailings Filter Compatibility

6.4.2.1 General Requirements for Drain Fill

Drain fill materials shall meet hydraulic conductivity and stability requirements. The dam underdrain fill (primary drain fill) shall be capable of retaining the cyclone underflow sand while allowing the transfer of drainage, i.e., without clogging. Inside the impoundment, the primary drain fill shall also be compatible with the underdrain pipe slot size and shall be capable of retaining the select native drain fill material while allowing tailing drainage to pass.

The select native drain fill layer shall meet a number of conditions, including:

- It shall be erosion resistant to control the potential for scour while temporarily exposed on impoundment slopes.
- It shall be compatible with the drain pipe slot size.
- It shall be capable of retaining the cyclone overflow slimes.
- It shall be retained by the primary drain fill.

6.4.2.2 Dam Underdrain Fill/Primary Drain Fill

Figure 3 shows the particle size distribution curve (PSD) for the cyclone underflow that will be used to construct the TSF embankment and will be in contact with the dam underdrain. The cyclone underflow filter envelope defines the range of drain fill gradations that are filter compatible with the cyclone underflow, i.e., materials that will restrict the migration of the cyclone underflow sand into the drain fill. It is assumed that this material will be prepared on site by reducing (screening out) a portion of the fine fraction of the native gravelly sand. A drain material with a minus 150-micron (No. 100 standard sieve) fraction of less than 10 percent and a minus 75-micron (No. 200 standard sieve) fraction of less than 5 percent is anticipated.

Figure 3 shows the estimated average PSD for the native soil composite samples following removal of the fine fraction with approximately 10 percent finer 425 microns (approximately 10 percent passing the No. 40 sieve). The modified gradation falls within the filter envelope for the cyclone underflow.

Type N-12 dual wall perforated, corrugated pipes have 3-millimeter (mm) wide slots for pipe diameters up to 10 inches. For broadly graded drain fill, Federal Emergency Management Agency (FEMA) (2007) recommends that the ratio of the D_{85} particle size (the particle size for which 85 percent is finer) to the drain pipe slot width be greater than 4. To satisfy this condition, a D_{85} of at least 12 mm is recommended.

Gravelly sand composite samples that were collected to represent materials available for drain construction meet the D_{85} requirement. When screened to remove fine particles, the D_{85} particle size will increase and the material will continue to meet the D_{85} size recommendation.

The primary drain fill that will be placed as an envelope around the primary drain pipes in the TSF interior will meet the same D_{85} size requirements for compatibility with the drain pipe slot size. The gravelly sand processed for the dam underdrain will also meet the requirements for primary drain fill.

For field production of the dam drain fill and primary drain fill during TSF construction, the minus 0.19 inch fraction (material finer than the No. 4 sieve) will be screened out to produce a granular drainage material. Table 7 presents the specification for the primary drain fill.

Table 7: Primary Drain Fill Specification

Particle Size (inch) or Sieve Size	Percent Passing
1	100
3/8	100-40
No. 4	0-20
No. 100	<10
No. 200	<5

Based on review of native soil gradation test results, a primary drain fill recovery rate of 40 to 60 percent is estimated during processing of available gravelly-sand soils. Fine rejects will be suitable for liner bedding fill material.

6.4.2.3 Select Native Drain Fill

The cyclone overflow slimes represent the finest material that will be discharged into the impoundment and placed in contact with the impoundment underdrain. Figure 4 shows the PSD of slimes and the gradation of the filter envelope required to retain the slimes. The SD of the composite gravelly sand samples that are anticipated to be used for the select native material drain fill are also shown. The PSD intercept the slimes filter band in the critical D_{15} range. The select native drain fills will be capable of retaining the slimes. Some local clogging could be anticipated because the native material fines content is higher than required; however, the material is expected to function as needed because the drainage rate into the filter layer will be very low. Table 8 presents the gradation specifications for the select native drain fill.

Table 8: Select Native Drain Fill Specification

Particle Size (inch) or Sieve Size	Percent Passing
1	100
3/8	90-60
No. 4	80-40
No. 10	70-30
No. 100	10-30
No. 200	>10

If the native soils are crushed to minus 1 inch, the recovery of select native drain fill should be 100 percent during field processing for construction.

6.4.2.4 Primary and Select Native Drain Fill Compatibility

The primary drain fill shall be capable of retaining the select native drain fill, while allowing tailing drainage to pass from the select native fill into the primary drains. Figure 5 shows the filter envelope for the select native drain fill and the estimated PSD for the primary drain. The primary drain fill in the critical D_{15} to D_{50} range of the PSD falls within the select native drain material filter envelope and the two drain materials are expected to be filter compactible, i.e., the select native drain fill will not migrate into the primary drain fill.

6.4.3 Drain Piping

The primary drainage pipes in the impoundment underdrain will be 10-inch diameter Type N-12 dual wall perforated, corrugated polyethylene pipe (PCPE). The 10-inch PCPE pipe will be plain-end and joined with soil tight split couplings.

The lateral drain piping in the impoundment and dam underdrain will be 4-inch diameter Type N-12 PCPE pipe with plain ends and soil tight split couplings.

6.4.4 Pipe Placement

The primary drain pipes will be placed in a constructed channel or drainage swale that is a minimum of 16 inches deep and inside an envelope of primary drain fill as shown in Drawings 16 and 17. After the primary drain fill is placed, the lateral drain pipes will be placed on the liner surface and oriented to drain into the primary drain pipe channel. In the primary pipe channel, lateral pipes will lie in select native fill and run parallel to the primary drain fill envelope for a length of at least 4 feet. The select native drain material fill will be placed over and around the primary drain fill and lateral drainage pipes. The final cover of primary and select native drain fill placed over the primary pipes will be a minimum of 24 inches thick. Pipe placement is such that collapse or damage of an individual lateral drain pipe will not result in the transfer of tailings or select native drain fill into the primary drain pipes. The cover of select native drain fill over the primary drain fill will prevent the transfer of soil or tailings from the lateral to primary pipe network.

Dam underdrain pipes will be placed within the drain fill and oriented to discharge outside the toe of the dam in the dam underdrain and runoff collection channel. As the dam is raised, the dam underdrain and runoff collection channel will be relocated and the dam underdrain pipes will be extended to the new perimeter collection channel.

6.4.5 Drain Pipe Deflection

Deflection analyses were conducted to evaluate the performance of the underdrain pipes under the loads imposed by a tailings cover of approximately 240 feet. The Type N-12, dual walled PCPE pipes used for the underdrain collection system are considered to be flexible and can resist damage by distorting sufficiently to shed overburden loads to the surrounding underdrain fill.

As pressure on the top of the pipe is increased through an increase in tailings height, an increasing proportion of the vertical pressure on the pipe is transferred to the surrounding fill. This process is commonly called bridging. Therefore, the key parameter in assessing deflection of the underdrain collection system is the stiffness (modulus) of the fill in contact with the pipe. This bridging phenomenon was first accurately modeled by Burns and Richards in the paper *Attenuation of Stress for Buried Cylinders* (Burns and Richards, 1964). Golder has analyzed the pipe stresses and deformations based on the work of Burns and Richards and Hoeg (1968), with modifications to the closed-form, plane strain solutions by Lupo (2001). The closed form equations were modified to allow an incremental stress approach and non-linear material compression.

Golder analyzed the worst-case scenario with an entire column of tailings underflow cyclone sand of maximum height placed over the underdrain collection system. Based on Golder laboratory test results for the tailings underflow cyclone sand, a friction angle of 39 degrees and soil density of 120 pcf was used to model the tailings properties used in the analysis. The supporting fill was assumed to consist of the select native drain fill material with a similar stress versus strain relationship for a silty sand compacted to 80 percent of maximum dry density. The primary drain fill used beneath the dam and in the impoundment primary drains will have a reduced fines content compared to the select native drain fill, and will exhibit a strength that is at least that of the select native drain fill. Modeling deflection based on the select native drain fill is conservative.

Drain fill properties, along with pipe dimension and properties, were used to determine the maximum deformation that may be expected for the pipes. The maximum vertical pipe deflections are estimated to be between 11 and 14 percent. Golder's observations have been that pipe deflections greater than 15 to 20 percent often result in plastic deformation of the pipe at the springline. A vertical deformation of 15 percent is assumed as the maximum limiting deflection for flexible pipe. Therefore, the estimated deformations of 11 to 14 percent are within the acceptable performance criteria established by Golder. Detailed data worksheets and calculations are provided in Appendix D.2.

6.4.6 Drainage Outlet Works

Tailing drainage from the impoundment underdrain will be routed beneath the tailings starter dam and cyclone sand dam to the TSF underdrain collection pond. Drainage outlet works details are shown on Drawings 16 and 17. The primary drain pipe network in the impoundment underdrain will be reduced to three pipes to transmit drainage to the outlet works. Three primary drainage pipes will be routed into a 12-inch diameter Type N-12 PCPE manifold at the upstream toe of the starter dam, which will in turn be connected to a 14-inch diameter, Schedule 80 carbon steel drain pipe. The steel drain pipe will be routed from the upstream toe of the starter dam to the TSF underdrain collection pond in a 42-inch deep by 42-inch wide ditch that will be backfilled with concrete.

The steel outlet pipe will pass through a valve vault. The valve vault will consist of a 72-inch diameter prefabricated concrete manhole base unit placed on an 18-inch thick reinforced concrete foundation mat. The manhole base unit will be fabricated with inlet and outlet openings for the steel drain pipe. Prefabricated manhole riser sections will be used to extend the valve vault vertically to a maximum height of 100 feet, to an elevation of approximately 5,300 ft-msl.

A 14-inch diameter, hydraulically actuated knife gate valve will be installed on the steel outlet pipe in the valve vault. The hydraulic actuator lines will be 100 feet long and will be routed up through the riser sections to the top surface of the dam for connection to a portable hydraulic power pack. As the manhole riser sections are added, the outlet valve hydraulic lines will be secured to the man-way ladder steps cast into the manhole riser sections. This arrangement will enable valve operation without manhole entry.

The purpose of the outlet valve is to prevent the drainage of excess water into the TSF underdrain collection pond in the early stages of impoundment operation (i.e., before the impoundment underdrain is covered with cyclone overflow). As positioned, the valve will be upstream of the main body of the dam, and its use will not result in pressurization of the underdrain pipe inside the dam. Once the underdrain is covered with cyclone overflow, the flow into the impoundment underdrain will be limited by the low hydraulic conductivity of the tailings slimes overlying the drain. When the dam reaches a height of 100 feet (approximately 5,300 ft-msl), the outlet valve will be fully opened and the valve vault will be backfilled with cement grout and granular fill materials.

6.5 TSF Underdrain Collection Pond

6.5.1 Pond Description

The location of the TSF underdrain collection pond is shown on Drawings 2, 10, 11, and 12. TSF underdrain collection pond details and sections are shown on Drawings 13, 18, 19 and 20. Figure 6 illustrates total TSF underdrain collection pond capacity, the maximum operating water required to preserve upset and stormwater storage capacity, and the maximum stormwater storage level.

The TSF underdrain collection pond will be double-lined with minimum 60-mil HDPE geomembrane liners. An HDPE geonet will be placed between the liners to serve as the collection pond leakage collection and recovery system (LCRS) and minimize the head on the lower pond liner. The pond will be fitted with a primary drain material filled sump and LCRS pump to recover any leakage through the upper geomembrane.

TSF underdrain collection pond reclaim pumps will be submersible, vertical turbine pumps supported in a reinforced concrete sump and headwall structure. The sump will allow the water level in the pond to be drained to the pond floor level and no dead storage will be required. The use of submersible turbine pumps mounted in a concrete sump will eliminate the potential for liner damage associated with a barge mounted pump coming to rest on the pond floor. The reinforced concrete sump is shown in cross section on Drawing 19.

Impoundment underdrain flows will be transported to the pond via a buried steel pipe. Runoff and dam underdrainage will be routed to the pond via an HDPE lined open ditch constructed at the toe of the dam.

6.5.2 TSF Underdrain Collection Pond Sizing

The TSF underdrain collection pond will contain drainage water from the TSF impoundment and dam underdrains, as well as runoff from the downstream face of the tailings dam. The pond is sized to contain 24 hours of tailing drainage flow at maximum estimated drainage rates, runoff from the 100-year, 24-hour storm event of 3.73 inches (National Oceanic and Atmospheric Administration [NOAA] 2006) incident on the downstream dam face, and an additional minimum 2-feet of freeboard. Underdrain flow rate calculations and runoff estimates are contained in Appendix E.

Underdrain flow rate estimates are based on the assumption that materials representative of the consolidated, cyclone overflow will be in contact with the impoundment underdrain and will control the rate of tailing drainage reporting to the TSF underdrain collection pond. The hydraulic conductivity of materials representative of beach and slimes samples are 5.0×10^{-7} and 5.0×10^{-8} cm/sec, respectively. If it is assumed that the more permeable beach-like material cover 60 percent of the impoundment underdrain at final build-out, the maximum underdrain flow rate will be on the order of 66 gpm.

Approximately 1,042 gpm of water will be delivered to the dam in cyclone underflow with a moisture content of approximately 30 percent. An estimated 42 percent of the water will be permanently bound or entrained within the pore space of the sand fill, and an additional 15 percent is estimated to be lost to evaporation. The remaining 28 percent (448 gpm) is assumed to report to the dam underdrain and TSF underdrain collection pond.

A storage allowance is provided for potential inflows associated with the free water pond coming in direct contact with the impoundment underdrain system. In this case, the drainage rate will be controlled by the hydraulic conductivity of the select native drain fill material that will cover the impoundment floor and drain pipe network. Permeability testing of a representative sample of select native drain fill indicated a hydraulic conductivity of 3.8×10^{-5} cm/sec. If it is assumed that a 20-acre area of impoundment drain will be inundated to an average depth of 2.5 feet, the estimated drainage rate will be on the order of 1,220 gpm.

The maximum contribution of stormwater runoff to the TSF underdrain collection pond will be from the combination of dam out-slope area and exposed toe area liner and underdrain occurring in Phase 4. The 100-year, 24-hour storm event incident on this area is estimated to produce a runoff volume of 3.94 million gallons.

Table 9 summarizes the TSF underdrain collection pond storage capacity requirements. The pond capacity is approximately 12.24 million gallons with 2 feet of dry freeboard below the crest of the pond (top of pond liner). The pond has the capacity to store up to approximately 5.8 million gallons of process water for facilitating process water make-up or storage of extra water during wet periods. A maximum water surface elevation of 5,157 should be maintained in order to provide sufficient storage for stormwater associated with the 100-year, 24-hour storm event and a coincident 24-hour upset period.

Table 9: TSF Underdrain Collection Pond Storage Capacity Requirements

Source	Type of Inflow	Volume (gal)
Dam Face Runoff	Storm Event Runoff	3,942,528
Dam Underdrainage	24-hour upset volume	645,206
Impoundment Underdrainage	24-hour upset volume	95,074
Free water pond direct drainage	24-hour upset volume	1,754,857
Total		**6,437,666**

6.6 Surface Water Management

6.6.1 Control of Impoundment Runon

The TSF will be required to contain inflows and direct precipitation associated with the 72-hour PMP of 26 inches. Diversion ditches constructed for impoundment runon control have been sized to carry the peak discharge associated with the prescribed PMP event using a rainfall intensity versus time distribution defined in Hydrometeorological Report 55A (US Department of Commerce, 1998). Runoff estimation and ditch sizing calculations are contained in Appendix F.1.

Diversion ditches will be constructed to divert runon away from the impoundment where possible. Peripheral catchment and runoff contributory areas are limited because the TSF lies in the head of a hydrologic catchment area. The Phase 1 grading plan (Drawing 11) indicates the location of diversion ditches. The Phase 1 ditches are located outside the Phase 2 construction area and will be functional during Phases 1 and 2. In Phase 3, a permanent diversion ditch will be constructed on the west periphery of the TSF as shown on Drawing 11. Table 10 summarizes peak discharge estimates for the Phase 1 and 3 diversion ditches.

Table 10: Summary of Impoundment Runoff Diversion Ditch Capacity and Size Requirements

Phase/Location	Peak Discharge (cfs)	Ditch Width (ft)	Ditch Depth (ft)(3)
Phase 1, TSF northeast	525	10 (1)	5.5
Phase 1, TSF southwest	340	10 (2)	5.1
Phase 3/ TSF southwest periphery	205	10 (2)	4.2

Notes
(1) 2H:1V side slopes assumes on the downslope side, slope on upstream side varies
(2) 2H:1V slopes
(3) Depth at the lowest channel slope, includes 1 foot of freeboard.

6.6.2 Dam and TSF Underdrain Collection Pond Surface Water Management

Surface water management facilities other than impoundment diversions are designed to contain and transport flows associated with the appropriate 100-year storm event. Hydrologic calculations for the dam and TSF underdrain collection pond surface water management facilities are contained in Appendix F.2.

Runoff from the downstream face of the dam will be routed to the TSF underdrain collection pond. The time of concentration (T_c) for the toe ditch catchment area is estimated to be three hours. The dam underdrain and runoff collection channel at the toe of the dam has been sized to carry the peak discharge associated with the 100-year, 3-hour storm. The 100-year, 3-hour storm will produce the peak 100-year storm runoff of 71 cubic feet per second. The flow depth at peak discharge is estimated to be a maximum of 0.5 feet. The perimeter toe berm height will be 3 feet (temporary berms) to 4 feet (permanent berms) high and will provide 2.5 to 3.5 feet of dry freeboard in the toe area dam underdrain and runoff collection channel.

6.7 Cyclone Plant Area

Excavation and site preparation will be required for the cyclone plant pad, the pump equipment pad and the surge pond. The cyclone plant general arrangement plan and site grading plan are shown on Drawing 21. The purpose of the cyclone plant is to separate whole tailings into sand and slimes fractions. Its' design and purpose are described in more detail in Section 7.0.

Surge pond cross sections and details are shown on Drawing 22. The purpose of the surge pond is to contain discharges (tailings, process, and reclaim water) from various processing locations under upset conditions, due to a pipe failure or shutdown of the cyclone plant. Upset flows from the cyclone plant will discharge by gravity to the surge pond within a secondary containment ditch lined with a minimum 60-mil HDPE geomembrane liner placed over 6 inches of liner bedding fill. Further details of the secondary containment ditch are provided below in Section 7.4.

7.0 TAILINGS DELIVERY AND DISTRIBUTION SYSTEM DESIGN

7.1 General System Description

The tailings delivery and distribution system design consists of pipeline system that delivers whole tailings from the processing plant to the tailings storage facility. Whole tailings will be separated into fine material and sand material in the cyclone plant. The sand fraction will be transported to the TSF and used for dam construction while fine material will be deposited into the TSF. The tailings surge system is designed for tailings management in case of unanticipated shutdown of any of the tailings stations or surges or overflows from station sumps. Return or reclaim water will be collected from the TSF surface pond and TSF underdrain water collection pond and transported back to the process plant. A general process flow diagram for the tailing delivery and distribution system is provided on Drawing 23.

Process equipment for the tailings delivery and distribution system will be located in four main stations as listed below:

- Cyclone Station: including the cyclone cluster, slurry pumps, slurry transfer sumps, gland seal water system, and electrical equipment;
- Surge Discharge System: including the surge pond evacuation pumps and lined secondary containment ditches;
- TSF Return Water Pond Barge Station: including a floating barge and barge mounted vertical turbine pumps and electrical equipment; and
- TSF Underdrain Collection Pond Pump Station: including vertical turbine pumps in a permanent structure and electrical equipment.

Tailings distribution will include whole tailings transport from the process area to the cyclone station and sand and fine tailings transport to the TSF. Return water will include tailing drainage water and TSF return water transported to the process plant. The major pipelines are listed below, and their interactions are shown in the overall system process flow diagram on Drawing 23.

- Cyclone Feed Line
- Cyclone Overflow Line
- Cyclone Underflow Line
- Cyclone Whole Tailings Bypass Line
- TSF Return Water Line
- TSF Underdrain Collection Return Water Line
- Main Surge Discharge Line

The major pipelines will be installed within secondary containment ditches lined with a minimum 60-mil HDPE geomembrane liner placed over six inches of liner bedding fill. The secondary containment ditches and associated pipelines will be constructed in accordance with the requirements listed in 20.6.7.23

NMAC, and will include secondary containment. Further details of the secondary containment ditches are provided below in Section 7.4.

The arrangement of the major components of the tailings delivery and distribution system is shown on Drawings 21 and 24. Drawings 25 and 26 present the tailings delivery and distribution system plan and profile. Whole tailings produced at the flotation plant will be transported via a 30-inch HDPE DR17 pipeline to the cyclone plant at the northwest side of the TSF. The cyclone plant will separate the sands fraction, which represents approximately 45 percent of the whole tailings stream, from the slimes fraction, which represents approximately 55 percent of the whole tailings stream. The sands fraction or the “underflow” of the cyclone plant will produce an underflow slurry which will be transported to the TSF in a separate 12-inch HDPE DR9 pipeline and discharged on the dam. The cyclone underflow sand placed on the dam crest will be then be spread, graded and compacted, as necessary to push sand down the dam out-slope and continually build the dam.

The cyclone overflow (slimes) from the cyclone plant will be routed to the TSF in a separate 30-inch HDPE DR17 pipeline and discharged into the impoundment. The cyclone overflow water will be returned to the process water reservoir at a rate of up tom 13,000 gpm. The cyclone plant will operate continuously to produce the sand material needed for continuous construction of the dam. In the event of upset conditions when the cyclone plant is not in operation, whole tailings will be discharged via gravity into the surge pond through a lined secondary containment ditch (see Section 7.4).

7.2 Tailings Delivery

7.2.1 Underflow Sand

The cyclone underflow pipeline will deliver sand to the top of the embankment for tailings dam construction. Two underflow pipelines will be used. The east leg will be routed around the north side of the TSF, and the south leg will be routed around the south side of the TSF as shown on Drawing 24. Each leg is sized to transport 100 percent of the cyclone underflow at up to 45.6 percent sand recovery. This allows for 100 percent availability of sand delivery to the dam.

Cyclone underflow will be discharged through 4-inch spigots placed every 333 feet. Each spigot will include one 4-inch manual pinch valve. The underflow pipelines will also have in-line knife-gate isolation valves every 2,000 feet to allow for isolation and relocation of the pipe as the dam rises. The knife-gate isolation valves will be quick-disconnect with hydraulic actuators powered by a mobile hydraulic power unit mounted on a pick-up truck.

The north and south cyclone underflow pipelines will be operated independently. When one is in operation, the other can be serviced or broken down and relocated. Cyclone underflow pipes will be flanged each 500 feet to facilitate breakdown and relocation.

7.2.2 Cyclone Overflow

Two cyclone overflow delivery pipelines, one leg to the north side and one leg to the south side of the TSF, will transport the cyclone overflow to the TSF interior (impoundment interior) as shown on Drawing 24. The cyclone overflow will be discharged via spigots placed every 667 feet. Each spigot will include a manual pinch valve. Each pipe is sized to carry 100 percent of the cyclone overflow to permit pipeline relocation without interrupting operation as the TSF elevation rises. One leg will remain active while the other is serviced or relocated.

The cyclone overflow pipelines will also have knife-gate isolation valves placed every 2,000 feet to allow for isolation and relocation of the pipe as the impoundment rises. The knife-gate isolation valves will be quick-disconnect with hydraulic actuators powered by a mobile hydraulic power unit mounted on a pickup truck. The cyclone overflow delivery pipelines will be flanged every 500 feet to allow for breaking down and relocating the pipe.

7.3 Deposition Management

7.3.1 Dam Construction

Figure 7 illustrates height versus capacity and surface area relationships and rate of rise for the tailings impoundment. Near continuous operation of the cyclone plant will be required to produce sufficient sand to construct the dam to the ultimate elevation of 5,460 ft-msl. The difference in elevation between the dam crest and the head of the cyclone overflow impoundment beach will be maintained at 10 feet. Maintenance of this elevation difference will place the transition between the cyclone underflow sand dam fill and the interior cyclone overflow a distance of approximately 30 feet upstream of the inside dam crest. The elevation differential of 10 feet will be maintained in order to maintain adequate freeboard for stormwater storage. Maintaining this elevation differential also allows for maximum storage capacity for cyclone overflow, and thus maximum production of sand needed for dam construction.

In the early stages of operation, there will be more sand available than needed to maintain the elevation differential between the dam crest and the head of the beach. Excess sand will be pushed down the out-slope of the dam and used to construct the dam base. In the later stages of operation, the sand previously used to construct the dam base will reduce the sand requirements for raising the dam crest, and facilitate maintaining the crest to beach elevation differential.

7.3.2 Cyclone Overflow Discharge

The storage volume for the cyclone overflow will be maximized through managing deposition and practicing sub-areal, thin lift deposition. Discharge spigot locations will be frequently cycled so that a thin lift of tailings is placed on the tailings beach. Exposure to evaporation prior to burial with a subsequent lift of tailings will allow the tailings to desiccate and consolidate. The degree to which thin lifts can be placed and consolidation can occur under managed deposition is primarily a function of rate of tailings rise. It is also influenced by tailings properties, climatic conditions, surface water management, and operator effort.

7.4 Management of Upset Flows

Potential upset flows from the process area, cyclone plant, and TSF will be controlled through a series of secondary containment ditches, the surge pond, and the TSF underdrain collection pond (see Section 6.5). The secondary containment ditches and associated pipelines will be constructed in accordance with the requirements listed in 20.6.7.23 NMAC. The secondary containment ditches will run from the process area to the TSF (the main ditch), from the main ditch to the cyclone area, and from the cyclone area to the surge pond. The secondary containment ditches are designed to contain and transport flows via gravity that are related to potential upset conditions and direct precipitation onto the ditches associated with the 25-year 24-hour storm event (2.88 inches). Maximum upset flow conditions would be associated with overtopping of the process water reservoir (as estimated by M3, the design contractor for the process water reservoir). This maximum upset flow was assumed to be 18,000 gpm over a 30-minute period, at which point the process area pumps would be shut down. The secondary containment ditches are designed for these maximum upset flows, direct precipitation, and an additional 2 feet of freeboard. The main ditch is designed to flow to the TSF by gravity for the first six years. After year six, gravity flow to the TSF is no longer possible because of the increased height of the TSF and upset flows will then discharge to the surge pond via gravity in a lined ditch through year 11.1. The alignment of the secondary containment ditches is shown on Drawings 2, 3, 10, 11, 12, 21, and 24 through 26. Details of the secondary containment ditches are provided in Drawing 29.

Surge pond cross sections and details are shown on Drawing 22. The surge pond liner system will consist of a liner bedding fill layer overlain with a minimum 60-mil HDPE geomembrane liner. The surge pond is located at an elevation of 5,340 feet and is sized for a surge retention time of half an hour with and additional reserve capacity of over one million gallons. The pond is sized for the retention of approximately 1,610,000 gallons of slurry with an additional 2 feet of freeboard. The use of the surge pond will be intermittent and temporary and the pond will be empty under normal operating conditions. The pond will be equipped with dedicated hard-wired pumps that will automatically evacuate its contents. Emergency power for the pumps will be provided by the emergency diesel power generation system located on-site in the event of a power outage. The process facility control room will be equipped with emergency alarms that notify the operator of an upset condition allowing the operator to make necessary adjustments in the process, as needed. The pumps at the surge pond will be automatically activated upon the pond reaching a predetermined level. Water and solids collected from the surge pond will be discharged through a 12-inch HDPE DR17 pipeline to the top of the TSF. The solids handling pump is designed to evacuate the surge pond within 12 hours.

8.0 WATER RECLAIM SYSTEM DESIGN

The water reclaim system is a significant part of NMCC's water conservation program. It will provide approximately 75 percent of the water used in the process in the form of recycled water. The purpose of the water reclaim system is to recycle supernatant water stored in the TSF and water captured in the underdrain collection gallery and stored in the TSF underdrain collection pond. The TSF water reclaim system will recover water released as the cyclone overflow consolidates within the TSF. The underdrain water collection system will recover water from the bottom of the tailings impoundment through the TSF underdrains into the TSF underdrain collection pond. The underdrain pond will also store water captured by the dam underdrains from the downstream side of the dam as sand is deposited and compacted as well as precipitation run-off water from the face of the dam. All of this water will be transported from the TSF and TSF underdrain collection pond to the process water reservoir located at the plant via a 20-inch HDPE variable DR return water pipeline. Water from the TSF underdrain collection pond may also be pumped back directly to the TSF. The major components of the water reclaim system are shown on Drawing 27. Water reclaim system details are shown on Drawing 28.

The TSF reclaim system will be a barge-mounted pump station in the impoundment equipped with four pumps (three operating and one spare) with a design flow from this station of 13,000 gpm. This is equal to the maximum design rate at which water will be delivered to the TSF from the cyclone plant during normal operation.

The TSF underdrain collection pond system will be a pump station of two pumps (one operating and one spare) installed in a sump within the pond. The design flow from this station will be 4,000 gpm. This is the maximum design flow of the TSF underdrain collection gallery. It is anticipated that up 4000 gpm of flow will be captured by the underdrains in the initial stages of operation of the TSF. This flow rate will become less over time as the tailings impoundment fills and the underdrains become overlain with tailings materials.

The water reclaim barge in the TSF impoundment will be accessed from a ramp constructed over the impoundment liner as shown on Drawing 28. The ramp will be approximately 35 feet wide and initially constructed to a height of 10 feet above the impoundment floor. As the tailings level rises during operations, the position of the barge will migrate up the ramp northwestward along the reclaim pipeline alignment. In each construction phase, ramp construction will be completed with borrowed structural fill material.

9.0 WATER BALANCE

Water balance calculations are included in Appendix G. Figure 8 summarizes the results of a water balance analysis of the proposed TSF for average rainfall conditions. The water balance model incorporates water input from slurry water inflow, direct precipitation on the impoundment surface and runon from un-diverted upgradient areas. On-site meteorological data collection at Copper Flat was initiated in August 2010. Due to the short duration of record keeping and recording gaps, NOAA data from Hillsboro and Caballo Dam, New Mexico, were used in conjunction with Copper Flat data to estimate monthly precipitation and evaporation rates. The ratio of site evaporation to Hillsboro evaporation for months where data are available from both sites was used to estimate site evaporation for months where data were not collected at the site.

Water balance model losses include entrainment of water within the tailings solids, evaporation from the TSF supernatant pool, evaporation from the exposed tailings beach, and evaporation of water from the dam. Entrainment represents the most significant water loss and is calculated on the basis of the estimated final post-deposition dry density of the cyclone underflow and cyclone overflow. An average post-deposition dry density of 57 pcf is assumed for the cyclone overflow. Over the life of the facility, approximately up to 49 million tons of cyclone underflow will be produced assuming near constant operation of the cyclone plant and mill.

The water balance model does not identify reclaim rates from specific locations because operation of the impoundment will impact where water accumulates. Water that is not lost to evaporation or bound within the tailings is assumed to be recovered from either the impoundment free water pond or the TSF underdrain collection pond.

The impoundment underdrain will be equipped with a shutoff valve at its inlet during the initial years of operation so that when the water level in the TSF underdrain collection pond exceeds the normal operating level, the underdrain will be closed to utilize the TSF supernatant pool for storage and the TSF undergrain collection pond will be pumped down.

A total process water inflow of 12,978 gpm is estimated based on average operating conditions. This inflow includes water contained in the cyclone overflow slurry and water delivered to the dam with the cyclone underflow. As shown in Figure 8, the estimated process water reclaim rate averages 9,215 gpm. The average make-up water requirement, calculated as the difference between the process water delivered and the water reclaimed, is estimated to be 3,169 gpm or approximately 152 gallons per ton of tailings placed in the TSF. The maximum estimated make-up water rate is 3,676 gpm.

The water balance examines water reclaim rates for average rainfall conditions. If the site experiences precipitation that is less than or exceeds average conditions, water reclaim rates and make-up water requirements can also be expected to vary. The water reclaim system is capable of recovering water at a rate adequate to account for all water in the tailings slurry discharged from the flotation plant. Maximum reclamation of water following storm events can temporarily reduce demand on external water sources. The water balance does not consider additions from the open pit or waste rock stockpile stormwater ponds. Water available from other on-site sources is not expected to be significant.

10.0 TAILINGS DAM STABILITY ANALYSIS

10.1 Methods

Slope stability analyses were performed in support of the feasibility design of the Copper Flat TSF with an ultimate crest elevation of 5,435 ft-msl. The analyses were performed using limit-equilibrium slope stability software and Spencer's (Spencer, 1967) method of slices to compute the theoretical factors of safety (FOS) for various potential failure surfaces. Material properties used in the stability calculations for native soil and tailings materials were based on laboratory geotechnical testing performed in Golder's in Denver, Colorado laboratory and discussed previously in Sections 3.3 and 4.3.

Slope stability analyses were conducted to determine the FOS against failure for the critical stability section along the highest embankment section and most adverse subsurface topography on the downstream slope. The critical factors of safety assumed for stability analysis are 1.5 for static conditions and 1.1 for pseudo-static conditions, according to NMAC 19.25.12.11.12. Stability analyses were performed for static (steady-state) and dynamic (pseudo-static) loading conditions. Steady-state loading conditions represent the long-term stability of the TSF and pseudo-static loading conditions represent the stability of the TSF during the design earthquake loading event.

The computer package SLIDE™ (Version 6.021) was used to conduct the stability analyses (Rocscience, 2013). An arcuate (circular) failure mode was used to analyze the critical section with the shear surface failing through the tailings and/or foundation materials. A block failure mode was used to analyze the critical section with a potential failure at the liner interface. Both methods are based on the principle of limit equilibrium, i.e., the method calculates the shear strengths that would be required to maintain equilibrium, and then calculates the FOS by dividing the available shear strength by the shear strength required to maintain stability.

Analyses were limited to the investigation of global failures that can affect the full height of the embankment, are deeper seated, and may result in lowering the embankment crest and loss of containment. Local stability analyses associated with shallow slope failures were not investigated.

A pseudo-static analysis approach was used for the seismic loading case. With this method, a lateral force is added to a potential failure mass, with magnitude equal to some fraction of the weight of the sliding mass. The fraction is defined in the form of a pseudo-static coefficient and is expressed as a percentage of gravity. Selection of the pseudo-static coefficient is discussed below. Stability analysis supporting data and computer-generated outputs are contained in Appendix H.

10.2 Seismic Design Criteria

According to the regulations set by the NMDSB, the TSF can be classified as having a significant hazard potential. Dams assigned the significant hazard potential classification are those where failure results in no probable loss of human life but can cause economic loss, environmental damage, and/or disruption of lifeline facilities. The NMDSB requires that structures such as the Copper Flat TSF be designed to withstand the seismic loading from the Maximum Design Earthquake (MDE) with a 2 percent probability of exceedance in 50 years (approximately 2,475-year return frequency). The peak ground acceleration (PGA) for the Copper Flat property was obtained using the US Seismic “Design Maps” Web Application developed by the United States Geological Survey (USGS) Geologic Hazards Science Center (USGS, 2011). Considering the 2009 National Earthquake Hazards Reduction Program provisions for a Site Class C and a site location of 32.96° North latitude and 107.5° West longitude, the resulting PGA for the 2,475-year return MDE is approximately 0.13 times gravitational acceleration (0.13g).

The method developed by Hynes-Griffin and Franklin (1984) and Jansen (1985) was used to evaluate pseudo-static loading conditions, as outlined by the NMDSB guidelines (2010). This method recommends that the pseudo-static coefficient selected for analysis must be at least 50 percent of the predicted PGA, but not less than 0.05g, and the FOS under pseudo-static analysis should be 1.1 or greater. A coefficient of 0.087g, corresponding to two-thirds of the design PGA, was conservatively used for the analyses.

The results of the previous seismic liquefaction potential evaluation of the Copper Flat TSF by SHB (1980) indicated that the probability of liquefaction affecting the Quintana TSF was extremely remote based on the seismic hazard potential of the site and empirical data derived from case histories of tailings dams and natural, saturated, loose sandy deposits subject to earthquake-induced ground motions. Golder anticipates that a drained response to seismic loading will dominate the pore water conditions in the TSF during and following its active life based on the material permeabilities, boundary drainage conditions, and construction practices. Given the seismic hazard potential of the site and the proposed TSF construction and operating practices, the liquefaction potential of the new TSF is also considered low.

10.3 Tailing Drainage and Phreatic Conditions

The primary source of tailing drainage is drain-down water associated with the centerline-constructed cycloned underflow tailings portion of the embankment, with a minor contribution from consolidation and drainage of the impounded cyclone overflow upstream of the embankment crest. The drainage control system consists of a continuous granular fill blanket drain beneath the cyclone underflow sand embankment and toe area, with lateral underdrain pipes spaced at 45-foot centers across the embankment footprint. Lateral drain pipes will connect to an open channel, which gravity drains to the HDPE-lined TSF underdrain collection pond.

The phreatic surface was assigned to be coincident with the drainage control system at the base of the final embankment, based on performance of similar structures. Because of the large difference in the hydraulic conductivity of the cyclone underflow and cyclone overflow, a near vertical phreatic surface is assumed at the dam/beach interface. This condition will result in the main body of the dam being well-drained and unsaturated.

10.4 Pore Pressure Conditions and Liquefaction Potential

The response of tailings material to loading can be either drained or undrained, and is associated with the development of pore water pressures. For stability analyses, a phreatic surface was assumed at the beach material surface level upstream of cycloned underflow tailings embankment and an undrained response was evaluated. Undrained analyses were performed by applying an undrained strength to the cyclone overflow on and beneath the beach.

Susceptibility to liquefaction potential is assumed to be limited to the saturated beach areas upstream of the dam. Steady-state (residual) undrained strength was applied to the tailings beach upstream of the cyclone sand dam fill to evaluate post-liquefaction stability.

The risk of static and seismic liquefaction triggering will likely be low if appropriate control over embankment construction and the phreatic-surface elevation is exercised, and the cyclone underflow sand behaves as anticipated. Sand placed on the dam crest will be spread and compacted. Operating experience at mine sites utilizing cyclone underflow fill indicates that self-weight compaction of sand on the tailings out-slope is typically adequate for minimizing liquefaction potential. At Copper Flat, some compaction will be realized on the dam out-slope as a result of dozer spreading operations.

10.5 Material Properties

The material properties used in the stability analyses are based on a review of the properties used in previous site studies (SHB 1980), new data derived from testing of samples collected during the site geotechnical investigation, and from tests conducted on tailings characterization study samples. The components of the slope stability model include:

- Foundation Materials
- Liner Interface Zone
- Cyclone Underflow sand
- Cyclone overflow (beach material)
- Structural Fill

Table11 summarizes the strength parameters used in the preliminary slope stability analyses.

Table 11: Summary of Properties Used in Stability Analyses

Component	Unit Weight (pcf)	Drained Strength		Undrained Strength (S_u/σ'_v)
		Cohesion (psf)	ϕ' (degrees)	
Foundation Materials	120	150	29	NA
Liner Interface Zone	120	0	26.5	NA
Cyclone Underflow	113	0	39	NA
Cyclone overflow	108	NA	NA	0.05
Structural Fill	120	0	29	NA

Notes:
pcf = pounds per cubic foot
psf = pounds per square foot
ϕ' = Effective stress friction angle
S_u/σ'_v = Residual undrained shear strength normalized by the effective overburden stress
NA = Not applicable

10.5.1 Foundation Materials

The foundation underlying the proposed TSF embankment has been characterized as an alluvial deposit comprised of predominately silty and clayey sands and gravels. Foundation material strength test results ranged from 28 to 32 degrees (effective friction angle). Based on the results of consolidated-undrained triaxial tests completed by Golder, an effective stress friction angle (ϕ') of 29 degrees and effective cohesion of 150 pounds per square foot were applied for the shear strength of the foundation materials.

10.5.2 Liner Interface Zone

The shear strength of the cycloned underflow tailings/geomembrane liner/liner bedding interface will be the controlling factor for possible sliding block-type failure surfaces along the base of the TSF embankment. The interface shear strength was evaluated in a direct shear test performed by Golder. Old (Quintana) tailings, and drain fill materials were placed in contact with a sample of textured, 80-mil HDPE geomembrane. The composition of the test sample is representative of the Phase 1 interface, when the old tailings will be utilized for liner bedding fill. The use of coarser, higher strength materials (crushed and screened native gravelly sand) is anticipated in later construction phases. The direct shear test indicated an interface friction of 26.5 degrees. This strength was assigned to the interface zone comprised of liner bedding, geomembrane and drainage materials.

10.5.3 Cyclone Underflow

The sloping, cyclone underflow embankment was considered to be fully drained and cohesionless because of the anticipated low phreatic-surface elevation and the high permeability of the cyclone underflow in the embankment, and the effect of the drainage control system. Mittal and Morganstern (1975) evaluated the ϕ' for cycloned copper tailings sands. The effects of particle crushing and sand dilatancy were most pronounced at stresses up to 40 psi, while at higher stresses ϕ' remained relatively constant and approximately equal to 34 degrees. Volpe (1975) reported ϕ' values for copper sands and slimes between 33 to 37 degrees. A consolidated-undrained triaxial test conducted by Golder on a cyclone underflow sample indicated an internal friction angle of 40 degrees. An effective friction angle of 39 degrees was assumed in stability analyses.

10.5.4 Cyclone Overflow

Cyclone overflow in the impoundment is assumed to exhibit a drained response for most loading conditions except for the conditions occurring after static or seismic liquefaction. However; for conservatism, an undrained shear strength behavior was assumed for the cyclone overflow upstream of the embankment.

Undrained shear strength implicitly accounts for the effects of shear-induced pore pressures. Based on experience from similar mining projects and published data (Mittal and Morganstern 1975, Vick 1990), the peak undrained shear strength normalized by the effective overburden stress (S_u/σ'_{vo}) was estimated to be 0.20 for the impoundment area extending upstream from the embankment crest.

Residual undrained shear strengths were used in a static analysis to evaluate embankment stability following liquefaction in the beach area. Similar to that for peak shear strength, the residual undrained shear strength normalized by the effective overburden stress (S_u/σ'_{vo}) was estimated to be 0.05 for the tailings upstream of the cyclone underflow dam.

10.5.5 Structural Fill

Strength parameters for the starter dam structural fill are based on testing of representative materials recovered from the TSF borrow areas during the site exploration. Foundation material strength test results ranged from 28 to 32 degrees. The material was conservatively classified as cohesionless with a ϕ' of 29 degrees with a moist unit weight of 120 pcf.

10.5.6 Liner Material

The liner interface direct shear test was conducted with a sample of textured geomembrane. The use of un-textured geomembrane may be feasible, but testing of interface strength with un-textured liner has not been performed. To evaluate the potential for use of smooth liner, the interface strength was varied to find the interface friction angle required to meet the minimum pseudostatic FOS of 1.1. This analysis was performed for the block failure mode.

10.5.7 Fissured Clay Foundation Analysis

Stability analyses presented in Section 10.6 for the maximum embankment section address the embankment, the cyclone underflow beach and the liner interface zone on a maximum height embankment section. Additional sections corresponding to geology sections B-B' and D-D' were evaluated to determine the effects of clay foundation soils on the stability of the TSF.

Drill holes in the vicinity of these sections intercepted a clay layer that appears to be dipping to the eastward based on the first high plasticity clay intercepts identified during drilling. At several locations in the TSF expansion area, the top of this clay layer exhibited characteristics of a softened clay, with locally high moisture content and corrected SPT blow counts, in the range of 12 to 25, that were lower than those in overlying and underlying soils.

Stark and Eid (1977) state that fissured clays in first time slides (or first time slope failures) may exhibit a mobilized shear strength that is lower that the strength of fully softened clay, and suggest the use of the average of the fully softened and residual (large strain) clay strength in evaluating stability. Clay shear strength was estimated based on an empirical method presented by Mesri and Shahien (2003) that relates shear strength under varying normal stress to plasticity index. The method provides a non-liner shear strength envelope used to estimate the fully softened, residual and average strength of hard, fissured clays. The resulting shear strength versus normal stress envelope is used for clay strength input in the slope stability model.

The highest plasticity index (I_p) of 42 percent in Copper Flat samples, which was associated with a softened clay sample recovered from drill hole BH-18 at a depth of 43 feet, was assumed for estimating the strength of the high plasticity clay layers. In section B-B', clay interbedded clay and granular soil layers were modeled. In Section D-D', the clay layer was assumed to extend from the first high plasticity clay intercept to the base of the model section.

10.6 Stability Analysis Results

The results of stability analyses for static and pseudo-static loading conditions are summarized in Table 12.

Table 12: Calculated Slope Stability Factors of Safety

Failure Mode	Method	Static FOS (Global)	Pseudostatic FOS (Global)
Maximum Section Circular	Spencer	2.53	1.92
Maximum Section Block	Spencer	2.24	1.69
Maximum Section Circular, Post Liquefaction	Spencer	2.53	NA
Maximum Section Block, min required interface strength = 13.6 degrees	Spencer	1.53	1.1
Fissured Clay Section B-B' Circular	Spencer	1.56	1.12
Fissured Clay Section B-B' Block	Spencer	2.50	1.90
Fissured Clay Section D-D' Circular	Spencer	1.53	1.13
Fissured Clay Section D-D' Block	Spencer	2.48	1.87

Notes:
FOS = factor of safety
NA = not applicable
Min = minimum

The conservative assumptions applied in the stability analyses suggest that the Copper Flat TSF will be stable. All factors of safety meet or exceed the minimum NMDSB requirements of 1.1 and 1.5 for static and pseudostatic conditions. The residual strength analysis suggests if liquefaction of saturated tailings upstream of the dam occurs, the embankment will remain stable. The evaluation of the sensitivity of pseudostatic stability to the friction angle of the liner interface indicates a relatively low interface friction angle is required to maintain stability, and that the required interface strength is likely to be achievable with an un-textured geomembrane liner.

11.0 TAILINGS DAM FOUNDATION SETTLEMENT POTENTIAL

11.1 Analysis Approach

The TSF will consist of an earthen starter dam constructed to a height of approximately 50 feet with the remainder of the dam constructed with sand recovered from the cyclone plant. A geotechnical investigation was performed in the embankment footprint, which included standard penetration testing and sample collection from the surface to a depth of 50 feet. Drilling indicated that in general, the tailings embankment foundation consists primarily of alluvial deposits that include silt, sand and gravel, which are underlain by clay.

Representative samples of the foundation strata were analyzed in Golder's geotechnical laboratory for index properties, gradation, and Atterberg limits. Selected samples were remolded in the laboratory, and the remolded samples were subjected to one-dimensional consolidation testing.

Settlement calculations were developed for the post-construction embankment, which represents the worst-case condition. Staged settlement was not analyzed because settlement of the embankment will be adequately mitigated by continuous fill placement during ongoing embankment construction. Settlement calculations were performed using the computer model SETTLE3D v. 2.0, a computer program developed by Rocscience, Inc., for the analysis of settlement and consolidation under foundations and embankments.

A detailed description of the settlement potential investigation, settlement calculations and supporting information are contained in Appendix I.1. Drill holes and the location of cross-sections used to evaluate subsurface conditions are shown on Drawing 3. Drawings 5 and 7 present geologic cross sections B-B' and D-D', respectively, which were developed to evaluate settlement perpendicular to the dam axis. The cross-sections also include information derived from the former geotechnical study conducted on behalf of Quintana by Sergent Hauskins and Beckwith (SHB, 1980). Drill hole logs are contained in Appendix A.2.

A differential settlement and geomembrane strain analysis was subsequently conducted by Golder and is included in Appendix I.2. Cross sections were developed to intercept the various geologic materials underlying the TSF site. The engineering properties of the foundation materials were derived from the 1980 Sargent, Hauskins and Beckwith (SHB) geotechnical study, the geotechnical investigation conducted as part of the TSF design report and experience with similar foundation materials.

11.2 Settlement Potential Analysis Results

Laboratory consolidation testing was conducted on remolded specimens of the fine fraction of samples recovered from the embankment foundation. As such, the settlement prediction does not account for the presence of the coarse fraction in the foundation soils, and associated inter-particle contact and support of foundation loads. Settlement predictions based on the laboratory consolidation tests are therefore conservative.

Results of the settlement potential analysis are shown graphically on geologic sections B-B’ and D-D’. The maximum calculated settlement beneath the embankment is approximately 2.1 feet in the area of the maximum dam (and tailings beach) foundation loads. Settlement decreases at a relatively uniform rate as the weight of post-construction loading decreases towards the outer toe of the embankment.

Settlement prediction based on the laboratory consolidation testing of the fine fraction of foundation samples is conservative. SPT testing conducted during drilling showed the foundation strata to generally be very dense to hard. On the basis of SPT test results, actual post-construction consolidation settlement of less than 1 foot is anticipated.

Dam construction will be more or less continuous during the life of the facility. The effects of foundation settlement include the potential for the loss of dry freeboard for stormwater storage. The potential loss of freeboard can be mitigated by elevating the dam crest with managed/targeted placement of cyclone underflow sand.

The analyses did not indicate the potential for differential settlement that could impact the integrity of the TSF geomembrane liner. Sections B-B’ and D-D’ indicate predicted settlement varies uniformly across areas subject to changing foundation loads.

The impoundment underdrain will pass beneath the dam in a steel pipe placed in a ditch backfilled with concrete near section F-F’ (Drawing 9). The settlement will not adversely impact the impoundment underdrain outlet pipe. There is adequate grade and elevation change along the outlet pipe alignment to accommodate predicted settlement.

A basalt outcrop identified by SHB (SHB, 1980) may lie beneath or in the vicinity of the impoundment underdrain pipe inlet near the upstream toe of the dam. The outcrop occurred in an area that was disturbed during Quintana dam construction activities, and was not observed during the recent site exploration. If the inlet to the underdrain pipe bears on basalt, local differential settlement could occur along the pipe alignment, which could induce stress on the outlet pipe. If, during construction, a basalt outcrop is identified at the location of the inlet, an alignment change may be warranted to avoid the pipe bearing on basalt.

It should be noted that the settlement potential investigation was performed for a previously completed design study, and evaluated an embankment geometry that differs from that presented in this report. The new embankment is higher and the depth of embankment fill overlying the foundation is greater for this 30,000 tons per day design; however, the original analyses assumed a higher, more conservative embankment moist unit weight of 130 pcf. Tailings testing completed after the settlement potential study was conducted indicates a post embankment fill placement moist unit weight of approximately 113 pcf. The foundation loads imposed by the higher embankment fill, when corrected for the moist unit weight determined by laboratory testing, are lower than those used in the settlement potential analysis. Therefore, the results of the settlement investigation presented above are conservative relative to the current design. As part of future detailed engineering studies, settlement calculations will be updated for final design conditions; however, the conclusions are anticipated to be consistent with those presented herein.

The results of the differential settlement and geomembrane strain analysis indicates that, in general, settlement potential across the TSF is predicted to be limited. As such, the potential for tearing of the HDPE liner due to potential differential settlement within the entire area of the TSF is considered to be low. The maximum settlement is estimated to be 0.72 feet, while the maximum tensile strain on the HDPE liner due to differential settlement is estimated to be 0.02 percent. The allowable tensile strain on an 80 mil HDPE geomembrane liner is 10 percent and the predicted tensile strain is well within acceptable conditions. Therefore, Golder does not expect tearing of the HDPE liner due to differential settlement to be an issue.

12.0 USE OF THIS REPORT

This feasibility level design report has been prepared by Golder exclusively for the use of THEMAC and NMCC. No third-party engineer or consultant shall be entitled to rely on any of the information, conclusions, or opinions contained in this report without the written approval of Golder, THEMAC or NMCC.

The conclusions and recommendations in this report have been prepared in a manner consistent with the level of care and skill ordinarily exercised by engineering professionals practicing under similar conditions, subject to the time limits and financial and physical constraints imposed on or otherwise applicable to the work.

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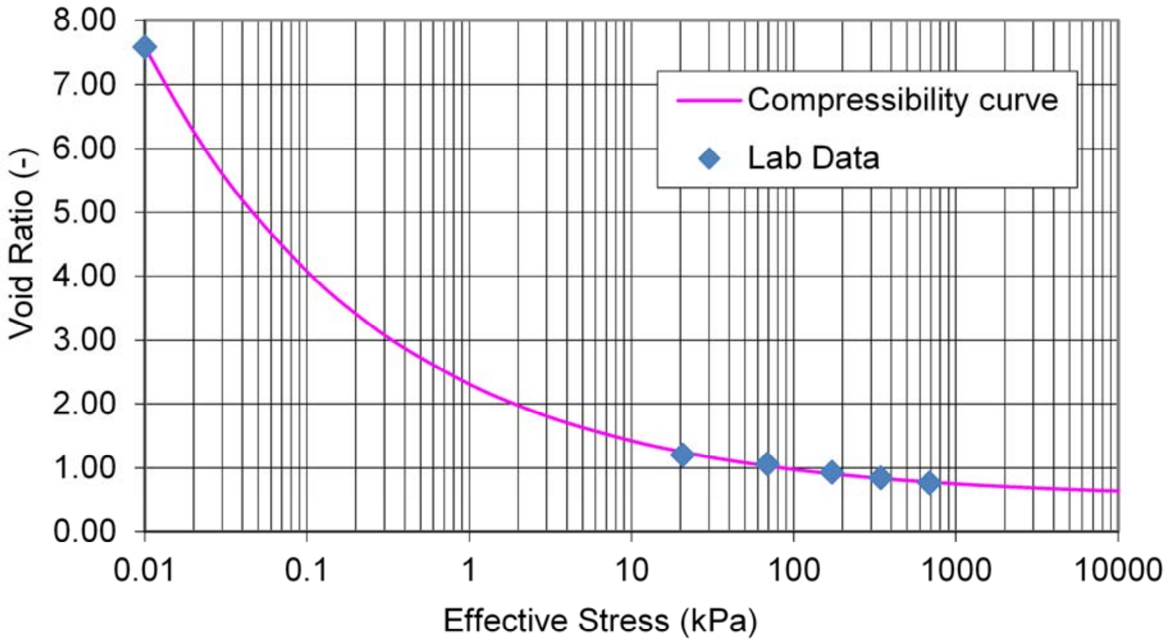
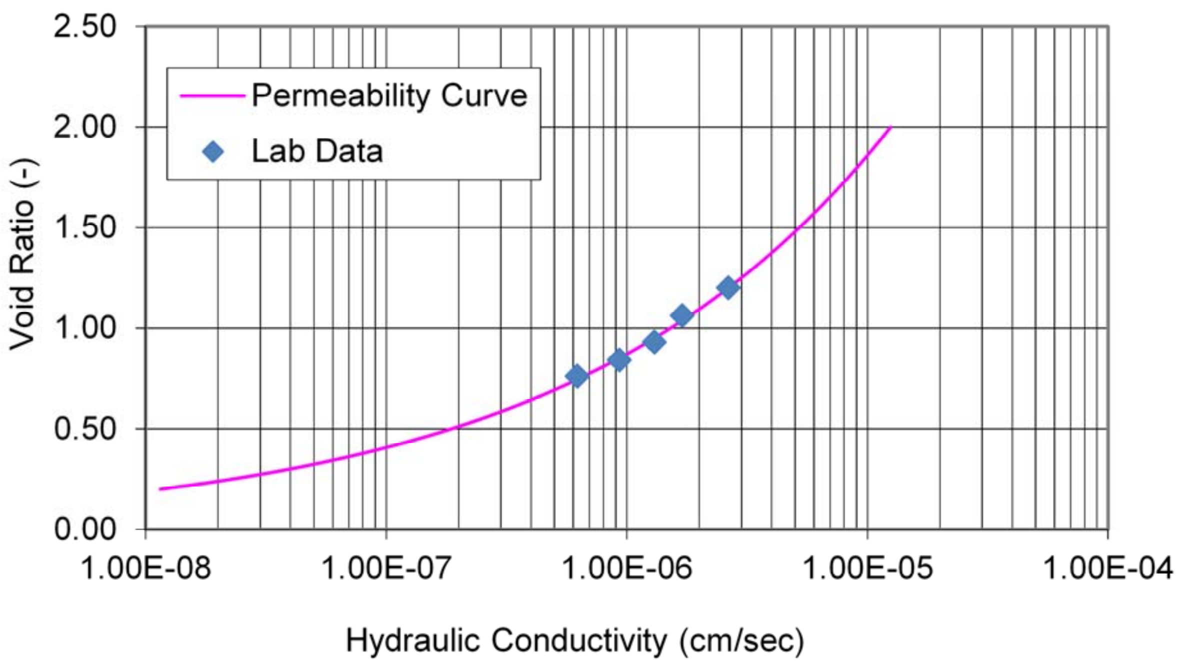
FIGURES





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30K TPD TAILINGS STORAGE
FACILITY FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

COMPRESSIBILITY AND PERMEABILITY VS. VOID RATIO THICKENED OVERFLOW- BEACH

Golder Associates

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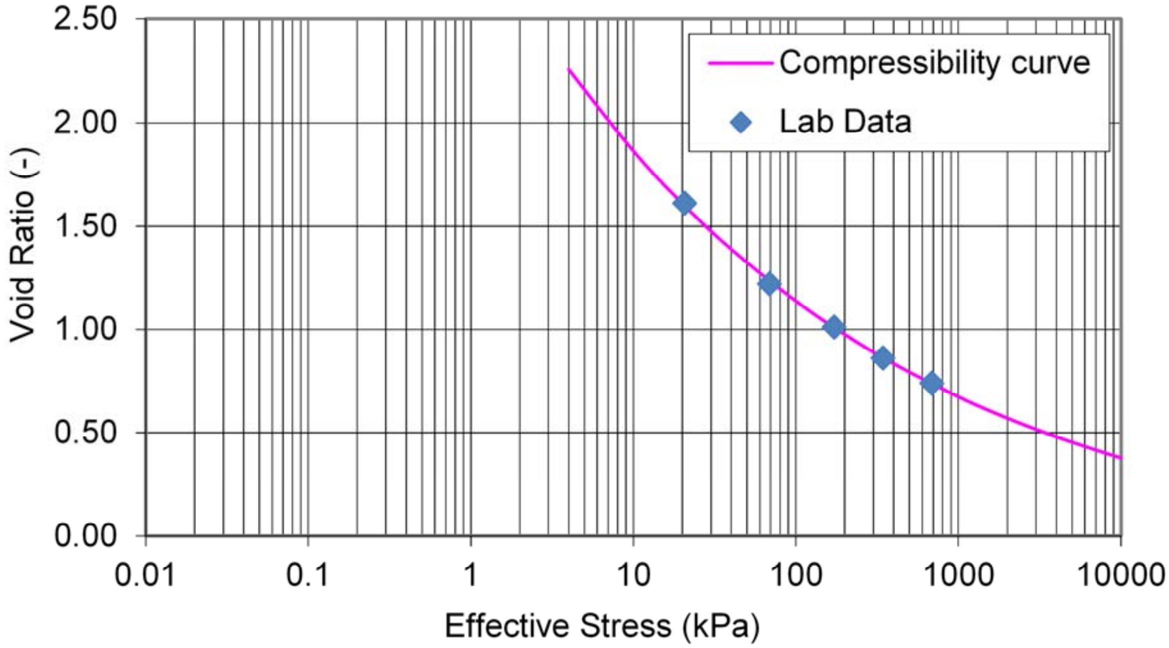

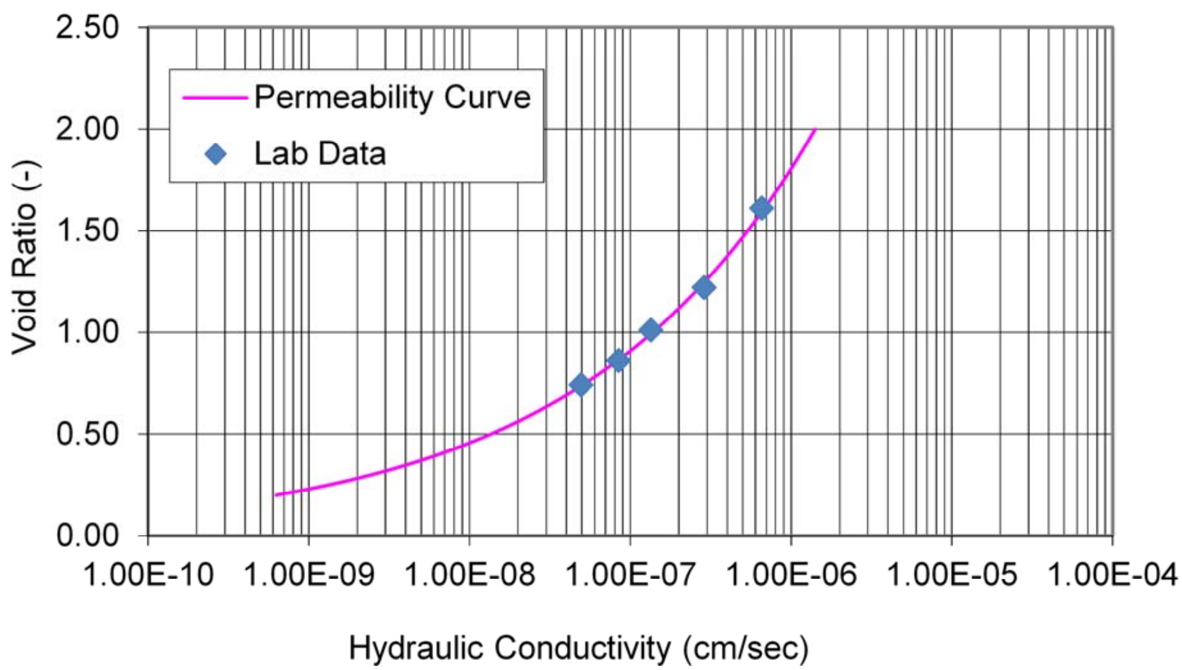

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COMPRESSIBILITY AND PERMEABILITY VS VOID THICKENED OVERFLOW SLIMES

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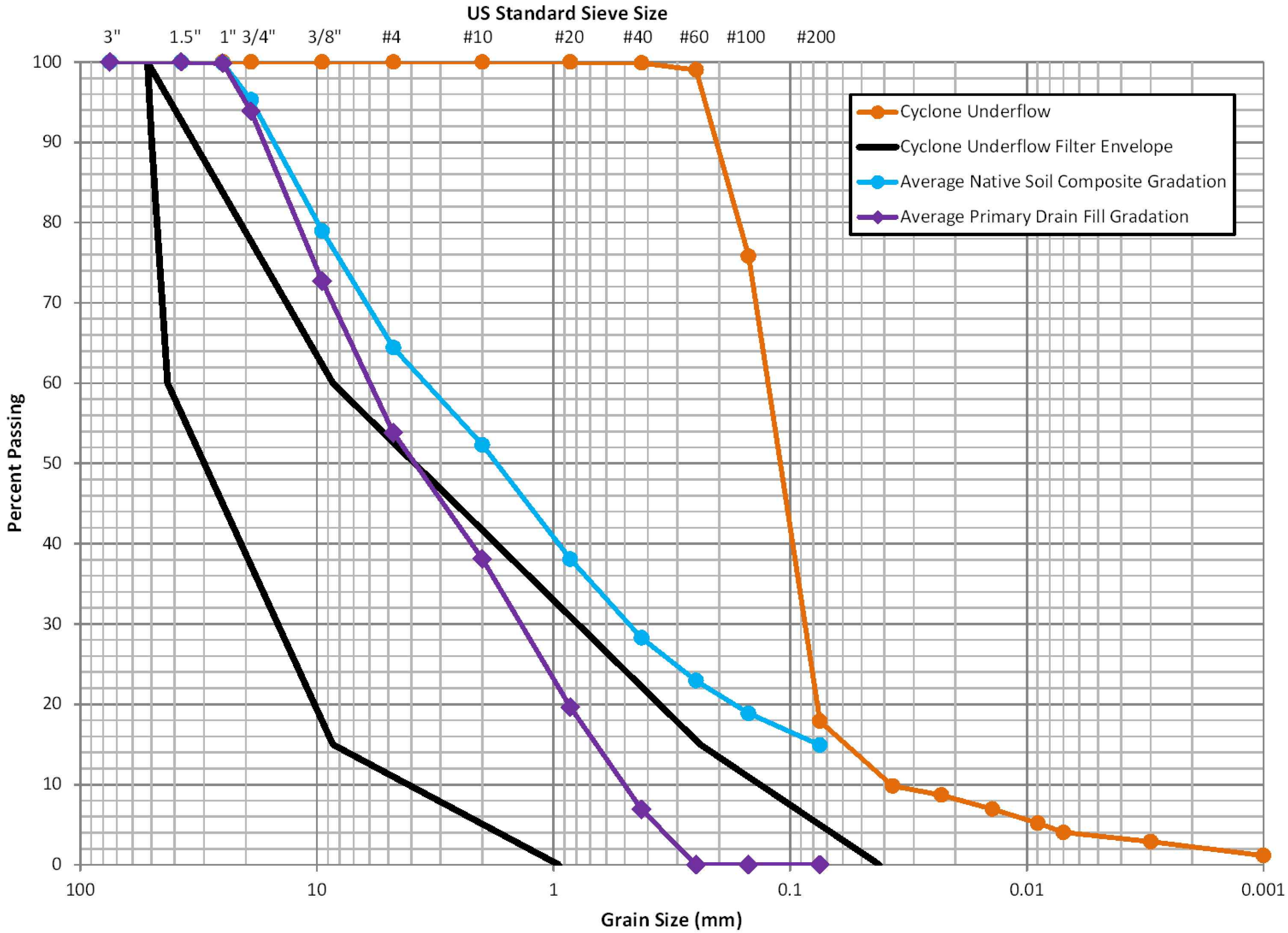

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CYCLONE UNDERFLOW PARTICLE SIZE DISTRIBUTION AND FILTER ENVELOPE

Golder Associates

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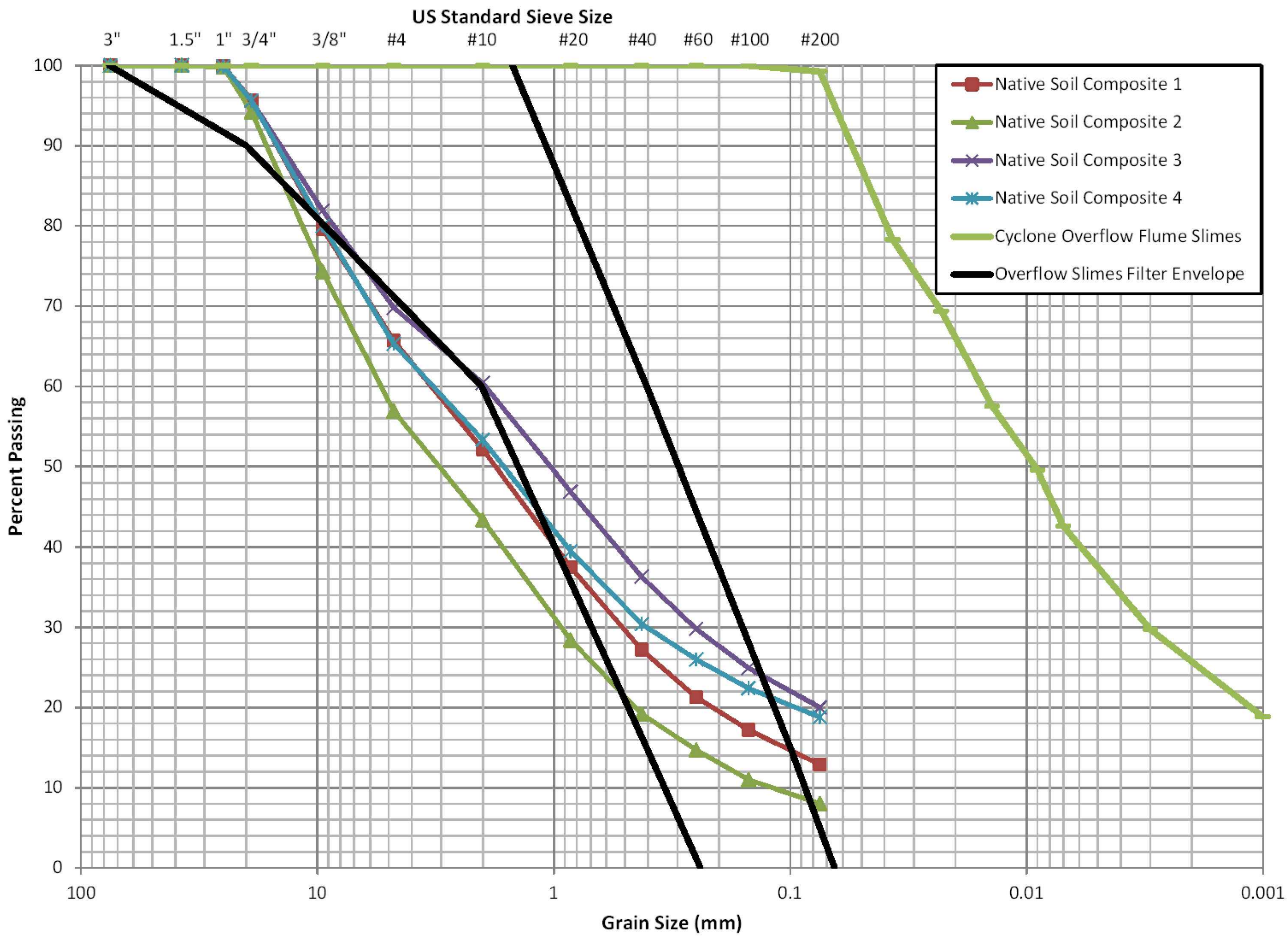

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TITLE

CYCLONE OVERFLOW SLIMES PARTICLE SIZE DISTRIBUTION AND FILTER ENVELOPE

Golder Associates				
PROJECT No.		153-1453	FILE No.	10392557K101_10232015
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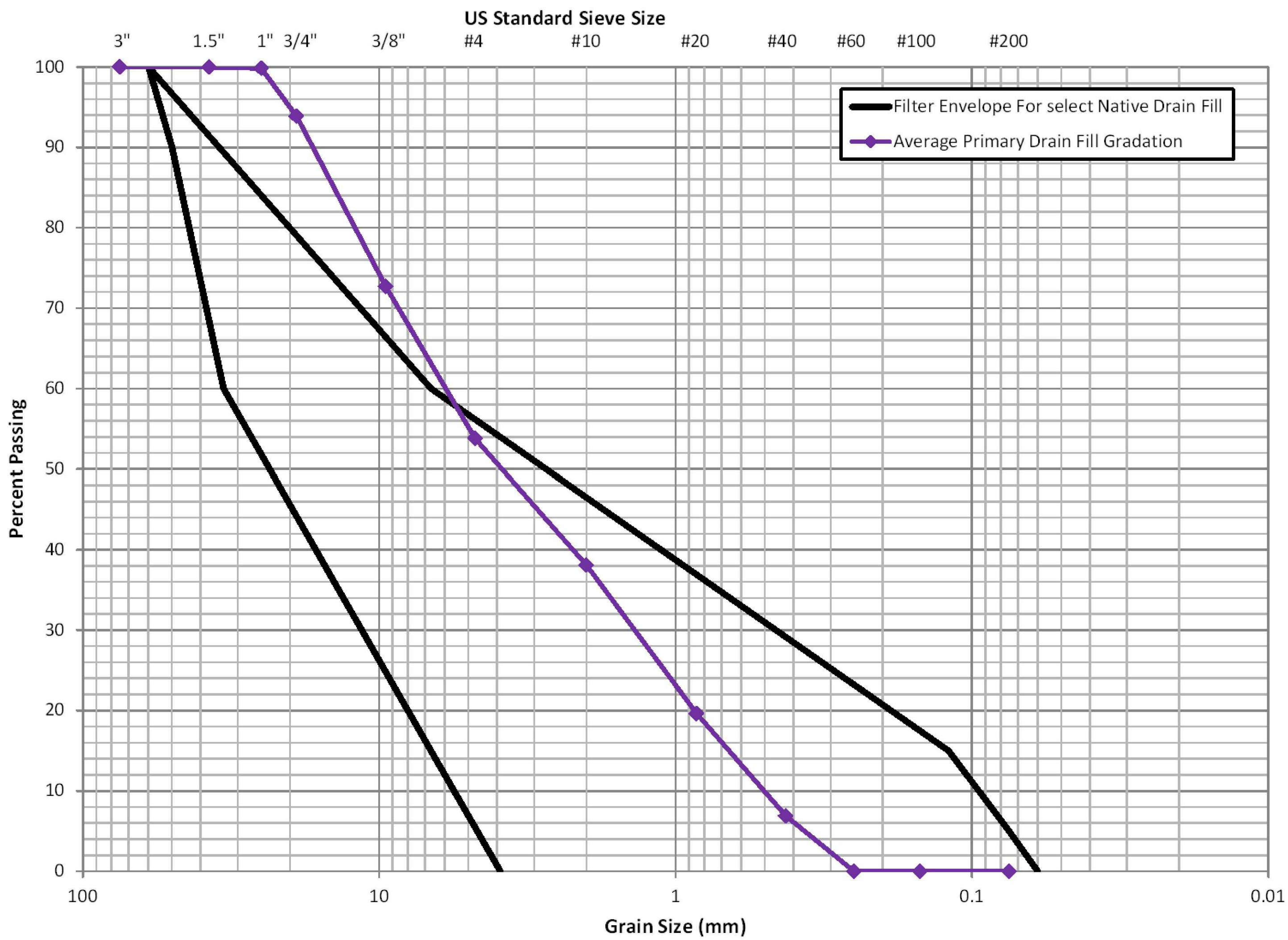

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TITLE					

FILTER ENVELOPE FOR NATIVE SOIL COMPOSITES ESTIMATE PRIMARY DRAIN FILL GRADATION

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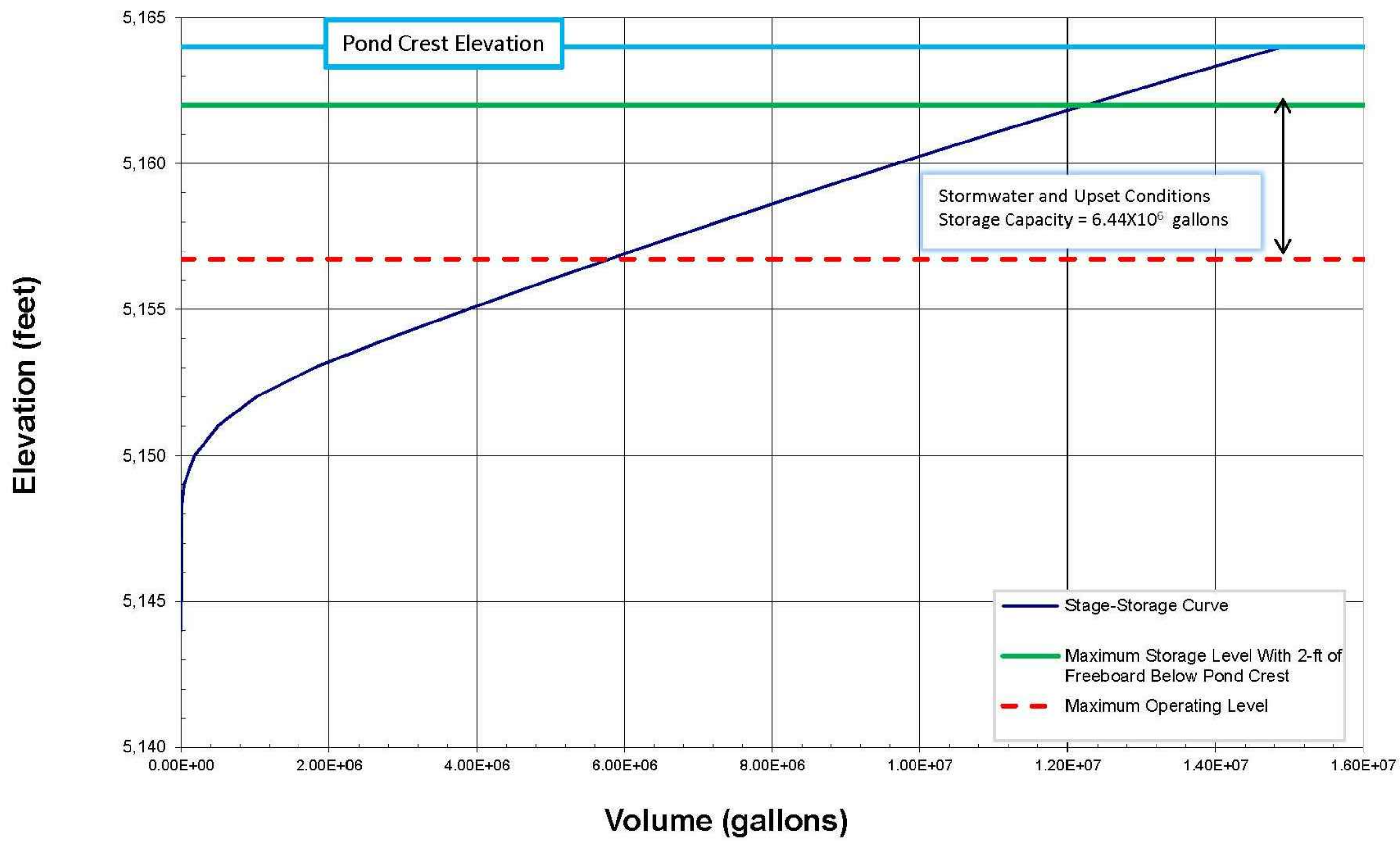

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STAGE-STORAGE CURVE
TSF UNDERDRAIN COLLECTION POND

Golder Associates

PROJECT No.		153-1453	FILE No.	10392557K101_10232015
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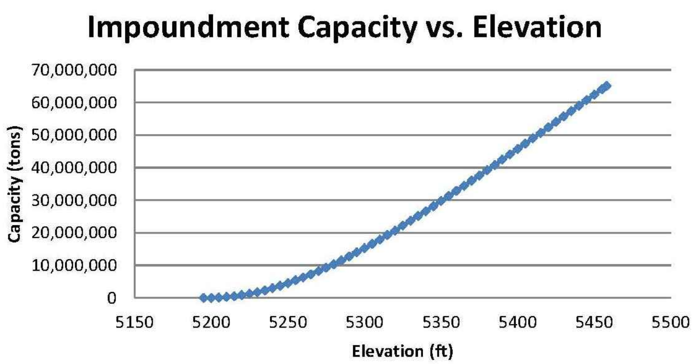

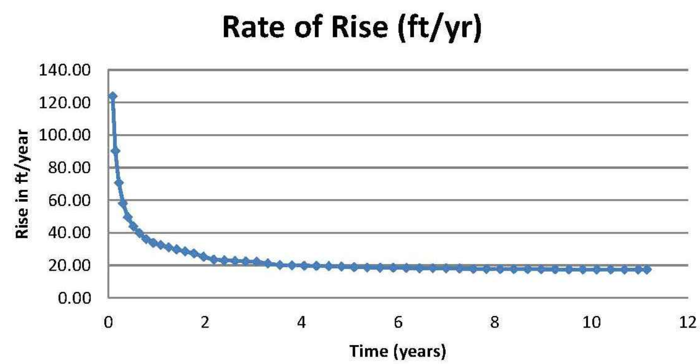

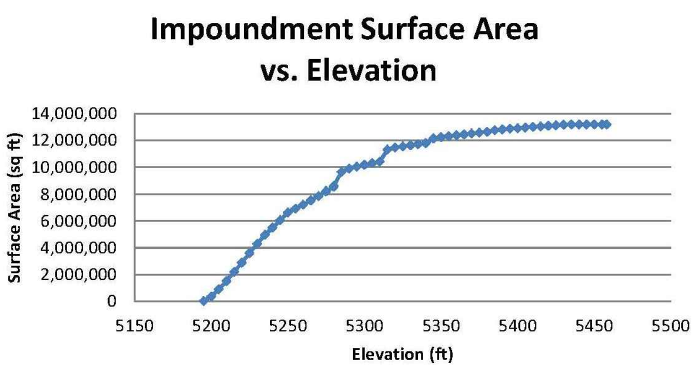

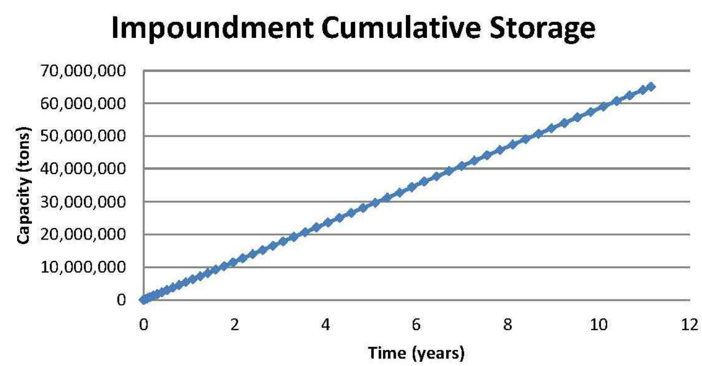

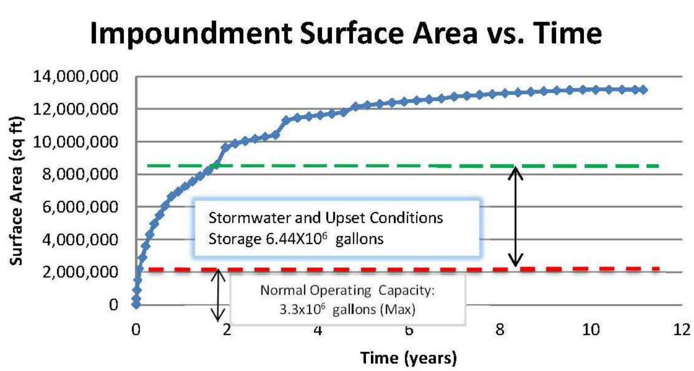

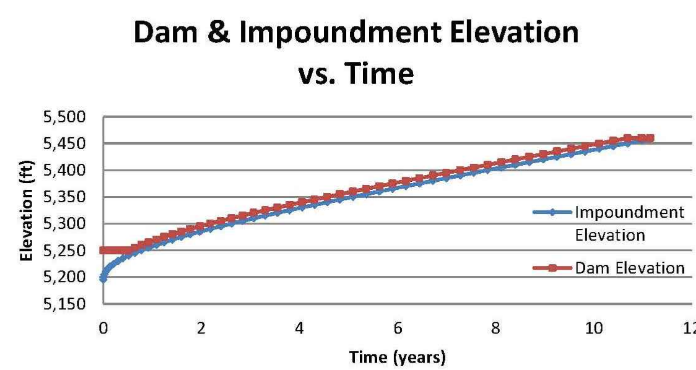

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TITLE

TAILINGS STORAGE FACILITIES ELEVATION, SURFACE AREA, CAPACITY AND RATE OF RISE RELATIONSHIPS

Golder Associates

PROJECT No.		153-1453	FILE No.	10392557K101_10232015
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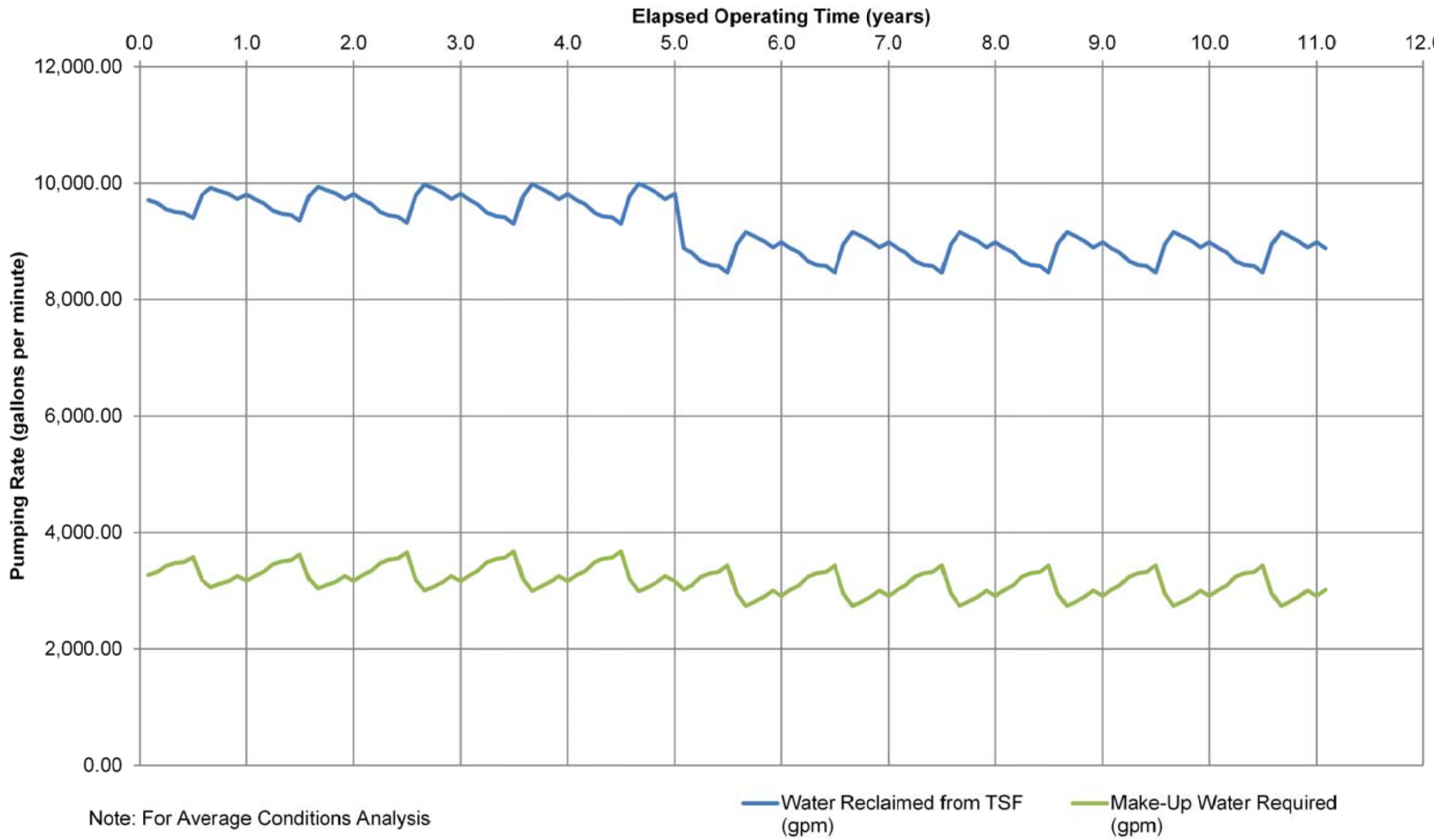

Note: For Average Conditions Analysis

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TITLE

WATER BALANCE ANALYSIS RESULTS

Golder Associates				
PROJECT No.		153-1453	FILE No.	10392557K101_10232015
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REVIEW	DAK	2013-07-12		

APPENDIX A
SITE EXPLORATION

APPENDIX A.1
TEST PIT LOGS

TEST PIT LOG: TP-1

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/3/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11977739.46 **E:** 867983.49

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	GM	sandy SILTY GRAVEL, medium, sub-angular, 35% coarse sub-rounded sand, 20% medium plasticity fines, 30% sub-angular cobbles (3-10"); pinkish gray (7.5YR 6/2), weak $CaCO_3$ cementation; non-cohesive, dry, dense.
2 - 4 ft.	GP	GRAVEL, medium, and SAND fine to coarse, poorly graded, 10% non-plastic fines; 25% angular to sub-angular cobbles (3-10"), light brown (7.5YR 6/3), $CaCO_3$ as cemented masses and disseminated; non-cohesive, dry, very dense.
4 - 8 ft.	SP	Friable/weathering rock (andesite); gravelly SAND, coarse, sub-rounded, 20% fine to medium sub-angular gravels; 10% non-plastic fines; 50% angular to sub-angular cobbles and boulders (3-20"), light brown (7.5YR 6/3), $CaCO_3$ coating rock fragments and fractures.

Samples:
None.

Special Notes:
Archaeologist present during excavation.
Pit located in road; top 2 ft. of original surface removed for road cut.
Native hillslope has ~70% surface rocks; with weathered/friable boulders exposed along road cut.
Test pit location immediately adjacent to existing waste rock disposal facility.

TEST PIT LOG: TP-2

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/21/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11976945.00 **E:** 869820.78

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 15% fine to coarse sub-rounded to sub-angular gravel, 40% low plasticity fines; 5% sub-rounded cobbles (3-6"), brown (7.5YR 4/3), blocky; cohesive, slightly moist, soft.
1 - 2 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 20% fine to coarse sub-rounded to sub-angular gravel, 35% low plasticity fines; 5% sub-rounded cobbles (3-6"), pinkish white (7.5YR 8/2), moderate $CaCO_3$ cementation, blocky to platy; non-cohesive, dry, dense.
2 - 6 ft.	GM	SILTY GRAVEL, fine to coarse, sub-rounded to sub-angular and SAND, fine to coarse, sub-rounded, 15% low to no plasticity fines; 20% sub-angular to sub-rounded cobbles and boulders (3-15"), pinkish gray (7.5YR 7/2), strong RXN with HCl, dry, dense.
6 - 7 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 10% non-plasticity fines; 25% sub-angular cobbles and boulders (3-15"), light brown (7.5YR 6/3), strong RXN with HCl; non-cohesive, dry, very dense.
7 - 9 ft.	GW	Friable/weathering rock (andesite); GRAVEL, fine to coarse, angular, 10% coarse sand, 5% non-plastic fines; 50% angular cobbles and boulders (3- 15"), weak RXN with HCl.

Samples:
2-6 ft., bag
6-7 ft., bag

Special Notes:
7 to 9 feet moderately strong rock, slightly weathered. Can slowly excavate with excavator (hard digging).

TEST PIT LOG: TP-3

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/21/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11977450.61 **E:** 869805.07

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	SM/ML	gravelly sandy CLAYEY SILT, low plasticity, 30% fine to coarse sub-rounded to sub-angular gravels, 20% fine to coarse sub-rounded sand; 20% sub-angular cobbles and boulders (3-15");\, brown (7.5YR 4/3), blocky, strong RXN with HCl; cohesive, moist, soft.
1 - 2 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to coarse sub-angular gravel, 20% low to non-plastic fines: 15% sub-angular cobbles, pinkish white (7.5YR 8/2), moderate $CaCO_3$ cementation; non-cohesive, dry, dense.
2 - 7 ft.	GM	SILTY GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 15% low plasticity fines; 25% sub-angular cobbles and boulders (3-20"), pink (7.5YR 7/3), strong RXN with HCl; non-cohesive, dry, dense.
7 - 9 ft.	GC	CLAYEY GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 15% medium plasticity fines; 30% sub-angular cobbles and boulders (3-20"); brown (7.5YR 5/3), $CaCO_3$ disseminated and as coatings on rocks; non-cohesive, dry, dense.
9 - 11 ft.	GW	sandy GRAVEL, fine to coarse, sub-angular, 30% fine to coarse sub-rounded sand, 10% low to non-plastic fines; 15% sub-angular cobbles (3-6"), brown (7.5YR 5/4), $CaCO_3$ as cemented masses, disseminated and coatings on rocks; non-cohesive, dry, very dense.

Samples:
BMI samples all layers (bag samples)

Special Notes:
Refusal at 11 ft., hit andesite. Fracturing andesite above.

TEST PIT LOG: TP-5

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/3/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11977574.94 **E:** 868955.59

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	SM	gravelly SILTY SAND, fine to coarse sub-rounded, 20% fine to coarse sub-angular gravel, 25% low plasticity fines; 25% sub-angular cobbles (3-8"), yellowish brown (10YR 5/4), friable, strong RXN with HCl; non-cohesive, dry, loose.
1 - 3 ft.	SM	SILTY SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-angular, 20% low plasticity fines; 5% sub-angular cobbles (3-8"), light brown (7.5YR 6/3), $CaCO_3$ as masses, weakly cemented in places, blocky; non-cohesive, dry, compact.
3 - 7 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, sub-angular, 10% non-plastic fines; 5% sub-angular cobbles, light brown (7.5YR 6/3), moderate $CaCO_3$ cementation in places (large plates excavated), clay fingering at 3 to 4 ft.; non-cohesive, dry, very dense.

Samples:
1-3 ft. bag, bucket
3-7 ft. bag, bucket
BMI samples (0-1ft, 1-3ft, 3-7ft)

Special Notes:
Refusal at 7 ft., hit bedrock (andesite).

TEST PIT LOG: TP-6

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/4/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11978206.72 **E:** 871778.25

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	SW	gravelly SAND, fine to coarse, sub-rounded, 25% fine to coarse poorly graded gravel, 20% non-plastic fines; 35% sub-rounded to sub-angular cobbles, brown (10YR 4/3), friable, strong RXN with HCl; non-cohesive, dry, loose.
1 - 3 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-angular, 25% fine to coarse sub-rounded sand, 35% low plasticity fines; 15% sub-rounded to sub-angular cobbles (3-5"), very pale brown (10YR 7/3), blocky, $CaCO_3$ as masses and disseminated; non-cohesive, dry, compact.
3 - 5 ft.	CL/GC	gravelly sandy SILTY CLAY, medium plasticity, 30% fine to coarse sub-rounded gravel, 25% fine to coarse sub-rounded sand; 5% sub-rounded to sub-angular cobbles (3-5"), strong brown (7.5YR 5/6), blocky, clay fingering, $CaCO_3$ as masses and moderately cementation in places, large blocky plates excavated; non-cohesive, dry, stiff.
5 - 7 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-rounded, poorly graded, 20% fine to coarse sub-rounded sand, 15% medium plasticity fines; 15% sub-angular cobbles (3-7"), light brown (7.5YR 6/4); non-cohesive, dry, dense.
7 - 13 ft.	SM	gravelly SAND, fine to coarse, sub-rounded, 35% fine to coarse sub-angular gravel, 25% med. plasticity fines; 45% sub-angular to angular cobbles and boulders (3-12"); light brown (7.5YR 6/4), $CaCO_3$ coatings on rocks; non-cohesive, dry, very dense.

Samples:
1-3 ft. bag
3-5 ft. bag
5-7 ft. bag, bucket
7-13 ft. bag, bucket

Special Notes:
At 7 feet excavator broke through large boulder.

TEST PIT LOG: TP-7

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/17/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974576.20 **E:** 872338.77

Lithology:

Depth	*USCS*	*Description*
0 - 1.5 ft.	CL	SILTY CLAY and SAND, medium plasticity, 40% medium to coarse sub-rounded sand, 5% fine to coarse poorly graded gravel; trace cobbles (3-4"), brown (7.5YR 4/4), friable; cohesive, dry, soft.
1.5 - 4 ft.	CH	CLAY and SAND, high plasticity, 45% medium to coarse poorly graded subrounded sand, 5% fine to coarse poorly graded gravels; reddish brown (5YR 4/4), blocky, some $CaCO_3$ masses and disseminated; cohesive, dry, very stiff.
4 - 6 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to coarse poorly graded gravel, 20% low plasticity fines; trace sub-angular cobbles (3-5"), pinkish gray (7.5YR 7/2), moderate $CaCO_3$ cementation; non-cohesive, dry dense.
6 - 8 ft.	SW-SM	SILTY SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, poorly graded, 10% non-plastic fines; 5% sub-angular cobbles (3-5"), pinkish gray (7.5YR 6/2), $CaCO_3$ masses and disseminated; non-cohesive, dry, very dense.
8 - 10 ft.	GP	GRAVEL, fine, poorly graded, and SAND, poorly graded, fine to coarse, 5% non-plastic fines; trace cobbles (3-4"), brown (7.5YR 5/3), $CaCO_3$ coating on rocks; non-cohesive, dry, very dense.
10 - 12 ft.	GP-GM	SILTY GRAVEL, fine to coarse, poorly graded, and SAND fine to coarse, sub-rounded, 10% low plasticity fines; 10% sub-angular cobbles (4-5"), brown (7.5YR 5/3), $CaCO_3$ coating on rock fragments; non-cohesive, dry, dense.

Samples:

0-1.5 ft. bag } 0-4ft. Bucket
1.5-4 ft. bag }
4-6 ft. bag
6-10 ft. bag, bucket
10-12 ft. bag, bucket
BMI bag samples all layers

Special Notes:

TEST PIT LOG: TP-8

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/18/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974106.85 **E:** 872357.94

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	CL	sandy SILTY CLAY, medium plasticity, 40% fine to coarse sub-rounded sand, 10% fine to coarse sub-angular gravel; trace cobbles (3-6"), brown (7.5YR 4/2), disseminated $CaCO_3$, platy; cohesive, moist, firm.
2 - 5 ft.	CI	sandy gravelly SILTY CLAY, high plasticity, 30% fine to coarse sand, 20% fine to coarse poorly graded gravel; trace cobbles (3-4"), brown (7.5YR 4/3), $CaCO_3$ masses and weakly cemented in places, platy; cohesive, dry, stiff.
5 - 7 ft.	SC/CI	CLAYEY SAND, fine to coarse, sub-rounded, 45% medium plasticity fines, 5% fine to coarse poorly graded gravels; dark brown (7.5YR 3/4), $CaCO_3$ masses, platy; cohesive, dry, stiff.
7 - 13 ft.	SC	gravelly CLAYEY SAND, fine to coarse, sub-rounded, 30% medium plasticity fines, 15% fine to coarse poorly graded gravels; trace cobbles (3-4"), reddish brown (5YR 5/4), moderate $CaCO_3$ cementation, large plates excavated; cohesive, dry, hard.
13 - 16 ft.	GW	GRAVEL, fine to coarse, sub-rounded, and SAND, fine to coarse, sub-rounded, 15% low plasticity fines; 5% sub-rounded cobbles (3-4"), light brown (7.5YR 6/3); CaCO3 coatings on rock fragments; non-cohesive, dry, compact to dense.

Samples:

0-2 ft. bag
2-5 ft. bag
5-7 ft. bag
7-13 ft. bag
13-16 ft. bag

Special Notes:

TEST PIT LOG: TP-9

Golder Associates

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/17/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974362.19 **E:** 873288.54

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	SC	FILL. gravelly CLAYEY SAND, fine to coarse, sub-rounded, 45% high plasticity fines, 15% fine to coarse poorly graded gravel; 5% sub-angular cobbles (3-6"), brown (7.5YR 4/3), blocky, strong RXN with HCl; cohesive, dry, firm.
2 - 6 ft.	SP	TAILINGS. poorly graded SAND, medium, sub-rounded, 5% non-plastic fines; pale yellow (2.5Y 7/3), no RXN with HCl; non-cohesive, dry, loose. Tailing thickness in pit is tapered east to west: lower depth 6 ft. (east) and 4 ft. (west).
6 - 8 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine poorly graded gravel, 15% medium plasticity fines; 5% sub-angular cobbles (3-4"); very pale brown (10YR 7/3), $CaCO_3$ masses; non-cohesive, dry, dense.
8 - 10 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 10% non-plastic fines; 5% angular cobbles (3-6"), pale brown (10YR 7/3), $CaCO_3$ coatings on coarse fragments and disseminated; non-cohesive, dry, dense.
10 - 11 ft.	GM	sandy SILTY GRAVEL, poorly graded, fine, sub-rounded, 35% fine to coarse sand, 15% medium plasticity fines; 10% angular cobbles (3-4"), pinkish gray (7.5YR 6/2), moderate $SiO_2/CaCO_3$ cementation; non-cohesive, dry, very dense.
11 - 14 ft.	GP-GM	sandy SILTY GRAVEL, poorly graded, fine to coarse, sub-angular, 35% fine to coarse sub-rounded sand; 10% medium plasticity fines; pinkish gray (7.5YR 6/2), strong $SiO_2/CaCO_3$ cementation; non-cohesive, dry, very dense.

Samples:

Bag	Bucket
6-8 ft. bag 8-10 ft. bag	6-10 ft. bucket
10-11 ft. bag 11-14 ft. bag	10-14 ft. bucket

BMI bag samples: 6-8 ft., 8-10ft, 10-11 ft.

Special Notes:

Reclaimed area on tailing dam.

TEST PIT LOG: TP-10

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/17/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974364.43 **E:** 873777.16

Lithology:

Depth	*USCS*	*Description*
0 - 0.5 ft.	ML	FILL. CLAYEY SILT and SAND, medium plasticity, 40% fine to coarse sub-rounded sand, 5% medium sub-angular gravel; trace sub-angular cobbles (3-6"), dark yellowish brown (10YR 4/4), friable, strong RXN with HCl; cohesive, slightly moist, soft.
0.5 - 3 ft.	SC	FILL. gravelly CLAYEY SAND, fine to coarse, sub-rounded, 40% high plasticity fines, 15% fine to coarse poorly graded gravel; 5% sub-angular cobbles (3-6"), dark brown (10YR 3/3), blocky, disseminated $CaCO_3$; cohesive, dry, firm.
3 - 6 ft.	SP	TAILING. poorly graded SAND, medium, rounded, 5% non-plastic fines; pale yellow (2.5Y 7/4), platy, no RXN with HCl; non-cohesive, dry, compact.
6 - 12 ft.	SP	TAILING. poorly graded SAND, medium, rounded, 5% non-plastic fines; pale yellow (2.5Y 8/4), no RXN with HCl; non-cohesive, dry, loose.
12 - 13 ft.	SC	gravelly CLAYEY SAND, fine to coarse, sub-rounded, 25% medium plasticity fines, 25% fine to coarse sub-rounded gravels; 15% sub-rounded cobbles (3-10"), pale brown (10YR 6/3), $CaCO_3$ masses and coatings on rock fragments, mixing with tailing at horizon contact; non-cohesive, dry, dense.

Samples:
0.5-3 ft. bag
3-6 ft. bag, bucket
6-12 ft. bag, bucket
12-13 ft. bag, bucket

Special Notes:
Reclaimed area on tailing dam.
Stop at 13 feet due to limit of backhoe, but appear to be on top of a layer of more gravels.

TEST PIT LOG: TP-11

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/17/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974375.04 **E:** 874235.34

Lithology:

Depth	*USCS*	*Description*
0 - 0.83 ft.	ML	FILL. CLAYEY SILT and SAND, medium plasticity, 40% fine to coarse sub-rounded sand, 5% fine to coarse poorly graded gravel; 5% sub-angular cobbles (3-10"), brown (10YR 4/3), friable, strong RXN with HCl; cohesive, moist, soft.
0.83 - 5 ft.	SP	TAILING. poorly graded SAND, medium, rounded, 5% non-plastic fines; light gray (2.5Y 7/2), platy, weak RXN with HCl; non-cohesive, dry, compact.
5 - 11 ft.	SP	TAILING. poorly graded SAND, medium, rounded, 5% non-plastic fines; brownish yellow (10YR 6/8), no RXN with HCl; non-cohesive, dry, loose to compact.
11 - 13 ft.	SP	TAILING. poorly graded SAND, medium, rounded, 5% non-plastic fines; grayish brown (2.5Y 5/2), no RXN with HCl; non-cohesive, dry, loose.

Samples:
0-1 ft. bag
1-5 ft. bag, bucket
5-11 ft. bag, bucket
11-13 ft. bag, bucket

Special Notes:
Reclaimed area on tailing dam.
Stop at 13 feet due to limit of backhoe.

TEST PIT LOG: TP-12

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/2/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974885.17 **E:** 875173.88

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	ML	SILT and SAND, low plasticity, 45% poorly graded fine sand, 5% medium gravel; trace cobbles (4-6"), strong brown (7.5YR 4/6), blocky; cohesive, dry, firm.
1 - 3 ft.	CL	sandy SILTY CLAY, medium plasticity, 35% fine to coarse sub-rounded sand, 5% medium gravel; trace sub-rounded to sub angular cobbles (4-6"), pink (7.5 YR 7/3), clay fingering, $CaCO_3$ masses and cemented in places, blocky; cohesive, dry, stiff.
3 - 7 ft.	GM	SILTY GRAVEL, fine to coarse, sub-rounded, and SAND, fine to coarse, sub-rounded, 15% low plasticity fines; 40% sub-rounded to sub-angular cobbles and boulders (3-20"), light brown (7.5YR 6/3), $CaCO_3$ coatings on rock fragments; non-cohesive, dry, dense.
7 - 8 ft.	SM/GM	SILTY SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-rounded; 20% low to medium plasticity fines; 10% cobbles (3-10"), pink (7.5YR 7/4), blocky, strong $CaCO_3$ cementation; non-cohesive, dry, very dense.
8 - 11 ft.	SM	SILTY SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-rounded, 10% non-plastic fines; 5% cobbles (3-10"), pale brown (10YR 6/3), weak to moderate SiO_2 cementation, $CaCO_3$ trace masses and disseminated; non-cohesive, dry, dense.
11 - 13 ft.	SM	SILTY SAND, fine to coarse, sub-rounded and GRAVEL, fine to coarse, sub-rounded; 20% low plasticity fines; trace cobbles (3-4"), yellowish brown (10YR 5/4), platy, moderate $SiO_2/CaCO_3$ cementation, $CaCO_3$ visible in pores and disseminated; non-cohesive, dry,
13 - 15 ft.	SW	SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-rounded, 10% low to non-plastic fines; 15% cobbles (3-10"), yellowish brown (10YR 5/4), CaCO3 coatings on rock fragments; non-cohesive, dry, dense.

Samples:
BMI bag samples: 0-1 ft., 1-3 ft., 3-7 ft., 8-11 ft., 11-13 ft.

Special Notes:
Surface reworked by wind, small dunes around shrubs (*Flourensia cernua* , tarbush and *Prosopis glandulosa* , honey mesquite).

TEST PIT LOG: TP-13

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/2/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974438.98 **E:** 875447.89

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	ML	SILT, non-plastic, 10% fine to coarse sub-rounded sand, 5% fine to coarse sub-rounded gravel; trace cobbles (3-6"), brown (7.5YR 4/4), friable; cohesive, dry, soft.
1 - 3 ft.	ML	sandy CLAYEY SILT, low plasticity, 30% fine to coarse sub-rounded sand, 5% fine to coarse sub-rounded gravel; trace cobbles (3-6"), light yellowish brown (10YR 6/4), blocky, clay fingering, $CaCO_3$ as masses and weakly cemented in places; cohesive, dry, soft.
3 - 5 ft.	CL	sandy SILTY CLAY, low to medium plasticity, 30% fine to coarse sub-rounded sand, 5% fine to coarse sub-rounded gravel; light brown (7.5YR 6/4), blocky, $CaCO_3$ as masses and disseminated; cohesive, dry, firm.
5 - 8 ft.	CL	sandy SILTY CLAY, medium plasticity, 30% fine to coarse sub-rounded sand, 5% fine to coarse sub-rounded gravel; trace cobbles (3-6"), light brown (7.5YR 6/4), strong angular blocky, $CaCO_3$ along pores, weak RXN with HCl; cohesive, dry, stiff.
8 - 10 ft.	SM	SILTY SAND, fine to coarse, subrounded, and GRAVEL, fine to coarse, sub-rounded, 15% low plasticity fines; 15% sub-rounded to sub-angular cobbles and boulders (3-15"), brown (7.5YR 5/4), strong SiO_2/$CaCO_3$ cementation, strong RXN with HCl; non-cohesive, dry, dense.
10 - 18 ft.	GW	sandy GRAVEL, fine to coarse, sub-rounded, 25% fine to coarse sub-rounded sand, 10% non-plastic fines; 30% sub-rounded to sub-angular cobbles and boulders (3-20"), dark yellowish brown (10YR 4/4), weak RXN with HCl; non-cohesive, dry, very, dense.

Samples:
5-8 ft. bag, bucket
5-10 ft. bag, bucket
10-18 ft. bag, bucket

Special Notes:

TEST PIT LOG: TP-14

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/2/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974366.80 **E:** 874917.98

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	CI	gravelly sandy SILTY CLAY, high plasticity, 20% fine to coarse sub-angular gravel, 15% fine to coarse sub-rounded sand; 20% sub-angular cobbles (3-12"); dark reddish brown (5YR 3/4), blocky, no RXN with HCl; cohesive, dry, firm.
1 - 4 ft.	CL	gravelly sandy SILTY CLAY, moderate plasticity, 25% fine to coarse sub-angular gravel, 25% fine to coarse sub-rounded sand; 15% sub-angular cobbles (3-12"); pink (7.5YR 7/3), blocky, $CaCO_3$ masses and weak cementation in places, strong RXN with HCl clay fingering; cohesive, dry, firm.
4 - 7 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% non-plastic fines, 15% fine to coarse poorly graded gravels; trace cobbles (3"), pinkish white (7.5YR 8/2), strong $CaCO_3$ cementation (large plates excavated); non-cohesive, dry, dense.
7 - 12 ft.	ML	sandy SILT, non-plastic, 20% fine to medium poorly graded sand, trace fine poorly graded gravels; brown (7.5YR 5/4), platy, $CaCO_3$ lining pores and some masses, weak RXN with HCl; cohesive, dry, soft.
12 - 14 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-angular, 35% fine to coarse sub-rounded sand, 15% non-plastic fines; 15% sub-angular cobbles (3-6"), pinkish white (7.5YR 8/2), strong $SiO_2/CaCO_3$ cementation, strong RXN with HCl; non-cohesive, dry, dense.
14 - 16.5 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-angular, 40% fine to coarse sand, 15% non-plastic fines; trace sub-angular cobbles (3-6"), pinkish white (7.5YR 8/2), weak SiO_2 cementation, $CaCO_3$ coatings on rocks, strong RXN with HCl; non-cohesive, dry, dense.

Samples:
0-1 ft. bag
1-4 ft. bag
4-7 ft. bag
7-12 ft. bag
12-14 ft. bag
14-16.5 ft. bag

Special Notes:
Offset pit location approximately 25 feet to the west to keep disturbance on tracked road.

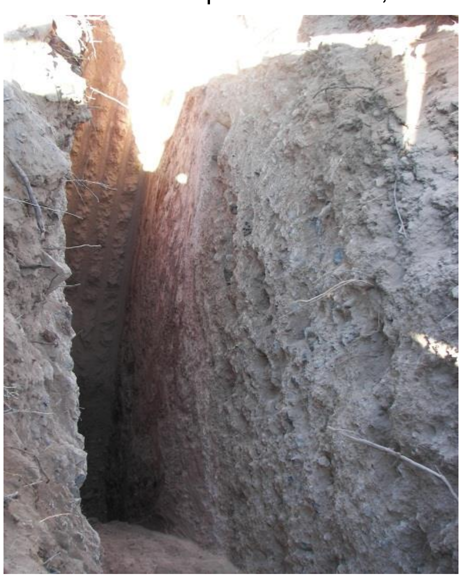
TEST PIT LOG: TP-15

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/20/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973832.93 **E:** 874871.54

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	ML	sandy CLAYEY SILT, low plasticity, 30% fine to coarse sub-rounded sand, 5% fine to medium poorly graded gravels; dark brown (7.5YR 3/3), friable, strong RXN with HCl; cohesive, dry, soft.
2 - 4 ft.	SM	SILTY SAND, fine to coarse, sub-rounded, 20% low plasticity fines, 10% fine to coarse sub-angular gravels; 5% sub-angular cobbles (3-10"), pink (7.5 YR 7/4), blocky, strong RXN with HCl; cohesive, dry, firm.
4 - 8 ft.	CI	sandy SILTY CLAY, medium plasticity, 30% fine to coarse sub-rounded sand, 10% fine to medium poorly graded gravel; light reddish brown (5YR 6/4), angular blocky (breaking to fine aggregates), $CaCO_3$ nodules and masses; cohesive, dry, firm.
8 - 10 ft.	CH	sandy CLAY, high plasticity, 15% fine poorly graded sand, trace gravels; dark reddish brown (2.5YR 3/4), angular blocky (breaking to gravel sized aggregates), weak RXN with HCl, clay pressure faces; cohesive, moist, firm.
10 - 20 ft.	CH	CLAY, high plasticity, 5% fine poorly graded sand, trace gravels; dark reddish brown (2.5YR 3/3), angular blocky (rock structure), weak RXN with HCl, clay pressure faces; cohesive, moist, stiff.



Samples:
8-10 ft. bag, bucket
10-20 ft. bag, bucket

Special Notes:
Excavator leaves slick sidewalls at 8+ feet. Clays formed in place (not illuvial) from weathering primary minerals.

TEST PIT LOG: TP-16

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/20/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973732.56 **E:** 875481.72

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	ML	sandy CLAYEY SILT, low plasticity, 30% fine to coarse sub-rounded sand, 5% fine to medium poorly graded sub-angular gravels; 10% sub-angular cobbles (3-6"), brown (7.5YR 4/3), friable, strong RXN with HCl; cohesive, moist, soft.
2 - 4 ft.	ML	sandy CLAYEY SILT, low plasticity, 20% fine to coarse sub-rounded sand, 5% fine to medium poorly graded sub-angular gravels; trace sub-angular cobbles (3-6"), brown (7.5YR 5/4), blocky, strong RXN with HCl; cohesive, dry, stiff.
4 - 7 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% non-plastic fines, 20% fine poorly graded sub-angular gravels; brown (7.5YR 5/3), friable, $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, firm.
7 - 10 ft.	ML	sandy SILT, non-plastic, 30% fine to coarse sub-angular sand, 5% fine poorly graded sub-angular gravels; light brown (7.5YR 6/3), blocky, $CaCO_3$ as masses and disseminated, strong RXN with HCl, thin layer (<1ft) of moderate cementation; non-cohesive, dry, hard.
10 - 17 ft.	GW	sandy GRAVEL, fine to coarse, sub-angular, 30% fine to coarse sub-rounded sand, 5% non-plastic fines; 20% sub-rounded cobbles (3-12"); brown (7.5YR 5/3), weak to strong $CaCO_3$ cementation (stratified), weak to strong RXN with HCl; non-cohesive, dry, very dense.

Samples:
0-2 ft. bag
2-4 ft. bag
4-7 ft. bag, bucket
7-10 ft. bag, bucket
BMI bag samples same as above

Special Notes:
10 to 17 foot interval has varying degrees of $CaCO_3$ cementation (none to strong), but grouped together due to particle size similarities.

TEST PIT LOG: TP-17

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/18/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973205.01 **E:** 873937.67

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	ML	sandy SILT, low plasticity, 40% fine to coarse sub-rounded sand, trace fine poorly graded gravels; trace sub-angular cobbles (3-6"), yellowish brown (10YR 5/4), platy, weak RXN with HCl; cohesive, dry, soft.
1 - 2 ft.	CH	sandy CLAY, high plasticity, 35% fine to coarse poorly graded sand, 5% fine to coarse poorly graded gravels; trace cobbles (3"), reddish brown (5YR 4/4), blocky, disseminated $CaCO_3$ and masses, strong RXN with HCl; cohesive, moist, stiff.
2 - 4 ft.	SC	CLAYEY SAND, fine to coarse, sub-rounded, 40% medium plasticity fines, 5% fine to coarse poorly graded gravel; trace cobbles (3-4"), pink (7.5YR 7/3), blocky, moderate $CaCO_3$ cementation and masses, strong RXN with HCl; cohesive, dry, very stiff.
4 - 6 ft.	SM	gravelly SILTY SAND, fine to coarse, poorly graded, 25% low plasticity fines, 25% fine poorly graded gravels; trace cobbles (3-6"), brown (7.5YR 5/3), blocky, $CaCO_3$ masses and coating rock fragments, strong RXN with HCl; cohesive, dry, firm.
6 - 14 ft.	GW	sandy GRAVEL, fine to coarse, poorly graded, 40% fine to coarse sub-rounded sand, 5% non-plastic fines; 5% cobbles (3-6"), light brown (7.5YR 6/3), stratified, thickly bedded, some weak $CaCO_3$ cementation at 8 feet moderate cementation at 14 feet, $CaCO_3$ masses, strong RXN with HCl; non-cohesive, dry, dense

Samples:

0-2 ft. bag
2-4 ft. bag
4-6 ft. bag
6-14 ft. bag
BMI bag samples: 0-2 ft., 2-4 ft., 4-6 ft., 6-10 ft.

Special Notes:

Disturbed surface, pit located in depression on tailing dam (cow lay-down area). Salt cedar (*Tamarix chinensis*) and seep willow (*Baccharis salicina*) stand.

TEST PIT LOG: TP-18

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/20/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973182.90 **E:** 874892.73

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	GM/SM	sandy SILTY GRAVEL, poorly graded, fine to medium, sub-angular, 25% fine to medium poorly graded sub-rounded sand, 45% low plasticity fines; trace sub-angular cobbles (3-4"), brown (7.5YR 4/4), blocky, strong RXN with HCl; cohesive, moist, soft.
2 - 3 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to medium poorly graded gravel, 25% low plasticity fines; trace sub-angular cobbles (3-4"), light brown (7.5YR 6/3), blocky, moderate $CaCO_3$ cementation, strong RXN with HCl; non-cohesive, dry, dense.
3 - 5 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to coarse poorly graded gravel, 30% low plasticity fines; pink (7.5YR 7/3), blocky, moderate to weak $CaCO_3$ cementation in places, disseminated, and coatings on rocks; non-cohesive, dry, dense.
5 - 7 ft.	SM/GM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to medium poorly graded gravel, 25% low plasticity fines; reddish brown (5YR 5/3), large plates excavated, moderate SiO_2 cementation, strong reaction with HCl; non-cohesive, dry, dense.
7 - 9 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to medium poorly graded gravel, 30% low plasticity fines; reddish brown (5YR 5/4), large plates excavated, strong SiO_2 cementation, weak reaction with HCl; non-cohesive, dry, very dense.
9 - 15 ft.	SP	SAND, poorly graded, medium, sub-rounded, 5% fine poorly graded gravel, 5% non-plastic fines; reddish brown (5YR 5/4), large plates excavated, moderate SiO_2 cementation, weak reaction with HCl; non-cohesive, dry, very dense.

Samples:
7-9 ft. bag, bucket
9-15 ft. bag, bucket

Special Notes:

TEST PIT LOG: TP-19

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/19/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973045.18 **E:** 875451.64

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	GC	Disturbed/FILL. sandy CLAYEY GRAVEL, fine to coarse, sub-rounded, 45% high plasticity fines, 20% fine to coarse sub-rounded sand; 15% sub-rounded cobbles (3-6"), reddish brown (5YR 4/4), blocky, no RXN with HCl; cohesive, moist, firm.
2 - 3 ft.	GC	sandy CLAYEY GRAVEL, fine to coarse, poorly graded, sub-rounded, 40% high plasticity fines, 30% fine to coarse sub-rounded sand; 5% sub-rounded cobbles (3-6"), yellowish red (5YR 4/6), blocky, no RXN with HCl; cohesive, dry, hard.
3 - 5 ft.	SW	SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-angular, 5% non-plastic fines; 10% sub-angular cobbles (3-6"), light brown (7.5YR 6/4), strong $CaCO_3$ cementation, strong RXN with HCl; non-cohesive, dry, dense.
5 - 10 ft.	GW	GRAVEL, fine to coarse, subangular, and SAND, fine to coarse, sub-rounded, 5% non-plastic fines; 15% sub-angular cobbles (3-6"), brown (7.5YR 5/3), $CaCO_3$ as masses, disseminated and weak cementation in places; non-cohesive, dry, dense.
10 - 11 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% medium poorly graded gravel, 25% low to medium plasticity fines; trace cobbles (3-10"), white (7.5YR 8/1), blocky, $CaCO_3$ as masses, disseminated and moderate cementation in places; non-cohesive, dry, dense.
11 - 14 ft.	GM-GC	sandy GRAVEL, fine to coarse, sub-angular, 35% fine to coarse sub-rounded sand; 25% low to medium plasticity fines; 5% sub-angular cobbles (3-6"), brown (7.5YR 5/3), $CaCO_3$ as masses, disseminated and strong cementation in places; non-cohesive, dry, dense.

Samples:
None.

Special Notes:
stratified gravels and sands, thickly bedded, from 5 to 14 feet.

TEST PIT LOG: TP-20

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/19/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972549.21 **E:** 875734.91

Lithology:

Depth	*USCS*	*Description*
0 - 0.5 ft.	ML	sandy SILT, non-plastic, 45% fine to coarse sub-rounded sand, 5% fine to medium poorly graded gravels; brown (7.5YR 4/2), friable, no RXN with HCl; cohesive, dry, soft.
0.5 - 2 ft.	CH	CLAY and SAND, high plasticity, 40% fine to coarse sub-rounded sand, 5% fine to medium poorly graded gravels; yellowish red (5YR 4/6), blocky, no RXN with HCl; cohesive, moist, stiff.
2 - 4 ft.	SC-SP	gravelly CLAYEY SAND, fine to coarse, poorly graded, 30% fine to coarse sub-rounded gravels, 15% medium plasticity fines; 10% sub-rounded cobbles (3-7"), brown (7.5YR 5/4), $CaCO_3$ as masses and disseminated; strong RXN with HCl; non-cohesive, dry, compact.
4 - 5 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 20% medium plasticity fines, 15% fine to coarse poorly graded sub-rounded gravels; trace sub-rounded cobbles (3"), white (7.5YR 8/1), blocky, weakly cemented ($CaCO_3$); non-cohesive, dry, very dense.
5 - 7 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 20% fine to coarse sub-rounded gravels, 15% medium plasticity fines; 5% sub-rounded cobbles (3-6"), brown (7.5YR 5/3), blocky, $CaCO_3$ as masses and disseminated; non-cohesive, dry, dense.
7 - 11 ft.	GP	GRAVEL, fine to coarse, poorly graded, and SAND, fine to coarse, sub-round SAND, 5% non-plastic fines; 5% sub-rounded cobbles (3-6"), brown (7.5YR 5/3), weakly cemented ($CaCO_3$); non-cohesive, dry, dense.
11 - 18.5 ft.	SW-SM	SILTY SAND fine to coarse, sub-rounded, and GRAVEL, fine to coarse, sub-rounded, 15% non-plastic fines; 10% sub-rounded cobbles (3-6"), grayish brown (10YR 5/2), blocky, $CaCO_3$ as masses, disseminated and coatings on rock fragments; non-cohesive, dry, dense to compact.

Samples:
- 0-2 ft. bag, 2-4 ft. bag → 0-4 ft. bucket
- 4-5 ft. bag, 5-7 ft. bag → 4-7 ft. bucket
- 7-11 ft. bag, bucket
- 11-18.5 ft. bag, bucket

Special Notes:
Surface disturbed.

TEST PIT LOG: TP-21

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/19/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972274.72 **E:** 875755.12

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	ML	CLAYEY SILT and SAND, low plasticity, 45% fine to coarse sub-rounded sand, 5% coarse poorly graded sub-angular, gravels; 5% sub-angular cobbles (3-4"), brown (7.5YR 4/3), blocky, strong RXN with HCl; cohesive, moist, soft.
2 - 3 ft.	SC/SM	gravelly CLAYEY SAND, fine to coarse, sub-rounded, 35% medium plasticity fines, 30% medium poorly graded sub-angular gravels; trace cobbles (3"), white (7.5YR 8/1), blocky, weak $CaCO_3$ cementation, strong RXN with HCl; cohesive, dry, firm.
3 - 5 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% medium plasticity fines, 25% fine to medium poorly graded sub-angular gravels; trace cobbles (3"), brown (7.5YR 5/3), blocky, $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, stiff.
5 - 7 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to medium poorly graded sub-angular gravels, 25% medium plasticity fines; 5% sub-rounded cobbles (3-5"), brown (7.5YR 4/3), disseminated $CaCO_3$, masses and coatings on rock fragments, strong RXN with HCl; cohesive, dry, stiff.
7 - 11 ft.	GC	sandy CLAYEY GRAVEL, fine to coarse, sub-angular, 35% fine to coarse sub-rounded sand, 20% medium plasticity fines; 10% sub-angular cobbles (3-6"), brown (7.5YR 5/4), weak RXN with HCl, moderate SiO_2 cementation; non-cohesive, dry, very dense.
11 - 14 ft.	GM	sandy SILTY GRAVEL, fine to coarse, poorly graded, sub-angular, 40% fine to coarse sub-rounded sand, 15% low plasticity fines; 5% sub-rounded cobbles (3-6"); brown (7.5YR 5/4), weak RXN with HCl, weak SiO_2 cementation; non-cohesive, dry, dense.
14 - 18 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to coarse poorly graded gravels, 20% low plasticity fines; trace cobbles (3-4"); light brown (7.5YR 6/4), large plates excavated, weak RXN with HCl, weak SiO_2 cementation; non-cohesive, dry, dense.

Samples:

7-11 ft. bag, bucket
11-14 ft. bag, bucket
14-18 ft. bag, bucket
BMI bag samples: 7-11 ft., 11-14 ft., 14-18 ft.

Special Notes:

$CaCO_3$ masses and cementation confined to upper layers (2-7 ft.). Disseminated $CaCO_3$ and coatings on coarse fragments at 7+ feet. SiO_2 cementation/conglomerate at 7-18 feet.

TEST PIT LOG: TP-22

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/20/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972597.58 **E:** 875051.00

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	CL	sandy gravelly SILTY CLAY, medium plasticity, 25% fine to coarse sub-rounded sand, 20% fine to coarse sub-angualr gravel; 5% cobbles (3-5"), brown (7.5YR 4/3), blocky, strong RXN with HCl; cohesive, dry, soft.
2 - 3 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% low to medium plasticity fines, 25% fine to coarse sub-angular gravel; 5% cobbles (3-5"), pinkish white (7.5YR 8/2), weak $CaCO_3$ cementation, strong RXN with HCl; cohesive, dry, firm.
3 - 5 ft.	SW	gravelly SAND, fine to coarse, sub-rounded, 35% fine to coarse sub-angular gravel, 10% non-plastic fines; 10% cobbles (3-12"), light brown (7.5YR 6/3), $CaCO_3$ as masses and disseminated, strong RXN with HCl; non-cohesive, dry, compact.
5 - 8 ft.	GW	sandy GRAVEL, fine to coarse, sub-angular, 40% fine to coarse sub-rounded sand, 10% non-plastic fines; 20% cobbles and boulders (3-15"), brown (7.5YR 5/4), $CaCO_3$ as masses and disseminated, strong RXN with HCl; non-cohesive, dry, compact.
8 - 11 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-angular, 35% fine to coarse sub-rounded sand, 25% medium plasticity fines; 20% cobbles and boulders (3-15"), reddish brown (5YR 4/4), $CaCO_3$ as masses and disseminated, strong RXN with HCl; non-cohesive, dry, dense.
11 - 13 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to coarse poorly graded gravels, 25% medium plasticity fines; trace cobbles (3-4"), reddish brown (5YR 5/4), $CaCO_3$ as masses and disseminated, strong RXN with HCl; non-cohesive, dry, dense.
13 - 16 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, 10% fine to medium poorly graded gravels, 10% low plasticity fines; yellowish red (5YR 5/6), weak RXN to HCl, moderate cementation (SiO_2), large plates excavated; non-cohesive, dry, very dense.

Samples:

None.

Special Notes:

Stratified gravels at 5 to 11 feet, thickly bedded.
Disturbed surface; A horizon has been removed.

TEST PIT LOG: TP-23

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/20/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972621.41 **E:** 874709.99

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	ML	sandy CLAYEY SILT, low plasticity, 35% fine to medium poorly graded sub-rounded sand, 5% fine to medium poorly graded sub-angular gravel; trace sub-angular cobbles (3-5"), brown (7.5YR 4/3), blocky, strong RXN with HCl; cohesive, dry, soft.
2 - 3 ft.	ML	CLAYEY SILT and SAND, medium plasticity, 40% fine to coarse sub-rounded sand, 10% fine to medium poorly graded sub-angular gravel; pink (7.5YR 7/3), blocky, weak $CaCO_3$ cementation, strong RXN with HCl; cohesive, dry, very stiff.
3 - 5 ft.	ML-SM	CLAYEY SILT and SAND, low to medium plasticity, 45% fine to coarse sub-rounded sand, 5% fine to medium poorly graded sub-angular gravel; light brown (7.5YR 6/3), blocky, $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, stiff.
5 - 8 ft.	SM	SILTY SAND, fine to coarse, sub-rounded, 20% low to non-plastic fines, 5% fine to medium poorly sub-angular graded gravel; pink (7.5YR 7/4), moderate $CaCO_3$ cementation and coatings on rock fragments, strong RNX with HCl; non-cohesive, dry, dense.
8 - 11 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 25% low plasticity fines, 25% fine to medium poorly graded sub-angular gravel; pink (7.5YR 7/4), strong $CaCO_3$ cementation and coatings on rock fragments, strong RXN with HCl; non-cohesive, dry, very dense.
11 - 12 ft.	GM	sandy SILTY GRAVEL, fine to coarse, sub-angular, 30% low plasticity fines, 30% fine to coarse sub-rounded sand; 5% cobbles (3-5"), brown (7.5YR 5/2), strong $SiO_2/CaCO_3$ cementation and coatings on rock fragments, strong RXN with HCl; non-cohesive, dry, very dense.

Samples:
None.

Special Notes:
very hard digging at 10 feet. Refusal at 12 feet.

TEST PIT LOG: TP-24

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/18/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972670.75 **E:** 873699.23

Lithology:

Depth	*USCS*	*Description*
0 - 3 ft.	CL	SILTY CLAY and SAND, medium plasticity, 40% fine to coarse sub-rounded sand, 10% fine to coarse poorly graded sub-rounded gravel; 20% cobbles (4-10"), brown (7.5YR 4/4), blocky, strong RXN with HCl; cohesive, dry, firm.
3 - 5 ft.	SC	CLAYEY SAND, fine to coarse, sub-rounded sand, 30% medium plasticity fines, 10% fine to coarse poorly graded sub-angular gravel; 5% sub-angular cobbles (3-5"); brown (7.5YR 5/4), blocky, $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, firm.
5 - 10 ft.	SM/SC	SILTY SAND, fine to coarse, well graded, sub-rounded, 25% medium plasticity fines, 10% fine to medium poorly graded sub-angular gravel; trace cobbles (3-5"); light brown (7.5YR 6/3), large blocky plates excavated, $CaCO_3$ as masses and weakly cemented (SiO_2/$CaCO_3$) in places, strong RXN with HCl; non-cohesive, dry, dense.
10 - 14 ft.	SW-SM	SILTY SAND, fine to coarse, sub-rounded, and GRAVEL, fine to coarse, poorly graded, sub-rounded, 10% low plasticity fines; 15% sub-angular cobbles; brown (7.5YR 5/3), $CaCO_3$ coatings on rock fragments and masses, strong RXN with HCl; non-cohesive, dry, dense.
14 - 16 ft.	GP-GM	sandy SILTY GRAVEL, fine to coarse, poorly graded, 30% fine to coarse well graded sand, 10% low plasticity fines; 20% sub-angular cobbles (3-10"), brown (7.5YR 5/3), $CaCO_3$ coatings on rock fragments and masses, strong RXN with HCl; non-cohesive, dry, dense.

Samples:
0-3 ft. bag
3-5 ft. bag, bucket
5-10 ft. bag, bucket
10-14 ft. bag, bucket
14-16 ft. bag, bucket
BMI samples all layers (bag samples)

Special Notes:
Disturbed surface.

TEST PIT LOG: TP-25

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/13/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972408.78 **E:** 872794.31

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	SC	FILL. gravelly CLAYEY SAND, fine to coarse, sub-rounded, 35% fine to medium poorly graded sub-rounded gravel, 20% medium plasticity fines; 5% sub-angular cobbles (3-6"), brown (7.5YR 4/4), blocky; cohesive, dry, firm.
2 - 5 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine to coarse poorly graded gravel, 10% low plasticity fines; 20% cobbles and boulders (3-15"), light brown (7.5YR 5/4), $CaCO_3$ as masses and disseminated; non-cohesive, dry,
5 - 6 ft.	GP	sandy GRAVEL, fine to coarse, poorly graded, sub-angular, 25% fine to coarse sub-rounded graded sand, 5% non-plastic fines; 15% cobbles and boulders (3-12"), light brown (7.5YR 6/4), large blocky plates excavated, strong SiO_2/$CaCO_3$ cementation (conglomerate); non-cohesive, dry, very dense.
6 - 7 ft.	GP	sandy GRAVEL, fine to coarse, poorly grades, sub-angular, 30% fine to coarse sub-rounded sand, 5% non-plastic fines; 15% cobbles (3-10"), light brown (7.5YR 6/3), large blocky plates excavated, moderate SiO_2/$CaCO_3$ cementation (conglomerate); non-cohesive, dry, very dense.

Samples:
0-2 ft. bag
2-5 ft. bag
5-6 ft. bag
6-7 ft. bag

BMI sample: 2-5 ft.

Special Notes:
Pit located in old borrow area. Hard to dig with backhoe at 5+ feet.

TEST PIT LOG: TP-26

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/13/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973262.64 **E:** 872782.60

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	SM	FILL. gravelly SILTY SAND, fine to coarse, sub-rounded sand, 40% medium plasticity fines, 20% fine to coarse sub-rounded gravel; 5% sub-angular cobbles (3-4"), brown (10YR 5/3), friable; cohesive, dry, soft.
1 - 3 ft.	CL/SM	gravelly sandy SILTY CLAY, medium plasticity, 30% fine to coarse sub-rounded sand, 20% fine to coarse sub-rounded gravel; trace cobbles (3-4"), brown (7.5YR 4/3), blocky, $CaCO_3$ as masses and disseminated; cohesive, dry, stiff.
3 - 4 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to coarse sub-rounded graded gravel, 15% low plasticity fines; 10% sub-angular cobbles (3-6"), light brown (7.5YR 6/4), large blocky plates excavated, moderate SiO_2/$CaCO_3$ cementation (conglomerate); non-cohesive, dry, very dense.
4 - 5 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 20% fine to coarse sub-angular gravel, 15% low plasticity fines; 5% sub-angular cobbles (3-5"), light brown (7.5YR 6/4), large blocky plates excavated, strong SiO_2/$CaCO_3$ cementation (conglomerate); non-cohesive, dry, very dense.

Samples:
0-3 ft. bag
3-4 ft. bag
4-5 ft. bag

Special Notes:
Pit located in old borrow area. Hard to dig with backhoe; refusal at 5 feet.

TEST PIT LOG: TP-27

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/19/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11972823.18 **E:** 871169.18

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	SM	SILTY SAND, fine to coarse, sub-rounded, 20% low plasticity fines, 10% fine to coarse poorly graded sub-angular gravel; trace cobbles (3-5"), dark brown (10YR 3/3), friable, strong RXN with HCl; cohesive, moist, soft.
2 - 3 ft.	SC	gravelly CLAYEY SAND, fine to coarse, sub-rounded sand, 40% medium plasticity fines, 20% fine to coarse poorly graded sub-angular gravel; 10% sub-angular cobbles and boulders (3-20"); brown (7.5YR 4/3), blocky, $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, firm.
3 - 7 ft.	GP	GRAVEL, fine to coarse, poorly graded, sub-angular, 45% fine to coarse sub-rounded sand, 5% non-plastic fines; 5% sub-angular cobbles (3-10"), pinkish gray (7.5YR 7/2), $CaCO_3$ coatings on rock fragments, weak RXN with HCl, moderate SiO_2 cementation at 5 feet; non-cohesive, dry, dense.
7 - 13 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 5% non-plastic fines; 15% cobbles and boulders (3-20"), pinkish gray (7.5YR 6/2), moderate SiO_2 cementation, $CaCO_3$ coatings on rock fragments, weak RXN with HCl; non-cohesive, dry, very dense.
13 - 14 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 5% non-plastic fines; 10% sub-angular cobbles (3-10"), pinkish gray (7.5YR 6/2), strong SiO_2 cementation (conglomerate), $CaCO_3$ coatings on rock fragments, weak RXN with HCl; non-cohesive, dry, very dense.

Samples:
0-2 ft. bag, bucket
2-3 ft. bag, bucket
3-7 ft. bag, bucket
7-13 ft. bag, bucket
13-14 ft. bag
BMI samples all layers (bag samples)

Special Notes:
Hard digging due to oversize at 7 feet and cemented conglomerate at 13 feet.

TEST PIT LOG: TP-28

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/3/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11973129.48 **E:** 871528.89

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	ML	CLAYEY SILT and SAND, low plasticity, 40% fine to coarse sub-rounded sand, 10% fine to coarse sub-rounded gravel; 10% sub-angular cobbles (3-8"), brown (7.5YR 4/2), blocky, weak RXN with HCl; cohesive, dry, soft.
2 - 4 ft.	SM/CL	gravelly SILTY SAND, fine to coarse, sub-rounded, 40% medium plasticity fines, 30% fine to coarse sub-rounded gravel; trace sub-angular cobbles (3-8"), pinkish gray (7.5YR 6/2), blocky, weak $CaCO_3$ cementation in places and masses strong RXN with HCl; cohesive, dry, firm.
4 - 6 ft.	GP	GRAVEL, fine to coarse, poorly graded, sub-rounded and SAND, fine to coarse, poorly graded, sub-rounded, 10% low plasticity fines; trace cobbles (3-8"), brown (7.5YR 5/2), $CaCO_3$ coatings on rock fragments, strong RXN with HCl; non-cohesive, dry, dense.
6 - 9 ft.	GW	GRAVEL, fine to coarse, sub-rounded, and SAND, fine to coarse, sub-rounded, 5% non-plastic fines; 15% cobbles and boulders (3-20"), light brown (7.5YR 6/4), moderate SiO_2 cementation, very weak RXN with HCl; non-cohesive, dry, very
9 - 14.5 ft.	GM	SILTY GRAVEL,fine to coarse, sub-rounded, and SAND, fine to coarse, sub-rounded, 15% low plasticity fines; 20% sub-angular cobbles (3-8"), light brown (7.5YR 6/4), strong SiO_2 cementation (conglomerate), very weak RXN with HCl; non-cohesive, dry, very dense.

Samples:
None.

Special Notes:
Difficult to excavate at 9 feet. Archaeologist present during excavation.

TEST PIT LOG: TP-29

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/18/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974098.42 **E:** 871178.07

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	CL	sandy SILTY CLAY, medium plasticity, 30% fine to coarse sub-rounded sand, 5% fine to coarse poorly graded sub-angular gravel; trace cobbles (3-12"), dark brown (7.5YR 3/3), friable, strong RXN with HCl; cohesive, dry, firm.
1 - 2 ft.	CI	gravelly sandy SILTY CLAY, medium to high plasticity, 25% fine to coarse sub-angular gravel; 20% medium to coarse poorly graded sub-rounded sand; 5% cobbles (3-12"), reddish brown (5YR 4/4), blocky, disseminated $CaCO_3$, strong RXN with HCl; cohesive, dry, stiff.
2 - 4 ft.	SC	gravelly CLAYEY SAND, fine to coarse, sub-rounded, 30% medium plasticity fines, 15% fine to coarse sub-angular gravels; 5% cobbles (3-6"), pinkish gray (7.5YR 6/2), $CaCO_3$ as masses and disseminated, strong RXN with HCl; cohesive, dry, very stiff.
4 - 7 ft.	SP	gravelly SAND, fine to coarse, poorly graded, sub-rounded, 25% fine to coarse poorly graded gravels, 5% non-plastic fines; trace sub-angular cobbles (3-6"), light brown (7.5YR 6/3), $CaCO_3$ as masses, disseminated and coatings on rock fragments, stong RXN with HCl; non-cohesive, dry, compact.
7 - 12 ft.	SW-GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 10% non-plastic fines; 10% sub-angular cobbles (3-8"), light brown (7.5YR 6/3), strong SiO_2 cementation (conglomerate) at 11 feet, strong RXN with HCl, $CaCO_3$ as masses, disseminated and coatings on rock fragments; non-cohesive, dry, very dense.

Samples:
0-2 ft. bag, bucket
2-4 ft. bag
4-7 ft. bag, bucket
7-12 ft. bag, bucket

Special Notes:
Refusal at 12 feet due to cementation and oversized.

TEST PIT LOG: TP-30

Checked GM 1/29/2013

Client: THEMAC **Date:** 12/18/2012
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11974680.06 **E:** 871571.56

Lithology:

Depth	*USCS*	*Description*
0 - 2 ft.	CL	sandy gravelly SILTY CLAY, medium plasticity, 25% fine to coarse sub-rounded sand, 20% fine to coarse poorly graded sub-angular gravel; trace cobbles (3-10"), dark brown (7.5YR 3/3), friable, strong RXN with HCl; cohesive, dry, firm.
2 - 4 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 40% fine to coarse poorly graded sub-angular gravel, 15% low plasticity fines; 10% sub-angular cobbles and boulders (3-20"), light brown (7.5YR 6/3), disseminated $CaCO_3$ and masses, strong RXN with HCl; non-cohesive, dry, compact.
4 - 5 ft.	SW	gravelly SILTY SAND, fine to coarse, sub-rounded, 35% fine poorly graded sub-angular gravels, 5% non-plastic fines; pinkish gray (7.5YR 6/2), $CaCO_3$ as masses and coatings on gravels, moderate SiO_2 cementation, strong RXN with HCl; non-cohesive, dry, dense.
5 - 12 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, sub-rounded, 5% non-plastic fines; 30% sub-angular cobbles and boulders (3-20"), light brown (7.5YR 6/3), disseminated $CaCO_3$ and coatings on rock fragments, strong RXN with HCl; non-cohesive, dry, dense.

Samples:
None.

Special Notes:

TEST PIT LOG: TP-31

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/3/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11975597.72 **E:** 872172.62

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	CL	gravelly sandy CLAYEY SILT, medium to high plasticity, 30% fine to coarse sub-rounded sand, 25% fine to coarse sub-angular gravel; 10% sub-angular to sub-rounded cobbles (3-6"), brown (7.5YR 5/4), blocky, strong RXN with HCl; cohesive, dry, soft.
1 - 2 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to coarse sub-angular gravel, 30% medium plasticity fines; 15% cobbles (3-9"), brown (7.5YR 5/3), blocky, $CaCO_3$ masses, disseminated and weak cementation in places, clay fingering, strong RXN with HCl; cohesive, dry, stiff.
2 - 5 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, poorly graded, sub-angular, 10% low plasticity fines; trace cobbles (3-5"), light brown (7.5YR 6/3), platy, weak SiO_2 cementation, weak RXN with HCl, $CaCO_3$ coatings on rocks; non-cohesive, dry, dense.
5 - 8 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, poorly graded, sub-angular, 5% non-plastic fines; trace cobbles (3-5"), light brown (7.5YR 6/3), platy, mod. SiO_2 cementation, no RXN with HCl; non-cohesive, dry, very dense.
8 - 13 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, poorly graded, sub-angular, 10% low plasticity fines; 5% cobbles (3-6"), brown (7.5YR 5/4), platy, weak SiO_2 cementation, no RXN with HCl; non-cohesive, dry, dense.
13 - 16 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, poorly graded, sub-angular, 10% low plasticity fines; 5% cobbles (3-6"), light brown (7.5YR 6/3), platy, strong SiO_2 cementation, no RXN with HCl; non-cohesive, dry, very dense.

Samples:
1-2 ft. bag
2-5 ft. bag
5-8 ft. bag
8-13 ft. bag
13-16 ft. bag
BMI bag samples all layers

Special Notes:
Surface disturbed- placer mining location. Pit located in drainage.

TEST PIT LOG: TP-32

Checked GM 1/29/2013

Client: THEMAC **Date:** 1/3/2013
Project: Copper Flat
Project No.: 103-92557
Location: Sierra County, NM
NAD 83: **N:** 11975136.61 **E:** 872876.80

Lithology:

Depth	*USCS*	*Description*
0 - 1 ft.	CL-ML	sandy CLAYEY SILT, medium plasticity, 30% fine to coarse sub-rounded sand, 10% fine to coarse sub-angular gravel; trace sub-angular cobbles (3-6"), brown (7.5YR 4/4), blocky, strong RXN with HCl; cohesive, dry, soft.
1 - 3 ft.	SM	gravelly SILTY SAND, fine to coarse, sub-rounded, 30% fine to coarse sub-angular gravel, 25% medium plasticity fines; 20% cobbles (3-10"), pinkish gray (7.5YR 7/2), blocky, $CaCO_3$ masses, coatings on rock fragments and weak cementation in places, stron RXN with HCl; non-cohesive, dry, compact.
3 - 5 ft.	SM	SILTY SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, sub-angular, 15% low plasticity fines; 5% cobbles (3-4"), light brown (7.5YR 6/3), weak $SiO_2/CaCO_3$ cementation, strong RXN to HCl; non-cohesive, dry, dense.
5 - 10 ft.	GW	GRAVEL, fine to coarse, sub-angular, and SAND, fine to coarse, poorly graded, sub-rounded sand, 10% low plasticity fines; 20% cobbles and boulders (3-12"), pinkish gray (7.5YR 6/2), weak SiO2 cementation, $CaCO_3$ coatings on rock fragments, weak RXN to HCl; non-cohesive, dry, very dense.
10 - 14 ft.	SP	SAND, fine to coarse, poorly graded, sub-rounded, and GRAVEL, fine to coarse, sub-angular, 5% low plasticity fines; 15% cobbles (3-8"), light brown (7.5YR 6/3), large platy blocks excavated, strong SiO_2 cementation, $CaCO_3$ masses, weak RXN to HCl; non-cohesive, dry, very dense.

Samples:
3-5 ft. bag, bucket
5-10 ft. bag, bucket
10-14 ft. bag, bucket

Special Notes:
Hard

APPENDIX A.2
DRILL HOLE LOGS

Golder Associates

REPORT OF BOREHOLE: SOIL KEY

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/24/13
CHECKED: DP DATE: 2/21/13

LOCATION: Copper Flat
XY COORDINATES: N , E
ELEVATION: ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer, Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0–5										Blows Per Six Inches Number of sample hammer blows required to drive the sampler six inches, or recorded number of blows to drive the sampler the specified distance (e.g. 50/4" = 50 hammer blows to drive the sampler four inches).				
5										Blows Per Foot Number of sample hammer blows required to drive the sampler twelve inches. Resolved using the final twelve inches of the sample or the amount of penetration upon sample refusal (50 blow counts).				
10														
			SS1		4 5 6	11	17 / 18			Sample Types Standard Penetration Test - Full penetration with 17 of 18 inches recovered.				
15			SS2		7 50/4"	R	7 / 10			Standard Penetration Test - Refusal at 10 inches, 7 of 10 inches recovered.				
			AUGER3							Auger Bag/Bulk Sample - Bulk grab from auger cuttings to become a collective bag sample over an interval.				
20														
25		▽								Depth at which water was encountered during drilling operations.				
30										Core				
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

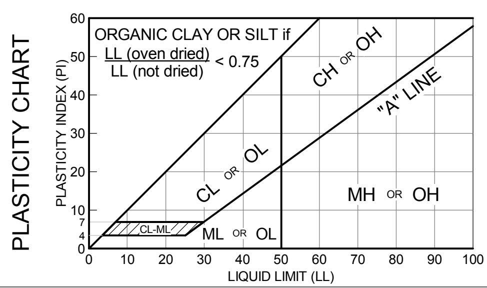
RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:7/16/13

Golder Associates

SOIL CLASSIFICATION / LEGEND

UNIFIED SOIL CLASSIFICATION (ASTM D 2487-00)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES AND GROUP SYMBOLS USING LABOARATORY TESTS			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	$C_U > 4$ AND $1 < C_C < 3$	GW	WELL-GRADED GRAVEL	If soil contains >15% sand, add "with sand"
			$C_U > 4$ AND/OR $1 > C_C > 3$	GP	POORLY-GRADED GRAVEL	
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	$C_U > 6$ AND $1 < C_C < 3$	SW	WELL-GRADED SAND	If soil contains >15% gravel, add "with gravel"
			$C_U > 6$ AND/OR $1 > C_C > 3$	SP	POORLY-GRADED SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	PLASTICITY CHART (see chart below)		CL	LEAN CLAY	If soil contains coarse-grained soil from 15% to 29%, add "with sand" or "with gravel" for whichever type is prominent, or for >30%, add "sandy" or "gravelly"
				ML	SILT	
				OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT>50			CH	FAT CLAY	
				MH	ELASTIC SILT	
				OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR			PT	PEAT	



$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

Gravels or sands with 5% to 12% fines require dual symbols (GW-GM, GW-GC, GP-GM, GP-GC, SW-SM, SW-SC, SP-SM, SP-SC) and add "with clay" or "with silt" to group name. If fines classify as CL-ML for GM or SM, use dual symbol GC-GM or SC-SM.

DESCRIPTIVE TERMINOLOGY FOR PERCENTAGES (ASTM D 2488-00)

DESCRIPTIVE TERMS	RANGE OF PROPORTION
TRACE	0 - 5%
FEW	5 - 10%
LITTLE	15 - 25%
SOME	30 - 45%
MOSTLY	50 - 100%

LABORATORY TEST ABBREVIATIONS

AL	Atterberg Limits	**HY**	Hydrometer	**SG**	Specific Gravity
CI	Chloride Content	**PT**	Proctor	**SP**	Swell Potential
CO	Consolidation	**pH**	Soil pH	**UC**	Unconfined Compression
CP	Collapse Potential	**RS**	Restivity	**UU**	Triaxial Unconsolidated, Undrained
CU	Triaxial Consolidated Undrained	**RV**	R-Value		
DD	Dry Density	**SA**	Sieve Analysis		
DS	Direct Shear	**SC**	Soluble Sulfate Content		

CRITERIA FOR DESCRIBING MOISTURE CONDITION (ASTM D 2488-00)

DRY	Absence of moisture, dusty, dry to the touch
MOIST	Damp but no visible water
WET	Visible free water, usually soil is below water table

COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in.
COBBLES	3 in. to 12 in.
GRAVEL	3 in. to No. 4 (4.76 mm)
COARSE GRAVEL	3 in. to 3/4 in.
FINE GRAVEL	3/4 in. to No. 4 (4.76 mm)
SAND	No. 4 (4.76 mm) to No. 200 (0.074 mm)
COARSE SAND	No. 4 (4.76 mm) to No. 10 (2.0 mm)
MEDIUM SAND	No. 10 (2.0 mm) to No. 40 (0.42 mm)
FINE SAND	No. 40 (0.42 mm) to No. 200 (0.074 mm)
SILT AND CLAY	Smaller than No. 200 (0.074 mm)
SILT	0.074 mm to 0.005 mm
CLAY	Less than 0.005 mm

RELATIVE DENSITY / CONSISTENCY ESTIMATE USING STANDARD PENETRATION TEST (SPT) VALUES

COHESIONLESS SOILS (GRAVEL, SAND, NONPLASTIC SILT)			COHESIVE SOILS (PLASTIC SILT, CLAY)		
DENSITY	N_1 (BLOWS /FOOT)*	RELATIVE DENSITY (%)	CONSISTENCY	N_1 (BLOWS /FOOT)*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	0 - 15	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	15 - 35	SOFT	2 - 4	0.25 - 0.50
COMPACT	10 - 30	35 - 65	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	65 - 85	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	> 85	VERY STIFF	15 - 30	2.0 - 4.0
			HARD	OVER 30	OVER 4.0

*Refer to ASTM D 1586-99 for a definition of N. Values shown are based on N values corrected for overburden pressures (N_1). N values may be affected by a number of factors including material size, depth, drilling method, and borehole disturbance. N values are only an approximate guide for consistency of cohesive soil.

GENERAL NOTES

Report of Borehole logs present material classifications, test data, and observations from subsurface explorations at the subject site as reported by the field geologist, engineer, or scientist. In some cases, the classifications may be made based on laboratory test data when available. It should be noted that the investigation methods only recover a small part of the subsurface materials at the exploration location. Therefore, actual conditions between borings and sampled intervals may differ from those presented on the Report of Borehole logs.

This key and Report of Borehole logs must be read together with the attached report. The information presented on the logs and in this key provide only a basis for an evaluation of the subsurface conditions. Any evaluation of the conditions reported on the Report of Borehole logs must be performed by Professional Engineers or Geologists.

RPT:TUC SOIL LEGEND PROJ:103-92557 COPPER FLAT.GPJ TMPL: LIB:GLDR_TUC_V1.GLB DATE:7/16/13

REPORT OF BOREHOLE: BH-01

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/17/12
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-1 43.5 feet west
XY COORDINATES: N 11,973,679, E 871,432
ELEVATION: 5,298.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						GM	Compact, light gray, SILTY GRAVEL (GM) with sand, dry, some cobbles.				
			SS1		18 17 32	49	18 / 18			Becomes dense, gray.				
5			Bulk											
			SS2		4 40 45	85	18 / 18			Becomes very dense.				
10			Bulk											
			SS3		13 32 50	82	18 / 18							
15			Bag											
	5280.5 17.5		Bulk						ML	Hard, brown, GRAVELLY SILT (ML), dry, some cobbles.				
			SS4		26 50/5"	R	11 / 11							
20			Bulk											
			SS5		45 30/2"	R	8 / 8							
25			Bag											
			SS6 Bag		40 40/3"	R	3 / 6							
30														
	5267.0 31.0		SS7		10 10/0"	R	0 / 0			Refusal at 31'. Backfilled with cuttings. No groundwater encountered in boring.				
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-02

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/18/12
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-2 2 feet east
XY COORDINATES: N 11,973,762, E 870,444
ELEVATION: 5,361.8 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			B/Bag						GC	Compact, light gray, CLAYEY GRAVEL WITH SAND (GC), dry, some cobbles.				
	5358.3 3.5		SS1		17 16 23	39	18 / 18		SM	Dense, light gray, SILTY SAND (SM), little gravel, dry.				
5			B/Bag							Becomes light brown, some gravel, occasional cobbles.				
			SS2		16 29 50	79	6 / 18							
10	5352.3								GW	6" lens of very dense, gray, GRAVEL (GW), dry.				
	5351.8 10.0		Bulk						ML	Hard, brown, SANDY SILT and gravel (ML), dry, occasional cobble.				
			SS3		17 50/6"	R	12 / 12							
15			Bulk											
	5343.3 18.5		SS4		26 47 50/3"	R	15 / 15		SM	Very dense, brown and gray, SILTY SAND (SM), some gravel, dry.				
20			Bulk											
	5340.3 21.5									Refusal at 21.5'. Backfilled with cuttings. No groundwater encountered in boring.				
25														
30														
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-03

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/25/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-3 5 feet south
XY COORDINATES: N 11,977,597, E 868,520
ELEVATION: 5,468.6 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						SW	Very dense, gray, WELL-GRADED SAND WITH GRAVEL (SW), trace fines, dry.				
8.0	5460.6		SS1 Bulk		50/0"	R	0 / 0			Slightly weathered, dark gray, strong rock.	Becomes rock.			
			Core											
15.0	5453.6									Refusal at 8'. Bottom of borehole at 15'. Backfilled with cuttings. No groundwater encountered in boring.				

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-04

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/5/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,977,281, E 870,076
ELEVATION: 5,355.3 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Diamond Coring
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description (consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.)	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						SW-SM	Compact, gray/light gray, SILTY SAND (SM), some gravel, cobbles, dry, cementation.				
	5351.3 / 4.0		SS1		14 23 19	42	18 / 18		ML	Dense, gray, SANDY SILT (SM), dry, some cementation.				
5			Bag											
	5346.3 / 9.0		SS2 Core		25/0"	R	0 / 0			Weathered, dark gray, fragmented ROCK, trace cementation, trace silty sand.	Becomes rock. Switch to Diamond Coring.			
10										Becomes moderate cementation				
15			Core							Become strong cementation. [CONGLOMERATE]				
			Core											
	5337.3 / 18.0									Refusal of Hollow Stem Auger at 9'. Core from 9' to 18'. Bottom of borehole at 18'. Backfilled with cuttings. No groundwater encountered in boring.				
20														
25														
30														
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-05

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/7/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,977,243, E 869,166
ELEVATION: 5,385.6 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Diamond Coring
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						SW-SM	Compact, gray/ light gray, SILTY SAND and gravel (SW-SM), dry, trace cementation, cobbles.				
					12 24 41	65	18 / 18			Becomes very dense.				
5	5379.6 6.0		Bulk											
			Core							Weathered, dark gray, fragmented ROCK, some sandy silt, strongly cemented.	Become rock. Switch to Diamond coring.			
10														
	5372.6 13.0									Refusal of Hollow Stem Auger at 6'. Diamond coring from 6-13'. Bottom of borehole at 13'. Backfilled with cuttings. No groundwater encountered in boring.				

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-06

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/25/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,976,597, E 870,667
ELEVATION: 5,308.1 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer, Diamond Coring
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						SW-SM	Very dense, brown, SILTY SAND and gravel (SW-SM), dry.				
			Bulk							Becomes gray.				
5														
8.0	5300.1 / 8.0		SS1 Bulk		50/0"	R	0 / 0			Slightly weathered, dark gray, strong ROCK.	Becomes rock.			
10														
15														
18			Core								Switch to Diamond Coring.			
20														
25	5283.1 / 25.0									Diamond coring from 18-25'. Bottom of borehole at 25'. Backfilled with cuttings. No groundwater encountered in boring.				
30														
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

Golder Associates

REPORT OF BOREHOLE: BH-07

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/18/12
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,976,181, E 871,532
ELEVATION: 5,372.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Diamond Coring
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0														
	5371.5 0.5		Bag Bag						SM	Loose, brown, SILTY SAND (SM), little gravel, dry.				
									GP	Compact, light gray, SANDY GRAVEL (GP), dry.				
			SS1		14 28 33	61	18 / 18			Lens of brown/white, SILTY SAND, trace gravel, dry. Becomes very dense. Becomes well-graded gravel.				
5	5367.0 5.0		Bag						SW-SM	Very dense, gray, SILTY SAND and gravel (SW-SM), dry.				
			SS2		12 39 50/5"	R	17 / 17							
10			Bag											
			SS3		11 37 50/2"	R	14 / 14							
15	5357.0 15.0		Bag Bag						GW-GM	Very dense, gray, GRAVEL and silty sand (GW-GM), dry, few cobbles.				
			SS4		25 30/2"	R	10 / 10							
20			Bag											
			SS5		23 32/3"	R	9 / 9							
25	5347.5 24.5		Bag						SW-SM	Very dense, brown, SILTY SAND and gravel (SW-SM), dry, few cobbles.				
			SS6		36/5"	R	5 / 5							
30	5342.0 30.0		SS7 Core		50/0"	R	0 / 0			Weathered, dark gray, fractured ROCK, strong cementation.	Becomes Rock. Switch to Diamond Coring.			
			SS8 Core		20 50/0"	R	6 / 6							
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-07

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/18/12
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,976,181, E 871,532
ELEVATION: 5,372.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Diamond Coring
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40										Weathered, dark gray, fractured ROCK, strong cementation. *(continued)*				
45														
	5324.0 48.0									Refusal of Hollow Stem Auger at 30'. Diamond coring from 30-48'. Bottom of borehole at 48'. Backfilled with cuttings. No groundwater encountered in boring.				
50														
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-08

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/19/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,971,703, E 873,489
ELEVATION: 5,218.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						SW-SM	Dense, brown, SILTY SAND (SW-SM), some gravel, slightly cohesive, trace cementation, trace clayey silt, dry.				
			SS1		18 19 23	42	18 / 18							
			Bulk							Becomes very dense.				
			SS2		50 53 30	83	18 / 18							
			Bulk											
	5200.0 18.0		Bulk						ML	Hard/very dense, brown, SANDY SILT and gravel (ML), some clayey silt (low plasticity), dry, trace cementation.				
			SS3 Bulk		50/5"	R	5 / 5							
	5190.0 28.0		Bag						SW-SM	Very dense, gray/brown, SILTY SAND and gravel (SW-SM), some clayey silt, dry.				
	5185.0 33.0		SS4 Bulk		50/5"	R	5 / 5		SW	Very dense, gray, SAND and gravel (SW), dry.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-08

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/19/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,971,703, E 873,489
ELEVATION: 5,218.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									SW	Very dense, gray, SAND and gravel (SW), dry. *(continued)*				
	5175.0 / 43.0								GW	Very dense, gray, GRAVEL and sand (GW), trace clayey silt, dry.				
45														
			SS5		50/0"	R	0 / 0							
50	5168.0 / 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-09

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/21/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-9 2 feet east
XY COORDINATES: N 11,972,261, E 875,052
ELEVATION: 5,176.7 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk				ML	Hard, brown, SANDY SILT (ML), trace gravel, dry.				
			SS1	20 34 40	74	18 / 18						
5			Bulk									
	5170.7 6.0		SS2 Bag(2)	20/0"	R	0 / 1	SW	Dense to very dense, light gray/brown, SAND and gravel (SW), dry.				
			SS3	20 25 24	49	18 / 18						
10			Bag(2)									
	5165.7 11.0		Bag				ML	Hard, light brown, SILT (ML), trace gravel, dry, slightly cohesive, trace cementation.				
			SS4	16 25 27	52	18 / 18		Becomes light reddish brown, little gravel.				
15			Bulk									
			SS5	4 14 24	38	18 / 18						
20	5156.7 20.0		Bulk				MH	Hard, reddish brown, CLAYEY SILT (MH), dry, cohesive.				
			SS6	22 14 19	33	18 / 18						
25			Bulk									
	5150.7 26.0		B/Bag				CL-ML	Hard, red SILTY CLAY (CL-ML), dry, cohesive, moderate plasticity.				
			SS7	16 15 19	34	18 / 18						
30			B/Bag									
			SS8	6 4 13	17	18 / 18						
35	5141.7 35.0		Bulk				CL	Hard, red, CLAY (CL), dry.				
			SS9	14 21 31	52	18 / 18						
40												

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

Golder Associates

REPORT OF BOREHOLE: BH-09

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/21/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-9 2 feet east
XY COORDINATES: N 11,972,261, E 875,052
ELEVATION: 5,176.7 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk						CL	Hard, red, CLAY (CL), dry. *(continued)*				
	5133.2 / 43.5		SS10		13 20 32	52	18 / 18		CL-ML	Hard, red, SILTY CLAY (CL-ML), dry.				
45	5131.7 / 45.0		Bulk						CH	Hard, red, CLAY, dry.				
			SS11		9 15 24	39	18 / 18							
50	5126.7 / 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-10

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/12/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,513, E 874,813
ELEVATION: 5,182.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	USCS	Sample Description (consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.)	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			B/Bag					SC	Compact, light gray, CLAYEY SAND WITH GRAVEL (SC), dry, few cobbles.				
			SS1		17, 6, 5	11	18 / 18	SC					
5			B/Bag					SC					
			SS2		9, 12, 18	30	18 / 18	SC					
10			B/Bag					SC					
			SS3		20, 16, 14	30	18 / 18	SC					
	5167.5 / 14.5							MH	Very stiff, red/light brown, CLAYEY SILT (MH), dry, little gravel.				
15			Bag					MH					
			SS4		8, 15, 20	35	18 / 18	MH					
	5163.0 / 19.0							CL	Very stiff-hard, red, LEAN CLAY (CL), some sand, dry, trace gravel, cohesive, low plasticity.				
20			B/Bag					CL					
			SS5		3, 10, 17	27	18 / 18	CL					
25			B/Bag					CL					
			SS6		10, 19, 41	60	18 / 18	CL					
30			B/Bag					CL					
								CL	Becomes moderate plasticity				
			SS7		8, 11, 17	28	18 / 18	CL					
35			B/Bag					CL	Becomes slightly moist, moderate plasticity.				
			SS8		4, 6, 19	25	18 / 18	CL					
40													

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-10

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/12/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,513, E 874,813
ELEVATION: 5,182.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			B/Bag						CL	Very stiff-hard, red, LEAN CLAY (CL), some sand, dry, trace gravel, cohesive, low plasticity. *(continued)*				
	5138.5 43.5		SS9		4 7 14	21	18 / 18		CH	Very stiff, red, CLAY (CH), slightly moist, high plasticity.				
45														
			SS10		7 10 16	26	18 / 18							
50	5132.0 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-11

Golder Associates

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/3/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,894, E 874,891
ELEVATION: 5,180.5 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag(2)						ML	Stiff-very stiff, brown, SILT (ML), trace sand and gravel, dry.				
	5178.0 / 2.5		Bulk						SW	Dense, white/light gray, GRAVELLY SAND (SW), dry.				
			SS1		9 13 27	40	18 / 18							
5			Bulk											
	5172.0 / 8.5		SS2		12 27 23	50	18 / 18		SW-SM	Very dense, light brown, SILTY SAND and gravel (SW-SM), dry.				
10														
	5167.0 / 13.5		SS3		5 11 16	27	18 / 18		MH	Very stiff, brown, CLAYEY SILT (MH), dry, low plasticity.				
15			Bulk											
	5162.0 / 18.5		SS4		7 12 23	35	18 / 18		CL-ML	Hard, reddish brown, SILTY CLAY (CL-ML), white and black inclusions, dry.				
20			B/Bag							Becomes red, trace gravel, moderate plasticity, slightly moist.				
			SS5		24 16 23	39	18 / 18							
25			B/Bag											
			SS6		7 15 25	40	18 / 18							
30			B/Bag											
	5147.0 / 33.5		SS7		11 13 18	31	18 / 18		CH	Hard, red/light brown, CLAY (CH), slightly moist, moderate plasticity.				
35			Bulk											
			SS8		12 18 30	48	18 / 18							
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-11

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/3/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,894, E 874,891
ELEVATION: 5,180.5 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									CH	Hard, red/light brown, CLAY (CH), slightly moist, moderate plasticity. *(continued)*				
			SS9		11 13 18	31	18 / 18							
45														
			SS10		11 12 21	33	18 / 18							
50	5130.5 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

REPORT OF BOREHOLE: BH-12

Golder Associates

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/4/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,981, E 875,148
ELEVATION: 5,179.5 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag(2)					ML	Stiff, brown, SANDY SILT (ML) and gravel, dry.				
	5175.5 / 4.0		SS1		5, 12, 15	27	18 / 18	GW	Compact, light gray, GRAVEL AND SAND (GW), dry.				
5	5174.5 / 5.0		Bulk					GW-GM	Compact, gray/light brown, GRAVEL and silty sand (GW-GM), dry, few cobbles.				
			SS2		39, 43, 50	93	17 / 17		Becomes very dense, trace cobbles.				
10			Bulk										
			SS3		13, 33, 50	83	16 / 16						
15	5164.5 / 15.0		Bulk Bag					ML	Hard, brown, SANDY SILT and gravel (ML), dry.				
			SS4		7, 18, 24	42	18 / 18						
20	5160.0 / 19.5		B/Bag					CL-ML	Hard, red, SILTY CLAY (CL-ML), trace gravel, dry, low plasticity.				
			SS5		7, 10, 20	30	18 / 18						
25			B/Bag										
			SS6		12, 15, 26	41	18 / 18						
30			B/Bag										
	5146.0 / 33.5		SS7		12, 14, 24	38	18 / 18	CH	Hard, red, CLAY (CH), slightly moist, trace gravel, high plasticity.				
35			Bulk										
			SS8		12, 16, 26	42	18 / 18						
40													

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-12

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/4/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,981, E 875,148
ELEVATION: 5,179.5 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk						CH	Hard, red, CLAY (CH), slightly moist, trace gravel, high plasticity. *(continued)*				
			SS9		10 11 18	29	18 / 18			Becomes very stiff-hard.				
45			Bulk											
			SS10		10 12 20	32	18 / 18							
50	5129.5 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-13

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/17/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,776, E 875,471
ELEVATION: 5,169.8 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						ML	Very stiff, light gray, SANDY SILT and gravel (ML), dry, slightly cohesive.				
			SS1		12 11 13	24	18 / 18							
5			Bulk											
			SS2		28 28 33	61	18 / 18			Becomes hard, light brown, trace cementation.				
10			Bag											
			SS3		13 29 35	64	18 / 18							
15			Bag											
			SS4		21 30 31	61	18 / 18							
20			Bulk											
	5146.3 23.5		SS5		28 50/3"	R			GW-GM	Very dense, brown, GRAVEL and sandy silt (GW-GM), dry, slightly cohesive fines.				
25			Bulk											
			SS6		21 50/4"	R				Lens of reddish brown clayey silt encountered at 34'.				
30			Bulk											
			SS7		27 49 50/2"	R								
35			Bulk											
	5131.3 38.5		SS8		13 24 33	57	18 / 18		CL-ML	Hard, reddish brown, SILTY CLAY (CL-ML), slightly moist, cohesive, trace gravel.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-13

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/17/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,776, E 875,471
ELEVATION: 5,169.8 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bag						CL-ML	Hard, reddish brown, SILTY CLAY (CL-ML), slightly moist, cohesive, trace gravel. *(continued)*				
			SS9		9 14 14	28	18 / 18			Becomes very stiff, red, dry.				
45			Bulk											
			SS10		25 32 28	60	18 / 18							
50	5119.3 50.5									Bottom of borehole at 50.5'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-14

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/22/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,766, E 875,868
ELEVATION: 5,158.2 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk							Very stiff, brown, SILT (ML), some gravel, dry.				
			SS1		23 44 30	74	18 / 18		ML	Becomes hard, brown, some gravel, cementation at 4-5 ft.				
5			Bulk											
	5149.7 8.5		SS2		15 19 23	42	18 / 18			Dense, light brown/gray, GRAVEL and sandy silt (GW-GM), dry, slightly cohesive fines, few cobbles.				
10			Bulk											
			SS3		22 20 25	45	18 / 18							
15			Bulk						GW-GM					
			SS4		17 50/3"	R	9 / 9		GW	Becomes very dense, light brown/gray, GRAVEL and silty sand.				
			Bag(2)											
20														
	5134.7 23.5		SS5		18 35 50/4"	R	16 / 16			Hard, light gray, SANDY SILT and gravel (ML), dry.				
25			Bulk						ML					
	5129.7 28.5		SS6		25 50/6"	R	12 / 18			Very dense, brown/gray, SILTY SAND and gravel (SW-SM), dry.				
30			Bulk											
			SS7		33 32 50/5"	R	17 / 17		SW-SM					
35			Bulk											
			SS8		16 50/5"	R	11 / 11							
40			Bulk											

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-14

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/22/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,972,766, E 875,868
ELEVATION: 5,158.2 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									SW-SM	Very dense, brown/gray, SILTY SAND and gravel (SW-SM), dry. *(continued)*				
			SS9 Bulk		50/1"	R	1 / 1							
45														
			SS10		31 29 44	73	18 / 18							
50	5108.2 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-15

Golder Associates

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/4/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,973,609, E 875,724
ELEVATION: 5,176.4 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						ML	Hard, light gray/light brown, SILT (ML), little gravel, dry.				
			SS1		9 15 26	41								
5			Bulk											
	5168.4 8.0		SS2		38 50/6"	R	12 / 12		GW	Very dense, brown, SANDY GRAVEL (GW), dry.				
10	5166.4 10.0		Bag						SW	Very dense, gray, SAND and gravel (SW), dry.				
	5164.4 12.0		SS3		17 23 50	73			GW	Very dense, gray, SANDY GRAVEL (GW), dry.				
			Bulk											
15			SS4		30 50/3"	R	6 / 9							
	5158.9 17.5		Bulk						SW	Very dense, light gray, SAND and gravel (SW), dry.				
20	5154.9 21.5		SS5		28 50/4"	R	10 / 10		ML	Hard, light gray, SANDY SILT and gravel (ML), dry.				
			Bag(2)											
25			SS6		22 50/6"	R	11 / 12							
	5148.9 27.5		Bag(2)						SW	Very dense, gray, SAND and gravel (SW), dry.				
30	5144.9 31.5		SS7 Bag(2)		20/0"	R			SW-SM	Very dense, light gray, SILTY SAND (SW-SM), some gravel, dry.				
35	5139.9 36.5		Bag(2)						SW	Very dense, light gray, SAND and gravel (SW), dry.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-15

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/4/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,973,609, E 875,724
ELEVATION: 5,176.4 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									SW	Very dense, light gray, SAND and gravel (SW), dry. *(continued)*				
	5134.9 / 41.5		SS8 Bag(2)		50/2"	R			ML	Very dense, gray/brown, SANDY SILT (ML), and gravel, dry, slightly cohesive.				
50	5126.4 / 50.0								MH	Hard, reddish brown, CLAYEY SILT (MH), some gravel, slightly moist, slightly cohesive.				
			SS9		24 54 38/3"	R								
55	5122.1 / 54.3									Bottom of borehole at 54.25'. Backfilled with cuttings. No groundwater encountered in boring.				
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-16

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/22/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-16 4 feet north
XY COORDINATES: N 11,973,973, E 875,187
ELEVATION: 5,191.7 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						GC	Very dense, brown, CLAYEY GRAVEL with sand (GC), dry.				
			SS1		9 32 30	62	18 / 18							
5			Bulk											
	5183.2 8.5		SS2		26 18 19	37	18 / 18		GP-GM	Very dense, gray, GRAVEL and sandy silt (GP-GM), dry.				
10			Bulk											
	5178.2 13.5		SS3 B/Bulk		50/3"	R	3 / 3		GW	Very dense, light brown, GRAVEL and silty sand (GW), dry, trace CaCO3.				
15														
			SS4 B/Bulk		26 50/4"	R	10 / 10							
20														
			SS5 B/Bulk		48 50/3"	R	9 / 9							
25														
	5162.7 29.0		SS6 Bulk		21 50/3"	R	9 / 9		SC	Very dense, gray, CLAYEY SAND with gravel, trace CaCO3, dry, some cementation.				
30														
	5157.7 34.0		SS7 Bulk		13 8 12	20	18 / 18		MH	Very stiff, light reddish brown, CLAYEY SILT (MH), dry.				
35														
	5153.2 38.5		SS8		14 9 11	20	18 / 18		CL-ML	Very stiff, reddish brown, SILTY CLAY (CL-ML), slightly moist.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-16

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/22/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-16 4 feet north
XY COORDINATES: N 11,973,973, E 875,187
ELEVATION: 5,191.7 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk						CL-ML	Very stiff, reddish brown, SILTY CLAY (CL-ML), slightly moist. *(continued)*				
			SS9		17 11 13	24	18 / 18							
45			Bulk											
			SS10		4 2 4	6	18 / 18			Becomes firm, caliche and little gravel.				
50	5141.7 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-17

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/5/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,131, E 875,734
ELEVATION: 5,186.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

LAYER ELEVATION / DEPTH (feet)	WATER	SAMPLE NUMBER	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	USCS	Sample Description (consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.)	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
		Bulk				ML	Very stiff, gray/light brown, SANDY SILT and gravel (ML), dry.				
		SS1	10 13 12	25	18 / 18	ML					
		Bulk				ML					
5177.5 / 8.5		SS2	4 45 50/4"	R	12 / 16	GW	Very dense, gray, SANDY GRAVEL (GW), dry. Becomes brown/gray.				
		Bulk				GW					
		SS3	7 28 39	67	18 / 18	GW					
		Bulk				GW					
5163.0 / 23.0						SW	Very dense, light brown, SAND and gravel (SW), dry.				
						SW	Becomes light gray/ light brown.				
5158.0 / 28.0		SS4	24 50 50/4"	R	16 / 16	SW-SM	Very dense, brown, SILTY SAND and gravel (SW-SM), dry, slightly cohesive fines.				
5154.0 / 32.0		Bulk					Very dense, white/gray CALICHE, dry.				
		SS5 Bulk	25/0"	R	0 / 0						

Depth scale: 0 – 40 feet

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-17

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/5/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,131, E 875,734
ELEVATION: 5,186.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40										Very dense, white/gray CALICHE, dry. *(continued)*				
										very dense, white/gray CALICHE, dry, little gravel, seam of light brown silt at 44-45'				
45														
50	5136.0 50.0		SS6		25/0"	R	0 / 0			Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-18

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/23/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-18 2 feet east
XY COORDINATES: N 11,974,701, E 874,701
ELEVATION: 5,207.3 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						ML	Stiff, light brown, SANDY SILT (ML), some gravel, dry.				
	5205.3 2.0		Bulk						GC	Dense, light brown, CLAYEY GRAVEL with sand (GC), dry.	Switch to Air Rotary drilling at 6'.			
			SS1		9 23 20	43	18 / 18							
5			Bulk											
	5199.3 8.0		Bulk						GW	Very dense, light brown/gray, GRAVEL and sand (GW), dry, little CaCO3.				
10														
			SS2 Bulk		50/4"	R								
15														
	5189.3 18.0		Bag(2)						ML	Hard, light reddish white, SANDY SILT (ML), some gravel, dry, some CaCO3.				
20														
	5184.3 23.0		SS3		24 31 31	62	18 / 18		CL	Hard, light reddish brown, sandy LEAN CLAY (CL), trace gravel, dry.				
25			Bulk											
			SS4		13 8 12	20	18 / 18							
30			Bulk											
	5173.8 33.5		SS5 Bulk		38 50/3"	R	9 / 9		CL-ML	Hard, reddish brown, CLAY (CL-ML), some silty clay, little gravel, moderate plasticity, dry.				
35														
	5168.8 38.5		SS6		11 21 24	45	18 / 18		CL	Hard, reddish brown, CLAY (CL), moderate plasticity, slightly moist.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-18

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/23/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-18 2 feet east
XY COORDINATES: N 11,974,701, E 874,701
ELEVATION: 5,207.3 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk						CL	Hard, reddish brown, CLAY (CL), moderate plasticity, slightly moist. *(continued)*				
	5163.8 43.5		SS7		5 6 9	15	18 / 18		CH	Stiff-hard, reddish brown, CLAY (CH), high plasticity, slightly moist, blocky.				
45			Bag											
			SS8		10 19 28	47	18 / 18							
50	5157.3 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-19

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/10/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,564, E 875,328
ELEVATION: 5,196.4 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0									ML	Soft, brown, SANDY SILT (ML), little gravel, dry.				
	5193.4 / 3.0		SS1		11 21 22	43	18 / 18		SW-SM	Dense, light brown, SILTY SAND and gravel (SW-SM), dry.				
5			Bulk											
			SS2		19 38 50/5"	R	17 / 17							
	5187.4 / 9.0		Bulk						GW	Very dense, brown/gray, SANDY GRAVEL (GW), dry.				
10														
15			Bag							Becomes dark gray.				
			Bag(2)							Becomes brown/gray.				
			SS3		27 40 23	63	18 / 18							
20														
	5174.4 / 22.0		B/Bag							Very dense, light gray/white, CALICHE, little gravel, dry.				
25														
			SS4 B/Bag		50/0"	R	0 / 0							
30														
35														
			SS5 Bulk		25/0"	R	0 / 0			Seam of brown sandy silt at 41' - 42', dry.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-19

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/10/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,564, E 875,328
ELEVATION: 5,196.4 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40										Very dense, light gray/white, CALICHE, little gravel, dry. *(continued)*				
	5153.4 43.0		Bulk							Very stiff, red, SILTY CLAY (CL-ML), slightly moist, cohesive				
45									CL-ML					
			Bag											
50	5146.4 50.0		SS6		5 13 14	27	18 / 18			Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-20

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/20/13
CHECKED: DP DATE: 2/21/13

LOCATION: BH-20 on top of waste rock pile, moved BH-20 25 feet east
XY COORDINATES: N 11,975,241, E 871,714
ELEVATION: 5,292.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag(2)						SM	Compact, brown, SILTY SAND (SM), little gravel, dry.				
5			Bag							Becomes compact to dense, light gray, slightly cohesive, trace clayey silt.				
8.0	5284.0		SS1		16 29 31	60	18 / 18		GW	Very dense, gray, GRAVEL (GW), some silty sand, dry, trace clayey silt lenses.				
10			Bulk											
18.0	5274.0		SS2 Bulk		50/3"	R	3 / 3		SW-SM	Very dense, light brown/gray, SILTY SAND and gravel, (SW-SM) dry, slightly cohesive, some light reddish brown clayey silt.				
28			SS3 Bulk		50/3"	R	3 / 3							
33			Bulk											
38			SS4 Bulk		15 50/3"	R	9 / 9							
40	5252.0													

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-20

Golder Associates

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/20/13
CHECKED: DP DATE: 2/21/13

LOCATION: BH-20 on top of waste rock pile, moved BH-20 25 feet east
XY COORDINATES: N 11,975,241, E 871,714
ELEVATION: 5,292.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40	40.0		Bulk						SM	Very dense, light brown, SILTY SAND (SM), some gravel, slightly moist, slightly cohesive.				
45														
			SS5		21 36 50/2"	R	14 / 14							
50	5242.0 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-21

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/24/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,975,236, E 874,685
ELEVATION: 5,214.2 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						SW-SM	Very dense, brown/gray, WELL-GRADED SAND with silt and gravel (SW-SM), dry.				
			SS1		21 36 47	83	18 / 18							
10			Bulk											
18.0	5196.2		SS2		25 30 38	68	18 / 18		SW-SM	Very dense, light brown/reddish white, SILTY SAND and gravel (SW-SM), trace clayey silt, cementation, dry.				
			SS3		50/0"	R	0 / 0							
30.0	5184.2		Bag(2)						MH	Hard, light reddish brown, CLAYEY SILT and silty clay (MH), trace gravel, dry.				
35			SS4		15 26 39	65	18 / 18							
36.5	5177.7									Bottom of borehole at 36.5'. Backfilled with cuttings. No groundwater encountered in boring.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-22

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/21/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,757, E 873,750
ELEVATION: 5,232.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag Bulk						CL-ML	Loose, dark brown, SANDY SILTY CLAY (CL-ML), some gravel, dry. Becomes very stiff, yellowish/orange, trace gravel, dry (old tailings).				
			SS1		16 8 8	16	18 / 18							
5			Bulk							Becomes orange/brown, slightly moist, cohesive, (old tailings).				
			SS2		5 4 6	10	18 / 18			Becomes stiff, greenish-gray, moist, cohesive, (old tailings).				
10			Bulk											
			SS3		9 10 50/3"	R	15 / 15							
15	5217.5 14.5		Bag						GW	Very dense, light gray-gray, GRAVEL and sand (GW), dry, CaCO3 inclusions.				
20	5210.0 22.0		Bag(2)						ML	Hard, light gray/yellowish, SILT (ML), some gravel, slightly moist, slightly cohesive.				
			SS4		23 50/3"	R	9 / 9							
25			Bag(2)											
			Bag							Becomes brown, SANDY SILT, some clayey silt, trace gravel, moist, cohesive fines.		10.4		
30	5202.0 30.0		Bulk						CL-ML	Very stiff, reddish brown, SILTY CLAY (CL-ML), moist, cohesive.				
			SS5		7 11 13	24	18 / 18							
35	5197.0 35.0		Bulk Bulk						CL	Hard, reddish brown, CLAY (CL), dry, moderate plasticity.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-22

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/21/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,974,757, E 873,750
ELEVATION: 5,232.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									CL	Hard, reddish brown, CLAY (CL), dry, moderate plasticity. *(continued)*				
	5188.5 43.5		SS6		20 45 50/3"	R	15 / 15		SM	Hard, gray/brown, SILTY SAND (SM), slightly moist.				
45			Bulk											
	5186.0 46.0								CL-ML	Hard, brown, SILTY CLAY (SM), slightly moist, little gravel.				
			SS7		10 17 50/5"	R	17 / 17							
50	5182.0 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

![Golder Associates]

REPORT OF BOREHOLE: BH-23

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/20/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-23 20 feet southwest
XY COORDINATES: N 11,974,757, E 873,750
ELEVATION: 5,230.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						SP	Loose, brown, SAND and gravel (SP), dry.				
	5228.0 / 2.0		SS						ML	Very stiff, yellowish, SILT (ML), trace gravel, dry (old tailings).				
			Bulk							Becomes slightly cohesive.				
5														
	5221.0		SS1		13 38 36	74	18 / 18							
	5220.6 / 5220.5 / 9.5								GM	Very dense, gray/brown, GRAVEL and silt (GM), dry, slight cementation.				
10			Bag						ML	Hard, white, SANDY SILT (ML), little gravel, dry.				
			SS2		13 16 14	30	18 / 30							
	5216.0 / 14.0		Bulk						SM	Dense, gray, SILTY SAND and gravel (SM), dry, CaCO3 inclusions, slight cementation.				
15														
20														
			SS3		16 18 50/2"	R	14 / 14							
			Bag(2)							Becomes very dense.				
25														
			Bulk							Becomes slightly moist.				
30														
35														
			SS4 Bulk		50/6"	R	6 / 4			Becomes brown, some blocky and cohesive clayey silt (low plasticity), slightly moist.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-23

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/20/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-23 20 feet southwest
XY COORDINATES: N 11,974,757, E 873,750
ELEVATION: 5,230.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									SM	Dense, gray, SILTY SAND and gravel (SM), dry, CaCO3 inclusions, slight cementation. *(continued)*				
45		▽												
	5182.0 48.0		SS5		50/4"	R	4 / 5		ML	Very dense, brown, SANDY SILT (ML), wet, little gravel.				
50	5180.5 49.5									Bottom of borehole at 49.5'. Backfilled with cuttings and bentonite. Groundwater encountered in boring at 45'.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

Golder Associates

REPORT OF BOREHOLE: BH-24

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/19/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,975,910, E 872,908
ELEVATION: 5,267.1 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag(2)						SP	Dense, gray/brown, SAND and gravel (SP), dry, trace CaCO3.				
	5264.6 2.5		Bulk						SW-SM	Very dense, gray, WELL-GRADED SAND with silt and gravel (SW-SM), dry.				
5														
			SS1 Bulk		50/4"	R	4 / 4							
10														
15														
			SS2 Bulk		50/3"	R	3 / 3							
20														
25														
	5239.1 28.0		SS3 Bulk		41 50/3"	R	9 / 9		ML	Hard/very dense, brown, SANDY SILT and gravel (ML), trace clayey silt, dry.				
30														
	5234.1 33.0		Bulk						SM	Very dense, gray/brown, SILTY SAND (SM), some gravel, trace clayey silt, dry.				
35														
			SS4		44 50/3"	R	9 / 9							
40	5227.1													

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-24

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/19/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,975,910, E 872,908
ELEVATION: 5,267.1 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40	40.0		Bulk						ML	Hard, light reddish brown, SANDY SILT (ML), some gravel, trace clayey silt, dry, slightly cohesive.				
45														
			SS5		50/1"	R	1 / 1							
50	5217.1 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-25

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/18/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,971,726, E 874,570
ELEVATION: 5,212.2 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	**Sample Description** consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						GC	Dense to very dense, gray/brown, CLAYEY GRAVEL with sand (GC), well graded, dry.				
			SS1		22 28 29	57	18 / 18							
5			Bulk											
			SS2		39 26 16	42	18 / 18							
10			Bulk											
	5199.7 12.5		Bulk						ML	Hard, brown, SANDY SILT and gravel (ML), dry, slightly cohesive fines, trace CaCO3.				
			SS3		18 21 20	41	18 / 18							
15			Bulk											
			SS4		15 15 33	48	18 / 18							
20			Bulk											
	5190.2 22.0		Bulk						SC	Very dense, light reddish brown, CLAYEY SAND (SC), dry, trace gravel, trace CaCO3.				
			SS5		10 27 31	58	18 / 18							
25			Bulk											
			SS6		5 22 35	57	18 / 18							
30			Bulk											
			SS7		6 9 16	25	18 / 18							
35	5177.2 35.0		Bulk						CL-ML	Very stiff, red, SILTY CLAY (CL-ML), dry, cohesive.				
			SS8		8 8	25	18 / 18							
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-25

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/18/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,971,726, E 874,570
ELEVATION: 5,212.2 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk		17				CL-ML	Very stiff, red, SILTY CLAY (CL-ML), dry, cohesive. *(continued)*				
			SS9		11 10 25	35	18 / 18							
45	5167.2 45.0		Bulk						CH	Hard, red, CLAY (CH), dry, sand seam at 44' to 44.5'.				
			SS10		10 18 26	44	18 / 18							
50	5161.7 50.5									Bottom of borehole at 50.5'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-26

Golder Associates

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/18/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-26 2 feet south
XY COORDINATES: N 11,971,618, E 872,048
ELEVATION: 5,312.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag(2)						GW	Dense, brown, GRAVEL (GW), some sand, dry.				
2.0	5310.0 / 2.0		Bulk						SW	Very dense, gray/brown, SAND and gravel (SW), dry, sheen.				
8.0	5304.0 / 8.0		SS1 Bulk		27 50/3"	R	9 / 9		GW	Very dense, dark gray, GRAVEL (GW), some sand, dry.				
15.0	5297.0 / 15.0		Bag(2)						SW	Very dense, brown/dark gray, SAND and gravel (SW), dry.				
18			SS2 Bulk		50/4"	R	4 / 4			Becomes gray/light brown, trace CaCO3.				
28			SS3 SS		25 50/2"	R	8 / 8							
33.0	5279.0 / 33.0		Bag(2)						SW-SM	Very dense, gray/light brown, SILTY SAND (SW-SM), some gravel, dry, slightly cohesive, trace clayey silt.				
38			SS4 Bulk		21 50/5"	R	11 / 4							
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-26

Golder Associates

SHEET: 2 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/18/13
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-26 2 feet south
XY COORDINATES: N 11,971,618, E 872,048
ELEVATION: 5,312.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40									SW-SM	Very dense, gray/light brown, SILTY SAND (SW-SM), some gravel, dry, slightly cohesive, trace clayey silt. *(continued)*				
45														
			SS5		50/2"	R	2 / 5							
50	5262.0 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

REPORT OF BOREHOLE: BH-27

Golder Associates

SHEET: 1 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/23/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,973,983, E 874,918
ELEVATION: 5,198.1 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bulk						SM	Dense, brown, SILTY SAND and gravel (50%) (SM), dry, trace CaCO3, some cementation.				
			SS1		17 16 15	31	18 / 18							
10			Bulk											
	5186.1 / 12.0		Bulk						ML	Hard, light brown/white-gray, SANDY SILT (ML), some gravel, dry, some CaCO3, cementation.				
15														
			SS2		30 58/6"	R	12 / 12							
20			Bulk											
	5175.1 / 23.0								SW	Very dense, brown, SAND and gravel (SW), dry.				
25														
	5172.1 / 26.0		SS3		20 24 33	57	18 / 18		CH	Hard, reddish brown, CLAY (CH), dry.				
	5170.6 / 27.5		Bulk						MH	Very stiff, light reddish brown, CLAYEY SILT (MH), some clay, dry, trace gravel.				
30														
			SS4		10 7 13	20	18 / 18							
35			Bulk											
	5159.6 / 38.5		SS5		12 24 30	54	18 / 18		CL-ML	Very stiff-hard, reddish brown, SILTY CLAY (CL-ML), dry, low plasticity, trace CaCO3 inclusions.				
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

REPORT OF BOREHOLE: BH-27

SHEET: 2 OF 2

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 1/23/13
CHECKED: DP DATE: 2/21/13

LOCATION:
XY COORDINATES: N 11,973,983, E 874,918
ELEVATION: 5,198.1 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: HSA, Air Hammer
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
40			Bulk						CL-ML	Very stiff-hard, reddish brown, SILTY CLAY (CL-ML), dry, low plasticity, trace CaCO3 inclusions. *(continued)*				
			SS6		10 12 17	29	18 / 18							
45			Bulk											
			SS7		14 20 27	47	18 / 18							
50	5148.1 50.0									Bottom of borehole at 50'. Backfilled with cuttings. No groundwater encountered in boring.				
55														
60														
65														
70														
75														
80														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

REPORT OF BOREHOLE: BH-28

Golder Associates

SHEET: 1 OF 1

PROJECT: Geotech Investigation, Tailings Storage Facility
PROJECT NO.: 103-92557
CLIENT: New Mexico Copper Corp.
LOGGED: CMT DATE: 12/18/12
CHECKED: DP DATE: 2/21/13

LOCATION: Moved BH-28 2 feet east
XY COORDINATES: N 11,975,241, E 870,785
ELEVATION: 5,388.0 ft.

DRILLING CONTRACTOR: Yellow Jacket
DRILL RIG: CME-1250
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: Auto Hammer
HOLE DIAMETER: 8.25

DEPTH feet	LAYER ELEVATION	WATER	SAMPLE NUMBER	SAMPLE TYPE	BLOWS PER SIX INCHES	BLOWS PER FOOT (N)	RECOVERY / ATTEMP (IN.)	GRAPHIC LOG	USCS	Sample Description consistency or density, color, grain size, MAJOR COMPONENT, minor components, moisture.	Comments	MOISTURE (%)	DRY DENSITY (pcf)	ADDITIONAL LAB TESTING
0			Bag						GW	Dense, light gray, SANDY GRAVEL (GW), dry, few cobbles.				
			SS1		9 13 18	31								
5	5383.0 5.0		Bulk and Bag						GP	Dense, light gray, SANDY GRAVEL (GP), dry.				
			SS2		22 32 50	82				Becomes very dense, white inclusions, sheen, dry.				
10	5378.0 10.0		Bag						GW	Very dense, light gray, SANDY GRAVEL (GW), dry, few cobbles.				
	5377.0 11.0		Bulk and Bag						SM	Very dense, light brown and gray, gravelly SILTY SAND (SM), dry.				
	5374.5 13.5		SS3		30 30/3"	R			SW	Very dense, light brown and gray, gravelly SAND (SW), sheen, dry.				
15			Bulk and Bag											
	5369.0 19.0		SS4		50/4"	R			GW	Seam of very dense, light gray, SANDY GRAVEL (GW), dry.				
20			Bulk and Bag							Becomes light brown.				
			Bag											
	5367.0 21.0								SW	Very dense, light brown and gray, gravelly SAND, (SW) sheen, dry.				
	5366.0 22.0		SS5		50/0"	R				Refusal at 22'. Backfilled with cuttings. No groundwater encountered in boring.				
25														
30														
35														
40														

Report of borehole must be read in conjunction with accompanying notes and abbreviations

RPT:TUC GEOTECH SOIL PROJ:103-92557 COPPER FLAT - COPY.GPJ TMPL:GLDR_TUC2.GDT LIB:GLDR_TUC_V1.GLB DATE:12/16/13

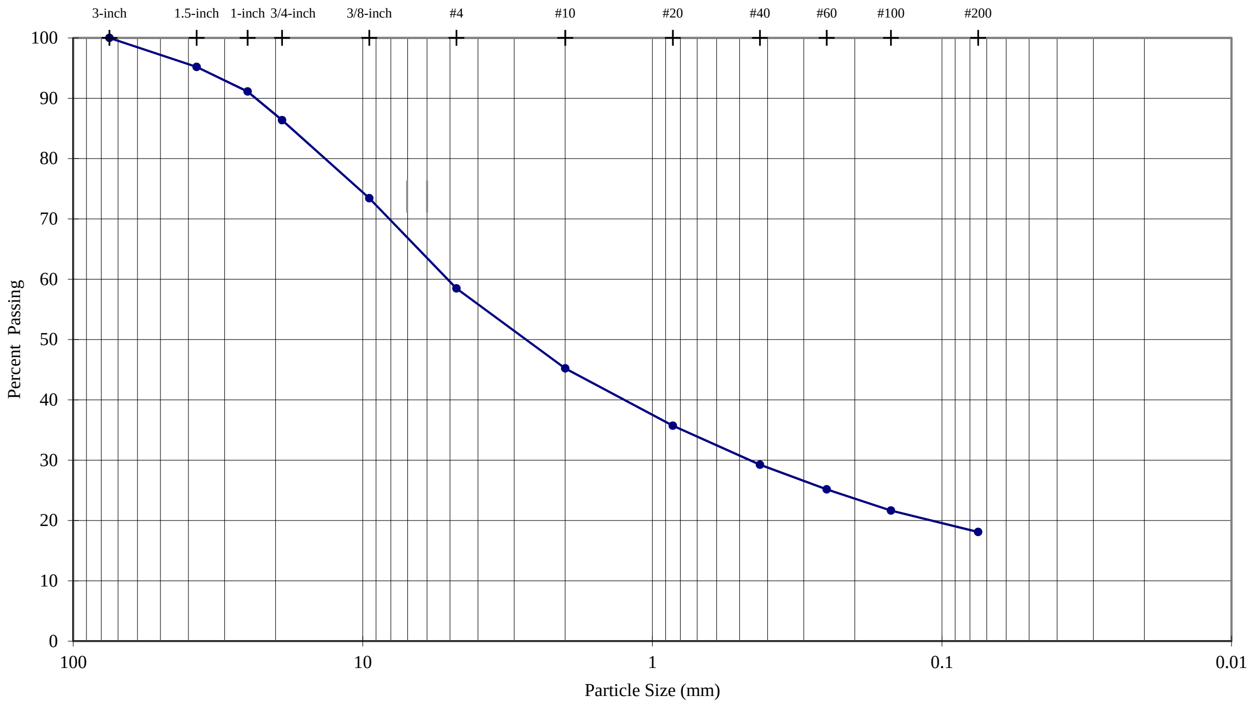
APPENDIX A.3
GEOTECHNICAL TEST RESULTS

APPENDIX A.3.1
GRADATION MOISTURE/DENSITY TEST REPORTS

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

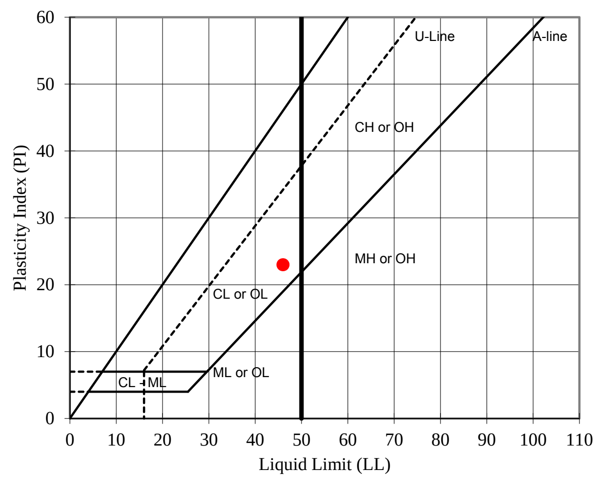
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-2** DEPTH (ft): **0-3.5**
TYPE: **Pail/Bag**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**95.2**
1-inch	25.0	**91.1**
3/4-inch	19.0	**86.4**
3/8-inch	9.5	**73.4**
#4	4.8	**58.5**
#10	2.00	**45.2**
#20	0.85	**35.7**
#40	0.43	**29.2**
#60	0.25	**25.2**
#100	0.15	**21.7**
#200	0.075	**18.1**

Description	Percentage
Coarse Gravel	**13.63**
Fine Gravel	**27.89**
Coarse Sand	**13.26**
Medium Sand	**15.98**
Fine Sand	**11.15**
Silt or Clay Fines	**18.10**



USCS Description (ASTM D 2487):

Clayey gravel with sand, olive brown, dry

LL	PL	PI
46	**23**	**23**

As-Received Moisture Content (%): --

USCS Group Symbol: GC

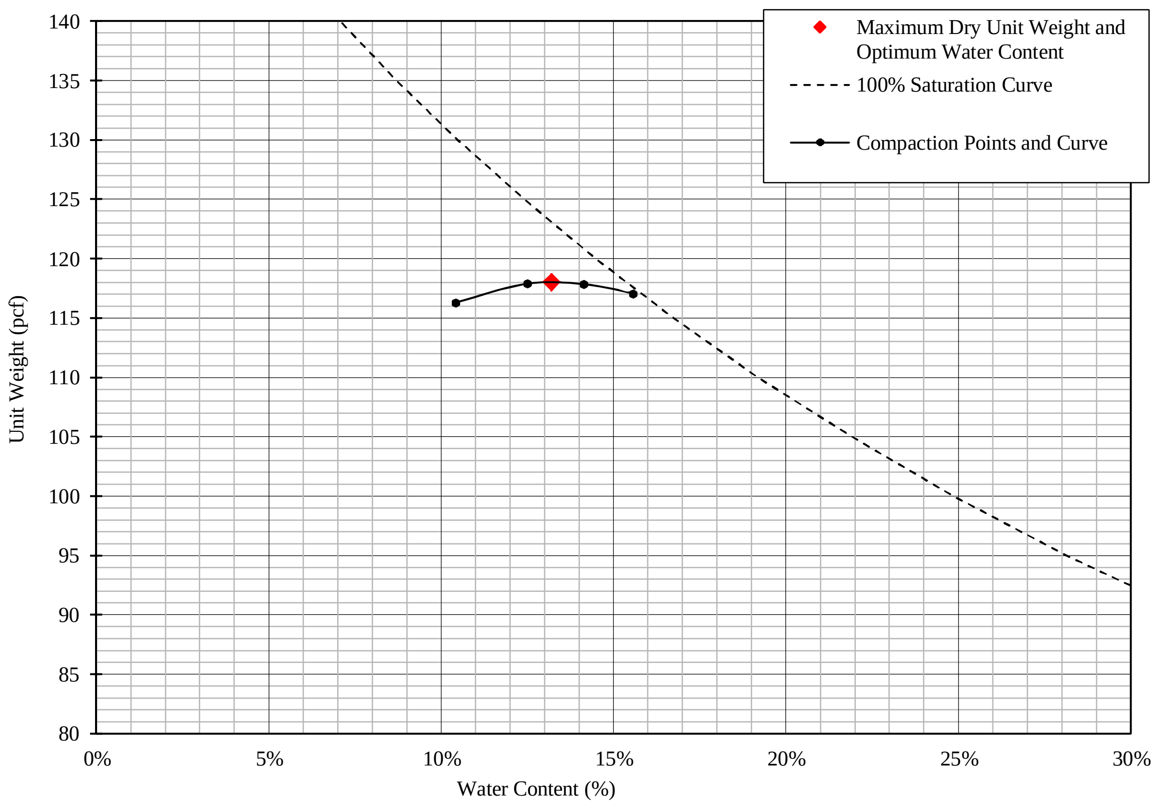
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	MGC
DATE	2/22/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method C

Manual Rammer	Dry Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-2** DEPTH (ft): **0-3.5**
TYPE: **Pail/Bag**



% Test Fraction Passing 3/4-inch Sieve	**87%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.67**

Maximum Dry Unit Weight (pcf)	**118.0**
Optimum Water Content (%)	**13.2**
Corrected Maximum Dry Unit Weight (pcf)	**122.4**
Corrected Optimum Water Content (%)	**11.5**

USCS Description (ASTM D 2487): Clayey gravel with sand, olive brown, dry

USCS GC

TECH	MGC
DATE	2-26-13
REVIEW	MB

February-13 103-92557

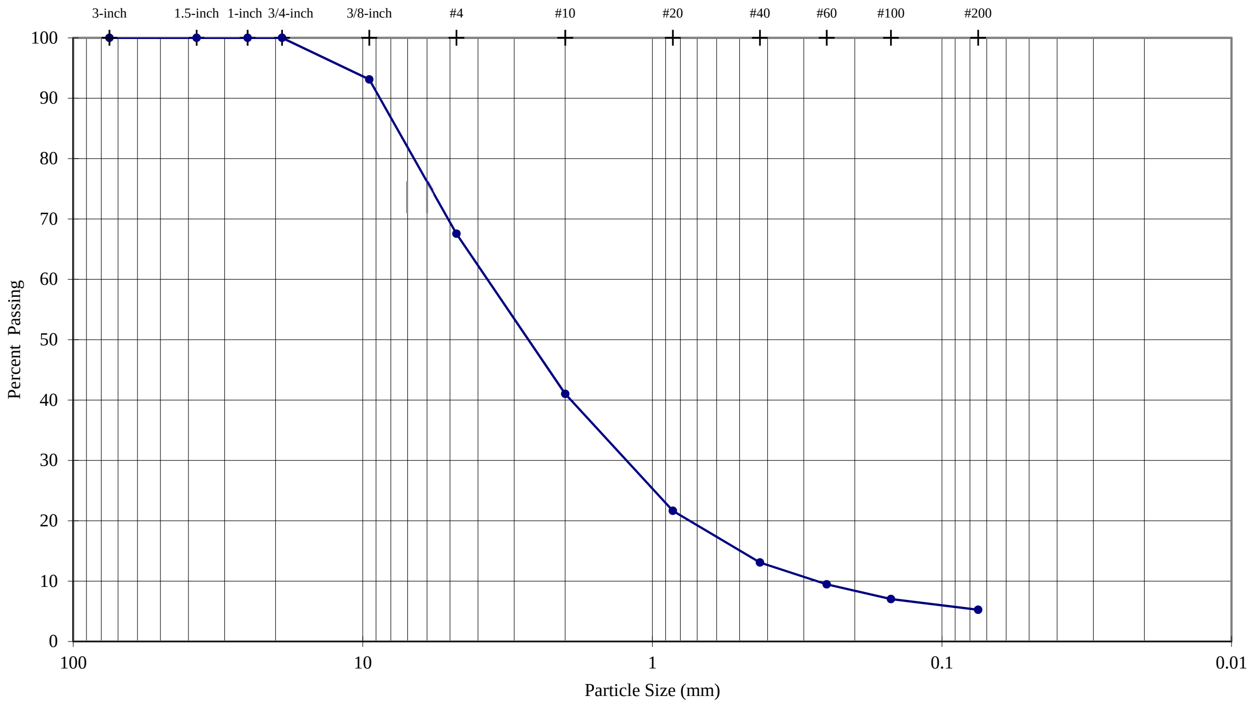
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **BH-3** DEPTH (ft): **0-8**

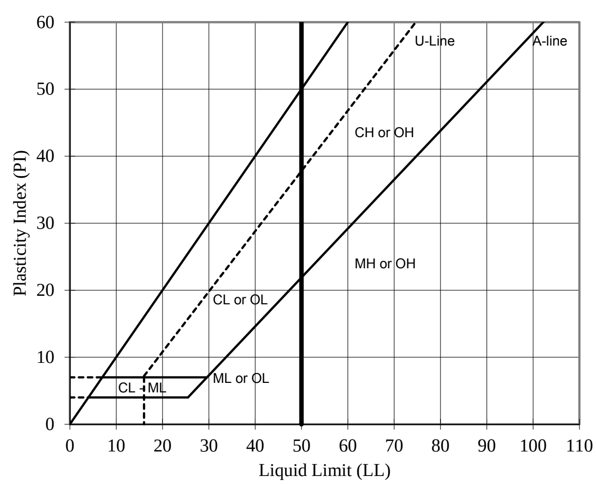
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**100.0**
3/8-inch	9.5	**93.1**
#4	4.8	**67.6**
#10	2.00	**41.0**
#20	0.85	**21.6**
#40	0.43	**13.1**
#60	0.25	**9.5**
#100	0.15	**7.0**
#200	0.075	**5.3**

Description	Percentage
Coarse Gravel	**0.00**
Fine Gravel	**32.44**
Coarse Sand	**26.53**
Medium Sand	**27.93**
Fine Sand	**7.83**
Silt or Clay Fines	**5.26**



Visual Description (Golder Procedure):

Gravelly SAND, some fines, greenish gray, dry

LL	PL	PI
--	--	--

As-Received Moisture Content (%): --

USCS Group Symbol: --

Notes: 0g of particles up to 19.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed

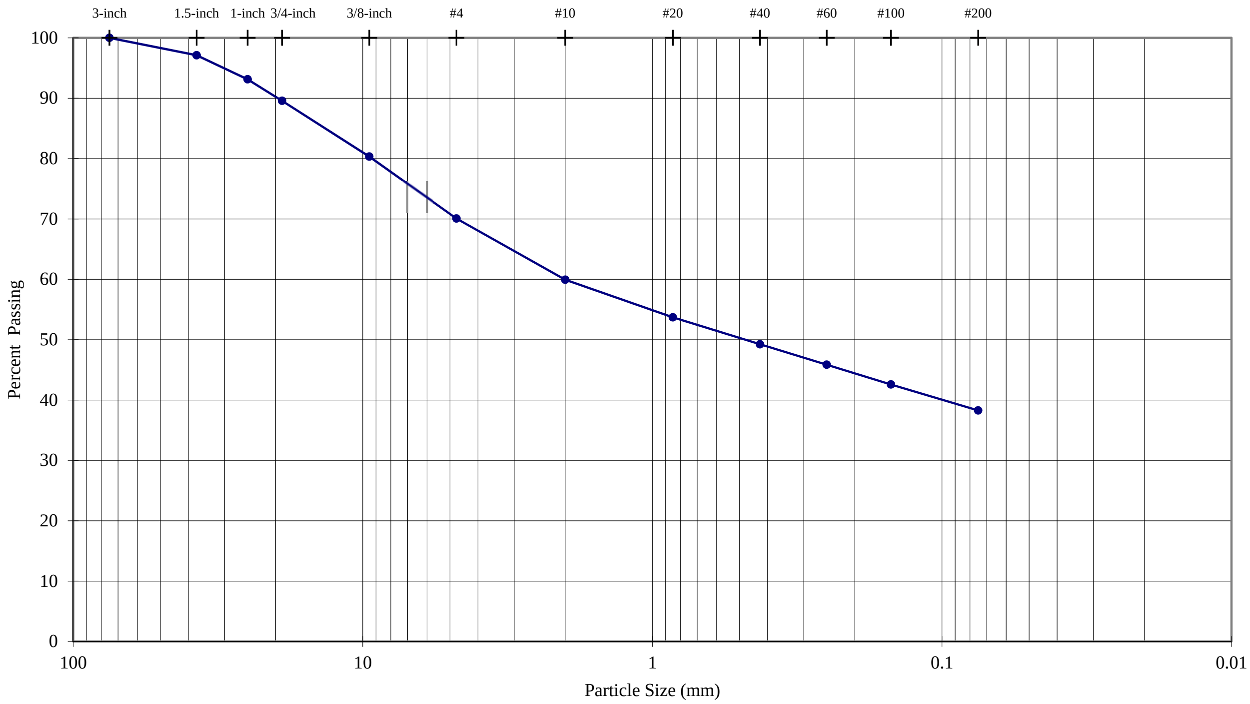
TECH	MGC
DATE	2/22/2013
REVIEW	MB

February-13 | 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

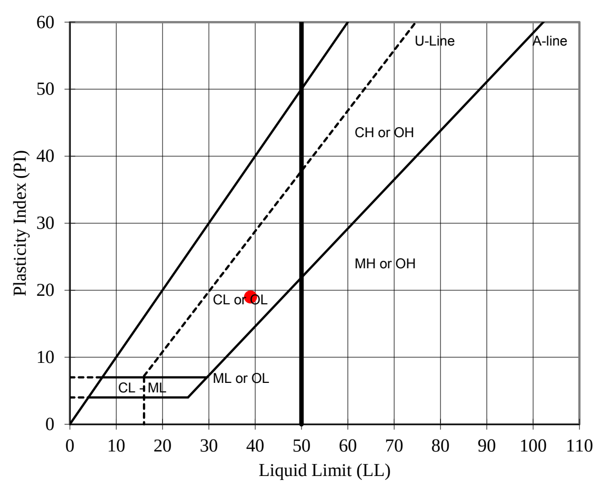
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-10** DEPTH (ft): **0-14.5**
TYPE: **Pail/Bag**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**97.1**
1-inch	25.0	**93.1**
3/4-inch	19.0	**89.6**
3/8-inch	9.5	**80.3**
#4	4.8	**70.1**
#10	2.00	**59.9**
#20	0.85	**53.7**
#40	0.43	**49.2**
#60	0.25	**45.9**
#100	0.15	**42.6**
#200	0.075	**38.3**

Description	Percentage
Coarse Gravel	**10.43**
Fine Gravel	**19.50**
Coarse Sand	**10.14**
Medium Sand	**10.69**
Fine Sand	**10.96**
Silt or Clay Fines	**38.28**



LL	PL	PI
39	**20**	**19**

USCS Description (ASTM D 2487):
Clayey sand with gravel, light yellowish brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

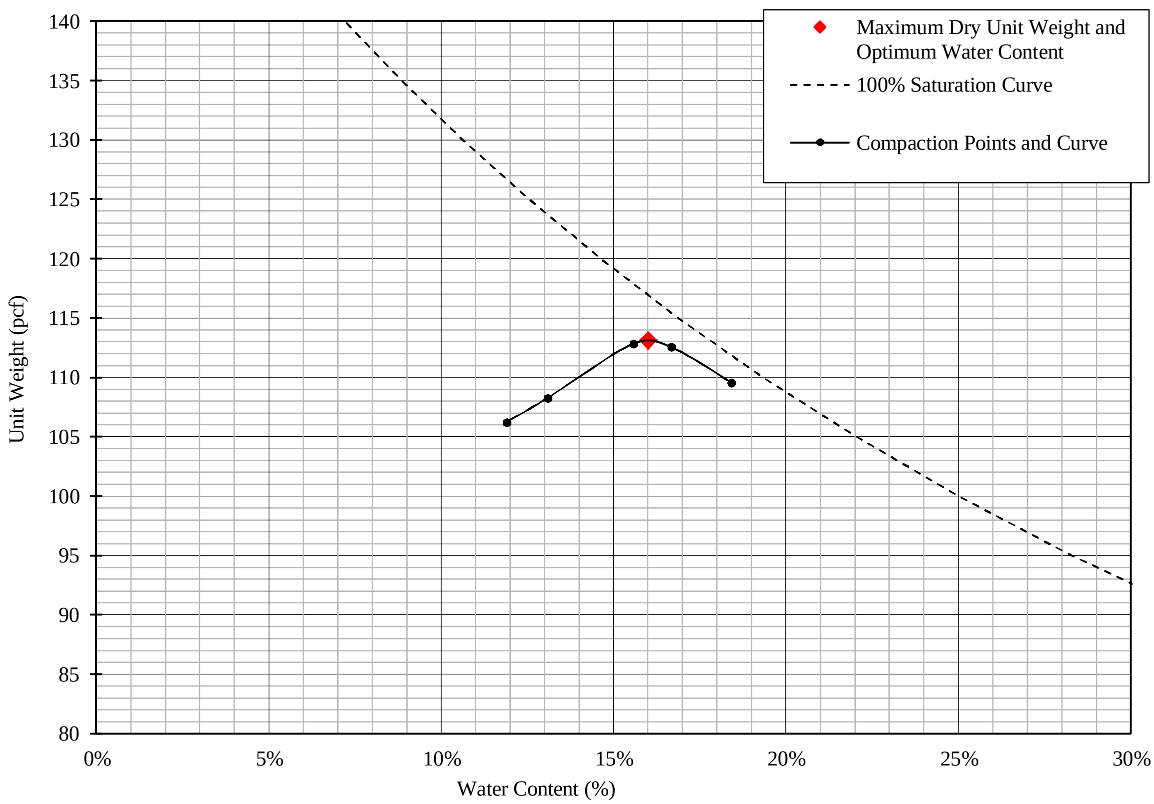
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS/MGC
DATE	2/25/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method B

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-10** DEPTH (ft): **0-14.5**
TYPE: **Pail/Bag**



% Test Fraction Passing 3/8-inch Sieve	**81%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.68**

Maximum Dry Unit Weight (pcf)	**113.1**
Optimum Water Content (%)	**16.0**
Corrected Maximum Dry Unit Weight (pcf)	**120.0**
Corrected Optimum Water Content (%)	**13.2**

USCS Description (ASTM D 2487): Clayey sand with gravel, light yellowish brown, dry

USCS SC

TECH	AMS
DATE	2-27-13
REVIEW	MB

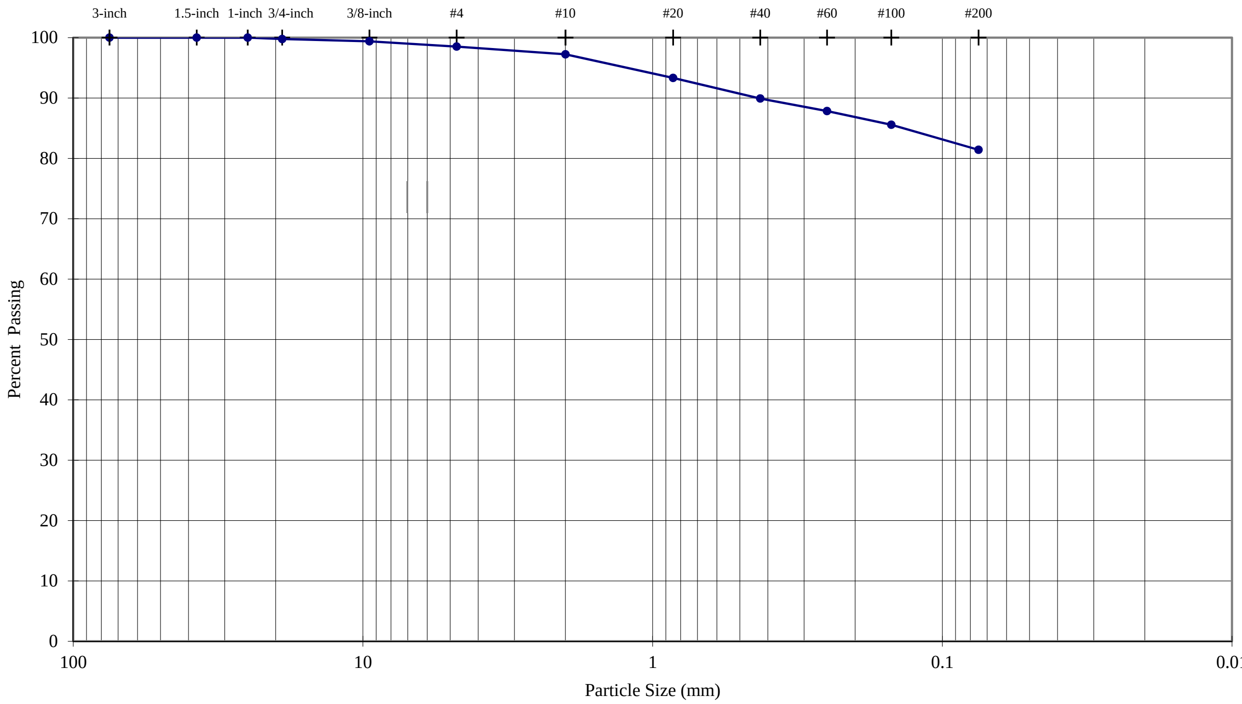
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **BH-10** DEPTH (ft): **19-33**

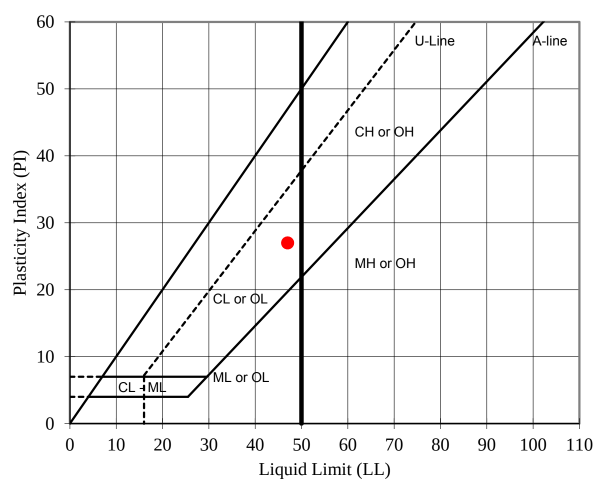
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.8**
3/8-inch	9.5	**99.4**
#4	4.8	**98.5**
#10	2.00	**97.2**
#20	0.85	**93.3**
#40	0.43	**89.9**
#60	0.25	**87.8**
#100	0.15	**85.6**
#200	0.075	**81.4**

Description	Percentage
Coarse Gravel	**0.23**
Fine Gravel	**1.25**
Coarse Sand	**1.28**
Medium Sand	**7.32**
Fine Sand	**8.49**
Silt or Clay Fines	**81.42**



USCS Description (ASTM D 2487):

Lean clay with sand, yellowish red, dry

LL	PL	PI
47	**20**	**27**

As-Received Moisture Content (%): **14.4**

USCS Group Symbol: CL

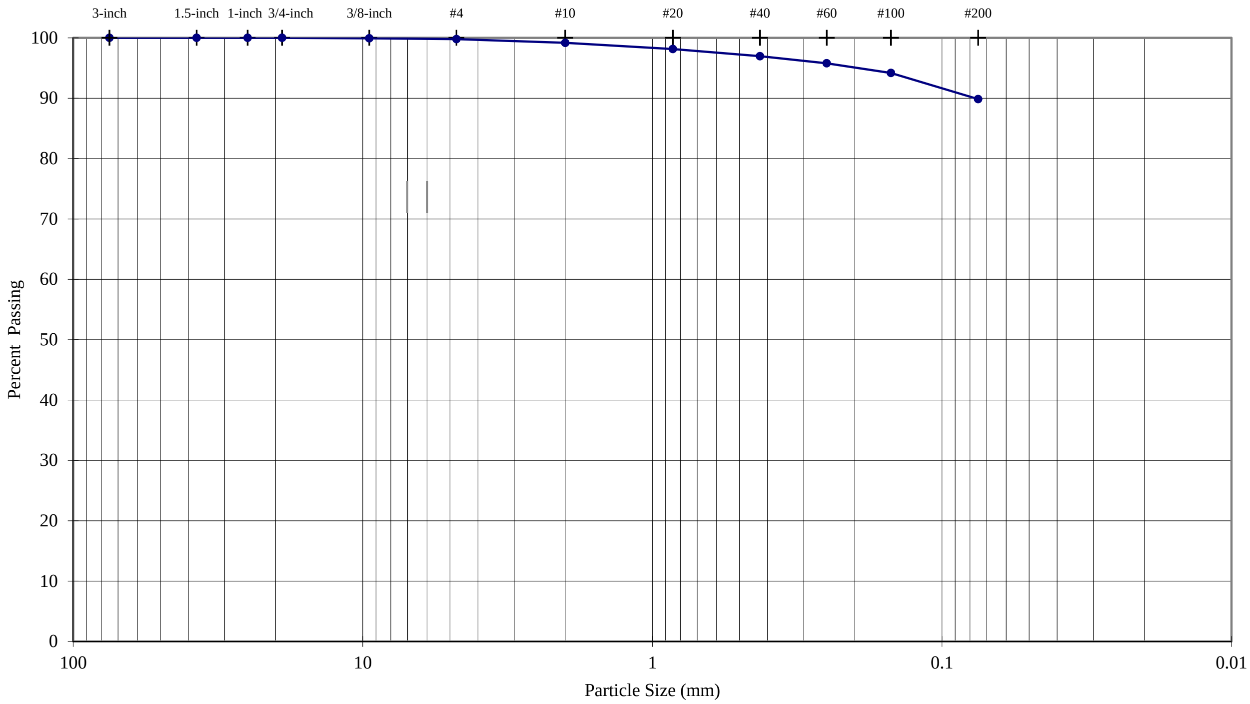
Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	2/25/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

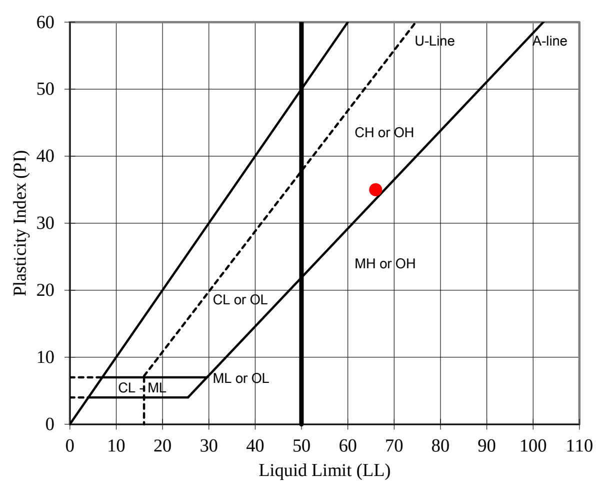
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-12** DEPTH (ft): **33.5-48.5**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**100.0**
3/8-inch	9.5	**99.9**
#4	4.8	**99.8**
#10	2.00	**99.2**
#20	0.85	**98.1**
#40	0.43	**97.0**
#60	0.25	**95.8**
#100	0.15	**94.2**
#200	0.075	**89.9**

Description	Percentage
Coarse Gravel	**0.00**
Fine Gravel	**0.21**
Coarse Sand	**0.62**
Medium Sand	**2.21**
Fine Sand	**7.10**
Silt or Clay Fines	**89.86**



LL	PL	PI
66	**31**	**35**

USCS Description (ASTM D 2487):
Fat clay, dark red, moist

As-Received Moisture Content (%): --

USCS Group Symbol: CH

Notes: 0g of particles up to 19.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AM
DATE	2/26/2013
REVIEW	MB

February-13 103-92557.006

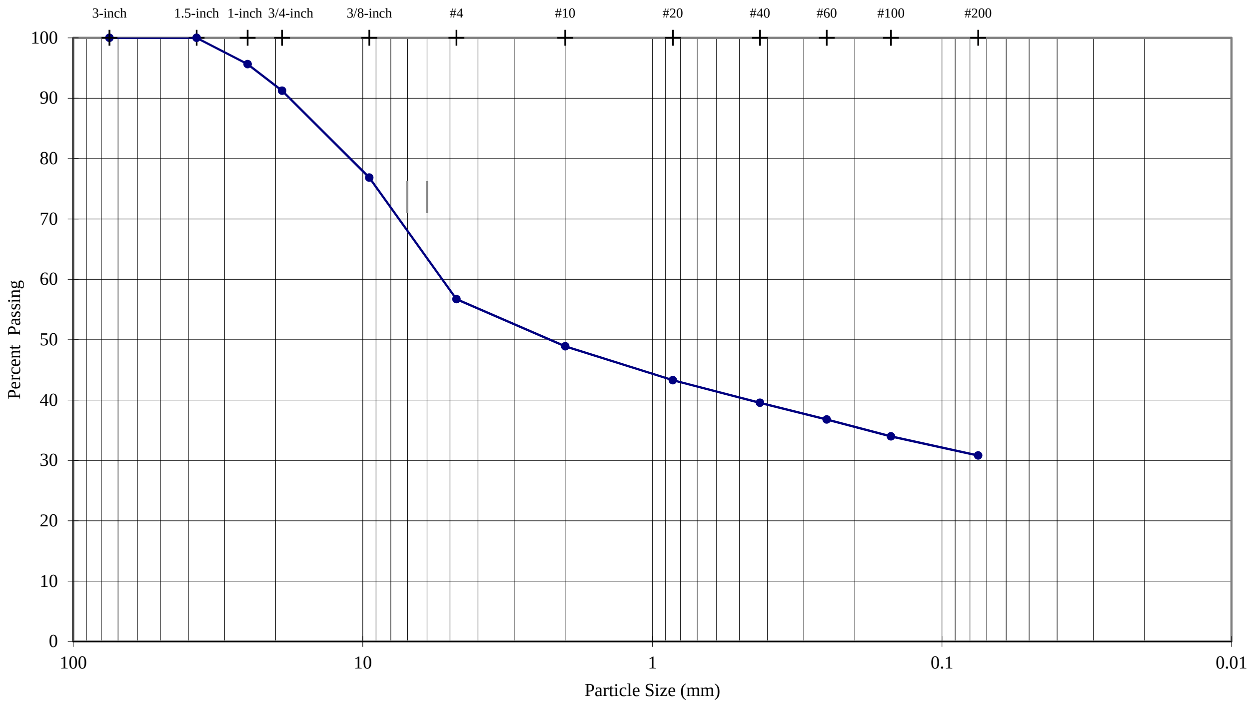
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **BH-16** DEPTH (ft): **0-8.5**

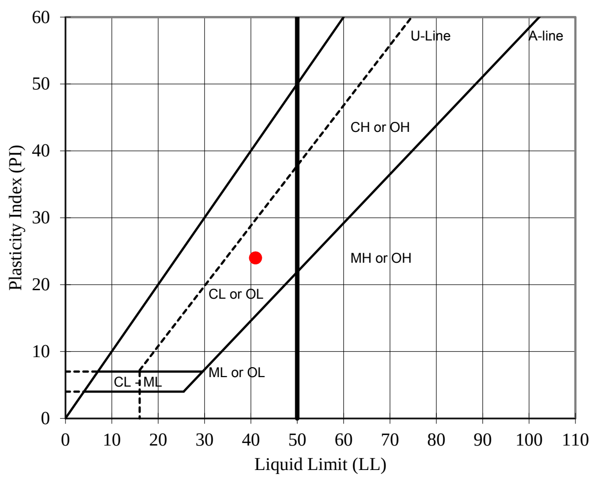
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**95.7**
3/4-inch	19.0	**91.2**
3/8-inch	9.5	**76.9**
#4	4.8	**56.7**
#10	2.00	**48.9**
#20	0.85	**43.3**
#40	0.43	**39.5**
#60	0.25	**36.8**
#100	0.15	**34.0**
#200	0.075	**30.8**

Description	Percentage
Coarse Gravel	**8.75**
Fine Gravel	**34.54**
Coarse Sand	**7.80**
Medium Sand	**9.36**
Fine Sand	**8.73**
Silt or Clay Fines	**30.81**



LL	PL	PI
41	**17**	**24**

USCS Description (ASTM D 2487):

Clayey gravel with sand, reddish brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: GC

Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

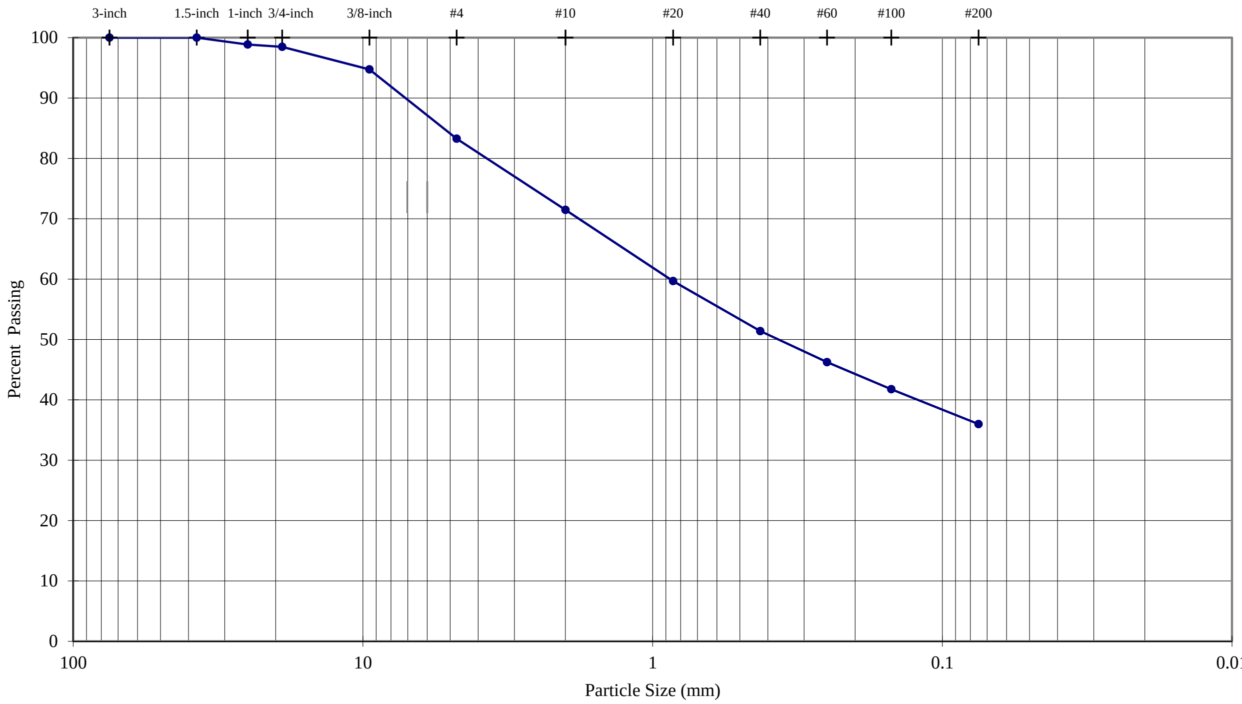
TECH	AMS
DATE	2/27/2013
REVIEW	MB

February-13 **103-92557.006**

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

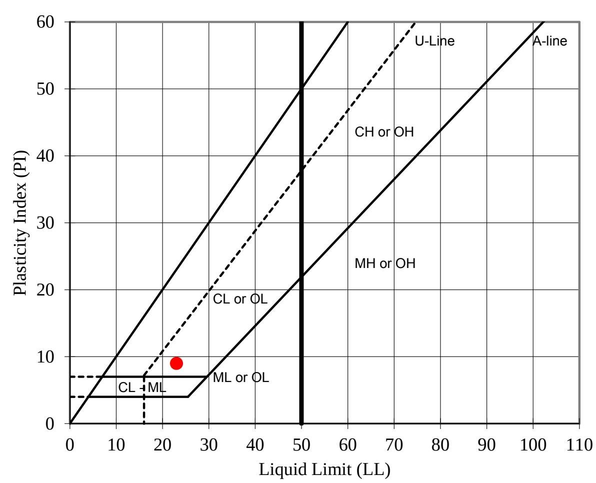
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-16** DEPTH (ft): **29-34**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**98.9**
3/4-inch	19.0	**98.5**
3/8-inch	9.5	**94.7**
#4	4.8	**83.3**
#10	2.00	**71.5**
#20	0.85	**59.7**
#40	0.43	**51.4**
#60	0.25	**46.2**
#100	0.15	**41.8**
#200	0.075	**36.0**

Description	Percentage
Coarse Gravel	**1.52**
Fine Gravel	**15.22**
Coarse Sand	**11.79**
Medium Sand	**20.08**
Fine Sand	**15.41**
Silt or Clay Fines	**35.98**



LL	PL	PI
23	**14**	**9**

USCS Description (ASTM D 2487):

Clayey sand with gravel, yellowish brown, dry

As-Received Moisture Content (%)	USCS Group Symbol
--	SC

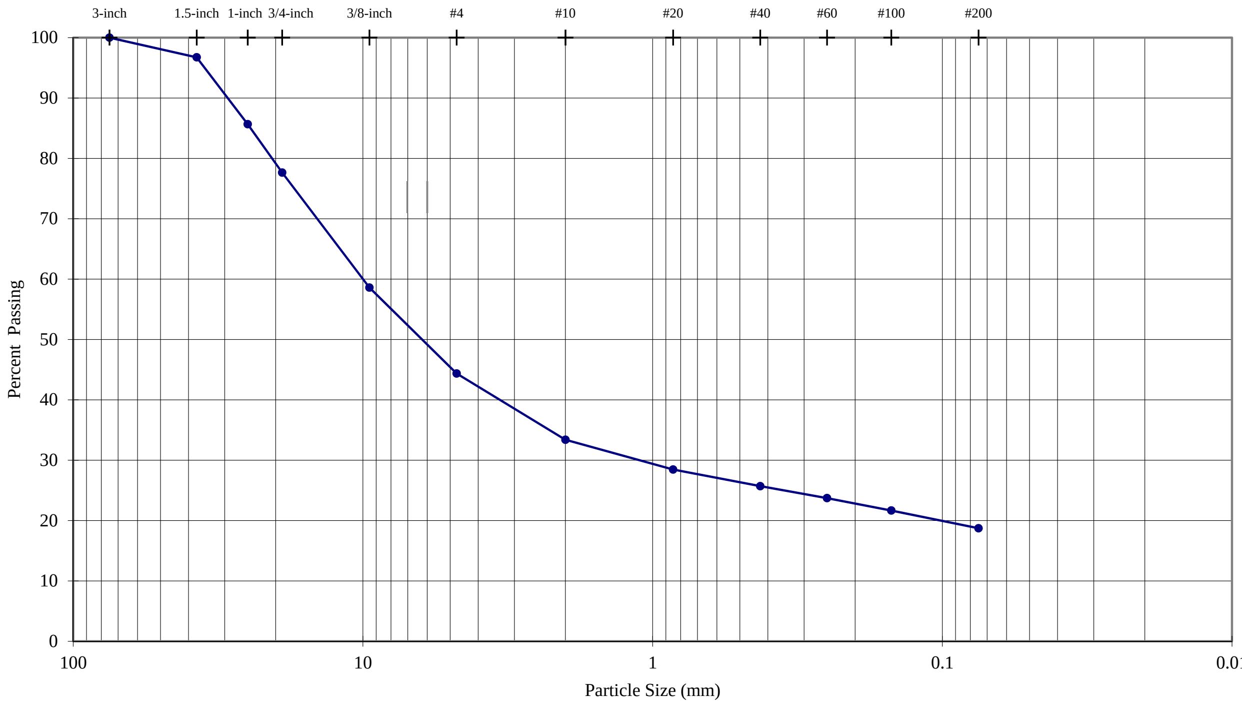
Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	EH
DATE	2/26/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

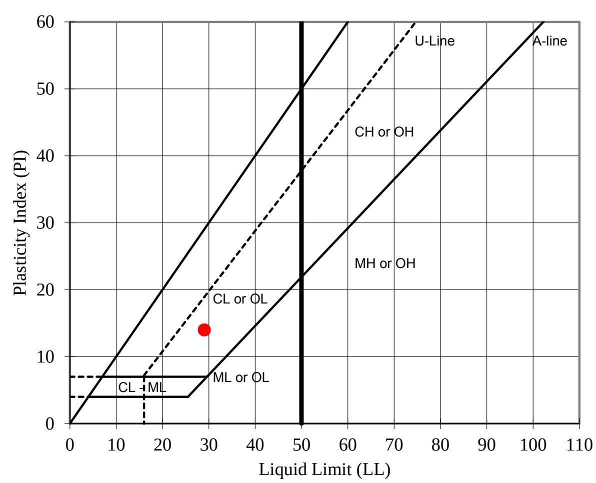
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-18** DEPTH (ft): **2-8**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**96.7**
1-inch	25.0	**85.7**
3/4-inch	19.0	**77.6**
3/8-inch	9.5	**58.6**
#4	4.8	**44.4**
#10	2.00	**33.4**
#20	0.85	**28.5**
#40	0.43	**25.7**
#60	0.25	**23.7**
#100	0.15	**21.7**
#200	0.075	**18.7**

Description	Percentage
Coarse Gravel	**22.35**
Fine Gravel	**33.28**
Coarse Sand	**10.98**
Medium Sand	**7.68**
Fine Sand	**6.98**
Silt or Clay Fines	**18.73**



USCS Description (ASTM D 2487):

Clayey gravel with sand, yellowish brown, dry

LL	PL	PI
29	**15**	**14**

As-Received Moisture Content (%): --

USCS Group Symbol: GC

Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

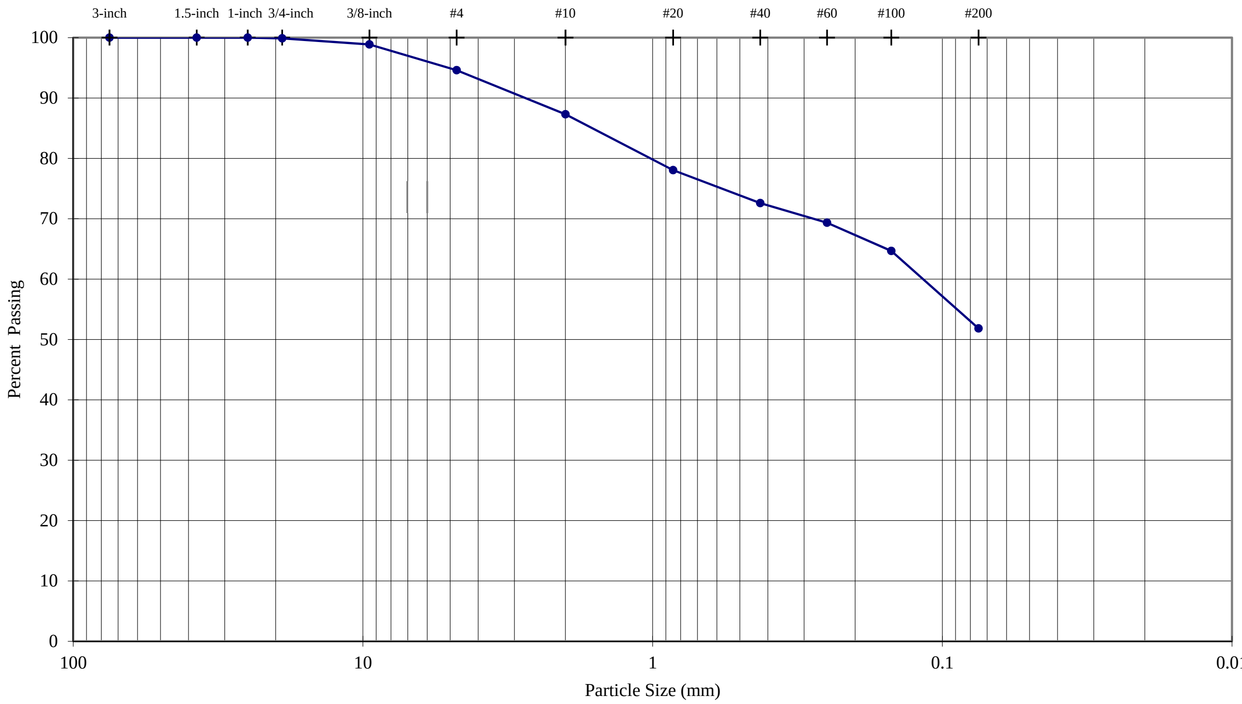
TECH	AMS
DATE	2/28/2013
REVIEW	MB

February-13 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

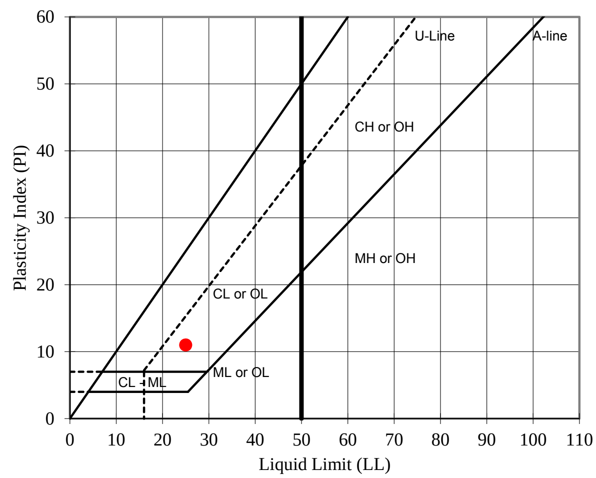
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-18** DEPTH (ft): **23-33.5**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.9**
3/8-inch	9.5	**98.9**
#4	4.8	**94.6**
#10	2.00	**87.3**
#20	0.85	**78.1**
#40	0.43	**72.6**
#60	0.25	**69.3**
#100	0.15	**64.7**
#200	0.075	**51.8**

Description	Percentage
Coarse Gravel	**0.12**
Fine Gravel	**5.27**
Coarse Sand	**7.30**
Medium Sand	**14.72**
Fine Sand	**20.76**
Silt or Clay Fines	**51.84**



USCS Description (ASTM D 2487):

Sandy lean clay, reddish brown, moist

LL	PL	PI
25	**14**	**11**

As-Received Moisture Content (%): **#DIV/0!**

USCS Group Symbol: CL

Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

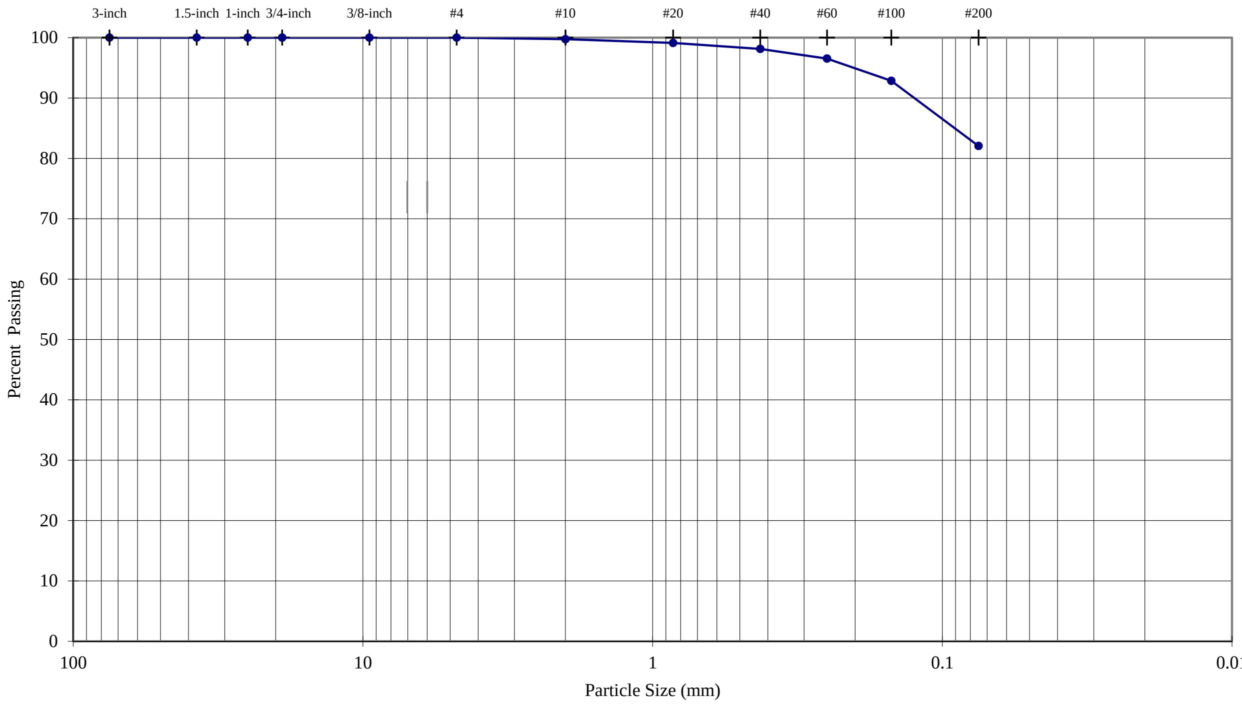
TECH	AMS
DATE	2/25/2013
REVIEW	MB

February-13 | 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

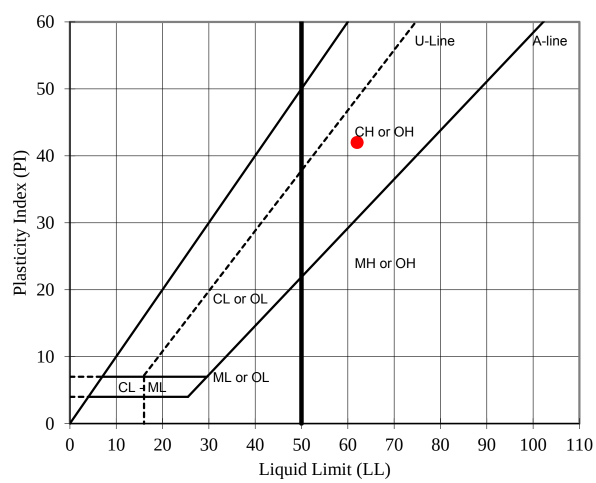
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-18** DEPTH (ft): **43.5-48.5**
TYPE: **Bag**



Sieve Analysis

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**100.0**
3/8-inch	9.5	**100.0**
#4	4.8	**100.0**
#10	2.00	**99.7**
#20	0.85	**99.1**
#40	0.43	**98.1**
#60	0.25	**96.5**
#100	0.15	**92.9**
#200	0.075	**82.1**

Description	Percentage
Coarse Gravel	**0.00**
Fine Gravel	**0.00**
Coarse Sand	**0.25**
Medium Sand	**1.61**
Fine Sand	**16.07**
Silt or Clay Fines	**82.06**



USCS Description (ASTM D 2487):
Fat clay with sand, dark red, wet

LL	PL	PI
62	**20**	**42**

As-Received Moisture Content (%): **29.6**

USCS Group Symbol: CH

Notes: 0g of particles up to 4.8mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the wet method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

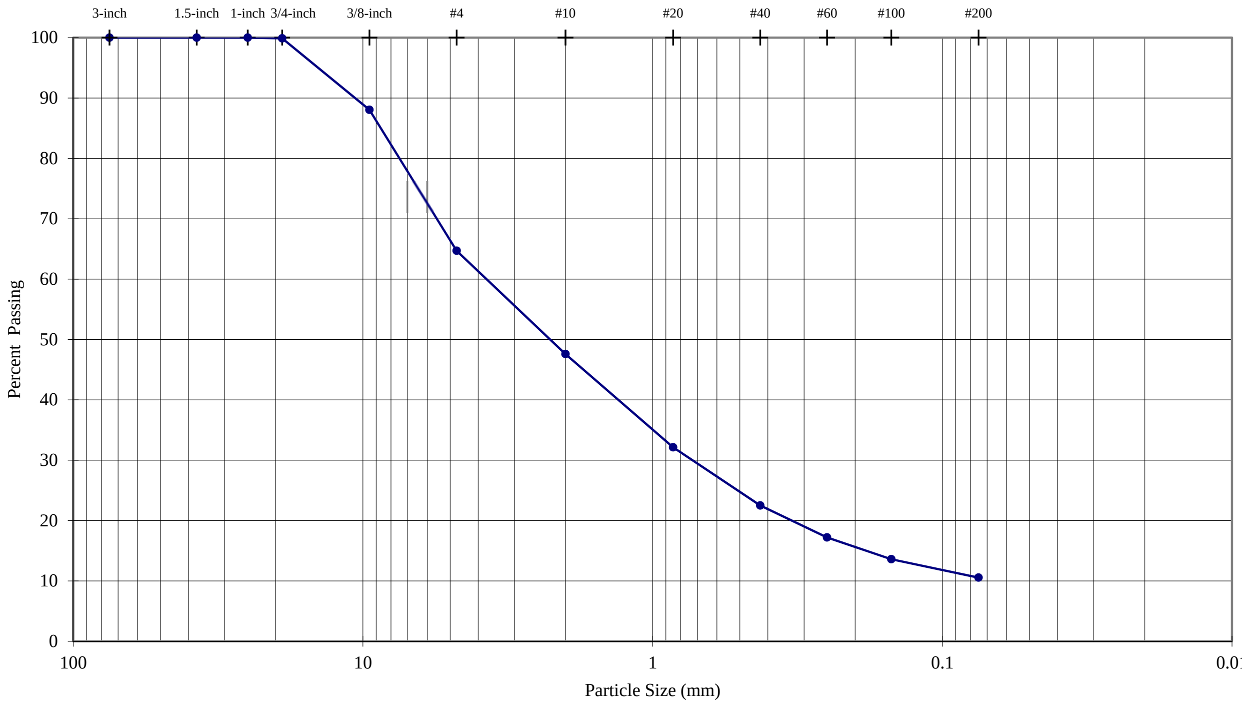
TECH	AMS
DATE	2/25/2013
REVIEW	MB

February-13 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

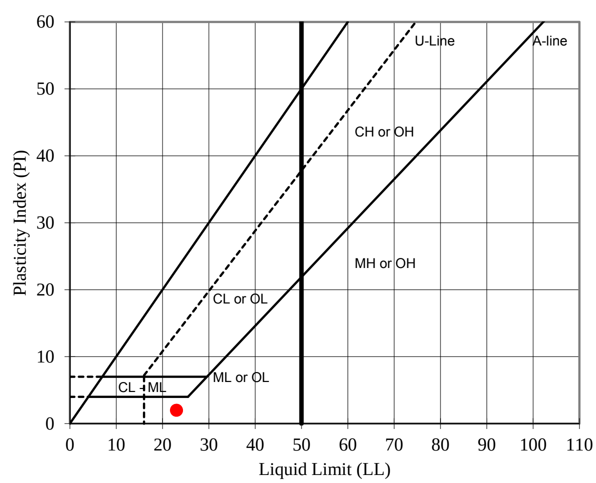
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-21** DEPTH (ft): **0-18**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.9**
3/8-inch	9.5	**88.1**
#4	4.8	**64.7**
#10	2.00	**47.6**
#20	0.85	**32.1**
#40	0.43	**22.5**
#60	0.25	**17.2**
#100	0.15	**13.6**
#200	0.075	**10.6**

Description	Percentage
Coarse Gravel	**0.12**
Fine Gravel	**35.18**
Coarse Sand	**17.11**
Medium Sand	**25.09**
Fine Sand	**11.95**
Silt or Clay Fines	**10.55**



LL	PL	PI
23	**21**	**2**

USCS Description (ASTM D 2487):

Well-graded sand with silt and gravel, yellowish red, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SW-SM

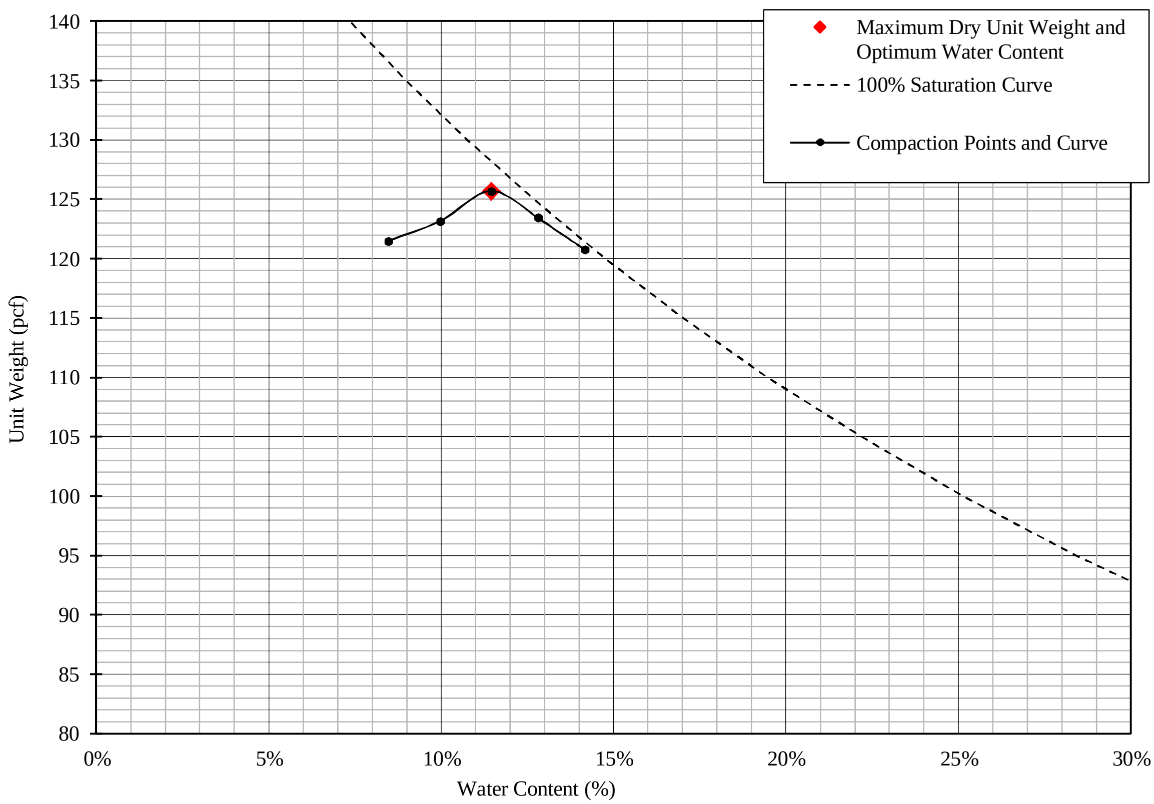
Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	2/26/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method B

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-21** DEPTH (ft): **0-18**
TYPE: **Pail**



% Test Fraction Passing 3/8-inch Sieve	**88%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.69**

Maximum Dry Unit Weight (pcf)	**125.7**
Optimum Water Content (%)	**11.4**
Corrected Maximum Dry Unit Weight (pcf)	**129.2**
Corrected Optimum Water Content (%)	**10.1**

USCS Description (ASTM D 2487): Well-graded sand with silt and gravel, yellowish red, dry

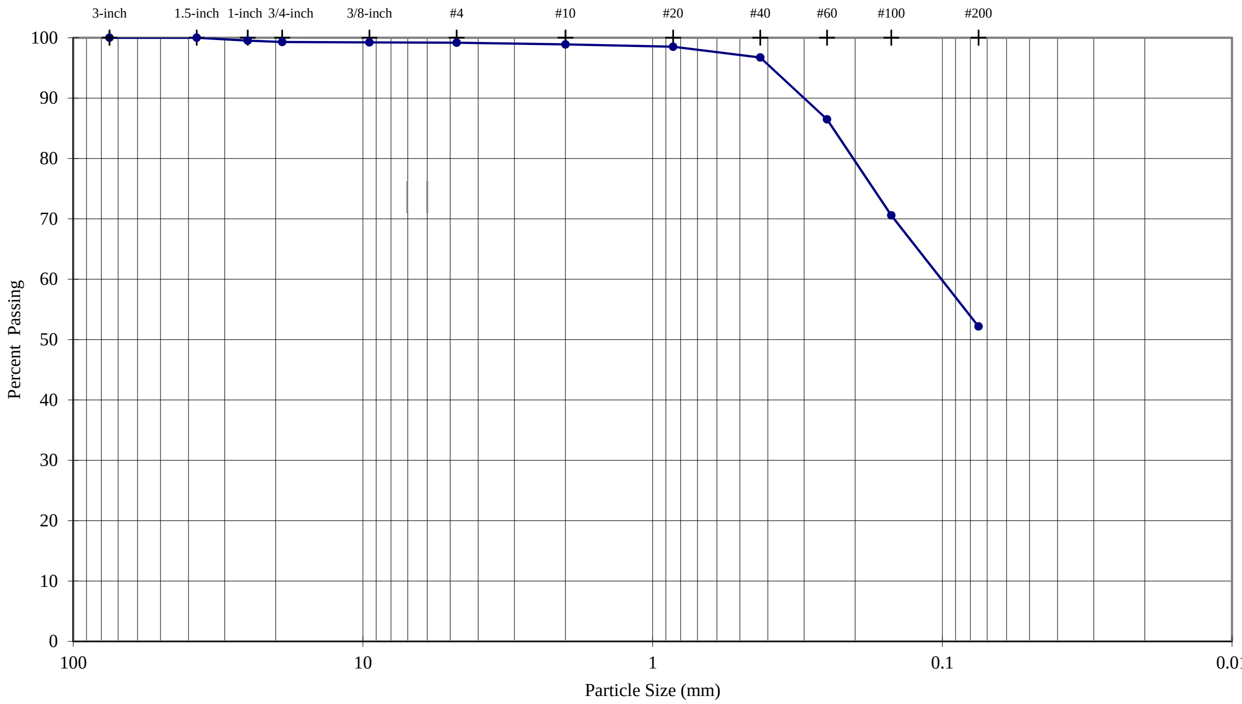
USCS SW-SM

TECH	AMS
DATE	2-27-13
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

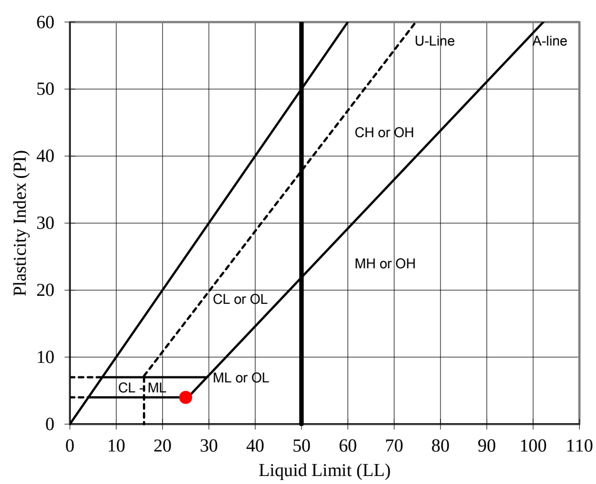
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-22** DEPTH (ft): **5-8.5**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.5**
3/4-inch	19.0	**99.3**
3/8-inch	9.5	**99.2**
#4	4.8	**99.2**
#10	2.00	**98.9**
#20	0.85	**98.5**
#40	0.43	**96.7**
#60	0.25	**86.5**
#100	0.15	**70.6**
#200	0.075	**52.2**

Description	Percentage
Coarse Gravel	**0.70**
Fine Gravel	**0.12**
Coarse Sand	**0.28**
Medium Sand	**2.17**
Fine Sand	**44.55**
Silt or Clay Fines	**52.18**



LL	PL	PI
25	**21**	**4**

USCS Description (ASTM D 2487):
Sandy silty clay, brownish yellow, moist

As-Received Moisture Content (%): **--**

USCS Group Symbol: CL-ML

Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

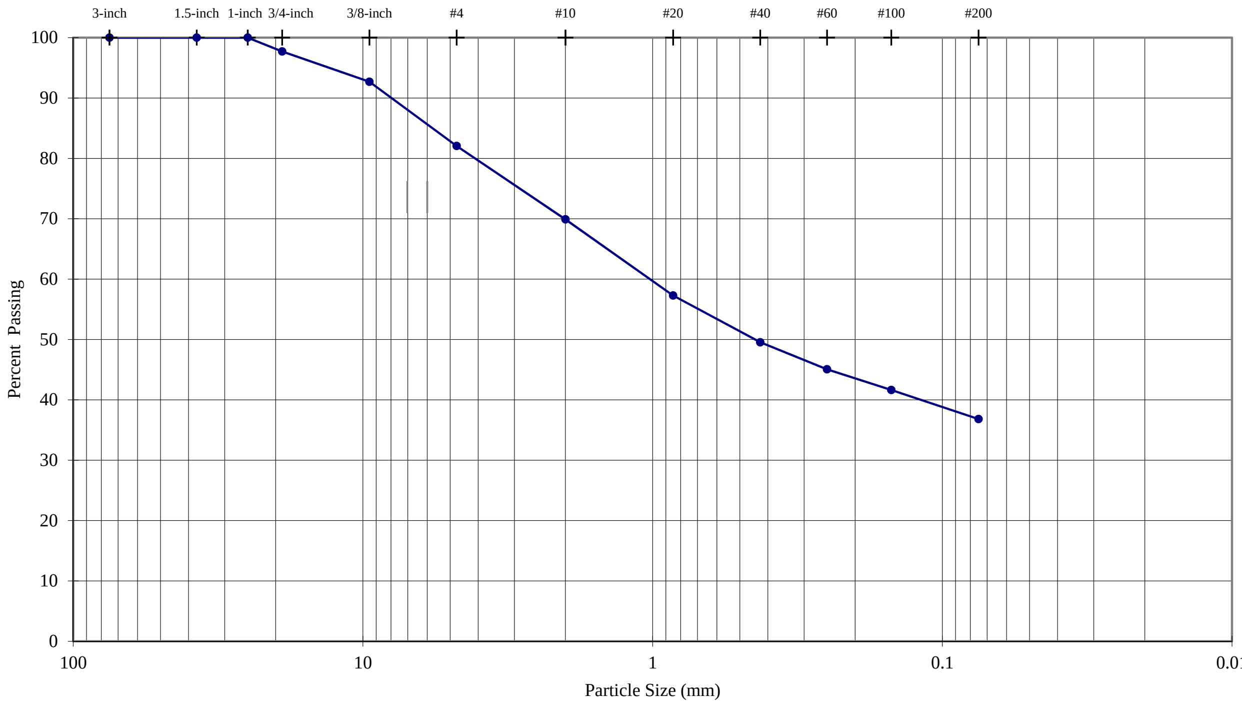
TECH	EH
DATE	2/26/2013
REVIEW	MB

February-13 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

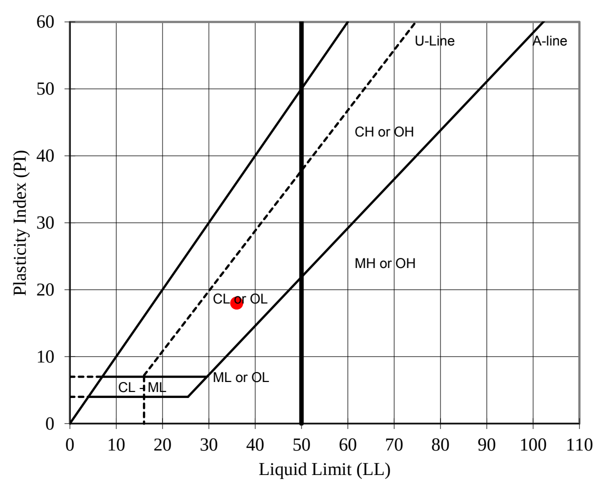
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-22** DEPTH (ft): **28-30**
TYPE: **Bag**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**97.7**
3/8-inch	9.5	**92.7**
#4	4.8	**82.1**
#10	2.00	**69.9**
#20	0.85	**57.3**
#40	0.43	**49.5**
#60	0.25	**45.1**
#100	0.15	**41.6**
#200	0.075	**36.8**

Description	Percentage
Coarse Gravel	**2.29**
Fine Gravel	**15.65**
Coarse Sand	**12.16**
Medium Sand	**20.36**
Fine Sand	**12.71**
Silt or Clay Fines	**36.82**



USCS Description (ASTM D 2487):

Clayey sand with gravel, reddish brown, moist

LL	PL	PI
36	**18**	**18**

As-Received Moisture Content (%): **10.4**

USCS Group Symbol: SC

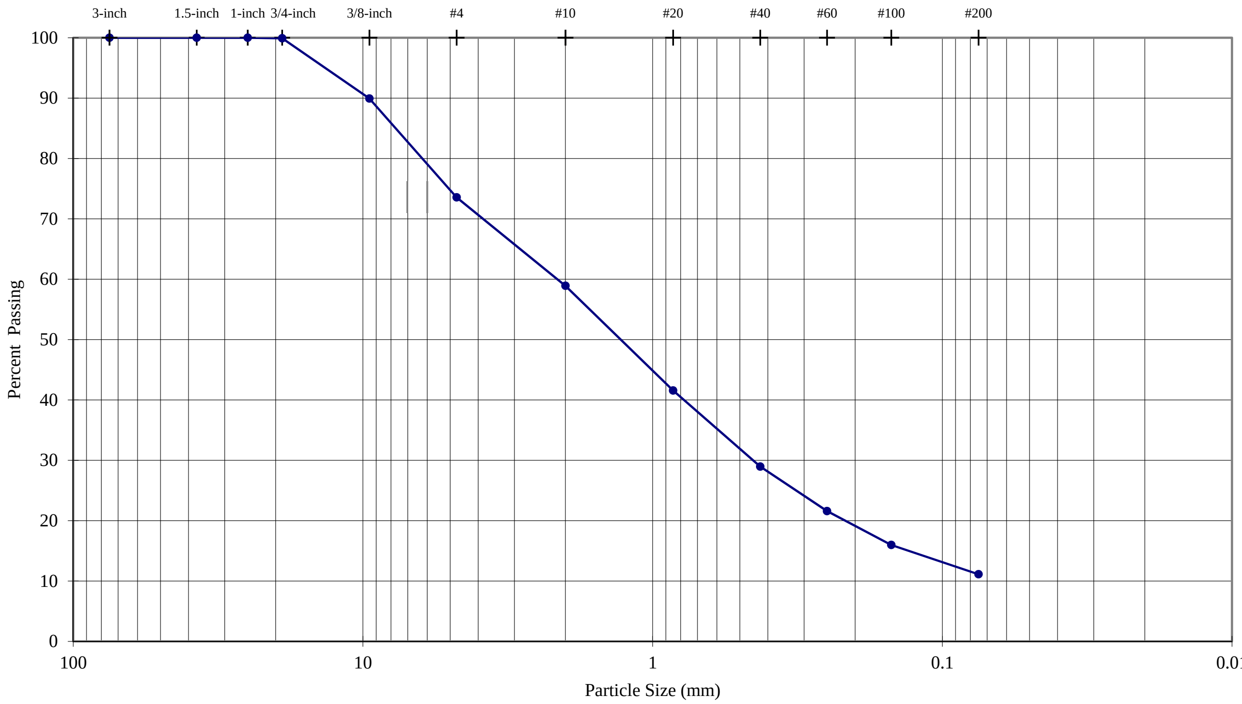
Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	2/25/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

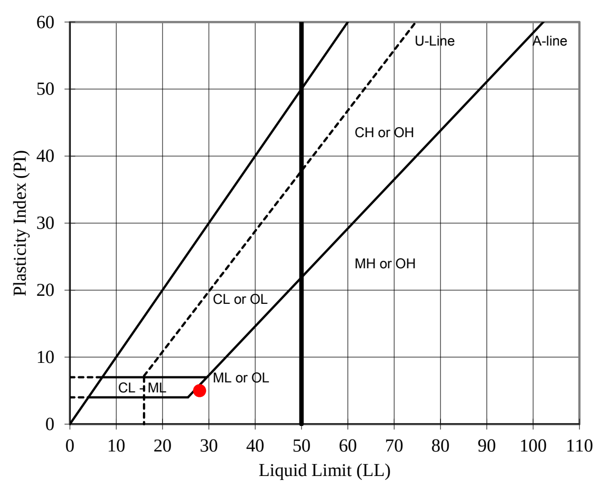
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-24** DEPTH (ft): **2.5-18**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.9**
3/8-inch	9.5	**89.9**
#4	4.8	**73.6**
#10	2.00	**58.9**
#20	0.85	**41.6**
#40	0.43	**29.0**
#60	0.25	**21.6**
#100	0.15	**16.0**
#200	0.075	**11.1**

Description	Percentage
Coarse Gravel	**0.09**
Fine Gravel	**26.35**
Coarse Sand	**14.65**
Medium Sand	**29.96**
Fine Sand	**17.83**
Silt or Clay Fines	**11.12**



USCS Description (ASTM D 2487):
Well-graded sand with silt and gravel, weak red, dry

LL	PL	PI
28	**23**	**5**

As-Received Moisture Content (%): --

USCS Group Symbol: SW-SM

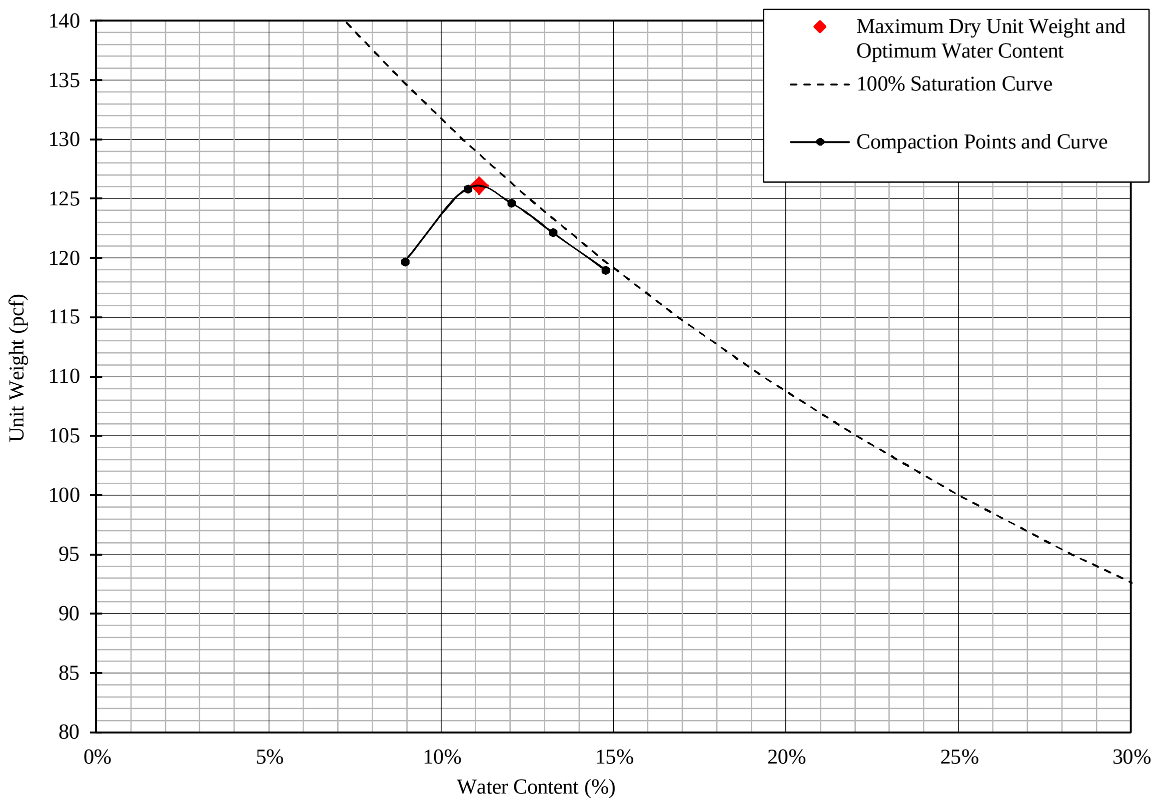
Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	2/27/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method B

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-24** DEPTH (ft): **2.5-18**
TYPE: **Pail**



% Test Fraction Passing 3/8-inch Sieve	**90%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.68**

Maximum Dry Unit Weight (pcf)	**126.1**
Optimum Water Content (%)	**11.1**
Corrected Maximum Dry Unit Weight (pcf)	**128.9**
Corrected Optimum Water Content (%)	**10.0**

USCS Description (ASTM D 2487): Well-graded sand with silt and gravel, weak red, dry

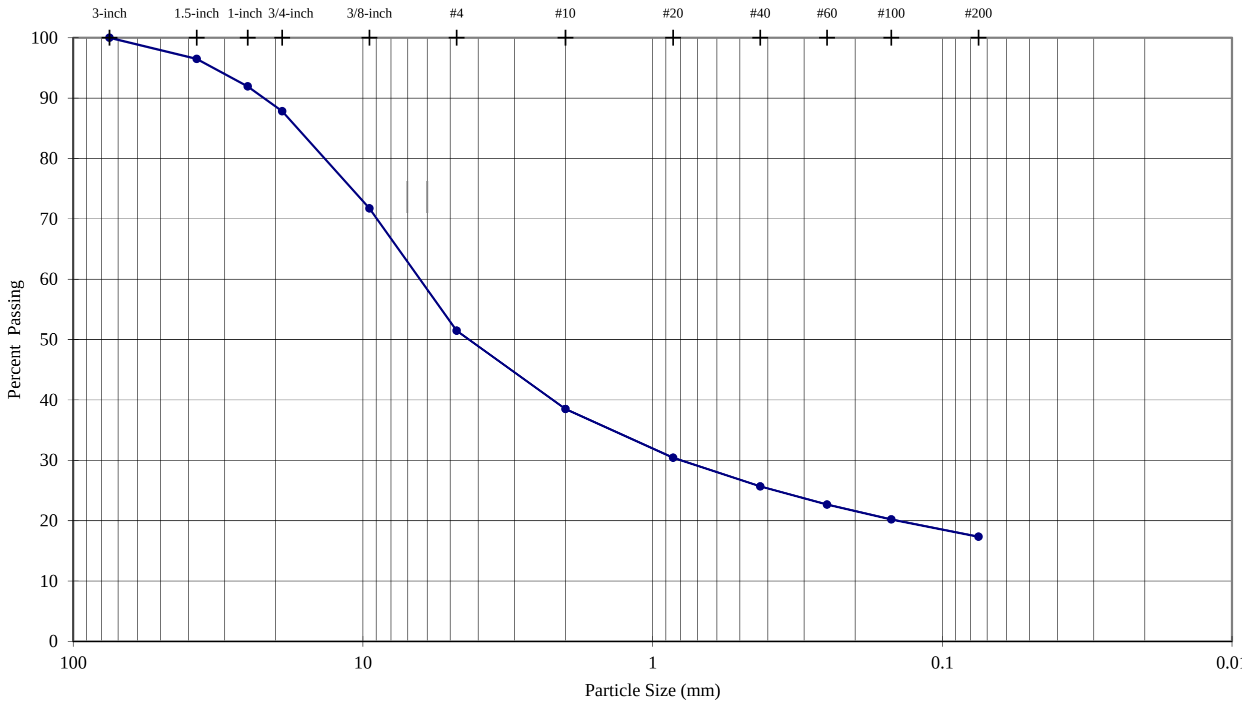
USCS SW-SM

TECH	AMS
DATE	2-27-13
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

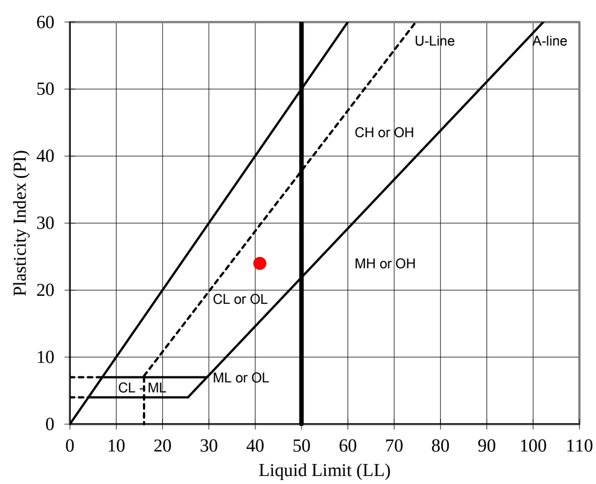
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-25** DEPTH (ft): **0-12.5**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**96.5**
1-inch	25.0	**91.9**
3/4-inch	19.0	**87.8**
3/8-inch	9.5	**71.7**
#4	4.8	**51.5**
#10	2.00	**38.5**
#20	0.85	**30.4**
#40	0.43	**25.7**
#60	0.25	**22.7**
#100	0.15	**20.2**
#200	0.075	**17.3**

Description	Percentage
Coarse Gravel	**12.17**
Fine Gravel	**36.36**
Coarse Sand	**12.97**
Medium Sand	**12.83**
Fine Sand	**8.33**
Silt or Clay Fines	**17.34**



LL	PL	PI
41	**17**	**24**

USCS Description (ASTM D 2487):
Clayey gravel with sand, dark yellowish brown, dry

As-Received Moisture Content (%): **--**

USCS Group Symbol: GC

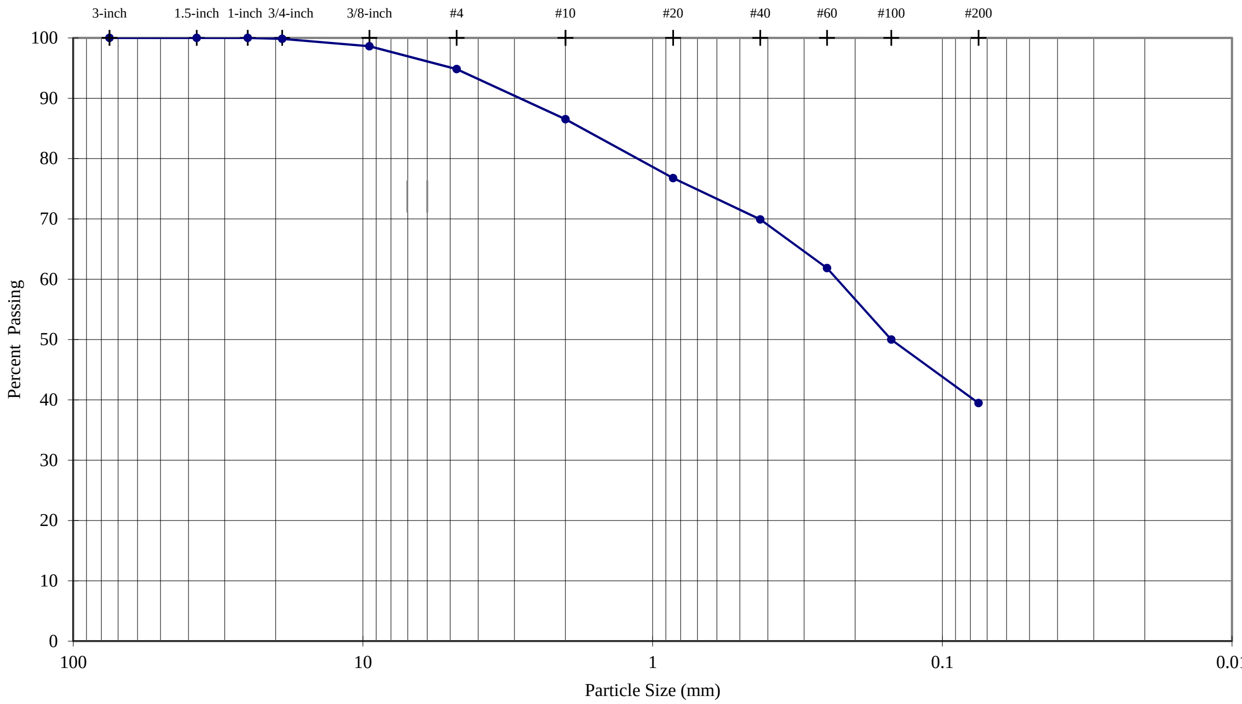
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	2/27/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

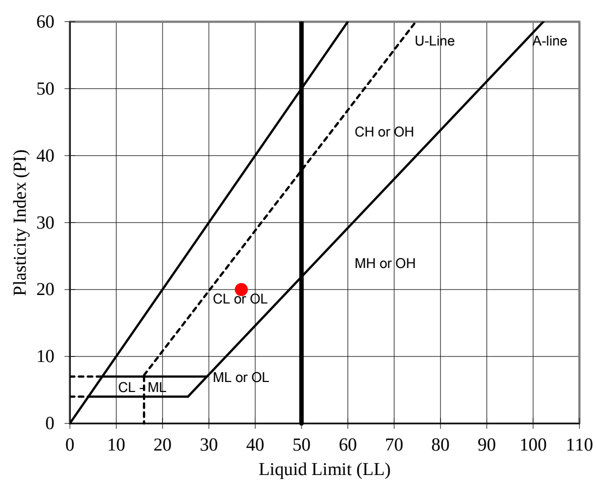
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **BH-25** DEPTH (ft): **22-34**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.8**
3/8-inch	9.5	**98.6**
#4	4.8	**94.8**
#10	2.00	**86.5**
#20	0.85	**76.8**
#40	0.43	**69.9**
#60	0.25	**61.8**
#100	0.15	**50.0**
#200	0.075	**39.5**

Description	Percentage
Coarse Gravel	**0.16**
Fine Gravel	**5.01**
Coarse Sand	**8.31**
Medium Sand	**16.62**
Fine Sand	**30.43**
Silt or Clay Fines	**39.47**



LL	PL	PI
37	**17**	**20**

USCS Description (ASTM D 2487):

Clayey sand, reddish brown, moist

As-Received Moisture Content (%): **#DIV/0!**

USCS Group Symbol: SC

Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

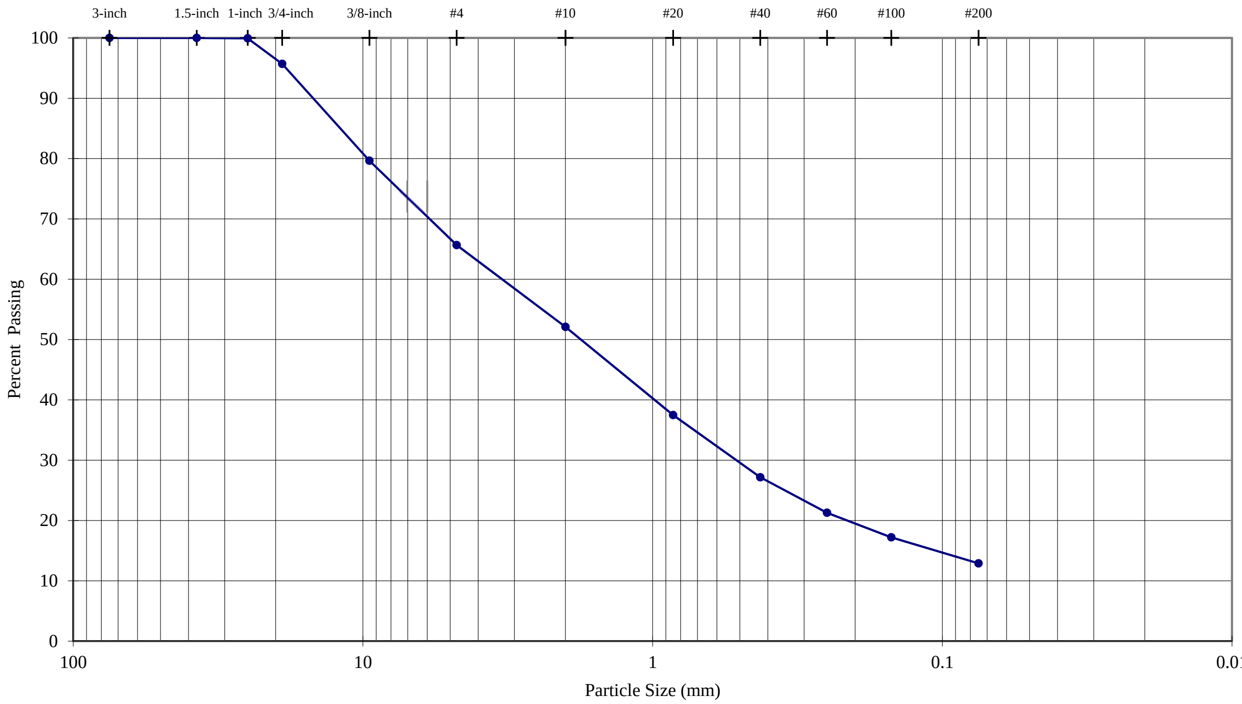
TECH	AMS
DATE	2/26/2013
REVIEW	MB

February-13 | 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

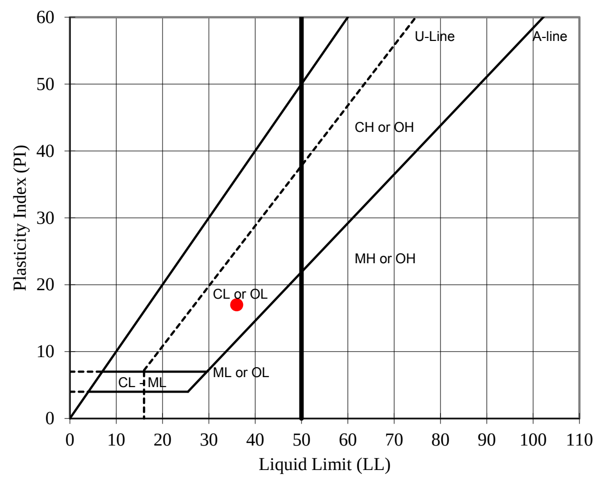
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Composite #1** DEPTH (ft): **5-13**
TYPE: **Pails**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.9**
3/4-inch	19.0	**95.7**
3/8-inch	9.5	**79.6**
#4	4.8	**65.7**
#10	2.00	**52.1**
#20	0.85	**37.5**
#40	0.43	**27.2**
#60	0.25	**21.3**
#100	0.15	**17.2**
#200	0.075	**12.9**

Description	Percentage
Coarse Gravel	**4.30**
Fine Gravel	**30.03**
Coarse Sand	**13.57**
Medium Sand	**24.93**
Fine Sand	**14.27**
Silt or Clay Fines	**12.90**



USCS Description (ASTM D 2487):

Clayey sand with gravel, brown, dry

LL	PL	PI	SpG
36	**19**	**17**	**2.75**

As-Received Moisture Content (%): --

USCS Group Symbol: SC

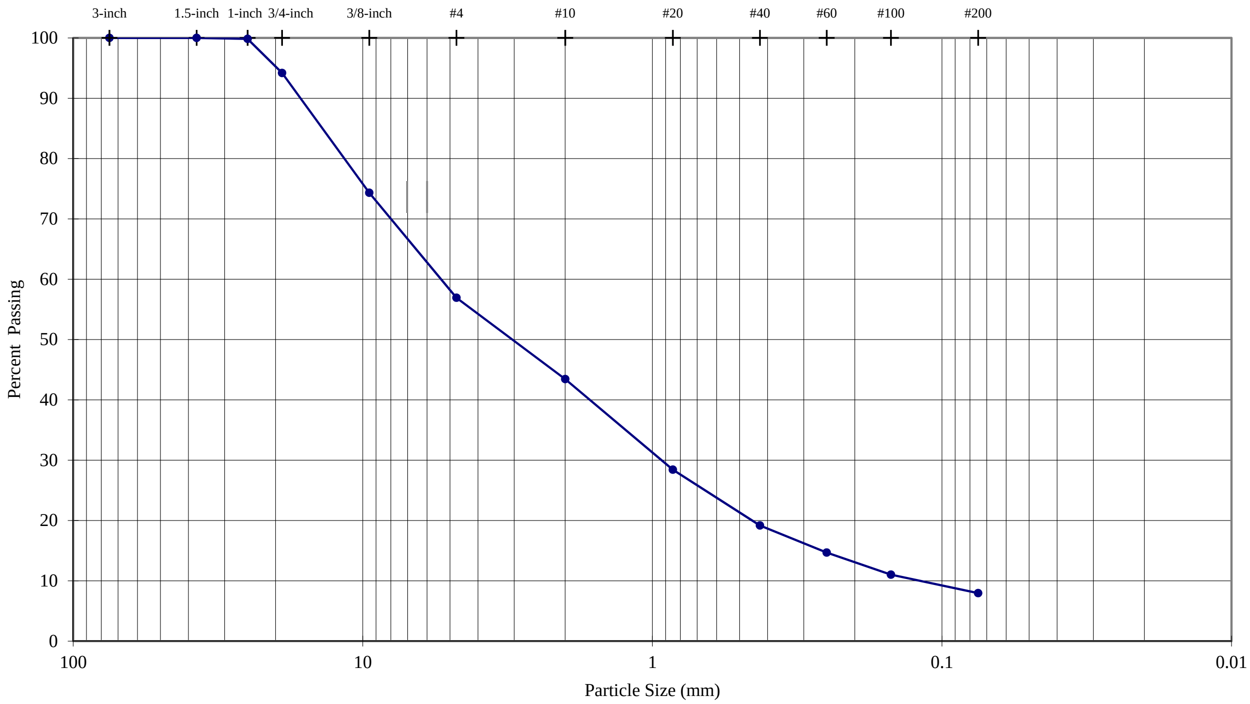
Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	3/4/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

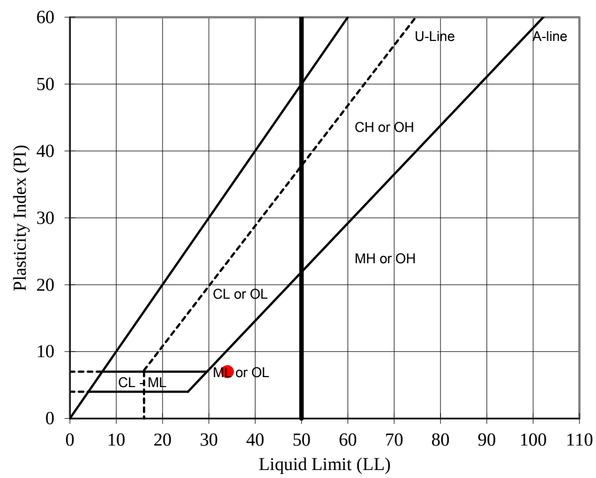
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Composite #2** DEPTH (ft): **5-14**
TYPE: **Pails**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.8**
3/4-inch	19.0	**94.2**
3/8-inch	9.5	**74.3**
#4	4.8	**56.9**
#10	2.00	**43.4**
#20	0.85	**28.4**
#40	0.43	**19.2**
#60	0.25	**14.7**
#100	0.15	**11.0**
#200	0.075	**8.0**

Description	Percentage
Coarse Gravel	**5.81**
Fine Gravel	**37.27**
Coarse Sand	**13.48**
Medium Sand	**24.28**
Fine Sand	**11.20**
Silt or Clay Fines	**7.96**



LL	PL	PI	SpG
34	**27**	**7**	**2.74**

USCS Description (ASTM D 2487):
Well-graded sand with silt and gravel, brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: GW-GM

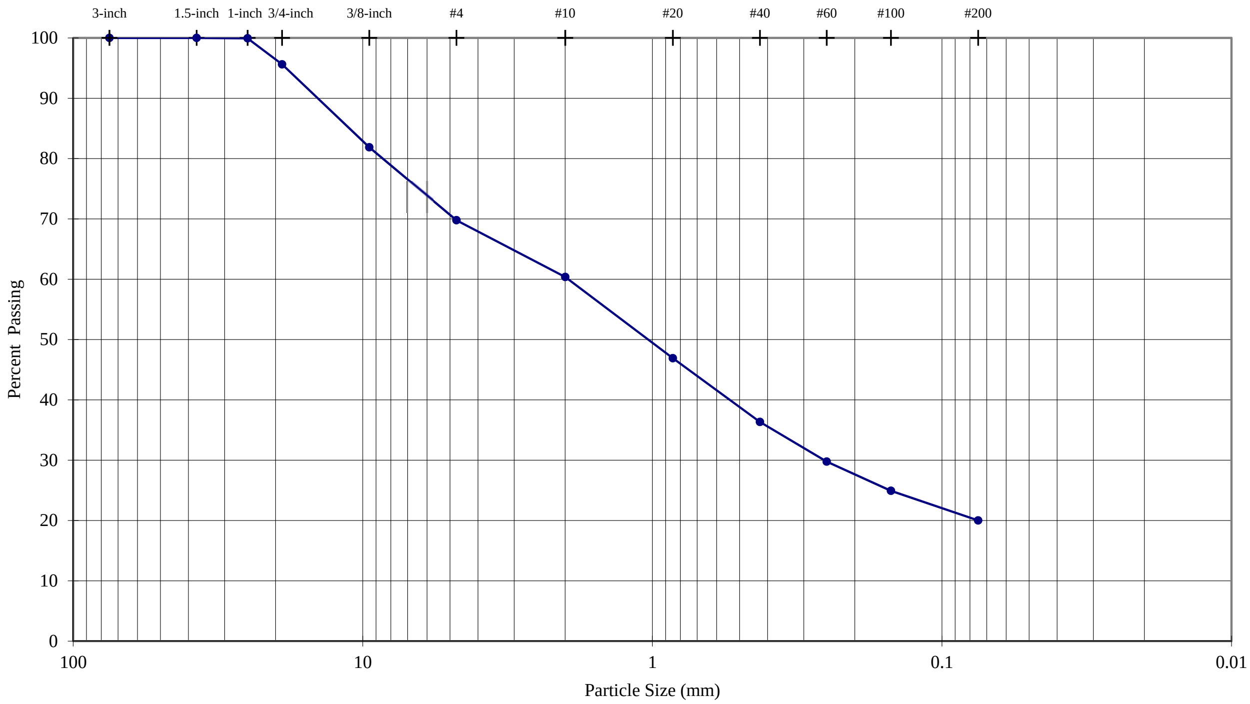
Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	3/4/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

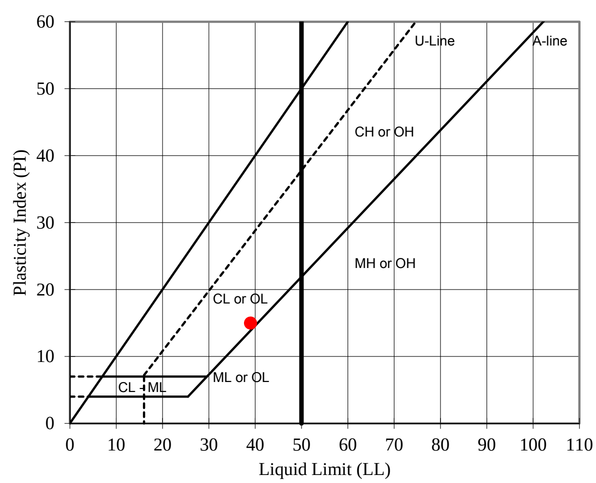
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Composite #3** DEPTH (ft): **2-3**
TYPE: **Pails**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.9**
3/4-inch	19.0	**95.6**
3/8-inch	9.5	**81.9**
#4	4.8	**69.8**
#10	2.00	**60.4**
#20	0.85	**46.9**
#40	0.43	**36.3**
#60	0.25	**29.8**
#100	0.15	**24.9**
#200	0.075	**20.0**

Description	Percentage
Coarse Gravel	**4.38**
Fine Gravel	**25.84**
Coarse Sand	**9.40**
Medium Sand	**24.04**
Fine Sand	**16.32**
Silt or Clay Fines	**20.01**



LL	PL	PI	SpG
39	**24**	**15**	**2.67**

USCS Description (ASTM D 2487):

Clayey sand with gravel, brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

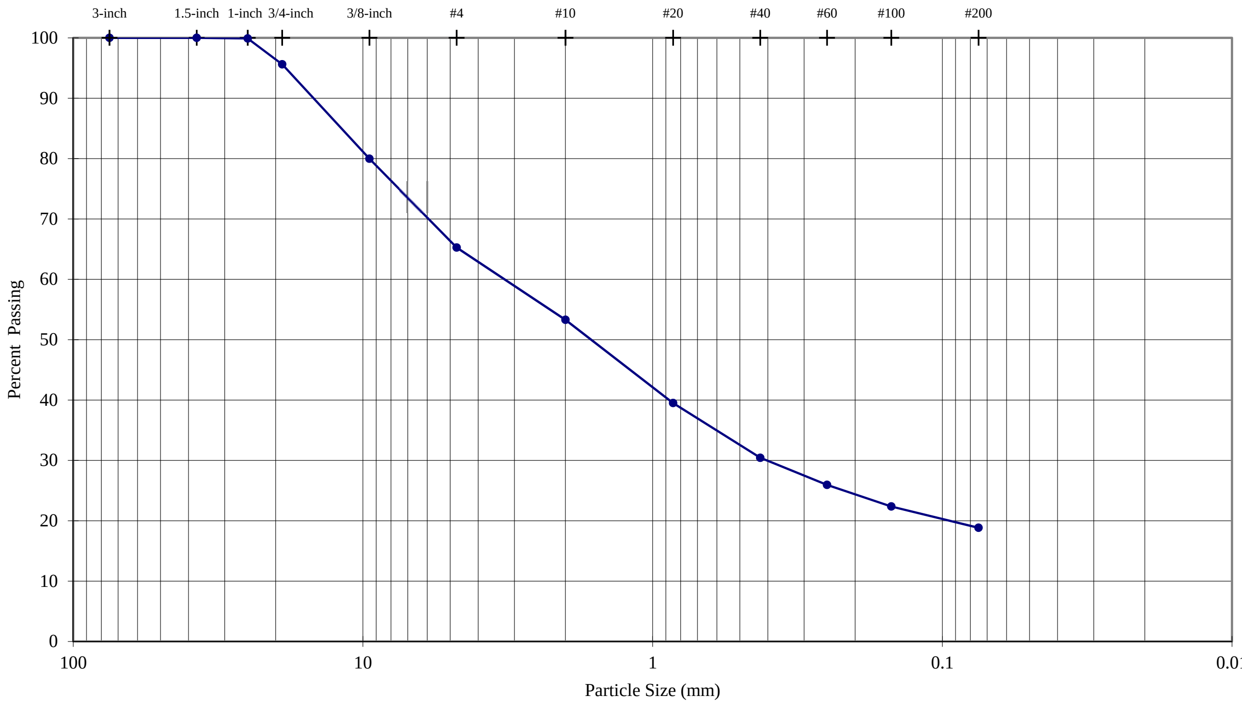
Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	3/4/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

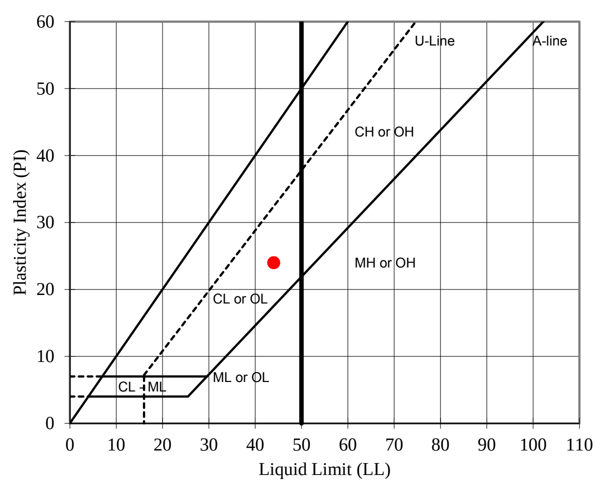
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Composite #4** DEPTH (ft): **0-10**
TYPE: **Pails**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.9**
3/4-inch	19.0	**95.6**
3/8-inch	9.5	**80.0**
#4	4.8	**65.3**
#10	2.00	**53.3**
#20	0.85	**39.5**
#40	0.43	**30.4**
#60	0.25	**26.0**
#100	0.15	**22.4**
#200	0.075	**18.8**

Description	Percentage
Coarse Gravel	**4.38**
Fine Gravel	**30.35**
Coarse Sand	**11.97**
Medium Sand	**22.86**
Fine Sand	**11.60**
Silt or Clay Fines	**18.84**



LL	PL	PI	SpG
44	**20**	**24**	**2.70**

USCS Description (ASTM D 2487):
Clayey sand with gravel, brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

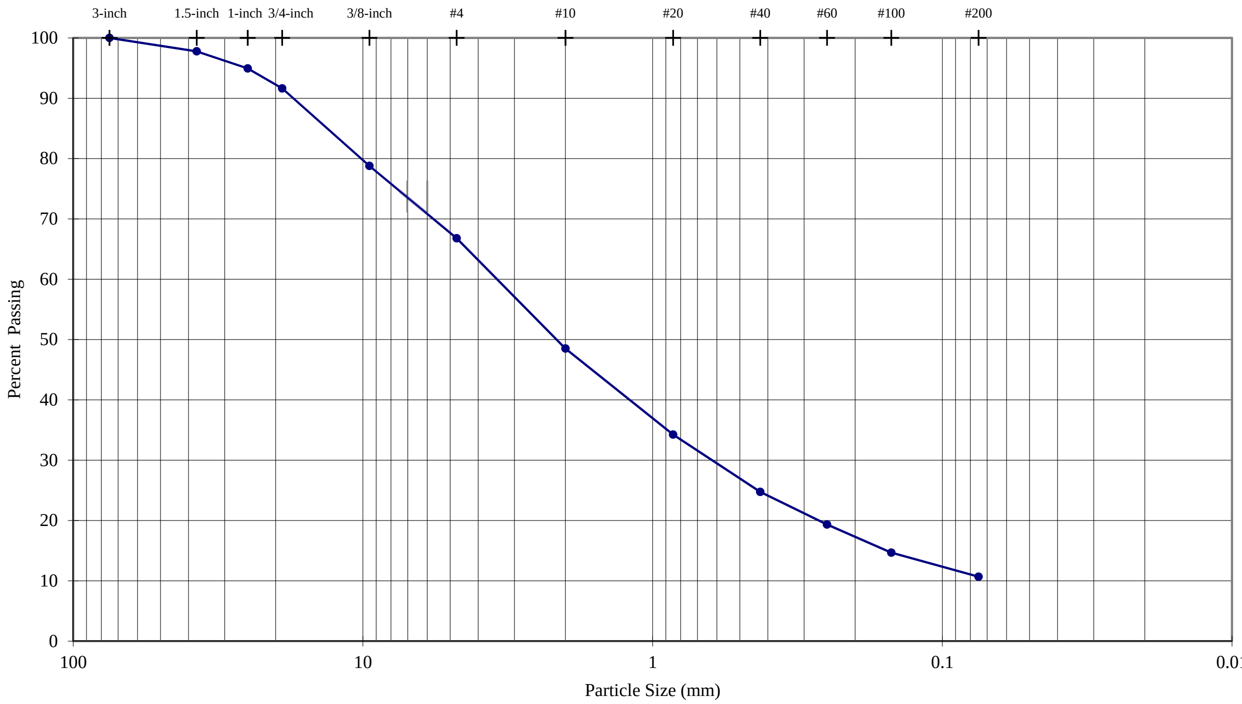
TECH	AMS
DATE	3/4/2013
REVIEW	MB

February-13 **103-92557.006**

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

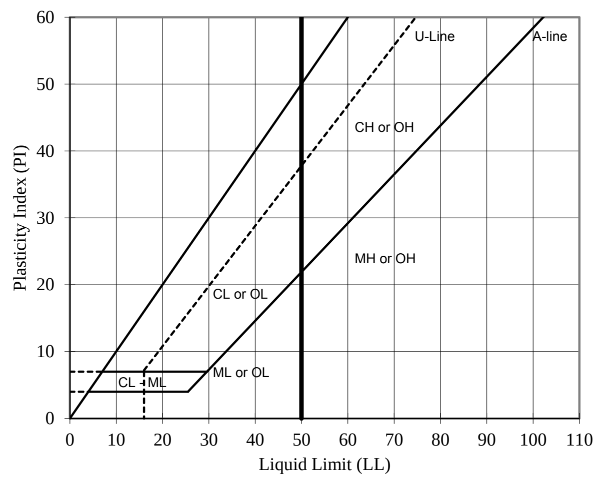
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-5** DEPTH (ft): **3-7**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**97.8**
1-inch	25.0	**94.9**
3/4-inch	19.0	**91.6**
3/8-inch	9.5	**78.8**
#4	4.8	**66.8**
#10	2.00	**48.5**
#20	0.85	**34.2**
#40	0.43	**24.7**
#60	0.25	**19.3**
#100	0.15	**14.7**
#200	0.075	**10.7**

Description	Percentage
Coarse Gravel	**8.37**
Fine Gravel	**24.84**
Coarse Sand	**18.28**
Medium Sand	**23.77**
Fine Sand	**14.07**
Silt or Clay Fines	**10.68**



LL	PL	PI
#VALUE!	**#DIV/0!**	**#VALUE!**

Visual Description (Golder Procedure):
gravelly SAND, some non-plastic fines, yellowish brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: --

Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed

TECH	AMS
DATE	2/27/2013
REVIEW	MB

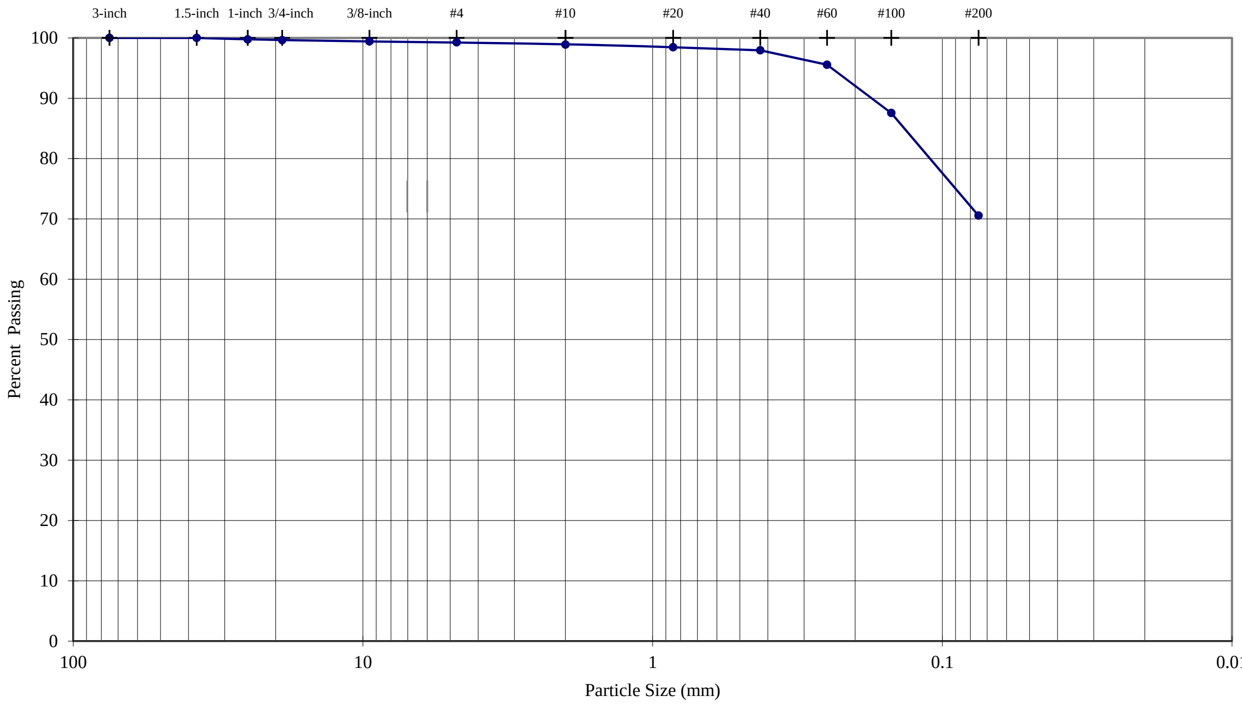
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **TP-10** DEPTH (ft): **3-5(12)**

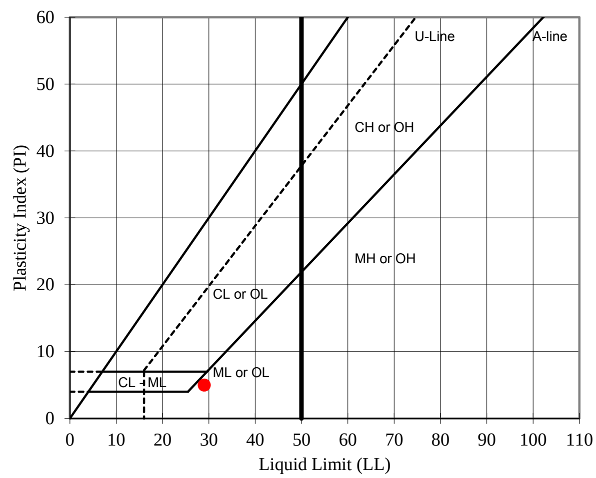
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**99.8**
3/4-inch	19.0	**99.6**
3/8-inch	9.5	**99.4**
#4	4.8	**99.3**
#10	2.00	**98.9**
#20	0.85	**98.5**
#40	0.43	**97.9**
#60	0.25	**95.6**
#100	0.15	**87.6**
#200	0.075	**70.6**

Description	Percentage
Coarse Gravel	**0.37**
Fine Gravel	**0.36**
Coarse Sand	**0.38**
Medium Sand	**0.95**
Fine Sand	**27.39**
Silt or Clay Fines	**70.55**



USCS Description (ASTM D 2487):

Silt with sand, yellowish brown, dry

LL	PL	PI
29	**24**	**5**

As-Received Moisture Content (%): --

USCS Group Symbol: ML

Notes: 0g of particles up to 37.5mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AMS
DATE	3/1/2013
REVIEW	MB

February-13 103-92557.006

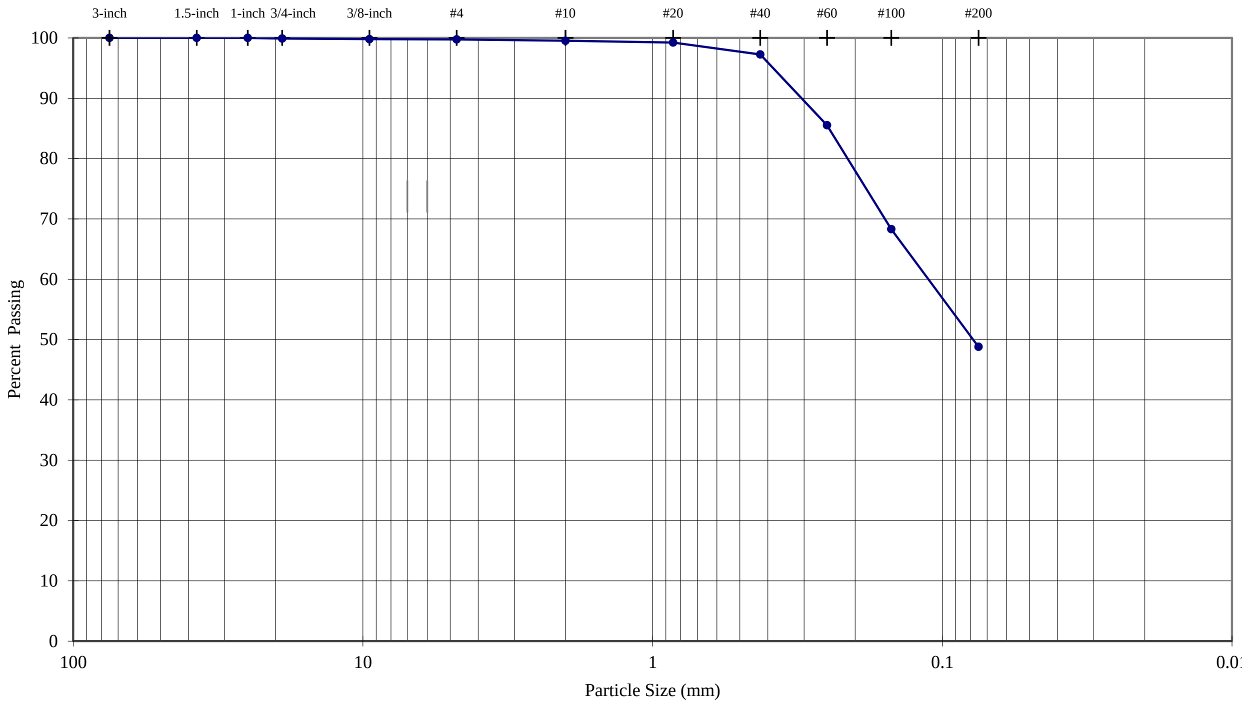
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **TP-11** DEPTH (ft): **3-11**

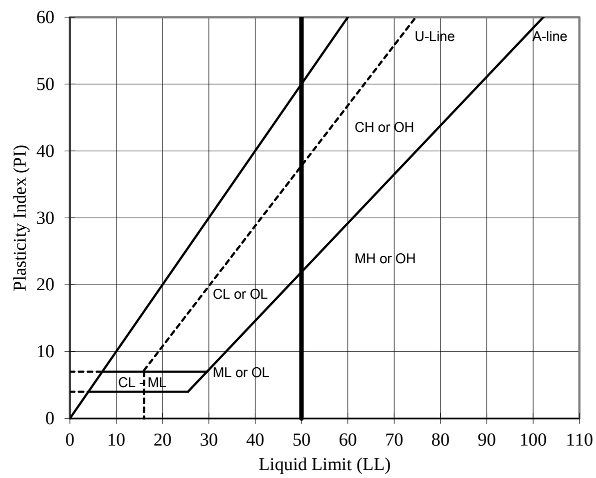
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**100.0**
1-inch	25.0	**100.0**
3/4-inch	19.0	**99.9**
3/8-inch	9.5	**99.8**
#4	4.8	**99.8**
#10	2.00	**99.5**
#20	0.85	**99.2**
#40	0.43	**97.3**
#60	0.25	**85.5**
#100	0.15	**68.3**
#200	0.075	**48.8**

Description	Percentage
Coarse Gravel	**0.11**
Fine Gravel	**0.14**
Coarse Sand	**0.22**
Medium Sand	**2.27**
Fine Sand	**48.47**
Silt or Clay Fines	**48.80**



LL	PL	PI	SpG
NP	**NP**	**NP**	**2.74**

USCS Description (ASTM D 2487):

Silty sand, brownish yellow, moist

As-Received Moisture Content (%): --

USCS Group Symbol: SM

Notes: 0g of particles up to 25.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

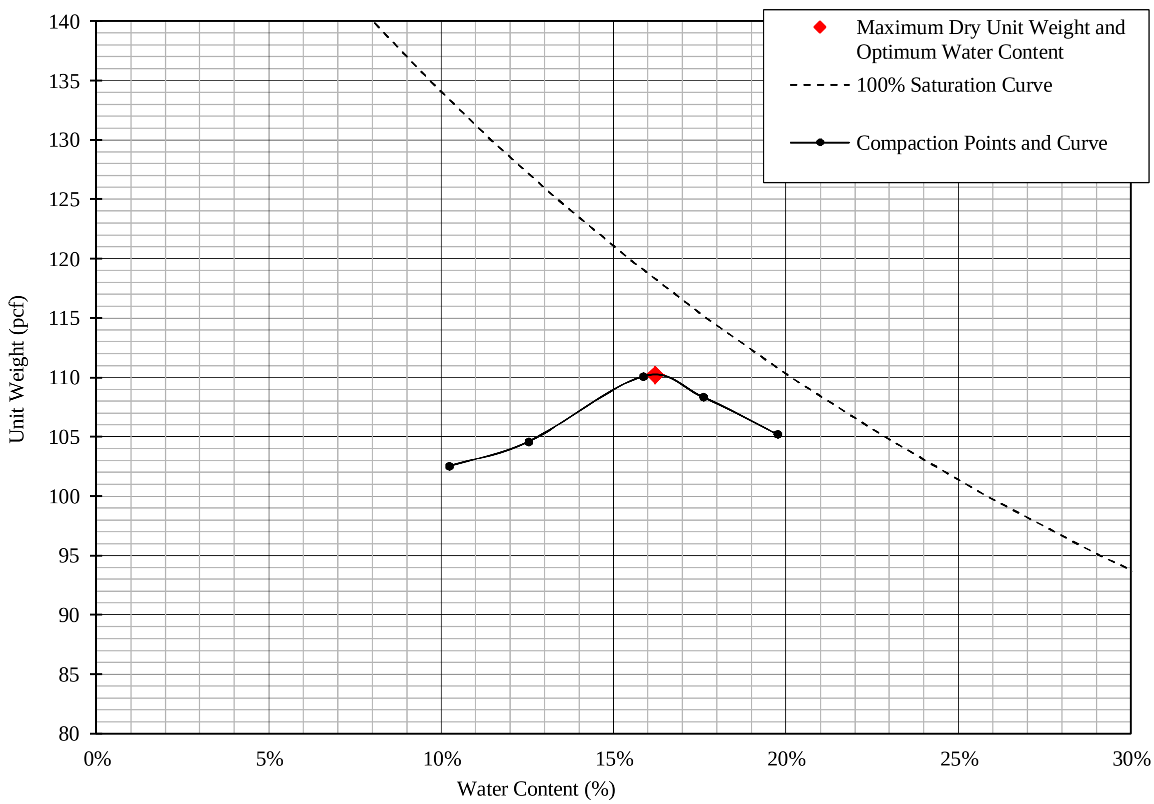
TECH	AM
DATE	2/20/2013
REVIEW	MB

February-13 | 103-92557.006

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Dry Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-11** DEPTH (ft): **3-11**
TYPE: **Pail**



% Test Fraction Passing #4 Sieve	**100%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM D854)	**2.74**

Maximum Dry Unit Weight (pcf)	**110.2**
Optimum Water Content (%)	**16.2**

USCS Description (ASTM D 2487): Silty sand, brownish yellow, moist

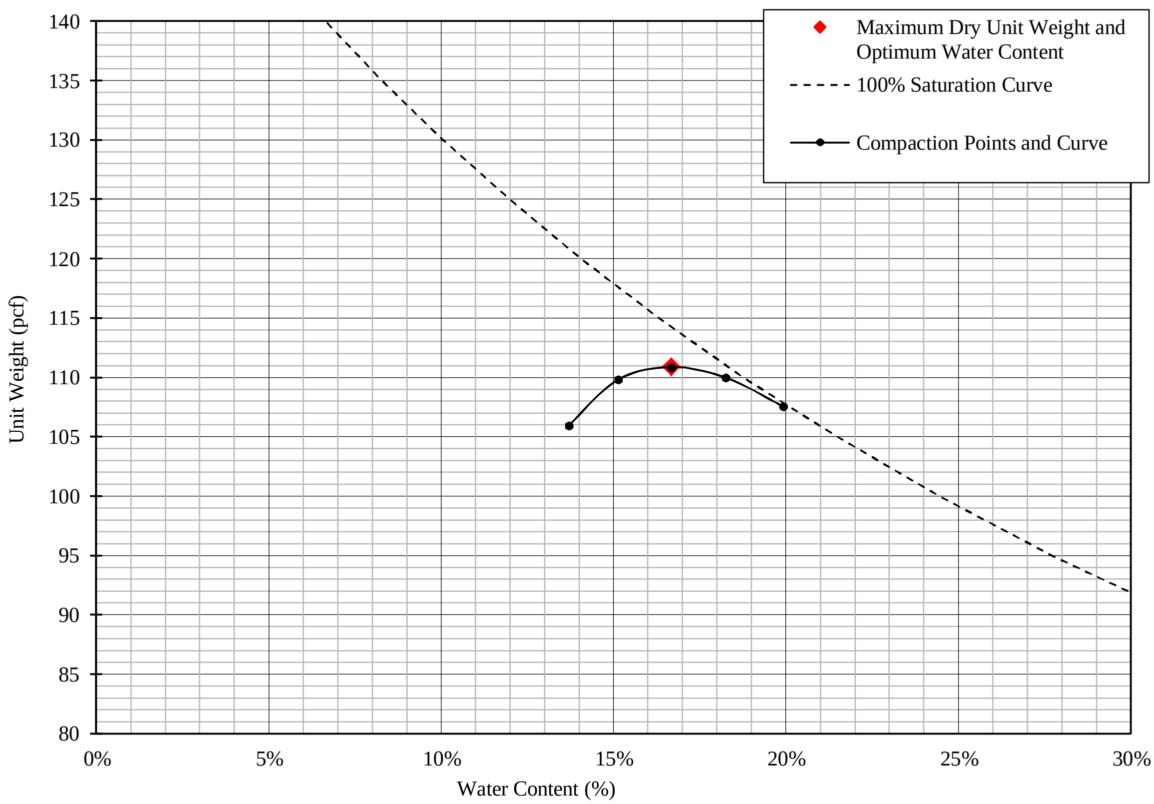
USCS SM

TECH	EH
DATE	2-22-2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-20** DEPTH (ft): **0-4**
TYPE: **Pail/Bag**



% Test Fraction Passing #4 Sieve	**82%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.64**

Maximum Dry Unit Weight (pcf)	**110.9**
Optimum Water Content (%)	**16.7**
Corrected Maximum Dry Unit Weight (pcf)	**116.9**
Corrected Optimum Water Content (%)	**13.9**

USCS Description (ASTM D 2487): Clayey sand with gravel, strong brown, wet

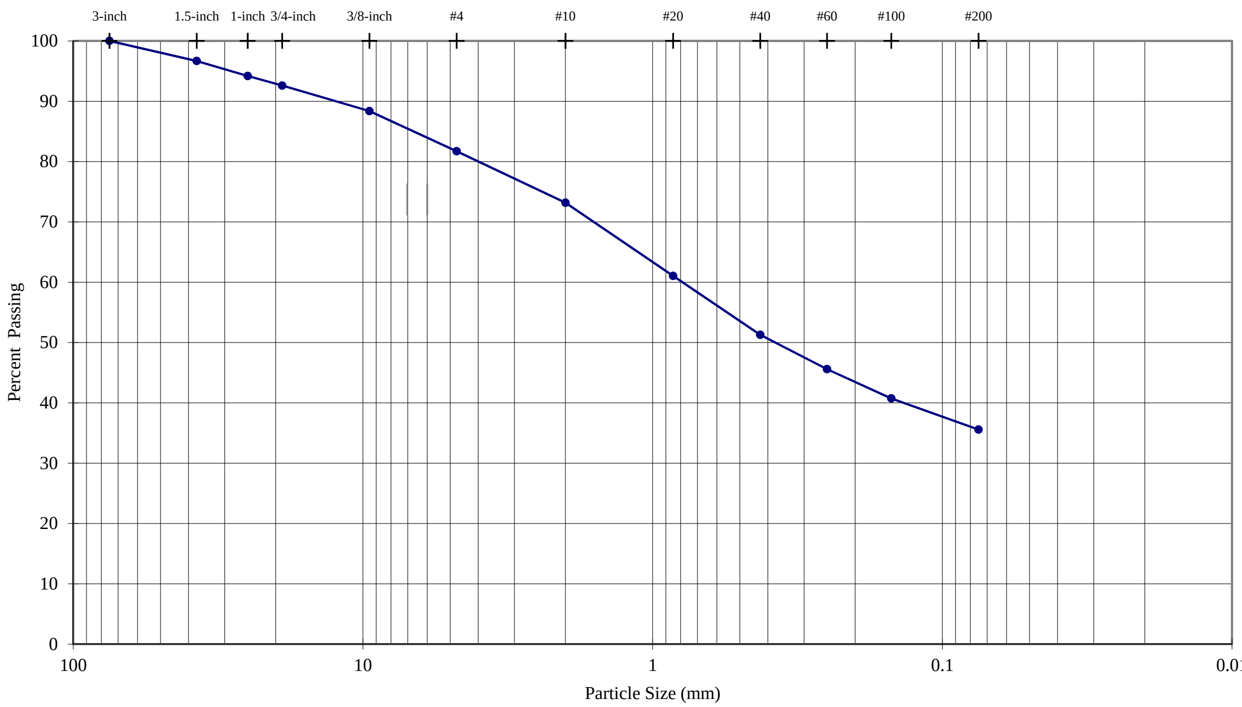
USCS SC

TECH	AM
DATE	2-27-13
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

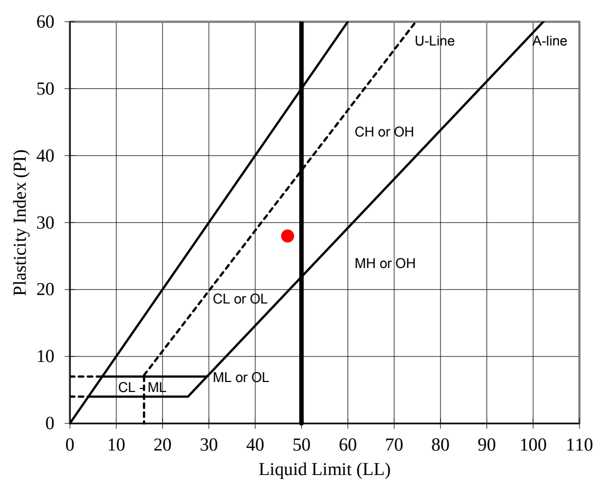
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-20** DEPTH (ft): **0-4**
TYPE: **Pail/Bag**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**96.7**
1-inch	25.0	**94.2**
3/4-inch	19.0	**92.6**
3/8-inch	9.5	**88.4**
#4	4.8	**81.7**
#10	2.00	**73.2**
#20	0.85	**61.0**
#40	0.43	**51.3**
#60	0.25	**45.6**
#100	0.15	**40.7**
#200	0.075	**35.6**

Description	Percentage
Coarse Gravel	**7.40**
Fine Gravel	**10.89**
Coarse Sand	**8.53**
Medium Sand	**21.90**
Fine Sand	**15.70**
Silt or Clay Fines	**35.57**



USCS Description (ASTM D 2487):

Clayey sand with gravel, strong brown, wet

LL	PL	PI
47	**19**	**28**

As-Received Moisture Content (%): --

USCS Group Symbol: SC

Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

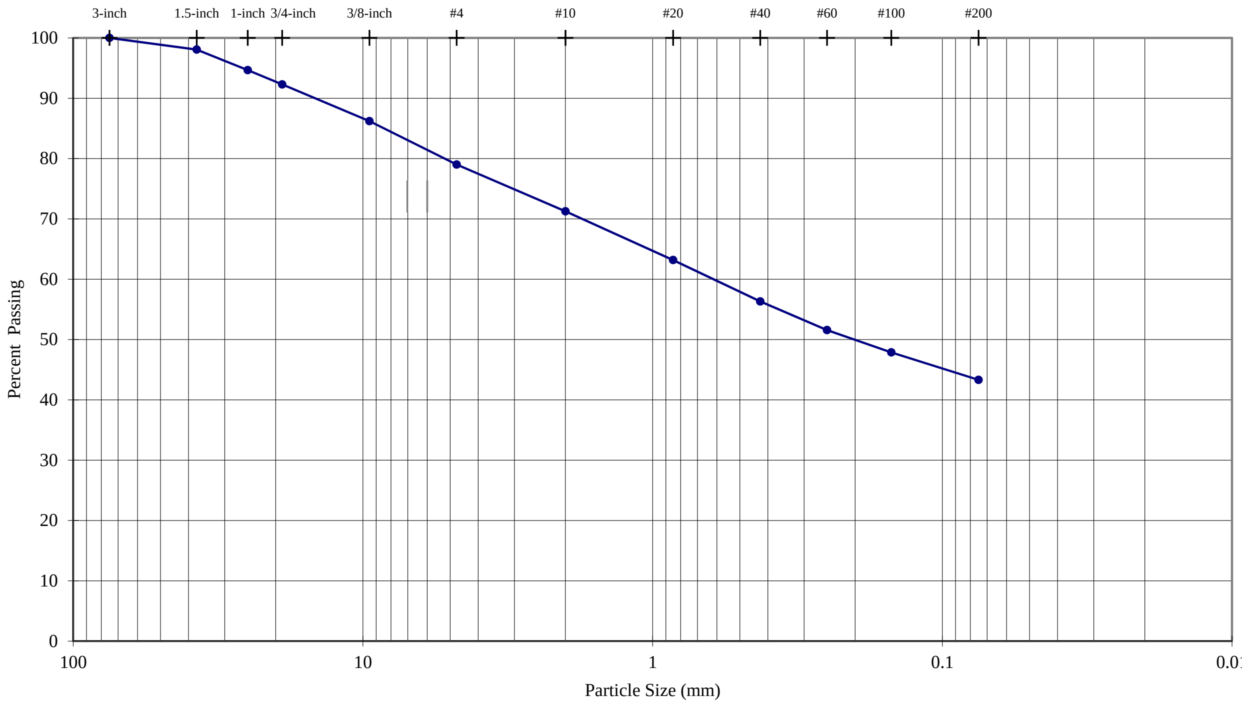
TECH	AMS
DATE	2/25/2013
REVIEW	MB

February-13 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

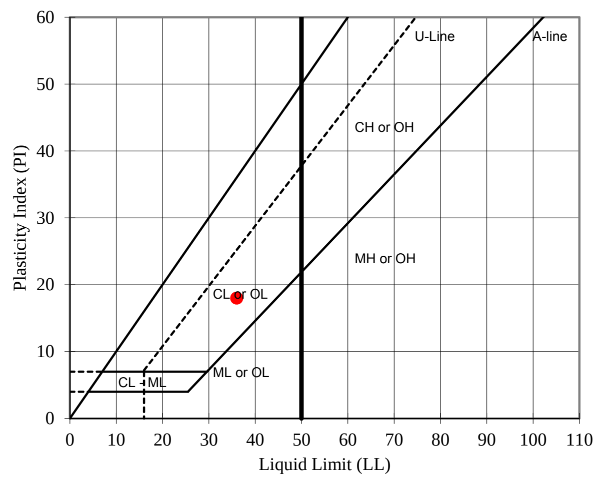
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-20** DEPTH (ft): **4-7**
TYPE: **Pail/Bag**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**98.1**
1-inch	25.0	**94.7**
3/4-inch	19.0	**92.3**
3/8-inch	9.5	**86.2**
#4	4.8	**79.0**
#10	2.00	**71.3**
#20	0.85	**63.2**
#40	0.43	**56.3**
#60	0.25	**51.6**
#100	0.15	**47.9**
#200	0.075	**43.3**

Description	Percentage
Coarse Gravel	**7.71**
Fine Gravel	**13.28**
Coarse Sand	**7.75**
Medium Sand	**14.95**
Fine Sand	**12.99**
Silt or Clay Fines	**43.32**



LL	PL	PI
36	**18**	**18**

USCS Description (ASTM D 2487):
Clayey sand with gravel, brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

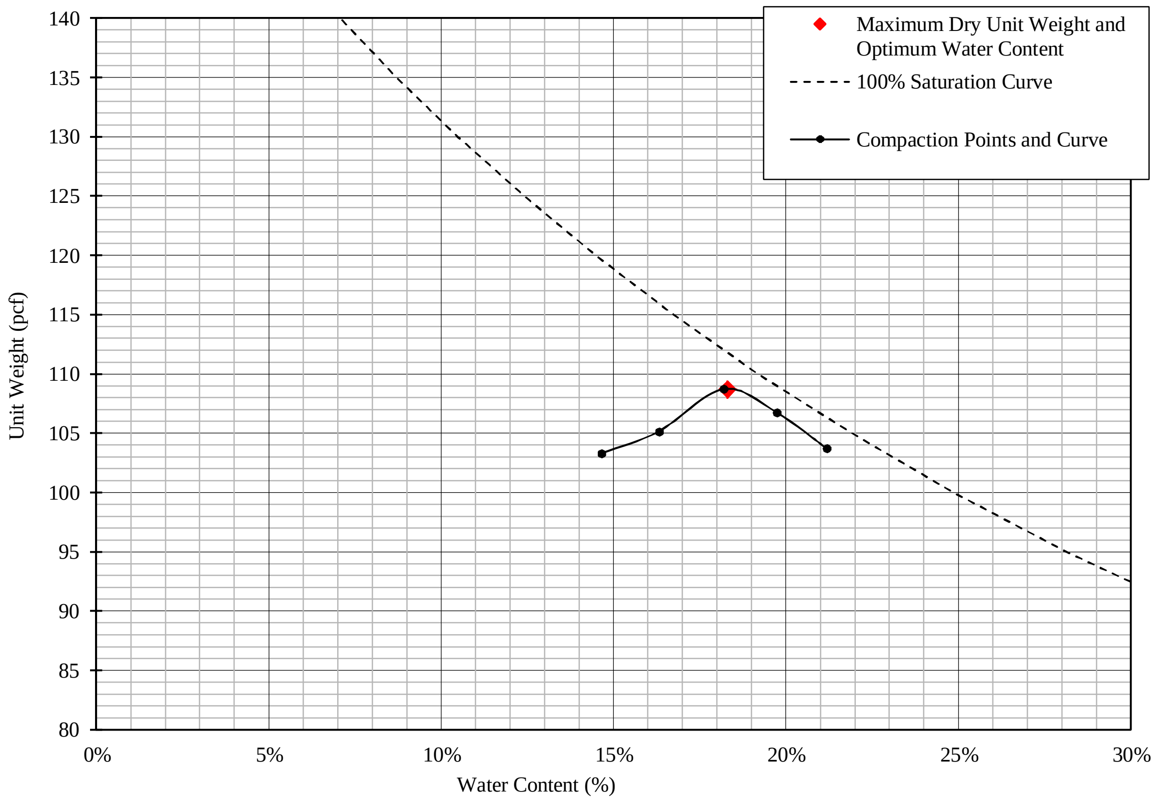
TECH	AMS
DATE	2/25/2013
REVIEW	MB

February-13 103-92557.006

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-20** DEPTH (ft): **4-7**
TYPE: **Pail/Bag**



% Test Fraction Passing #4 Sieve	**79%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.67**

Maximum Dry Unit Weight (pcf)	**108.7**
Optimum Water Content (%)	**18.3**
Corrected Maximum Dry Unit Weight (pcf)	**116.1**
Corrected Optimum Water Content (%)	**14.8**

USCS Description (ASTM D 2487): Clayey sand with gravel, brown, dry

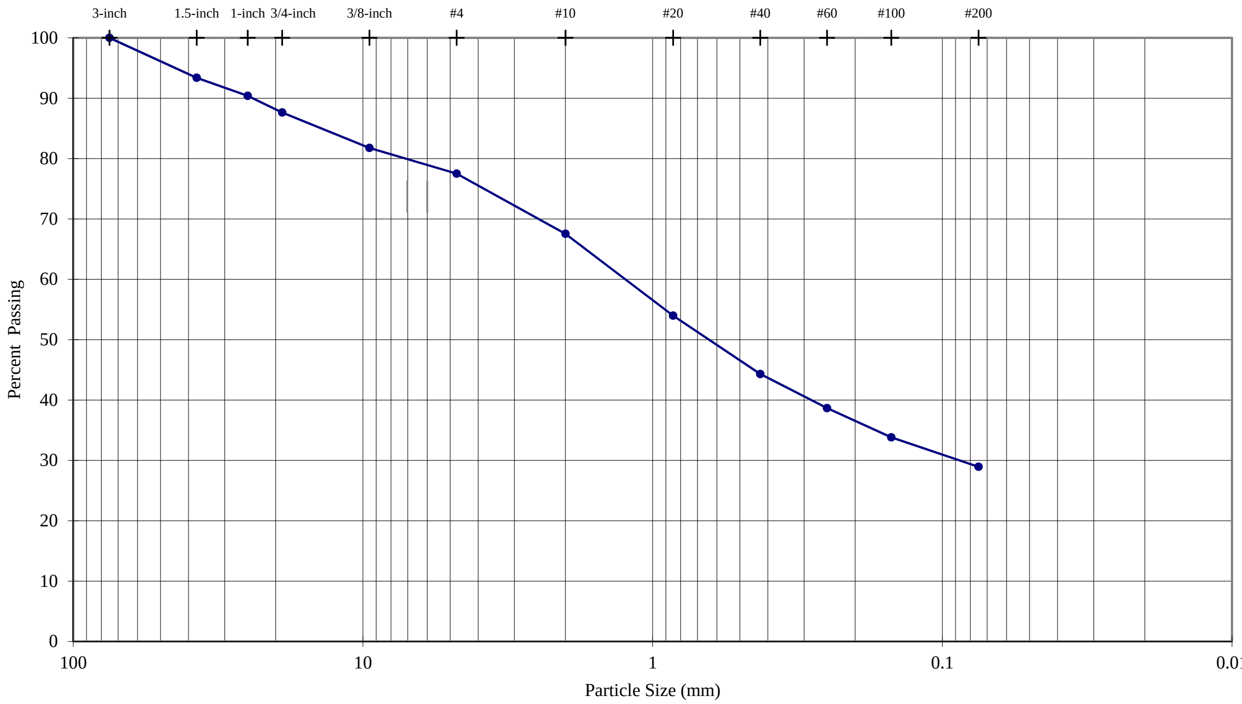
USCS SC

TECH	AMS
DATE	2-28-13
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

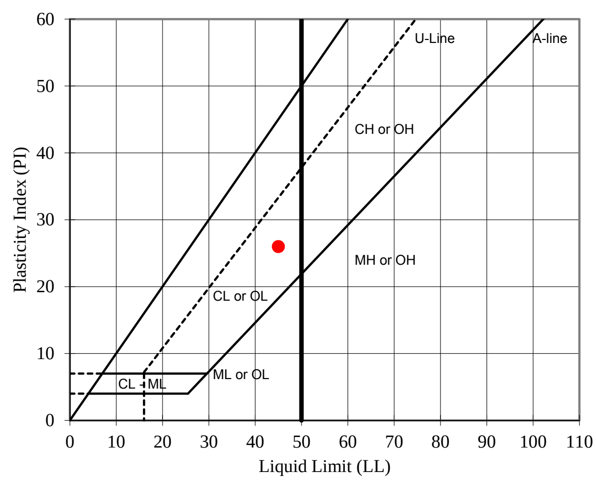
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-24** DEPTH (ft): **3-5**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**93.4**
1-inch	25.0	**90.4**
3/4-inch	19.0	**87.6**
3/8-inch	9.5	**81.8**
#4	4.8	**77.5**
#10	2.00	**67.5**
#20	0.85	**54.0**
#40	0.43	**44.3**
#60	0.25	**38.7**
#100	0.15	**33.8**
#200	0.075	**28.9**

Description	Percentage
Coarse Gravel	**12.37**
Fine Gravel	**10.12**
Coarse Sand	**9.97**
Medium Sand	**23.23**
Fine Sand	**15.37**
Silt or Clay Fines	**28.94**



LL	PL	PI
45	**19**	**26**

USCS Description (ASTM D 2487):
Clayey sand with gravel, yellowish brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

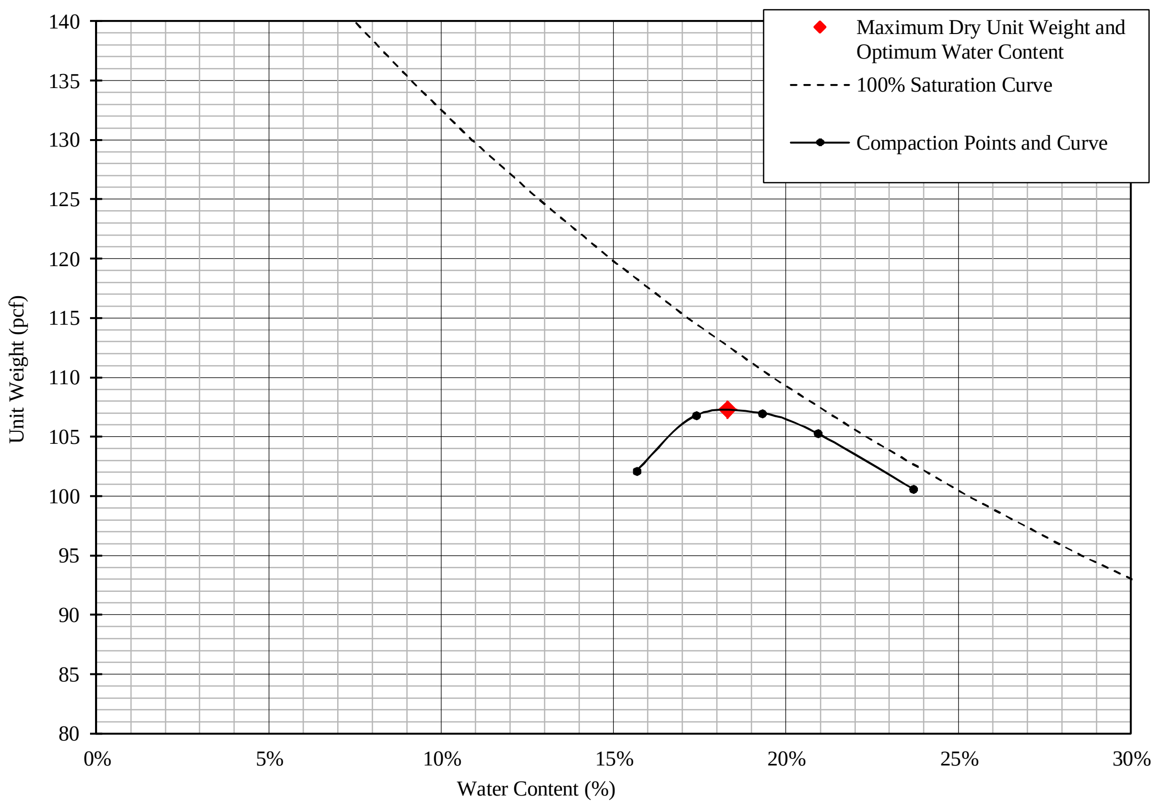
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AM
DATE	2/20/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Dry Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-24** DEPTH (ft): **3-5**
TYPE: **Pail**



% Test Fraction Passing #4 Sieve	**79%**
As-Received Moisture Content	**NA**
Specific Gravity (estimated)	**2.70**

Maximum Dry Unit Weight (pcf)	**107.3**
Optimum Water Content (%)	**18.3**
Corrected Maximum Dry Unit Weight (pcf)	**114.7**
Corrected Optimum Water Content (%)	**14.4**

USCS Description (ASTM D 2487): Clayey sand with gravel, yellowish brown, dry

USCS SC

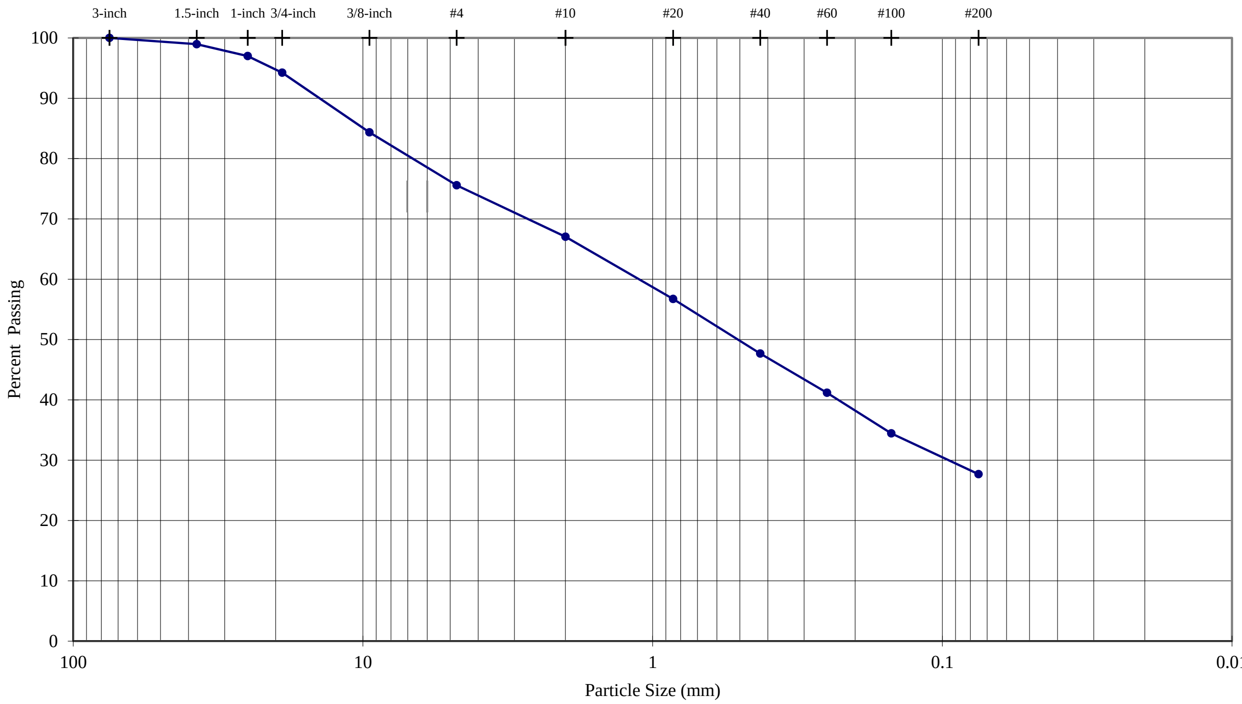
TECH	EH
DATE	2-22-2013
REVIEW	MB

February-13 | 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

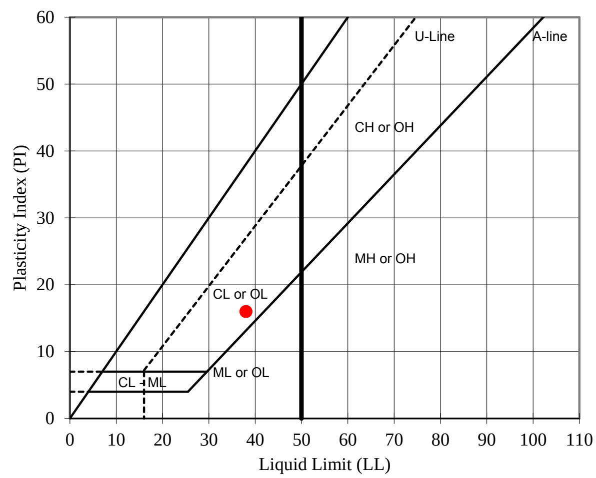
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-27** DEPTH (ft): **0-2**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**99.0**
1-inch	25.0	**97.0**
3/4-inch	19.0	**94.2**
3/8-inch	9.5	**84.4**
#4	4.8	**75.6**
#10	2.00	**67.0**
#20	0.85	**56.7**
#40	0.43	**47.7**
#60	0.25	**41.2**
#100	0.15	**34.4**
#200	0.075	**27.7**

Description	Percentage
Coarse Gravel	**5.76**
Fine Gravel	**18.67**
Coarse Sand	**8.53**
Medium Sand	**19.37**
Fine Sand	**19.99**
Silt or Clay Fines	**27.69**



USCS Description (ASTM D 2487):

Clayey sand with gravel, dark yellowish brown, dry

LL	PL	PI
38	**22**	**16**

As-Received Moisture Content (%): **--**

USCS Group Symbol: SC

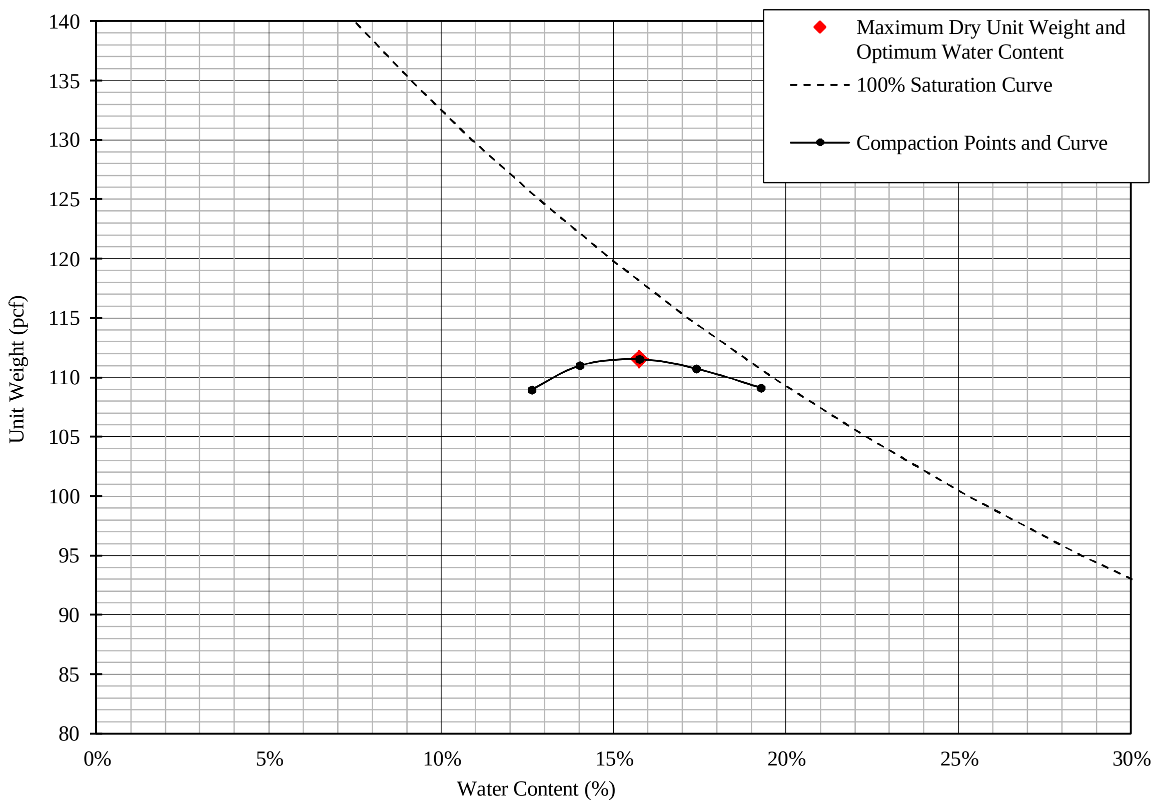
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	MGC
DATE	2/22/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Dry Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-27** DEPTH (ft): **0-2**
TYPE: **Pail**



% Test Fraction Passing #4 Sieve	**76%**
As-Received Moisture Content	**NA**
Specific Gravity (estimated)	**2.70**

Maximum Dry Unit Weight (pcf)	**111.5**
Optimum Water Content (%)	**15.7**
Corrected Maximum Dry Unit Weight (pcf)	**119.9**
Corrected Optimum Water Content (%)	**12.2**

USCS Description (ASTM D 2487): Clayey sand with gravel, dark yellowish brown, dry

USCS SC

TECH	MGC/AMS
DATE	2-26-2013
REVIEW	MB

February-13 103-92557.006

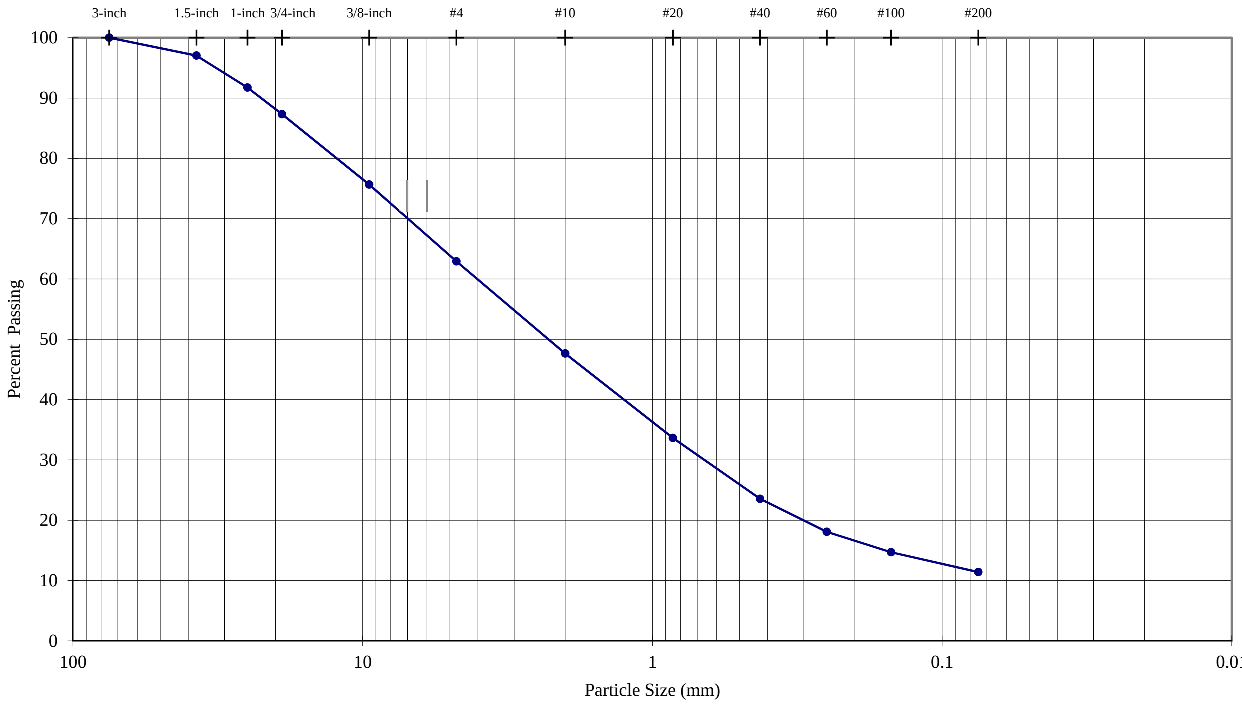
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**

SAMPLE ID: **TP-27** DEPTH (ft): **3-7**

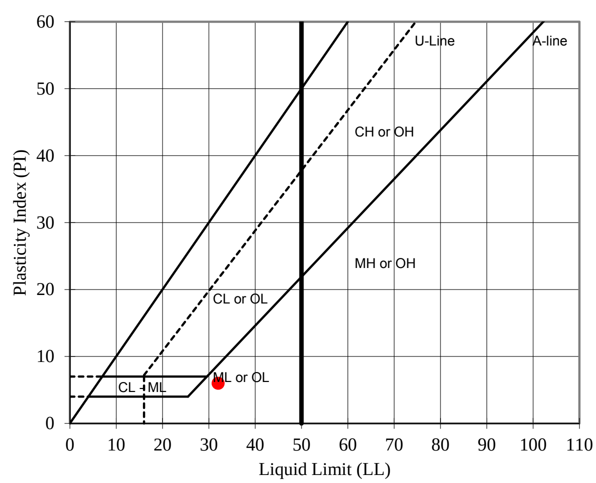
TYPE: **Bag/Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**97.0**
1-inch	25.0	**91.7**
3/4-inch	19.0	**87.3**
3/8-inch	9.5	**75.6**
#4	4.8	**62.9**
#10	2.00	**47.6**
#20	0.85	**33.7**
#40	0.43	**23.6**
#60	0.25	**18.1**
#100	0.15	**14.7**
#200	0.075	**11.4**

Description	Percentage
Coarse Gravel	**12.68**
Fine Gravel	**24.40**
Coarse Sand	**15.27**
Medium Sand	**24.09**
Fine Sand	**12.14**
Silt or Clay Fines	**11.42**



USCS Description (ASTM D 2487):

Well-graded sand with silt and gravel, dark yellowish brown, dry

LL	PL	PI
32	**26**	**6**

As-Received Moisture Content (%): --

USCS Group Symbol: SW-SM

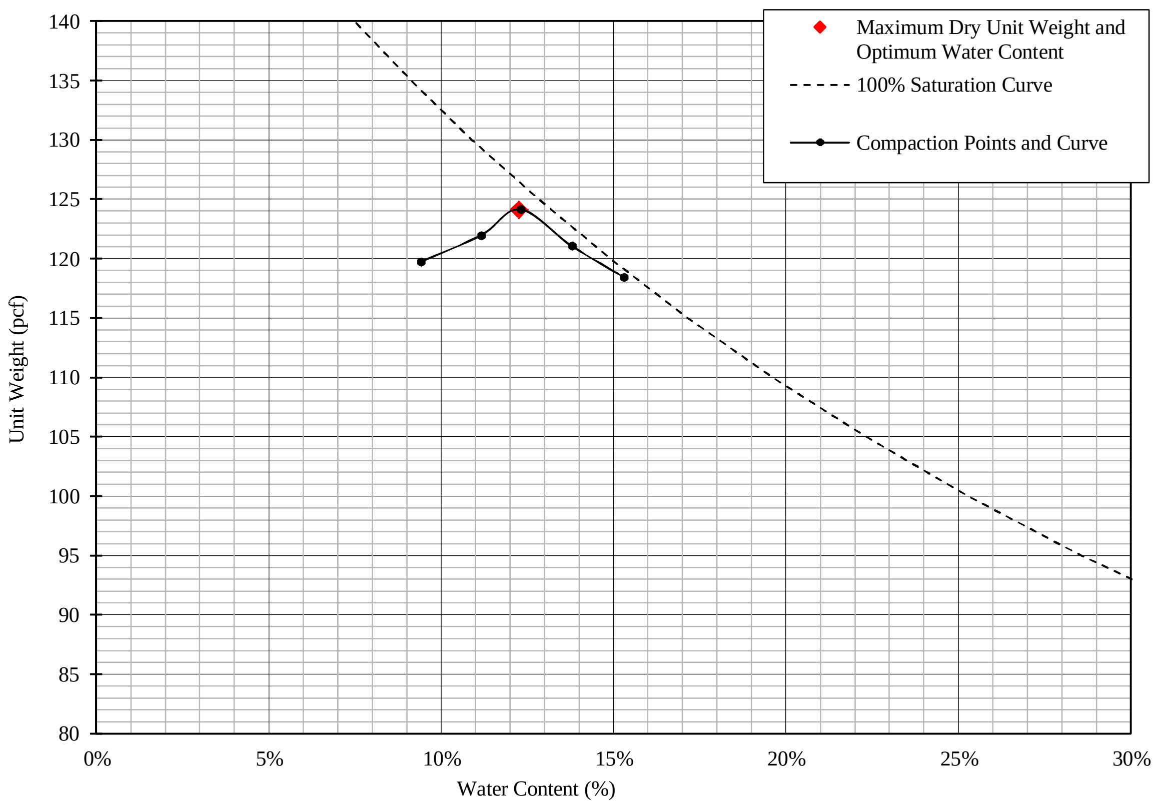
Notes: 0g of particles up to 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	EH
DATE	2/20/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method B

Manual Rammer	Dry Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-27** DEPTH (ft): **3-7**
TYPE: **Bag/Pail**



% Test Fraction Passing 3/8-inch Sieve	**76%**
As-Received Moisture Content	**NA**
Specific Gravity (estimated)	**2.70**

Maximum Dry Unit Weight (pcf)	**124.1**
Optimum Water Content (%)	**12.3**
Corrected Maximum Dry Unit Weight (pcf)	**130.5**
Corrected Optimum Water Content (%)	**9.6**

USCS Description (ASTM D 2487): Well-graded sand with silt and gravel, dark yellowish brown, dry

USCS SW-SM

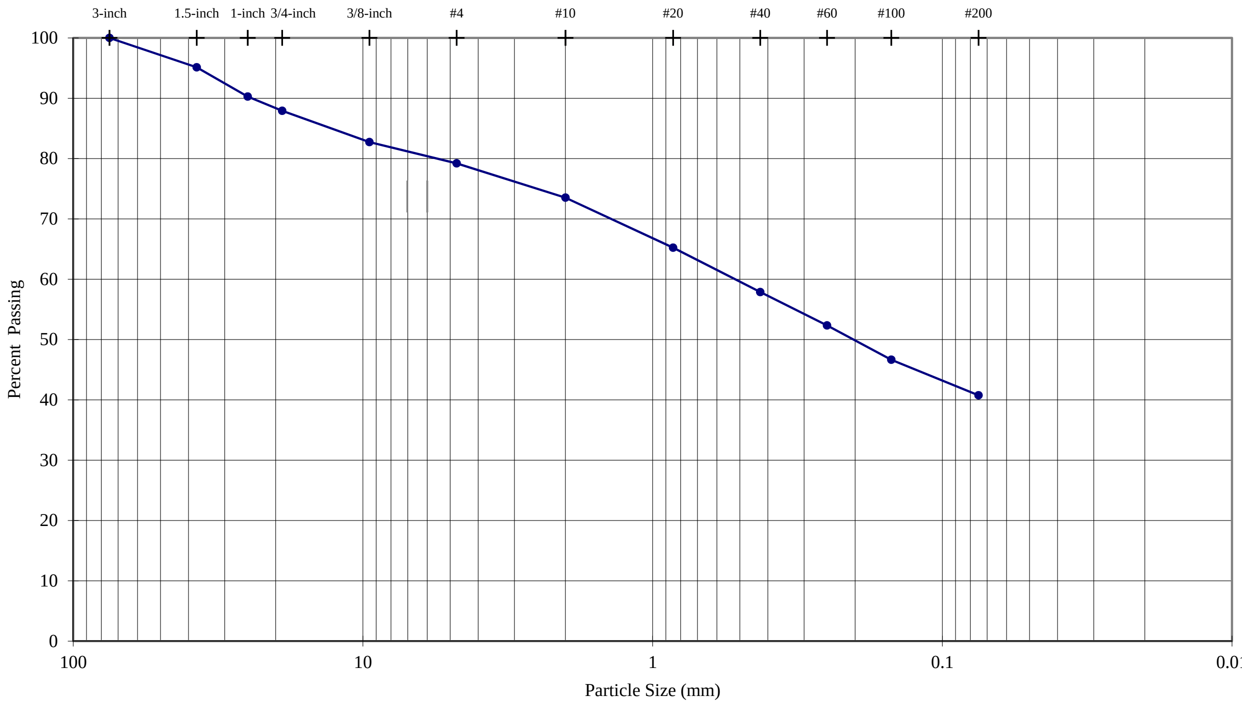
TECH	EH
DATE	3-8-2013
REVIEW	MB

February-13 | 103-92557.006

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

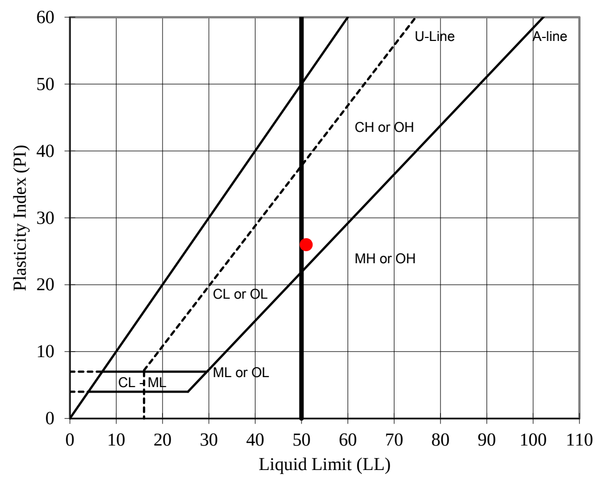
PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-29** DEPTH (ft): **0-2**
TYPE: **Pail**



Sieve Analysis (Initial Separation on No. 4 Sieve)

Sieve	Particle Size (mm)	% Passing
3-inch	75.0	**100.0**
1.5-inch	37.5	**95.1**
1-inch	25.0	**90.3**
3/4-inch	19.0	**87.9**
3/8-inch	9.5	**82.7**
#4	4.8	**79.2**
#10	2.00	**73.5**
#20	0.85	**65.2**
#40	0.43	**57.9**
#60	0.25	**52.3**
#100	0.15	**46.7**
#200	0.075	**40.8**

Description	Percentage
Coarse Gravel	**12.08**
Fine Gravel	**8.71**
Coarse Sand	**5.68**
Medium Sand	**15.66**
Fine Sand	**17.10**
Silt or Clay Fines	**40.76**



LL	PL	PI
51	**25**	**26**

USCS Description (ASTM D 2487):
Clayey sand with gravel, strong brown, dry

As-Received Moisture Content (%): --

USCS Group Symbol: SC

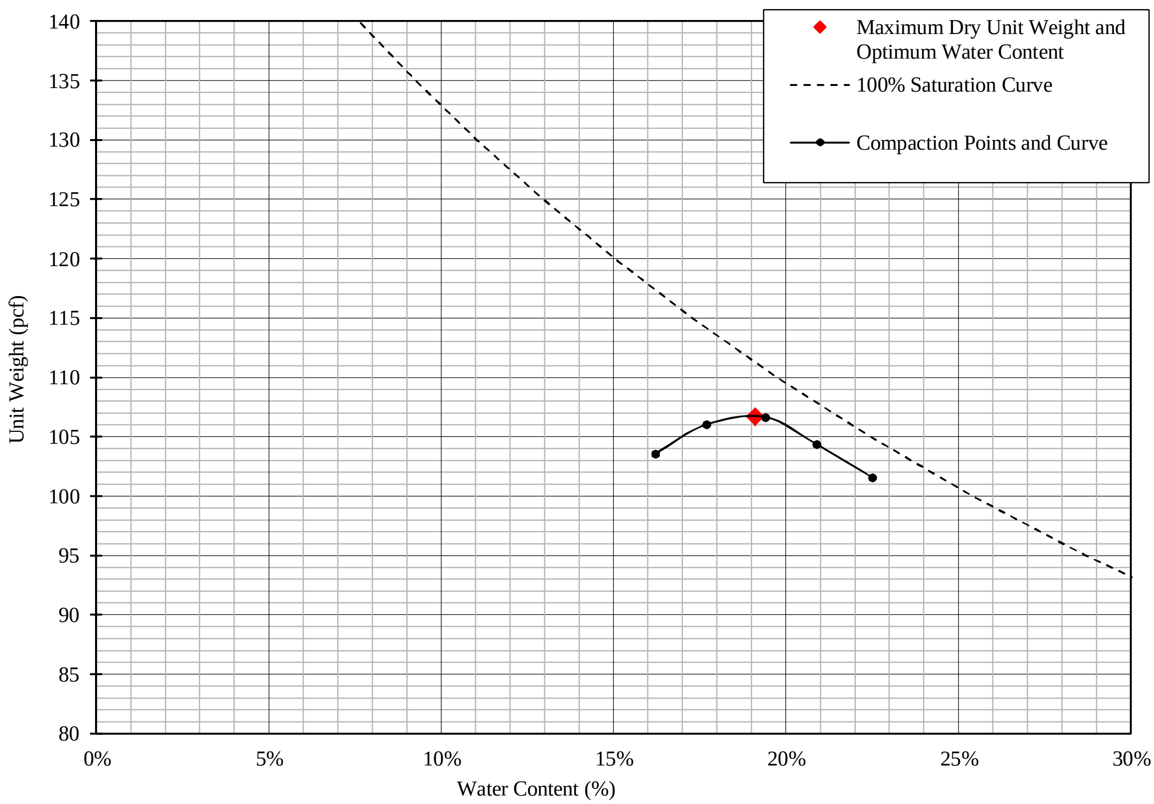
Notes: 0g of particles up to plus 75.0mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample was not mechanically dispersed; hydrometer test was not performed
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AM
DATE	2/21/2013
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **TP-29** DEPTH (ft): **0-2**
TYPE: **Pail**



% Test Fraction Passing #4 Sieve	**80%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM C127)	**2.71**

Maximum Dry Unit Weight (pcf)	**106.7**
Optimum Water Content (%)	**19.1**
Corrected Maximum Dry Unit Weight (pcf)	**114.4**
Corrected Optimum Water Content (%)	**15.5**

USCS Description (ASTM D 2487): Clayey sand with gravel, strong brown, dry

USCS SC

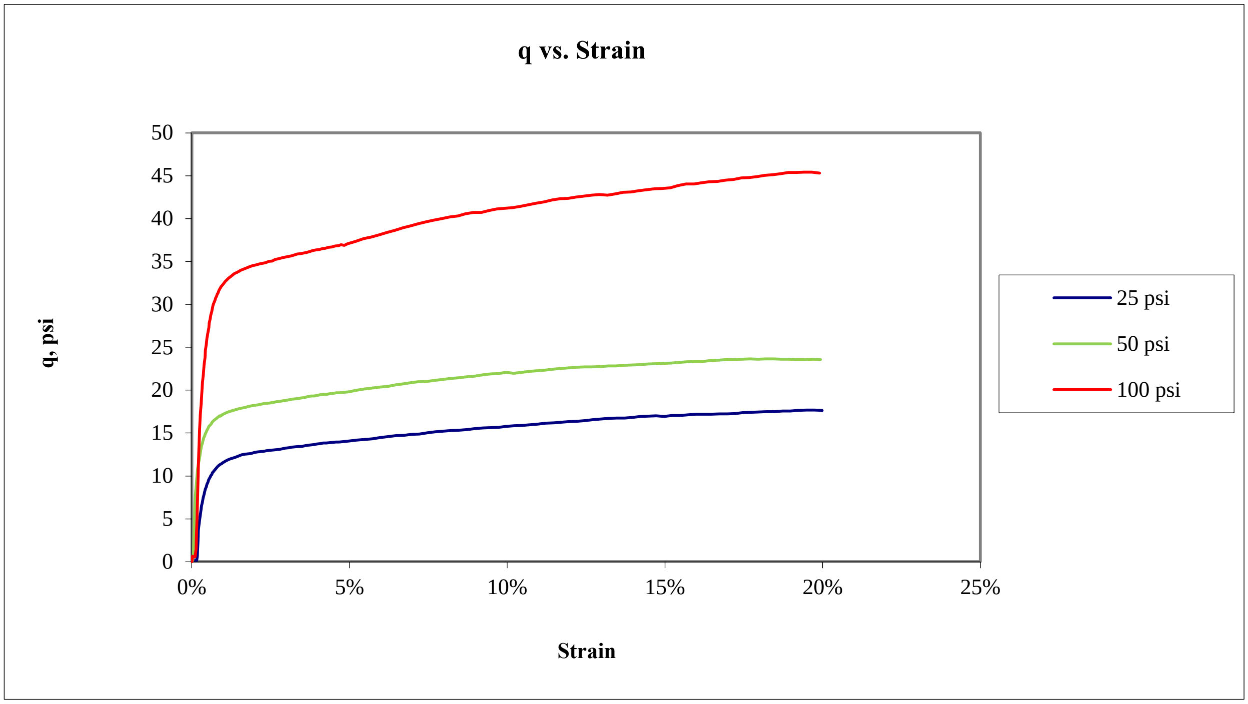
TECH	AM
DATE	2-25-2013
REVIEW	MB

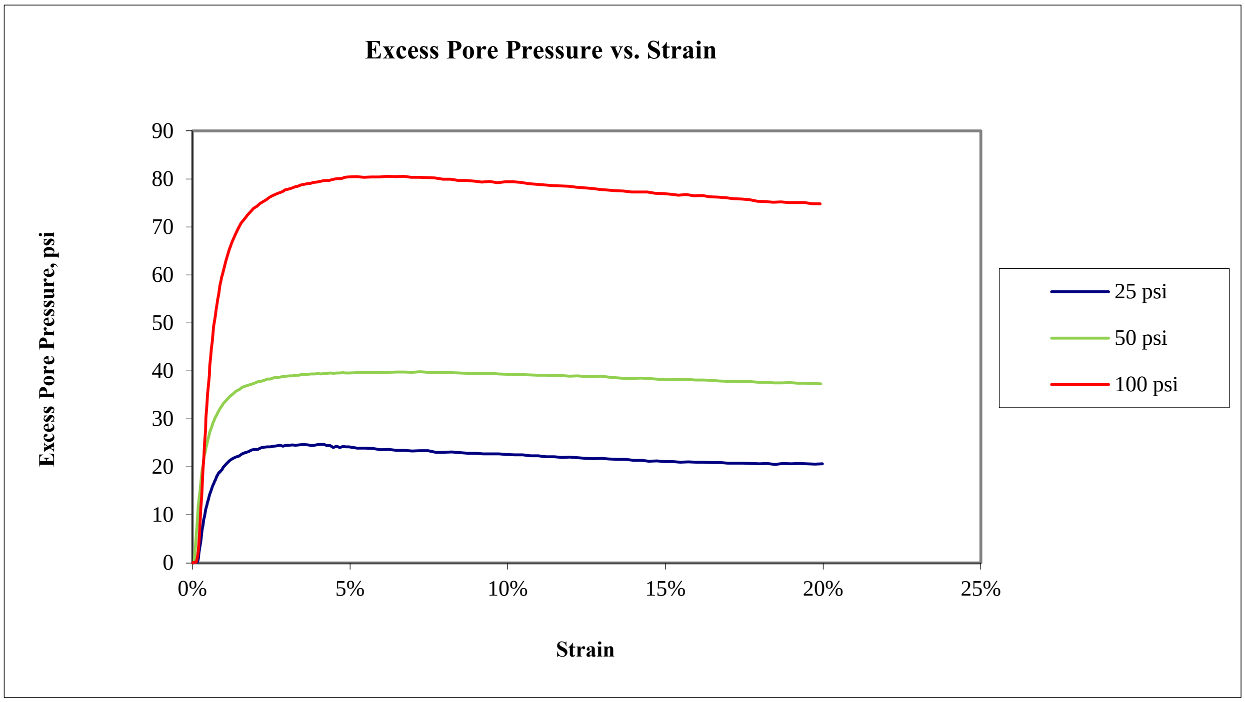
APPENDIX A.3.2
TRIAXIAL TEST REPORTS

	Point 1		Point 2		Point 3	
Boring or Test Pit:	--		--		--	
Sample:	Comp 1-4		Comp 1-4		Comp 1-4	
Depth:	--	ft	--	ft	--	ft
Point No.:	1		2		3	
Initial						
Length =	9.250	in	9.250	in	9.250	in
Diameter =	4.001	in	4.001	in	4.001	in
Wet Mass =	8.517	lb	8.506	lb	8.506	lb
Area =	12.573	in^2	12.573	in^2	12.573	in^2
Volume =	116.297	in^3	116.297	in^3	116.297	in^3
Specific Gravity =	2.64	(Provided)	2.64	(Provided)	2.64	(Provided)
Dry Mass of Solids =	7.355	lb	7.332	lb	7.377	lb
Moisture Content =	15.8%		16.0%		15.3%	
Wet Unit Weight =	126.6	pcf	126.4	pcf	126.4	pcf
Dry Unit Weight =	109.3	pcf	108.9	pcf	109.6	pcf
Void Ratio =	0.51		0.51		0.50	
Percent Saturation =	83%		83%		81%	
After Consolidation						
Length =	9.173	in	9.094	in	9.057	in
Diameter =	3.814	in	3.821	in	3.799	in
Area =	11.424	in^2 (Method B)	11.465	in^2 (Method B)	11.333	in^2 (Method B)
Volume =	104.789	in^3	104.264	in^3	102.647	in^3
Moisture Content =	13.5%		13.4%		12.3%	
Wet Unit Weight =	137.7	pcf	137.8	pcf	139.5	pcf
Dry Unit Weight =	121.3	pcf	121.5	pcf	124.2	pcf
Void Ratio =	0.36		0.35		0.32	
Percent Saturation =	100%		100%		100%	
B Parameter =	0.97		0.98		0.96	
Shear Rate =	0.071%	/min.	0.083%	/min.	0.027%	/min.
t_{50} =	5.6	min.	1.8	min.	14.5	min.
Strain at Failure =	5.0%		5.0%		5.0%	
Cell Pressure =	75	psi	100	psi	150	psi
Back Pressure =	50	psi	50	psi	50	psi
Confining Pressure =	25	psi	50	psi	100	psi

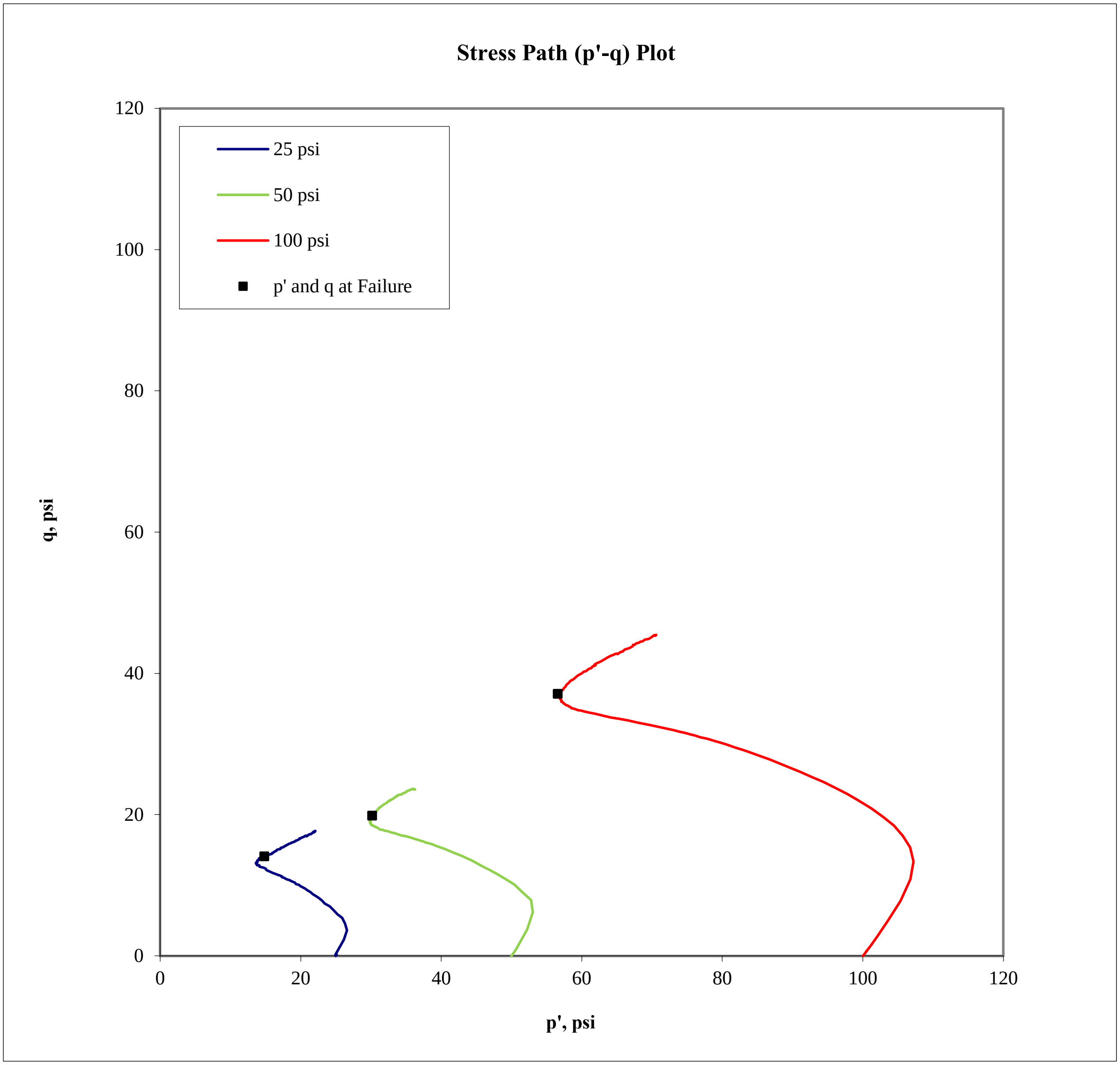
Notes:
- Sample description: Clayey sand with gravel, yellowish brown, moist
- Atterberg limits: LL = -- PL = -- PI = -- (-- indicates test was not performed)
- Percent finer: 3/4 in. = -- No. 4 = -- No. 200 = -- (-- indicates test was not performed)
- Specimen type: [ ] Intact [X] Reconstituted Remold targets: 110.0 pcf (dry) at 16.0% moisture
- Moisture from: [X] Cuttings [ ] Entire specimen
- Saturation method: [X] Wet [ ] Dry
- Failure criterion: [ ] $(\sigma'_1/\sigma'_3)_{max}$ [ ] $(\sigma'_1-\sigma'_3)_{max}$ [5] % strain
- Membrane effect: [X] Corrected [ ] Not Corrected

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SAMPLE AND TEST DATA				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Composite 1-4	Technician: RJM	Reviewed: CCS	Date: 5/3/2013	Job Number: 103-92557.006	Figure: 1





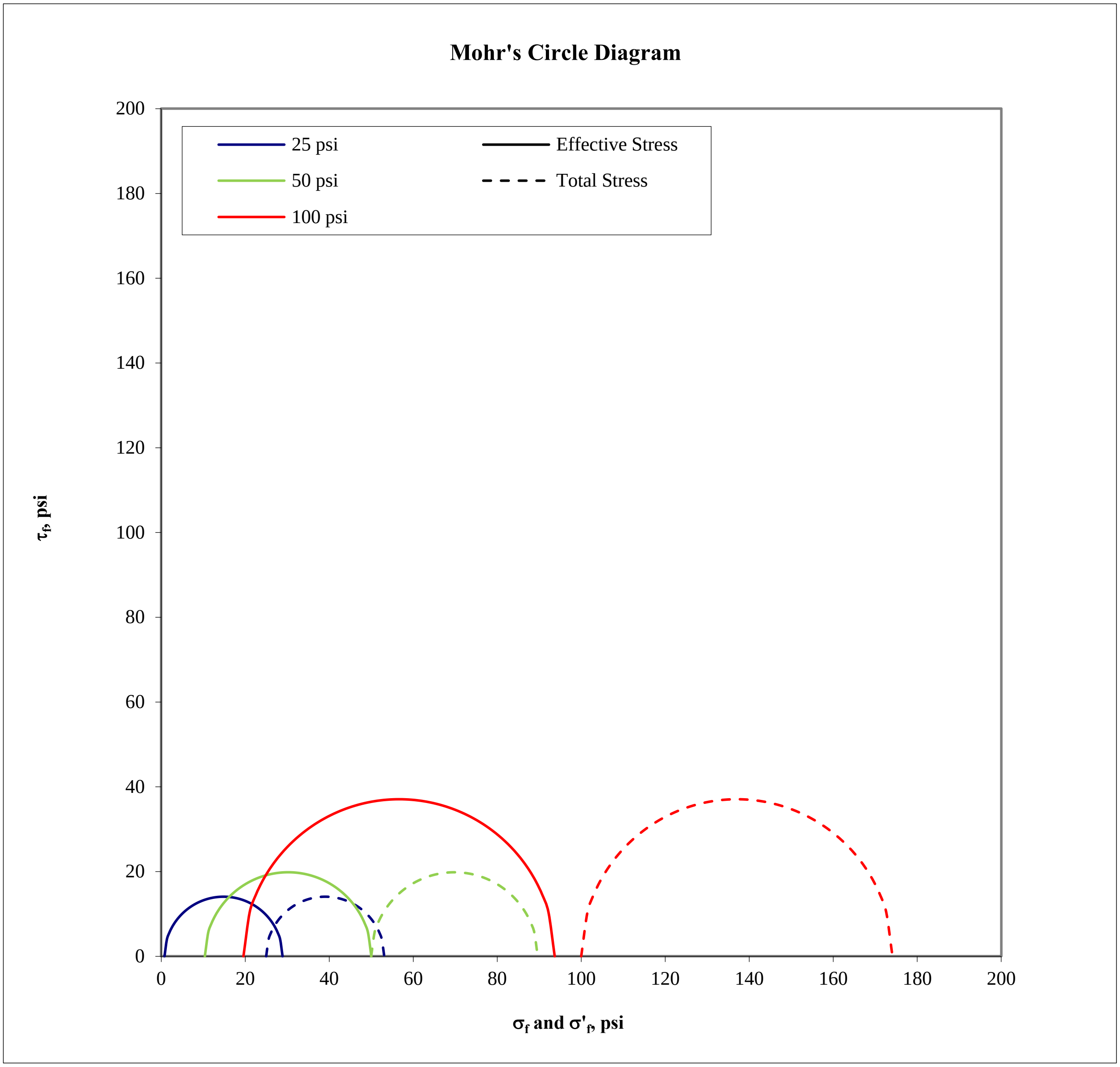
Golder Associates Inc. Denver, Colorado	**Title:** **ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **Composite 1-4**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Date:** **5/3/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
25	39.1	14.8	14.1
50	69.8	30.2	19.8
100	137.0	56.6	37.0

Golder Associates Inc. Denver, Colorado	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Composite 1-4	**RJM**	**CCS**	**5/3/2013**	**103-92557.006**	**3**



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
25	28.9	0.8	53.1	25.0
50	50.0	10.4	89.6	50.0
100	93.7	19.6	174.1	100.0

Golder Associates Inc. Denver, Colorado	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Composite 1-4	**Technician:** RJM	**Reviewed:** CCS	**Date:** 5/3/2013	**Job Number:** 103-92557.006	**Figure:** 4

Golder Associates Inc. Denver, Colorado	Title:
Job Short Title: Copper Flat Tailings Design Study	ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 25 psi

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
Composite 1-4	RJM	CCS	5/3/2013	103-92557.006	5

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Composite 1-4	Technician: RJM	Reviewed: CCS	Date: 5/3/2013	Job Number: 103-92557.006	Figure: 6

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 100 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Composite 1-4	Technician: RJM	Reviewed: CCS	Date: 5/3/2013	Job Number: 103-92557.006	Figure: 7

	Point 1		Point 2		Point 3	
Boring or Test Pit:	--		--		--	
Sample:	BH-16		BH-16		BH-16	
Depth:	0.0 - 8.5	ft	0.0 - 8.5	ft	0.0 - 8.5	ft
Point No.:	1		2		3	
Initial						
Length =	5.751	in	5.785	in	5.764	in
Diameter =	2.882	in	2.812	in	2.877	in
Wet Mass =	2.743	lb	2.734	lb	2.724	lb
Area =	6.523	in^2	6.210	in^2	6.501	in^2
Volume =	37.516	in^3	35.927	in^3	37.471	in^3
Specific Gravity =	2.74	(Provided)	2.74	(Provided)	2.74	(Provided)
Dry Mass of Solids =	2.371	lb	2.367	lb	2.348	lb
Moisture Content =	15.7%		15.5%		16.0%	
Wet Unit Weight =	126.3	pcf	131.5	pcf	125.6	pcf
Dry Unit Weight =	109.2	pcf	113.8	pcf	108.3	pcf
Void Ratio =	0.56		0.50		0.58	
Percent Saturation =	76%		85%		76%	
After Consolidation						
Length =	5.697	in	5.692	in	5.579	in
Diameter =	2.772	in	2.760	in	2.731	in
Area =	6.035	in^2 (Method B)	5.984	in^2 (Method B)	5.859	in^2 (Method B)
Volume =	34.380	in^3	34.058	in^3	32.690	in^3
Moisture Content =	15.8%		15.4%		13.7%	
Wet Unit Weight =	138.0	pcf	138.6	pcf	141.2	pcf
Dry Unit Weight =	119.2	pcf	120.1	pcf	124.1	pcf
Void Ratio =	0.43		0.42		0.38	
Percent Saturation =	100%		100%		100%	
B Parameter =	0.95		0.98		0.95	
Shear Rate =	0.083%	/min.	0.083%	/min.	0.083%	/min.
t_{50} =	2.8	min.	--	(not computed)	0.8	min.
Strain at Failure =	5.0%		5.0%		5.0%	
Cell Pressure =	75	psi	110	psi	150	psi
Back Pressure =	50	psi	60	psi	50	psi
Confining Pressure =	25	psi	50	psi	100	psi

Notes:

Sample description: Clayey gravel with sand, reddish brown, moist

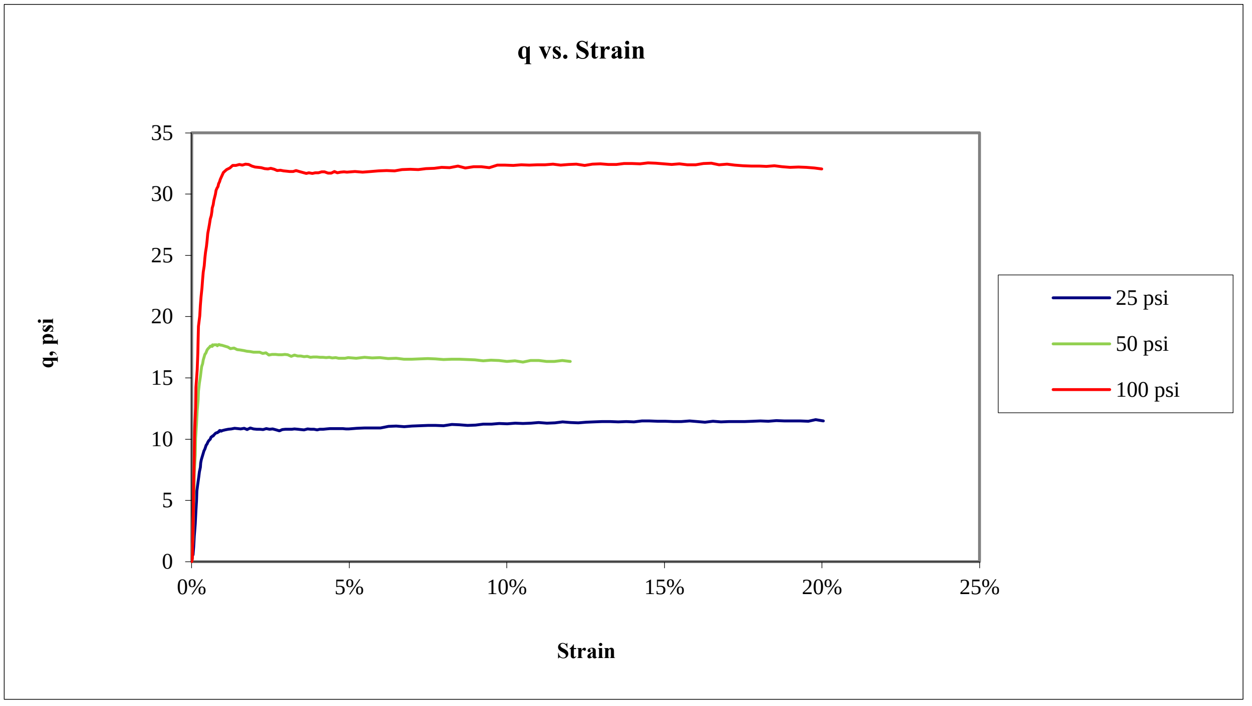
Atterberg limits: LL = 41 PL = 17 PI = 24 (ASTM D4318)

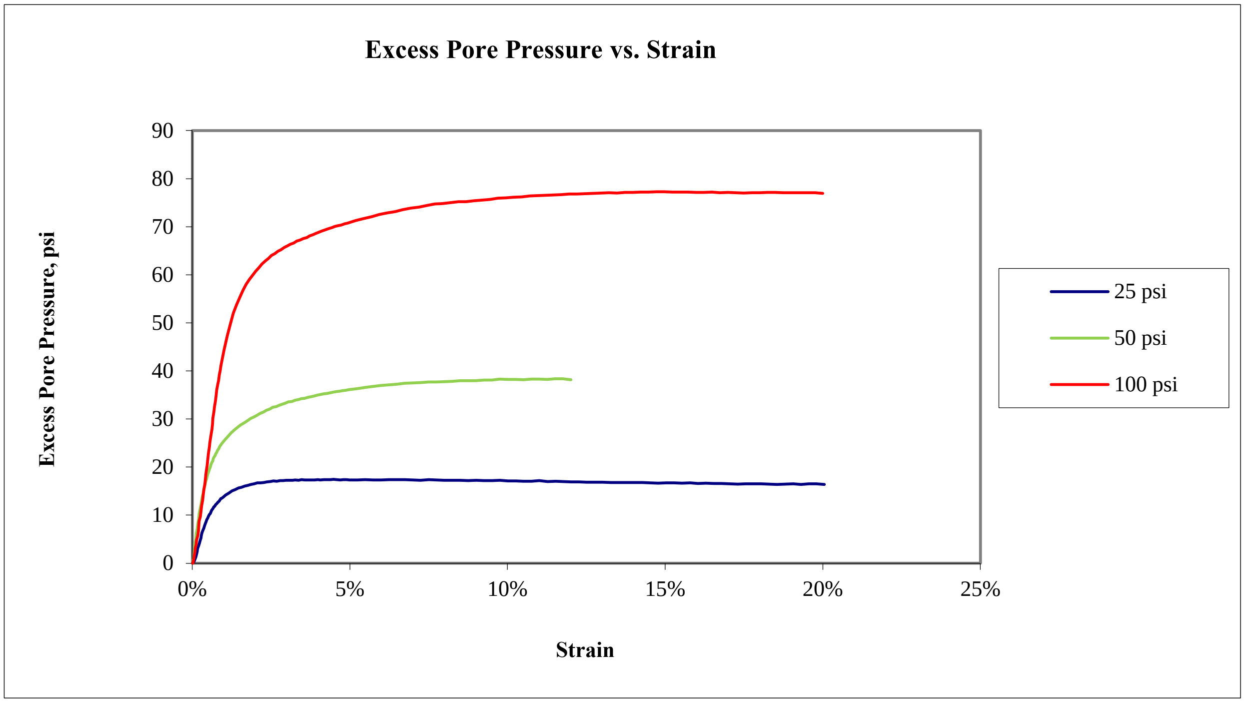
Percent finer: 3/4 in. = 91% No. 4 = 57% No. 200 = 31% (ASTM D422, refer to separate report for gradation curve)

Specimen type:		Intact	X	Reconstituted		Remold targets: 110.0 pcf (dry) at 16.0% moisture
Moisture from:	X	Cuttings		Entire specimen		
Saturation method:	X	Wet		Dry		
Failure criterion:		$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	5	% strain
Membrane effect:	X	Corrected		Not Corrected		

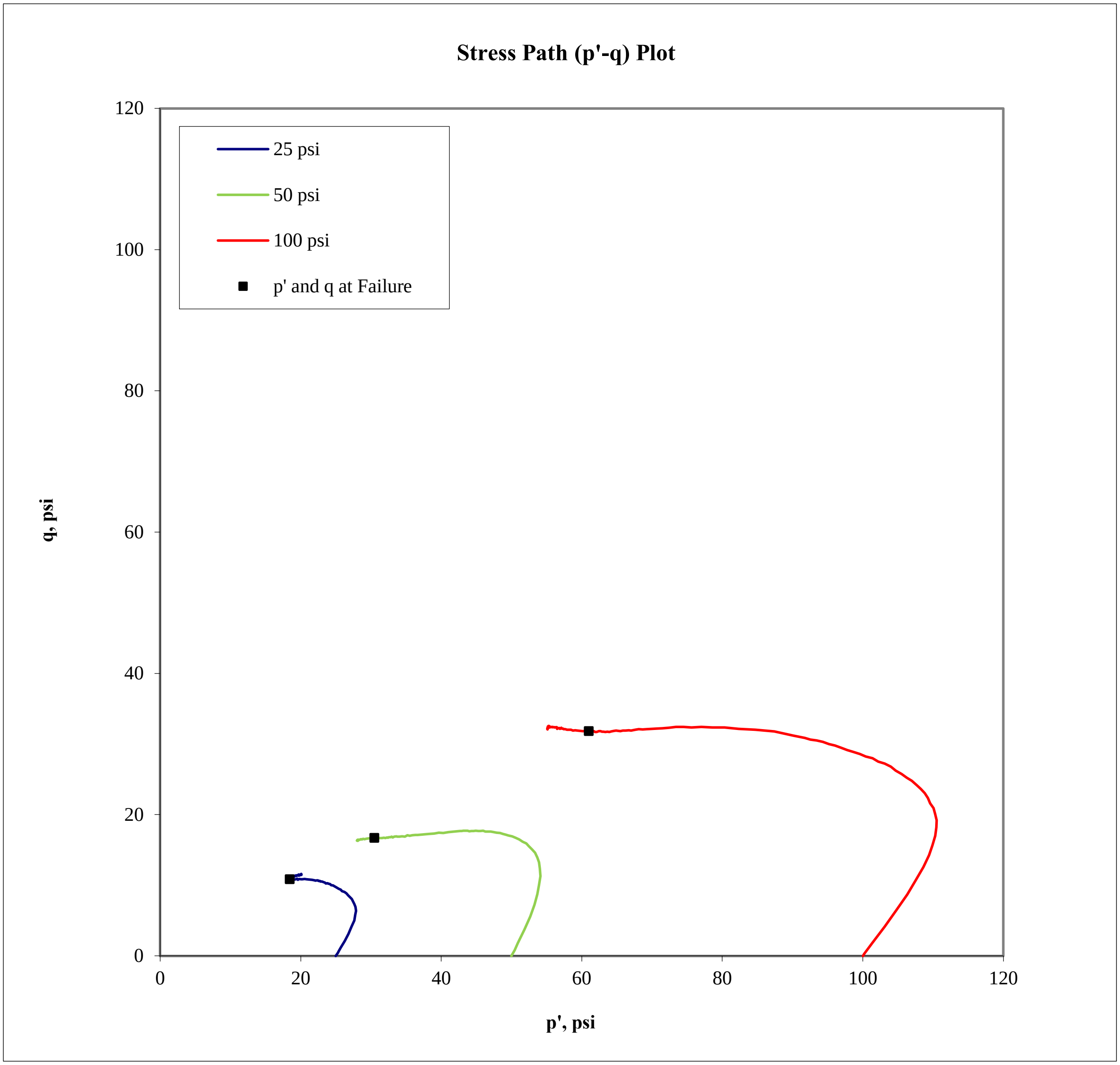
Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
BH-16 @ 0.0 - 8.5 ft	**RJM**	**CCS**	**3/26/2013**	**103-92557.006**	**1**





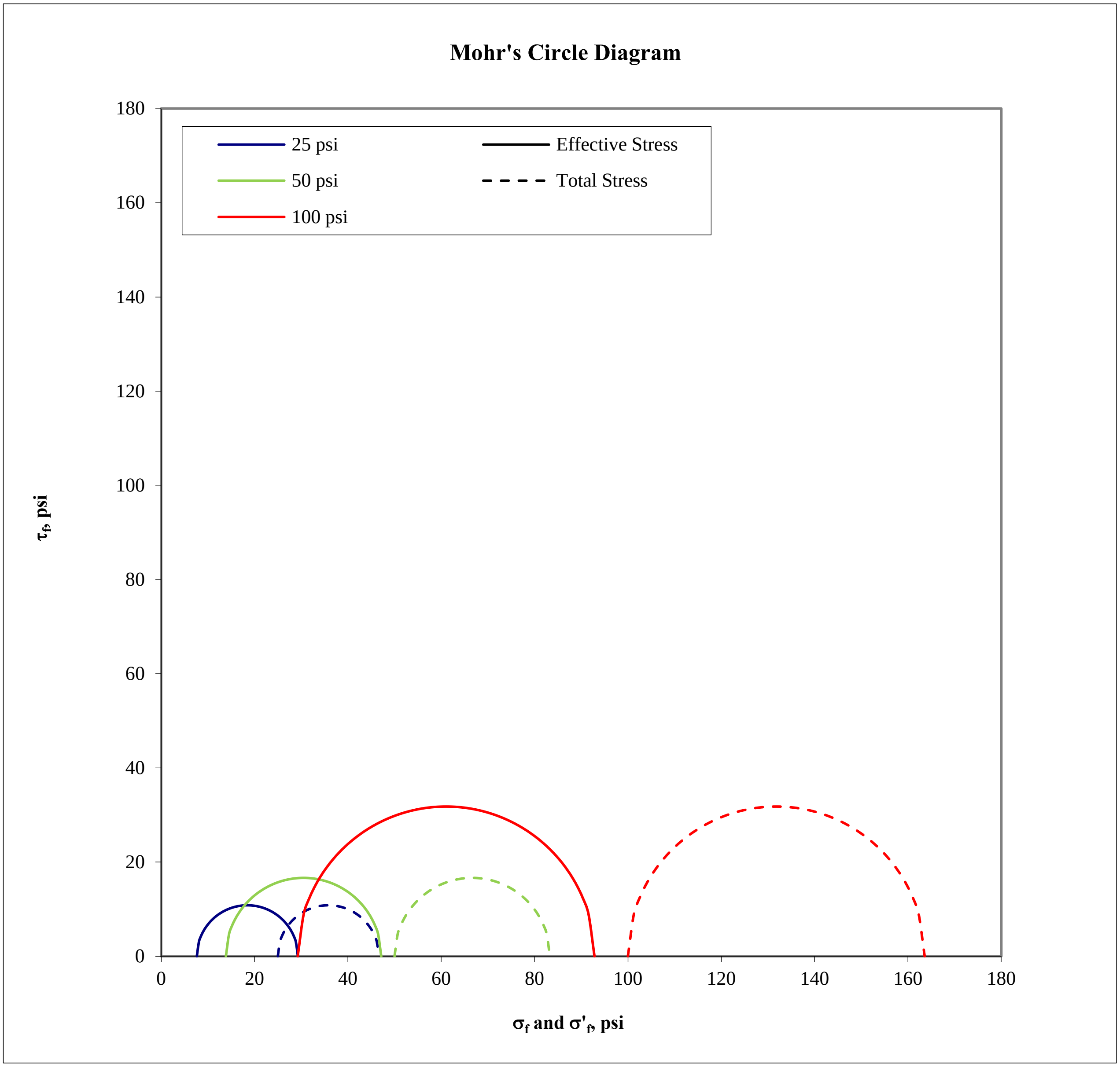
Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-16 @ 0.0 - 8.5 ft	**Technician:** RJM	**Reviewed:** CCS	**Date:** 3/26/2013	**Job Number:** 103-92557.006	**Figure:** 2



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
25	35.8	18.5	10.8
50	66.6	30.5	16.6
100	131.8	61.1	31.8

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
BH-16 @ 0.0 - 8.5 ft	**RJM**	**CCS**	**3/26/2013**	**103-92557.006**	**3**



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
25	29.3	7.6	46.7	25.0
50	47.2	13.9	83.3	50.0
100	92.8	29.3	163.6	100.0

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-16 @ 0.0 - 8.5 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Date:** **3/26/2013**	**Job Number:** **103-92557.006**	**Figure:** **4**

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 25 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-16 @ 0.0 - 8.5 ft	Technician: RJM	Reviewed: CCS	Date: 3/26/2013	Job Number: 103-92557.006	Figure: 5

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-16 @ 0.0 - 8.5 ft	Technician: RJM	Reviewed: CCS	Date: 3/26/2013	Job Number: 103-92557.006	Figure: 6

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 100 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-16 @ 0.0 - 8.5 ft	Technician: RJM	Reviewed: CCS	Date: 3/26/2013	Job Number: 103-92557.006	Figure: 7

	Point 1		Point 2		Point 3	
Boring or Test Pit:	--		--		--	
Sample:	BH-25		BH-25		BH-25	
Depth:	0.0 - 12.5 ft		0.0 - 12.5 ft		0.0 - 12.5 ft	
Point No.:	1		2		3	
Initial						
Length =	9.250	in	9.250	in	9.250	in
Diameter =	4.001	in	4.001	in	4.001	in
Wet Mass =	8.589	lb	8.601	lb	8.587	lb
Area =	12.573	in^2	12.573	in^2	12.573	in^2
Volume =	116.297	in^3	116.297	in^3	116.297	in^3
Specific Gravity =	2.74	(Provided)	2.74	(Provided)	2.74	(Provided)
Dry Mass of Solids =	7.443	lb	7.421	lb	7.416	lb
Moisture Content =	15.4%		15.9%		15.8%	
Wet Unit Weight =	127.6	pcf	127.8	pcf	127.6	pcf
Dry Unit Weight =	110.6	pcf	110.3	pcf	110.2	pcf
Void Ratio =	0.54		0.55		0.55	
Percent Saturation =	78%		79%		79%	
After Consolidation						
Length =	9.195	in	9.131	in	9.054	in
Diameter =	3.788	in	3.765	in	3.749	in
Area =	11.267	in^2 (Method B)	11.133	in^2 (Method B)	11.037	in^2 (Method B)
Volume =	103.604	in^3	101.651	in^3	99.932	in^3
Moisture Content =	13.7%		12.9%		12.1%	
Wet Unit Weight =	141.2	pcf	142.4	pcf	143.7	pcf
Dry Unit Weight =	124.1	pcf	126.2	pcf	128.2	pcf
Void Ratio =	0.38		0.35		0.33	
Percent Saturation =	100%		100%		100%	
B Parameter =	0.95		0.98		0.96	
Shear Rate =	0.010%	/min.	0.033%	/min.	0.047%	/min.
t_{50} =	38.0	min.	12.0	min.	8.4	min.
Strain at Failure =	5.0%		5.0%		5.0%	
Cell Pressure =	65	psi	90	psi	145	psi
Back Pressure =	40	psi	40	psi	45	psi
Confining Pressure =	25	psi	50	psi	100	psi

Notes: Sample description: Clayey gravel with sand, yellowish brown, moist

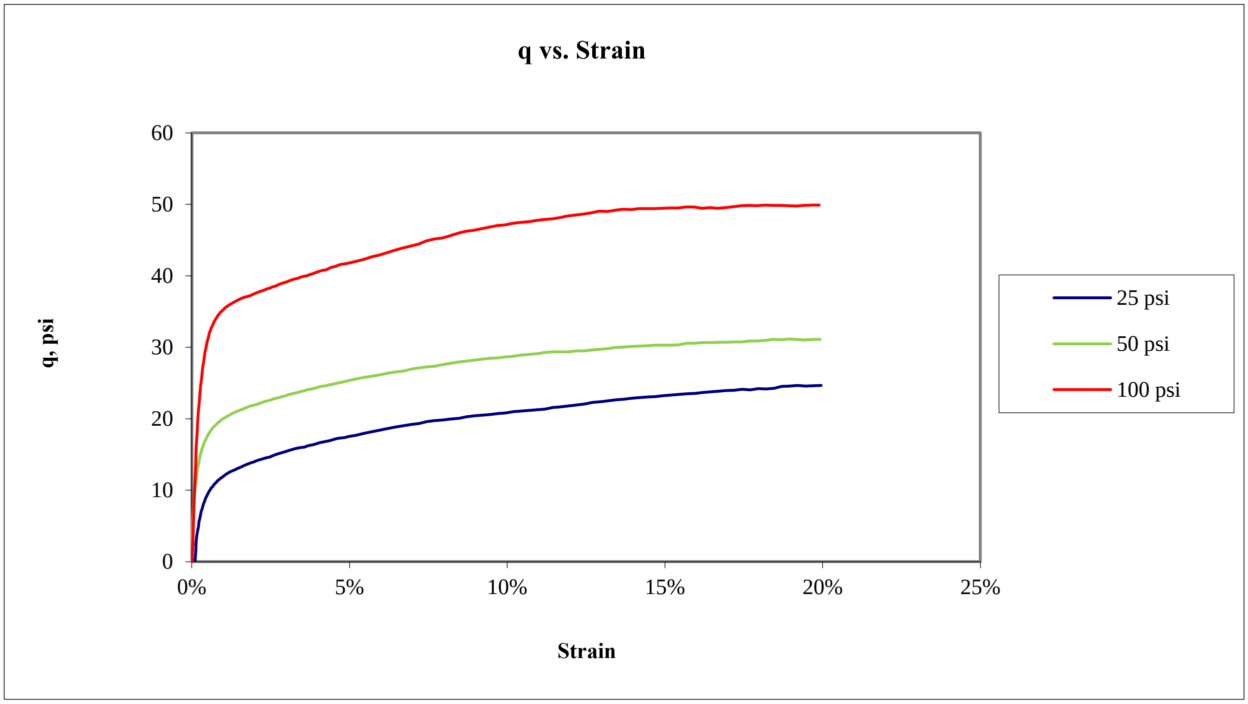
Atterberg limits: LL = 41 PL = 17 PI = 24 (ASTM D4318)

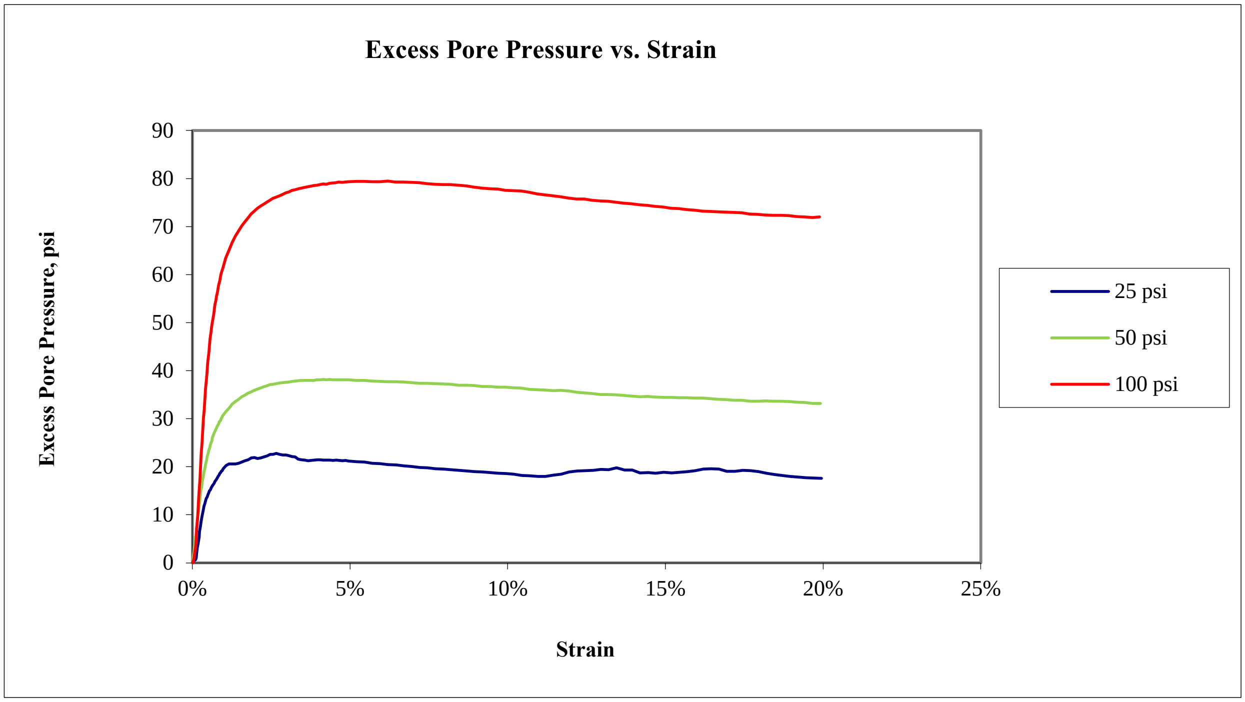
Percent finer: 3/4 in. = 88% No. 4 = 51% No. 200 = 17% (ASTM D422, refer to separate report for gradation curve)

Specimen type:		Intact	X	Reconstituted	Remold targets: 110.0 pcf (dry) at 16.0% moisture	
Moisture from:	X	Cuttings		Entire specimen		
Saturation method:	X	Wet		Dry		
Failure criterion:		$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	5	% strain
Membrane effect:	X	Corrected		Not Corrected		

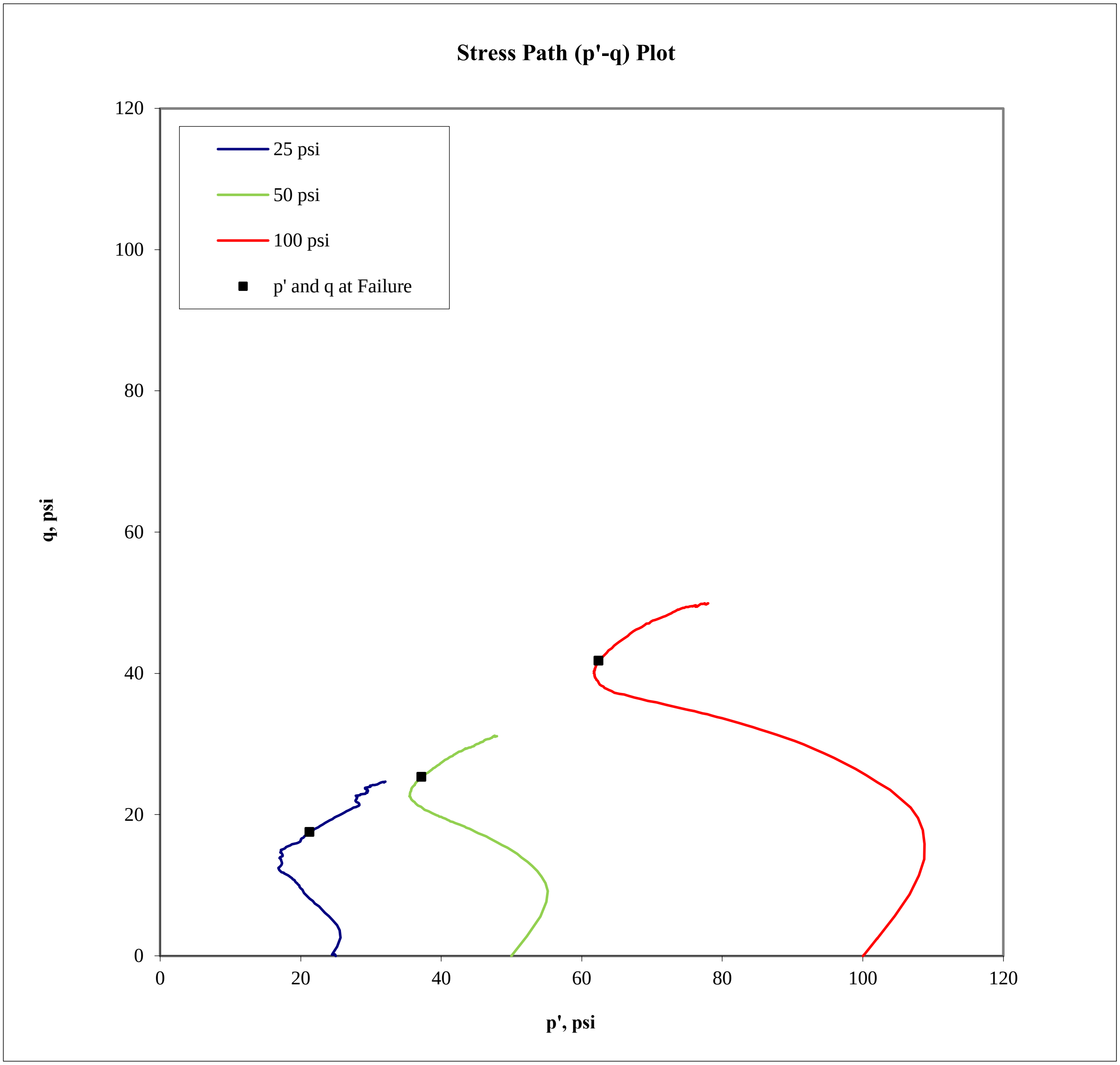
Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
BH-25 @ 0.0 - 12.5 ft.	**RJM**	**CCS**	**5/1/2013**	**103-92557.006**	**1**





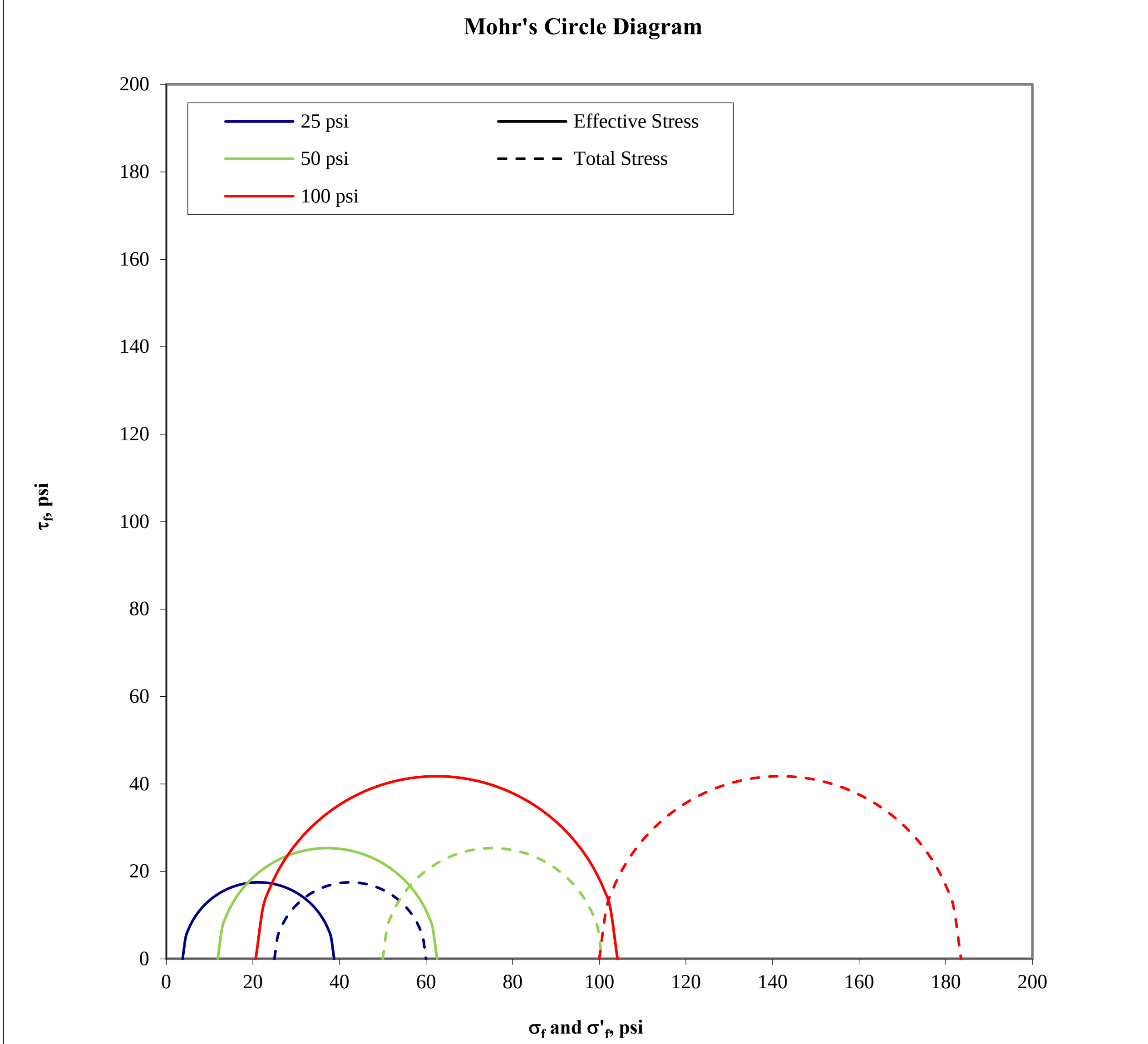
Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 0.0 - 12.5 ft.	**Technician:** RJM	**Reviewed:** CCS	**Date:** 5/1/2013	**Job Number:** 103-92557.006	**Figure:** 2



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
25	42.5	21.3	17.5
50	75.3	37.2	25.3
100	141.8	62.4	41.8

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
BH-25 @ 0.0 - 12.5 ft.	**RJM**	**CCS**	**5/1/2013**	**103-92557.006**	**3**



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
25	38.8	3.8	60.0	25.0
50	62.5	11.9	100.6	50.0
100	104.2	20.7	183.5	100.0

Golder Associates Inc.
Denver, Colorado

Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
MOHR'S CIRCLE DIAGRAM

Job Short Title: Copper Flat Tailings Design Study

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
BH-25 @ 0.0 - 12.5 ft.	RJM	CCS	5/1/2013	103-92557.006	4

Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 25 psi
Job Short Title: Copper Flat Tailings Design Study	

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
BH-25 @ 0.0 - 12.5 ft.	RJM	CCS	5/1/2013	103-92557.006	5

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 0.0 - 12.5 ft.	Technician: RJM	Reviewed: CCS	Date: 5/1/2013	Job Number: 103-92557.006	Figure: 6

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 100 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 0.0 - 12.5 ft.	Technician: RJM	Reviewed: CCS	Date: 5/1/2013	Job Number: 103-92557.006	Figure: 7

	Point 1	Point 2	Point 3
Boring or Test Pit:	--	--	--
Sample:	TP-10	TP-10	TP-10
Depth:	3.0 - 12.0 ft	3.0 - 12.0 ft	3.0 - 12.0 ft
Point No.:	1	2	3

Initial

	Point 1	Point 2	Point 3
Length =	5.786 in	5.784 in	5.796 in
Diameter =	2.886 in	2.886 in	2.886 in
Wet Mass =	2.610 lb	2.611 lb	2.607 lb
Area =	6.542 in^2	6.542 in^2	6.542 in^2
Volume =	37.850 in^3	37.836 in^3	37.915 in^3
Specific Gravity =	2.74 (Provided)	2.74 (Provided)	2.74 (Provided)
Dry Mass of Solids =	2.256 lb	2.247 lb	2.240 lb
Moisture Content =	15.7%	16.2%	16.4%
Wet Unit Weight =	119.2 pcf	119.2 pcf	118.8 pcf
Dry Unit Weight =	103.0 pcf	102.6 pcf	102.1 pcf
Void Ratio =	0.66	0.66	0.67
Percent Saturation =	65%	67%	67%

After Consolidation

	Point 1	Point 2	Point 3
Length =	5.747 in	5.724 in	5.667 in
Diameter =	2.842 in	2.855 in	2.884 in
Area =	6.345 in^2 (Method B)	6.400 in^2 (Method B)	6.532 in^2 (Method B)
Volume =	36.467 in^3	36.631 in^3	37.016 in^3
Moisture Content =	21.8%	22.3%	23.1%
Wet Unit Weight =	130.2 pcf	129.6 pcf	128.7 pcf
Dry Unit Weight =	106.9 pcf	106.0 pcf	104.6 pcf
Void Ratio =	0.60	0.61	0.63
Percent Saturation =	100%	100%	100%

	Point 1	Point 2	Point 3
B Parameter =	0.96	0.95	0.95
Shear Rate =	0.083% /min.	0.083% /min.	0.083% /min.
t_{50} =	0.5 min.	0.6 min.	0.4 min.
Strain at Failure =	5.0%	5.0%	5.0%
Cell Pressure =	95 psi	130 psi	190 psi
Back Pressure =	70 psi	80 psi	90 psi
Confining Pressure =	25 psi	50 psi	100 psi

Notes:

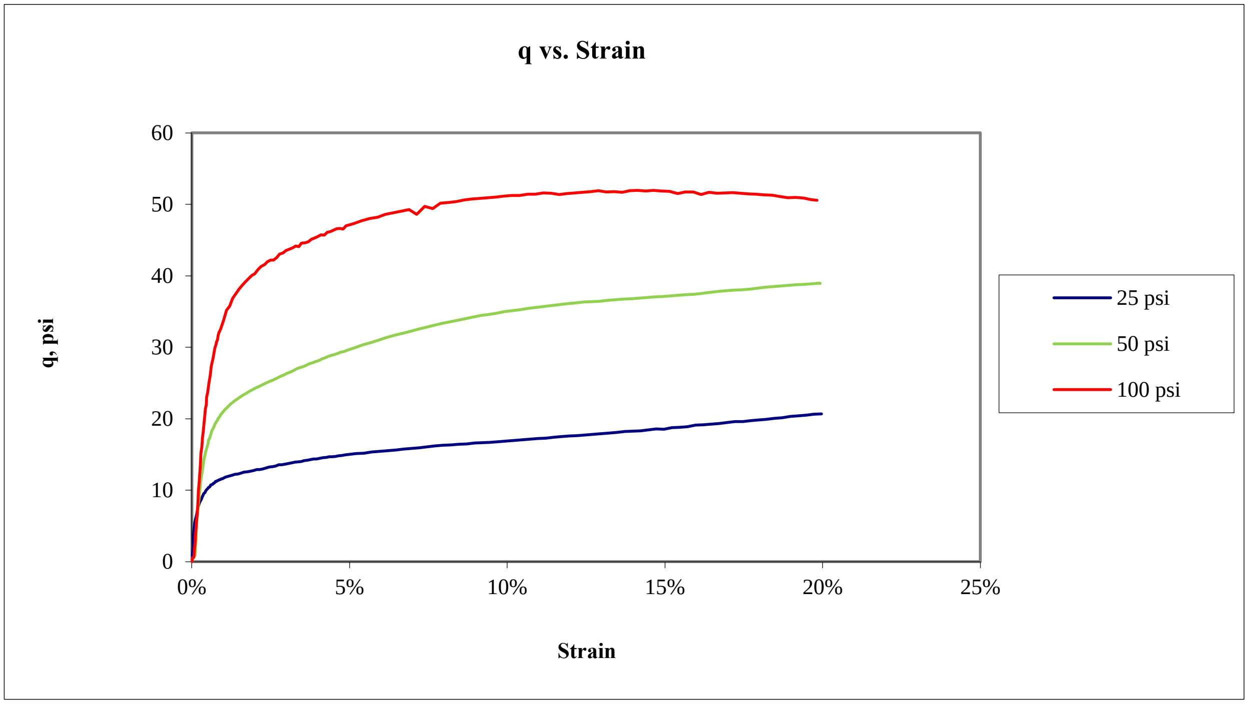
Sample description: Silty sand, brownish yellow, moist

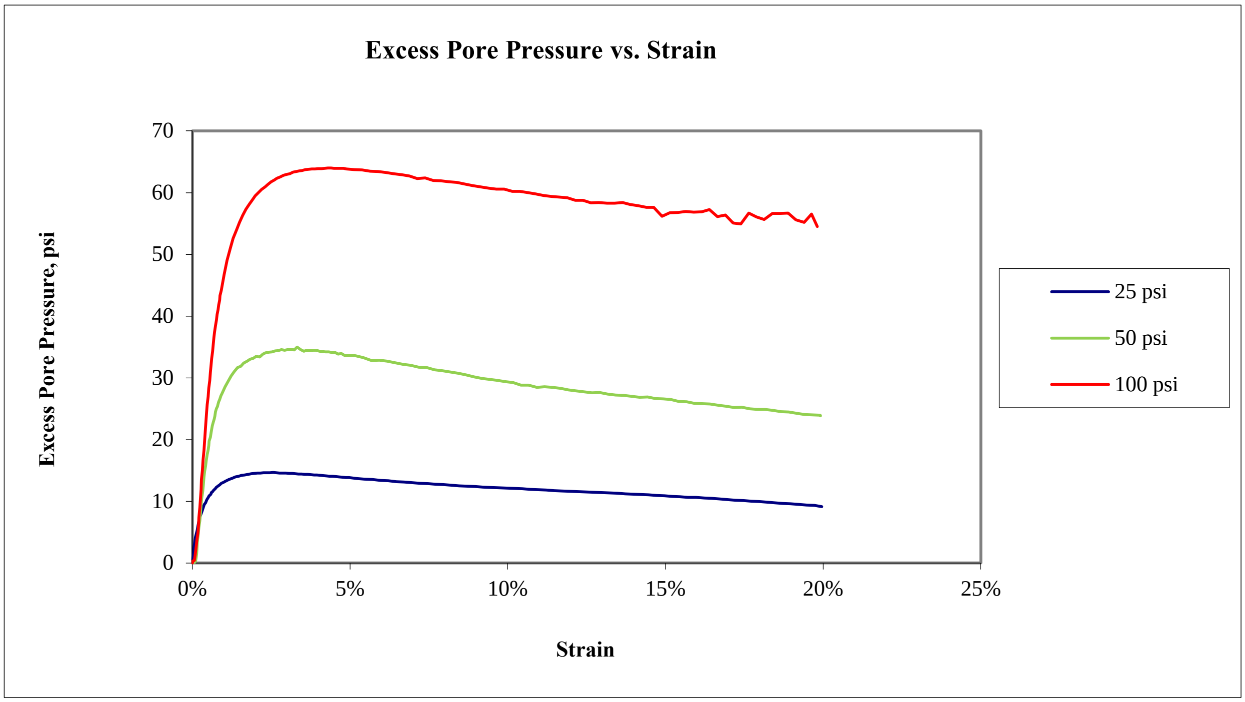
Atterberg limits: LL = NP PL = NP PI = NP (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 49% (ASTM D422, refer to separate report for gradation curve)

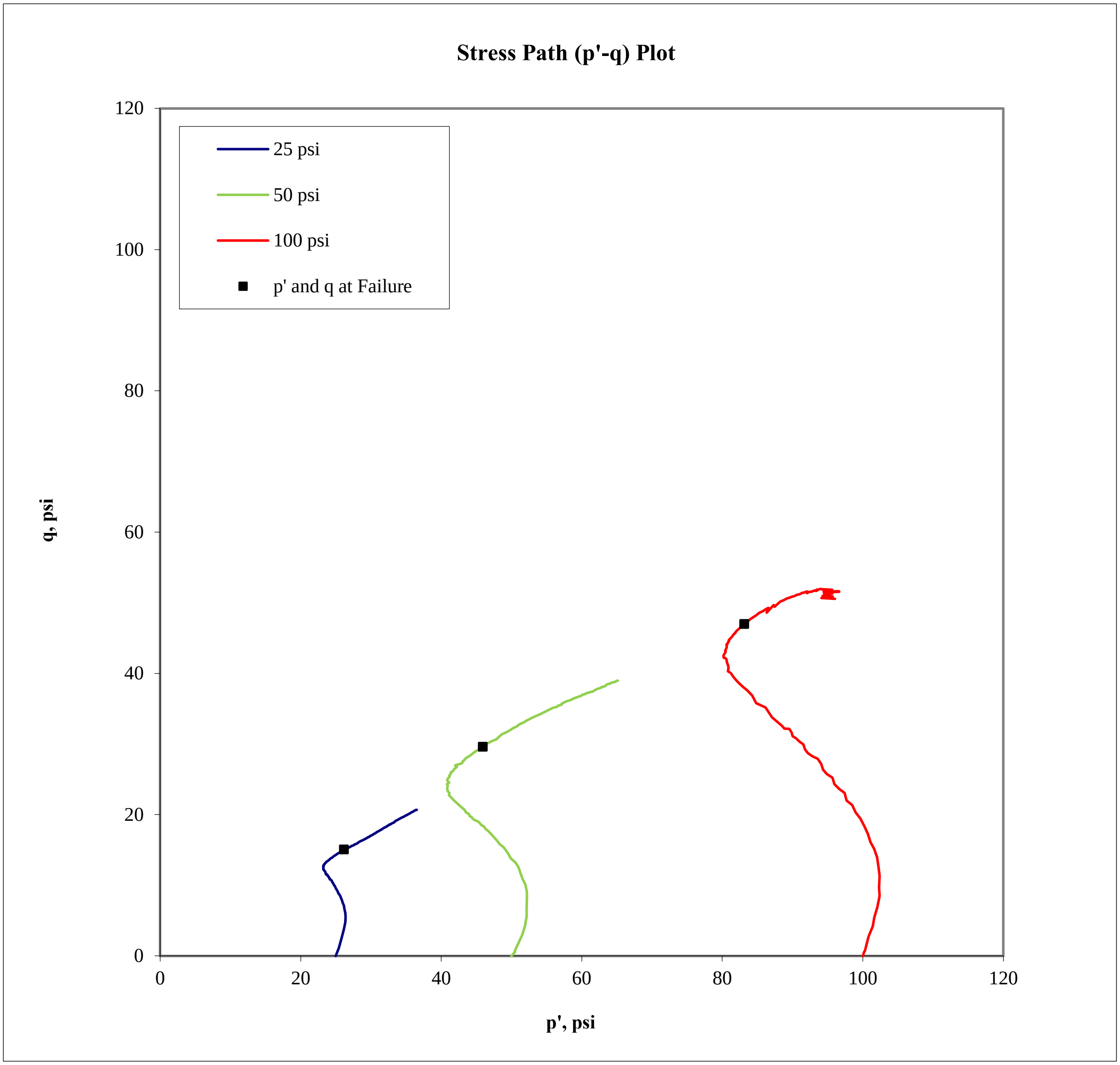
Specimen type:		Intact	X	Reconstituted	Remold targets: 104.7 pcf (dry) at 16.2% moisture	
Moisture from:		Cuttings	X	Entire specimen		
Saturation method:	X	Wet		Dry		
Failure criterion:		$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	5	% strain
Membrane effect:	X	Corrected		Not Corrected		

Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SAMPLE AND TEST DATA				
Job Short Title: Copper Flat Tailings Design Study					
Sample: TP-10 @ 3 - 12 ft	**Technician:** RJM	**Reviewed:** CCS	**Date:** 4/8/2013	**Job Number:** 103-92557.006	**Figure:** 1



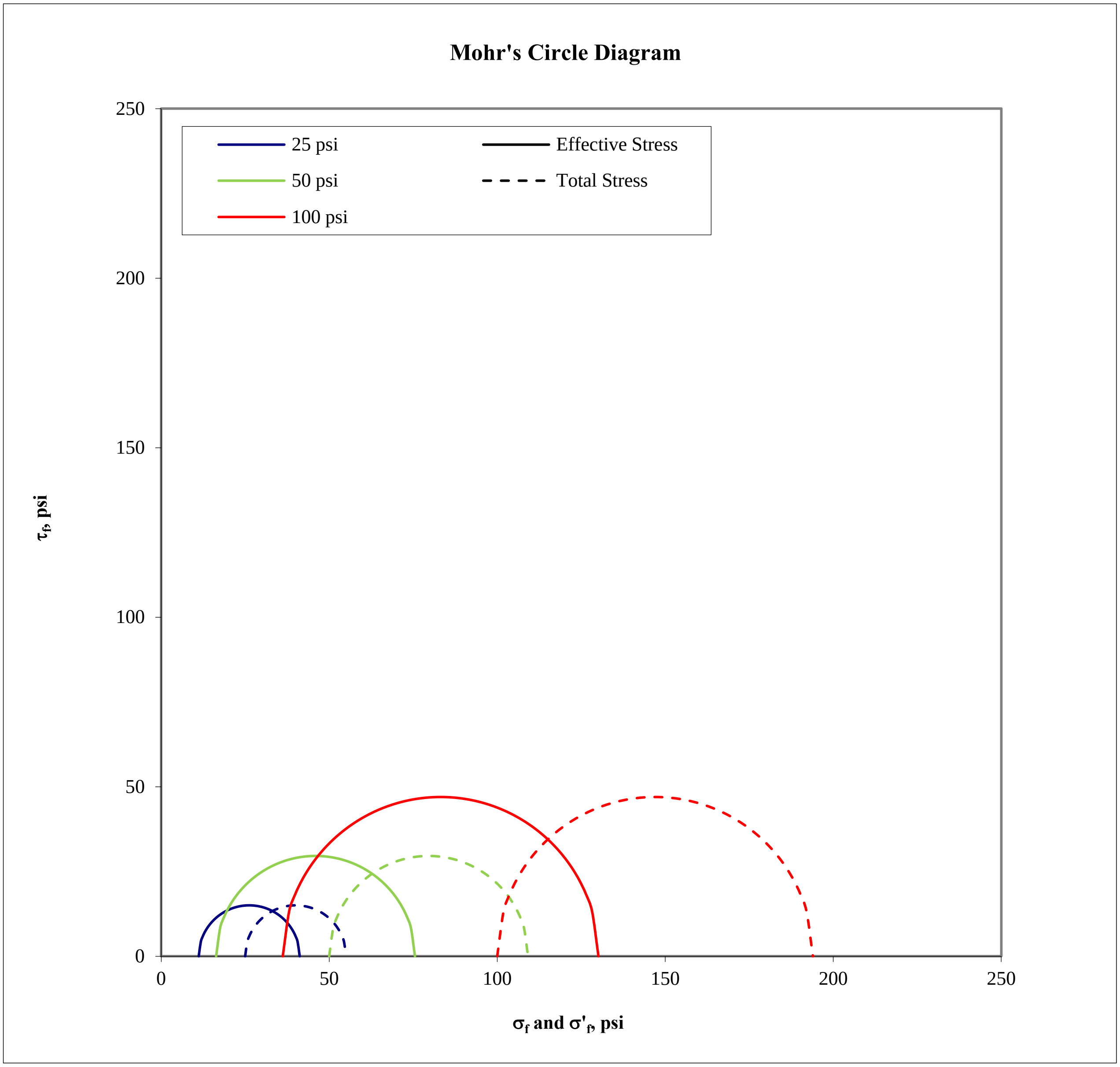


Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **TP-10 @ 3 - 12 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Date:** **4/8/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**



Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
25	40.0	26.2	15.0
50	79.6	45.9	29.6
100	147.0	83.2	47.0

Golder Associates Inc. Denver, Colorado	**Title:** **ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT STRESS PATH PLOT**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **TP-10 @ 3 - 12 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Date:** **4/8/2013**	**Job Number:** **103-92557.006**	**Figure:** **3**



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
25	41.2	11.2	55.0	25.0
50	75.5	16.4	109.2	50.0
100	130.1	36.2	193.9	100.0

Golder Associates Inc. Denver, Colorado	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM
Job Short Title: Copper Flat Tailings Design Study	

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
TP-10 @ 3 - 12 ft	RJM	CCS	4/8/2013	103-92557.006	4

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SPECIMEN PHOTOGRAPH - 25 psi**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **TP-10 @ 3 - 12 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Date:** **4/8/2013**	**Job Number:** **103-92557.006**	**Figure:** **5**

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: TP-10 @ 3 - 12 ft	Technician: RJM	Reviewed: CCS	Date: 4/8/2013	Job Number: 103-92557.006	Figure: 6

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 100 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: TP-10 @ 3 - 12 ft	Technician: RJM	Reviewed: CCS	Date: 4/8/2013	Job Number: 103-92557.006	Figure: 7

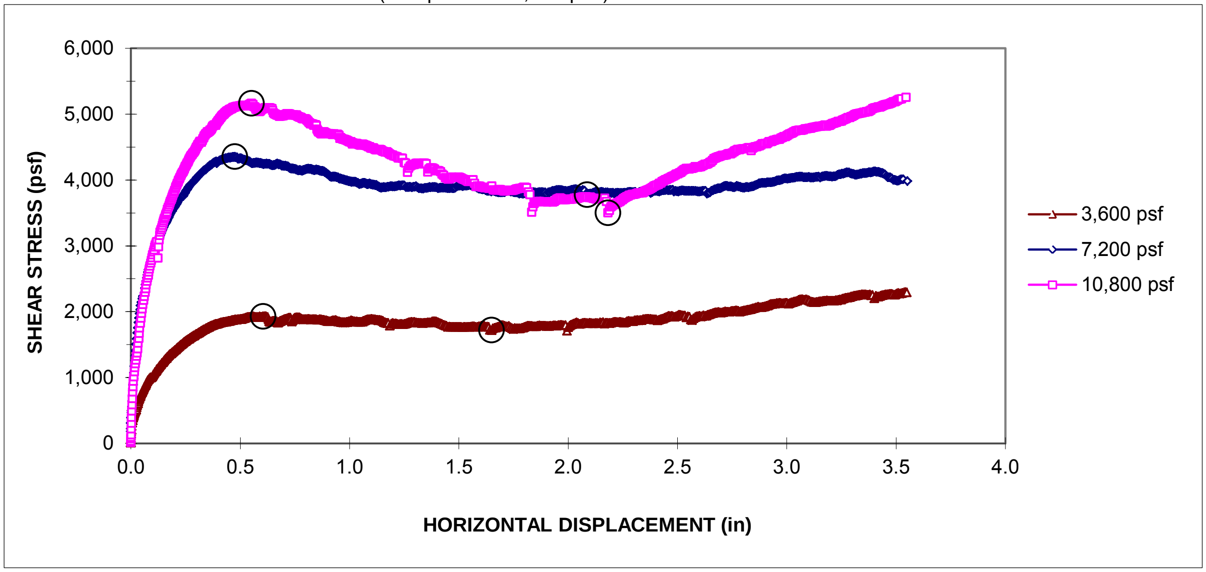
DIRECT SHEAR TEST RESULTS

ASTM D5321

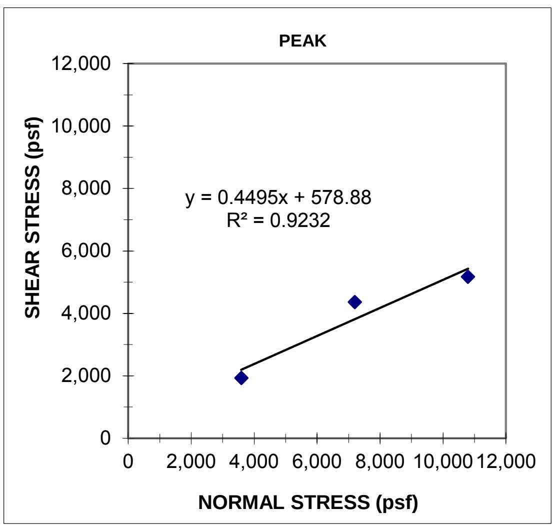
PROJECT NAME: Copper Flat Tailings Design Study

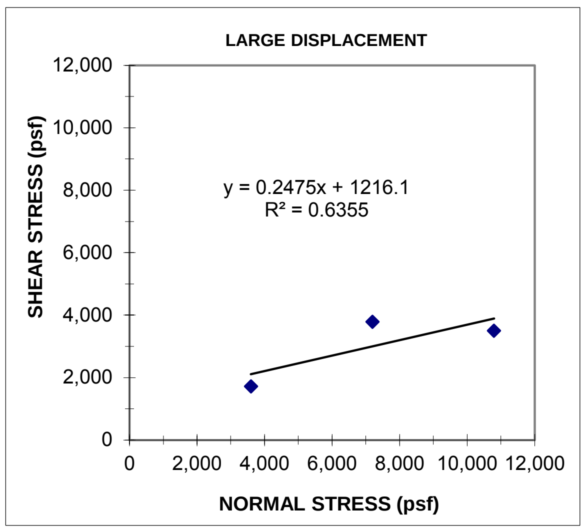
SAMPLE NUMBER: Tailings / 80-mil Textured Geomembrane / Drain Rock

APPARTUS:	12.0 inch by 12.0 inch shear box; air bladder used to apply normal loads.
INTERFACE TESTED:	Top: Tailings (remolded to 104.7 pcf @ 15.7% moisture content) Bottom: GSE 80-mil HDPE double-sided textured geomembrane
TEST CONDITIONS:	Drain Rock inundated; consolidated overnight at normal load; Floating geomembrane
SHEAR RATE:	0.04 in/min
SUBSTRATE:	Drain Rock (Composites 1-4, scalped)



Normal	Shear Stress		Peak		Large Displacement	
Stress (psf)	Peak[1] (psf)	Lg. Displ. (psf)	Friction Angle	Adhesion[2] (psf)	Friction Angle	Adhesion[2] (psf)
3,600	1,927	1,717				
7,200	4,354	3,778	24.2	578.9	13.9	1216.1
10,800	5,164	3,500				





Observations After Test

Peak and residual shear strengths were chosen based on testing observations. Shear stresses measured at greater horizontal displacements than those chosen for the large-displacement shear strength appeared to have been affected by gravel particles pushing against the end of the bottom shear box.

3,600 psf: Primary failure occurred at Geomembrane-Drain Rock interface; some displacement at Geomembrane-Tailings interface

7,200 psf: Primary failure occurred at Geomembrane-Drain Rock interface; some displacement at Geomembrane-Tailings interface

10,800 psf: Primary failure occurred at Geomembrane-Drain Rock interface; some displacement at Geomembrane-Tailings interface

Drain Gravel interfered with shear boxes at approximately 2.2 inches displacement and may have affected

Tech: PRH
Review: CCS

(1) Peak shear stresses for 3,600 psf, 7,200 psf, and 10,800 psf normal stresses were chosen at 0.606, 0.476, and 0.552 inches horizontal displacements, respectively.

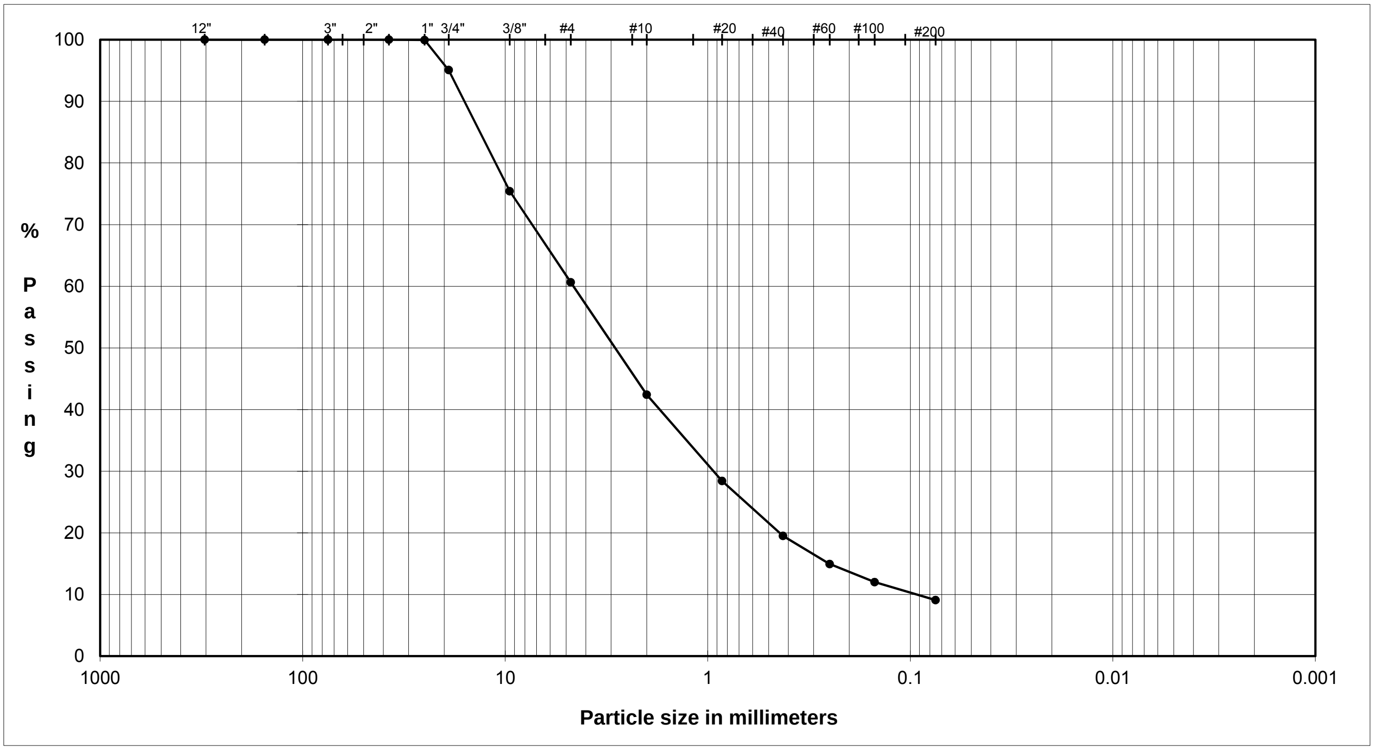
(2) Interface shear parameters are based on the "best-fit" line per ASTM D5321. Interpretation of the test data by a qualified professional for the specific application is required.

Golder Associates Inc.

APPENDIX A.3.3
PERMEABILITY TEST REPORTS

PRE-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Compostie 1-4** Depth (ft) --
TYPE: **Pail**

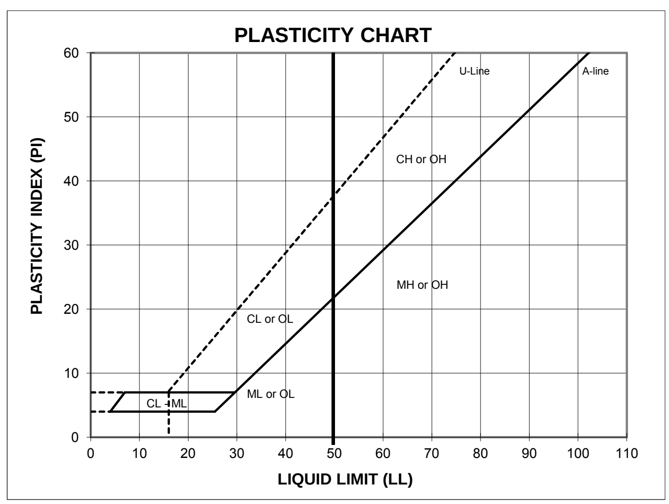


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**	Cobbles	**0.00**
3.0"	75.0	**100.0**		
3.0"	75.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**99.9**		
0.75"	19.0	**95.1**	Coarse Gravel	**4.93**
0.375"	9.5	**75.4**		
#4	4.8	**60.7**	Fine Gravel	**34.42**
#10	2.0	**42.4**	Coarse Sand	**18.25**
#20	0.9	**28.4**		
#40	0.4	**19.5**	Medium Sand	**22.89**
#60	0.3	**14.9**		
#100	0.2	**12.0**		
#200	0.1	**9.1**	Fine Sand	**10.42**
			Fines	**9.09**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

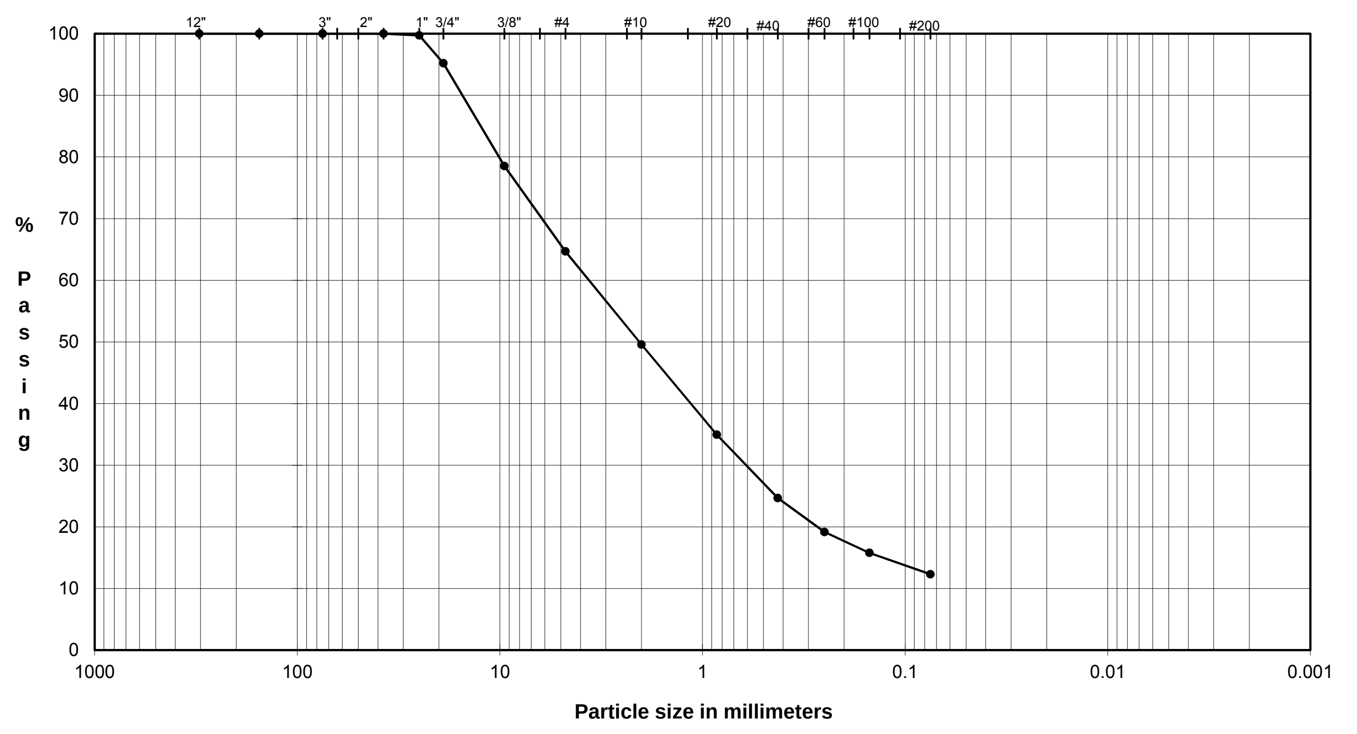
Visual Description (Golder Procedure): silty clayey SAND and GRAVEL, yellowish brown, dry

USCS: --

TECH	EH
DATE	4/10/13
REVIEW	MB

POST-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Compostie 1-4** Depth (ft) --
TYPE: **Pail**

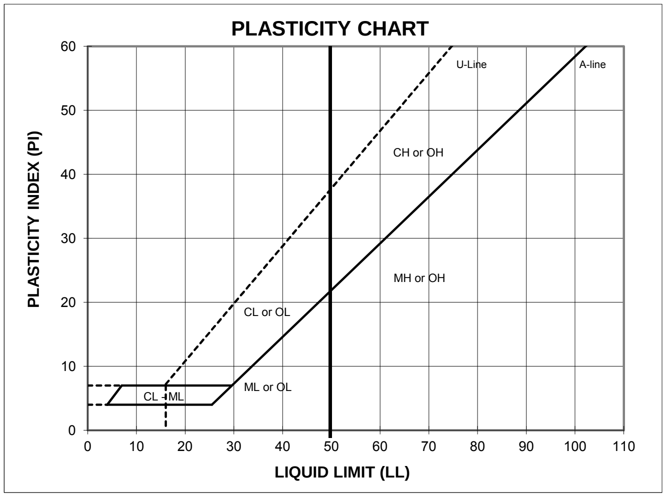


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**	Cobbles	**0.00**
3.0"	75.0	**100.0**		
3.0"	75.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**99.7**		
0.75"	19.0	**95.2**	Coarse Gravel	**4.79**
0.375"	9.5	**78.5**		
#4	4.8	**64.7**	Fine Gravel	**30.52**
#10	2.0	**49.6**	Coarse Sand	**15.12**
#20	0.9	**34.9**		
#40	0.4	**24.7**	Medium Sand	**24.90**
#60	0.3	**19.2**		
#100	0.2	**15.8**		
#200	0.1	**12.3**	Fine Sand	**12.36**
			Fines	**12.31**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

Visual Description (Golder Procedure): silty clayey SAND and GRAVEL, yellowish brown, dry

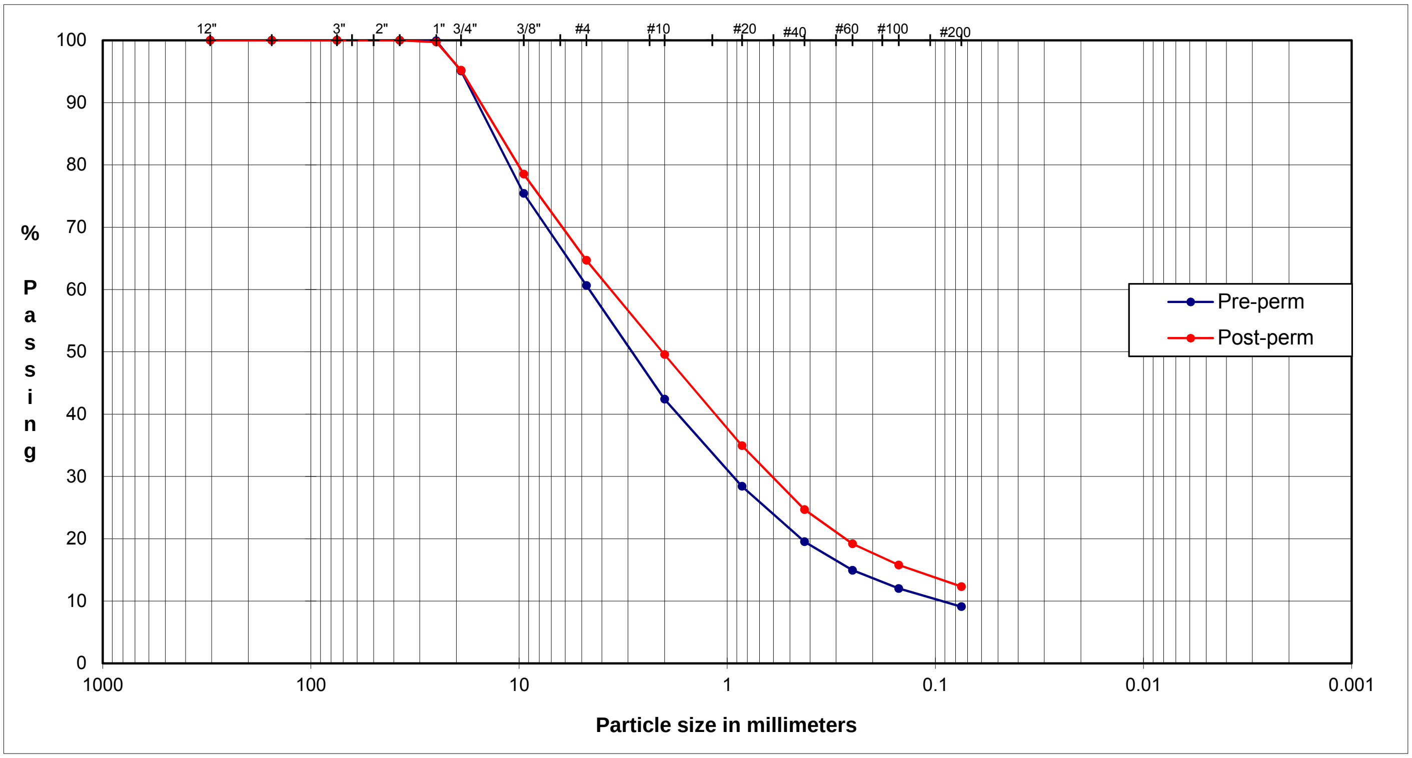
USCS: --

TECH	EH
DATE	4/16/2013
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Compostie 1-4** Depth (ft) **--**
TYPE: **Pail**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**	Cobbles	**0.00**
3.0"	75.0	**100.0**		
3.0"	75.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**99.9**		
0.75"	19.0	**95.1**	Coarse Gravel	**4.93**
0.375"	9.5	**75.4**		
#4	4.8	**60.7**	Fine Gravel	**34.42**
#10	2.0	**42.4**	Coarse Sand	**18.25**
#20	0.9	**28.4**		
#40	0.4	**19.5**	Medium Sand	**22.89**
#60	0.3	**14.9**		
#100	0.2	**12.0**		
#200	0.1	**9.1**	Fine Sand	**10.42**
			Fines	**9.09**

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**	Cobbles	**0.00**
3.0"	75.0	**100.0**		
3.0"	75.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**99.7**		
0.75"	19.0	**95.2**	Coarse Gravel	**4.79**
0.375"	9.5	**78.5**		
#4	4.8	**64.7**	Fine Gravel	**30.52**
#10	2.0	**49.6**	Coarse Sand	**15.12**
#20	0.9	**34.9**		
#40	0.4	**24.7**	Medium Sand	**24.90**
#60	0.3	**19.2**		
#100	0.2	**15.8**		
#200	0.1	**12.3**	Fine Sand	**12.36**
			Fines	**12.31**

ATTERBERG LIMITS

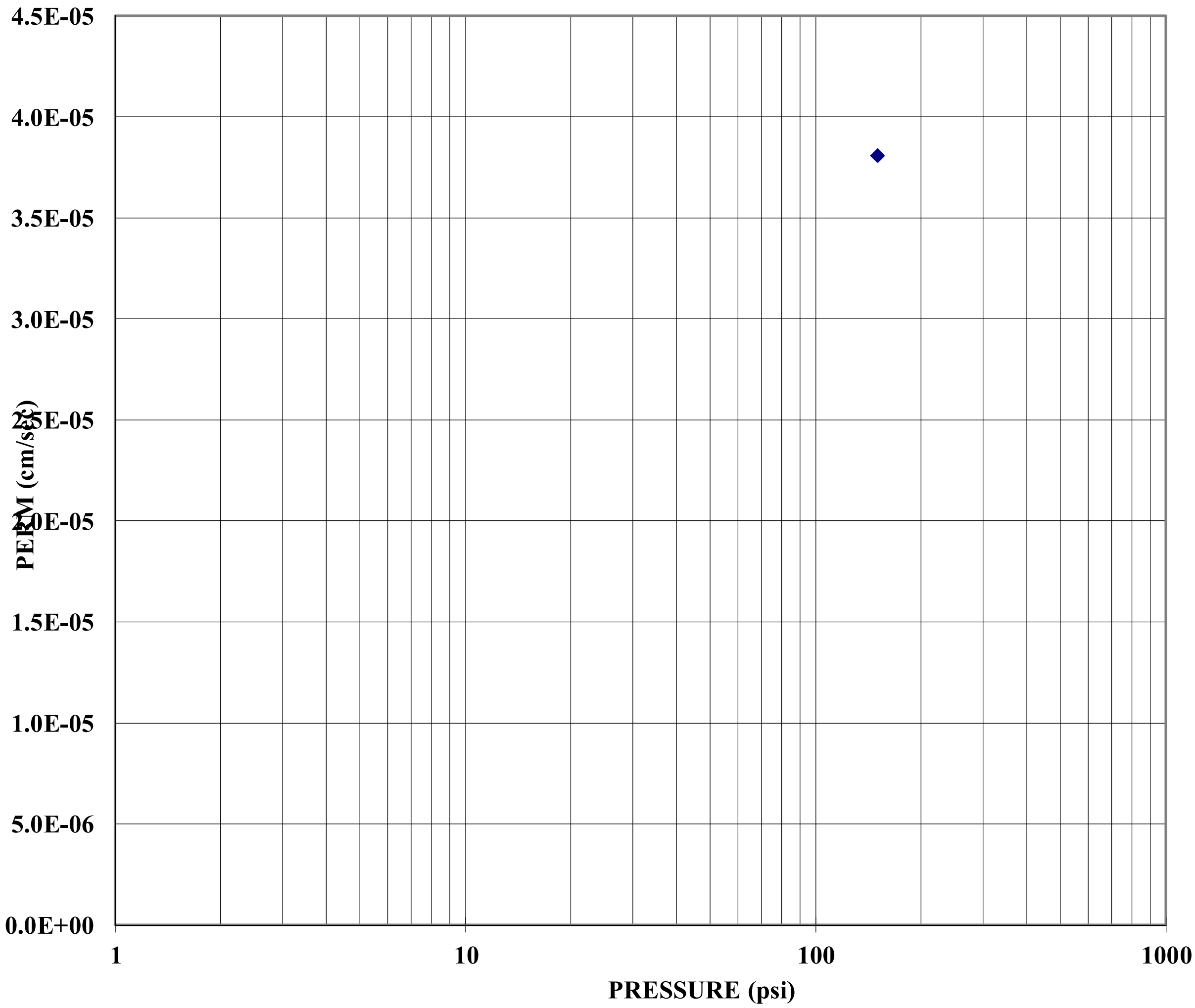
M_c	LL	PL	PI	SG
--	--	--	--	--

Visual Description (Golder Procedure): silty clayey SAND and GRAVEL, yellowish brown, dry

USCS: --

TECH	EH
DATE	4/10/13
REVIEW	MB

ONE-DIMENSIONAL CONSOLIDATION X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Repor



SAMPLE #:	Composite 1-4
Visual Description (Golder Procedure):	silty clayey SAND and GRAVEL, yellowish brown, dry

DATE	4/11/2013
TECH	MGC
REVIEW	MB

103-92557.006

Copper Flat Tailings Design Study

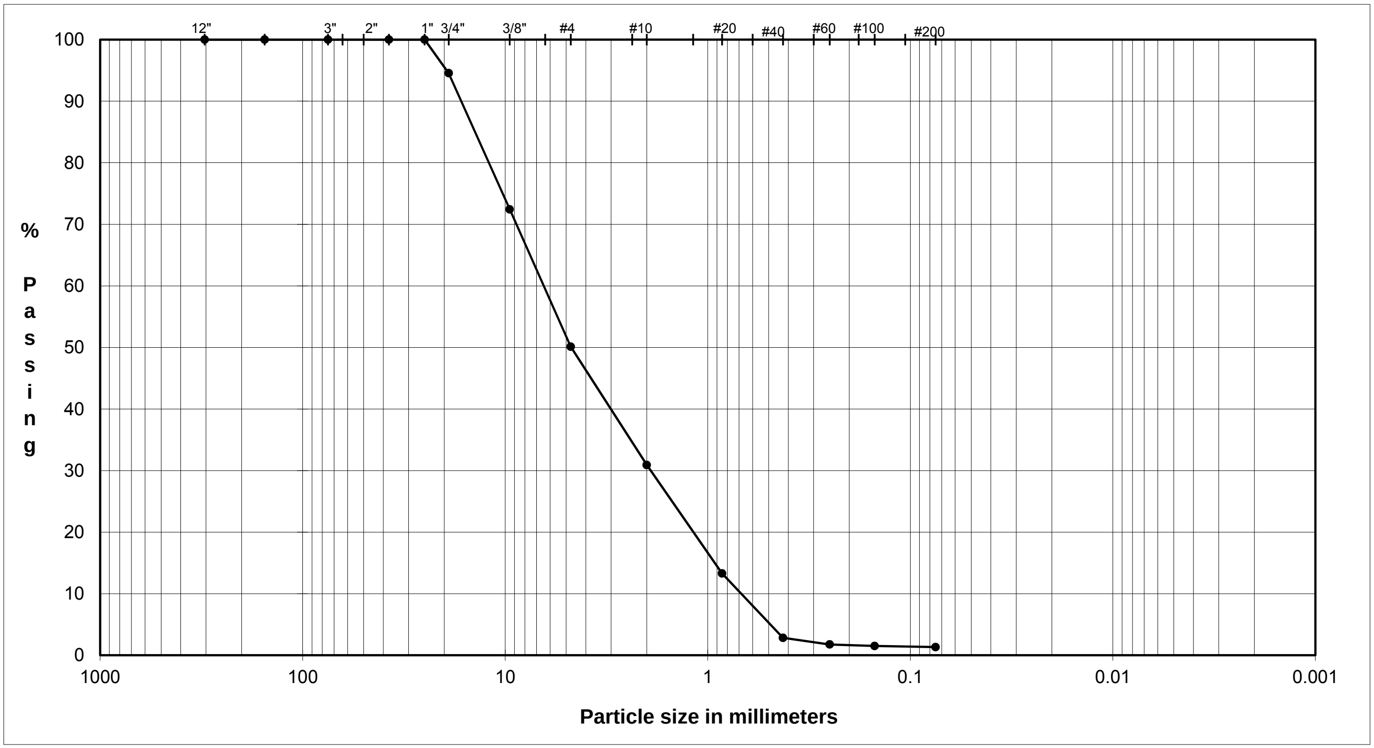
GOLDER ASSOCIATES INC.

LAKEWOOD, COLORADO

Golder Associates

PRE-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME:	**Copper Flat Tailings Design Study**		
SAMPLE ID:	**Comp 1-4 SCALPED**	Depth (ft)	--
TYPE:	**Pail**		

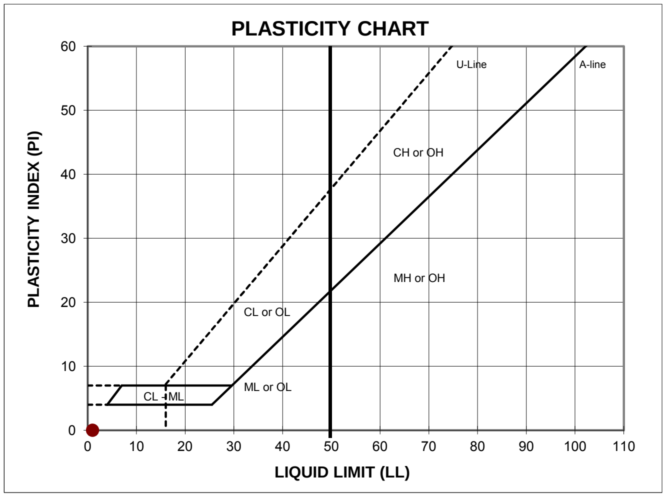


COBBLES	GRAVEL (Coarse)	GRAVEL (Fine)	SAND (Coarse)	SAND (Medium)	SAND (Fine)	FINES (Silt or Clay)

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**94.5**	Coarse Gravel	**5.45**
0.375"	9.5	**72.4**		
#4	4.8	**50.1**	Fine Gravel	**44.42**
#10	2.0	**30.9**	Coarse Sand	**19.22**
#20	0.9	**13.3**		
#40	0.4	**2.8**	Medium Sand	**28.06**
#60	0.3	**1.8**		
#100	0.2	**1.5**		
#200	0.1	**1.3**	Fine Sand	**1.51**
			Fines	**1.33**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

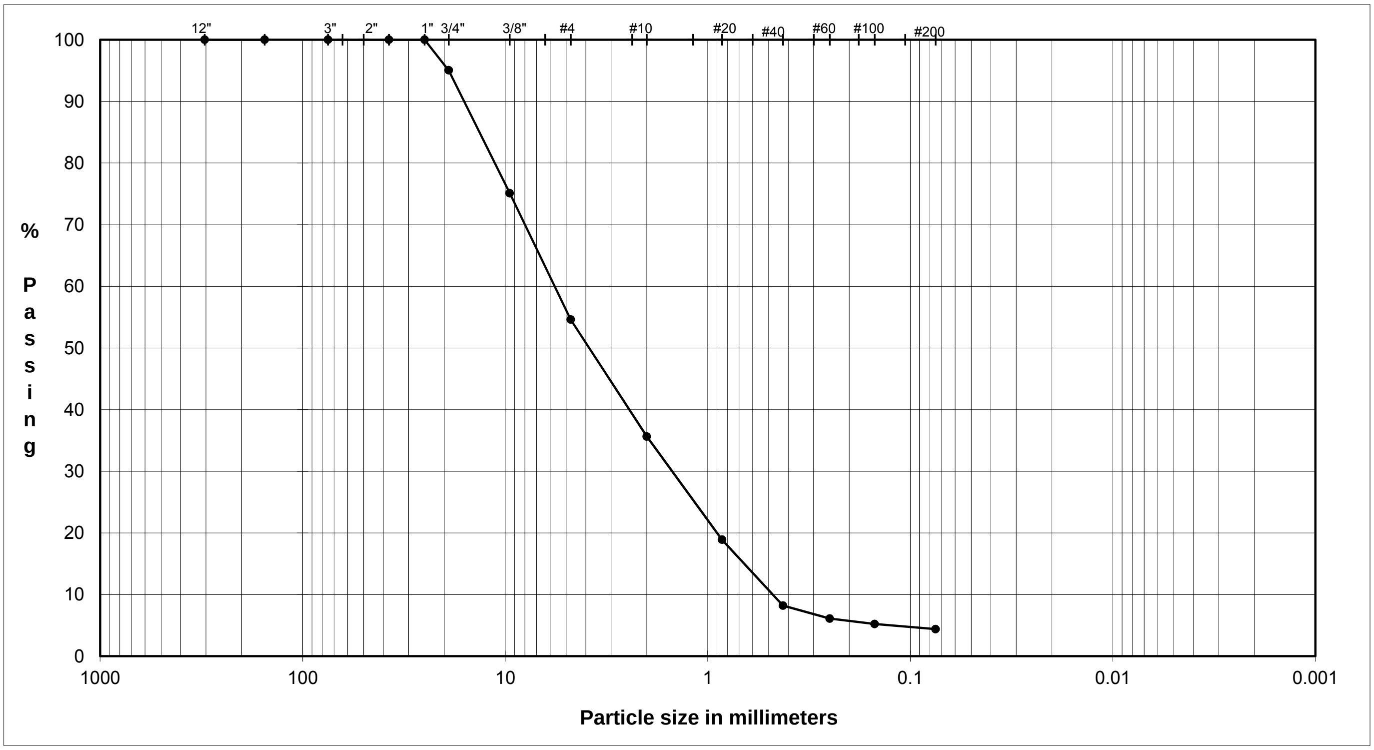
DESCRIPTION: SAND and GRAVEL, yellowish brown

USCS: --

TECH	AM
DATE	4/22/13
REVIEW	PRH

POST-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Comp 1-4 SCALPED** Depth (ft) --
TYPE: **Pail**

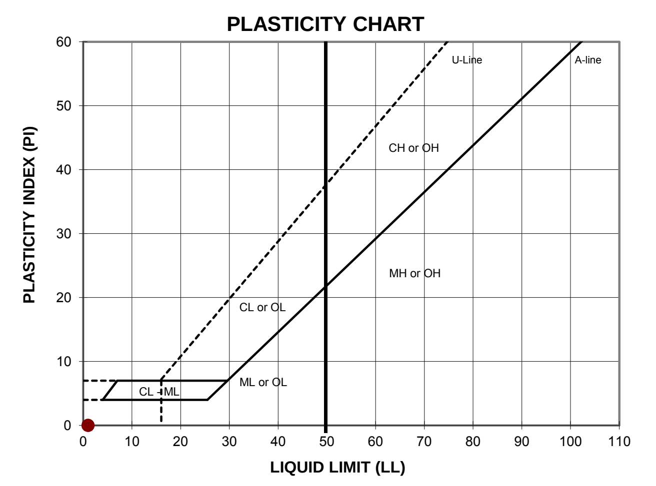


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

POST-PERM

U.S. Standard Sieves Sizes and Numbers

U.S. Standard Sieves Sizes and Numbers	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**95.0**	Coarse Gravel	**4.96**
0.375"	9.5	**75.1**		
#4	4.8	**54.6**	Fine Gravel	**40.43**
#10	2.0	**35.6**	Coarse Sand	**18.97**
#20	0.9	**18.9**		
#40	0.4	**8.2**	Medium Sand	**27.43**
#60	0.3	**6.1**		
#100	0.2	**5.2**		
#200	0.1	**4.4**	Fine Sand	**3.82**
			Fines	**4.39**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: SAND and GRAVEL, yellowish brown

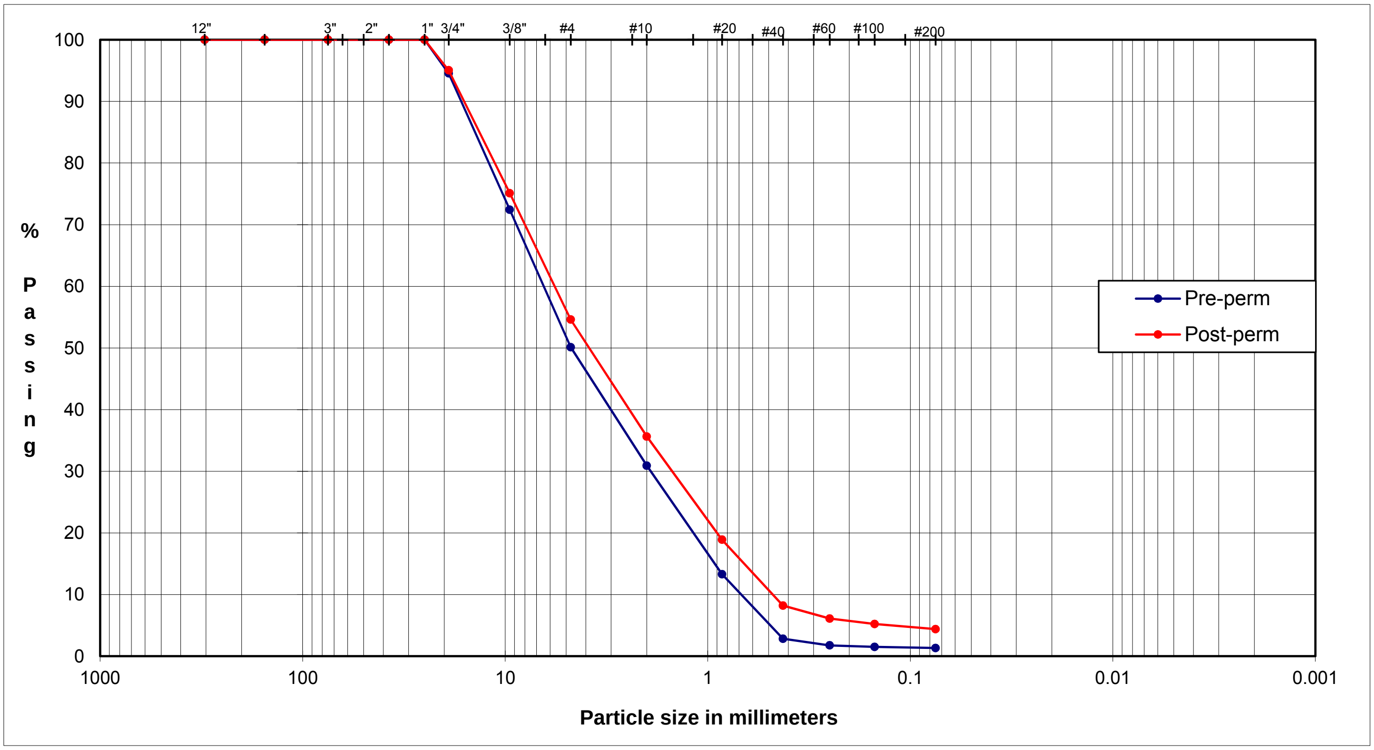
USCS: --

TECH	EH
DATE	5/1/2013
REVIEW	PRH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Comp 1-4 SCALPED** Depth (ft) --
TYPE: **Pail**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**94.5**	Coarse Gravel	**5.45**
0.375"	9.5	**72.4**		
#4	4.8	**50.1**	Fine Gravel	**44.42**
#10	2.0	**30.9**	Coarse Sand	**19.22**
#20	0.9	**13.3**		
#40	0.4	**2.8**	Medium Sand	**28.06**
#60	0.3	**1.8**		
#100	0.2	**1.5**		
#200	0.1	**1.3**	Fine Sand	**1.51**
			Fines	**1.33**

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**95.0**	Coarse Gravel	**4.96**
0.375"	9.5	**75.1**		
#4	4.8	**54.6**	Fine Gravel	**40.43**
#10	2.0	**35.6**	Coarse Sand	**18.97**
#20	0.9	**18.9**		
#40	0.4	**8.2**	Medium Sand	**27.43**
#60	0.3	**6.1**		
#100	0.2	**5.2**		
#200	0.1	**4.4**	Fine Sand	**3.82**
			Fines	**4.39**

ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: SAND and GRAVEL, yellowish brown

USCS: --

TECH	AM
DATE	4/22/13
REVIEW	PRH

Copper Flat Tailing Design Study
Table 1 - Rigid Wall Compression
Falling Head Permability - 10 inch diameter cell

Project Title:	Copper Flat Tailings Design Study		**Boring:**	--
Project Number:	103-92557.006		**Sample:**	Comp 1-4 SCALPED
Dates Tested:	4/26/2013 To:	4/29/2013	**Depth (ft):**	--

Sample Setup

Initial Sample Height, in	9.194
Mold Diameter, in	10.00
Sample Area, in^2	78.54
Wet Sample Weight, g	19,998.9
Wet Sample Weight, lb	44.10
Dry Sample Weight, g	19,416.3
Dry Sample Weight, lb	42.81

Initial Sample:
Moisture Determination

Tare	PGC
Wet Weight and Tare, g	663.26
Dry Weight and Tare, g	647.65
Tare Weight, g	127.37
Moisture Content, %	3.0

Initial Sample Density and Void Ratio

Specific Gravity[1]	2.70
Initial Sample Volume, ft^3	0.418
Initial Wet Density, lb/ft^3	105.5
Initial Dry Density, lb/ft^3	102.5
Initial Void Ratio	0.64

Final Sample Density and Void Ratio

Final Sample Height, in	8.330
Final Sample Volume, ft^3	0.379
Final Dry Density, lb/ft^3	113.1
Final Void Ratio	0.49

Load (psi)	Height (in)	Dry Density (pcf)	Void Ratio	Flow Rate (ml/sec)	Gradient	Permeability (cm/sec)	Porosity
150	8.330	113.1	0.49	10.62	0.23	9.1E-02	0.33

NOTES: [1]Specific Gravity = Assumed Value

CONSTANT-HEAD PERMEABILITY
(RIGID-WALL)

JOB NUMBER:	103-92557.006	BORING NUMBER:	--
JOB NAME:	Copper Flat Tailings Design Study	SAMPLE NUMBER:	Comp 1-4 SCALPED
DATE TESTED:	04/26/13	SAMPLE DEPTH:	--

Initial Moisture Content

Tare:	PGC
Wet Weight & Tare, g:	663.26
Dry Weight & Tare, g:	647.65
Tare Weight, g:	127.37
Moisture, %:	**3.0**

Final Moisture Content

Tare:	J11
Wet Weight & Tare, g:	662.43
Dry Weight & Tare, g:	607.20
Tare Weight, g:	82.33
Moisture, %:	**10.5**

Initial Height Determination (Inches)

(Height from mold rim to plate on sample

1.	3.447
2.	3.442
3.	3.404
4.	3.379
5.	3.404
6.	3.365
Average	3.406
Cell Height	12.600
Sample Height[1]	9.194

Density

Wet Weight:	19,998.90	g		
Dry Weight:	19,416.35	g		
Diameter:	10.000	in	25.40	cm
Area:	78.540	in^2	506.71	cm^2
Initial Height:	9.194	in	23.35	cm
Final Height[2]:	8.330	in	21.16	cm
Initial Volume:	0.418	ft^3	11,832.48	cm^3
Final Volume:	0.379	ft^3	10,721.13	cm^3
Initial Wet Density:	105.6	pcf		
Final Wet Density:	116.5	pcf		
Initial Dry Density:	102.5	pcf		
Final Dry Density:	113.1	pcf		

TRIAL	TIME	OUTFLOW	BURRETTE	Q	i	k
	seconds	ml	(mm)	(cm^3/sec)		cm/sec
01	240	1704.9	35	7.1	0.165	8.48E-02
02	240	1704.5	35	7.1	0.165	8.47E-02
03	240	1705.2	35	7.1	0.165	8.48E-02
04	240	2513.2	48	10.5	0.227	9.11E-02
05	240	2508.93	48	10.5	0.227	9.09E-02
06	240	2507.75	48	10.4	0.227	9.09E-02
07	240	3436.38	62	14.3	0.293	9.64E-02
08	240	3434.01	62	14.3	0.293	9.64E-02
09	240	3435.08	62	14.3	0.293	9.64E-02
10						
Average	240.0	2549.996	48.3	10.6	0.228	9.07E-02

NOTES: [1]Sample Height = Cell Height - Average distance to rim of mold

[2]Final Height = Initial Height - Displacement of Final Reading *Before* Running Perm Test

CONSTANT-HEAD PERMEABILITY
(RIGID-WALL)

JOB NUMBER:	103-92557.006	BORING NUMBER:	--
JOB NAME:	Copper Flat Tailings Design Study	SAMPLE NUMBER:	Comp 1-4 SCALPED
DATE TESTED:	04/26/13	SAMPLE DEPTH:	--

DATE	TIME	LOAD	DIAL	DIAL	AVERAGE	DISPLACEMENT
		(psi)	(Left)	(Right)		
INITIAL	10:10 AM	0	0.005	0.004	0.005	--
SATURATE	10:25 AM	0	0.021	0.044	0.033	0.028
LOAD	12:40 PM	150	0.775	0.742	0.759	0.754
	8:55 AM	150	0.880	0.844	0.862	0.858
PERM	7:55 AM	150	0.886	0.850	0.868	0.864
END PERM	12:10 PM	150	0.887	0.851	0.869	0.865

APPENDIX A.3.4
CONSOLIDATION TEST REPORTS

	Initial		Final	
Height =	0.994	in	0.960	in
Diameter =	2.499	in	2.499	in
Area =	4.905	in^2	4.905	in^2
Volume =	4.875	in^3	4.709	in^3
Water Content =	14.4%		4.8%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5641	in	0.5641	in
Void Ratio =	0.762		0.702	
Degree of Saturation =	51.1%		18.5%	
Wet Mass =	0.308	lb	0.282	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	109.3	pcf	103.6	pcf
Dry Unit Weight =	95.5	pcf	98.9	pcf

Notes

USCS description (ASTM D2487):	Lean clay with sand, yellowish red, moist					
Atterberg Limits (ASTM D4318):	LL = 47		PL = 20		PI = 27	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 99%		No. 200 = 81%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture		
Water Content of Trimmings (ASTM D2216):	14.6%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	1	(Wykeham Farrance 24251)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0158	in				
Estimated Preconsolidation Stress:	Not Computed					

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1058					0.0000	0.9901	0.00	0.755				
1	0.25	1410					0.0083	0.9818	0.84	0.740				
2	0.50	1410					0.0174	0.9726	1.75	0.724				
3	1.00	1440					0.0254	0.9647	2.55	0.710				
4	2.00	1470					0.0315	0.9585	3.17	0.699				
5	4.00	1425					0.0361	0.9540	3.63	0.691				
6	8.00	1425					0.0390	0.9510	3.93	0.686				
7	16.00	1425	0.0410	0.9491	4.12	0.683	0.0431	0.9470	4.33	0.679	2 (Root time)	0.683	3.650	0.5
8	32.00	1440	0.0474	0.9426	4.77	0.671	0.0502	0.9398	5.05	0.666	2 (Root time)	0.672	2.520	0.5
9	8.00	95					0.0485	0.9415	4.88	0.669				
10	2.00	120					0.0473	0.9427	4.76	0.671				
11	0.50	95					0.0464	0.9436	4.67	0.673				
12	0.10	70					0.0459	0.9442	4.62	0.674				

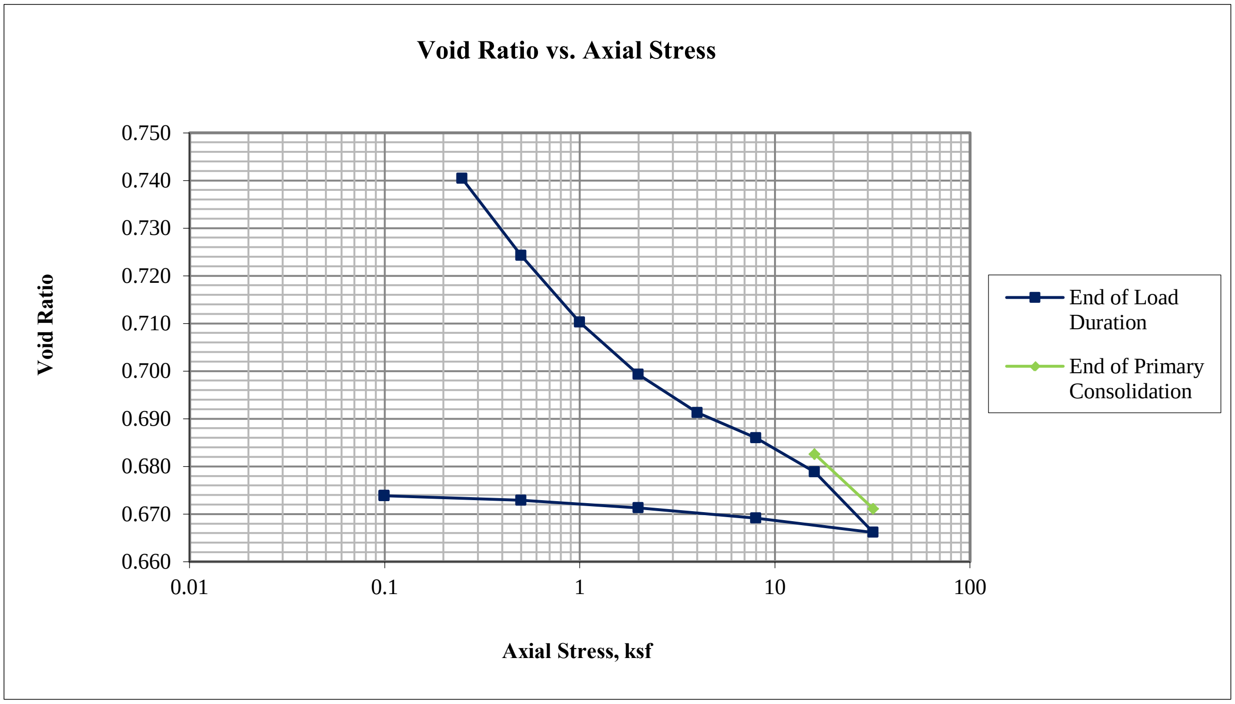
Golder Associates Inc.
Denver, Colorado

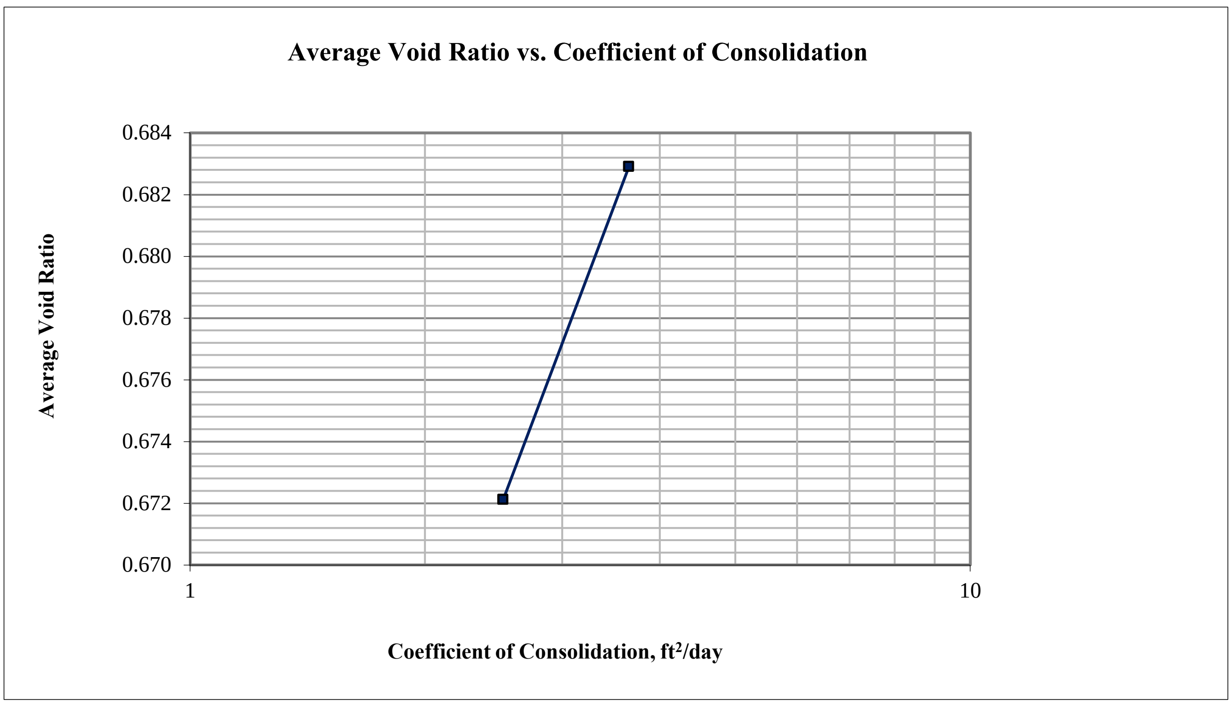
Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Job Short Title: Copper Flat Tailings Design Study

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-10 @ 19-33 ft	RJM	CCS	3/11/2013	103-92557.006	1

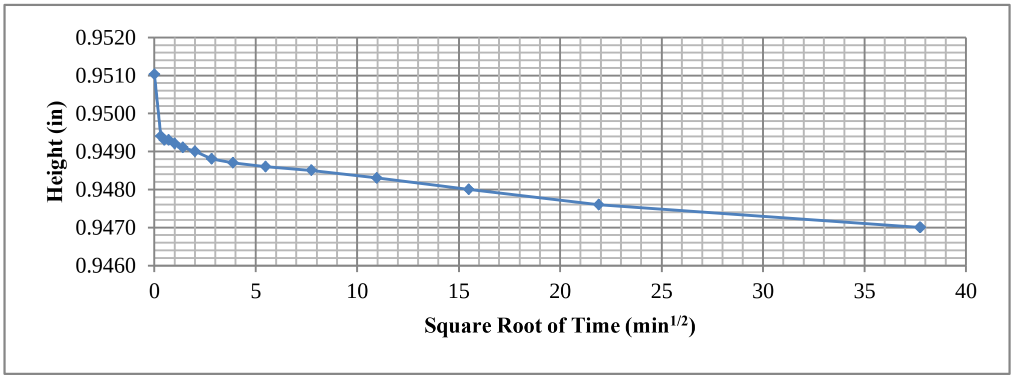
X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports



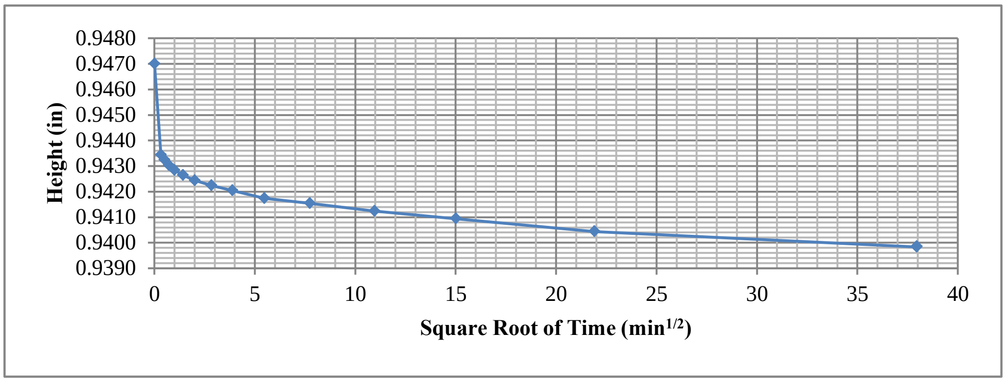


Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-10 @ 19-33 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 2

16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-10 @ 19-33 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/11/2013**	**Job Number:** **103-92557.006**	**Figure:** **3**

	Initial		Final	
Height =	0.997	in	0.905	in
Diameter =	2.496	in	2.496	in
Area =	4.893	in^2	4.893	in^2
Volume =	4.878	in^3	4.428	in^3
Water Content =	25.9%		6.4%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5215	in	0.5215	in
Void Ratio =	0.912		0.735	
Degree of Saturation =	76.7%		23.5%	
Wet Mass =	0.313	lb	0.264	lb
Dry Mass =	0.248	lb	0.248	lb
Wet Unit Weight =	110.8	pcf	103.2	pcf
Dry Unit Weight =	88.0	pcf	97.0	pcf

Notes

USCS description (ASTM D2487):	Fat clay, dark red, moist					
Atterberg Limits (ASTM D4318):	LL = 66		PL = 31		PI = 35	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 100%		No. 200 = 90%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	86.0	pcf (dry) at	29.0%	moisture		
Water Content of Trimmings (ASTM D2216):	28.8%					
Trimming Procedure:	Speciment remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	4	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0304	in				
Estimated Preconsolidation Stress:	Not Computed					

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1019					0.0000	0.9822	0.00	0.883				
1	0.25	1410					0.0197	0.9625	1.98	0.845				
2	0.50	1410					0.0385	0.9437	3.86	0.809				
3	1.00	1430					0.0579	0.9242	5.81	0.772				
4	2.00	1470					0.0764	0.9057	7.66	0.737				
5	4.00	1415					0.0968	0.8853	9.71	0.698				
6	8.00	1420					0.1023	0.8798	10.26	0.687				
7	16.00	1425					0.1074	0.8747	10.77	0.677				
8	32.00	1440					0.1123	0.8699	11.26	0.668				
9	8.00	90					0.1109	0.8712	11.13	0.670				
10	2.00	115					0.1099	0.8722	11.02	0.672				
11	0.50	100					0.1089	0.8733	10.92	0.674				
12	0.10	70					0.1076	0.8746	10.79	0.677				

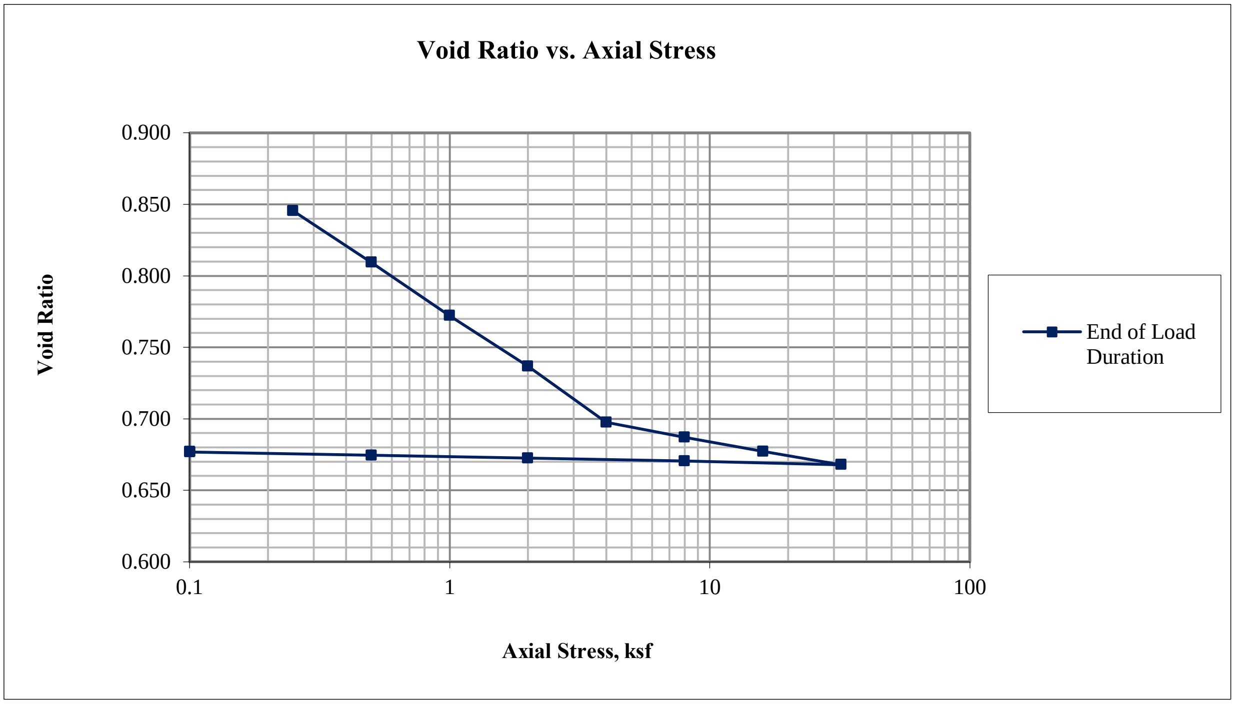
Golder Associates Inc.
Denver, Colorado

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Job Short Title: **Copper Flat Tailings Design Study**

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-12 @ 33.5-48.5 ft	RJM	CCS	3/11/2013	103-92557.006	1

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Start Date:**	**Job Number:**	**Figure:**
BH-12 @ 33.5-48.5 ft	**RJM**	**CCS**	**3/11/2013**	**103-92557.006**	**2**

	Initial		Final	
Height =	0.993	in	0.887	in
Diameter =	2.500	in	2.500	in
Area =	4.909	in^2	4.909	in^2
Volume =	4.874	in^3	4.354	in^3
Water Content =	14.1%		1.7%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5636	in	0.5636	in
Void Ratio =	0.762		0.574	
Degree of Saturation =	49.8%		8.0%	
Wet Mass =	0.307	lb	0.274	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	108.9	pcf	108.7	pcf
Dry Unit Weight =	95.5	pcf	106.9	pcf

Notes

USCS description (ASTM D2487):	Clayey sand with gravel, yellowish brown, dry				
Atterberg Limits (ASTM D4318):	LL = 23		PL = 14		PI = 9
Percent Finer (ASTM D422):	3/4 in. = 98%		No. 4 = 83%		No. 200 = 36%
Specimen Type:		Intact	X	Reconstituted	
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture	
Water Content of Trimmings (ASTM D2216):	14.7%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	X	Not inundated		Inundated	
Test Method:		A	X	B	
Apparatus:	Frame No.	1	(Wykeham Farrance 24251)		
Final Water Content Specimen:	X	Entire		Partial	
Final Differential Height:	0.0528	in			
Estimated Preconsolidation Stress:	16.4	ksf			

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1055					0.0000	0.9877	0.00	0.752				
1	0.25	1425					0.0077	0.9800	0.78	0.739				
2	0.50	1425					0.0129	0.9747	1.30	0.730				
3	1.00	1440					0.0173	0.9704	1.74	0.722				
4	2.00	1410					0.0219	0.9657	2.21	0.714				
5	4.00	2785	0.0229	0.9647	2.31	0.712	0.0283	0.9594	2.85	0.702	2 (Root time)	0.712	8.212	0.4
6	8.00	1425					0.0309	0.9567	3.12	0.698				
7	16.00	1430	0.0321	0.9555	3.24	0.695	0.0343	0.9534	3.45	0.692	2 (Root time)	0.696	10.130	0.3
8	32.00	1440	0.0457	0.9420	4.60	0.671	0.0498	0.9378	5.02	0.664	2 (Root time)	0.675	4.980	0.4
9	8.00	105					0.0487	0.9389	4.91	0.666				
10	2.00	90					0.0484	0.9392	4.88	0.667				
11	0.50	180					0.0478	0.9398	4.82	0.668				

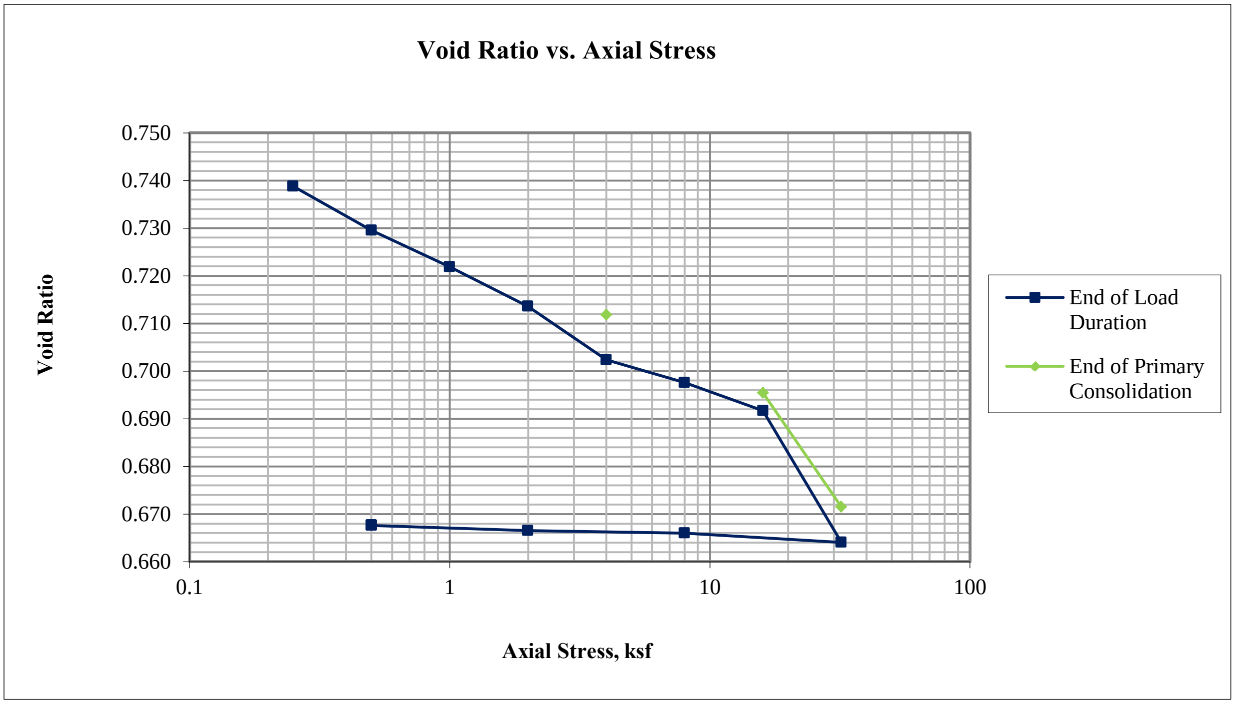
Golder Associates Inc.
Denver, Colorado

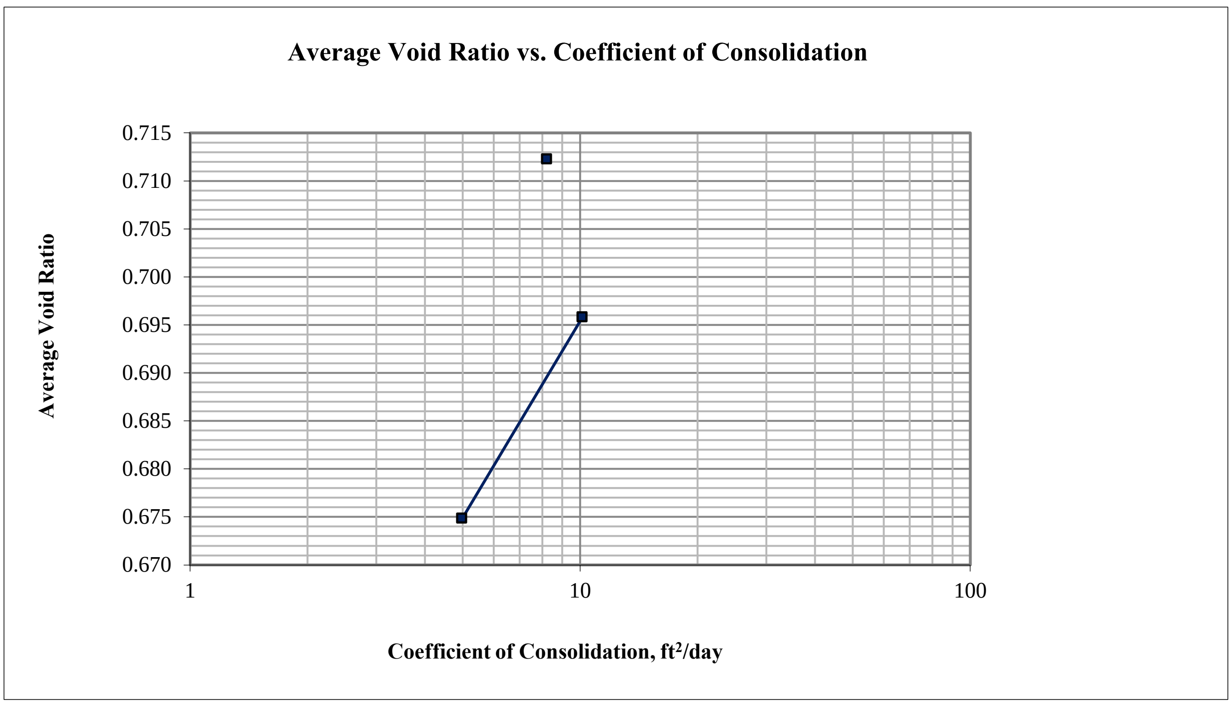
Job Short Title: **Copper Flat Tailings Design Study**

Title:

ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

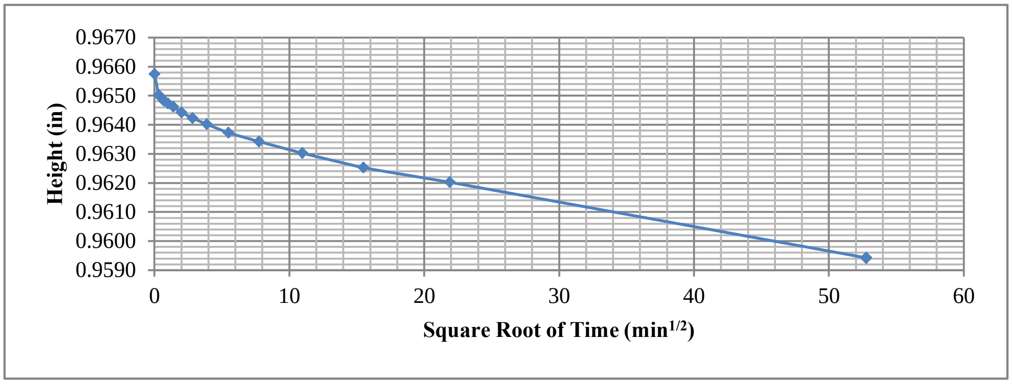
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-16 @ 29-34 ft	RJM	CCS	3/25/2013	103-92557.006	1



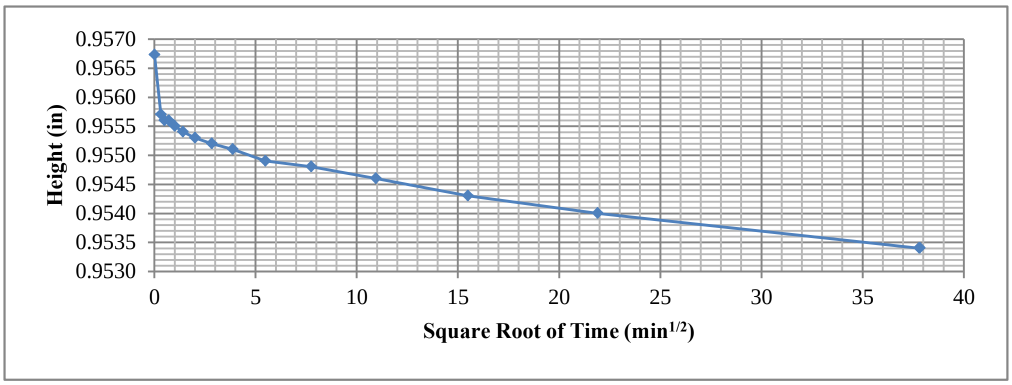


Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-16 @ 29-34 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/25/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**

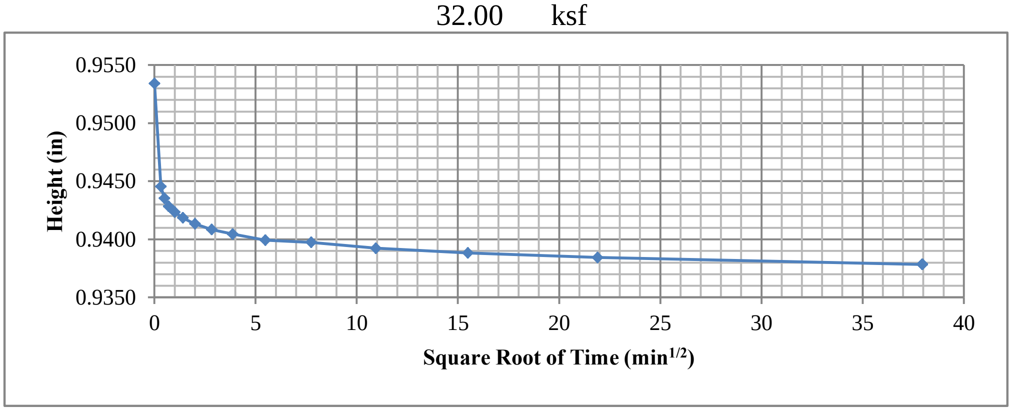
4.00 ksf



16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-16 @ 29-34 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/25/2013**	**Job Number:** **103-92557.006**	**Figure:** **3**

	Initial		Final	
Height =	0.997	in	0.960	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.886	in^3	4.705	in^3
Water Content =	14.5%		2.7%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5638	in	0.5638	in
Void Ratio =	0.768		0.703	
Degree of Saturation =	51.1%		10.4%	
Wet Mass =	0.308	lb	0.276	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	109.0	pcf	101.5	pcf
Dry Unit Weight =	95.1	pcf	98.8	pcf

Notes

USCS description (ASTM D2487):	Sandy lean clay, reddish brown, moist					
Atterberg Limits (ASTM D4318):	LL = 25		PL = 14		PI = 11	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 95%		No. 200 = 52%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture		
Water Content of Trimmings (ASTM D2216):	14.7%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	4	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	0.0045	in				
Estimated Preconsolidation Stress:	14.7	ksf				

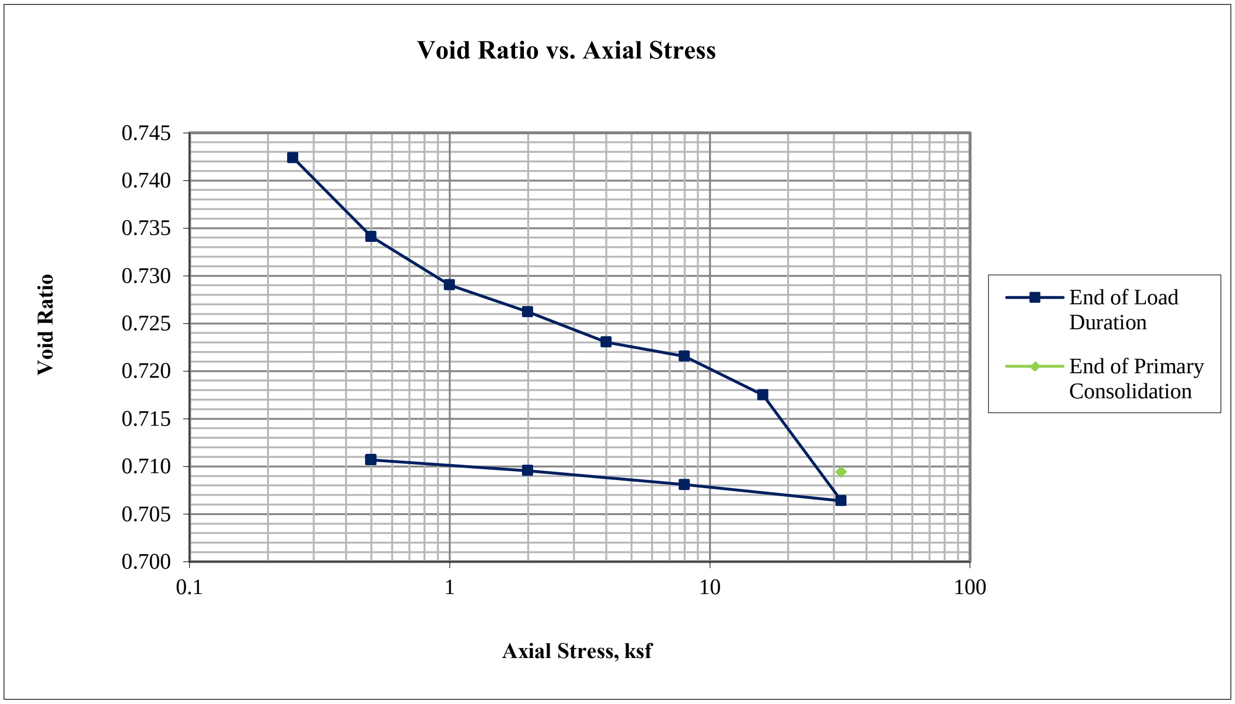
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1025					0.0000	0.9894	0.00	0.755				
1	0.25	1425					0.0070	0.9824	0.70	0.742				
2	0.50	1425					0.0117	0.9777	1.17	0.734				
3	1.00	1440					0.0145	0.9748	1.46	0.729				
4	2.00	1410					0.0161	0.9732	1.62	0.726				
5	4.00	2780					0.0179	0.9714	1.80	0.723				
6	8.00	1425					0.0187	0.9706	1.88	0.722				
7	16.00	1420					0.0210	0.9683	2.11	0.717				
8	32.00	1440	0.0256	0.9638	2.57	0.709	0.0273	0.9621	2.74	0.706	2 (Root time)	0.710	5.423	0.5
9	8.00	105					0.0263	0.9630	2.64	0.708				
10	2.00	90					0.0255	0.9638	2.56	0.710				
11	0.50	180					0.0249	0.9645	2.49	0.711				

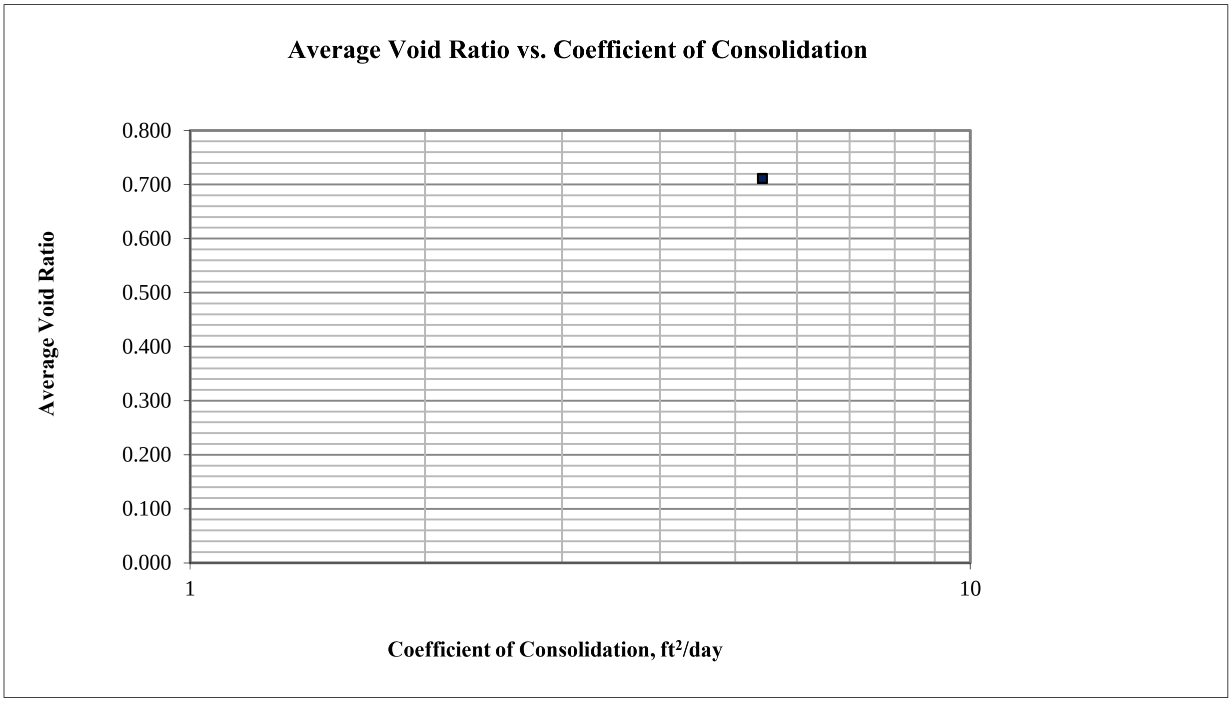
Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-18 @ 23-33.5 ft	RJM	CCS	3/25/2013	103-92557.006	1

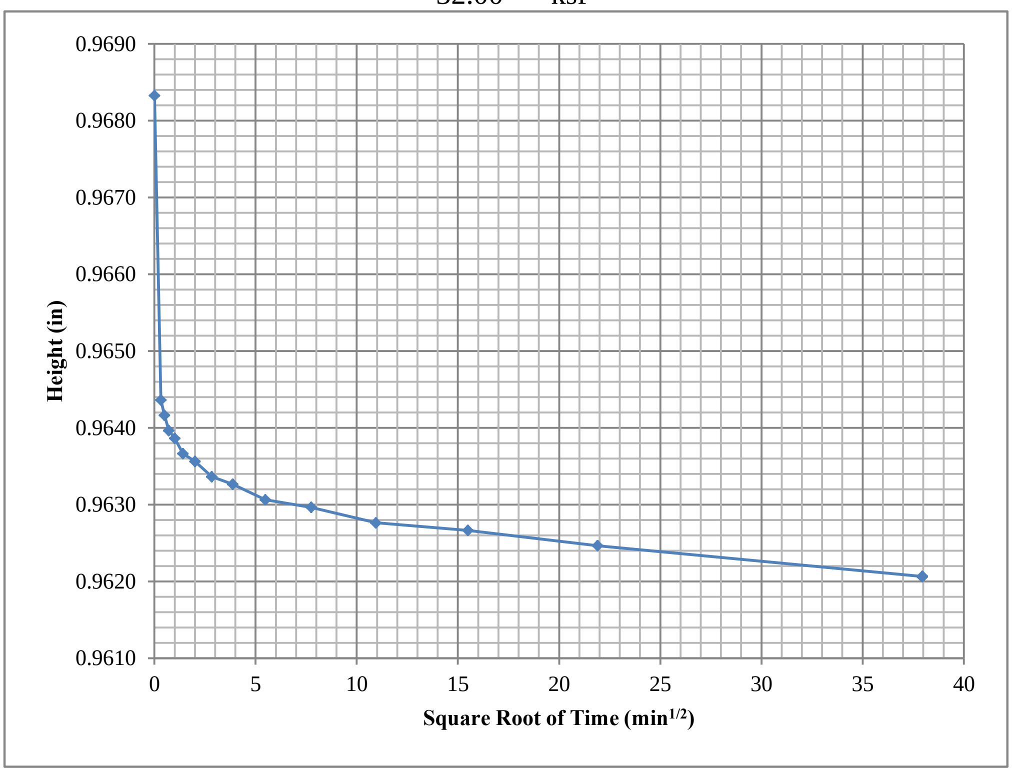




Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-18 @ 23-33.5 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/25/2013	Job Number: 103-92557.006	Figure: 2

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports

32.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-18 @ 23-33.5 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/25/2013	**Job Number:** 103-92557.006	**Figure:** 3

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports

	Initial		Final	
Height =	0.994	in	0.924	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.871	in^3	4.528	in^3
Water Content =	28.9%		9.0%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5085	in	0.5085	in
Void Ratio =	0.955		0.817	
Degree of Saturation =	81.7%		29.7%	
Wet Mass =	0.313	lb	0.264	lb
Dry Mass =	0.243	lb	0.243	lb
Wet Unit Weight =	110.9	pcf	100.9	pcf
Dry Unit Weight =	86.1	pcf	92.6	pcf

Notes

USCS description (ASTM D2487):	Fat clay with sand, dark red, wet					
Atterberg Limits (ASTM D4318):	LL = 62		PL = 20		PI = 42	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 100%		No. 200 = 82%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	86.0	pcf (dry) at	29.0%	moisture		
Water Content of Trimmings (ASTM D2216):	29.1%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	5	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0246	in				
Estimated Preconsolidation Stress:	--	ksf				

-- indicates test was not performed

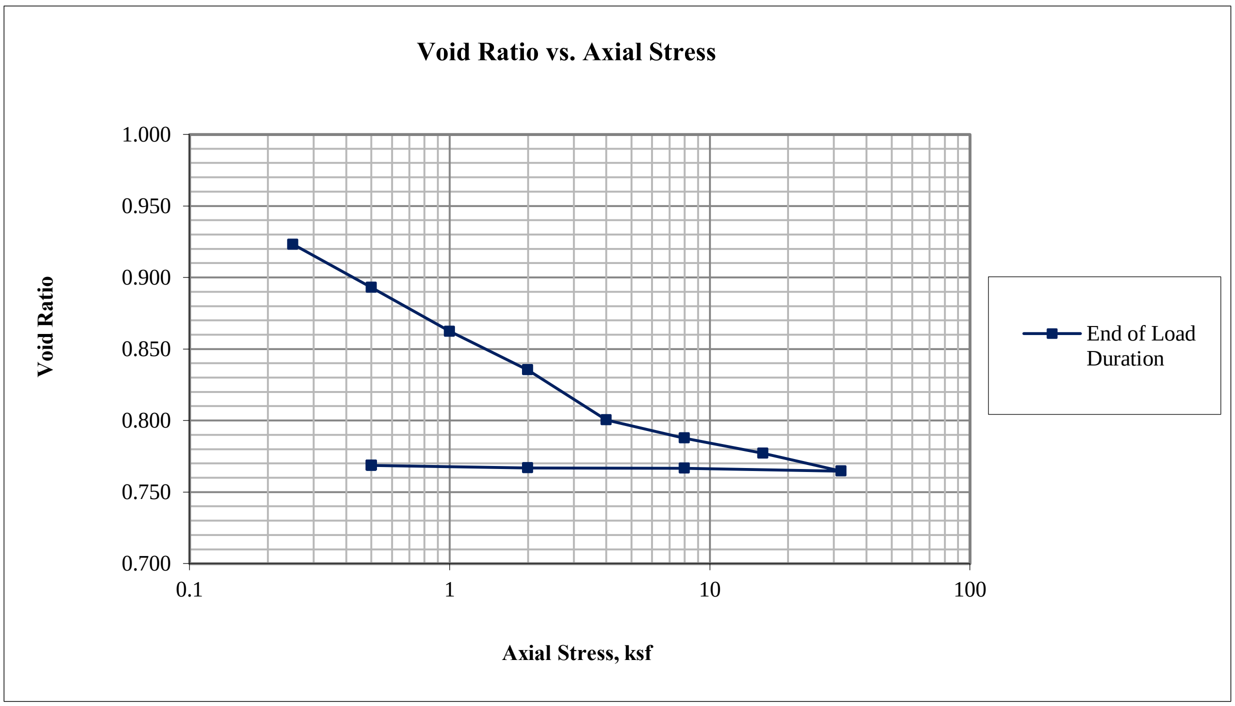
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	990					0.0000	0.9933	0.00	0.953				
1	0.25	1425					0.0154	0.9779	1.55	0.923				
2	0.50	1825					0.0307	0.9626	3.09	0.893				
3	1.00	1440					0.0463	0.9470	4.66	0.862				
4	2.00	1410					0.0600	0.9333	6.04	0.835				
5	4.00	2775					0.0778	0.9155	7.82	0.800				
6	8.00	1425					0.0843	0.9090	8.48	0.788				
7	16.00	1425					0.0897	0.9036	9.02	0.777				
8	32.00	1440					0.0960	0.8973	9.65	0.765				
9	8.00	105					0.0950	0.8983	9.55	0.767				
10	2.00	105					0.0948	0.8985	9.54	0.767				
11	0.50	165					0.0939	0.8994	9.45	0.769				

Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-18 @ 43.5-48.5 ft	RJM	CCS	3/25/2013	103-92557.006	1



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-18 @ 43.5-48.5 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/25/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports

	Initial		Final	
Height =	1.000	in	0.981	in
Diameter =	2.497	in	2.497	in
Area =	4.897	in^2	4.897	in^2
Volume =	4.897	in^3	4.804	in^3
Water Content =	9.7%		1.1%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5363	in	0.5363	in
Void Ratio =	0.865		0.829	
Degree of Saturation =	30.3%		3.6%	
Wet Mass =	0.281	lb	0.259	lb
Dry Mass =	0.256	lb	0.256	lb
Wet Unit Weight =	99.0	pcf	93.0	pcf
Dry Unit Weight =	90.2	pcf	92.0	pcf

Notes

USCS description (ASTM D2487):	Sandy silty clay, brownish yellow, moist					
Atterberg Limits (ASTM D4318):	LL = 25		PL = 21		PI = 4	
Percent Finer (ASTM D422):	3/4 in. = 99%		No. 4 = 99%		No. 200 = 52%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	90.0	pcf (dry) at	10.0%	moisture		
Water Content of Trimmings (ASTM D2216):	9.4%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	6	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0094	in				
Estimated Preconsolidation Stress:	13.0	ksf				

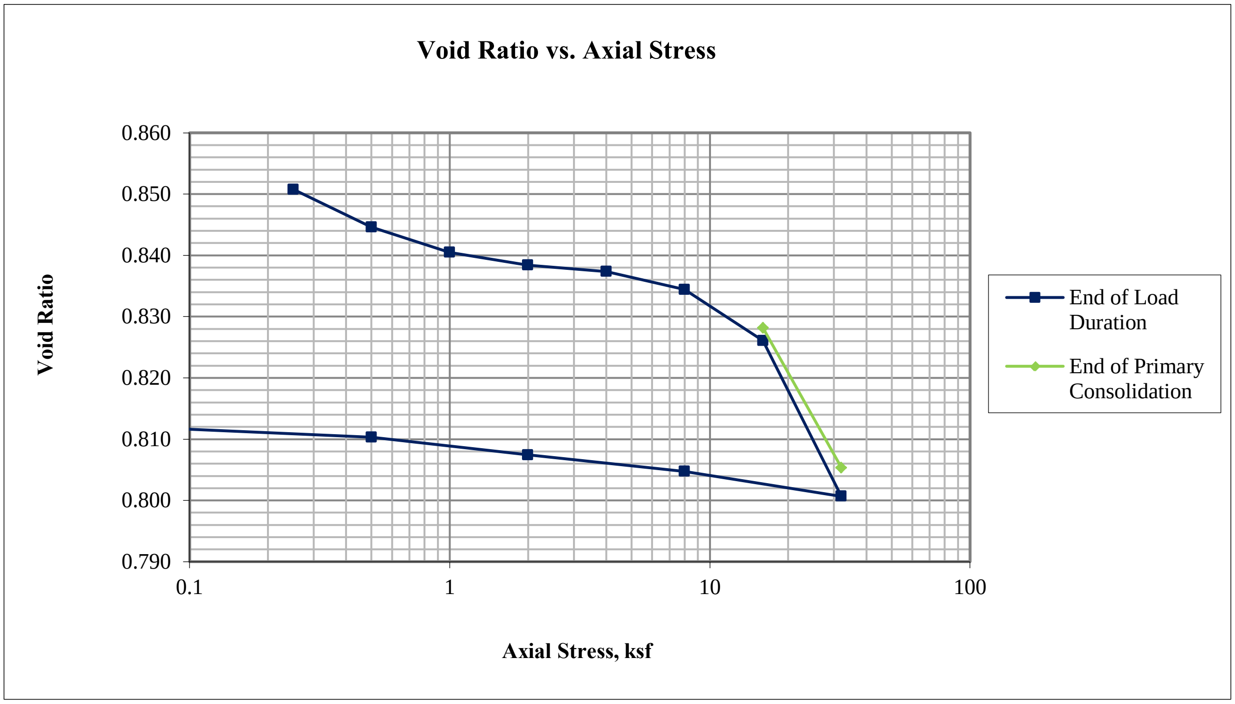
	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	944					0.0000	0.9957	0.00	0.857				
1	0.25	1410					0.0031	0.9926	0.31	0.851				
2	0.50	1410					0.0064	0.9893	0.64	0.845				
3	1.00	1440					0.0086	0.9871	0.86	0.841				
4	2.00	1470					0.0097	0.9860	0.97	0.838				
5	4.00	1410					0.0103	0.9854	1.03	0.837				
6	8.00	1410					0.0119	0.9838	1.19	0.834				
7	16.00	1425	0.0152	0.9805	1.52	0.828	0.0164	0.9794	1.64	0.826	2 (Root time)	0.829	23.310	0.3
8	32.00	1470	0.0275	0.9682	2.75	0.805	0.0300	0.9657	3.00	0.801	2 (Root time)	0.807	3.521	0.4
9	8.00	75					0.0278	0.9679	2.78	0.805				
10	2.00	95					0.0263	0.9694	2.63	0.807				
11	0.50	1315					0.0248	0.9709	2.48	0.810				
12	0.10	195					0.0241	0.9716	2.41	0.812				

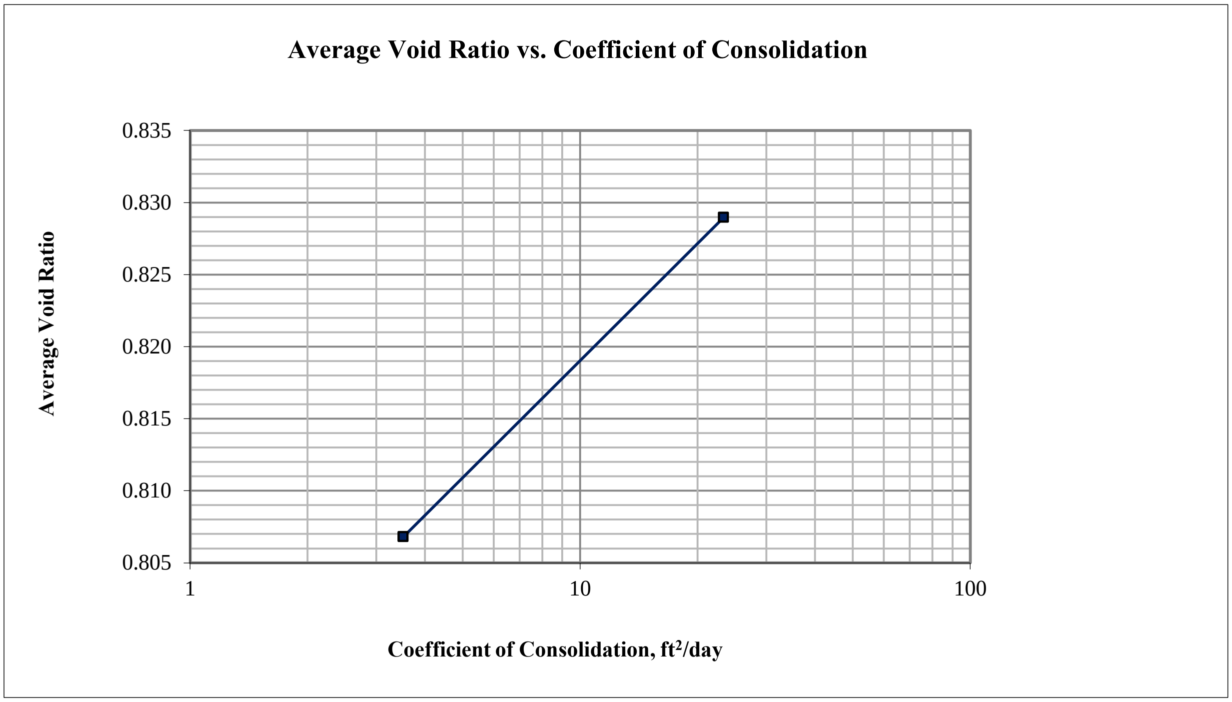
Golder Associates Inc.
Denver, Colorado

Job Short Title: **Copper Flat Tailings Design Study**

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

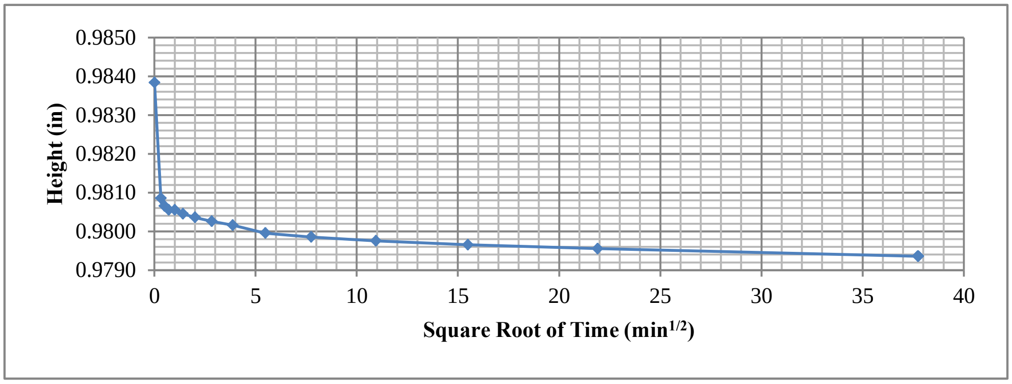
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-22 @ 0-8.5 ft	RJM	CCS	3/11/2013	103-92557.006	1



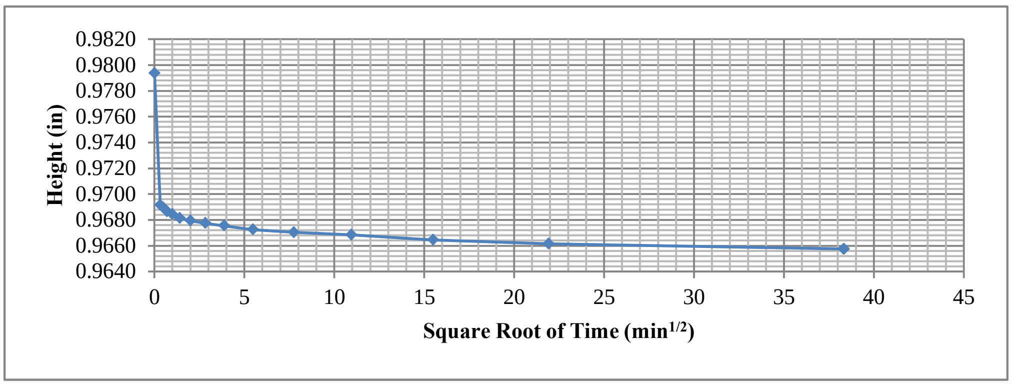


Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-22 @ 0-8.5 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/11/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**

16.00 ksf



32.00 ksf



Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
TIME-DEFORMATION PLOTS

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-22 @ 0-8.5 ft	RJM	CCS	3/11/2013	103-92557.006	3

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports

	Initial		Final	
Height =	0.997	in	0.924	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.886	in^3	4.528	in^3
Water Content =	14.2%		2.9%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5690	in	0.5690	in
Void Ratio =	0.752		0.624	
Degree of Saturation =	50.8%		12.6%	
Wet Mass =	0.310	lb	0.279	lb
Dry Mass =	0.272	lb	0.272	lb
Wet Unit Weight =	109.6	pcf	106.6	pcf
Dry Unit Weight =	96.0	pcf	103.6	pcf

Notes

Visual description (Golder procedure):	CLAYEY SAND, pale red, moist					
Atterberg Limits (ASTM D4318):	LL = 36		PL = 18		PI = 18	
Percent Finer (ASTM D422):	3/4 in. = 98%		No. 4 = 82%		No. 200 = 37%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture		
Water Content of Trimmings (ASTM D2216):	14.5%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	5	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	0.0184	in				
Estimated Preconsolidation Stress:	14.5	ksf				

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	980					0.0000	0.9843	0.00	0.730				
1	0.25	1410					0.0077	0.9766	0.77	0.716				
2	0.50	1410					0.0119	0.9724	1.20	0.709				
3	1.00	1440					0.0156	0.9687	1.57	0.702				
4	2.00	1470					0.0188	0.9655	1.89	0.697				
5	4.00	1410					0.0207	0.9636	2.07	0.693				
6	8.00	1415					0.0229	0.9614	2.29	0.690				
7	16.00	1425	0.0267	0.9576	2.67	0.683	0.0290	0.9553	2.91	0.679	2 (Root time)	0.684	31.272	0.3
8	32.00	1440	0.0436	0.9407	4.37	0.653	0.0470	0.9373	4.71	0.647	2 (Root time)	0.655	3.684	0.4
9	8.00	75					0.0455	0.9388	4.56	0.650				
10	2.00	130					0.0444	0.9399	4.46	0.652				
11	0.50	100					0.0433	0.9410	4.34	0.654				
12	0.10	70					0.0419	0.9424	4.20	0.656				

Golder Associates Inc.
Denver, Colorado

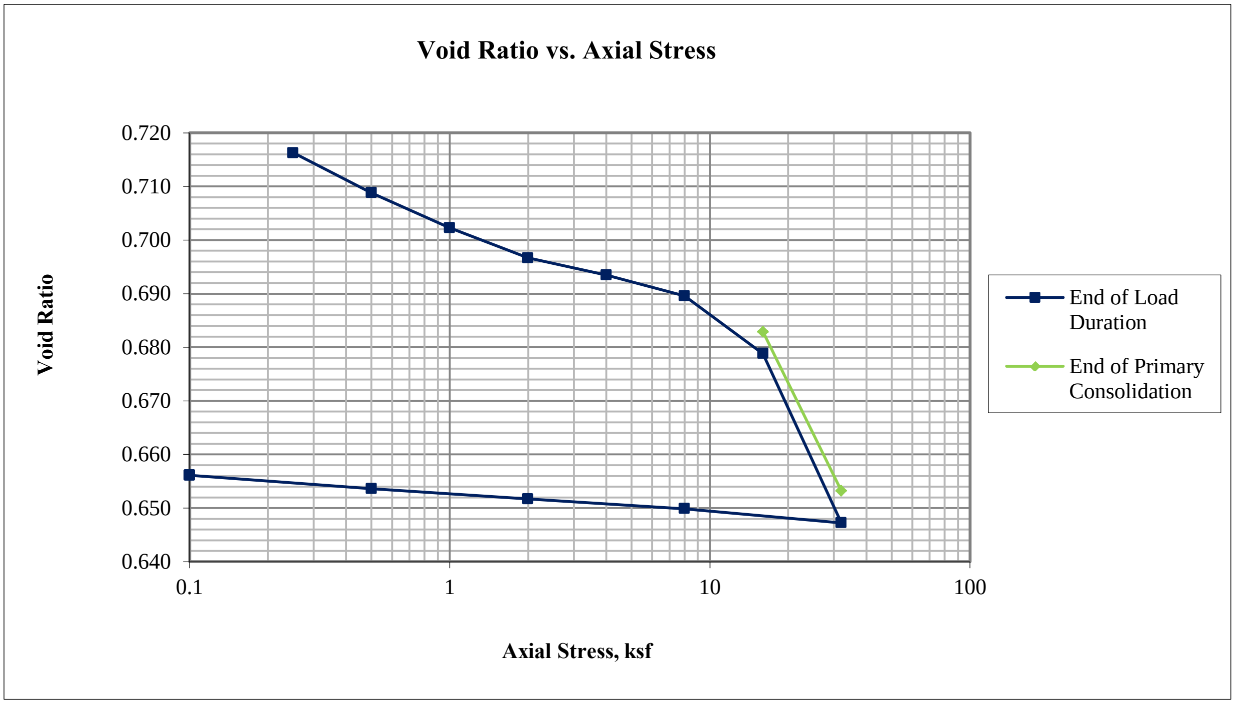
Job Short Title: **Copper Flat Tailings Design Study**

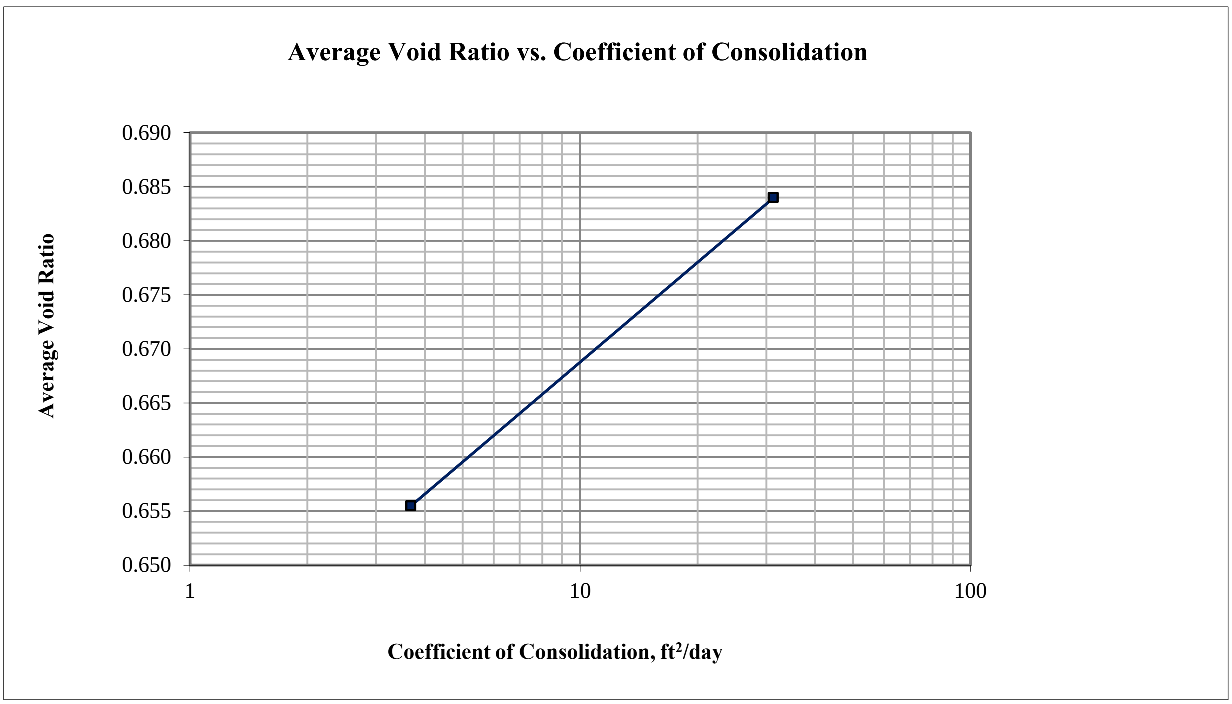
Title:

ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-22 @ 28-30 ft	RJM	CCS	3/11/2013	103-92557.006	1

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix A.3 Geotechnical Test Results\4 Consolidation Test Reports

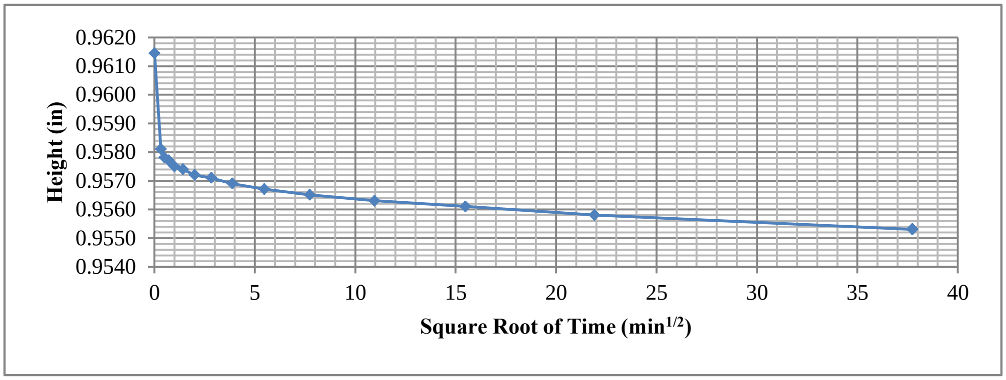




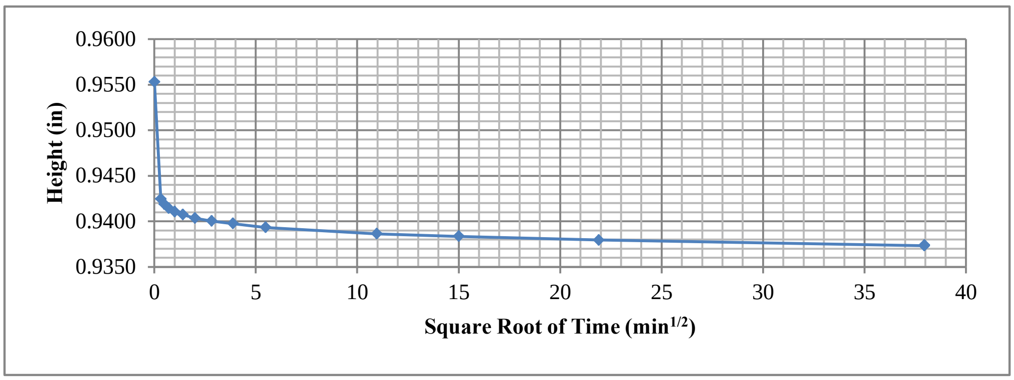
Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Start Date:**	**Job Number:**	**Figure:**
BH-22 @ 28-30 ft	**RJM**	**CCS**	**3/11/2013**	**103-92557.006**	**2**

16.00 ksf



32.00 ksf



Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-22 @ 28-30 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 3

	Initial		Final	
Height =	1.000	in	0.973	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.901	in^3	4.769	in^3
Water Content =	9.8%		4.2%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5558	in	0.5558	in
Void Ratio =	0.799		0.751	
Degree of Saturation =	33.0%		15.1%	
Wet Mass =	0.291	lb	0.276	lb
Dry Mass =	0.265	lb	0.265	lb
Wet Unit Weight =	102.7	pcf	100.1	pcf
Dry Unit Weight =	93.5	pcf	96.1	pcf

Notes

USCS description (ASTM D2487):	Clayey sand, reddish brown, moist					
Atterberg Limits (ASTM D4318):	LL = 37		PL = 17		PI = 20	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 95%		No. 200 = 39%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	93.0	pcf (dry) at	10.0%	moisture		
Water Content of Trimmings (ASTM D2216):	9.9%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	6	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0136	in				
Estimated Preconsolidation Stress:	13.8	ksf				

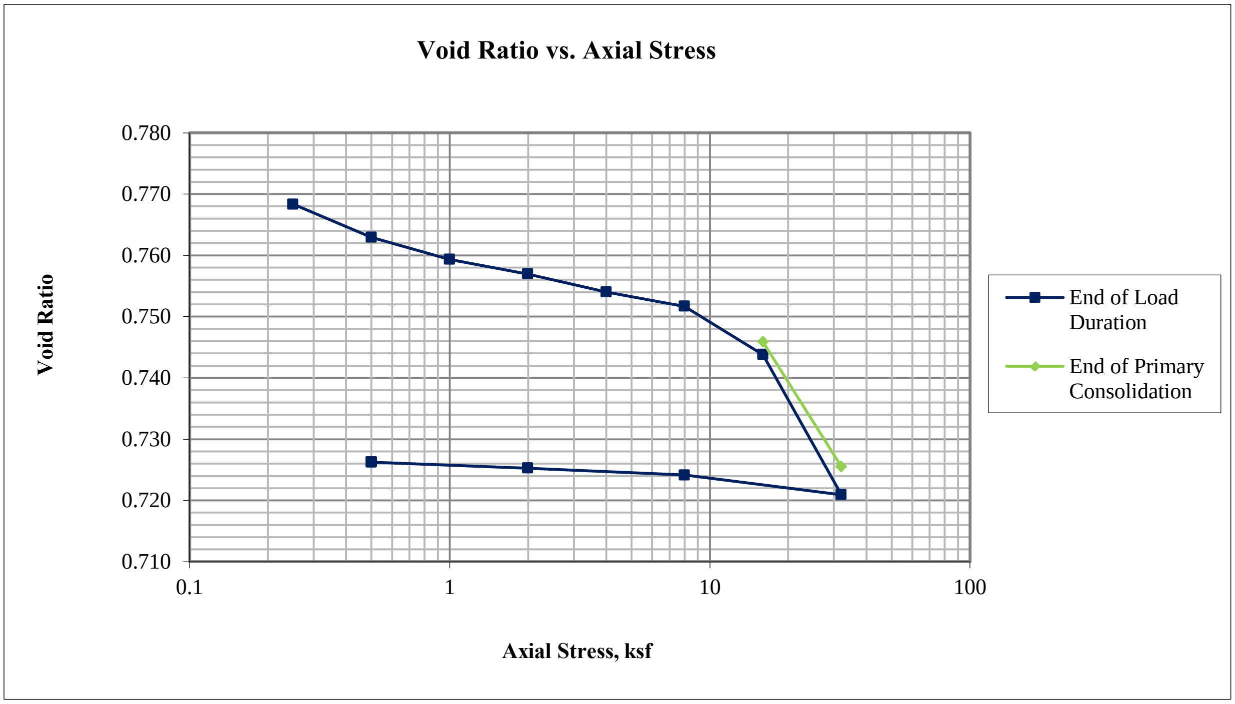
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	960					0.0000	0.9894	0.00	0.780				
1	0.25	1440					0.0066	0.9828	0.66	0.768				
2	0.50	1425					0.0096	0.9798	0.96	0.763				
3	1.00	1440					0.0116	0.9778	1.16	0.759				
4	2.00	1410					0.0129	0.9765	1.29	0.757				
5	4.00	2770					0.0146	0.9748	1.46	0.754				
6	8.00	1410					0.0159	0.9735	1.59	0.752				
7	16.00	1410	0.0191	0.9703	1.91	0.746	0.0203	0.9692	2.03	0.744	2 (Root time)	0.746	1.313	0.9
8	32.00	1440	0.0304	0.9590	3.04	0.726	0.0330	0.9564	3.30	0.721	2 (Root time)	0.727	3.137	0.5
9	8.00	80					0.0312	0.9582	3.12	0.724				
10	2.00	100					0.0305	0.9589	3.05	0.725				
11	0.50	180					0.0300	0.9594	3.00	0.726				

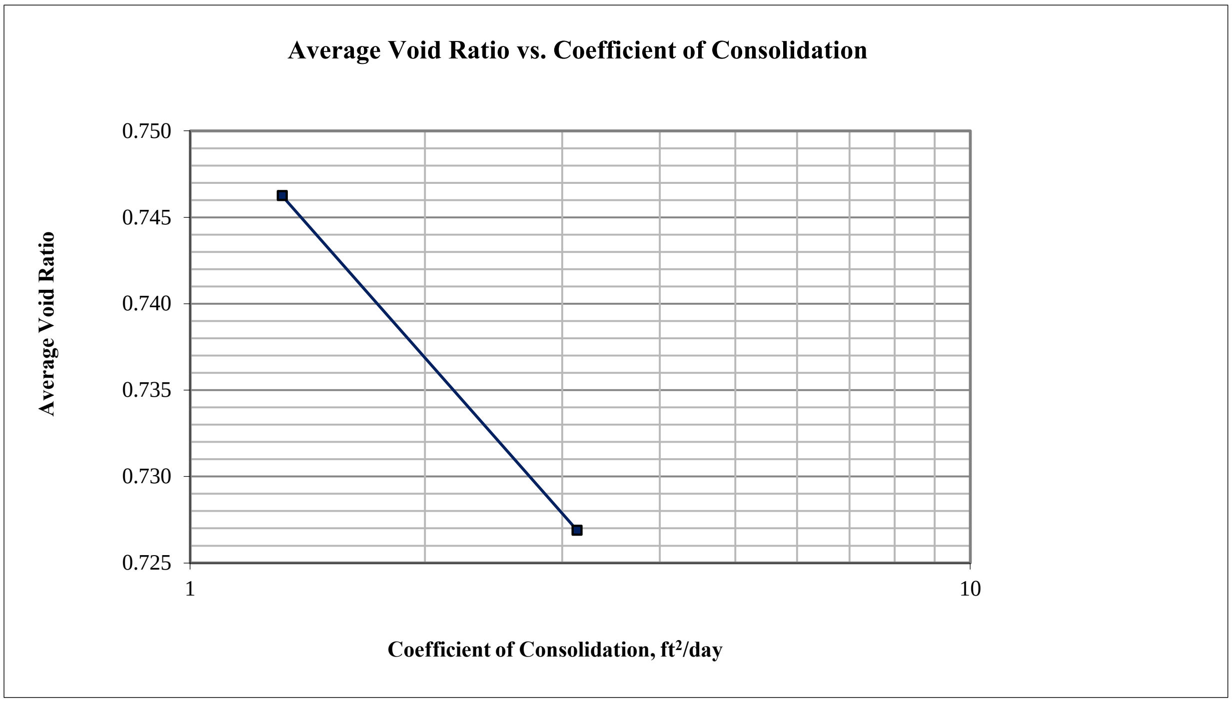
Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title: ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

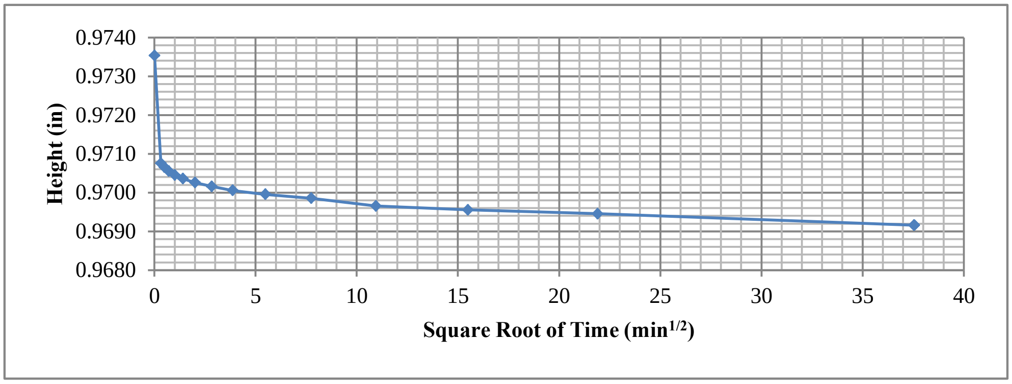
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-25 @ 22-34 ft	RJM	CCS	3/25/2013	103-92557.006	1



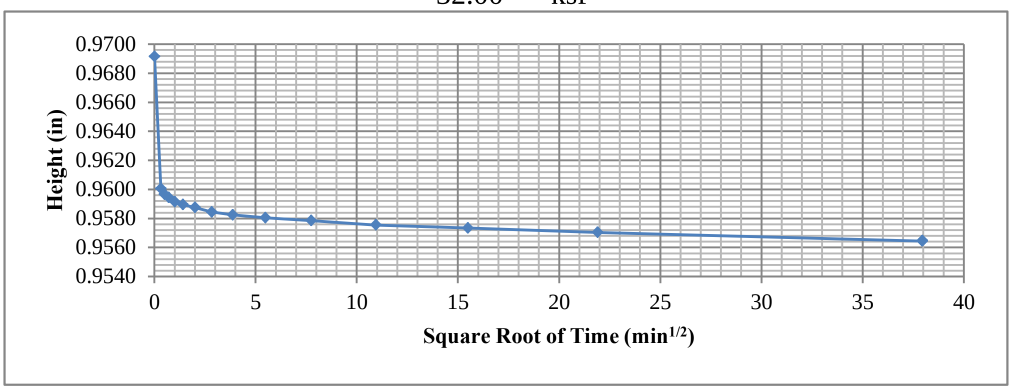


Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **CONSOLIDATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-25 @ 22-34 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/25/2013**	**Job Number:** **103-92557.006**	**Figure:** **2**

16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**		**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS			
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 22-34 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/25/2013	**Job Number:** 103-92557.006	**Figure:** 3

APPENDIX B
TAILINGS TEST RESULTS

APPENDIX B.1
CYCLONE TEST RESULTS,
FULL SCALE CYCLONE PERFORMANCE SIMULATION

KREBS ENGINEERS

SHEET: 6-1

DATE: 15-Nov-13

BY: MPB

Client: Golder Assoc. Copper Flat

Problem: Feed = 29.1% solids; 1222 STPH; 55.5% -200 mesh

U/F = 18.2% -200 mesh; 45.2% recovery

Number, Model Krebs Cyclones: 15 operating gMAX15U-20

	Inlet Area	Vortex Finder	Apex	Pressure Drop
Orifices:	18.00 sq. in.	6.75 in.	TBD	13-14 PSI

Specific Gravity: Solids: 2.650 Liquid: 1.000 Temperature: Amb. °F Viscosity: 1 Cps

	FEED	OVERFLOW	UNDERFLOW
STPH Solids	1222.00	669.86	552.15
STPH Liquids	2977.31	2740.68	236.63
STPH Slurry	4199.31	3410.53	788.78
Wt Solids	29.10	19.64	70.00
S.G. Slurry	1.221	1.139	1.773
Vol% Solids	13.41	8.44	46.82
GPM Slurry	13734.13	11956.71	1777.42
M3/Hr. Slurry	3119.34	2715.64	403.69

Ref: 72.3 4.5 38.9*

Mesh	Micron	FEED			OVERFLOW			UNDERFLOW			ACT.
		Cum. % +	Ind. % +	STPH	Cum. % +	Ind. % +	STPH	Cum. % +	Ind. % +	STPH	REC.
65	208.0	1.80	1.80	22.0	0.00	0.00	0.0	3.98	3.98	22.0	100.0
100	149.0	18.50	16.70	204.1	0.23	0.23	1.6	40.66	36.68	202.5	99.2
150	104.0	30.60	12.10	147.9	2.69	2.46	16.5	64.46	23.79	131.4	88.9
200	74.0	44.50	13.90	169.9	13.74	11.05	74.0	81.81	17.36	95.8	56.4
270	53.0	56.40	11.90	145.4	29.20	15.46	103.5	89.40	7.59	41.9	28.8
325	45.0	61.10	4.70	57.4	35.93	6.73	45.0	91.64	2.24	12.4	21.6
400	37.0	63.70	2.60	31.8	39.89	3.97	26.6	92.58	0.94	5.2	16.4
-400	-37.0	100.00	36.30	443.6	100.00	60.11	402.6	100.00	7.42	40.9	9.2
TOTAL				1222.00			669.86			552.15	45.2

KREBS ENGINEERS

SHEET: 8-1

DATE: 15-Nov-13

BY: MPB

Client: Golder Assoc. Copper Flat

Problem: Feed = 29.1% solids; 1333 STPH; 55.5% -200 mesh

U/F = 18.4% -200 mesh; 45.6% recovery

Number, Model Krebs Cyclones: 16 operating gMAX15U-20

	Inlet Area	Vortex Finder	Apex	Pressure Drop
Orifices:	18.00 sq. in.	6.75 in.	TBD	14 PSI

Specific Gravity: Solids: 2.650 Liquid: 1.000 Temperature: Amb.°F Viscosity: 1 Cps

	FEED	OVERFLOW	UNDERFLOW
STPH Solids	1333.00	724.53	608.47
STPH Liquids	3247.76	2986.98	260.77
STPH Slurry	4580.76	3711.51	869.24
Wt Solids	29.10	19.52	70.00
S.G. Slurry	1.221	1.138	1.773
Vol% Solids	13.41	8.39	46.82
GPM Slurry	14981.66	13022.93	1958.73
M3/Hr. Slurry	3402.68	2957.81	444.87

Ref: 71.4 4.5 38.9*

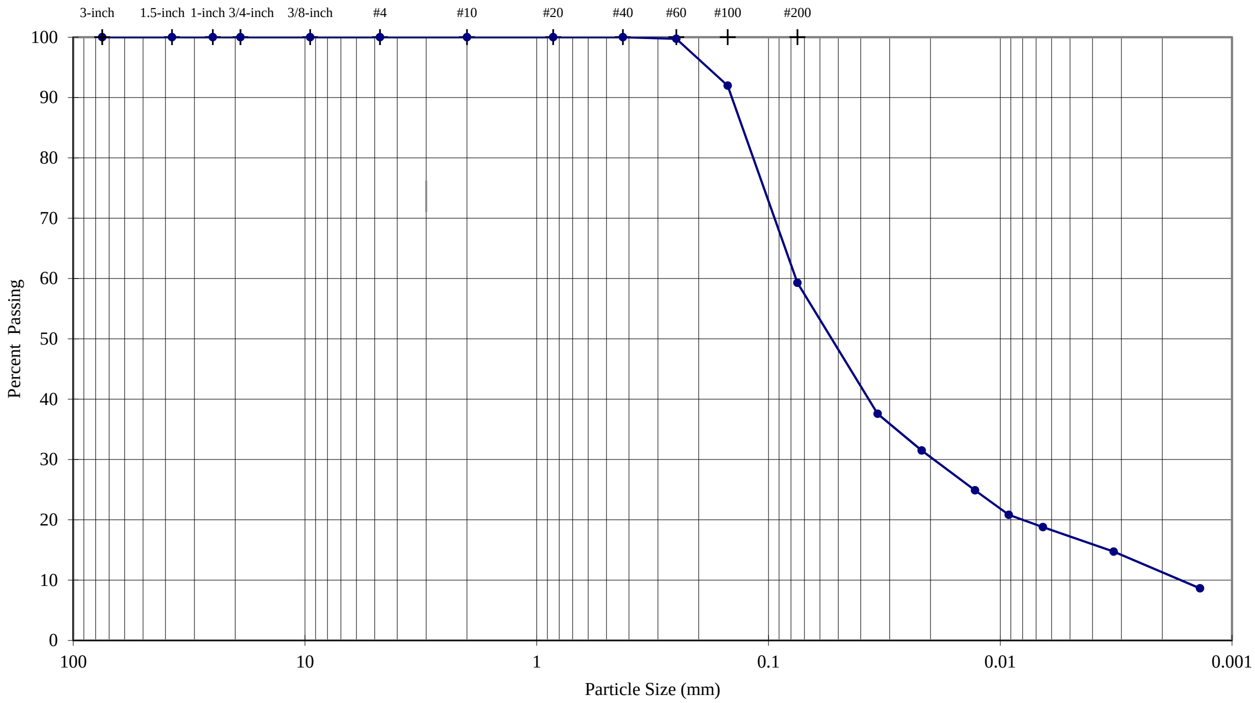
		FEED			OVERFLOW			UNDERFLOW			ACT.
Mesh	Micron	Cum. % +	Ind. % +	STPH	Cum. % +	Ind. % +	STPH	Cum. % +	Ind. % +	STPH	REC.
65	208.0	1.80	1.80	24.0	0.00	0.00	0.0	3.94	3.94	24.0	100.0
100	149.0	18.50	16.70	222.6	0.21	0.21	1.5	40.28	36.34	221.1	99.3
150	104.0	30.60	12.10	161.3	2.52	2.31	16.7	64.04	23.76	144.6	89.6
200	74.0	44.50	13.90	185.3	13.31	10.79	78.2	81.64	17.60	107.1	57.8
270	53.0	56.40	11.90	158.6	28.73	15.42	111.7	89.35	7.71	46.9	29.6
325	45.0	61.10	4.70	62.7	35.47	6.74	48.8	91.62	2.27	13.8	22.1
400	37.0	63.70	2.60	34.7	39.45	3.98	28.9	92.58	0.95	5.8	16.7
-400	-37.0	100.00	36.30	483.9	100.00	60.55	438.7	100.00	7.42	45.2	9.3
TOTAL				1333.00			724.53			608.47	45.6

KREBS ENGINEERS
5505 WEST GILLETTE ROAD TUCSON, AZ 85743
TEL: (520) 744-8200 FAX: (520) 744-8300
www.krebs.com

APPENDIX B.2
TAILINGS GRADATIONS

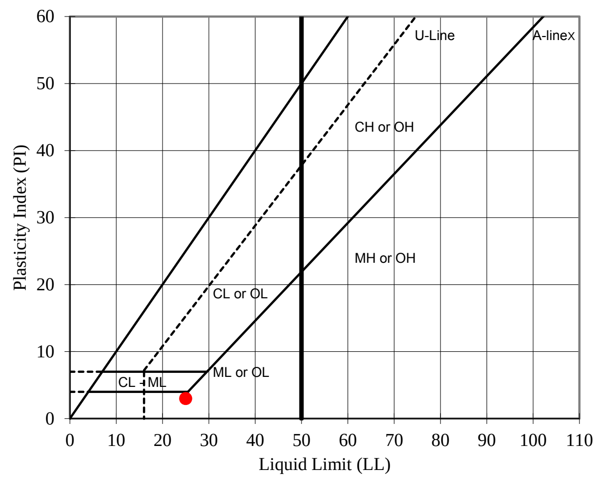
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Whole Tailings Drum** DEPTH (ft): --
TYPE: **Drum**



Sieve	Particle Size (mm)	% Passing	Description	Percentage
3-inch	75.0	**100.0**		
1.5-inch	37.5	**100.0**	Coarse Gravel	**0.00**
1-inch	25.0	**100.0**		
3/4-inch	19.0	**100.0**		
3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
#4	4.75	**100.0**		
#10	2.0	**100.0**	Coarse Sand	**0.00**
#20	0.85	**100.0**	Medium Sand	**0.00**
#40	0.425	**100.0**		
#60	0.25	**99.7**	Fine Sand	**40.71**
#100	0.15	**92.0**		
#200	0.075	**59.3**		
Hydrometer Analysis	0.034	**37.6**	Silt or Clay Fines	**59.29**
	0.022	**31.5**		
	0.013	**24.9**		
	0.009	**20.8**		
	0.007	**18.8**		
	0.003	**14.7**		
	0.001	**8.6**		

Sieve Analysis (Initial Separation on No. 4 Sieve)



USCS Description (ASTM D 2487):
Dry, yellow sandy silt

LL	PL	PI	SpG
25	**22**	**3**	**2.64**

As-Received Moisture Content (%): --

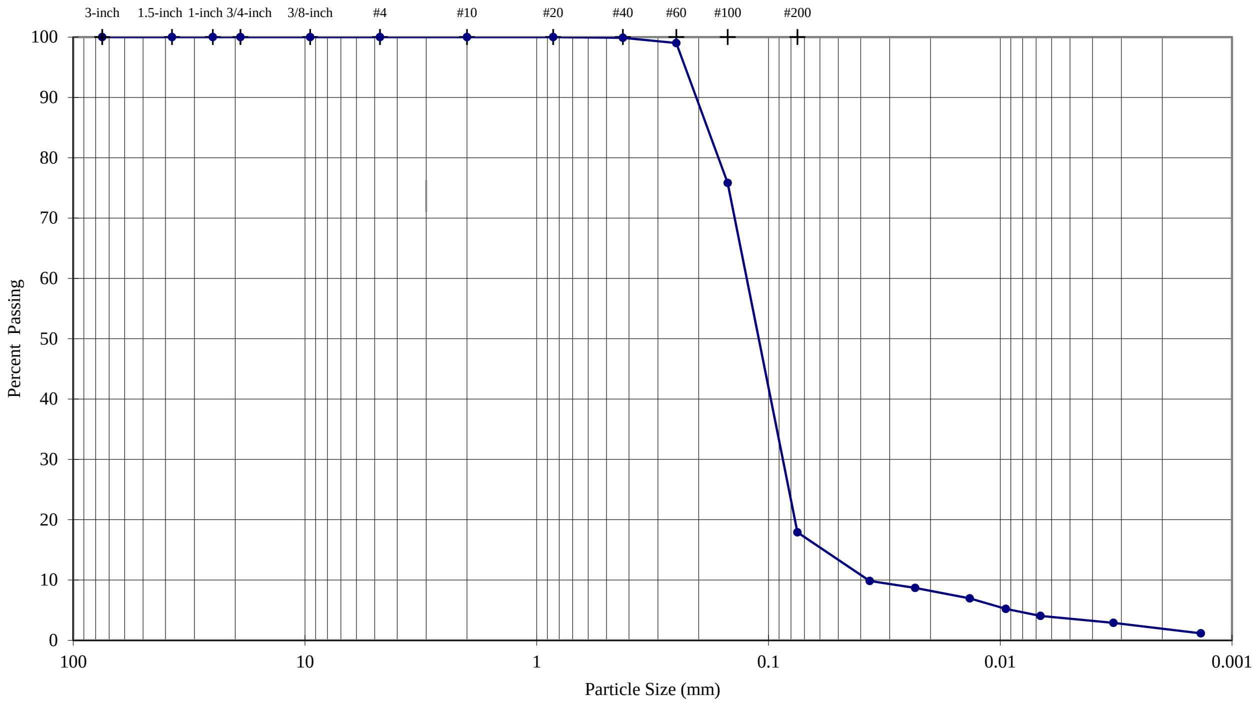
USCS Group Symbol: ML

Notes: 0 g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

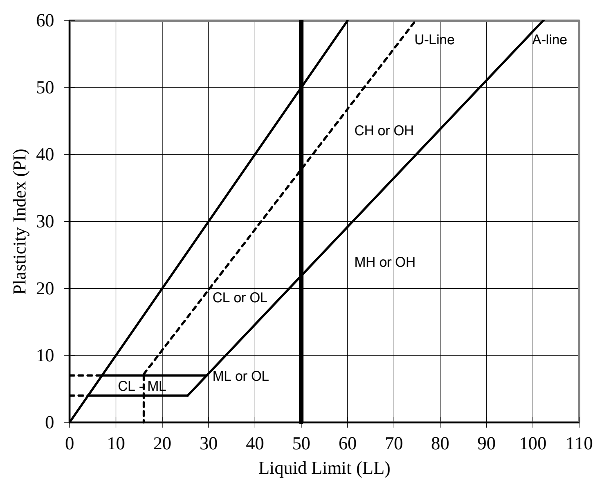
TECH	AM/SRS
DATE	11/13/2012
REVIEW	MB

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Tailings Underflow** DEPTH (ft): --
TYPE: **Pail**



	Sieve	Particle Size (mm)	% Passing	Description	Percentage
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**		
	1.5-inch	37.5	**100.0**	Coarse Gravel	**0.00**
	1-inch	25.0	**100.0**		
	3/4-inch	19.0	**100.0**		
	3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
	#4	4.75	**100.0**		
	#10	2.0	**100.0**	Coarse Sand	**0.00**
	#20	0.85	**100.0**	Medium Sand	**0.12**
	#40	0.425	**99.9**		
	#60	0.25	**99.0**	Fine Sand	**81.98**
	#100	0.15	**75.8**		
	#200	0.075	**17.9**		
Hydrometer Analysis		0.037	**9.8**	Silt or Clay Fines	**17.91**
		0.023	**8.7**		
		0.014	**6.9**		
		0.009	**5.2**		
		0.007	**4.1**		
		0.003	**2.9**		
		0.001	**1.2**		



USCS Description (ASTM D 2487):

Wet, light, yellowish brown silty sand

LL	PL	PI	Spg (assumed)
NP	**NP**	**NP**	**2.7**

As-Received Moisture Content (%): --

USCS Group Symbol: SM

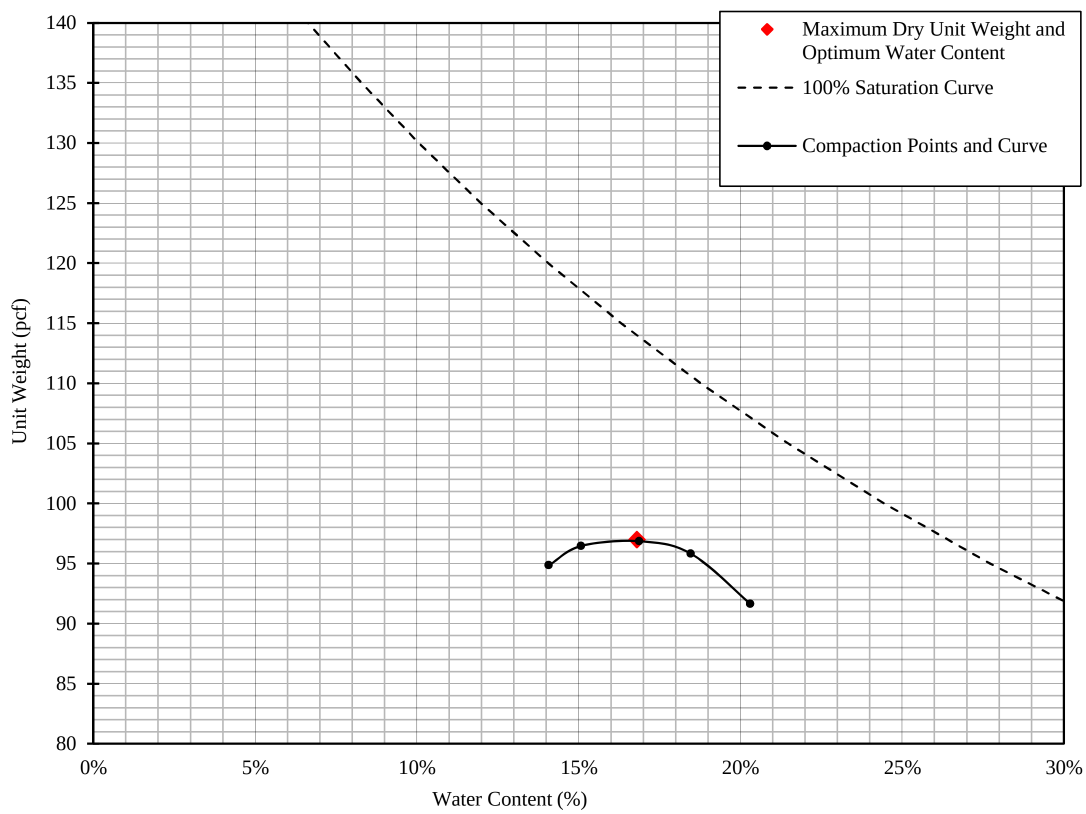
Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	MC/SRS
DATE	10/24/2012
REVIEW	MB

LABORATORY COMPACTION CHARACTERISTICS OF SOIL
ASTM D698 - Method A

Manual Rammer	Moist Preparation

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Tailings Underflow** DEPTH (ft): --
TYPE: **Pail**



% Test Fraction Passing #4 Sieve	**100%**
As-Received Moisture Content	**NA**
Specific Gravity (ASTM D854)	**2.64**

Maximum Dry Unit Weight (pcf)	**97.0**
Optimum Water Content (%)	**16.8**

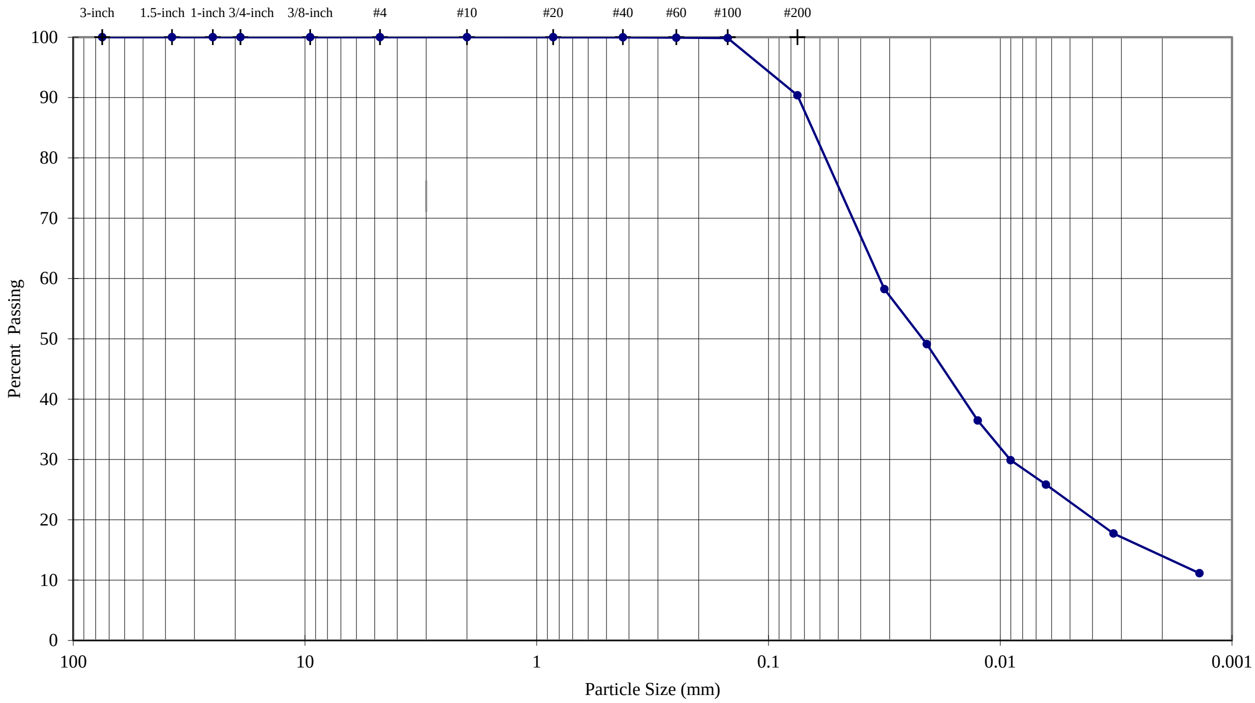
USCS Description (ASTM D 2487): Wet, light, yellowish brown silty sand

USCS SM

TECH	ACE/MC
DATE	10-25-12
REVIEW	MB

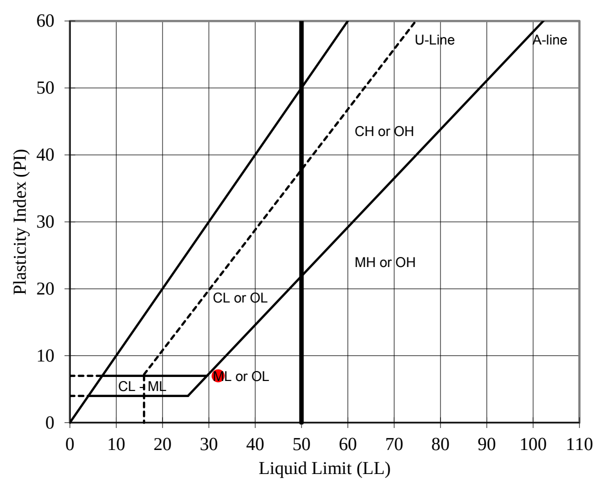
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Tailings Overflow** DEPTH (ft): --
TYPE: **Drum**



	Sieve	Particle Size (mm)	% Passing
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**
	1.5-inch	37.5	**100.0**
	1-inch	25.0	**100.0**
	3/4-inch	19.0	**100.0**
	3/8-inch	9.5	**100.0**
	#4	4.75	**100.0**
	#10	2.0	**100.0**
	#20	0.85	**100.0**
	#40	0.425	**100.0**
	#60	0.25	**99.9**
	#100	0.15	**99.9**
	#200	0.075	**90.4**
Hydrometer Analysis		0.032	**58.2**
		0.021	**49.1**
		0.013	**36.5**
		0.009	**29.9**
		0.006	**25.8**
		0.003	**17.7**
		0.001	**11.1**

Description	Percentage
Coarse Gravel	**0.00**
Fine Gravel	**0.00**
Coarse Sand	**0.00**
Medium Sand	**0.02**
Fine Sand	**9.61**
Silt or Clay Fines	**90.37**



USCS Description (ASTM D 2487):

Dry, olive yellow SILT

LL	PL	PI	SpG (assumed)
32	**25**	**7**	**2.64**

As-Received Moisture Content (%): --

USCS Group Symbol: ML

Notes: 0 g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

TECH	AM/SRS
DATE	1/2/2013
REVIEW	MB

APPENDIX B.3
CYCLONE UNDERFLOW TEST RESULTS

	Point 1		Point 2		Point 3	
Boring or Test Pit:	--		--		--	
Sample:	Tailings Underflow		Tailings Underflow		Tailings Underflow	
Depth:	--	ft	--	ft	--	ft
Point No.:	1		2		3	
Initial						
Length =	5.006	in	5.006	in	5.006	in
Diameter =	2.500	in	2.500	in	2.500	in
Wet Mass =	1.526	lb	1.523	lb	1.517	lb
Area =	4.909	in^2	4.909	in^2	4.909	in^2
Volume =	24.573	in^3	24.573	in^3	24.573	in^3
Specific Gravity =	2.64	(Assumed)	2.64	(Assumed)	2.64	(Assumed)
Dry Mass of Solids =	1.311	lb	1.312	lb	1.306	lb
Moisture Content =	16.4%		16.1%		16.1%	
Wet Unit Weight =	107.3	pcf	107.1	pcf	106.7	pcf
Dry Unit Weight =	92.2	pcf	92.3	pcf	91.9	pcf
Void Ratio =	0.79		0.78		0.79	
Percent Saturation =	55%		54%		54%	
After Consolidation						
Length =	4.989	in	4.977	in	4.971	in
Diameter =	2.470	in	2.469	in	2.429	in
Area =	4.792	in^2 (Method B)	4.787	in^2 (Method B)	4.633	in^2 (Method B)
Volume =	23.906	in^3	23.824	in^3	23.033	in^3
Moisture Content =	27.9%		27.6%		25.7%	
Wet Unit Weight =	121.2	pcf	121.4	pcf	123.2	pcf
Dry Unit Weight =	94.7	pcf	95.2	pcf	98.0	pcf
Void Ratio =	0.74		0.73		0.68	
Percent Saturation =	100%		100%		100%	
B Parameter =	0.98		0.97		0.96	
Shear Rate =	0.083%	/min.	0.083%	/min.	0.082%	/min.
t_{50} =	--	(not computed)	--	(not computed)	--	(not computed)
Strain at Failure =	5.0%		5.0%		5.0%	
Cell Pressure =	120	psi	150	psi	170	psi
Back Pressure =	100	psi	100	psi	80	psi
Confining Pressure =	20	psi	50	psi	90	psi

Notes:

Sample description: Light yellowish brown silty sand

Atterberg limits: LL = NP PL = NP PI = NP (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 18% (ASTM D422, refer to separate report for gradation curve)

Specimen type:		Intact	X	Reconstituted	Remold targets: 92.2 pcf (dry) at 16.8% moisture (+/- 2%)	
Moisture from:		Cuttings	X	Entire specimen		
Saturation method:	X	Wet		Dry		
Failure criterion:		$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	5	% strain
Membrane effect:	X	Corrected		Not Corrected		

Golder Associates Inc.
Denver, Colorado

Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SAMPLE AND TEST DATA

Job Short Title: **Copper Flat Tailings Design Study**

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
Tailing Underflow	RJM/PRH	CCS	1/8/2013	103-92557	1

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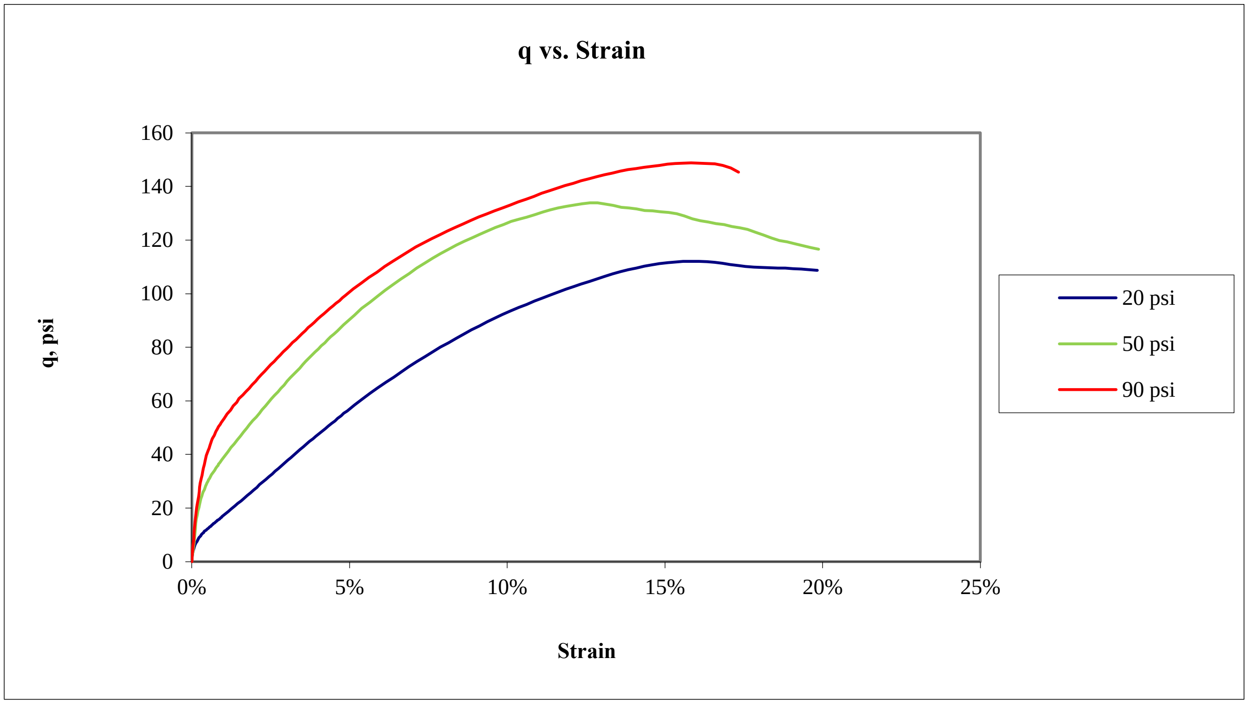
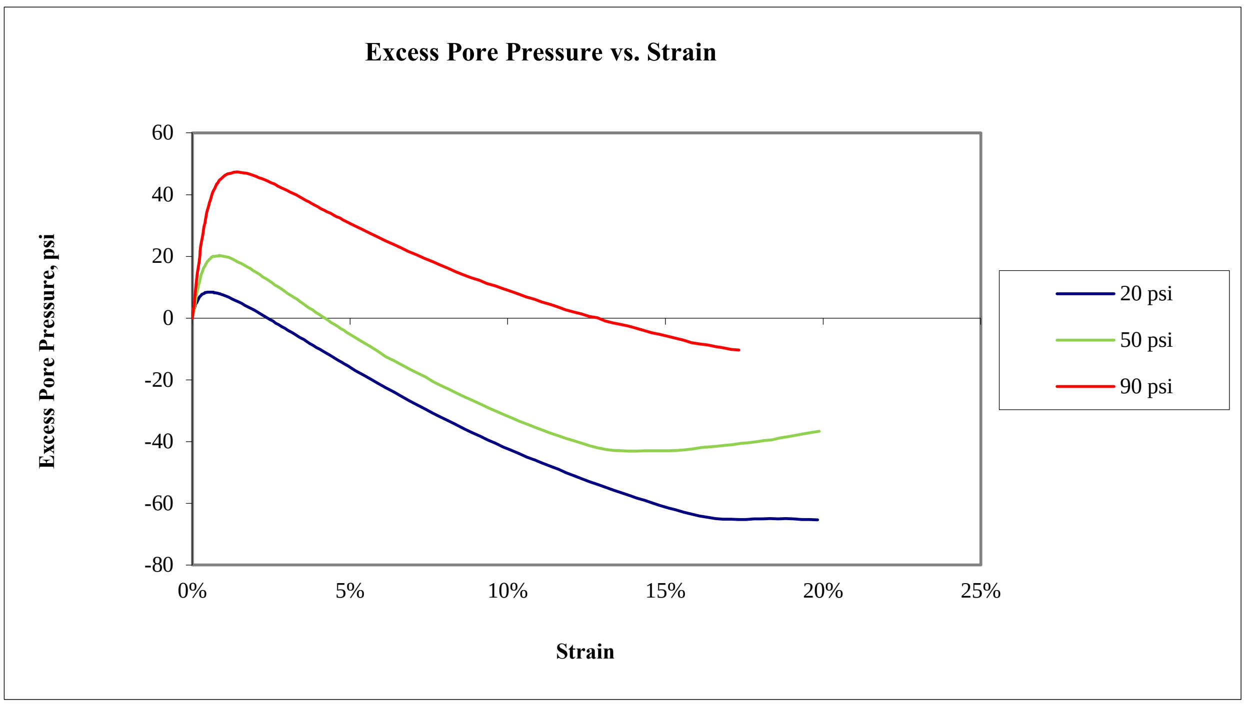
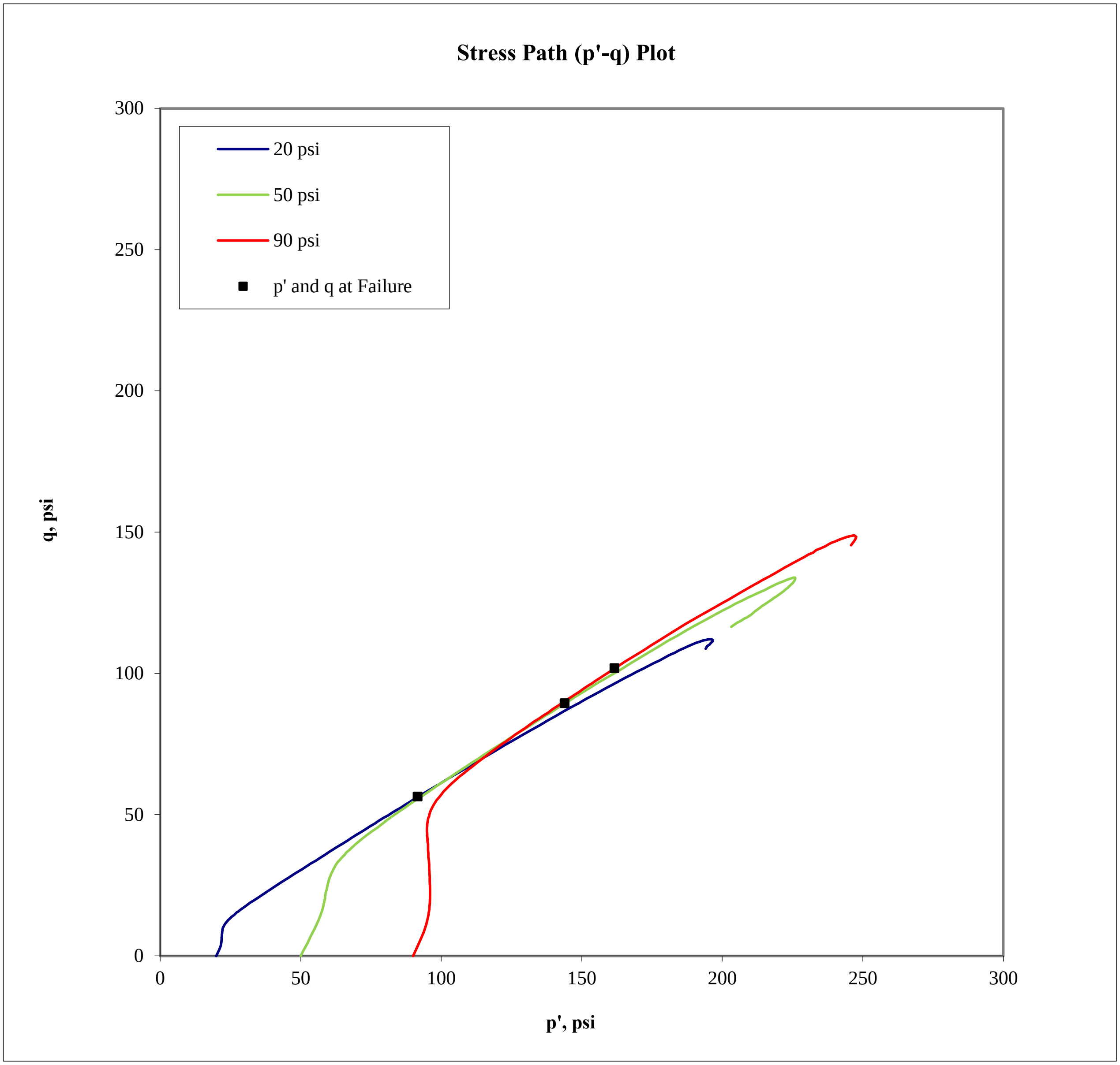




Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **q AND EXCESS PORE PRESSURE PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **Tailing Underflow**	**Technician:** **RJM/PRH**	**Reviewed:** **CCS**	**Date:** **1/8/2013**	**Job Number:** **103-92557**	**Figure:** **2**

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Draft\Appendix B.3 Underflow Test Results



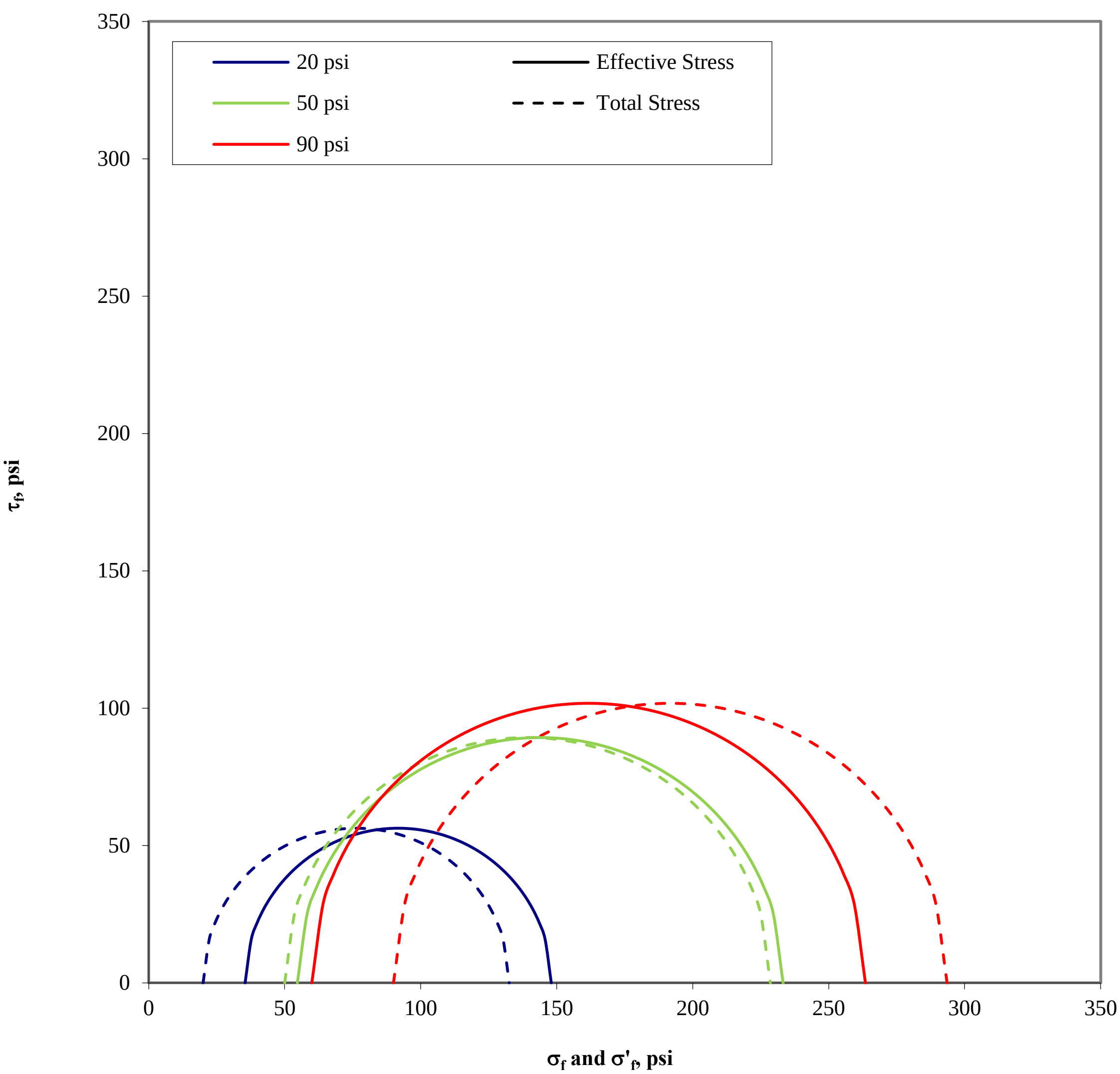
Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
20	76.3	91.7	56.3
50	139.3	143.9	89.3
90	191.8	161.7	101.8

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**
Job Short Title: **Copper Flat Tailings Design Study**	

Sample:	**Technician:**	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Tailing Underflow	**RJM/PRH**	**CCS**	**1/8/2013**	**103-92557**	**3**

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Draft\Appendix B.3 Underflow Test Results

Mohr's Circle Diagram



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
20	148.0	35.4	132.6	20.0
50	233.2	54.7	228.6	50.0
90	263.5	60.0	293.5	90.0

Golder Associates Inc. Denver, Colorado	**Title:** **ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **Tailing Underflow**	**Technician:** **RJM/PRH**	**Reviewed:** **CCS**	**Date:** **1/8/2013**	**Job Number:** **103-92557**	**Figure:** **4**

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 20 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Tailing Underflow	Technician: RJM/PRH	Reviewed: CCS	Date: 1/8/2013	Job Number: 103-92557	Figure: 5

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Tailing Underflow	Technician: RJM/PRH	Reviewed: CCS	Date: 1/8/2013	Job Number: 103-92557	Figure: 6

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Draft\Appendix B.3 Underflow Test Results

Golder Associates Inc. Denver, Colorado		Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 90 psi				
Job Short Title: Copper Flat Tailings Design Study						
Sample: Tailing Underflow		Technician: RJM/PRH	Reviewed: CCS	Date: 1/8/2013	Job Number: 103-92557	Figure: 7

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Draft\Appendix B.3 Underflow Test Results

	Initial		Final	
Height =	0.994	in	0.973	in
Diameter =	2.501	in	2.501	in
Area =	4.913	in^2	4.913	in^2
Volume =	4.883	in^3	4.780	in^3
Water Content =	16.5%		25.0%	
Specific Gravity =	2.64	(Assumed)	2.64	(Assumed)
Height of Solids =	0.5584	in	0.5584	in
Void Ratio =	0.780		0.743	
Degree of Saturation =	55.8%		88.9%	
Wet Mass =	0.304	lb	0.326	lb
Dry Mass =	0.261	lb	0.261	lb
Wet Unit Weight =	107.6	pcf	118.0	pcf
Dry Unit Weight =	92.4	pcf	94.4	pcf

Notes

- Visual description (Golder procedure): Damp, yellowish brown SILTY SAND
- Atterberg Limits (ASTM D4318): LL = NP; PL = NP; PI = NP
- Percent Finer (ASTM D422): 3/4 in. = 100%; No. 4 = 100%; No. 200 = 18%
- Specimen Type: [ ] Intact; [X] Reconstituted
- Remold Targets: 92.2 pcf (dry) at 16.8% moisture (+/- 2.0%)
- Water Content of Trimmings (ASTM D2216): 16.6%
- Trimming Procedure: Specimen trimmed in ring
- Inundation: [ ] Not inundated; [X] Inundated at 0.1 ksf
- Test Method: [ ] A; [X] B
- Apparatus: Frame No. 2 (Wykeham Farrance 24251)
- Final Water Content Specimen: [X] Entire; [ ] Partial
- Final Differential Height: 0.0036 in
- Estimated Preconsolidation Stress: 3.7 ksf

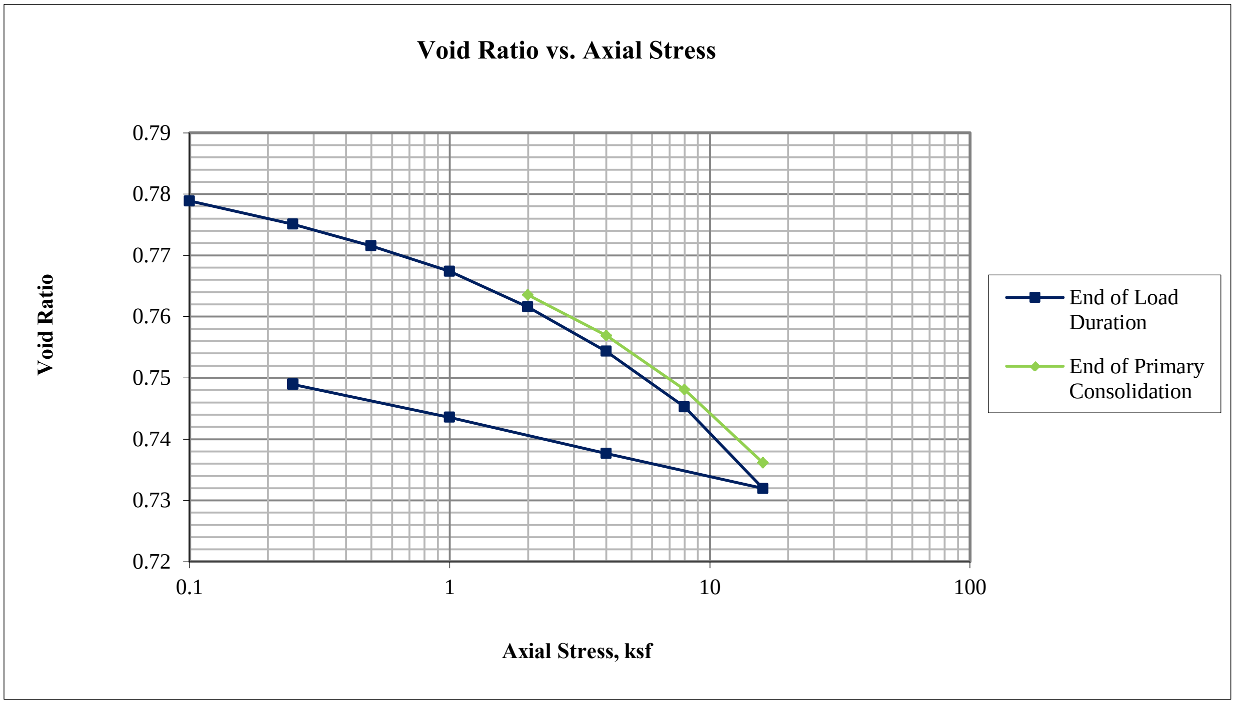
	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	160					0.0000	0.9937	0.00	0.780				
1	0.10	1000					0.0004	0.9933	0.04	0.779				
2	0.25	1500					0.0025	0.9912	0.25	0.775				
3	0.50	1440					0.0045	0.9892	0.45	0.772				
4	1.00	1440					0.0068	0.9869	0.68	0.767				
5	2.00	1440	0.0090	0.9847	0.90	0.764	0.0101	0.9836	1.01	0.762	2 (Root time)	0.764	10.328	0.3
6	4.00	1440	0.0127	0.9810	1.27	0.757	0.0141	0.9796	1.42	0.754	2 (Root time)	0.758	26.471	0.3
7	8.00	1440	0.0176	0.9761	1.77	0.748	0.0192	0.9745	1.93	0.745	2 (Root time)	0.749	22.898	0.3
8	16.00	1440	0.0243	0.9694	2.44	0.736	0.0266	0.9671	2.68	0.732	2 (Root time)	0.737	14.013	0.4
9	4.00	150					0.0234	0.9703	2.35	0.738				
10	1.00	870					0.0201	0.9736	2.02	0.744				
11	0.25	1145					0.0171	0.9766	1.72	0.749				

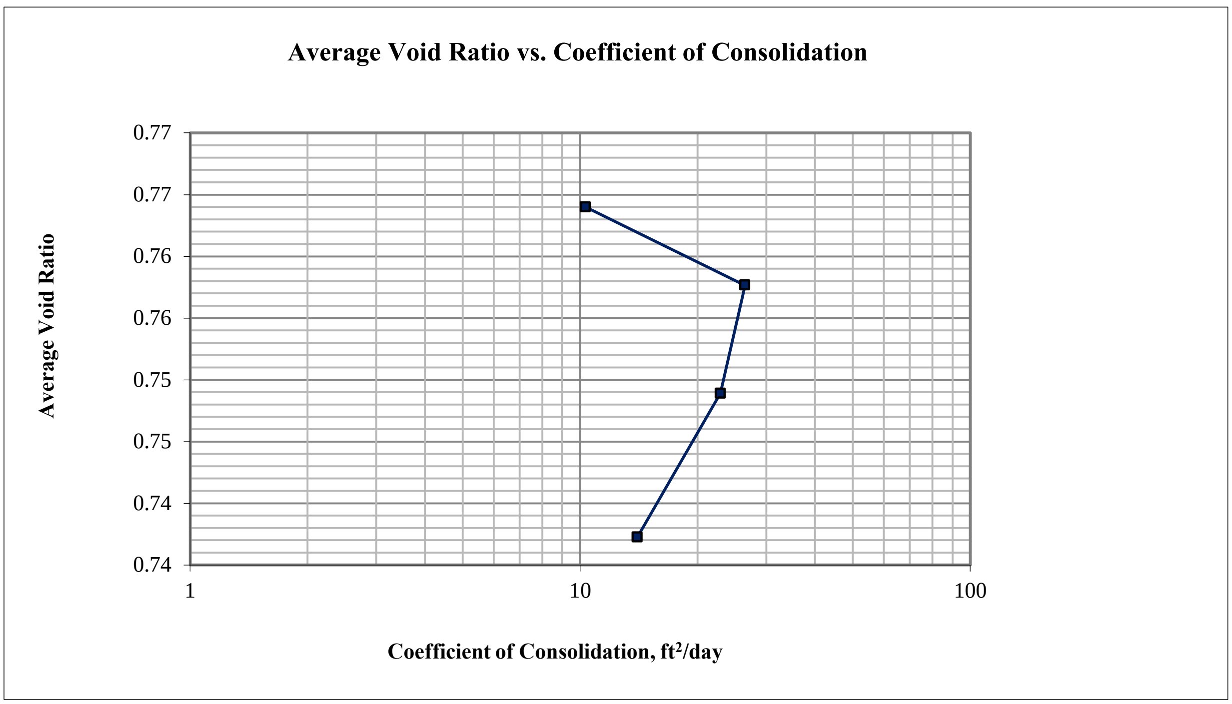
Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT SPECIMEN AND SUMMARY DATA

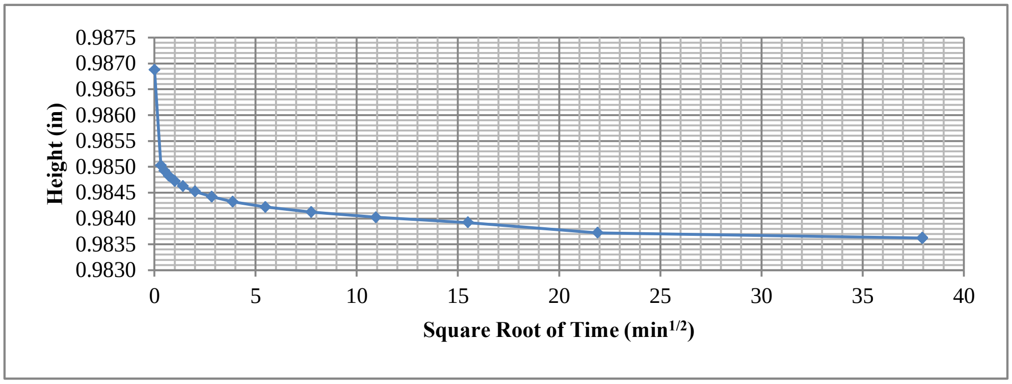
Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
Tailings Underflow	RJM	CCS	11/12/2012	103-92557	1



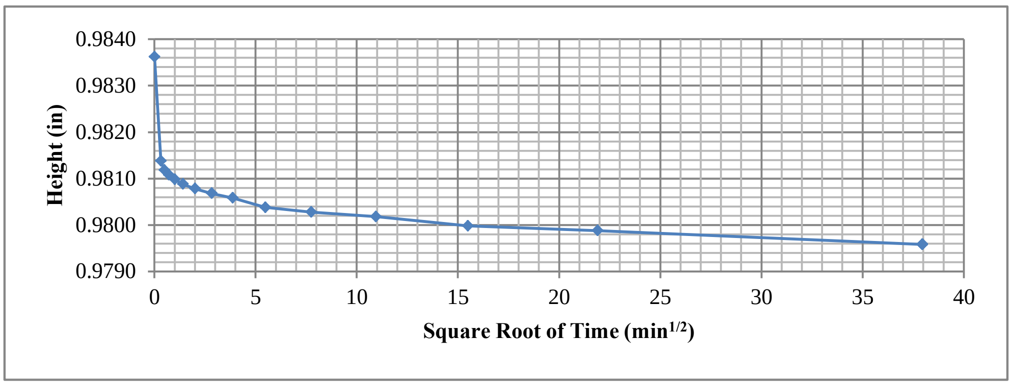


Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Tailings Underflow	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 11/12/2012	**Job Number:** 103-92557	**Figure:** 2

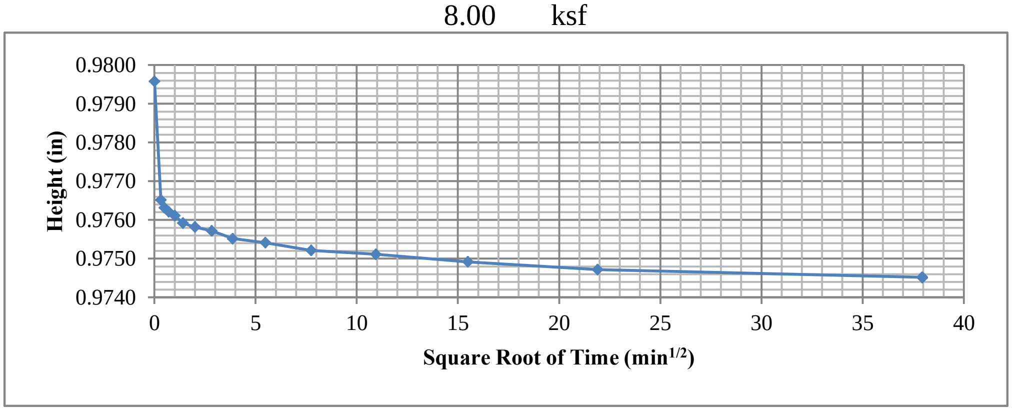
2.00 ksf



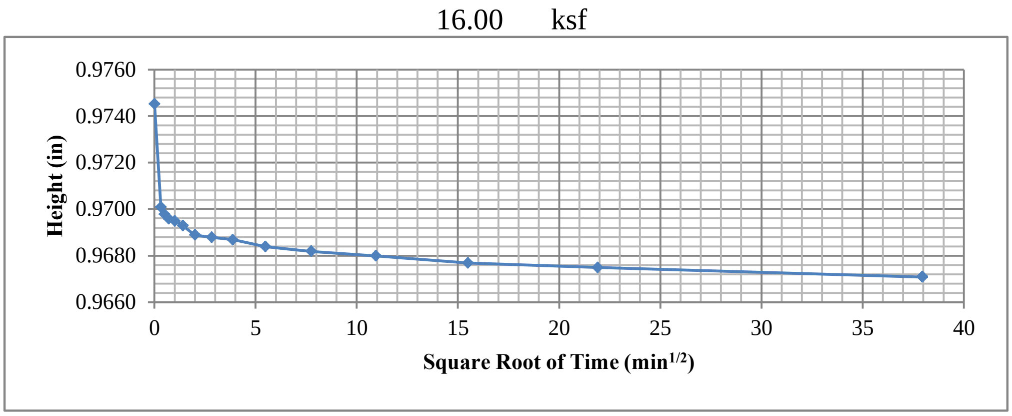
4.00 ksf



8.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS (1)**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **Tailings Underflow**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **11/12/2012**	**Job Number:** **103-92557**	**Figure:** **3**



Golder Associates Inc. Denver, Colorado	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS (2)				
Job Short Title: Copper Flat Tailings Design Study					
Sample: Tailings Underflow	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 11/12/2012	**Job Number:** 103-92557	**Figure:** 4

APPENDIX B.4
CYCLONE OVERFLOW AND WHOLE TAILINGS TEST RESULTS

APPENDIX B.4.1
CYCLONE OVERFLOW TEST REPORTS

	Point 1		Point 2		Point 3	
Boring or Test Pit:	--		--		--	
Sample:	O/F Flume Beach		O/F Flume Beach		O/F Flume Beach	
Depth:	--	ft	--	ft	--	ft
Point No.:	1		2		3	
Initial						
Length =	4.183	in	4.127	in	4.257	in
Diameter =	1.924	in	1.930	in	1.929	in
Wet Mass =	0.851	lb	0.832	lb	0.868	lb
Area =	2.907	in^2	2.926	in^2	2.922	in^2
Volume =	12.162	in^3	12.074	in^3	12.441	in^3
Specific Gravity =	2.64	(Provided)	2.64	(Provided)	2.64	(Provided)
Dry Mass of Solids =	0.666	lb	0.653	lb	0.682	lb
Moisture Content =	27.7%		27.4%		27.3%	
Wet Unit Weight =	120.9	pcf	119.1	pcf	120.5	pcf
Dry Unit Weight =	94.6	pcf	93.5	pcf	94.7	pcf
Void Ratio =	0.74		0.76		0.74	
Percent Saturation =	99%		95%		98%	
After Consolidation						
Length =	4.091	in	4.080	in	4.224	in
Diameter =	1.894	in	1.866	in	1.849	in
Area =	2.816	in^2 (Method B)	2.734	in^2 (Method B)	2.685	in^2 (Method B)
Volume =	11.522	in^3	11.156	in^3	11.339	in^3
Moisture Content =	24.5%		23.7%		22.1%	
Wet Unit Weight =	124.4	pcf	125.2	pcf	126.9	pcf
Dry Unit Weight =	99.9	pcf	101.2	pcf	103.9	pcf
Void Ratio =	0.65		0.63		0.58	
Percent Saturation =	100%		100%		100%	
B Parameter =	0.95		0.99		0.98	
Shear Rate =	0.051%	/min.	0.084%	/min.	0.083%	/min.
t_{50} =	7.8	min.	3.7	min.	4.4	min.
Strain at Failure =	5.0%		5.0%		5.0%	
Cell Pressure =	60	psi	90	psi	120	psi
Back Pressure =	40	psi	40	psi	30	psi
Confining Pressure =	20	psi	50	psi	90	psi

Notes:

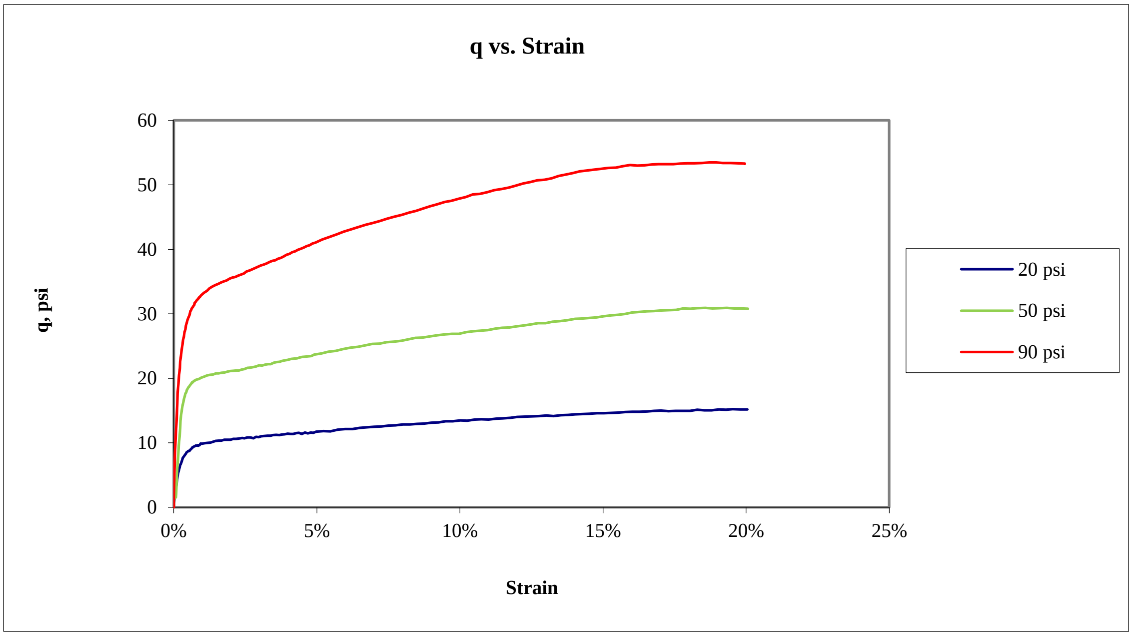
Sample description: Silt, pale yellow, moist

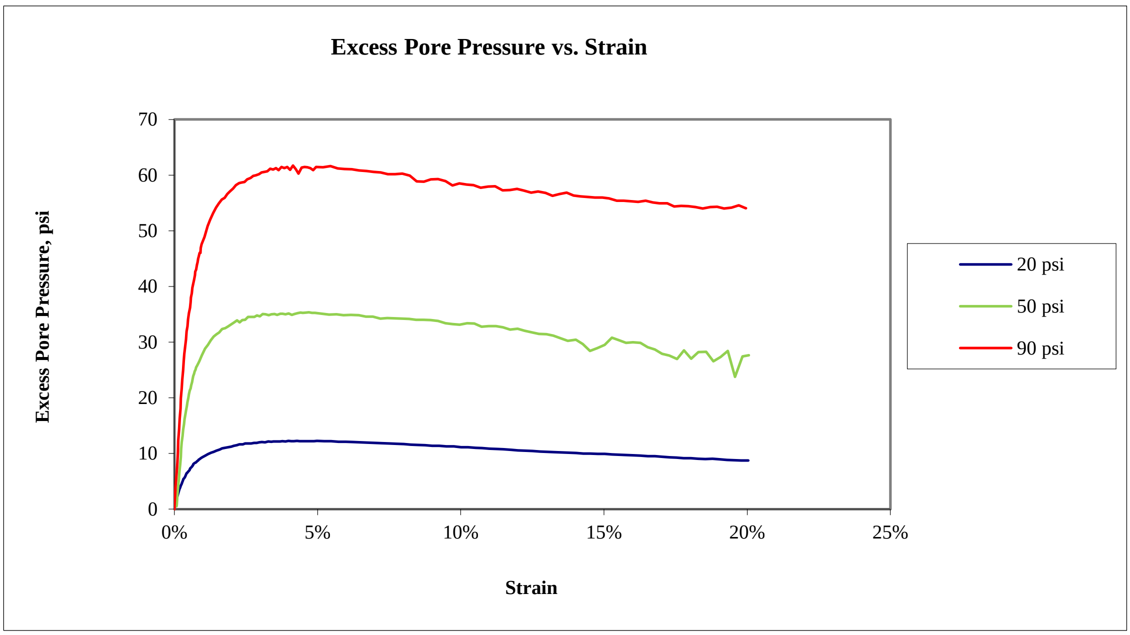
Atterberg limits: LL = 28 PL = 25 PI = 3 (ASTM D4318)

Percent finer: 3/4 in. = 100% No. 4 = 100% No. 200 = 84% (ASTM D422, refer to separate report for gradation curve)

Specimen type:		Intact		Reconstituted	X	Slurry consolidated in tube and extruded
Moisture from:	X	Cuttings		Entire specimen		
Saturation method:	X	Wet		Dry		
Failure criterion:		$(\sigma'_1/\sigma'_3)_{max}$		$(\sigma'_1-\sigma'_3)_{max}$	5	% strain
Membrane effect:	X	Corrected		Not Corrected		

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **SAMPLE AND TEST DATA**				
Job Short Title: **Copper Flat Tailngs Design Study**					
Sample: **Overflow Flume Test Beach**	**Technician:** **RJM**	**Reviewed:** **DAR**	**Date:** **3/12/2013**	**Job Number:** **103-92557.010**	**Figure:** **1**





Golder Associates Inc. Denver, Colorado	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT q AND EXCESS PORE PRESSURE PLOTS				
Job Short Title: Copper Flat Tailngs Design Study					
Sample: Overflow Flume Test Beach	**Technician:** RJM	**Reviewed:** DAR	**Date:** 3/12/2013	**Job Number:** 103-92557.010	**Figure:** 2

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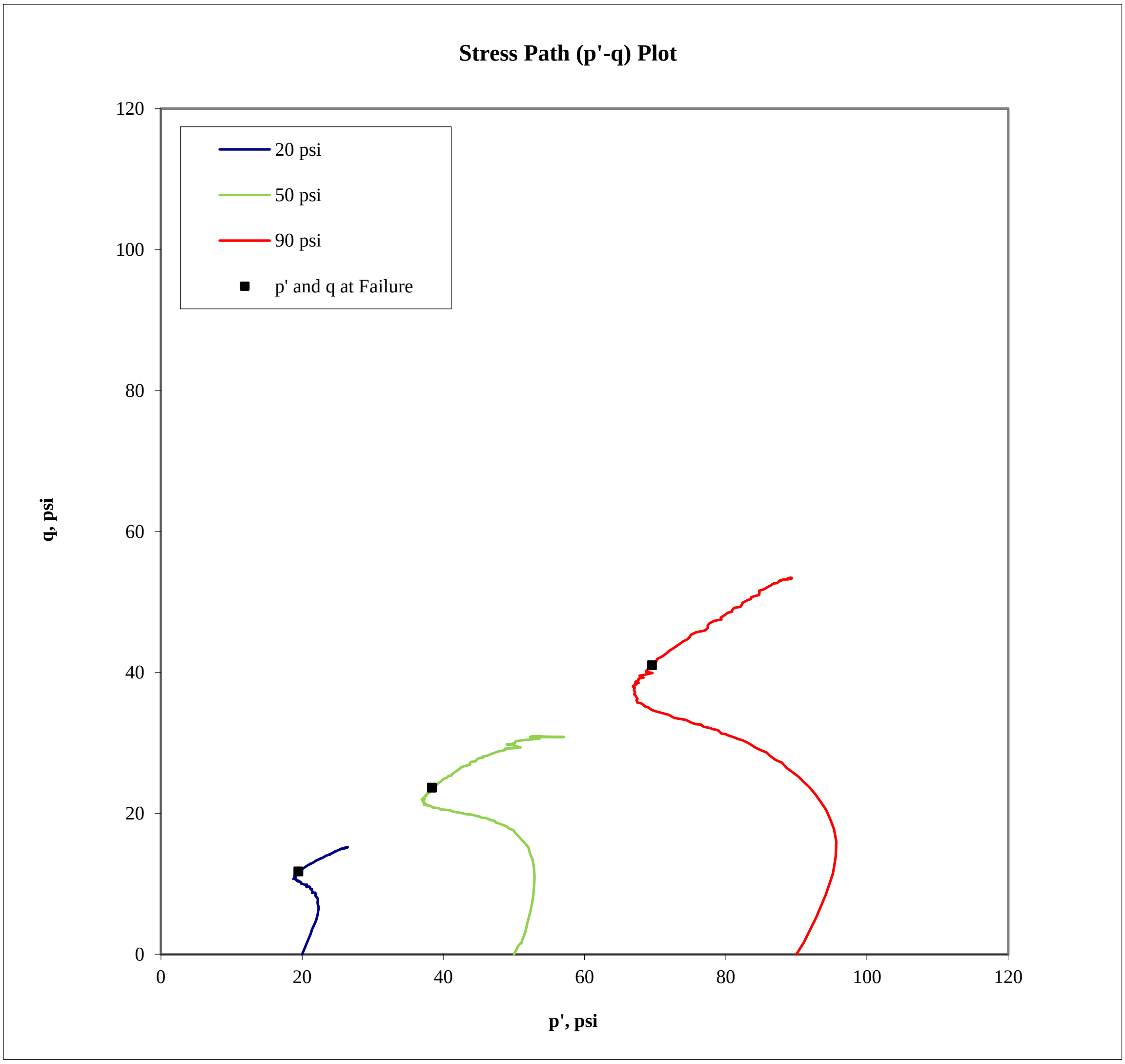
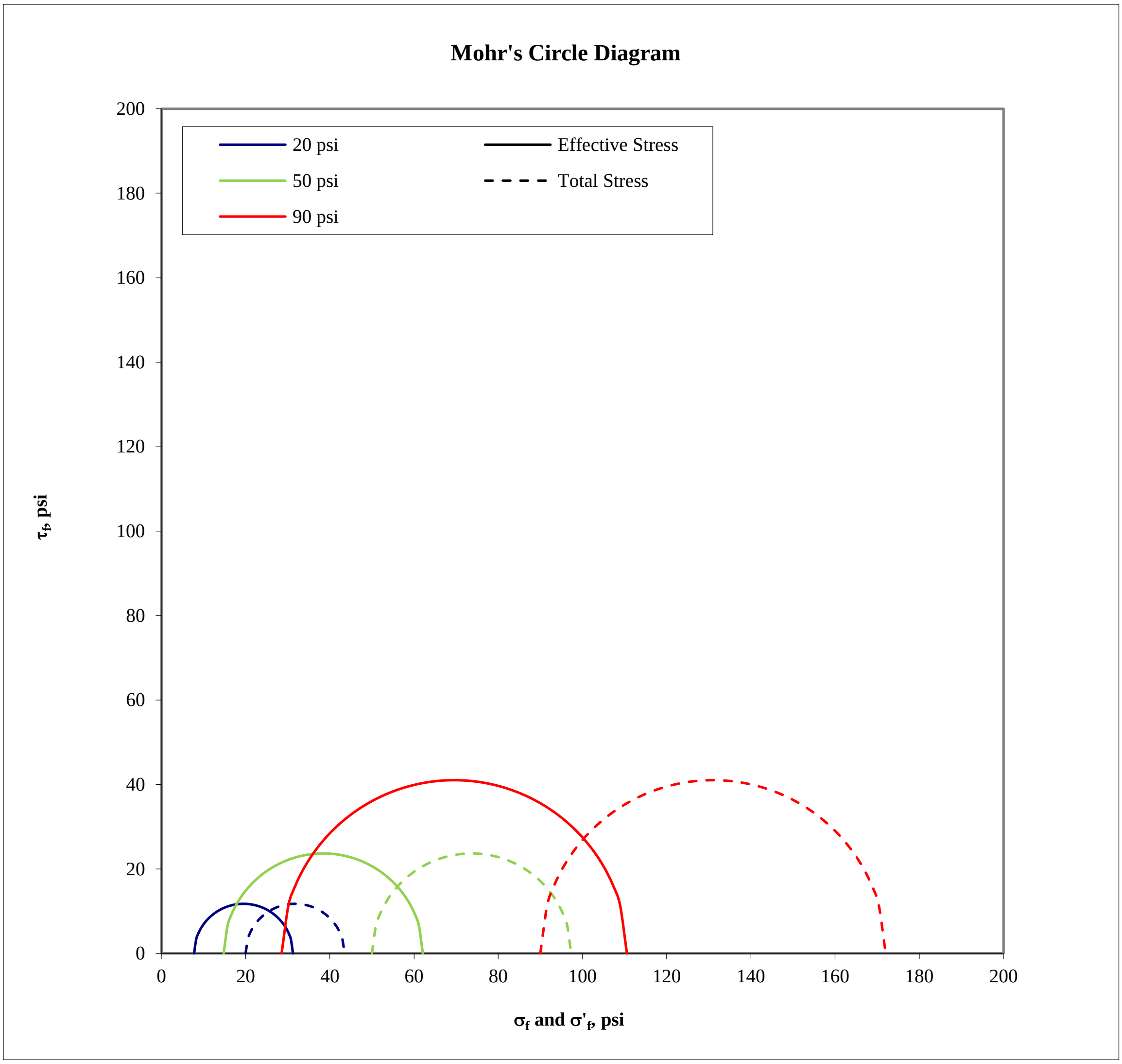


Confining Pressure (psi)	p at failure (psi)	p' at failure (psi)	q at failure (psi)
20	31.7	19.5	11.7
50	73.7	38.4	23.7
90	131.0	69.6	41.0

Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D4767** **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT** **STRESS PATH PLOT**				
Job Short Title: **Copper Flat Tailngs Design Study**					
Sample: **Overflow Flume Test Beach**	**Technician:** **RJM**	**Reviewed:** **DAR**	**Date:** **3/12/2013**	**Job Number:** **103-92557.010**	**Figure:** **3**

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix B.4 Flume Sample Test Results\B.4.1



Confining Pressure (psi)	σ'_1 at failure (psi)	σ'_3 at failure (psi)	σ_1 at failure (psi)	σ_3 at failure (psi)
20	31.2	7.8	43.5	20.0
50	62.1	14.8	97.3	50.0
90	110.6	28.5	172.0	90.0

Golder Associates Inc. Denver, Colorado	**Title:** ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT MOHR'S CIRCLE DIAGRAM				
Job Short Title: Copper Flat Tailngs Design Study					
Sample: Overflow Flume Test Beach	**Technician:** RJM	**Reviewed:** DAR	**Date:** 3/12/2013	**Job Number:** 103-92557.010	**Figure:** 4

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix B.4 Flume Sample Test Results\B.4.1

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 20 psi			
Job Short Title: Copper Flat Tailngs Design Study				
Sample: Overflow Flume Test Beach	Technician: RJM	Reviewed: DAR	Date: 3/12/2013	Job Number: 103-92557.010	Figure: 5

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix B.4 Flume Sample Test Results\B.4.1

Golder Associates Inc. Denver, Colorado	Title: ASTM D4767 CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT SPECIMEN PHOTOGRAPH - 50 psi				
Job Short Title: Copper Flat Tailngs Design Study					
Sample: Overflow Flume Test Beach	Technician: RJM	Reviewed: DAR	Date: 3/12/2013	Job Number: 103-92557.010	Figure: 6

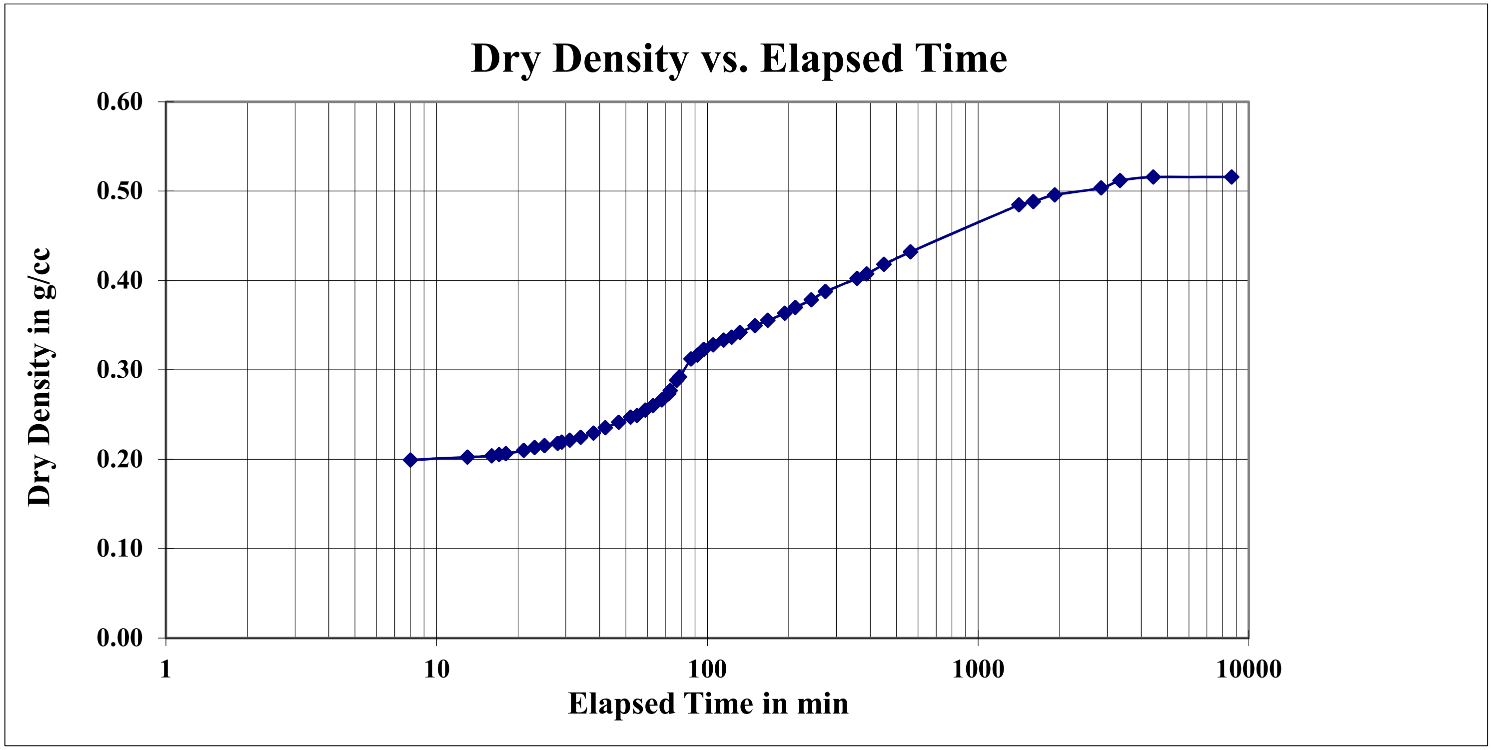
X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix B.4 Flume Sample Test Results\B.4.1

Golder Associates Inc.
Denver, Colorado

Title:
ASTM D4767
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST REPORT
SPECIMEN PHOTOGRAPH - 90 psi

Job Short Title: Copper Flat Tailngs Design Study

Sample:	Technician:	Reviewed:	Date:	Job Number:	Figure:
Overflow Flume Test Beach	RJM	DAR	3/12/2013	103-92557.010	7



Golder Associates, Inc. Denver, Colorado			Title: SEDIMENTATION TESTING GRAPHICAL DATA		
Job Short Title: Copper Flat Tailings Design Study					
Sample No. Tailings Overflow Beach	System Single Drain	Reviewed: MB	Date: 08-Nov-12	Job Number: 103-92557	Figure: 2

	Initial	Final	
Length =	7.826	1.25	cm
Diameter =	7.11	7.11	cm
Wet Mass =	358.37	98.17	g
Area =	39.70	39.70	cm^2
Volume =	310.7	49.5	cm^3
Moisture Content =	378.6%	32.5%	
Specific Gravity =	2.64	2.64	
Dry Mass of Solids =	74.88	74.09	g
Unit Weight =	1.15	1.98	g/cm^3
Dry Unit Weight =	0.24	1.50	g/cm^3
Unit Weight =	72.00	123.62	lb/ft^3
Dry Unit Weight =	15.04	93.30	lb/ft^3
Percent Solids =	20.9%	75.5%	

Piston Pressure:	8 psi	562.5 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation pressure:	**3 psi**	210.9 g/cm^2
Before Consolidation		
Initial Sample Height:	7.83	cm
Initial Dry Unit Weight:	0.24	g/cm^3
Initial Void Ratio:	9.96	
After Consolidation		
Final Sample Height:	1.56	cm
Final Dry Unit Weight:	1.20	g/cm^3
Final Void Ratio:	1.20	
Calculations		
Coefficient of Compressibility, a_v	4.15E-02	cm^2/g
Coefficient of Volume Compressibility, m_v	3.79E-03	cm^2/g
Compression Index, C_c	-	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
6.1	4.70E-06	1.24E-03
13.3	3.51E-06	9.28E-04
17.5	3.27E-06	8.65E-04
22.3	3.10E-06	8.19E-04
27.8	2.98E-06	7.88E-04
34.3	2.89E-06	7.63E-04
42.2	2.81E-06	7.43E-04
52.5	2.72E-06	7.19E-04
66.3	2.66E-06	7.03E-04
88.2	2.58E-06	6.82E-04
Average (of final 3 values)	2.66E-06	7.01E-04

Piston Pressure:	15 psi	1,054.6 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**10 psi**	703.1 g/cm^2
Before Consolidation		
Initial Sample Height:	1.56	cm
Initial Dry Unit Weight:	1.20	g/cm^3
Initial Void Ratio:	1.20	
After Consolidation		
Final Sample Height:	1.45	cm
Final Dry Unit Weight:	1.28	g/cm^3
Final Void Ratio:	1.06	
Calculations		
Coefficient of Compressibility, a_v	2.99E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	1.36E-04	cm^2/g
Compression Index, C_c	0.28	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
9.4	2.82E-06	2.1E-02
19.1	2.28E-06	1.7E-02
24.8	2.16E-06	1.6E-02
31.41	2.06E-06	1.5E-02
38.77	2.00E-06	1.5E-02
47.58	1.94E-06	1.4E-02
58.69	1.89E-06	1.4E-02
72.92	1.83E-06	1.4E-02
93.21	1.76E-06	1.3E-02
126.08	1.69E-06	1.2E-02
145.49	1.67E-06	1.2E-02
Average (of final 3 values)	1.71E-06	1.26E-02

Piston Pressure:	30 psi	2,109.2 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**25 psi**	1,757.7 g/cm^2
Before Consolidation		
Initial Sample Height:	1.45	cm
Initial Dry Unit Weight:	1.28	g/cm^3
Initial Void Ratio:	1.06	
After Consolidation		
Final Sample Height:	1.36	cm
Final Dry Unit Weight:	1.37	g/cm^3
Final Void Ratio:	0.93	
Calculations		
Coefficient of Compressibility, a_v	1.21E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	5.87E-05	cm^2/g
Compression Index, C_c	0.32	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
13.4	1.86E-06	3.2E-02
26.1	1.56E-06	2.7E-02
33.7	1.49E-06	2.5E-02
42.27	1.44E-06	2.4E-02
51.99	1.40E-06	2.4E-02
63.55	1.37E-06	2.3E-02
77.12	1.35E-06	2.3E-02
94.4	1.33E-06	2.3E-02
117.21	1.32E-06	2.2E-02
152.46	1.31E-06	2.2E-02
175.79	1.30E-06	2.2E-02
Average (of final 3 values)	1.31E-06	2.23E-02

Piston Pressure:	55 psi	3,866.9 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**50 psi**	3,515.4 g/cm^2
Before Consolidation		
Initial Sample Height:	1.36	cm
Initial Dry Unit Weight:	1.37	g/cm^3
Initial Void Ratio:	0.93	
After Consolidation		
Final Sample Height:	1.30	cm
Final Dry Unit Weight:	1.43	g/cm^3
Final Void Ratio:	0.84	
Calculations		
Coefficient of Compressibility, a_v	4.83E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	2.50E-05	cm^2/g
Compression Index, C_c	0.28	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
18.5	1.29E-06	5.1E-02
35.8	1.09E-06	4.4E-02
46.0	1.04E-06	4.2E-02
57.41	1.01E-06	4.0E-02
70.07	9.92E-07	4.0E-02
85.49	9.71E-07	3.9E-02
103.67	9.57E-07	3.8E-02
126.62	9.46E-07	3.8E-02
157	9.40E-07	3.8E-02
183.27	9.31E-07	3.7E-02
203.01	9.40E-07	3.8E-02
Average (of final 3 values)	9.37E-07	3.74E-02

Piston Pressure:	105 psi	7,382.3 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**100 psi**	7,030.8 g/cm^2
Before Consolidation		
Initial Sample Height:	1.30	cm
Initial Dry Unit Weight:	1.43	g/cm3
Initial Void Ratio:	0.84	
After Consolidation		
Final Sample Height:	1.25	cm
Final Dry Unit Weight:	1.50	g/cm^3
Final Void Ratio:	0.76	
Calculations		
Coefficient of Compressibility, a_v	2.33E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	1.27E-05	cm^2/g
Compression Index, C_c	0.27	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
25.8	8.81E-07	7.0E-02
49.9	7.48E-07	5.9E-02
64.4	7.11E-07	5.6E-02
80.74	6.86E-07	5.4E-02
99.34	6.69E-07	5.3E-02
121.11	6.55E-07	5.2E-02
147.26	6.44E-07	5.1E-02
179.88	6.36E-07	5.0E-02
205.76	6.28E-07	5.0E-02
224.62	6.28E-07	5.0E-02
248.31	6.24E-07	4.9E-02
Average (of final 3 values)	6.26E-07	4.95E-02

Golder Associates Inc.
Denver, Colorado

Title:

SLURRY CONSOLIDATION TEST
SAMPLE DATA AND CALCULATIONS

Job Short Title: Copper Flat Tailings Design Study

Sample No.	Reviewed:	Date:	Job Number:	Figure:
Tailings Overflow Flume Test Beach	CCS	12/3/2012	103-92557	1

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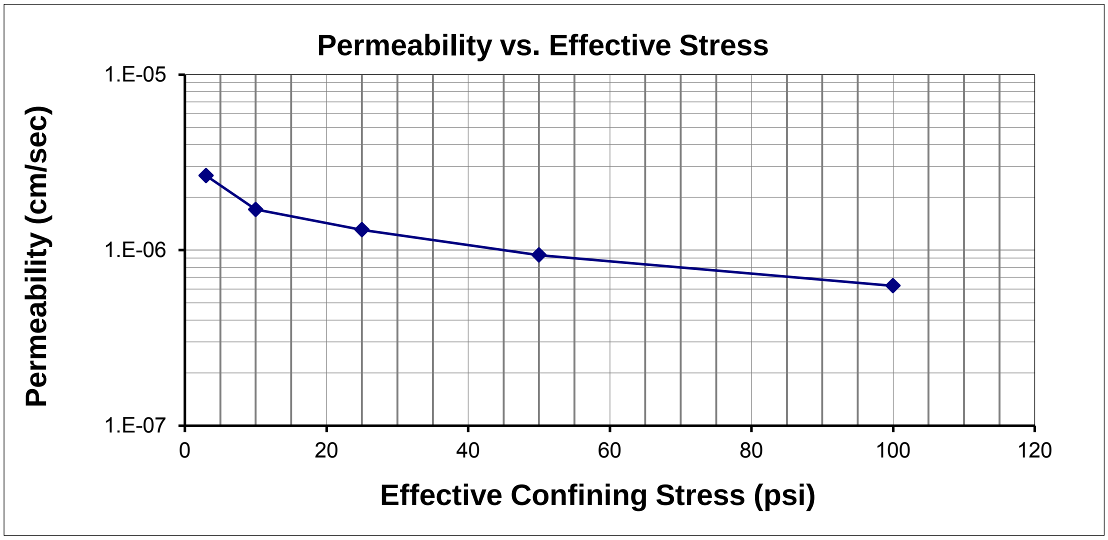

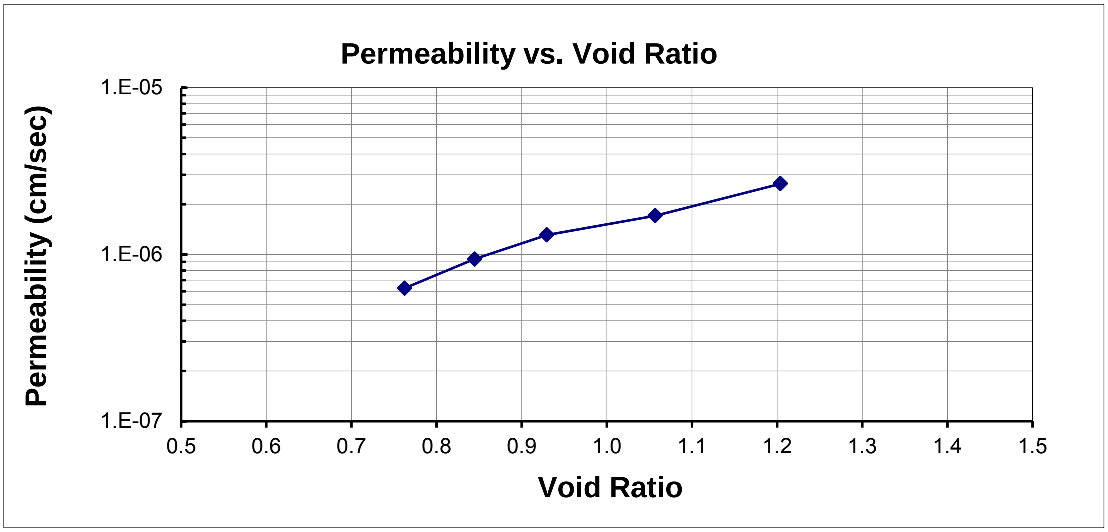

Golder Associates Inc. **Denver, Colorado**		**Title:** **SLURRY CONSOLIDATION TEST RESULTS** **PERMEABILITY DATA**		
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Tailings Overflow Flume Test Beach	**Reviewed:** CCS	**Date:** 12/3/2012	**Job Number:** 103-92557	**Figure:** 2

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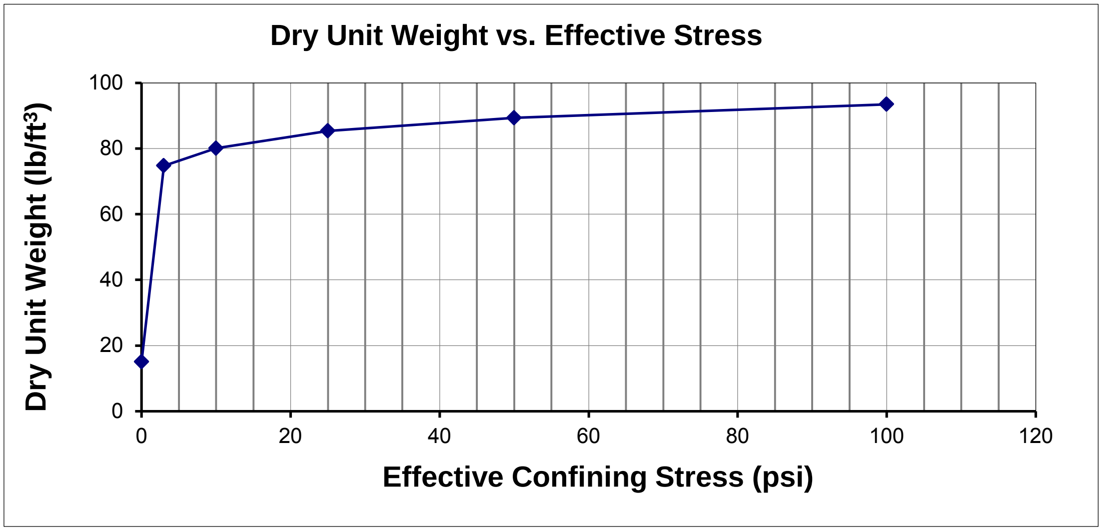

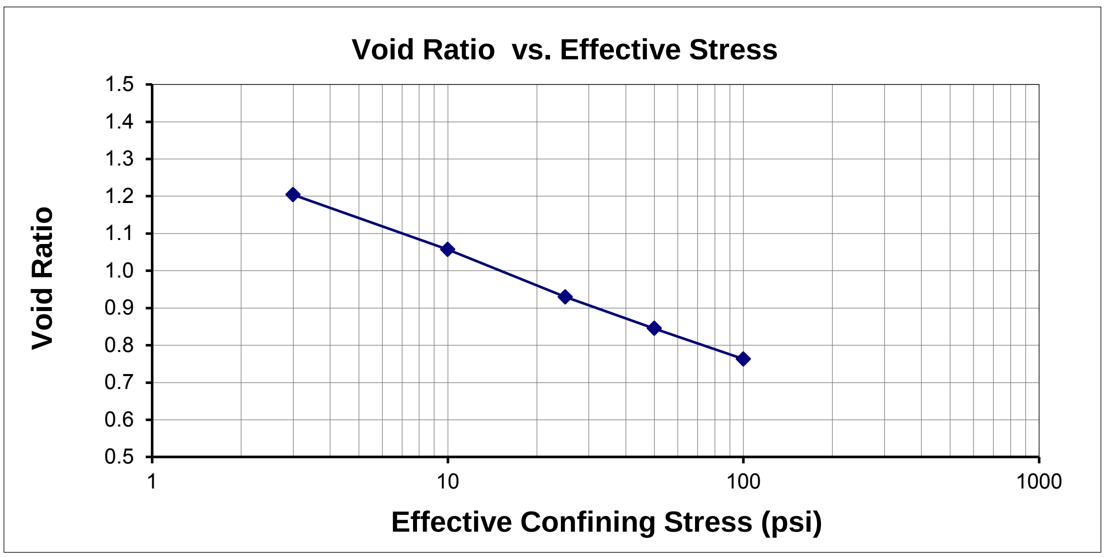

Golder Associates Inc. Denver, Colorado	Title: SLURRY CONSOLIDATION TEST RESULTS DENSITY DATA			
Job Short Title: Copper Flat Tailings Design Study				
Sample No.	Reviewed:	Date:	Job Number:	Figure:
Tailings Overflow Flume Test Beach	CCS	12/3/2012	103-92557	3

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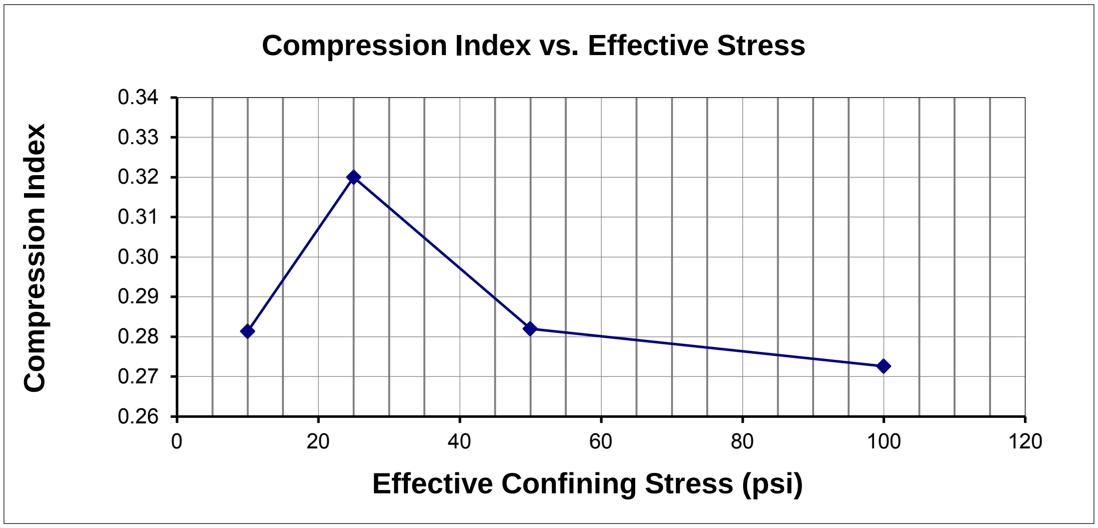
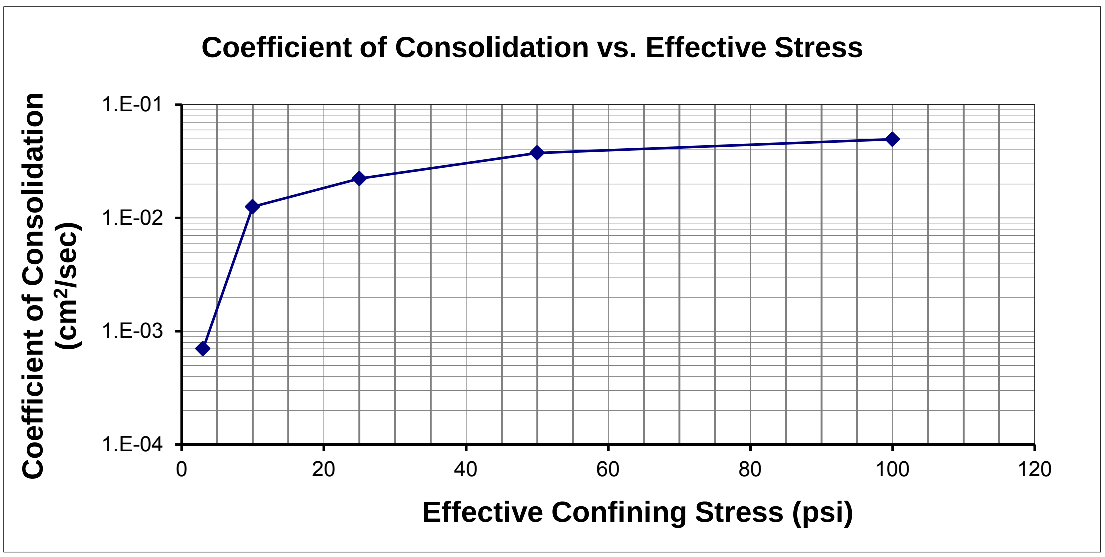




Golder Associates Inc. **Denver, Colorado**	**Title:** **SLURRY CONSOLIDATION TEST RESULTS** **COMPRESSION DATA**			
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Tailings Overflow Flume Test Beach	**Reviewed:** CCS	**Date:** 12/3/2012	**Job Number:** 103-92557	**Figure:** 4

	Initial	Final	
Length =	8.172	0.64	cm
Diameter =	7.104	7.104	cm
Wet Mass =	351.12	53.21	g
Area =	39.64	39.64	cm^2
Volume =	323.9	25.5	cm^3
Moisture Content =	786.2%	37.1%	
Specific Gravity =	2.64	2.64	
Dry Mass of Solids =	39.62	38.81	g
Unit Weight =	1.08	2.08	g/cm^3
Dry Unit Weight =	0.12	1.52	g/cm^3
Unit Weight =	67.67	130.13	lb/ft^3
Dry Unit Weight =	7.64	94.92	lb/ft^3
Percent Solids =	11.3%	72.9%	

Piston Pressure:	8 psi	562.5 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation pressure:	**3 psi**	210.9 g/cm^2
Before Consolidation		
Initial Sample Height:	8.17	cm
Initial Dry Unit Weight:	0.12	g/cm^3
Initial Void Ratio:	20.58	
After Consolidation		
Final Sample Height:	1.01	cm
Final Dry Unit Weight:	0.97	g/cm^3
Final Void Ratio:	1.72	
Calculations		
Coefficient of Compressibility, a_v	8.94E-02	cm^2/g
Coefficient of Volume Compressibility, m_v	4.14E-03	cm^2/g
Compression Index, C_c	-	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
22.46	8.20E-07	1.98E-04
41.52	7.28E-07	1.76E-04
52.62	7.06E-07	1.70E-04
65.16	6.89E-07	1.66E-04
79.43	6.78E-07	1.64E-04
96.23	6.68E-07	1.61E-04
115.84	6.63E-07	1.60E-04
140.26	6.61E-07	1.60E-04
172.37	6.63E-07	1.60E-04
Average (of final 3 values)	6.62E-07	1.60E-04

Piston Pressure:	15 psi	1,054.6 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**10 psi**	703.1 g/cm^2
Before Consolidation		
Initial Sample Height:	1.01	cm
Initial Dry Unit Weight:	0.97	g/cm^3
Initial Void Ratio:	1.72	
After Consolidation		
Final Sample Height:	0.86	cm
Final Dry Unit Weight:	1.14	g/cm^3
Final Void Ratio:	1.32	
Calculations		
Coefficient of Compressibility, a_v	8.05E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	2.96E-04	cm^2/g
Compression Index, C_c	0.76	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
50.77	3.10E-07	1.0E-03
86.68	2.98E-07	1.0E-03
107.84	2.94E-07	9.9E-04
131.71	2.91E-07	9.8E-04
158.8	2.90E-07	9.8E-04
190.02	2.89E-07	9.7E-04
226.55	2.90E-07	9.8E-04
Average (of final 3 values)	2.89E-07	9.77E-04

Piston Pressure:	30 psi	2,109.2 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**25 psi**	1,757.7 g/cm^2
Before Consolidation		
Initial Sample Height:	0.86	cm
Initial Dry Unit Weight:	1.14	g/cm^3
Initial Void Ratio:	1.32	
After Consolidation		
Final Sample Height:	0.77	cm
Final Dry Unit Weight:	1.28	g/cm^3
Final Void Ratio:	1.07	
Calculations		
Coefficient of Compressibility, a_v	2.43E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	1.05E-04	cm^2/g
Compression Index, C_c	0.64	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
98.24	1.42E-07	1.4E-03
166.02	1.38E-07	1.3E-03
205.40	1.37E-07	1.3E-03
250.52	1.36E-07	1.3E-03
299.74	1.36E-07	1.3E-03
359.30	1.36E-07	1.3E-03
430.18	1.36E-07	1.3E-03
521.68	1.35E-07	1.3E-03
590.52	1.35E-07	1.3E-03
638.40	1.36E-07	1.3E-03
707.55	1.35E-07	1.3E-03
Average (of final 3 values)	1.35E-07	1.29E-03

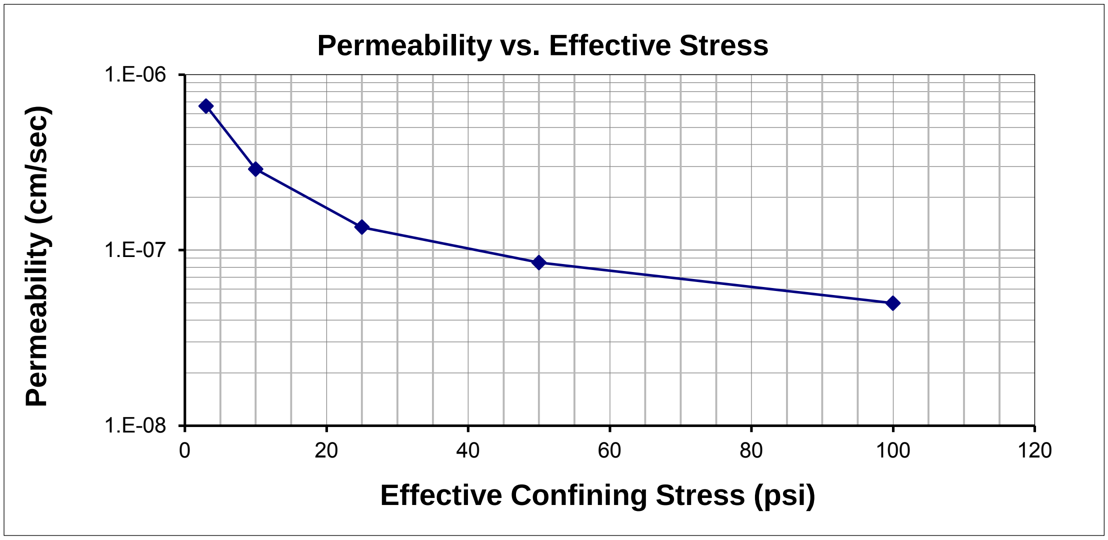
Piston Pressure:	55 psi	3,866.9 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**50 psi**	3,515.4 g/cm^2
Before Consolidation		
Initial Sample Height:	0.77	cm
Initial Dry Unit Weight:	1.28	g/cm^3
Initial Void Ratio:	1.07	
After Consolidation		
Final Sample Height:	0.70	cm
Final Dry Unit Weight:	1.41	g/cm^3
Final Void Ratio:	0.88	
Calculations		
Coefficient of Compressibility, a_v	1.07E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	5.20E-05	cm^2/g
Compression Index, C_c	0.63	

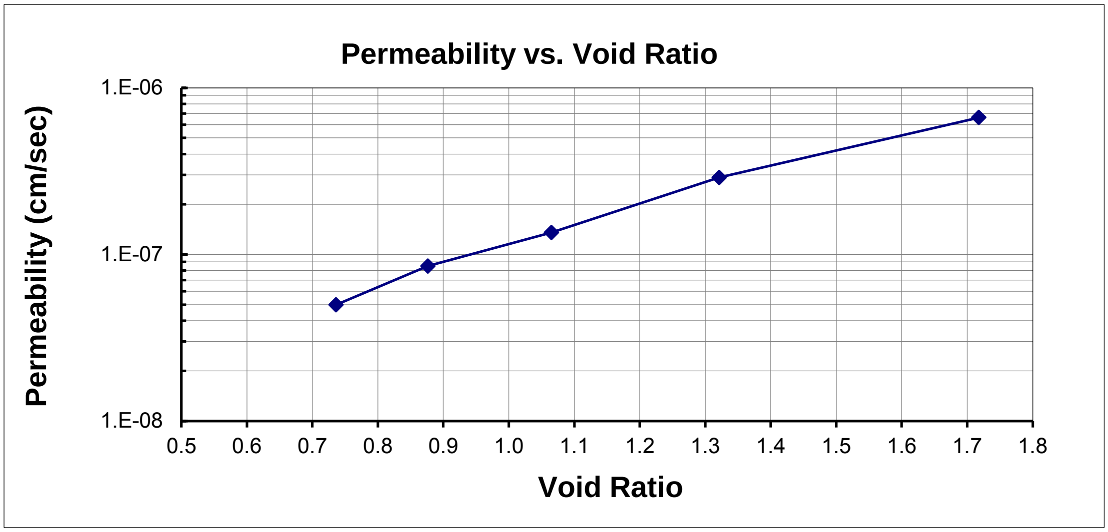
Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
144.92	8.78E-08	1.7E-03
243.05	8.59E-08	1.7E-03
301.11	8.52E-08	1.6E-03
364.17	8.52E-08	1.6E-03
436.95	8.51E-08	1.6E-03
524.36	8.46E-08	1.6E-03
625.14	8.49E-08	1.6E-03
751.92	8.51E-08	1.6E-03
849.86	8.51E-08	1.6E-03
Average (of final 3 values)	8.50E-08	1.64E-03

Piston Pressure:	105 psi	7,382.3 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**100 psi**	7,030.8 g/cm^2
Before Consolidation		
Initial Sample Height:	0.70	cm
Initial Dry Unit Weight:	1.41	g/cm3
Initial Void Ratio:	0.88	
After Consolidation		
Final Sample Height:	0.64	cm
Final Dry Unit Weight:	1.52	g/cm^3
Final Void Ratio:	0.74	
Calculations		
Coefficient of Compressibility, a_v	3.99E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	2.13E-05	cm^2/g
Compression Index, C_c	0.47	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
228.9	5.14E-08	2.4E-03
384.0	5.03E-08	2.4E-03
474.8	5.00E-08	2.4E-03
576.64	4.98E-08	2.3E-03
690.24	4.98E-08	2.3E-03
824.08	4.98E-08	2.3E-03
Average (of final 3 values)	4.98E-08	2.34E-03

Golder Associates Inc. **Denver, Colorado**	**Title:** SLURRY CONSOLIDATION TEST SAMPLE DATA AND CALCULATIONS			
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Tailings Overflow Flume Test Slime	**Reviewed:** CCS	**Date:** 12/17/2012	**Job Number:** 103-92557	**Figure:** 1





Golder Associates Inc. **Denver, Colorado**	**Title:**
Job Short Title: Copper Flat Tailings Design Study	**SLURRY CONSOLIDATION TEST RESULTS** **PERMEABILITY DATA**

Sample No.	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Tailings Overflow Flume Test Slime	CCS	12/17/2012	103-92557	2

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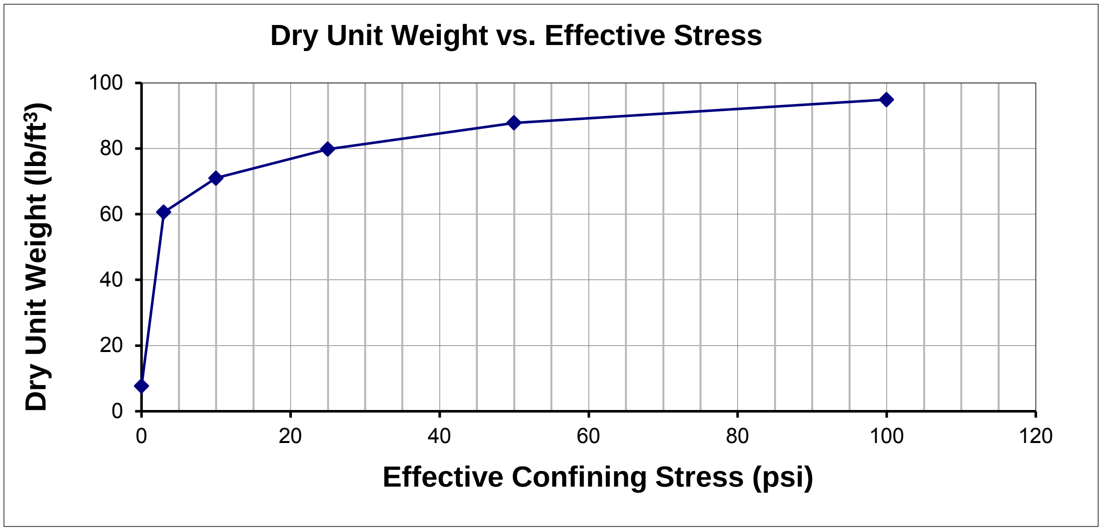
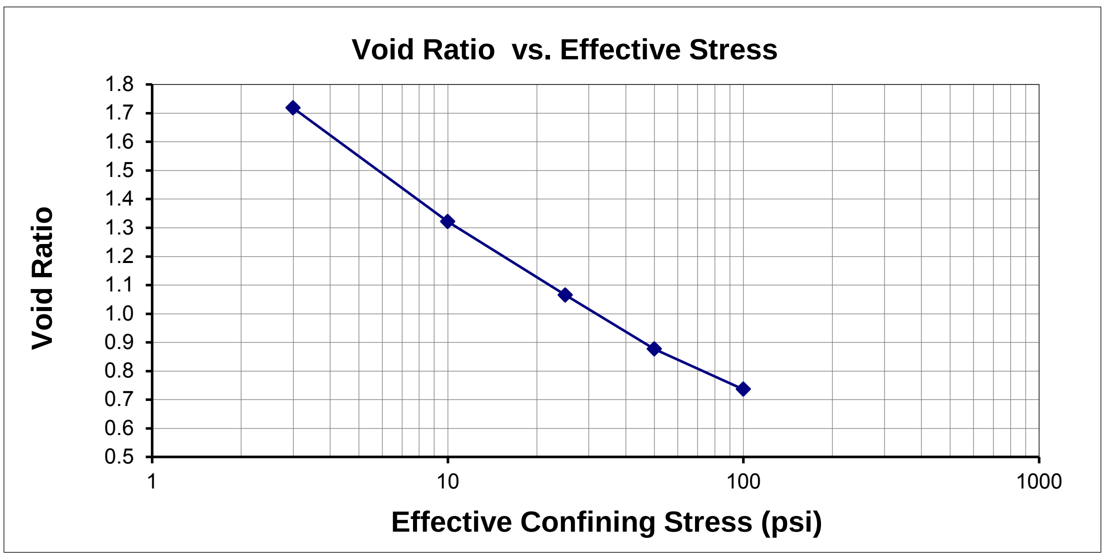


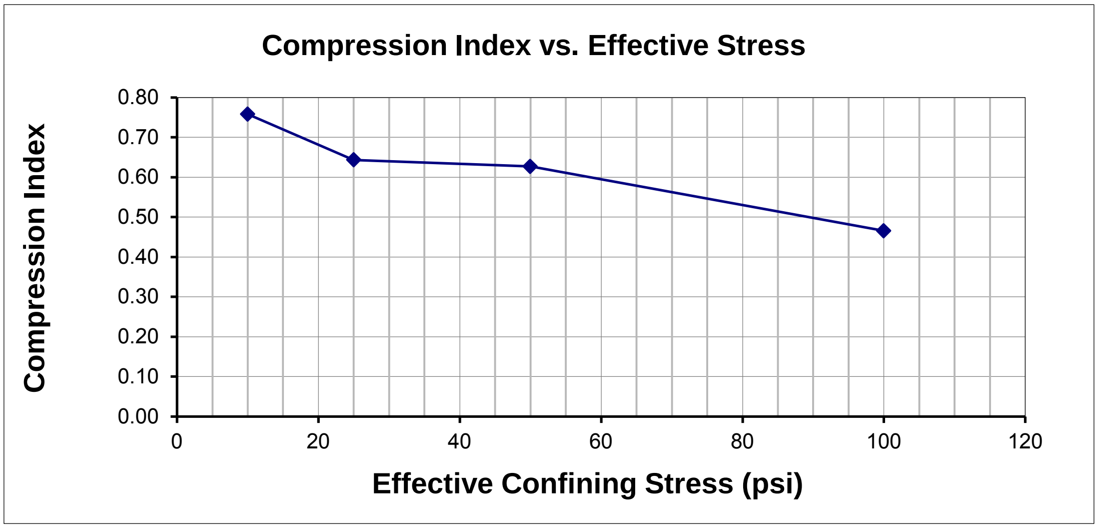


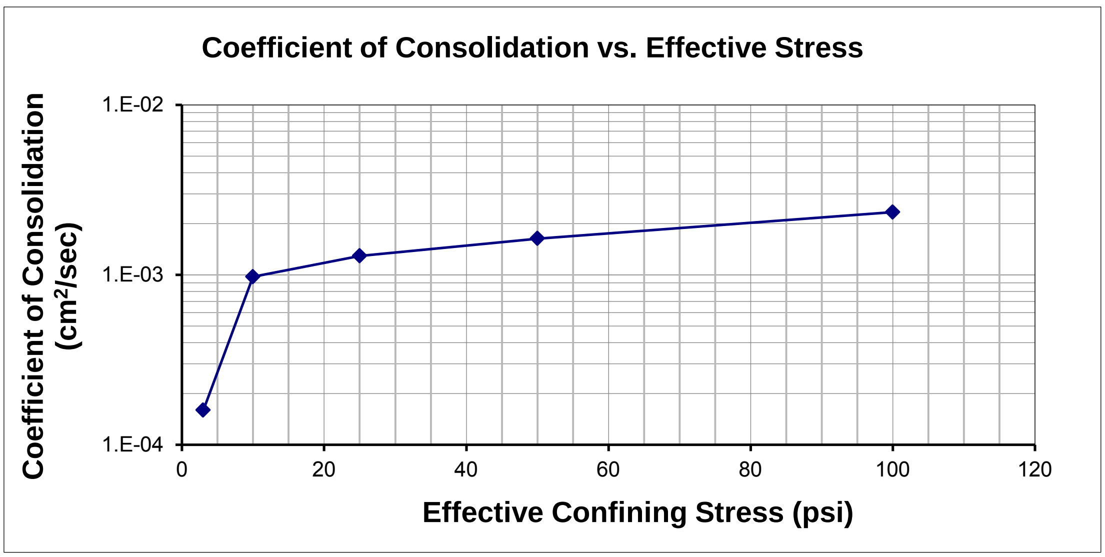
Golder Associates Inc.
Denver, Colorado

Title:
SLURRY CONSOLIDATION TEST RESULTS
DENSITY DATA

Job Short Title: Copper Flat Tailings Design Study

Sample No.	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Tailings Overflow Flume Test Slime	CCS	12/17/2012	103-92557	3





Golder Associates Inc. **Denver, Colorado**	**Title:** **SLURRY CONSOLIDATION TEST RESULTS** **COMPRESSION DATA**
Job Short Title: Copper Flat Tailings Design Study	

Sample No.	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Tailings Overflow Flume Test Slime	CCS	12/17/2012	103-92557	4

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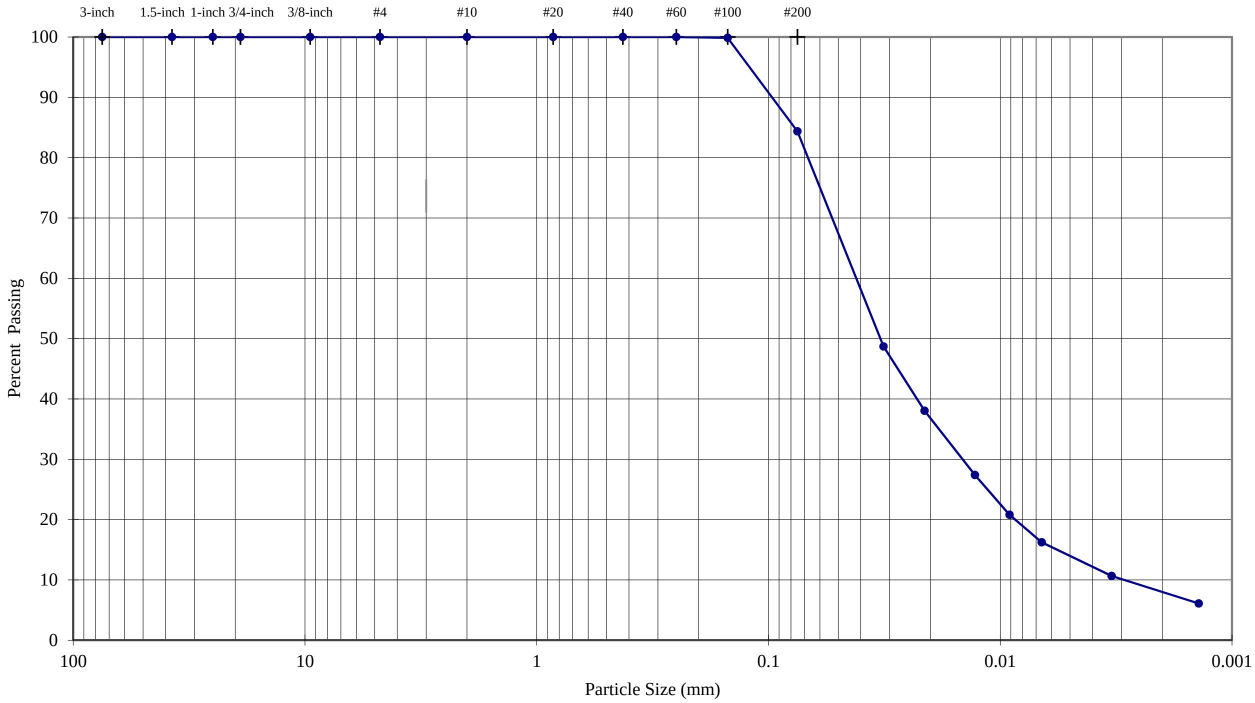
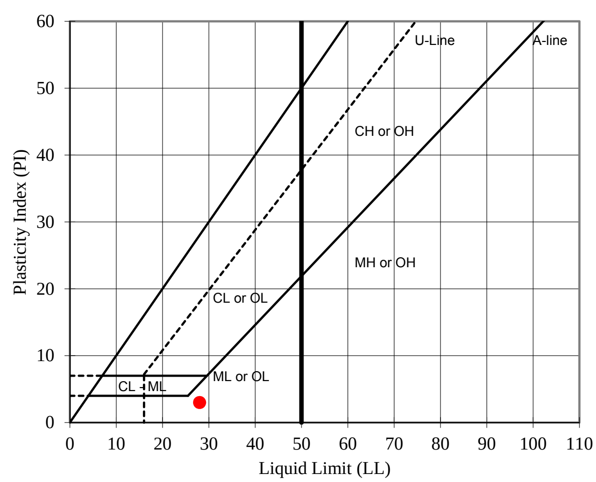
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Tailings Overflow** DEPTH (ft): **Beach**
TYPE: **Flume Test**



Sieve Analysis (Initial Separation on No. 4 Sieve) / Hydrometer Analysis	Sieve	Particle Size (mm)	% Passing	Description	Percentage
Sieve Analysis	3-inch	75.0	**100.0**		
	1.5-inch	37.5	**100.0**	Coarse Gravel	**0.00**
	1-inch	25.0	**100.0**		
	3/4-inch	19.0	**100.0**		
	3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
	#4	4.75	**100.0**		
	#10	2.0	**100.0**	Coarse Sand	**0.00**
	#20	0.85	**100.0**	Medium Sand	**0.00**
	#40	0.425	**100.0**		
	#60	0.25	**100.0**	Fine Sand	**15.64**
	#100	0.15	**99.9**		
	#200	0.075	**84.4**		
Hydrometer Analysis		0.032	**48.7**	Silt or Clay Fines	**84.36**
		0.021	**38.0**		
		0.013	**27.4**		
		0.009	**20.8**		
		0.007	**16.2**		
		0.003	**10.7**		
		0.001	**6.1**		



USCS Description (ASTM D 2487):

Dry, pale yellow silt

LL	PL	PI	SpG (assumed)
28	**25**	**3**	**2.64**

As-Received Moisture Content (%): **#DIV/0!**

USCS Group Symbol: ML

Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute
Sample prepared for Atterberg Limits testing by the dry method
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device

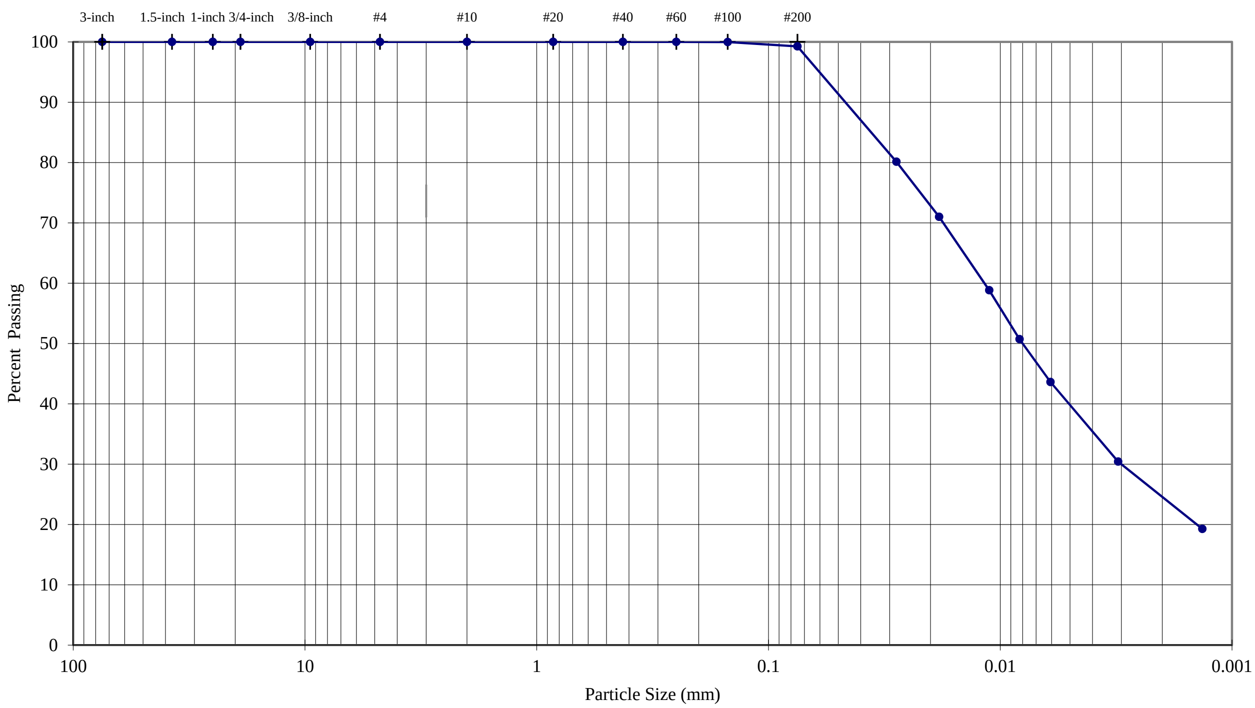
TECH	PRH/SRS
DATE	12/16/2012
REVIEW	MB

November-12 **103-92557**

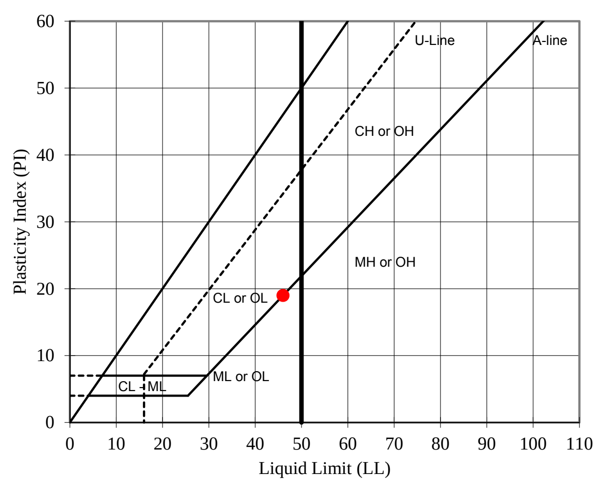
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Tailings Overflow** DEPTH (ft): **Slime**
TYPE: **Flume Test**



	Sieve	Particle Size (mm)	% Passing	Description	Percentage
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**	Coarse Gravel	**0.00**
	1.5-inch	37.5	**100.0**		
	1-inch	25.0	**100.0**		
	3/4-inch	19.0	**100.0**		
	3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
	#4	4.75	**100.0**		
	#10	2.0	**100.0**	Coarse Sand	**0.00**
	#20	0.85	**100.0**	Medium Sand	**0.00**
	#40	0.425	**100.0**		
	#60	0.25	**100.0**	Fine Sand	**0.74**
	#100	0.15	**100.0**		
	#200	0.075	**99.3**		
Hydrometer Analysis		0.028	**80.1**	Silt or Clay Fines	**99.26**
		0.018	**71.0**		
		0.011	**58.8**		
		0.008	**50.7**		
		0.006	**43.6**		
		0.003	**30.4**		
		0.001	**19.3**		



Visual Description (Golder Procedure):

Dry, pale yellow silty clay

LL	PL	PI	SpG (assumed)
46	**27**	**19**	**2.64**

As-Received Moisture Content (%): --

USCS Group Symbol: CL-ML

Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute

TECH	PRH/SRS
DATE	12/16/2012
REVIEW	MB

APPENDIX B.4.2
WHOLE TAILINGS TEST REPORTS

	Initial	Final	
Length =	7.852	5.64	cm
Diameter =	7.104	7.104	cm
Wet Mass =	515.99	424.51	g
Area =	39.64	39.64	cm^2
Volume =	311.2	223.6	cm^3
Moisture Content =	60.1%	32.4%	
Specific Gravity =	2.64	2.64	
Dry Mass of Solids =	322.29	320.63	g
Unit Weight =	1.66	1.90	g/cm^3
Dry Unit Weight =	1.04	1.43	g/cm^3
Unit Weight =	103.50	118.30	lb/ft^3
Dry Unit Weight =	64.65	89.35	lb/ft^3
Percent Solids =	62.5%	75.5%	

Piston Pressure:	8 psi	562.5 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation pressure:	**3 psi**	210.9 g/cm^2
Before Consolidation		
Initial Sample Height:	7.85	cm
Initial Dry Unit Weight:	1.04	g/cm^3
Initial Void Ratio:	1.55	
After Consolidation		
Final Sample Height:	5.94	cm
Final Dry Unit Weight:	1.36	g/cm^3
Final Void Ratio:	0.94	
Calculations		
Coefficient of Compressibility, a_v	2.90E-03	cm^2/g
Coefficient of Volume Compressibility, m_v	1.14E-03	cm^2/g
Compression Index, C_c	-	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
3.85	1.12E-04	9.86E-02
4.60	1.12E-04	9.88E-02
5.68	1.11E-04	9.73E-02
Average (of final 3 values)	1.12E-04	9.83E-02

Piston Pressure:	15 psi	1,054.6 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**10 psi**	703.1 g/cm^2
Before Consolidation		
Initial Sample Height:	5.94	cm
Initial Dry Unit Weight:	1.36	g/cm^3
Initial Void Ratio:	0.94	
After Consolidation		
Final Sample Height:	5.84	cm
Final Dry Unit Weight:	1.38	g/cm^3
Final Void Ratio:	0.91	
Calculations		
Coefficient of Compressibility, a_v	6.37E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	3.28E-05	cm^2/g
Compression Index, C_c	0.06	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
6.70	6.33E-05	1.93
8.03	6.33E-05	1.93
9.69	6.38E-05	1.94
Average (of final 3 values)	6.35E-05	1.93E+00

Piston Pressure:	30 psi	2,109.2 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**25 psi**	1,757.7 g/cm^2
Before Consolidation		
Initial Sample Height:	5.84	cm
Initial Dry Unit Weight:	1.38	g/cm^3
Initial Void Ratio:	0.91	
After Consolidation		
Final Sample Height:	5.79	cm
Final Dry Unit Weight:	1.40	g/cm^3
Final Void Ratio:	0.89	
Calculations		
Coefficient of Compressibility, a_v	1.73E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	9.09E-06	cm^2/g
Compression Index, C_c	0.05	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
10.15	4.96E-05	5.46
12.44	4.92E-05	5.41
15.42	4.99E-05	5.50
Average (of final 3 values)	4.96E-05	5.46E+00

Piston Pressure:	55 psi	3,866.9 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**50 psi**	3,515.4 g/cm^2
Before Consolidation		
Initial Sample Height:	5.79	cm
Initial Dry Unit Weight:	1.40	g/cm^3
Initial Void Ratio:	0.89	
After Consolidation		
Final Sample Height:	5.72	cm
Final Dry Unit Weight:	1.41	g/cm^3
Final Void Ratio:	0.87	
Calculations		
Coefficient of Compressibility, a_v	1.24E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	6.59E-06	cm^2/g
Compression Index, C_c	0.07	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
10.77	3.86E-05	5.86
12.80	3.89E-05	5.90
15.65	3.86E-05	5.87
Average (of final 3 values)	3.87E-05	5.88E+00

Piston Pressure:	105 psi	7,382.3 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**100 psi**	7,030.8 g/cm^2
Before Consolidation		
Initial Sample Height:	5.72	cm
Initial Dry Unit Weight:	1.41	g/cm^3
Initial Void Ratio:	0.87	
After Consolidation		
Final Sample Height:	5.64	cm
Final Dry Unit Weight:	1.43	g/cm^3
Final Void Ratio:	0.84	
Calculations		
Coefficient of Compressibility, a_v	7.52E-06	cm^2/g
Coefficient of Volume Compressibility, m_v	4.03E-06	cm^2/g
Compression Index, C_c	0.09	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
8.18	3.68E-05	9.14
9.75	3.69E-05	9.16
11.77	3.65E-05	9.07
Average (of final 3 values)	3.67E-05	9.12E+00

Golder Associates Inc.
Denver, Colorado

Title:

SLURRY CONSOLIDATION TEST
SAMPLE DATA AND CALCULATIONS

Job Short Title: Copper Flat Tailings Design Study

Sample No.	Reviewed:	Date:	Job Number:	Figure:
Whole Tailings Flume Test Beach	CCS	11/12/2012	103-92557	1

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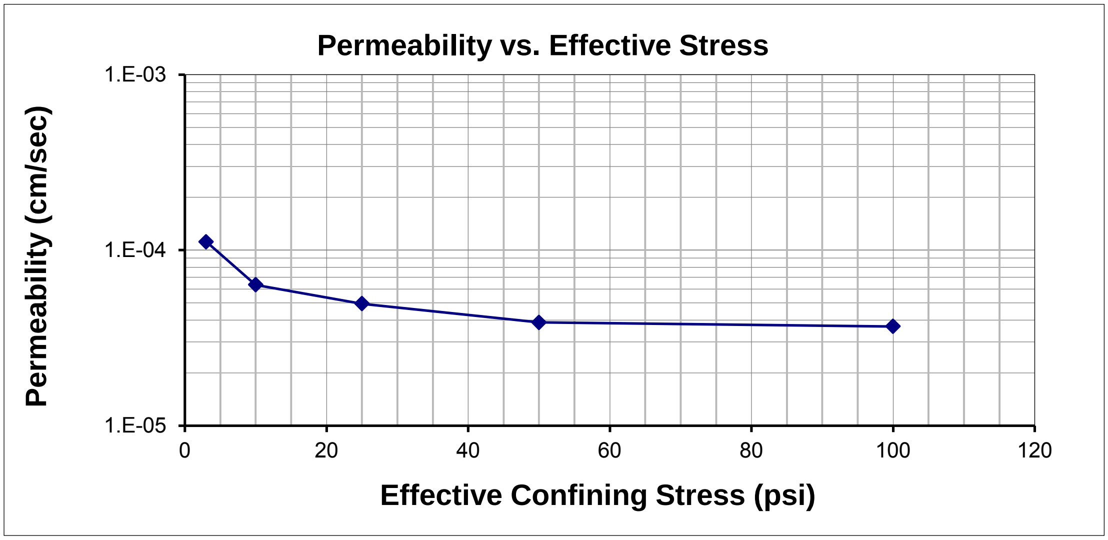

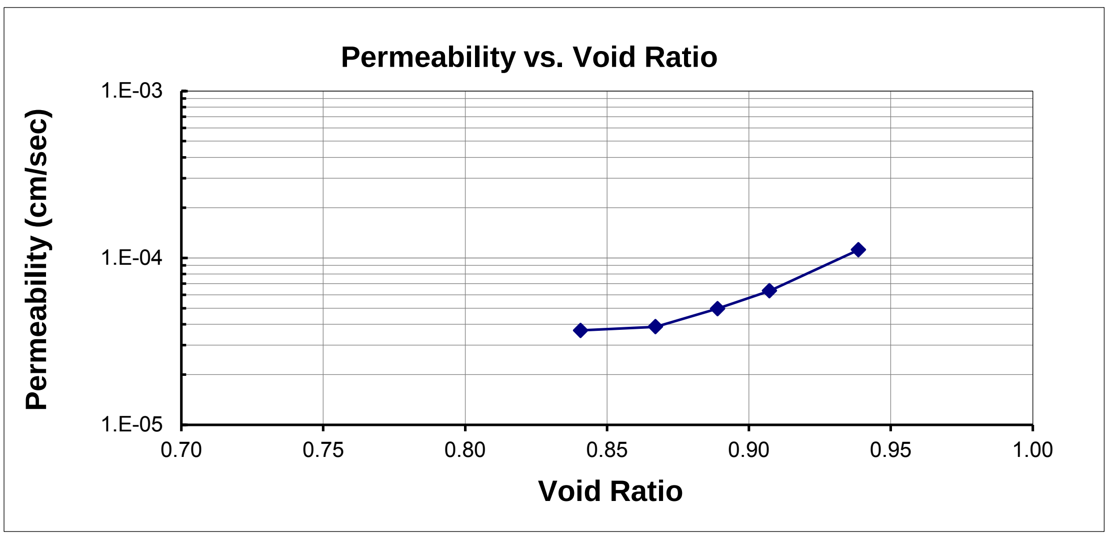

Golder Associates Inc. Denver, Colorado	**Title:** SLURRY CONSOLIDATION TEST RESULTS PERMEABILITY DATA			
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Whole Tailings Flume Test Beach	**Reviewed:** CCS	**Date:** 11/12/2012	**Job Number:** 103-92557	**Figure:** 2

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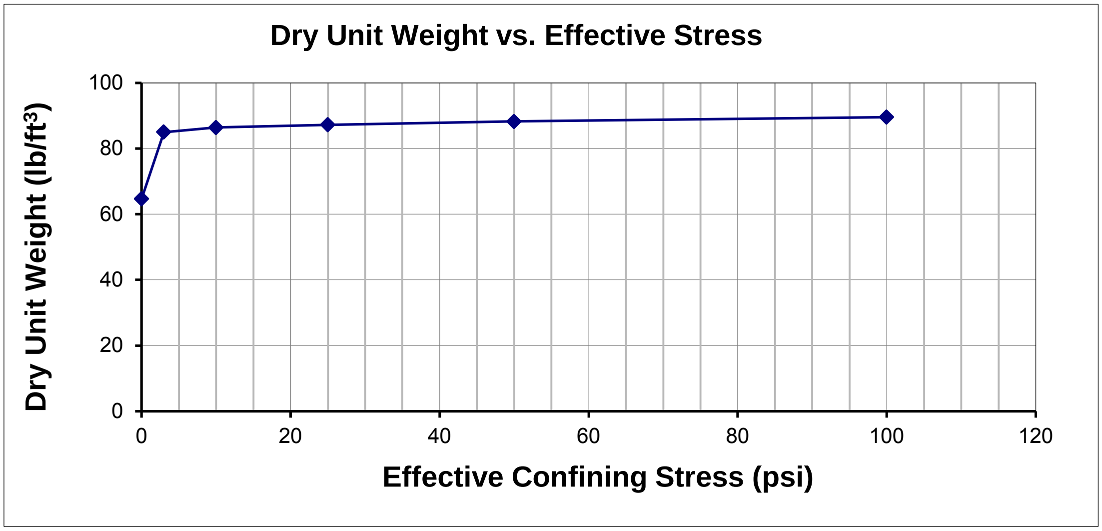
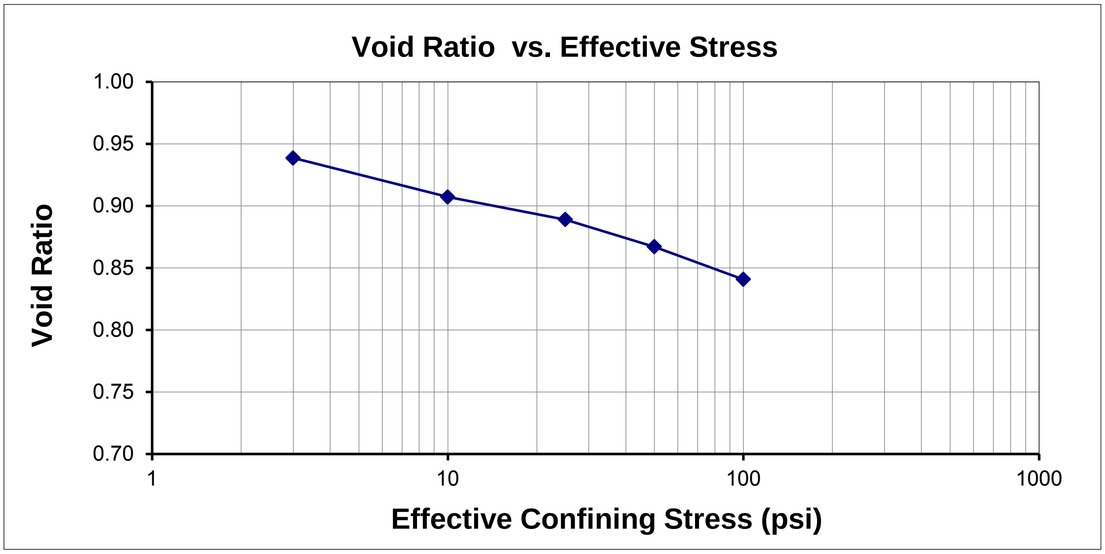
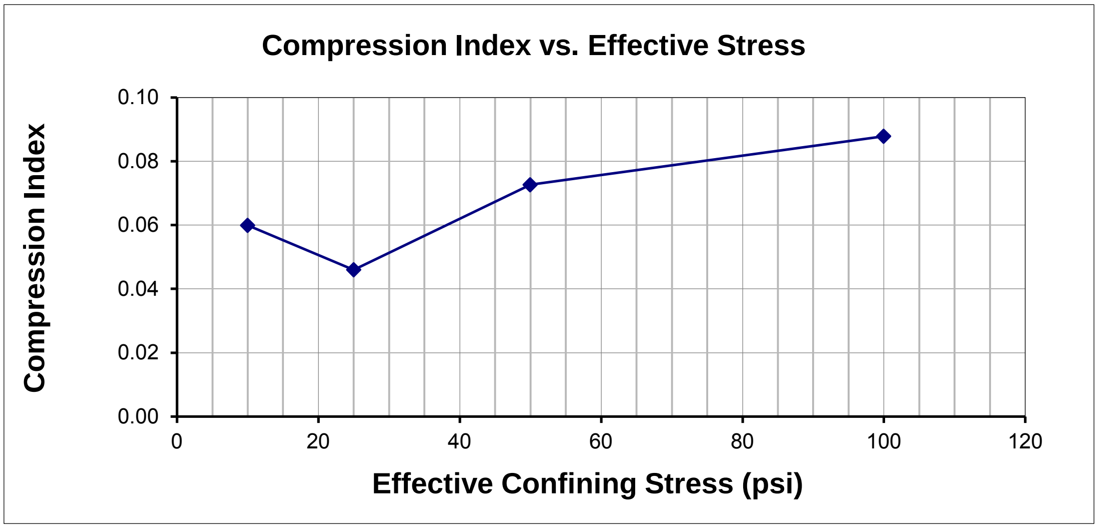
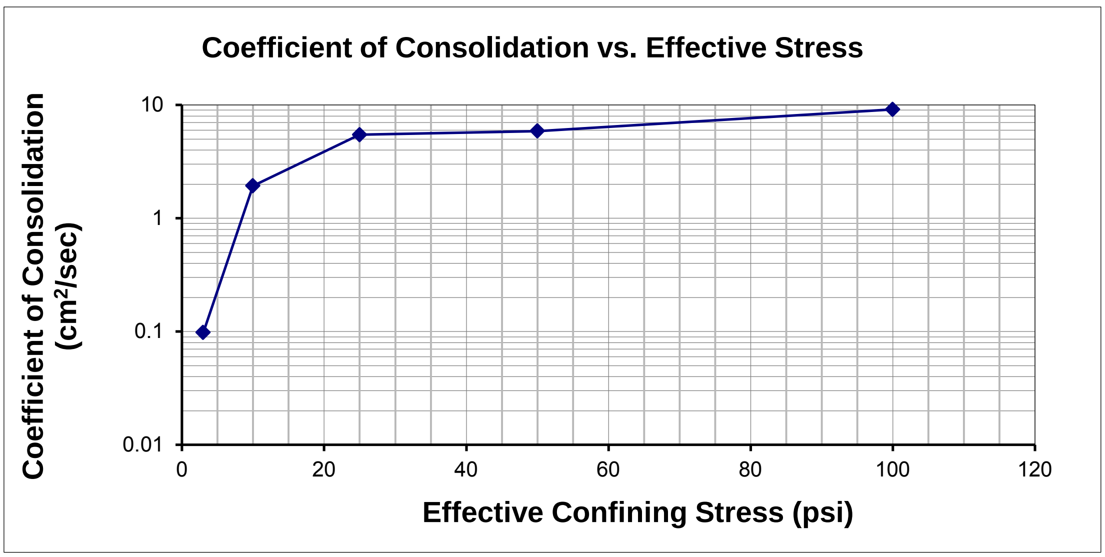




Golder Associates Inc. **Denver, Colorado**		**Title:** SLURRY CONSOLIDATION TEST RESULTS DENSITY DATA		
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Whole Tailings Flume Test Beach	**Reviewed:** CCS	**Date:** 11/12/2012	**Job Number:** 103-92557	**Figure:** 3





Golder Associates Inc. **Denver, Colorado**	**Title:** **SLURRY CONSOLIDATION TEST RESULTS** **COMPRESSION DATA**
Job Short Title: Copper Flat Tailings Design Study	

Sample No.	**Reviewed:**	**Date:**	**Job Number:**	**Figure:**
Whole Tailings Flume Test Beach	CCS	11/12/2012	103-92557	4

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix B.4 Flume Sample Test Results\B.4.2

	Initial	Final	
Length =	7.285	0.740	cm
Diameter =	7.099	7.099	cm
Wet Mass =	338.65	60.46	g
Area =	39.58	39.58	cm^2
Volume =	288.3	29.29	cm^3
Moisture Content =	628.5%	35.5%	
Specific Gravity =	2.64	2.64	
Dry Mass of Solids =	46.49	44.62	g
Unit Weight =	1.174	2.064	g/cm^3
Dry Unit Weight =	0.1612	1.523	g/cm^3
Unit Weight =	73.32	128.6	lb/ft^3
Dry Unit Weight =	10.06	94.90	lb/ft^3
Percent Solids =	13.7%	73.8%	

Piston Pressure:	8 psi	562.5 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation pressure:	**3 psi**	210.9 g/cm^2
Before Consolidation		
Initial Sample Height:	7.29	cm
Initial Dry Unit Weight:	0.16	g/cm^3
Initial Void Ratio:	15.38	
After Consolidation		
Final Sample Height:	1.11	cm
Final Dry Unit Weight:	1.02	g/cm^3
Final Void Ratio:	1.60	
Calculations		
Coefficient of Compressibility, a_v	6.53E-02	cm^2/g
Coefficient of Volume Compressibility, m_v	3.99E-03	cm^2/g
Compression Index, C_c	-	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
204	5.66E-07	1.42E-04
221	5.69E-07	1.43E-04
245	5.65E-07	1.42E-04
Average (of final 3 values)	5.66E-07	1.42E-04

Piston Pressure:	15 psi	1,054.6 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**10 psi**	703.1 g/cm^2
Before Consolidation		
Initial Sample Height:	1.11	cm
Initial Dry Unit Weight:	1.02	g/cm^3
Initial Void Ratio:	1.60	
After Consolidation		
Final Sample Height:	0.94	cm
Final Dry Unit Weight:	1.19	g/cm^3
Final Void Ratio:	1.21	
Calculations		
Coefficient of Compressibility, a_v	7.85E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	3.02E-04	cm^2/g
Compression Index, C_c	0.74	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
367	2.67E-07	8.8E-04
397	2.69E-07	8.9E-04
440	2.67E-07	8.8E-04
Average (of final 3 values)	2.68E-07	8.86E-04

Piston Pressure:	30 psi	2,109.2 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**25 psi**	1,757.7 g/cm^2
Before Consolidation		
Initial Sample Height:	0.94	cm
Initial Dry Unit Weight:	1.19	g/cm^3
Initial Void Ratio:	1.21	
After Consolidation		
Final Sample Height:	0.86	cm
Final Dry Unit Weight:	1.32	g/cm^3
Final Void Ratio:	1.00	
Calculations		
Coefficient of Compressibility, a_v	1.98E-04	cm^2/g
Coefficient of Volume Compressibility, m_v	8.94E-05	cm^2/g
Compression Index, C_c	0.52	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
604	1.47E-07	1.6E-03
652	1.49E-07	1.7E-03
718	1.48E-07	1.7E-03
Average (of final 3 values)	1.48E-07	1.66E-03

Piston Pressure:	55 psi	3,866.9 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**50 psi**	3,515.4 g/cm^2
Before Consolidation		
Initial Sample Height:	0.86	cm
Initial Dry Unit Weight:	1.32	g/cm^3
Initial Void Ratio:	1.00	
After Consolidation		
Final Sample Height:	0.79	cm
Final Dry Unit Weight:	1.42	g/cm^3
Final Void Ratio:	0.86	
Calculations		
Coefficient of Compressibility, a_v	8.26E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	4.13E-05	cm^2/g
Compression Index, C_c	0.48	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
533	9.48E-08	2.3E-03
639	9.46E-08	2.3E-03
770	9.47E-08	2.3E-03
Average (of final 3 values)	9.47E-08	2.30E-03

Piston Pressure:	105 psi	7,382.3 g/cm^2
Sample Pressure:	5 psi	351.5 g/cm^2
Consolidation Pressure:	**100 psi**	7,030.8 g/cm^2
Before Consolidation		
Initial Sample Height:	0.79	cm
Initial Dry Unit Weight:	1.42	g/cm^3
Initial Void Ratio:	0.86	
After Consolidation		
Final Sample Height:	0.74	cm
Final Dry Unit Weight:	1.52	g/cm^3
Final Void Ratio:	0.73	
Calculations		
Coefficient of Compressibility, a_v	3.53E-05	cm^2/g
Coefficient of Volume Compressibility, m_v	1.90E-05	cm^2/g
Compression Index, C_c	0.41	

Δ Time (sec)	Permeability k (cm/sec)	Coefficient of Consolidation, c_v (cm^2/sec)
1024	5.51E-08	2.9E-03
1233	5.52E-08	2.9E-03
1396	5.51E-08	2.9E-03
Average (of final 3 values)	5.51E-08	2.90E-03

Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Title: SLURRY CONSOLIDATION TEST
SAMPLE DATA AND CALCULATIONS

Sample No.	Reviewed:	Date:	Job Number:	Figure:
Whole Tailings Flume Test Slime	CCS	10/30/2012	103-92557	1

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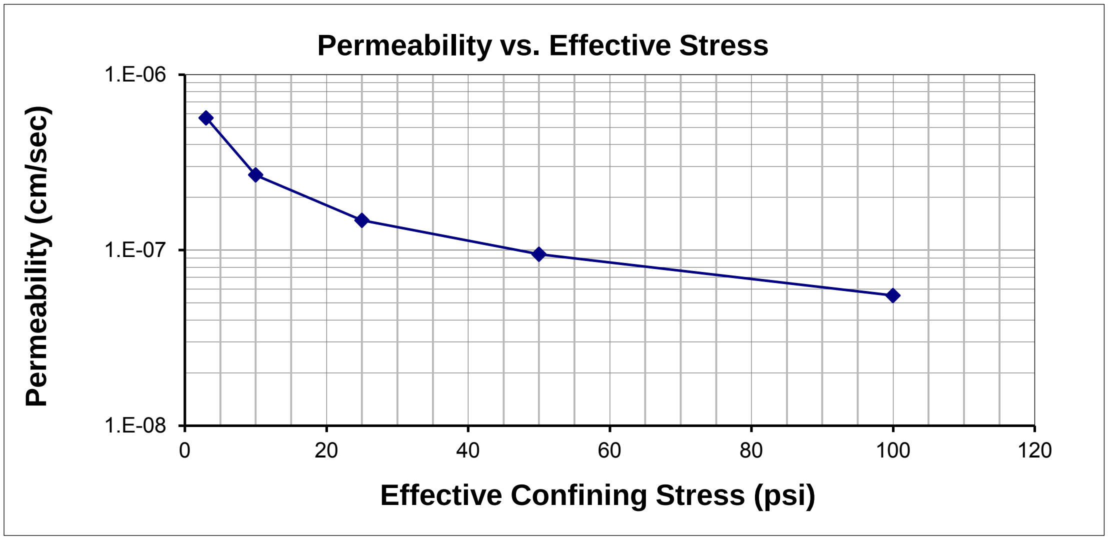

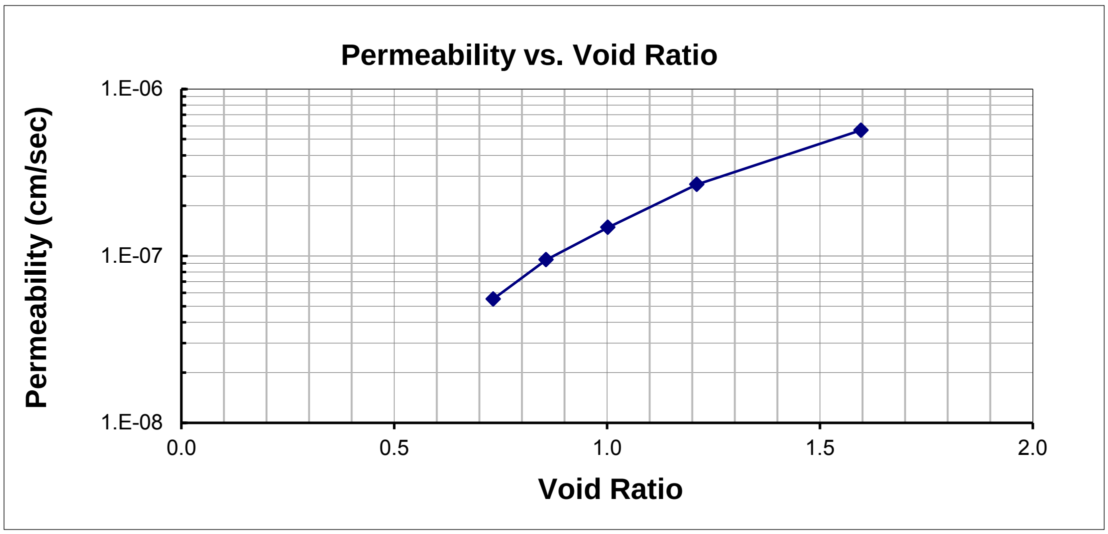

Golder Associates Inc. Denver, Colorado		**Title:** **SLURRY CONSOLIDATION TEST RESULTS PERMEABILITY DATA**		
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Whole Tailings Flume Test Slime	**Reviewed:** CCS	**Date:** 10/30/2012	**Job Number:** 103-92557	**Figure:** 2

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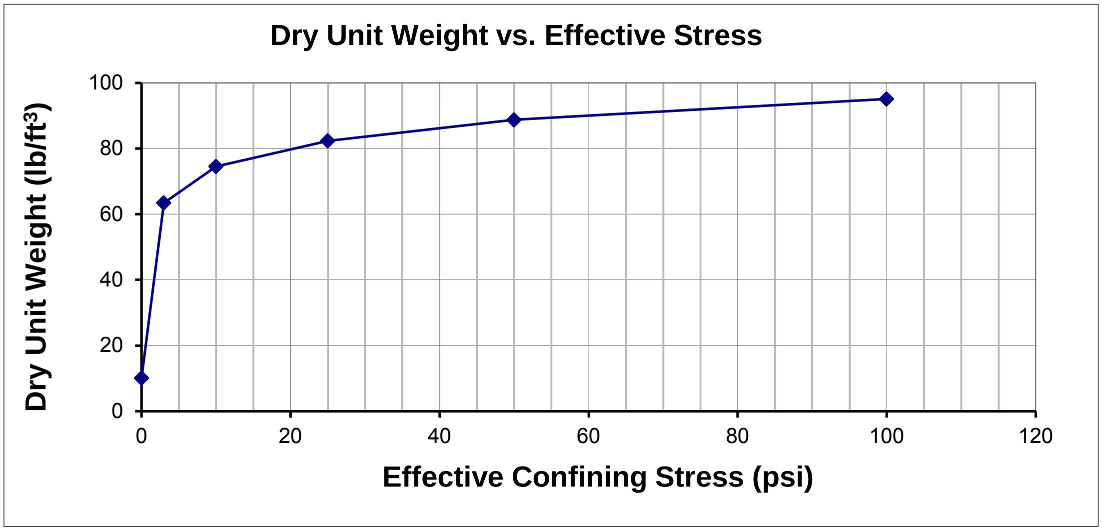

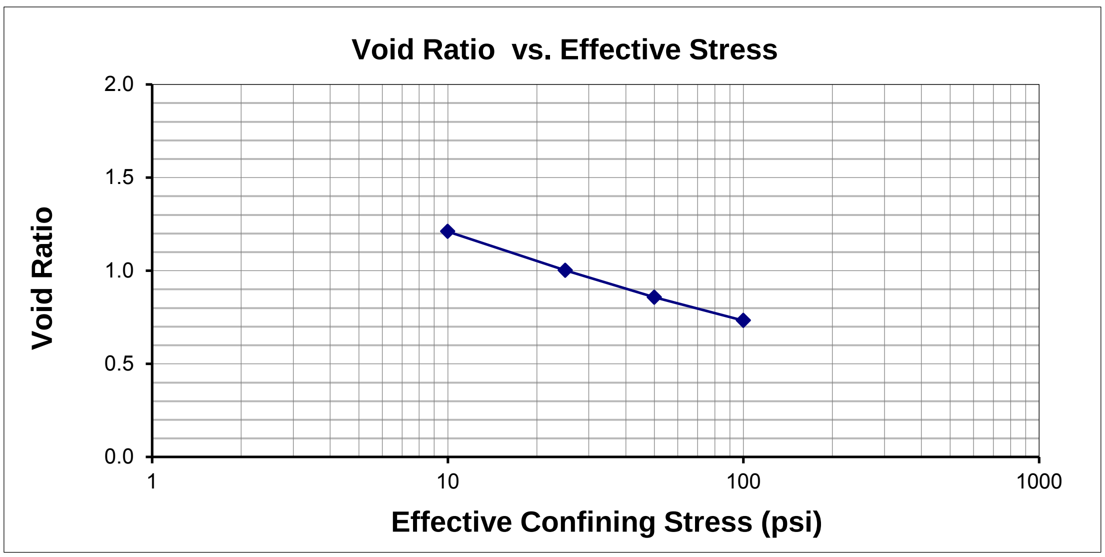

Golder Associates Inc. Denver, Colorado		**Title:** SLURRY CONSOLIDATION TEST RESULTS DENSITY DATA		
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Whole Tailings Flume Test Slime	**Reviewed:** CCS	**Date:** 10/30/2012	**Job Number:** 103-92557	**Figure:** 3

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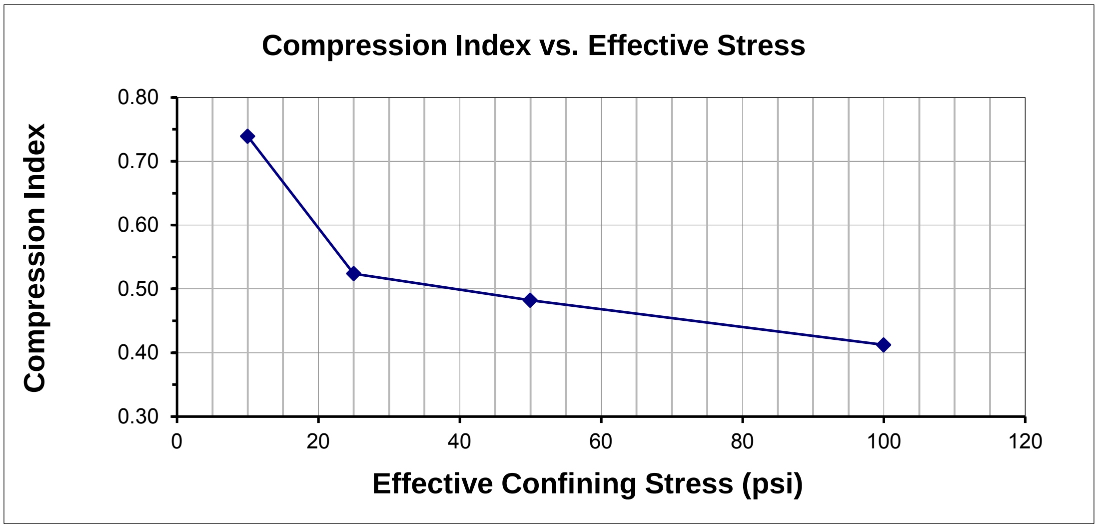
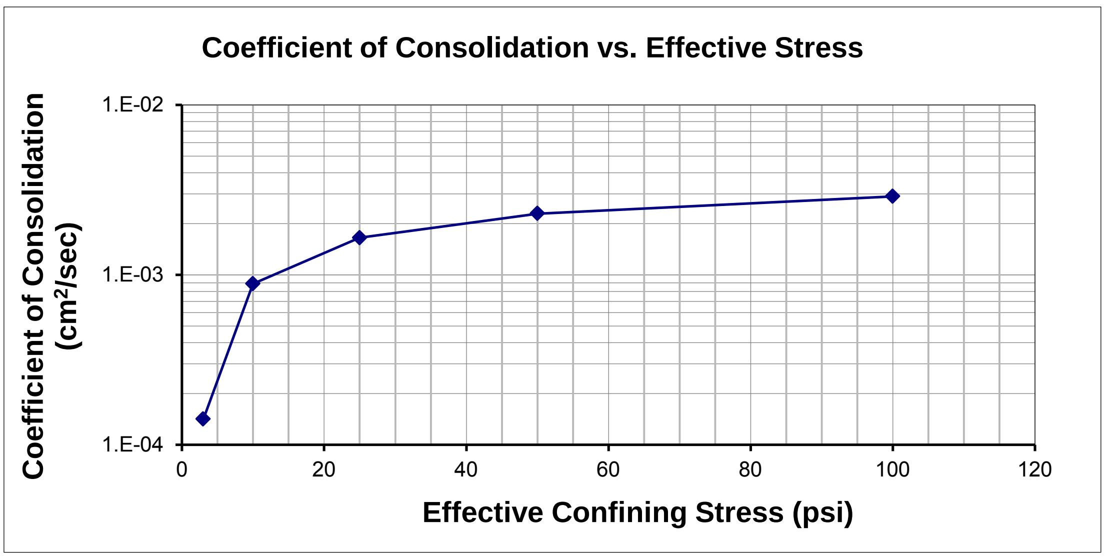
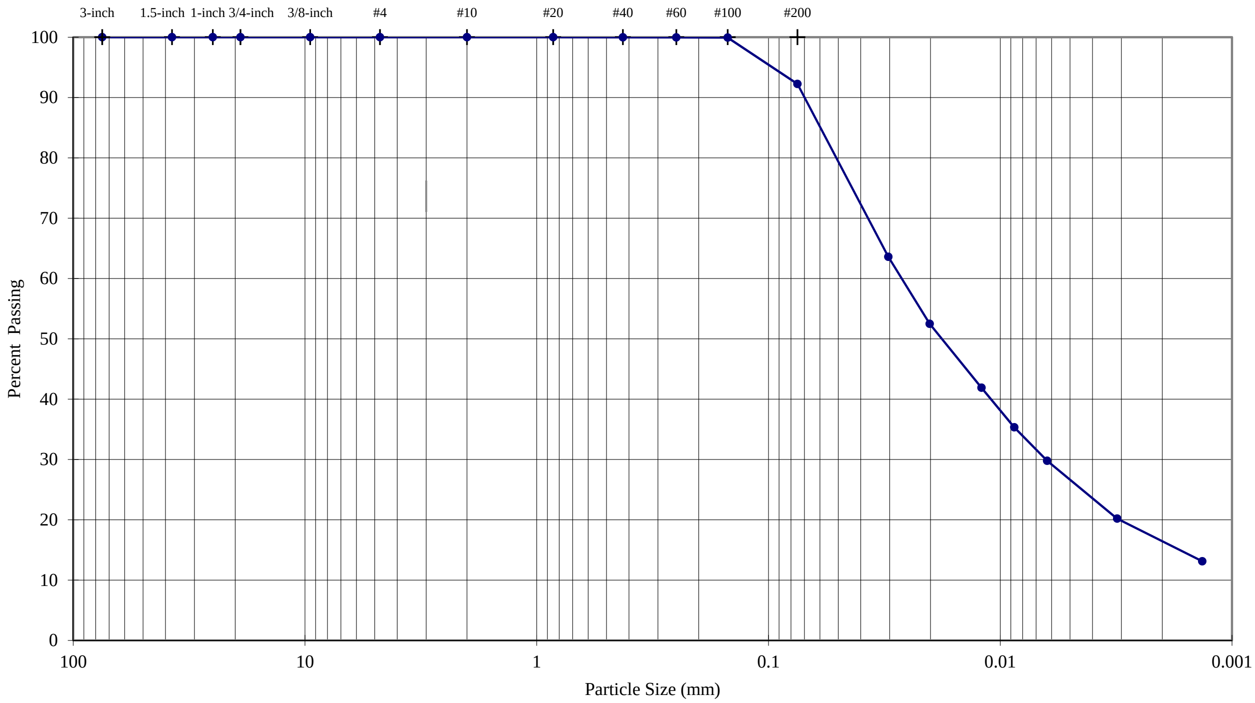




Golder Associates Inc. **Denver, Colorado**		**Title:** **SLURRY CONSOLIDATION TEST RESULTS** **COMPRESSION DATA**		
Job Short Title: Copper Flat Tailings Design Study				
Sample No. Whole Tailings Flume Test Slime	**Reviewed:** CCS	**Date:** 10/30/2012	**Job Number:** 103-92557	**Figure:** 4

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Whole Tailings Flume** DEPTH (ft): **Beach**
TYPE: **Single Drain**



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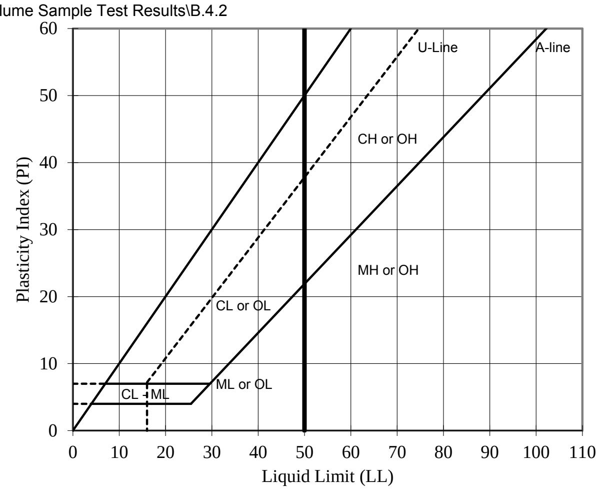
	Sieve	Particle Size (mm)	% Passing	Description	Percentage
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**	Coarse Gravel	**0.00**
	1.5-inch	37.5	**100.0**		
	1-inch	25.0	**100.0**		
	3/4-inch	19.0	**100.0**		
	3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
	#4	4.75	**100.0**		
	#10	2.0	**100.0**	Coarse Sand	**0.00**
	#20	0.85	**100.0**	Medium Sand	**0.02**
	#40	0.425	**100.0**		
	#60	0.25	**100.0**	Fine Sand	**7.72**
	#100	0.15	**99.9**		
	#200	0.075	**92.3**		
Hydrometer Analysis		0.030	**63.6**	Silt or Clay Fines	**92.26**
		0.020	**52.5**		
		0.012	**41.9**		
		0.009	**35.3**		
		0.006	**29.8**		
		0.003	**20.2**		
		0.001	**13.1**		



Visual Description (Golder Procedure):

Wet, light yellowish brown SITLY SAND

LL	PL	PI	Spg (assumed)
--	--	--	**2.64**

As-Received Moisture Content (%)	USCS Group Symbol
--	--

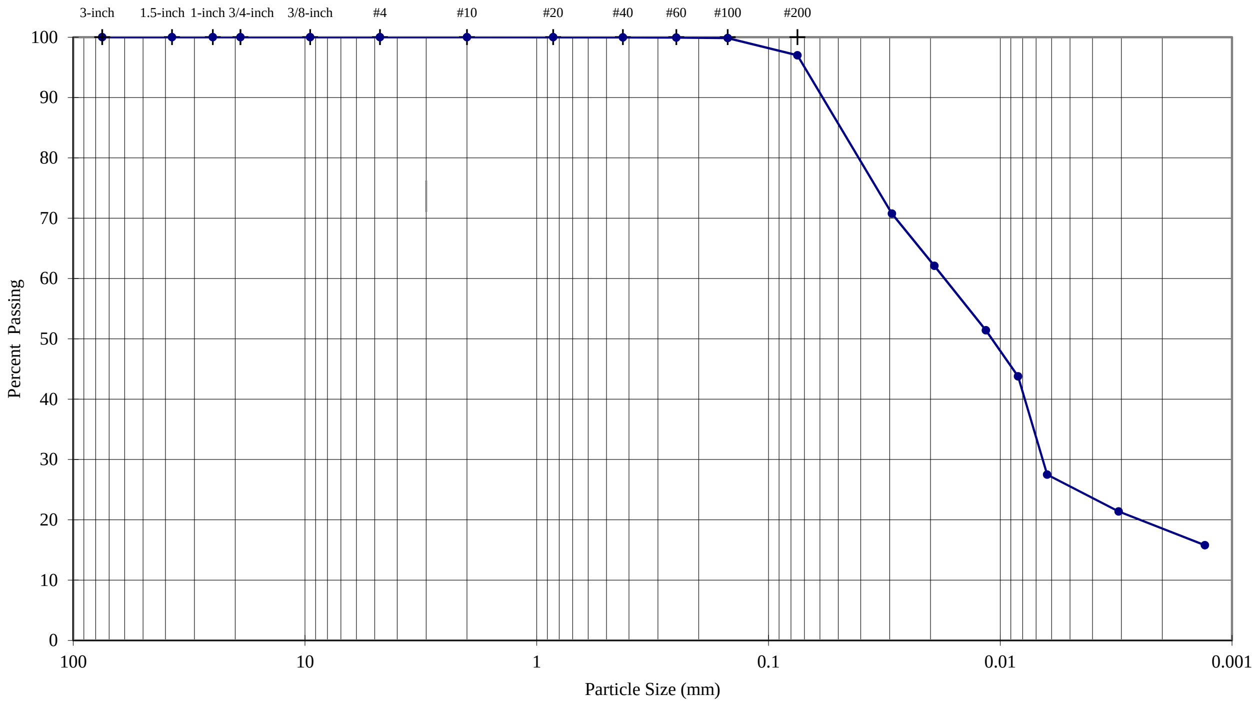
Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute

TECH	RJM/SRS
DATE	11/8/2012
REVIEW	MB

Golder Associates

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Whole Tailings** DEPTH (ft): **Slime**
TYPE: **Flume**



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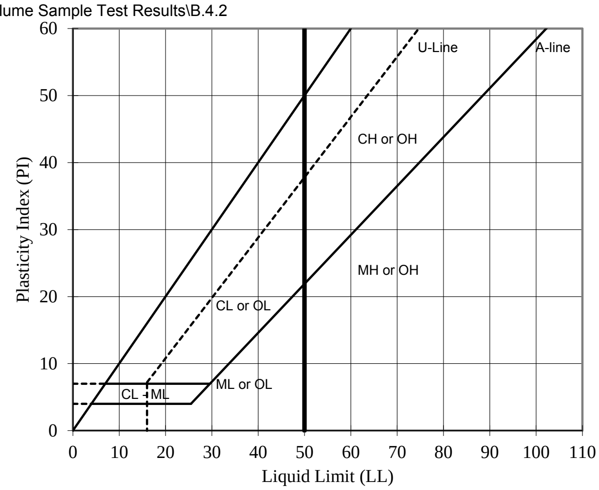
	Sieve	Particle Size (mm)	% Passing	Description	Percentage
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**		
	1.5-inch	37.5	**100.0**	Coarse Gravel	**0.00**
	1-inch	25.0	**100.0**		
	3/4-inch	19.0	**100.0**		
	3/8-inch	9.5	**100.0**	Fine Gravel	**0.00**
	#4	4.75	**100.0**		
	#10	2.0	**100.0**	Coarse Sand	**0.00**
	#20	0.85	**100.0**	Medium Sand	**0.04**
	#40	0.425	**100.0**		
	#60	0.25	**99.9**	Fine Sand	**2.96**
	#100	0.15	**99.9**		
	#200	0.075	**97.0**		
Hydrometer Analysis		0.029	**70.8**	Silt or Clay Fines	**97.00**
		0.019	**62.1**		
		0.012	**51.4**		
		0.008	**43.8**		
		0.006	**27.5**		
		0.003	**21.4**		
		0.001	**15.8**		



Visual Description (Golder Procedure):

Wet, light yellowish brown silty sand

LL	PL	PI	SpG (assumed)
--	--	--	**2.64**

As-Received Moisture Content (%)	USCS Group Symbol
--	--

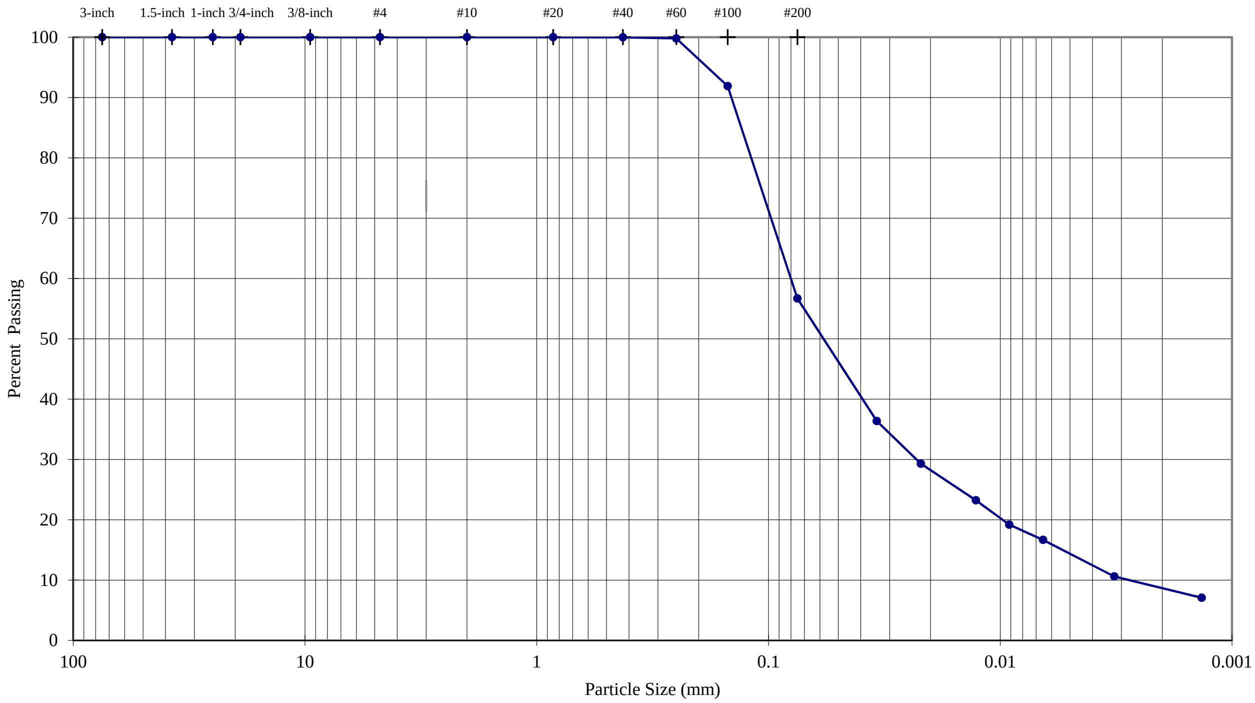
Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute

TECH	AM/SRS
DATE	11/8/2012
REVIEW	MB

Golder Associates

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Copper Flat Tailings Design Study**
SAMPLE ID: **Whole Tailings Flume** DEPTH (ft): **Slime**
TYPE: **Single Drain**



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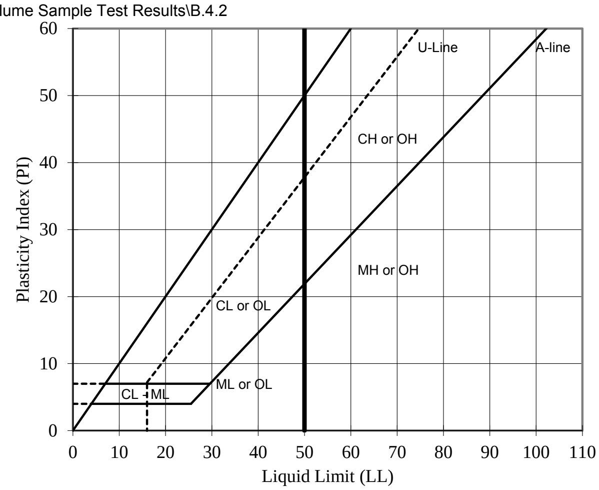
	Sieve	Particle Size (mm)	% Passing
Sieve Analysis (Initial Separation on No. 4 Sieve)	3-inch	75.0	**100.0**
	1.5-inch	37.5	**100.0**
	1-inch	25.0	**100.0**
	3/4-inch	19.0	**100.0**
	3/8-inch	9.5	**100.0**
	#4	4.75	**100.0**
	#10	2.0	**100.0**
	#20	0.85	**100.0**
	#40	0.425	**100.0**
	#60	0.25	**99.8**
	#100	0.15	**91.9**
	#200	0.075	**56.7**
Hydrometer Analysis		0.034	**36.4**
		0.022	**29.3**
		0.013	**23.2**
		0.009	**19.2**
		0.007	**16.7**
		0.003	**10.6**
		0.001	**7.1**

Description	Percentage
Coarse Gravel	**0.00**
Fine Gravel	**0.00**
Coarse Sand	**0.00**
Medium Sand	**0.02**
Fine Sand	**43.29**
Silt or Clay Fines	**56.69**



Visual Description (Golder Procedure):

Wet, light yellowish brown SITLY SAND

LL	PL	PI	SpG (assumed)
--	--	--	**2.64**

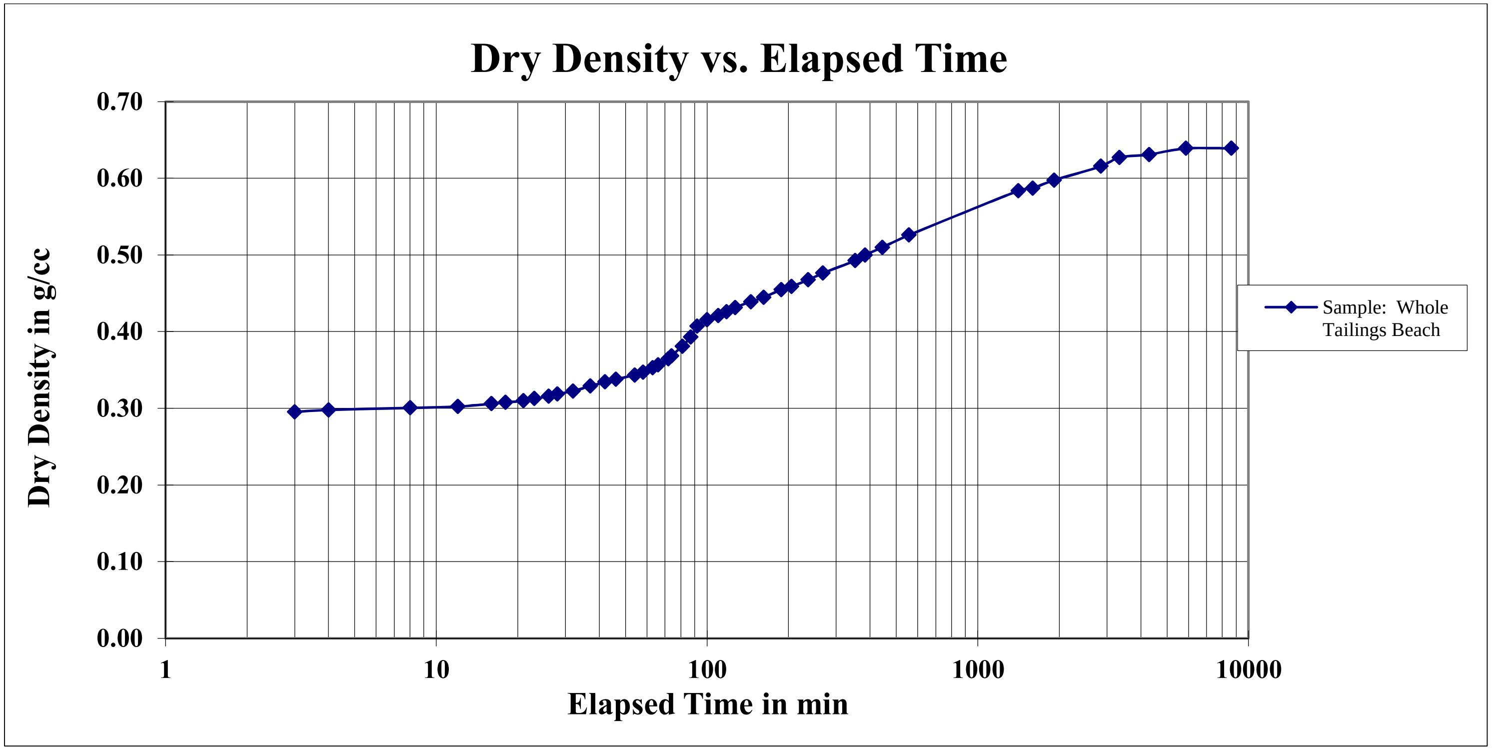
As-Received Moisture Content (%): --

USCS Group Symbol: --

Notes: 0g of particles up to 4.75mm maximum size were removed from particle size analysis sample prior to testing
Particle size analysis sample mechanically dispersed using Stirring Apparatus A for about 1 minute

TECH	RJM/SRS
DATE	11/8/2012
REVIEW	MB

Golder Associates



Golder Associates, Inc. Denver, Colorado			Title: SEDIMENTATION TESTING GRAPHICAL DATA		
Job Short Title: Copper Flat Tailings Design Study					
Sample No. Whole Tailings Beach	System Single Drain	Reviewed: MB	Date: 23-Oct-12	Job Number: 103-92557	Figure: 2

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APPENDIX C
FSCONSOL MODEL OUTPUT

CALCULATIONS

Date:	November 11, 2013	**Made by:**	CDJ and DMW
Project No.:	133-92505	**Checked by:**	GM
Subject:	Cyclone Overflow Beach and Slimes Tailings Consolidation Analyses	**Reviewed by:**	GG
Project Short Title:	**COPPER FLAT FEASIBILITY DESIGN**		

1.0 OBJECTIVE

Estimate the Tailing Storage Facility (TSF) impoundment capacity by computing the average dry density of tailings at the end-of-filling using a one-dimensional (1D) large strain consolidation model to obtain the void ratio profile with depth. Use calculated 1D percent errors to compute an adjusted average dry density, which is then weighted based on the tailings cyclone overflow split between tailings "beach" versus tailings "slimes" within the TSF impoundment.

2.0 ASSUMPTIONS

- Total tailings production rate (overflow and underflow): 27,618 tons per day
- Total tailings capacity (overflow and underflow): 112 million tons
- Cyclone Availability: 100 percent (i.e. no whole tailings deposited in the TSF impoundment based on the recommendation to produce as much cyclone underflow tailings sand as possible)
- Percentage split of cyclone overflow tailings: 54.75 percent of total
- Tailings production rate (overflow): 15,121 tons per day (calculated based on total tailings production rate and percentage of cyclone overflow)
- Percentage split of slimes: 40 percent by mass of storage in TSF impoundment
- Initial Tailings Overflow Solids Content: 25.9 percent
- Tailings Overflow filling rate
  - Years 0-1:13.3 million kilograms per day
  - Years 1-5:15.4 million kilograms per day
  - Years 5-11:14.2 million kilograms per day
  - Years 11-11.12:13.2 million kilograms per day
- Impermeable Bottom Boundary condition

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3.0 INPUTS

3.1 Geometry

Model geometry was based on the existing ground topography (THEMAC Resources, 2011) and Golder's optimized TSF design. Stage storage curve data used for TSF modeling is displayed in Table 1.

- Bottom Elevation: 5,196 feet above mean sea level (ft-msl)
- Top Dam Crest Elevation: 5,450 ft-msl
- Maximum depth of Impoundment: 254 feet
- Maximum Overflow Impoundment Area: 13.66 million square feet
- Impoundment volume used in the FSConsol analyses: 96.88 million cubic yards (MCY)

Table 1: Elevation–Area-Volume Relationship

Elevation (ft-msl)	Height (ft)	Area (acre)	Cumulative Volume (yd^3)
5,196	0	0.0	0
5,210	14	16.3	367,859
5,225	29	58.6	1,786,931
5,235	39	101.7	3,427,369
5,250	54	141.8	6,859,887
5,265	69	180.3	11,223,775
5,280	84	203.4	16,145,709
5,295	99	240.6	21,968,132
5,310	114	255.1	28,141,570
5,325	129	280.1	34,919,345
5,340	144	288.9	41,911,903
5,355	159	300.0	49,171,933
5,370	174	305.0	56,552,360
5,385	189	308.6	64,019,422
5,400	204	312.6	71,583,431
5,425	229	313.6	84,231,795
5,435	239	313.6	89,291,466
5,450	254	313.6	96,880,975

3.2 Material Properties

Material properties and numerical model inputs are based on laboratory tests performed by Golder Associates Inc. in Denver, CO. Slurry consolidation tests were performed to determine void ratio and permeability versus applied effective stresses. The specific gravity of the tailings material is 2.65 based on laboratory tests.

4.0 METHOD

Calculations were performed using the computer program FSConsol (GWP Software, 1999), which performs a one-dimensional, large-strain consolidation analysis using finite strain consolidation theory as presented in Gibson (1967).

4.1 Numerical Model

4.1.1 Equations

For modeling purposes, it is convenient to express constitutive relationships (permeability and compressibility, respectively) in a closed form. Non-linear relationships are proposed by Abu-Hejleh and Znidarcic (1994 and 1996), defined by Equations 4.1 and 4.2, which are used in consolidation and desiccation numerical models.

$$k = C\,e^{D}$$ Equation 4.1

$$e = A\left(\sigma' + Z\right)^{B}$$ Equation 4.2

When using FSConsol model, Equation 4.1 remains the same; however, Equation 4.2 is rewritten by the modified power law form to represent compressibility, shown in Equation 4.3.

$$e = A\left(\sigma'\right)^{B} + M$$ Equation 4.3

In the above relationships, *e* is the void ratio, σ' is the effective stress, and *k* is hydraulic conductivity functionally dependent on void ratio.

4.1.2 Parameters

The five material parameters, *A, B, C, D,* and *M* (or *Z*), were determined by fitting constitutive relationships to laboratory data, as shown in Figures 1 through 4, which are on the following next two pages (pages 4 and 5). The fitted parameters calculated for those constitutive relationships are shown in Tables 2 and 3 for different systems of units.

Table 2: Permeability Input Parameters for Cyclone Overflow and Whole Tailings

Sample	C (centimeters per second)	D (dimensionless)[1]
Slimes	1.380×10^{-7}	3.353
Beach	1.523×10^{-6}	3.035

Table 3: Compressibility Input Parameters for Cyclone Overflow and Whole Tailings

Sample	A $(1/\text{kilopascals})^{B}$	B (dimensionless)[1]	M (dimensionless)[1]
Slimes	3.144	-0.1952	-0.1424
Beach	1.787	-0.2983	0.5224

Note:
[1] B, D, and M are dimensionless and valid for English, International, and centimeter-gram-second (cgs) units

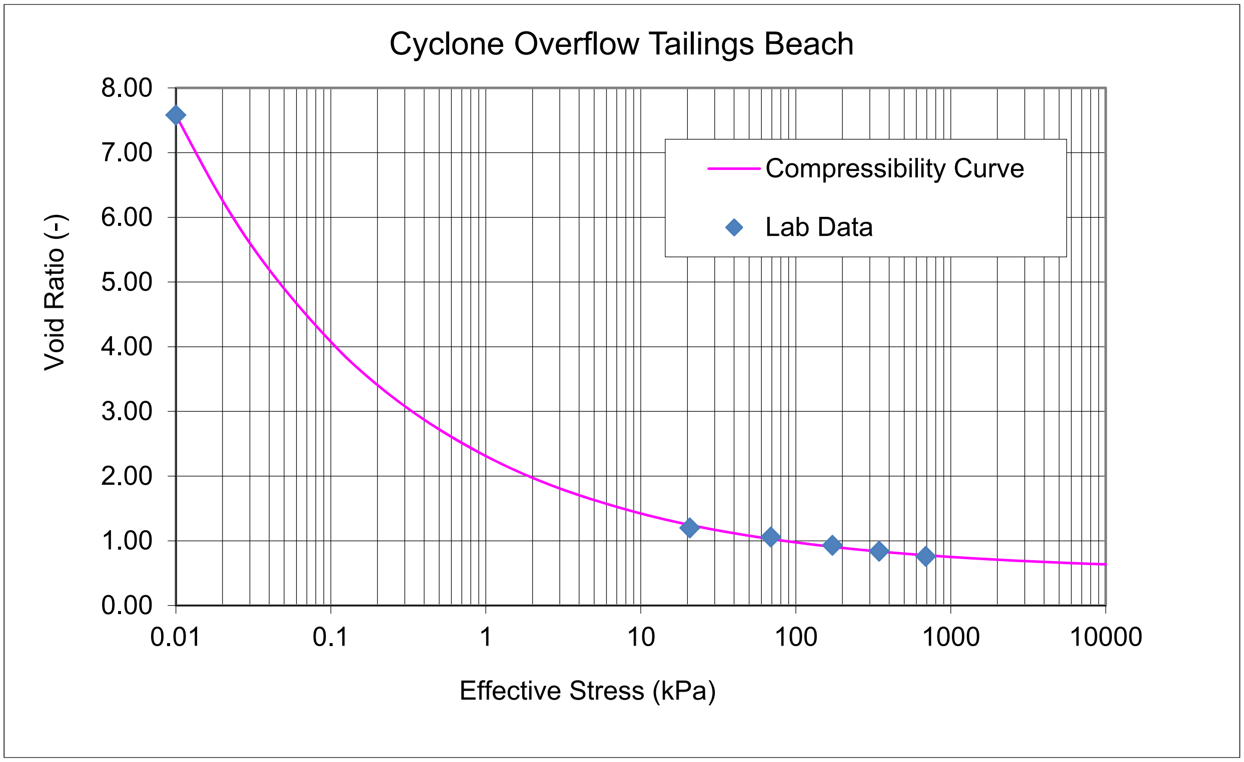

Figure 1: Cyclone Overflow Tailings Beach Compressibility Constitutive Relationship versus Lab Data

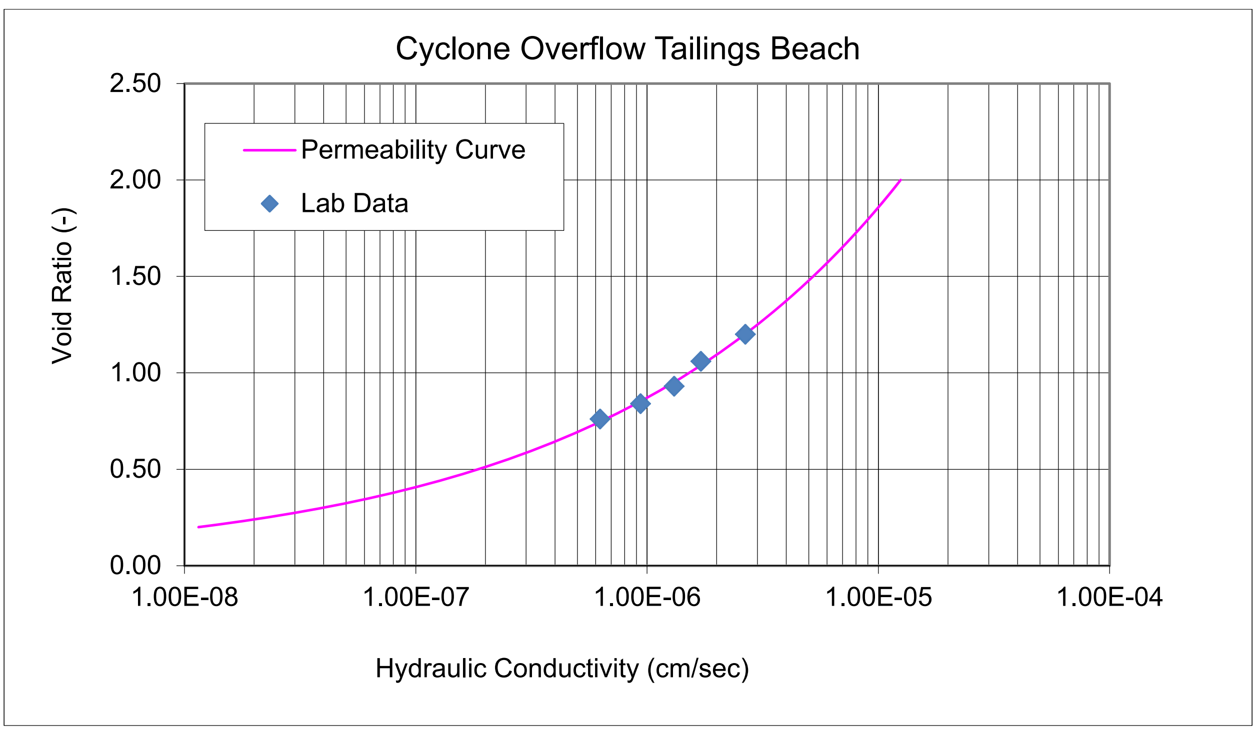

Figure 2: Cyclone Overflow Tailings Beach Permeability Constitutive Relationship versus Lab Data

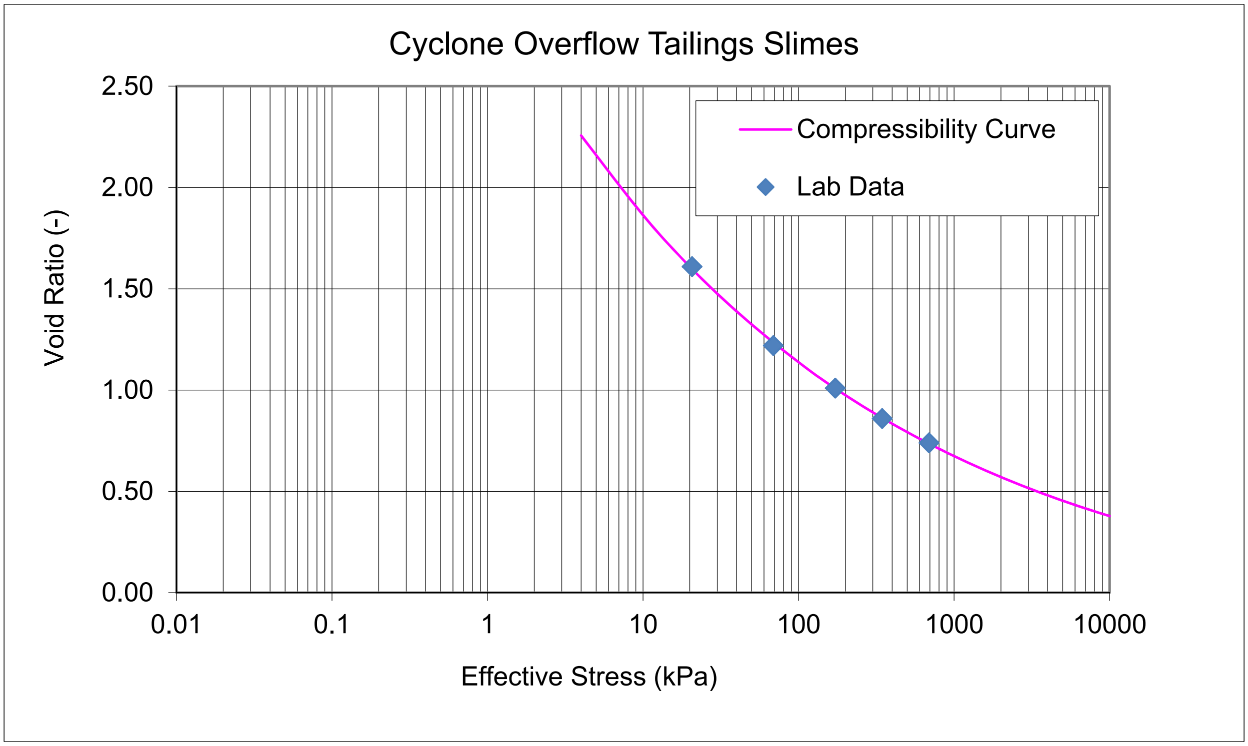

Figure 3: Cyclone Overflow Tailings Slimes Compressibility Constitutive Relationship versus Lab Data

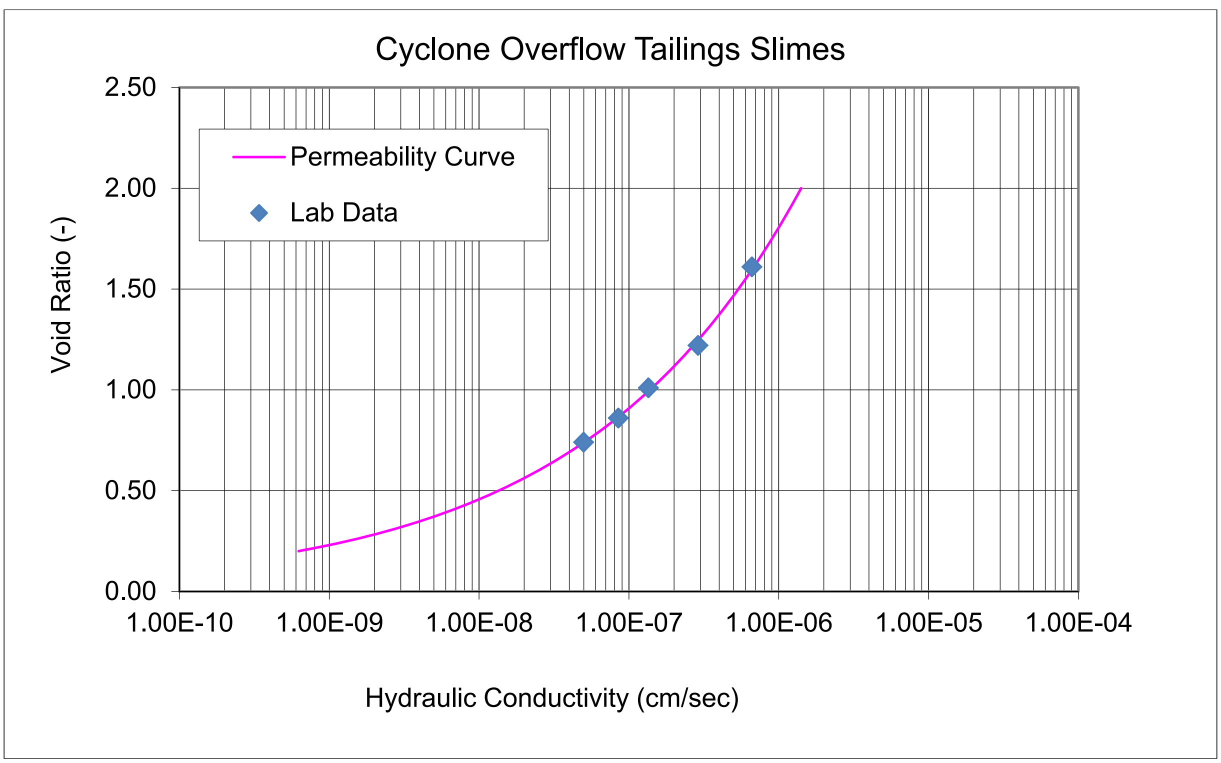

Figure 4: Cyclone Overflow Tailings Slimes Permeability Constitutive Relationship versus Lab Data

4.2 Procedure

The tailings cyclone overflow portion of the TSF was modeled by running a consolidation analysis on a single tailings column located in the deepest part of the impoundment. Using the parameters described above in Section 4.1.2 to define the compressibility and permeability relationships, separate analyses were performed for each material representing either the tailings beach or tailings slimes components of the cyclone overflow.

In each respective model run, the model analyzed each material component assuming it to represent 100 percent of the inflow into the model storage volume (i.e. the impoundment). In the model, the incremental area was calculated based on elevation and volume differences with Golder's TSF design volumes determined using AutoCAD Civil 3D (2013). The storage volume requirement for the TSF impoundment is estimated by applying FSConsol (1999) calculated densities from the final void ratio profile of each tailings component to obtain an overall density that is weighted based on laboratory grain- size distribution results, which is detailed further in Section 4.2.1. Furthermore, the calculated densities based on the FSConsol analyses are adjusted for 1D percent errors as discussed in Section 4.2.2.

4.2.1 Overflow Beach/Slimes Split

Grain-size distribution tests were performed by Golder in the Denver, CO laboratory on tailings beach and slime samples from laboratory flume tests and on total overflow tailings before the flume tests. From the grain-size distributions, the percent by weight of sand versus fines (silt and/or clay) can be used to approximate the weight or mass percentage of the tailings beach and tailings slime that will report to the respective areas within the TSF impoundment. To determine the split, the percentage summation of sand and fines from the tailings beach and tailings slimes samples should equate to the percentage for the original cyclone overflow head sample. Table 4 depicts the results of the laboratory test and the split calculation, which results in an approximate ratio of 60:40 (beach versus slimes).

Table 4: Laboratory and Split Results

Sample	Grain Size Distribution		Split Calculation		
	Sand (%)	Fines (%)	% Solids by Weight	% Sand of Total Overflow	% Fines of Total Overflow
Beach	15.64	84.36	59.7	9.33	50.34
Slimes	0.74	99.26	40.3	0.3	40.03
Cyclone Overflow Head	9.63	90.37	100	9.63	90.37

4.2.2 1D Percent Error

The consolidation model constructed in FSConsol is 1D, and does not accurately take into account the overall geometry of the TSF (i.e. "bowl" shaped), and that mass and volume quantities are larger towards the top than at the bottom of the TSF due to an increase in surface area. The approximated average dry density of each tailings component is corrected based on the calculated average percent error between 1D versus three-dimensional (3D) by checking: height of solids, volume of solids, and mass of solids.

Based on Golder's experience, 1D analysis resulting in less than an average 15 percent error reasonably depicts expected consolidation in the field, and 3D impoundment geometry can be accounted for by reducing the 1D results of estimated average dry density values by the average percent error.

5.0 RESULTS

The average dry density generally increases during filling until the ultimate height of tailings is reached. At closure, the tailings density continues to increase as the consolidation continues. If 100 percent of the inflow into the TSF impoundment is represented by the cyclone overflow tailings slimes samples from the tail section of the flume (i.e., the finest fraction of the tailings), FSConsol predicts that the final average density of the slimes fraction over the modeled profile will be approximately 33.55 pcf. With 100 percent of the inflow representative of cyclone overflow tailings beach materials, FSConsol predicts a final average tailings density of approximately 76.65 pcf. Attachment 1 contains FSConsol outputs for each respective material properties used in the consolidation analysis.

Because a 1D model was used, percent error calculations were performed to account for 3D effects. The error is expected to be greater for cone-shaped impoundments than for flat-based (i.e. bowl shaped) impoundments, and greater with higher rates of rise than lower rates of rise. Based on calculated material properties, the TSF geometry, and the anticipated rate of rise, Golder calculated the 1D modeling error to range between 1.1 to 13.7 percent with an average error ranging between 2.7 to 5.4 percent when considering calculated impoundment capacities. Attachment 2 contains the error calculations for each respective cyclone overflow tailings components.

After accounting for 3D characteristics of the impoundment geometry, the recommended dry density of each tailings component is 31.7 and 74.6 pcf, respectively. In addition, the FSConsol results were submitted to error checking to determine that solids and water inputs calculated by FSConsol were consistent with the delivery rates of the various components.

6.0 CONCLUSIONS

Based on model results and error checking, 31.7 and 74.6 pcf have been assumed, respectively, for the average dry density of the cyclone overflow tailings slimes and cyclone overflow tailings beach materials at the end-of-filling. Capacity has been estimated with 40 percent of the total represented by tailings slime materials, which is based on the calculated beach to slime ratio split discussed previously in Section 4.2.1. Therefore without consideration of 3D and managed deposition effects, the calculated weighted density of tailings slimes and tailings beach based on each component's volume within the TSF impoundment is 48.4 pcf. At this density, the TSF will require approximately 93.8 MCY of storage, which can be achieved by building to an ultimate tailings surface elevation of 5450 ft-msl and an ultimate cyclone underflow tailings sand dam crest elevation of 5460 ft-msl.

A summary for the cyclone overflow tailings beach and slimes components is located in Attachment 3, which contains the percent errors, adjusted densities, corresponding volumes, and the weighted density based on the percentage of the overall volume occupied by that tailings materials.

3D and managed deposition effects could potentially increase the post deposition density to reduce storage volume requirements. On average, a density increase in 5 pcf results in approximately 10 MCY of additional TSF impoundment storage capacity and a decrease in ultimate crest elevation by approximately 20 feet.

Actual flows into the impoundment will be mixed, with cyclone overflow tailings beach inter-fingered with slimes layers as the decant pond migrates upstream away from the embankment and points of cyclone overflow discharge are relocated. The denser and more permeable beach layers will increase the rate of consolidation in the underlying slimes material, resulting in a higher rate of consolidation than that calculated in the model. In addition, the consolidation modeling does not account for managed deposition of tailings. Thin-lift, sub-aerial deposition techniques will result in increases of dry density and a decrease in required storage volume by enhancing evaporation of exposed tailings. Managed deposition will increase consolidation of both the cyclone overflow tailings beach and slimes. However due to the height of the proposed tailings embankment and the design out-slopes, an embankment raise of several feet will also be feasible near the end of the mining operation if additional capacity is needed.

7.0 REFERENCES

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Attachments: Attachment 1- FSConsol Model Output
Attachment 2 - FSConsol Error Checking
Attachment 3 - FSConsol Model Summary

ATTACHMENT 1
FSCONSOL MODEL OUTPUT

FSConsol (c) 1994-2011 - version 3.45 GWP Geo Software Inc.
Date and Time of Analysis (mm/dd/yy) 11/11/2013 at 12:58:34
input filename: P:\2013 Projects\133-92505 Cu Flat TSF\Consolidation\Nov 2013\OF-slimes.fs1

Overflow - slimes (Non-thickened)
Revised flow rates and pond areas 11/11/2013
CDJ

ANALYSIS CONDITIONS
Analysis Type = Pond
Analysis Time = 16.115 years
Maximum Pond Height = 77.42 meters
Number of Filling Rates = 5

Rate	Period
kg/day	yrs
1.33E+07	1
1.54E+07	4
1.42E+07	6
1.32E+07	0.12
0.00E+00	5

Number of Pond Areas = 17

Pond Height	Pond Area
m	sq. km
4.27	0.07
4.57	0.24
3.05	0.41
4.57	0.57
4.57	0.73
4.57	0.82
4.57	0.97
4.57	1.03
4.57	1.13
4.57	1.17
4.57	1.21
4.57	1.23
4.57	1.25
4.57	1.26
7.62	1.27
3.05	1.27
4.57	1.27

Number of Surcharge Episodes = 0

INITIAL CONDITIONS
Initial Height = 0.00000 meters

MATERIAL PROPERTIES
Number of Soil Types = 1

Soil Type #1 duration = 16.11 years
Initial Solids Content = 25.90 %
void ratio @ initial S.C. = 7.582; effective stress @ initial S.C. = 10.00 Pascals
Specific Gravity = 2.65
Compressibility Parameters (stress in kPa)
A = 3.144; B = -0.1952 ; Mconst = -0.1424
Permeability Parameters (cm/second)
C = 1.38e-07; D = 3.353

BOUNDARY CONDITIONS
Bottom Boundary: Impermeable
Top Boundary: Constant Water Cap of: 0.000 m thickness

NUMERICAL TWEAKS
Time Step = 0.050 days
Maximum Stress Difference = 1e+06 kPa

OUTPUT PREFERENCES
Time Step Multiplier = 730
Time Step Units from: Time Step (days)

Time Step Output

Elapsed Time days	Height metres	Ave.Sol.Cont. %	Ave. Normalized Ue %	Ave. Dissipation %	Total Solids (kg)	Solids Flux (kg/d/m2)
0	0	25.9	100	0	0	201.363
36.5	8.952323	27.665	99.338	0.662	4.84E+08	32.2474
73	11.974489	28.534	99.338	0.662	9.69E+08	23.1181
109.5	13.962894	29.275	99.29	0.71	1.45E+09	23.1181
146	15.951077	29.826	99.268	0.732	1.94E+09	23.1181
182.5	17.505217	30.356	99.233	0.767	2.42E+09	18.1828
219	18.909844	30.834	99.199	0.801	2.91E+09	18.1828
255.5	20.314418	31.243	99.176	0.824	3.39E+09	18.1828
292	21.599814	31.627	99.153	0.847	3.87E+09	16.1217
328.5	22.7607	31.998	99.128	0.872	4.36E+09	16.1217
365	23.92199	32.331	99.109	0.891	4.84E+09	18.7619
401.5	25.394898	32.553	99.113	0.887	5.41E+09	18.7619
438	26.573655	32.822	99.103	0.897	5.97E+09	15.86
474.5	27.703532	33.079	99.093	0.907	6.53E+09	15.86
511	28.833398	33.316	99.085	0.915	7.10E+09	15.86
547.5	29.963253	33.533	99.08	0.92	7.66E+09	15.86
584	31.006515	33.755	99.073	0.927	8.23E+09	14.9583
620.5	32.029764	33.966	99.066	0.934	8.79E+09	14.9583
657	33.053007	34.164	99.06	0.94	9.35E+09	14.9583
693.5	34.076244	34.349	99.056	0.944	9.92E+09	14.9583
730	35.045301	34.535	99.051	0.949	1.05E+10	13.6253
766.5	35.910971	34.735	99.042	0.958	1.10E+10	13.6253
803	36.776635	34.924	99.035	0.965	1.16E+10	13.6253
839.5	37.642296	35.105	99.028	0.972	1.22E+10	13.6253
876	38.507953	35.276	99.023	0.977	1.27E+10	13.6253
912.5	39.37049	35.441	99.018	0.982	1.33E+10	13.207
949	40.186694	35.608	99.012	0.988	1.39E+10	13.207
985.5	41.002895	35.768	99.007	0.993	1.44E+10	13.207
1022	41.819093	35.922	99.002	0.998	1.50E+10	13.207
1058.5	42.635291	36.069	98.998	1.002	1.56E+10	13.207
1095	43.4515	36.211	98.995	1.005	1.61E+10	13.207
1131.5	44.241255	36.353	98.991	1.009	1.67E+10	12.7196
1168	45.000136	36.496	98.987	1.013	1.72E+10	12.7196
1204.5	45.759528	36.633	98.982	1.018	1.78E+10	12.7196
1241	46.519832	36.766	98.979	1.021	1.84E+10	12.7196
1277.5	47.281436	36.893	98.975	1.025	1.89E+10	12.7196
1314	48.04463	37.015	98.972	1.028	1.95E+10	12.7196
1350.5	48.798638	37.134	98.969	1.031	2.01E+10	12.5125
1387	49.541361	37.25	98.966	1.034	2.06E+10	12.5125
1423.5	50.286082	37.362	98.963	1.037	2.12E+10	12.5125
1460	51.032752	37.47	98.961	1.039	2.18E+10	12.5125
1496.5	51.7813	37.573	98.959	1.041	2.23E+10	12.5125

1533	52.53164	37.672	98.957	1.043	2.29E+10	12.5125
1569.5	53.278167	37.768	98.956	1.044	2.34E+10	12.3672
1606	54.015293	37.863	98.954	1.046	2.40E+10	12.3672
1642.5	54.754054	37.954	98.953	1.047	2.46E+10	12.3672
1679	55.494353	38.041	98.952	1.048	2.51E+10	12.3672
1715.5	56.236103	38.126	98.951	1.049	2.57E+10	12.3672
1752	56.979224	38.207	98.951	1.049	2.63E+10	12.3672
1788.5	57.720815	38.286	98.951	1.049	2.68E+10	12.2088
1825	58.448575	38.365	98.95	1.05	2.74E+10	11.2472
1861.5	59.070262	38.461	98.946	1.054	2.79E+10	11.2472
1898	59.694243	38.553	98.943	1.057	2.84E+10	11.2472
1934.5	60.319981	38.642	98.94	1.06	2.89E+10	11.2472
1971	60.947381	38.728	98.937	1.063	2.95E+10	11.2472
2007.5	61.576356	38.812	98.934	1.066	3.00E+10	11.2472
2044	62.206642	38.893	98.932	1.068	3.05E+10	11.21
2080.5	62.834453	38.972	98.929	1.071	3.10E+10	11.21
2117	63.463654	39.049	98.927	1.073	3.15E+10	11.21
2153.5	64.094161	39.124	98.926	1.074	3.21E+10	11.21
2190	64.725911	39.197	98.924	1.076	3.26E+10	11.21
2226.5	65.358846	39.268	98.923	1.077	3.31E+10	11.21
2263	65.992908	39.337	98.921	1.079	3.36E+10	11.21
2299.5	66.628047	39.404	98.92	1.08	3.41E+10	11.21
2336	67.264213	39.469	98.919	1.081	3.47E+10	11.21
2372.5	67.90136	39.532	98.919	1.081	3.52E+10	11.21
2409	68.539445	39.594	98.918	1.082	3.57E+10	11.21
2445.5	69.178426	39.654	98.918	1.082	3.62E+10	11.21
2482	69.818263	39.713	98.917	1.083	3.67E+10	11.2094
2518.5	70.458862	39.77	98.917	1.083	3.73E+10	11.2094
2555	71.100248	39.826	98.917	1.083	3.78E+10	11.2094
2591.5	71.742389	39.88	98.917	1.083	3.83E+10	11.2094
2628	72.385254	39.933	98.917	1.083	3.88E+10	11.2094
2664.5	73.028814	39.985	98.917	1.083	3.93E+10	11.2094
2701	73.67304	40.036	98.918	1.082	3.99E+10	11.2094
2737.5	74.317906	40.085	98.918	1.082	4.04E+10	11.2094
2774	74.963389	40.134	98.919	1.081	4.09E+10	11.2094
2810.5	75.609464	40.181	98.919	1.081	4.14E+10	11.2094
2847	76.256109	40.227	98.92	1.08	4.19E+10	11.2094
2883.5	76.903302	40.272	98.921	1.079	4.24E+10	11.2094

Observation Point Data

Number of Observation Points: 50
Number of Observation Point Readings: 80
Observation Point Time Step: 36.50 days

E X C E S S P O R E P R E S S U R E (kPa)

Time	Height from Bottom (metres)																																																	
days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	16.98446	13.9697	11.04461	8.124095	5.203581	2.283068	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	23.19398	19.99803	16.74713	13.82442	10.90391	7.983397	5.062884	2.142371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	27.56299	24.4176	20.65647	17.57597	14.65439	11.73387	8.813361	5.892848	2.972334	0.051821	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	31.99563	28.9716	24.83343	21.41572	18.40499	15.48393	12.56342	9.642905	6.722391	3.801878	0.881365	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	35.65401	32.76572	28.37042	24.63573	21.39069	18.41559	15.4948	12.57428	9.653769	6.733256	3.812743	0.89223	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	39.06397	36.30706	31.74427	27.73378	24.24599	21.09897	18.14431	15.22365	12.30314	9.382627	6.462114	3.541601	0.621088	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	42.50059	39.86499	35.2001	30.95167	27.24053	23.89984	20.81519	17.873	14.95241	12.0319	9.111384	6.190871	3.270358	0.349844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	45.7345	43.20909	38.48926	34.03705	30.12169	26.59747	23.35327	20.31126	17.37693	14.45638	11.53586	8.61535	5.694836	2.774323	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	48.75229	46.3265	41.58553	36.96029	32.85799	29.16233	25.76304	22.5868	19.57533	16.64603	13.7255	10.80498	7.88447	4.963956	2.043443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	51.78702	49.45134	44.71334	39.94259	35.66908	31.81312	28.26698	24.95682	21.83091	18.84197	15.9159	12.99538	10.07486	7.15435	4.233837	1.313324	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	55.42372	53.16975	48.45184	43.56002	39.1298	35.12358	31.43866	28.00023	24.75681	21.66954	18.69754	15.77354	12.85302	9.93251	7.011996	4.091483	1.17097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	58.51822	56.33862	51.65286	46.66148	42.08809	37.94073	34.12435	30.56376	27.20657	24.01499	20.95819	17.99905	15.07637	12.15585	9.235337	6.314823	3.39431	0.473797	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	61.53186	59.42021	54.77501	49.70286	44.99899	40.71887	36.77769	33.10064	29.63438	26.34067	23.19047	20.15817	17.20885	14.287	11.36648	8.445968	5.525455	2.604942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	64.55574	62.50647	57.90753	52.77096	47.94853	43.54343	39.48351	35.69523	32.12446	28.73224	25.48952	22.37309	19.36078	16.41893	13.49761	10.57709	7.656577	4.736064	1.815551	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	67.58898	65.59711	61.04828	55.8614	50.9316	46.40887	42.23577	38.34102	34.67	31.18299	27.85047	24.64958	21.56118	18.56537	15.6292	12.70819	9.787681	6.867168	3.946654	1.026141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	70.46748	68.52871	64.03234	58.80731	53.78064	49.14722	44.86611	40.86925	37.10191	33.52364	30.10437	26.82102	23.65508	20.59027	17.60814	14.67626	11.75545	8.83494	5.914426	2.993913	0.0734	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	73.31618	71.42668	66.98411	61.73138	56.61763	51.88012	47.49584	43.40091	39.54083	35.8746	32.37156	29.00824	25.76611	22.62978	19.58505	16.61433	13.68566	10.76497	7.844453	4.92394	2.003426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	76.17223	74.32856	69.94041	64.66892	59.47723	54.64194	50.15905	45.96979	42.02029	38.26914	34.68514	31.24439	27.9281	24.72102	21.61008	18.58259	15.62139	12.69508	9.774467	6.853953	3.93344	1.012927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	79.03514	77.23425	72.90055	67.61796	62.35679	57.42978	52.85261	48.57251	44.53667	40.70343	37.04109	33.52532	30.13702	26.86081	23.68389	20.59495	17.58236	14.6291	11.70453	8.783955	5.863442	2.942929	0.022415	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	81.80228	80.04144	75.76183	70.47466	65.15186	60.1389	55.47159	51.10395	46.98464	43.07192	39.33368	35.74517	32.28696	28.94346	25.70184	22.55115	19.48142	16.4818	13.53512	10.6118	7.691252	4.770739	1.850226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	84.38044	82.65718	78.43101	73.14483	67.76764	62.67429	57.92079	53.46872	49.26862	45.27887	41.467	37.8079	34.28178	30.87281	27.56803	24.35655	21.22888	18.17606	15.18774	12.24651	9.324076	6.403542	3.483028	0.562515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	86.96426	85.27636	81.10277	75.82231	70.3974	65.22897	60.3931	55.85957	51.5812	47.51669	43.63333	39.90562	36.31348	32.84082	29.47449	26.20352	23.01854	19.91121	16.87336	13.89492	10.95816	8.036348	5.115822	2.195309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	89.55344	87.89887	83.77687	78.50615	73.03965	67.80121	62.88665	58.27447	53.92023	49.7831	45.83023	42.0358	38.37942	34.84474	31.41841	28.08935	24.84816	21.68668	18.59745	15.57291	12.60313	9.669995	6.748615	3.828095	0.907581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	92.14767	90.52461	86.45308	81.19552	75.69306	70.38946	65.39976	60.71166	56.28381	52.07608	48.05556	44.19616	40.47721	36.88211	33.39729	30.01153	26.71535	23.50059	20.36006	17.28703	14.27439	11.31217	8.381963	5.460877	2.54036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	94.74083	93.1476	89.12539	83.88386	78.35058	72.98645	67.92506	63.16364	58.66434	54.38792	50.30151	46.3788	42.59886	38.94482	35.40295	31.96183	28.61189	25.34493	22.1538	19.03208	15.97362	12.97163	10.01603	7.088144	4.167258	1.246742	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	97.25118	95.68624	91.71215	86.48908	80.9297	75.50945	70.37968	65.54748	60.97878	56.63549	52.48485	48.50039	44.66093	40.94938	37.3518	33.85662	30.45414	27.13608	23.89526	20.72537	17.62061	14.57531	11.5829	8.633047	5.707	2.786245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	99.76587	98.22781	94.30063	89.09808	83.51689	78.04471	72.84978	67.94924	63.31314	58.9047	54.6914	50.64666	46.74908	42.98136	39.32936	35.78135	32.32749	28.95942	25.66991	22.45263	19.30193	16.21255	13.17918	10.19539	7.250517	4.325896	1.405228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	102.2847	100.7722	96.89076	91.71043	86.11135	80.59122	75.33427	70.36775	65.66615	61.19421	56.91975	52.81612	48.86175	45.03912	41.33391	37.73424	34.23014	30.81312	27.4759	24.21211	21.01613	17.88285	14.80747	11.78496	8.808922	5.868344	2.944817	0.024205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	104.8075	103.3194	99.48245	94.32577	88.71238	83.14808	77.83213	72.80193	68.03667	63.50281	59.16861	55.00743	50.99751	47.12118	43.36392	39.7137	36.16041	32.69547	29.3115	26.0021	22.76161	19.585	16.46762	13.40501	10.3924	7.423354	4.486452	1.563753	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	107.3342	105.8693	102.0757	96.94379	91.31935	85.71447	80.34242	75.25078	70.42366	65.82939	61.43682	57.21934	53.15507	49.22617	45.41796	41.71824	38.11678	34.6049	31.17513	27.821	24.53681	21.31753	18.1586	15.05577	12.00488	9.001322	6.038559	3.104778	0.182699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	109.8144	108.3719	104.6203	99.51423	93.88169	88.23961	82.81431	77.66341	72.77615	68.12294	63.67329	59.40071	55.28323	51.30285	47.44472	43.69651	40.04786	36.48998	33.0153	29.6173	26.29022	23.02901	19.82912	16.68639	13.59692	10.55681	7.561533	4.604415	1.673262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	112.2395	110.8183	107.1077	102.0282	96.39028	90.71419	85.23839	80.03034	75.08462	70.37388	65.86841	61.54189	57.37228	53.34144	49.43438	45.63864	41.94372	38.34073	34.82202	31.38098	28.01181	24.7094	21.4692	18.28709	15.15927	12.08212	9.051933	6.064253	3.112194	0.183236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	114.668	113.2672	109.5965	104.5442	98.90332	93.19625	87.67257	82.40945	77.40691	72.64	68.07992	63.70055	59.47984	55.39953	51.44449	47.60213	43.86182	40.21458	36.65266	33.16938	29.75888	26.41602	23.13619	19.91529	16.74955	13.63549	10.56973	7.548702	4.567991	1.620449	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	117.0997	115.7185	112.0866	107.062	101.4204	95.6852	90.1162	84.80003	79.74226	74.92051	70.30697	65.87581	61.60499	57.47615	53.47404	49.58592	45.80108	42.1104	38.50607	34.98132	31.53024	28.14762	24.82884	21.56976	18.36664	15.21604	12.11471	9.059491	6.046946	3.07263	0.129166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	119.5346	118.1721	114.5781	109.5815	103.9412	98.18054	92.56868	87.20142	82.08997	77.21468	72.5488	68.06687	63.74689	59.57042	55.52209	51.58906	47.76048	44.02715	40.38116	36.81568	33.32473	29.90305	26.54598	23.24935	20.0094	16.82272	13.68613	10.59663	7.551201	4.546516	1.578067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	121.9724	120.628	117.0708	112.1025	106.4653	100.6818	95.02944	89.61302	84.44941	79.52181	74.80468	70.27297	65.90474	61.68151	57.58779	53.61063	49.73908	45.96385	42.27694	38.67144	35.1413	31.68123	28.2865	24.95294	21.67674	18.4545	15.28306	12.15949	9.080983	6.044669	3.047279	0.084545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	124.3923	123.0653	119.5439	114.6041	108.9717	103.1676	97.47709	92.01337	86.79909	81.82041	77.05308	72.47253	68.05693	63.78775	59.64944	55.62892	51.71515	47.89873	44.17159	40.52675	36.95809	33.46027	30.02851	26.65861	23.34673	20.08945	16.88363	13.72637	10.61493	7.546672	4.518854	1.528239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	126.7897	125.4795	121.9929	117.0818	111.4556	105.6333	99.90672	94.39752	89.13403	84.10545	79.28895	74.66046	70.19834	65.88403	61.70188	57.63873	53.68344	49.82653	46.05983	42.37629	38.76975	35.23479	31.76661	28.36095	25.01395	21.72217	18.48246	15.29191	12.14786	9.047741	5.989065	2.969181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	129.1898	127.8957	124.4431	119.5607	113.9422	108.1036	102.3432	96.79028	91.47899	86.40169	81.537	76.86148	72.35365	67.99496	63.7697	59.66463	55.66851	51.77176	47.96615	44.24455	40.60073	37.02923	33.52521	30.08435	26.70278	23.37702	20.1039	16.88053	13.70423	10.57252	7.482999	4.43329	1.420825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	131.5926	130.3141	126.8946	122.0407	116.4311	110.5784	104.7861	99.1912	93.83351	88.70862	83.79671	79.07501	74.52225	70.11993	65.85227	61.70595	57.66965	53.7337	49.88979	46.13073	42.45023	38.84276	35.30345	31.82794	28.41232	25.05309	21.74706	18.49132	15.28321	12.12024	9.000079	5.920488	2.879189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	133.9979	132.7344	129.3472	124.5219	118.9223	113.0572	107.235	101.5998	96.19711	91.02574	86.06756	81.30051	76.7036	72.25835	67.94898	63.76206	59.68621	55.71166	51.83005	48.03411	44.31748	40.67461	37.10055	33.59092	30.14177	26.74957	23.4111	20.12345	16.88394	13.69009	10.5396	7.430288	4.360022	1.326621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	136.4056	135.1568	131.8009	127.0042	121.4155	115.5398	109.6896	104.0158	98.56937	93.3526	88.34907	83.53749	78.89716	74.40969	70.05925	65.83236	61.71756	57.70501	53.78627	49.954	46.20181	42.52405	38.91577	35.37252	31.89033	28.46564	25.09521	21.7761	18.50561	15.28129	12.10081	8.962045	5.862925	2.801431	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	138.8051	137.5703	134.2452	129.4767	123.9	118.0153	112.1388	106.428	100.9392	95.67809	90.63011	85.77479	81.09176	76.56272	72.17185	67.9056	63.75244	59.70246	55.74713	51.87908	48.09183	44.37972	40.73771	37.16133	33.64659	30.18987	26.78793	23.4378	20.13677	16.88236	13.67228	10.50437	7.376624	4.287101	1.233872	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	141.1853	139.9641	136.6688	131.9285	126.3645	120.4724	114.5714	108.8251	103.2952	97.9908	92.89925	88.00095	83.27592	78.70597	74.27528	69.97026	65.77929	61.69242	57.70105	53.79773	49.97594	46.22995	42.5547	38.94568	35.39884	31.91056	28.47755	25.09683	21.76567	18.48158	15.24225	12.04555	8.889464	5.772105	2.691634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	143.5676	142.3597	139.0936	134.3813	128.8307	122.9326	117.0088	111.2284	105.6586	100.312	95.17779	90.23727	85.47092	80.86068	76.39076	72.04753	67.81931	63.69608	59.66918	55.73109	51.87524	48.09586	44.38784	40.74662	37.16814	33.64873	30.18509	26.77419	23.41331	20.09993	16.83174	13.60658	10.42248	7.277543	4.169988	1.098067	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	145.9522	144.7571	141.5194	136.8349	131.2984	125.3957	119.4506	113.6377	108.0293	102.6415	97.46535	92.48335	87.67633	83.02642	78.51785	74.13695	69.87201	65.71293	61.65099	57.67861	53.78918	49.97688	46.23653	42.56357	38.95388	35.40376	31.90989	28.46924	25.07903	21.73674	18.44005	15.18681	11.97501	8.802785	5.668377	2.570089	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	148.339	147.1562	143.9463	139.2894	133.7676	127.8615	121.8966	116.0526	110.4068	104.9787	99.76158	94.73881	89.89178	85.20279	80.65612	76.23809	71.93693	67.74249	63.64599	59.6398	55.71725	51.87246	48.10023	44.39595	40.75546	37.17506	33.65137	30.18134	26.7622	23.39138	20.06656	16.78557	13.54641	10.34721	7.186211	4.06176	0.972245	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	150.7278	149.5571	146.3743	141.7446	136.2381	130.3298	124.3466	118.4729	112.7908	107.3235	102.0661	97.00332	92.11689	87.3894	82.80517	78.35053	74.01365	69.78433	65.65374	61.61418	57.65894	53.7821	49.97842	46.24323	42.57236	38.96206	35.40894	31.90993	28.46221	25.06324	21.71064	18.40225	15.13606	11.91019	8.722897	5.572527	2.457506	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	153.1132	151.9541	148.7979	144.1952	138.7044	132.7949	126.7948	120.8928	115.1756	109.67	104.3732	99.27101	94.34581	89.58038	84.95912	80.46836	76.09624	71.83251	67.66827	63.59579	59.60829	55.69981	51.86508	48.09938	44.39852	40.75872	37.17655	33.64892	30.17301	26.74622	23.3662	20.03075	16.73785	13.48563	10.27233	7.096311	3.956008	0.849934	0	0	0	0	0	0	0	0	0	0	0	0
1825	155.4704	154.3227	151.1924	146.6165	141.1418	135.2323	129.2165	123.2875	117.5363	111.9933	106.6579	101.517	96.55363	91.7508	87.09303	82.56664	78.15974	73.86204	69.66459	65.55961	61.54027	57.60056	53.73517	49.93936	46.20889	42.53995	38.92911	35.37322	31.86946	28.41522	25.00811	21.64593	18.32665	15.04838	11.80938	8.607977	5.442639	2.311889	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	157.6156	156.4789	153.3739	148.8244	143.3662	137.4576	131.4275	125.4726	119.6887	114.1092	108.7359	103.557	98.55604	93.71636	89.02257	84.46102	80.0198	75.68856	71.45832	67.32125	63.27046	59.29992	55.40426	51.57871	47.819	44.12129	40.48212	36.89833	33.36707	29.8857	26.45183	23.06325	19.71791	16.4139	13.14948	9.922985	6.732872	3.577677	0.456044	0	0	0	0	0	0	0	0	0	0	0
1898	159.7625	158.6366	155.5563	151.033	145.5916	139.6849	133.6416	127.6622	121.8465	116.2314	110.8211	105.6048	100.5668	95.69082	90.9615	86.36525	81.89014	77.52579	73.26318	69.09441	65.01257	61.01157	57.08601	53.23109	49.4425	45.71637	42.04922	38.43787	34.87943	31.37127	27.91097	24.4963	21.12519	17.79575	14.50621	11.2549	8.040271	4.860874	1.715319	0	0	0	0	0	0	0	0	0	0	0
1934.5	161.9114	160.7959	157.7398	153.2424	147.8181	141.914	135.8588	129.856	124.0095	118.3599	112.9132	107.6601	102.5857	97.67389	92.90951	88.27901	83.77044	79.3734	75.0788	70.87872	66.76621	62.73512	58.78003	54.89608	51.07896	47.32476	43.62996	39.99138	36.40609	32.87146	29.38503	25.94458	22.54802	19.19343	15.87905	12.6032	9.36433	6.160981	2.991774	0	0	0	0	0	0	0	0	0	0	0
1971	164.062	162.9567	159.9243	155.4525	150.0455	144.1449	138.0788	132.0538	126.1776	120.4942	115.0119	109.7228	104.6124	99.66529	94.86632	90.202	85.66039	81.23104	76.90485	72.67385	68.53102	64.4702	60.48592	56.57331	52.72799	48.94604	45.22393	41.55843	37.94661	34.38581	30.87357	27.40763	23.9859	20.60647	17.26752	13.96741	10.70456	7.477511	4.284886	1.125379	0	0	0	0	0	0	0	0	0	0
2007.5	166.2144	165.119	162.1097	157.6632	152.2738	146.3774	140.3015	134.2553	128.3506	122.6342	117.1171	111.7924	106.6467	101.6648	96.83165	92.13393	87.55968	83.09843	78.74102	74.47945	70.30667	66.21647	62.20334	58.26239	54.3892	50.57983	46.83071	43.13861	39.50057	35.91391	32.37614	28.88501	25.43841	22.0344	18.67117	15.34706	12.06049	8.809992	5.59419	2.411778	0	0	0	0	0	0	0	0	0	0
2044	168.3682	167.2824	164.2958	159.8743	154.5026	148.6111	142.5265	136.4602	130.5278	124.7794	119.228	113.8685	108.688	103.6717	98.80486	94.07417	89.46767	84.97489	80.58663	76.29485	72.09246	67.97322	63.93158	59.9626	56.06187	52.22539	48.44958	44.73117	41.06721	37.45497	33.89198	30.37594	26.90473	23.47642	20.08918	16.74134	13.4313	10.15761	6.918867	3.713776	0.541151	0	0	0	0	0	0	0	0	0
2080.5	170.5157	169.4393	166.4749	162.0781	156.7243	150.8384	144.7459	138.6606	132.7015	126.9218	121.337	115.9432	110.7284	105.6782	100.7781	96.01488	91.37652	86.85258	82.43382	78.11217	73.88052	69.73256	65.66273	61.66605	57.73807	53.87479	50.07259	46.32818	42.63858	39.00105	35.41311	31.87243	28.3769	24.92456	21.51357	18.14224	14.809	11.51235	8.250906	5.023366	1.828491	0	0	0	0	0	0	0	0	0
2117	172.6649	171.5976	168.655	164.2825	158.9468	153.067	146.9676	140.8643	134.8794	129.0694	123.4518	118.0243	112.7758	107.6921	102.7592	97.96375	93.29391	88.73916	84.29025	79.93908	75.67847	71.50212	67.40441	63.38034	59.42543	55.53564	51.70733	47.9372	44.22224	40.55971	36.94708	33.38204	29.86245	26.38633	22.95185	19.5573	16.20109	12.88173	9.597821	6.348058	3.131202	0	0	0	0	0	0	0	0	0
2153.5	174.8156	173.7573	170.836	166.4876	161.1701	155.297	149.1915	143.0712	137.0614	131.2218	125.5721	120.1115	114.8297	109.7131	104.7478	99.92053	95.21957	90.63437	86.15566	81.77528	77.48605	73.28162	69.15634	65.10517	61.12361	57.2076	53.35347	49.5579	45.81786	42.13059	38.49355	34.90441	31.36101	27.86138	24.40365	20.98612	17.60718	14.26534	10.9592	7.687443	4.448822	1.242168	0	0	0	0	0	0	0	0
2190	176.968	175.9184	173.0179	168.6933	163.394	157.5282	151.4174	145.2811	139.2474	133.379	127.6979	122.2047	116.8901	111.741	106.7436	101.885	97.15329	92.53798	88.02978	83.62052	79.30298	75.07077	70.91821	66.84024	62.83232	58.89036	55.01069	51.18995	47.4251	43.71336	40.05216	36.43917	32.87223	29.34932	25.86859	22.42832	19.0269	15.66281	12.33466	9.041128	5.780957	2.552978	0	0	0	0	0	0	0	0
2226.5	179.1218	178.0808	175.2007	170.8997	165.6187	159.7605	153.6454	147.4938	141.4371	135.5406	129.8288	124.3037	118.9568	113.7756	108.7466	103.857	99.09483	94.44974	89.91238	85.47456	81.12901	76.86931	72.68976	68.58527	64.55126	60.58364	56.6787	52.83305	49.04365	45.30768	41.62259	37.986	34.39575	30.84981	27.34632	23.88354	20.45986	17.07376	13.72383	10.40873	7.127225	3.878126	0.660366	0	0	0	0	0	0	0
2263	181.2772	180.2446	177.3845	173.1066	167.844	161.9941	155.8752	149.7094	143.6305	137.7067	131.9648	126.4083	121.0296	115.8167	110.7565	105.8362	101.044	96.36943	91.80323	87.33714	82.96387	78.67698	74.47073	70.33999	66.28017	62.28715	58.35719	54.4869	50.6732	46.91326	43.20451	39.54457	35.93124	32.36251	28.83649	25.35144	21.90573	18.49783	15.12633	11.78989	8.487257	5.217243	1.978733	0	0	0	0	0	0	0
2299.5	183.4341	182.4096	179.5691	175.3142	170.0699	164.2286	158.1068	151.9276	145.8273	139.877	134.1056	128.5182	123.1083	117.8642	112.7731	107.8224	103.0005	98.29683	93.7021	89.20804	84.80735	80.49354	76.26086	72.10414	68.01878	64.00062	60.0459	56.15121	52.31345	48.52979	44.79763	41.11457	37.47841	33.88711	30.33879	26.83168	23.36416	19.93468	16.54183	13.18426	9.8607	6.569972	3.310952	0.089208	0	0	0	0	0	0
2336	185.5925	184.5759	181.7547	177.5223	172.2965	166.4642	160.3402	154.1483	148.0274	142.0514	136.2512	130.6335	125.1926	119.9177	114.7962	109.8156	104.9642	100.2318	95.60878	91.08704	86.6592	82.31876	78.05991	73.87748	69.76683	65.72378	61.74455	57.82571	53.96414	50.15699	46.40165	42.6957	39.03693	35.4233	31.85289	28.32395	24.83483	21.38399	17.96999	14.59149	11.24721	7.935968	4.656632	1.408137	0	0	0	0	0	0
2372.5	187.7522	186.7434	183.9411	179.7311	174.5236	168.7008	162.5751	156.3714	150.2308	144.2297	138.4013	132.7538	127.2826	121.9773	116.8257	111.8154	106.935	102.174	97.52306	92.97393	88.51922	84.15241	79.86766	75.65977	71.52408	67.45639	63.45289	59.51014	55.625	51.79459	48.01629	44.28768	40.60653	36.97077	33.3785	29.82794	26.31743	22.84543	19.4105	16.01126	12.64647	9.3149	6.015438	2.747009	0	0	0	0	0	0
2409	189.9134	188.9122	186.1284	181.9404	176.7514	170.9382	164.8116	158.5968	152.4372	146.4118	140.5558	134.8791	129.3779	124.0426	118.8613	113.8217	108.9125	104.1233	99.44476	94.8685	90.3872	85.99427	81.68387	77.45078	73.2903	69.19821	65.17068	61.20425	57.29576	53.44232	49.64129	45.89023	42.18692	38.52925	34.91533	31.34336	27.81167	24.31871	20.86303	17.44327	14.05814	10.70645	7.387047	4.098869	0.840923	0	0	0	0	0
2445.5	192.0759	191.0821	188.3166	184.1503	178.9797	173.1766	167.0496	160.8244	154.6467	148.5975	142.7146	137.0091	131.4785	126.1136	120.9029	115.8344	110.8967	106.0796	101.3737	96.77057	92.26292	87.84414	83.50835	79.2503	75.06526	70.949	66.89768	62.90779	58.97618	55.09993	51.27639	47.50311	43.77783	40.09847	36.4631	32.86992	29.31725	25.80353	22.32731	18.88721	15.48194	12.1103	8.771149	5.463401	2.186039	0	0	0	0	0
2482	194.2398	193.2533	190.5056	186.3608	181.2085	175.4158	169.2889	163.0542	156.8589	150.7868	144.8775	139.1438	133.5842	128.1901	122.9503	117.8532	112.8874	108.0427	103.3096	98.67993	94.14621	89.70182	85.34088	81.0581	76.84875	72.70855	68.63365	64.62054	60.66602	56.76718	52.92133	49.12603	45.37901	41.67816	38.02154	34.40734	30.83389	27.29961	23.80304	20.34279	16.91757	13.52617	10.16744	6.8403	3.543723	0.278782	0	0	0	0
2518.5	196.4049	195.4255	192.6953	188.5717	183.4378	177.6556	171.5295	165.2859	159.0738	152.9794	147.0443	141.2829	135.6947	130.2718	125.0034	119.8779	114.8843	110.0122	105.2523	100.5963	96.03674	91.56699	87.18113	82.87387	78.64043	74.47652	70.37827	66.34214	62.36493	58.4437	54.57577	50.75865	46.99008	43.26793	39.59026	35.95525	32.36121	28.80656	25.28981	21.8096	18.36461	14.95363	11.57551	8.22915	4.91353	1.627674	0	0	0	0
2555	198.5713	197.5989	194.8859	190.7832	185.6675	179.8963	173.7714	167.5195	161.2914	155.1753	149.215	143.4264	137.81	132.3587	127.062	121.9085	116.8873	111.9881	107.2017	102.5196	97.93446	93.4396	89.02906	84.69753	80.44022	76.25282	72.13143	68.07251	64.07281	60.12941	56.23959	52.40086	48.61093	44.86769	41.16916	37.51353	33.89908	30.32424	26.78751	23.28751	19.82293	16.39255	12.9952	9.629796	6.295301	2.990739	0	0	0	0
2591.5	200.7389	199.7734	197.0772	192.9953	187.8978	182.1377	176.0145	169.755	163.5115	157.3744	151.3894	145.5741	139.9301	134.4507	129.1259	123.9448	118.8963	113.9703	109.1576	104.4497	99.83921	95.31946	90.88447	86.5289	82.24795	78.03727	73.89295	69.81143	65.78947	61.82408	57.91257	54.05242	50.24134	46.47719	42.75799	39.08192	35.44725	31.8524	28.29587	24.77626	21.29227	17.84265	14.42625	11.04197	7.688762	4.365655	1.071729	0	0	0
2628	202.9078	201.949	199.2695	195.2079	190.1286	184.3797	178.2588	171.9922	165.734	159.5766	153.5675	147.726	142.0546	136.5476	131.1952	125.9867	120.9112	115.9587	111.1199	106.3864	101.7508	97.20641	92.74719	88.3678	84.06342	79.82967	75.66264	71.55872	67.51468	63.52752	59.5945	55.71313	51.88108	48.09621	44.35653	40.66019	37.00548	33.3908	29.81464	26.2756	22.77236	19.30368	15.8684	12.4654	9.093647	5.752156	2.439989	0	0	0
2664.5	205.0779	204.1257	201.4625	197.421	192.3598	186.6225	180.5042	174.2312	167.959	161.7817	155.7492	149.8819	144.1836	138.6493	133.2696	128.034	122.9318	117.953	113.0884	108.3296	103.6691	99.10028	94.61706	90.21406	85.88645	81.62984	77.44029	73.31418	69.24825	65.2395	61.28519	57.38277	53.52994	49.72453	45.96454	42.24812	38.57355	34.93921	31.3436	27.78529	24.26298	20.7754	17.32139	13.89984	10.5097	7.14998	3.819743	0.518729	0	0
2701	207.2493	206.3035	203.6563	199.6347	194.5915	188.8659	182.7506	176.4719	170.1861	163.9897	157.9342	152.0417	146.317	140.7557	135.349	130.0866	124.958	119.9532	115.063	110.2791	105.594	101.0009	96.4939	92.0675	87.71687	83.4376	79.22573	75.07763	70.99001	66.95986	62.98442	59.06115	55.18771	51.36194	47.58182	43.8455	40.15123	36.49741	32.8825	29.3051	25.76387	22.25756	18.78499	15.34504	11.93667	8.558876	5.210721	1.891307	0	0
2737.5	209.4218	208.4823	205.8509	201.849	196.8237	191.11	184.9981	178.7141	172.4155	166.2006	160.1226	154.2053	148.4545	142.8666	137.4332	132.1444	126.9896	121.959	117.0435	112.2348	107.5252	102.9082	98.37756	93.92797	89.55452	85.25279	81.01878	76.84888	72.73975	68.68839	64.69201	60.74806	56.8542	53.00824	49.20816	45.45211	41.73832	38.06517	34.43114	30.8348	27.27482	23.74993	20.25895	16.80077	13.37432	9.978605	6.61268	3.275645	0	0
2774	211.5955	210.6622	208.0463	204.0637	199.0563	193.3546	187.2466	180.9578	174.647	168.4141	162.3142	156.3726	150.5962	144.982	139.5223	134.2072	129.0265	123.9705	119.0299	114.1965	109.4627	104.8219	100.2679	95.79531	91.39923	87.07523	82.81929	78.62776	74.49731	70.42492	66.40778	62.44333	58.52921	54.66323	50.84337	47.06774	43.3346	39.64229	35.9893	32.37418	28.7956	25.2523	21.74307	18.26679	14.82242	11.40893	8.025384	4.670873	1.34455	0
2810.5	213.7704	212.8431	210.2424	206.279	201.2893	195.5999	189.4961	183.2031	176.8806	170.6302	164.5089	158.5434	152.7418	147.1018	141.616	136.275	131.0687	125.9873	121.0219	116.1641	111.4063	106.7419	102.1647	97.66936	93.25086	88.90478	84.62708	80.41411	76.26253	72.16927	68.13154	64.14676	60.21256	56.32674	52.48725	48.69222	44.93987	41.22857	37.55677	33.92304	30.32602	26.76444	23.23711	19.7429	16.28074	12.84963	9.448602	6.076759	2.733236	0
2847	215.9464	215.0251	212.4393	208.4949	203.5228	197.8457	191.7464	185.4497	179.1161	172.8489	166.7067	160.7178	154.8913	149.2257	143.7142	138.3476	133.1159	128.0095	123.0195	118.1375	113.3559	108.6681	104.068	99.54999	95.10925	90.74127	86.442	82.20777	78.03522	73.92128	69.86313	65.85819	61.90408	57.99857	54.13962	50.32534	46.55396	42.82381	39.13336	35.48116	31.86585	28.28615	24.74087	21.22887	17.74908	14.30048	10.88212	7.493078	4.132502	0.799766
2883.5	218.1235	217.2081	214.637	210.7112	205.7568	200.092	193.9976	187.6976	181.3535	175.0699	168.9074	162.8956	157.0446	151.3539	145.8169	140.4249	135.1681	130.037	125.0225	120.1165	115.3114	110.6004	105.9774	101.4371	96.97426	92.58456	88.2639	84.00858	79.81524	75.68078	71.60239	67.57745	63.60358	59.67855	55.8003	51.96693	48.17666	44.42782	40.71887	37.04836	33.41491	29.81724	26.25415	22.7245	19.22721	15.76127	12.32571	8.919614	5.542119	2.192397

N O R M A L I Z E D E X C E S S P O R E P R E S S U R E (%)

Time	Height from Bottom (metres)																																																	
days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	92.90502	99.91771	99.90954	99.87706	99.80819	99.56389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	91.37177	99.73175	99.93711	99.92771	99.90837	99.87489	99.80287	99.53538	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	90.2578	99.36906	99.89207	99.94177	99.93181	99.91485	99.88666	99.83058	99.66468	83.82378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	89.64368	98.91912	99.81661	99.92504	99.94506	99.93546	99.92046	99.8964	99.85146	99.73765	98.87808	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	89.07373	98.41125	99.71374	99.89032	99.9366	99.94541	99.9355	99.92053	99.89652	99.8517	99.7384	98.89159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	88.61819	97.89495	99.58671	99.84733	99.91613	99.94187	99.94475	99.93435	99.91878	99.89353	99.84549	99.71843	98.41538	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	88.29472	97.40497	99.44108	99.798	99.89232	99.92887	99.94479	99.94399	99.93316	99.91695	99.89036	99.83873	99.69514	97.22092	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	88.01206	96.93664	99.2769	99.74102	99.86512	99.91293	99.93563	99.94585	99.94243	99.93087	99.91339	99.88406	99.8247	99.64083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

328.5	87.75008	96.48967	99.09645	99.67597	99.83436	99.89489	99.92382	99.93914	99.94549	99.93993	99.92719	99.90753	99.87332	99.79895	99.513	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	87.54737	96.07999	98.9077	99.60484	99.80108	99.87567	99.91118	99.93043	99.94114	99.94455	99.93719	99.92311	99.90084	99.86041	99.76436	99.2443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	87.50748	95.75165	98.72977	99.53454	99.76887	99.85775	99.89983	99.92277	99.93619	99.94373	99.94494	99.93663	99.92225	99.89942	99.85759	99.75618	99.15321	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	87.38755	95.41465	98.53705	99.45401	99.73129	99.83664	99.88624	99.91323	99.92923	99.93897	99.94418	99.94337	99.93371	99.9178	99.89183	99.84189	99.70624	97.93294	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	87.27935	95.10089	98.34246	99.36817	99.69083	99.81407	99.87182	99.90314	99.92177	99.9334	99.94053	99.94386	99.94118	99.93005	99.9121	99.88174	99.81934	99.61757	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	87.19531	94.8148	98.15027	99.27869	99.64813	99.79041	99.85685	99.89276	99.91414	99.92761	99.93622	99.94137	99.94309	99.93863	99.92596	99.90554	99.86956	99.78929	99.4522	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	87.13099	94.55365	97.96188	99.18626	99.60332	99.76569	99.84136	99.8821	99.90634	99.92169	99.93169	99.93811	99.94167	99.94191	99.93572	99.92137	99.89793	99.85459	99.74725	99.03485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	87.05679	94.30237	97.77278	99.08905	99.5552	99.73906	99.82469	99.87065	99.89794	99.91525	99.92666	99.93419	99.93889	99.94105	99.93981	99.93169	99.915	99.88694	99.8312	99.66709	88.00914	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	86.99211	94.06872	97.58752	98.98931	99.50479	99.71112	99.8073	99.85877	99.88926	99.90863	99.92145	99.93008	99.93573	99.93899	99.93987	99.93709	99.92684	99.90719	99.87268	99.79731	99.50332	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	86.94075	93.85369	97.40791	98.88818	99.45255	99.68208	99.78932	99.84657	99.88041	99.9019	99.91619	99.9259	99.93245	99.93659	99.93861	99.93825	99.93383	99.92119	99.89779	99.85431	99.7464	99.02238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	86.90068	93.65562	97.23429	98.7862	99.39866	99.652	99.77076	99.83405	99.87139	99.89508	99.91086	99.92168	99.92911	99.93403	99.9369	99.93778	99.93618	99.92995	99.91457	99.88628	99.82974	99.66134	69.1496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	86.85601	93.46514	97.06301	98.68198	99.34228	99.62025	99.75116	99.82086	99.86188	99.88788	99.90523	99.91717	99.92548	99.93115	99.93473	99.93645	99.9362	99.93322	99.9248	99.90581	99.87015	99.79082	99.46241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	86.79404	93.27404	96.89039	98.57394	99.28247	99.58621	99.73007	99.80662	99.85159	99.88006	99.89906	99.91218	99.92137	99.92776	99.93199	99.93436	99.93495	99.93344	99.92872	99.91732	99.89283	99.84407	99.7137	98.25326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	86.74147	93.09613	96.7237	98.46595	99.22131	99.5511	99.70832	99.79201	99.84109	99.87211	99.89282	99.90714	99.91724	99.92436	99.92921	99.9322	99.93346	99.93289	99.92999	99.92319	99.90796	99.8757	99.8049	99.54653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	86.69718	92.93032	96.56296	98.35838	99.15898	99.51498	99.68595	99.77702	99.83037	99.86404	99.8865	99.90206	99.91309	99.92094	99.92642	99.92998	99.93184	99.93202	99.93025	99.92574	99.91635	99.89601	99.85202	99.73944	98.91014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	86.66018	92.77566	96.4081	98.25153	99.09566	99.47791	99.66295	99.76166	99.81942	99.85583	99.8801	99.89694	99.90891	99.9175	99.9236	99.92772	99.93015	99.93096	99.93004	99.92692	99.9205	99.90776	99.88029	99.8172	99.60788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	86.6289	92.63081	96.25879	98.14554	99.03146	99.43991	99.63931	99.74591	99.80824	99.84747	99.87361	99.89175	99.90469	99.91403	99.92075	99.92542	99.92838	99.92976	99.92954	99.92744	99.92279	99.91399	99.89674	99.85868	99.76059	99.20426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	86.59295	92.48909	96.11158	98.0388	98.96551	99.4004	99.61462	99.72944	99.79653	99.83873	99.86681	99.88631	99.90024	99.91035	99.91768	99.92289	99.92635	99.92825	99.92861	99.92728	99.92381	99.9172	99.90512	99.88109	99.82471	99.64236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	86.56261	92.35624	95.96983	97.93338	98.899	99.36008	99.58933	99.71258	99.7846	99.82984	99.85993	99.88082	99.89576	99.90665	99.91461	99.92035	99.92429	99.92668	99.92758	99.92691	99.92437	99.91929	99.91022	99.89366	99.85929	99.76904	99.29337	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	86.5373	92.2316	95.83339	97.82942	98.83208	99.31903	99.56347	99.69535	99.77243	99.8208	99.85295	99.87526	99.89125	99.90292	99.91152	99.91779	99.92221	99.92506	99.92646	99.92637	99.92461	99.92071	99.91368	99.90139	99.8784	99.82706	99.66125	70.76378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	86.51649	92.11457	95.70209	97.72706	98.7649	99.27731	99.53706	99.67775	99.76003	99.81162	99.84588	99.86965	99.88669	99.89917	99.90841	99.91521	99.92011	99.92341	99.92527	99.92572	99.92463	99.92167	99.91616	99.90667	99.88999	99.85725	99.77479	99.36418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	86.49974	92.00461	95.57575	97.6264	98.69759	99.23499	99.51013	99.65979	99.74739	99.80229	99.83872	99.86398	99.8821	99.8954	99.90528	99.91262	99.91799	99.92172	99.92403	99.92496	99.92446	99.9223	99.91798	99.91052	99.89783	99.87489	99.82621	99.67591	94.80857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	86.48131	91.89778	95.45213	97.52632	98.62953	99.19168	99.48239	99.64125	99.73434	99.79266	99.83132	99.85813	99.87736	99.89149	99.90202	99.9099	99.91573	99.9199	99.92261	99.92399	99.92401	99.92251	99.91913	99.91315	99.90314	99.88592	99.85311	99.77406	99.40176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	86.46028	91.79314	95.33068	97.42663	98.56068	99.14733	99.45378	99.62207	99.72083	99.7827	99.82368	99.85207	99.87244	99.88743	99.89863	99.90705	99.91334	99.91792	99.92103	99.92281	99.92329	99.92235	99.91973	99.91489	99.90679	99.89326	99.86918	99.81915	99.66846	94.80073	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	86.44268	91.69437	95.21365	97.32878	98.49195	99.10253	99.4247	99.60254	99.70709	99.77257	99.81592	99.84595	99.86748	99.88334	99.89522	99.90419	99.91094	99.91592	99.91942	99.92159	99.92249	99.92206	99.9201	99.91621	99.90961	99.89877	99.88035	99.84558	99.76275	99.3691	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	86.42822	91.60106	95.1009	97.23281	98.42344	99.05732	99.39517	99.58266	99.69311	99.76229	99.80807	99.83975	99.86248	99.87922	99.89178	99.9013	99.90852	99.91391	99.91779	99.92034	99.92163	99.92166	99.92028	99.9172	99.91181	99.90302	99.88852	99.86292	99.81004	99.65128	92.67793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	86.4166	91.51288	94.99225	97.13876	98.35525	99.01179	99.36521	99.56245	99.67889	99.75185	99.8001	99.83349	99.85742	99.87507	99.88833	99.8984	99.90609	99.91188	99.91613	99.91904	99.92072	99.92117	99.92032	99.91792	99.91355	99.90636	99.89473	99.87512	99.83831	99.75082	99.32948	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	86.40759	91.42949	94.88754	97.04663	98.28744	98.96597	99.33485	99.54191	99.66444	99.74125	99.79204	99.82715	99.85232	99.87088	99.88485	99.89549	99.90363	99.90984	99.91445	99.91771	99.91975	99.9206	99.92022	99.91843	99.9149	99.90901	99.89956	99.88413	99.85703	99.80121	99.6332	89.04065	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	86.39898	91.34925	94.78575	96.9559	98.21974	98.91972	99.30399	99.52094	99.64967	99.73043	99.7838	99.82069	99.84713	99.86662	99.8813	99.89251	99.90113	99.90773	99.91271	99.91631	99.91869	99.91991	99.91995	99.9187	99.91588	99.91104	99.90327	99.89085	99.87002	99.83102	99.7381	99.27945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	86.39027	91.27165	94.68656	96.86645	98.15214	98.87302	99.27259	99.49954	99.63458	99.71936	99.77539	99.81409	99.84182	99.86227	99.87768	99.88947	99.89856	99.90556	99.9109	99.91483	99.91754	99.9191	99.91953	99.91874	99.91654	99.91256	99.90611	99.89593	99.87943	99.85048	99.79064	99.60732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	86.3837	91.19808	94.59087	96.77891	98.08509	98.82619	99.24087	99.47783	99.61926	99.70814	99.76687	99.80742	99.83647	99.85788	99.87403	99.8864	99.89597	99.90338	99.90907	99.91333	99.91636	99.91825	99.91904	99.91868	99.91702	99.91377	99.90842	99.9	99.88667	99.86439	99.82254	99.72172	99.19316	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	86.3791	91.12828	94.49853	96.69327	98.01863	98.77926	99.20885	99.45584	99.60371	99.69676	99.75824	99.80068	99.83106	99.85346	99.87036	99.88332	99.89337	99.90118	99.90722	99.91181	99.91514	99.91735	99.91848	99.91851	99.91734	99.91474	99.9103	99.9033	99.89238	99.87476	99.84387	99.77963	99.57832	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	86.37631	91.06205	94.40943	96.60952	97.95282	98.73229	99.17657	99.43357	99.58796	99.68522	99.7495	99.79385	99.8256	99.849	99.86666	99.88022	99.89075	99.89897	99.90536	99.91027	99.9139	99.91641	99.91787	99.91826	99.91752	99.91548	99.91183	99.90599	99.89695	99.88275	99.85905	99.81445	99.70578	99.10159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	86.37519	90.99918	94.32342	96.52764	97.88768	98.68532	99.14404	99.41104	99.57199	99.67353	99.74065	99.78696	99.82008	99.8445	99.86293	99.87709	99.88811	99.89674	99.90348	99.9087	99.91264	99.91544	99.9172	99.91793	99.91759	99.91605	99.91307	99.9082	99.90068	99.88905	99.87036	99.83759	99.76907	99.54973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	86.3747	90.93883	94.23994	96.44731	97.82307	98.63827	99.11121	99.38821	99.55576	99.66164	99.73166	99.77995	99.81449	99.83994	99.85915	99.87392	99.88543	99.89447	99.90157	99.9071	99.91133	99.91441	99.91646	99.91751	99.91753	99.91644	99.91404	99.90999	99.90368	99.89404	99.87897	99.85387	99.80647	99.68965	98.9979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	86.37384	90.88019	94.15845	96.36822	97.75883	98.59103	99.07801	99.365	99.53925	99.64953	99.7225	99.77282	99.80879	99.83529	99.8553	99.8707	99.8827	99.89215	99.8996	99.90544	99.90995	99.91331	99.91564	99.91698	99.91734	99.91665	99.91475	99.91139	99.90608	99.89799	99.8856	99.86574	99.83084	99.75721	99.51429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	86.37438	90.82442	94.07972	96.2909	97.69533	98.54389	99.04464	99.34157	99.52253	99.63727	99.71322	99.7656	99.80303	99.83061	99.85142	99.86744	99.87995	99.88981	99.89762	99.90377	99.90856	99.91219	99.91478	99.9164	99.91707	99.91674	99.9153	99.91254	99.90807	99.90126	99.89096	99.87492	99.84818	99.79738	99.6699	98.83507	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	86.3762	90.77136	94.00362	96.21534	97.63261	98.49689	99.01112	99.31793	99.50562	99.62486	99.70384	99.75831	99.79722	99.82588	99.84751	99.86417	99.87719	99.88746	99.89562	99.90208	99.90715	99.91104	99.91389	99.91578	99.91674	99.91675	99.91572	99.91348	99.90974	99.90399	99.89535	99.88218	99.86109	99.82393	99.7447	99.47403	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	86.37922	90.72086	93.93006	96.14149	97.57068	98.45005	98.97747	99.29408	99.48852	99.6123	99.69435	99.75093	99.79135	99.82111	99.84357	99.86087	99.8744	99.8851	99.8936	99.90037	99.90572	99.90987	99.91297	99.91512	99.91635	99.91667	99.91601	99.91425	99.91113	99.90627	99.89898	99.88803	99.87104	99.8427	99.78853	99.65017	98.64225	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	86.38334	90.67279	93.85894	96.06933	97.50956	98.40339	98.94372	99.27005	99.47124	99.5996	99.68476	99.74348	99.78543	99.8163	99.8396	99.85755	99.87159	99.88271	99.89158	99.89865	99.90427	99.90868	99.91202	99.91442	99.91591	99.91652	99.91621	99.91486	99.91229	99.90819	99.90202	99.89284	99.87891	99.85663	99.81724	99.73242	99.43247	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	86.38806	90.6267	93.78994	95.99867	97.44915	98.35689	98.90984	99.2458	99.45377	99.58673	99.67503	99.73594	99.77943	99.81143	99.83559	99.85419	99.86876	99.8803	99.88952	99.89691	99.9028	99.90745	99.91104	99.91367	99.91542	99.9163	99.91629	99.91533	99.91324	99.90979	99.90455	99.89679	99.88521	99.86729	99.83734	99.77975	99.63	98.40137	0	0	0	0	0	0	0	0	0	0	0	0
1825	86.39146	90.58114	93.72203	95.92883	97.38902	98.31025	98.87563	99.2212	99.43598	99.57362	99.66511	99.72824	99.77331	99.80646	99.83148	99.85076	99.86585	99.87783	99.88741	99.8951	99.90126	99.90616	99.90998	99.91284	99.91482	99.91596	99.91624	99.91561	99.91395	99.91105	99.90658	99.89997	99.89021	99.87545	99.85184	99.80987	99.71827	99.37889	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	86.37986	90.52598	93.648	95.85486	97.32584	98.26121	98.83951	99.19509	99.417	99.55954	99.65441	99.71988	99.76662	99.801	99.82693	99.84691	99.86256	99.87499	99.88493	99.89293	99.89937	99.90451	99.90855	99.91162	99.91381	99.91516	99.91567	99.91531	99.91397	99.91149	99.90757	99.90175	99.89322	99.88053	99.86079	99.82745	99.76172	99.57948	96.97979	0	0	0	0	0	0	0	0	0	0	0
1898	86.36959	90.47305	93.57615	95.78242	97.26345	98.21239	98.80332	99.1688	99.39783	99.54531	99.64359	99.71143	99.75987	99.79549	99.82235	99.84304	99.85925	99.87213	99.88245	99.89076	99.89747	99.90285	99.90711	99.91039	99.91278	99.91434	99.91508	99.91497	99.91393	99.91182	99.9084	99.90328	99.8958	99.8848	99.86809	99.84098	99.79141	99.67628	99.1413	0	0	0	0	0	0	0	0	0	0	0
1934.5	86.36058	90.42225	93.50641	95.7115	97.20184	98.16382	98.76707	99.14234	99.37848	99.53093	99.63265	99.7029	99.75305	99.78993	99.81773	99.83914	99.85593	99.86926	99.87995	99.88859	99.89557	99.90119	99.90567	99.90915	99.91174	99.9135	99.91446	99.91458	99.91383	99.91207	99.9091	99.9046	99.89802	99.88843	99.87413	99.85167	99.81294	99.73317	99.48425	0	0	0	0	0	0	0	0	0	0	0
1971	86.35276	90.3735	93.43869	95.64207	97.14104	98.11551	98.73078	99.11573	99.35897	99.51641	99.62159	99.69428	99.74617	99.78432	99.81307	99.83522	99.85258	99.86637	99.87745	99.8864	99.89365	99.89952	99.90421	99.9079	99.91069	99.91265	99.91381	99.91417	99.91368	99.91224	99.90968	99.90572	99.89993	99.89153	99.87919	99.86032	99.82922	99.77053	99.6238	98.66297	0	0	0	0	0	0	0	0	0	0
2007.5	86.34606	90.32669	93.37294	95.57408	97.08104	98.06749	98.69448	99.08898	99.3393	99.50174	99.61042	99.68557	99.73923	99.77866	99.80838	99.83127	99.84921	99.86347	99.87493	99.8842	99.89173	99.89784	99.90275	99.90664	99.90963	99.91178	99.91314	99.91372	99.91348	99.91233	99.91015	99.90669	99.90158	99.8942	99.88347	99.86742	99.84192	99.79688	99.69937	99.34517	0	0	0	0	0	0	0	0	0	0
2044	86.34038	90.28173	93.30906	95.50751	97.02185	98.01976	98.65818	99.06211	99.31947	99.48693	99.59914	99.67678	99.73222	99.77296	99.80366	99.8273	99.84582	99.86056	99.8724	99.882	99.88981	99.89615	99.90129	99.90538	99.90855	99.91089	99.91245	99.91324	99.91323	99.91237	99.91052	99.90751	99.90301	99.8965	99.88713	99.87334	99.85208	99.81641	99.74664	99.55607	97.19677	0	0	0	0	0	0	0	0	0
2080.5	86.33516	90.23813	93.24672	95.44213	96.96331	97.97225	98.62183	99.03506	99.29945	99.47196	99.58773	99.66788	99.72513	99.76719	99.79888	99.82328	99.8424	99.85761	99.86985	99.87977	99.88786	99.89445	99.8998	99.90409	99.90745	99.90998	99.91173	99.91272	99.91293	99.91232	99.9108	99.90818	99.90422	99.89847	99.89023	99.87828	99.86029	99.83132	99.77874	99.65799	99.11805	0	0	0	0	0	0	0	0	0
2117	86.33088	90.19625	93.18614	95.37811	96.90558	97.92507	98.58551	99.00792	99.27929	99.45685	99.5762	99.6589	99.71797	99.76137	99.79407	99.81924	99.83896	99.85466	99.86729	99.87754	99.8859	99.89274	99.8983	99.90279	99.90634	99.90905	99.91099	99.91217	99.91259	99.91223	99.911	99.90875	99.90526	99.90018	99.89292	99.8825	99.8671	99.84312	99.80205	99.71827	99.46238	0	0	0	0	0	0	0	0	0
2153.5	86.32751	90.156	93.12727	95.31543	96.84866	97.87823	98.54923	98.98068	99.259	99.44162	99.56457	99.64983	99.71075	99.7555	99.78922	99.81516	99.8355	99.85168	99.86471	99.87529	99.88394	99.89102	99.8968	99.90149	99.90522	99.90811	99.91023	99.91159	99.91223	99.91209	99.91113	99.90922	99.90616	99.90167	99.89526	99.88612	99.87283	99.85268	99.81971	99.75802	99.60604	98.67895	0	0	0	0	0	0	0	0
2190	86.32499	90.11733	93.07006	95.25405	96.79253	97.83175	98.51303	98.95337	99.23859	99.42626	99.55283	99.64068	99.70346	99.74959	99.78433	99.81107	99.83202	99.84869	99.86212	99.87304	99.88196	99.88929	99.89529	99.90017	99.90409	99.90716	99.90945	99.911	99.91183	99.91191	99.9112	99.9096	99.90694	99.90297	99.8973	99.88925	99.87769	99.86055	99.83352	99.78615	99.68475	99.32782	0	0	0	0	0	0	0	0
2226.5	86.32328	90.08015	93.01444	95.19395	96.73721	97.78564	98.4769	98.92599	99.21806	99.41079	99.54099	99.63144	99.69611	99.74363	99.77941	99.80694	99.82852	99.84568	99.85952	99.87077	99.87998	99.88755	99.89377	99.89885	99.90295	99.9062	99.90866	99.91038	99.9114	99.91169	99.91122	99.9099	99.90761	99.90411	99.89908	99.89197	99.88186	99.86713	99.84459	99.80706	99.73435	99.53957	97.49664	0	0	0	0	0	0	0
2263	86.32232	90.04441	92.96037	95.13511	96.68268	97.7399	98.44086	98.89855	99.19742	99.3952	99.52905	99.62213	99.6887	99.73762	99.77445	99.80279	99.82499	99.84266	99.8569	99.86849	99.87799	99.88581	99.89224	99.89752	99.90181	99.90522	99.90785	99.90975	99.91094	99.91143	99.91119	99.91014	99.90817	99.9051	99.90065	99.89435	99.88546	99.8727	99.85365	99.82319	99.76841	99.64446	99.11762	0	0	0	0	0	0	0
2299.5	86.32209	90.01006	92.90779	95.07748	96.62895	97.69455	98.40493	98.87106	99.17667	99.37949	99.51701	99.61274	99.68123	99.73156	99.76946	99.7986	99.82144	99.83962	99.85427	99.86621	99.87599	99.88406	99.89071	99.89618	99.90065	99.90423	99.90703	99.90909	99.91046	99.91114	99.91111	99.91031	99.90865	99.90596	99.90202	99.89643	99.88859	99.87746	99.86117	99.83598	99.7932	99.70699	99.45126	86.11629	0	0	0	0	0	0
2336	86.32254	89.97703	92.85666	95.02106	96.57599	97.64959	98.36911	98.84354	99.15583	99.36368	99.50488	99.60327	99.6737	99.72546	99.76442	99.79439	99.81788	99.83656	99.85163	99.86391	99.87398	99.8823	99.88917	99.89484	99.89948	99.90323	99.90619	99.90842	99.90996	99.91082	99.91099	99.91042	99.90904	99.90671	99.90323	99.89827	99.89132	99.88155	99.8675	99.84634	99.81201	99.74845	99.595	98.74189	0	0	0	0	0	0
2372.5	86.32363	89.94526	92.80693	94.96579	96.52381	97.60502	98.33342	98.816	99.1349	99.34777	99.49265	99.59372	99.6661	99.7193	99.75935	99.79016	99.81429	99.83349	99.84898	99.8616	99.87196	99.88053	99.88762	99.89348	99.8983	99.90222	99.90534	99.90773	99.90944	99.91047	99.91083	99.91049	99.90937	99.90736	99.90429	99.89988	99.89372	99.88511	99.87288	99.85489	99.82675	99.7779	99.67494	99.32794	0	0	0	0	0	0
2409	86.32534	89.91472	92.75854	94.91167	96.47241	97.56087	98.29787	98.78844	99.11388	99.33176	99.48034	99.58409	99.65844	99.7131	99.75425	99.78589	99.81067	99.8304	99.84631	99.85928	99.86994	99.87875	99.88606	99.89212	99.89712	99.9012	99.90448	99.90703	99.90889	99.91009	99.91064	99.9105	99.90963	99.90792	99.90522	99.90131	99.89583	99.88821	99.87751	99.86205	99.83859	99.79986	99.72577	99.53268	97.87652	0	0	0	0	0
2445.5	86.32762	89.88535	92.71147	94.85867	96.42176	97.51712	98.26246	98.76087	99.09279	99.31566	99.46793	99.57439	99.65073	99.70685	99.74911	99.78159	99.80704	99.82729	99.84362	99.85694	99.8679	99.87696	99.88449	99.89075	99.89592	99.90017	99.90361	99.90631	99.90833	99.90969	99.91041	99.91047	99.90982	99.90839	99.90604	99.90258	99.8977	99.89094	99.88152	99.86812	99.84828	99.81684	99.76089	99.63678	99.14316	0	0	0	0	0
2482	86.33045	89.85711	92.66566	94.80675	96.37187	97.47378	98.22721	98.7333	99.07163	99.29946	99.45543	99.56461	99.64295	99.70056	99.74393	99.77727	99.80338	99.82416	99.84093	99.8546	99.86585	99.87517	99.88292	99.88937	99.89472	99.89913	99.90272	99.90557	99.90774	99.90927	99.91016	99.9104	99.90997	99.90879	99.90675	99.90369	99.89936	99.89334	99.88501	99.87332	99.85635	99.83033	99.78656	99.69972	99.45157	94.03317	0	0	0	0
2518.5	86.33379	89.82993	92.62107	94.75589	96.32272	97.43086	98.19212	98.70574	99.05041	99.28318	99.44285	99.55476	99.63511	99.69422	99.73871	99.77292	99.7997	99.82102	99.83822	99.85225	99.86379	99.87337	99.88133	99.88798	99.89351	99.89808	99.90183	99.90483	99.90714	99.90882	99.90987	99.91029	99.91006	99.90912	99.90738	99.90468	99.90082	99.89546	99.88808	99.87781	99.86316	99.84129	99.80612	99.74183	99.5905	98.83488	0	0	0	0
2555	86.33763	89.8038	92.57767	94.70607	96.2743	97.38836	98.1572	98.6782	99.02913	99.26681	99.43019	99.54484	99.62722	99.68783	99.73346	99.76854	99.796	99.81786	99.83549	99.84988	99.86173	99.87155	99.87974	99.88658	99.89229	99.89702	99.90092	99.90406	99.90653	99.90835	99.90956	99.91015	99.91011	99.90939	99.90792	99.90556	99.90213	99.89735	99.89078	99.88171	99.86896	99.85036	99.82149	99.77193	99.66944	99.34138	0	0	0	0
2591.5	86.34193	89.77867	92.53542	94.65726	96.22662	97.34628	98.12246	98.65069	99.00779	99.25037	99.41745	99.53485	99.61926	99.68139	99.72817	99.76413	99.79228	99.81468	99.83275	99.8475	99.85965	99.86973	99.87814	99.88518	99.89106	99.89596	99.9	99.90329	99.90589	99.90786	99.90922	99.90998	99.91012	99.90961	99.90838	99.90633	99.90329	99.89903	99.89317	99.88513	99.87396	99.85796	99.83387	99.79449	99.72029	99.53306	98.21603	0	0	0
2628	86.34667	89.7545	92.49429	94.60944	96.17965	97.30462	98.08791	98.6232	98.98642	99.23385	99.40463	99.52479	99.61125	99.67491	99.72284	99.75969	99.78853	99.81148	99.82999	99.84511	99.85756	99.8679	99.87654	99.88376	99.88982	99.89488	99.89907	99.9025	99.90525	99.90736	99.90886	99.90977	99.91009	99.90977	99.90878	99.907	99.90432	99.90052	99.89529	99.88815	99.8783	99.86442	99.84404	99.81201	99.75573	99.63374	99.18279	0	0	0
2664.5	86.35183	89.73125	92.45423	94.56259	96.13339	97.26339	98.05355	98.59576	98.965	99.21726	99.39174	99.51467	99.60318	99.66838	99.71748	99.75522	99.78476	99.80826	99.82722	99.8427	99.85546	99.86606	99.87492	99.88234	99.88857	99.89379	99.89813	99.90171	99.90459	99.90683	99.90848	99.90954	99.91002	99.90989	99.90911	99.9076	99.90524	99.90186	99.89718	99.89081	99.8821	99.86997	99.85252	99.82597	99.78181	99.69572	99.45978	96.37947	0	0
2701	86.35739	89.70889	92.41523	94.51668	96.08783	97.22258	98.01938	98.56837	98.94355	99.20061	99.37877	99.50447	99.59506	99.66181	99.71208	99.75072	99.78097	99.80503	99.82444	99.84029	99.85336	99.86422	99.8733	99.88092	99.88732	99.8927	99.89718	99.9009	99.90391	99.90629	99.90807	99.90928	99.90992	99.90997	99.90939	99.90812	99.90606	99.90305	99.89887	99.89318	99.88544	99.87477	99.85969	99.83735	99.80178	99.73767	99.59095	98.93443	0	0
2737.5	86.36333	89.68739	92.37723	94.4717	96.04296	97.1822	97.98542	98.54103	98.92207	99.18389	99.36574	99.49421	99.58688	99.65519	99.70665	99.7462	99.77715	99.80177	99.82164	99.83786	99.85124	99.86236	99.87166	99.87948	99.88606	99.89159	99.89623	99.90008	99.90322	99.90574	99.90765	99.909	99.90979	99.91	99.90961	99.90857	99.90678	99.90412	99.90038	99.89529	99.88839	99.87896	99.86582	99.84679	99.81754	99.7679	99.66738	99.36286	0	0
2774	86.36962	89.66672	92.34022	94.42761	95.99877	97.14224	97.95167	98.51375	98.90057	99.16711	99.35263	99.48389	99.57864	99.64853	99.70118	99.74164	99.77331	99.7985	99.81882	99.83542	99.84911	99.86049	99.87002	99.87804	99.88479	99.89048	99.89526	99.89924	99.90252	99.90516	99.90721	99.90869	99.90963	99.91	99.90979	99.90896	99.90742	99.90507	99.90174	99.89718	99.89101	99.88264	99.87111	99.85473	99.83027	99.7907	99.71736	99.53864	98.48926	0
2810.5	86.37625	89.64684	92.30416	94.38441	95.95524	97.1027	97.91813	98.48654	98.87905	99.15028	99.33946	99.47351	99.57036	99.64182	99.69567	99.73706	99.76945	99.79521	99.81599	99.83297	99.84697	99.85862	99.86837	99.87658	99.88351	99.88936	99.89428	99.8984	99.90181	99.90458	99.90675	99.90837	99.90944	99.90996	99.90993	99.90929	99.90799	99.90593	99.90296	99.89887	99.89334	99.88589	99.87571	99.86149	99.84075	99.80849	99.75256	99.63427	99.22846	0
2847	86.3832	89.62772	92.26903	94.34206	95.91238	97.06359	97.88481	98.4594	98.85752	99.1334	99.32623	99.46306	99.56202	99.63507	99.69013	99.73245	99.76556	99.7919	99.81315	99.8305	99.84482	99.85673	99.86672	99.87512	99.88223	99.88823	99.8933	99.89755	99.90109	99.90398	99.90628	99.90802	99.90923	99.9099	99.91002	99.90957	99.90849	99.90669	99.90405	99.90039	99.89543	99.88877	99.87975	99.8673	99.84953	99.82273	99.77866	99.69434	99.47314	97.46591
2883.5	86.39046	89.60934	92.23479	94.30055	95.87017	97.0249	97.85171	98.43233	98.83598	99.11647	99.31294	99.45256	99.55362	99.62827	99.68455	99.7278	99.76165	99.78857	99.81029	99.82802	99.84266	99.85484	99.86505	99.87366	99.88093	99.88709	99.8923	99.89669	99.90036	99.90337	99.90579	99.90765	99.90899	99.9098	99.91008	99.9098	99.90892	99.90737	99.90503	99.90176	99.89731	99.89134	99.88331	99.87235	99.85697	99.83438	99.79875	99.73552	99.59504	99.02926

P O R E P R E S S U R E (kPa)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0.310038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	104.7969	86.60238	68.48768	50.37756	32.26744	14.15732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	140.6539	122.2782	103.8377	85.72534	67.61522	49.5051	31.39498	13.28485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	164.5292	146.204	127.2532	108.9831	90.87195	72.76183	54.65171	36.54158	18.43146	0.321343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	188.4659	170.2621	150.9343	132.327	114.1266	96.01595	77.90583	59.79571	41.68559	23.57547	5.465348	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	207.3704	189.3023	169.7174	150.7931	132.3584	114.1937	96.08333	77.97321	59.86308	41.75296	23.64284	5.532721	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	224.5597	206.623	186.8706	167.6705	148.9931	130.6565	112.5122	94.40197	76.29185	58.18173	40.07161	21.96149	3.851368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	241.7752	223.9598	204.1053	184.6673	165.7665	147.2362	128.962	110.8302	92.71999	74.60987	56.49975	38.38963	20.27951	2.169386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	257.6189	239.9137	220.0042	200.3624	181.2574	162.5436	144.1098	125.8782	107.7542	89.64408	71.53396	53.42384	35.31371	17.20359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	272.0249	254.4194	234.4888	214.6739	195.382	176.4968	157.9079	139.542	121.3409	103.222	85.11189	67.00177	48.89164	30.78152	12.6714	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	286.4519	268.9365	249.0088	229.0485	209.5854	190.5398	171.8041	153.3043	134.9888	116.8102	98.69455	80.58441	62.47429	44.36417	26.25405	8.143927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	304.5379	287.1041	267.1966	247.1151	227.4953	208.2995	189.425	170.7969	152.3639	134.087	115.9254	97.8118	79.70168	61.59155	43.48143	25.37131	7.261191	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	319.196	301.8366	281.9612	261.7802	242.0172	222.6802	203.6743	184.9241	166.3773	147.9961	129.7497	111.6009	93.48863	75.3785	57.26838	39.15826	21.04814	2.938016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	333.2937	316.0023	296.1674	275.9057	256.0122	236.5425	217.4117	198.545	179.8892	161.4059	143.066	124.8441	106.7052	88.59375	70.48362	52.3735	34.26338	16.15326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	347.4016	330.1725	310.3839	290.0578	270.0457	250.451	231.2015	212.2236	193.4632	174.8814	156.4491	138.143	119.9411	101.8097	83.69873	65.58861	47.47848	29.36836	11.25824	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	361.5187	344.347	324.6086	304.2321	284.1127	264.4003	245.0376	225.9533	207.0927	188.416	169.8939	151.5034	133.2254	115.04	96.91421	78.80359	60.69347	42.58335	24.47323	6.363107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	374.6316	357.513	337.827	317.4124	297.1961	277.3731	257.9024	238.7159	219.759	200.9911	182.3822	163.9092	145.5537	127.2993	109.1275	91.00605	72.89564	54.78551	36.67539	18.56527	0.455151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	387.5184	370.4491	350.8169	330.3745	310.0712	290.1441	270.5702	251.2856	232.236	213.3801	194.6875	176.1345	157.7028	139.3769	121.1425	102.9822	84.86392	66.75362	48.6435	30.53338	12.42326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	400.4124	383.389	363.8112	343.3501	322.9688	302.9439	283.2714	263.8925	244.7534	225.8127	207.0391	188.4087	169.9028	151.5061	133.2056	114.9885	96.83767	78.72175	60.61153	42.50141	24.39129	6.281165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	413.3133	396.3326	376.8093	356.3371	335.8863	315.7697	296.0029	276.5332	257.3078	238.2849	219.433	200.7276	182.1497	163.6839	145.3173	127.0388	108.8366	90.69372	72.57954	54.46936	36.35924	18.24912	0.138998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	425.5869	408.6462	389.177	368.7002	348.1878	327.9853	308.1283	288.5711	269.2622	250.1599	231.232	212.4539	193.8061	175.273	156.8417	138.5014	120.2421	102.0529	83.91659	65.80366	47.6935	29.58338	11.47326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	436.6573	419.7542	400.3384	379.8626	359.2958	339.0129	319.0698	299.4281	280.0384	260.859	241.8575	223.0088	204.2931	185.6945	167.2001	148.7991	130.4818	112.2394	94.06142	75.93058	57.81854	39.7084	21.59828	3.488158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	447.7332	430.8655	411.5024	391.0323	370.4178	350.0597	330.0342	310.3111	290.8431	271.589	252.516	233.5987	214.817	196.1547	177.5988	159.1382	140.7636	122.4667	104.2392	86.07117	67.9448	49.83338	31.72324	13.61312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	458.8145	441.9802	422.6686	402.2082	381.5521	361.1241	341.0199	321.2181	301.6743	282.3476	263.2051	244.221	225.3751	206.6508	188.0348	169.5162	151.0854	132.7343	114.4554	96.24129	78.0819	59.95915	41.84817	23.73804	5.627917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	469.9009	453.098	433.8369	413.3897	392.6976	372.2044	352.0251	332.1474	312.53	293.1326	273.9225	254.8735	235.9649	217.1802	198.5058	179.9304	161.4446	143.0403	124.7101	106.4475	88.24525	70.09342	51.97361	33.86291	15.75279	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	480.9555	464.1825	444.9707	424.5395	403.8167	383.2629	363.0119	343.0609	323.372	303.906	284.6299	265.5176	246.5481	227.7044	208.9729	190.3422	171.8027	153.3461	134.9654	116.654	98.40597	80.21438	62.06916	43.95167	25.84118	7.731054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	491.4728	474.7281	455.5644	435.1517	414.4027	393.7929	373.4735	353.4517	333.6934	314.1605	294.8202	275.6462	256.6171	237.7159	218.9288	200.244	181.6519	163.1442	144.7138	126.3543	108.0599	89.82501	71.643	53.50353	35.38788	17.27752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	501.9945	485.2766	466.1598	445.7677	424.9969	404.3351	383.9505	363.8604	344.0347	324.4366	305.0337	285.7994	266.7122	247.7549	228.9132	210.1756	191.5322	172.9745	154.4954	136.0885	117.7482	99.46918	81.24621	63.07281	44.93833	26.8241	8.713821	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	512.5202	495.8279	476.7568	456.3869	435.5982	414.8885	394.4419	374.2858	354.3946	334.733	315.269	295.9757	276.8318	257.8195	238.9247	220.1354	201.4417	182.8351	164.3083	145.8549	127.4693	109.1464	90.8814	72.66928	54.50364	36.37345	18.26032	0.150096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1058.5	523.0499	506.382	487.3554	467.0091	446.2062	425.4522	404.9467	384.7269	364.772	345.0485	325.5247	306.1739	286.9744	267.9085	248.9616	230.1218	211.3789	192.7243	174.1508	155.6518	137.2217	118.8554	100.5484	82.29624	64.09402	45.93536	27.80885	9.696546	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	533.5836	516.939	497.9557	477.6342	456.8201	436.0256	415.464	395.1827	375.166	355.3821	335.8	316.3929	297.139	278.0205	259.0227	240.1333	221.3423	202.6408	184.0214	165.4777	147.0039	128.595	110.2464	91.954	73.71351	55.52034	37.36797	19.24458	1.132894	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	543.8113	527.189	508.2478	487.9521	467.13	446.2983	425.6834	405.3429	385.266	365.4232	345.7839	326.3217	307.0147	287.8447	268.7969	249.8591	231.0208	212.2734	193.6091	175.0215	156.5048	138.054	119.6645	101.3321	83.05305	64.82333	46.63844	28.49172	10.37096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	553.681	537.08	518.1798	497.9107	477.0832	456.2175	435.5521	415.1544	395.0191	375.1187	355.4237	335.9075	316.5483	297.3279	278.2312	259.2459	240.3613	221.5687	202.8604	184.2298	165.671	147.179	128.7492	110.3774	92.06002	73.79327	55.57347	37.39618	19.25451	1.135946	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	563.5592	546.9785	528.1183	507.8764	487.0459	466.1492	445.4359	424.9832	404.791	384.8345	365.0848	345.5158	326.1055	306.8356	287.691	268.659	249.7291	230.8922	212.1407	193.4678	174.8677	156.3352	137.8658	119.4553	101.0999	82.79627	64.5409	46.33026	28.15995	10.0228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	573.4495	556.8884	538.067	517.8527	497.0215	476.0967	455.3381	434.8323	414.5849	394.5736	374.7704	355.1497	335.6892	316.3708	297.1791	278.1014	259.1269	240.2466	221.4527	202.7383	184.0976	165.5254	147.017	128.5683	110.1756	91.83539	73.54446	55.29963	37.09748	18.93355	0.80048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	583.3556	566.8134	548.0297	527.8436	507.0136	486.0634	465.2619	444.7051	424.404	404.3391	384.4836	364.8121	345.3025	325.9364	306.6985	287.5758	268.5576	249.6347	230.7991	212.044	193.3635	174.7522	156.2055	137.7193	119.2897	100.9134	82.58722	64.3081	46.07307	27.87878	9.720718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	593.2804	576.7562	558.0094	537.8515	517.0247	496.0516	475.2096	454.6036	434.2504	414.1332	394.2264	374.5051	354.9473	335.5344	316.2511	297.0843	278.0232	259.0583	240.1818	221.3867	202.667	184.0173	165.433	146.9098	128.444	110.0321	91.67108	73.3579	55.08979	36.86387	18.67687	0.524526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	603.0971	586.5903	567.8793	547.75	526.9279	505.9342	485.0541	464.4007	443.9969	423.8286	403.8716	384.1015	364.4963	345.0375	325.7096	306.4994	287.3961	268.39	249.4733	230.6388	211.8806	193.1931	174.5718	156.0123	137.5108	119.0639	100.6685	82.32159	64.02054	45.76268	27.54525	9.365032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	612.7806	596.2906	577.6144	557.5137	536.698	515.686	494.7698	474.071	453.6179	433.3997	413.3936	393.5755	373.9238	354.4199	335.0481	315.7954	296.6505	277.6039	258.6476	239.7745	220.9784	202.2538	183.596	165.0007	146.4641	127.9827	109.5534	91.17325	72.83959	54.54987	36.30158	18.09209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	622.4865	606.0126	587.3704	567.2983	546.4902	525.462	504.512	483.7695	463.2686	443.0017	422.9474	403.0823	383.3848	363.8365	344.4217	325.127	305.9412	286.8549	267.8597	248.9485	230.115	211.3539	192.6603	174.0298	155.4587	136.9433	118.4806	100.0676	81.70168	63.38035	45.10123	26.86191	8.659836	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	632.214	615.7558	597.1467	577.1032	556.304	535.2616	514.2797	493.4952	472.9479	452.6334	432.5319	412.6206	392.8783	373.2863	353.8291	334.4931	315.2672	296.1417	277.1081	258.1595	239.2894	220.4923	201.7634	183.0983	164.493	145.9442	127.4486	109.0032	90.60549	72.25291	53.94314	35.67394	17.44304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	641.9626	625.5194	606.9425	586.9277	566.1384	545.0837	524.0719	503.2471	482.6548	462.2938	442.146	422.1894	402.4029	382.768	363.269	343.8925	324.627	305.4629	286.3917	267.4061	248.4999	229.6674	210.9037	192.2045	173.5657	154.9839	136.4559	117.9786	99.54947	81.16602	62.82592	44.527	26.26713	8.044118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	651.7312	635.3025	616.7571	596.7707	575.9925	554.9272	533.8873	513.0239	492.3879	471.9815	451.7884	431.7872	411.9573	392.2802	372.7401	353.3236	334.0192	314.8171	295.7087	276.6868	257.745	238.8777	220.0798	201.3469	182.6751	164.0608	145.5008	126.9921	108.532	90.11805	71.74797	53.41959	35.13086	16.87976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	661.4541	645.0395	626.5248	606.5667	585.8004	564.7261	543.66	522.7596	502.0811	481.6304	461.3929	441.3479	421.4753	401.7566	382.1762	362.7203	343.3775	324.1379	304.993	285.9353	266.9585	248.0568	229.2252	210.4592	191.7548	173.1085	154.5169	135.9772	117.4866	99.04255	80.64286	62.28534	43.96799	25.68886	7.446024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	671.0655	654.6645	636.1796	616.2497	595.4961	574.4144	553.3238	532.3879	511.6683	491.1743	470.8932	450.8053	430.8907	411.1311	391.5108	372.0162	352.6356	333.3591	314.1781	295.0852	276.0738	257.1382	238.2734	219.4747	200.7383	182.0604	163.4378	144.8674	126.3467	107.873	89.44404	71.05773	52.71204	34.40507	16.13499	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	680.6951	664.3073	645.8516	625.9497	605.2096	584.1218	563.0084	542.0384	521.279	500.7428	480.419	460.2889	440.3329	420.533	400.8735	381.3407	361.9229	342.61	323.3935	304.2658	285.2204	266.2514	247.3537	228.5229	209.7548	191.0458	172.3925	153.792	135.2416	116.7386	98.28077	79.86601	61.49229	43.15775	24.86059	6.59906	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	690.342	673.967	655.5398	635.6657	614.9396	593.8472	572.7125	551.7101	530.912	510.3346	489.9689	469.7973	449.8006	429.9611	410.2629	390.6924	371.2379	351.8892	332.6376	313.4757	294.3966	275.3947	256.4648	237.6022	218.8029	200.0632	181.3797	162.7494	144.1696	125.6377	107.1514	88.70856	70.30716	51.94533	33.62131	15.33342	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	700.0054	683.6428	665.2433	645.3967	624.6854	603.5896	582.4351	561.4016	540.5661	519.9484	499.5417	479.3293	459.2927	439.4141	419.6778	400.0701	380.5794	361.1953	341.9092	322.7134	303.6013	284.5669	265.605	246.7111	227.8811	209.111	190.3977	171.7381	153.1294	134.5689	116.0545	97.5839	79.15513	60.76632	42.41572	24.10166	5.822538	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	709.6842	693.3337	674.9613	655.142	634.4459	613.3479	592.1751	571.1119	550.2402	529.5832	509.1363	488.8838	468.8078	448.8907	429.1168	409.4726	389.9461	370.5272	351.207	331.9778	312.833	293.7665	274.7732	255.8484	236.988	218.1881	199.4453	180.7567	162.1194	143.5308	124.9886	106.4906	88.03479	69.61932	51.24242	32.90244	14.59781	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	719.3446	703.0057	684.6599	664.8676	644.1872	623.0881	601.8984	580.8068	559.9	539.2047	518.7183	498.4265	478.3117	458.3567	438.5458	418.8654	399.3037	379.8504	360.4965	341.2344	322.0573	302.9592	283.9349	264.9796	246.0891	227.2597	208.4879	189.7707	171.1052	152.4888	133.9192	115.3941	96.9116	78.46977	60.06687	41.70124	23.37132	5.075643	0	0	0	0	0	0	0	0	0	0	0	0
1825	728.8412	712.5136	694.1937	674.4282	653.7639	632.6647	611.4594	590.3407	569.4	548.6673	528.1423	507.8118	487.6589	467.6664	447.819	428.103	408.5065	389.0192	369.6322	350.3376	331.1286	311.9993	292.9443	273.9589	255.0388	236.1803	217.3798	198.6343	179.941	161.2971	142.7004	124.1486	105.6397	87.17185	68.74323	50.35223	31.99728	13.67692	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	737.085	720.7685	702.4739	682.7348	662.087	640.9888	619.7691	598.6246	577.6511	556.882	536.3191	515.9506	495.76	475.7307	455.8473	436.0962	416.4653	396.9445	377.5247	358.198	338.9576	319.7974	300.7122	281.697	262.7477	243.8604	225.0316	206.2582	187.5373	168.8663	150.2429	131.6647	113.1297	94.63612	76.18209	57.76598	39.38626	21.04146	2.730219	0	0	0	0	0	0	0	0	0	0	0
1898	745.3533	729.0475	710.7776	691.0647	670.4337	649.3373	628.1045	606.9355	585.9301	565.1255	544.5256	524.1196	503.8921	483.8264	463.9075	444.1217	424.4569	404.903	385.4508	366.0924	346.8209	327.6303	308.5152	289.4706	270.4924	251.5767	232.7199	213.919	195.1709	176.4732	157.8233	139.219	120.6583	102.1392	83.66006	65.21915	46.81491	28.44591	10.11075	0	0	0	0	0	0	0	0	0	0	0
1934.5	753.6406	737.3453	719.0996	699.4126	678.7987	657.705	636.4602	615.2677	594.2317	573.3924	552.7561	532.3135	512.0494	491.948	471.994	452.1739	432.4757	412.8891	393.4049	374.0152	354.7131	335.4924	316.3477	297.2741	278.2674	259.3236	240.4392	221.611	202.8361	184.1118	165.4358	146.8057	128.2196	109.6754	91.1714	72.70594	54.27746	35.8845	17.52569	0	0	0	0	0	0	0	0	0	0	0
1971	761.946	745.6609	727.4389	707.7775	687.1809	666.0906	644.835	623.6203	602.5546	581.6815	561.0096	540.5309	520.231	500.0942	480.1056	460.2517	440.5205	420.9015	401.3857	381.9651	362.6327	343.3822	324.2084	305.1061	286.0712	267.0997	248.1879	229.3328	210.5314	191.781	173.0791	154.4236	135.8123	117.2432	98.71466	80.22494	61.77248	43.35583	24.97359	6.624479	0	0	0	0	0	0	0	0	0	0
2007.5	770.2687	753.9934	735.7946	716.1585	695.5795	674.4934	653.228	631.9921	610.8978	589.9918	569.285	548.7708	528.4355	508.2639	488.2412	468.3539	448.59	428.9392	409.3921	389.941	370.5786	351.2988	332.096	312.9655	293.9027	274.9037	255.965	237.0833	218.2556	199.4793	180.752	162.0712	143.435	124.8414	106.2886	87.77484	69.29866	50.85856	32.45315	14.08113	0	0	0	0	0	0	0	0	0	0
2044	778.6055	762.3399	744.1638	724.5526	703.9914	682.9102	661.636	640.3801	619.2581	598.32	577.5791	557.03	536.6599	516.4539	496.3975	476.4772	456.6811	436.9987	417.4208	397.9395	378.5475	359.2386	340.0074	320.8488	301.7584	282.7323	263.7669	244.8589	226.0053	207.2035	188.4509	169.7452	151.0844	132.4665	113.8897	95.35222	76.85258	58.38927	39.96092	21.56623	3.203993	0	0	0	0	0	0	0	0	0
2080.5	786.9119	770.6557	752.5017	732.9153	712.3719	691.2963	670.0142	648.7393	627.5906	606.6213	585.8469	565.2635	544.8591	524.6193	504.5296	484.5768	464.7488	445.0352	425.4269	405.9156	386.4943	367.1568	347.8973	328.7111	309.5935	290.5406	271.5488	252.6148	233.7355	214.9084	196.1309	177.4006	158.7154	140.0735	121.4729	102.912	84.3891	65.90285	47.4518	29.03465	10.65017	0	0	0	0	0	0	0	0	0
2117	795.2335	778.9865	760.8542	741.2922	720.7668	699.6974	678.4084	657.1155	635.941	614.9414	594.1342	573.5171	553.0789	532.8057	512.6831	492.6981	472.8386	453.0943	433.4558	413.915	394.4648	375.0988	355.8115	336.5978	317.4533	298.3739	279.356	260.3962	241.4917	222.6395	203.8373	185.0826	166.3735	147.7077	129.0836	110.4995	91.95366	73.44469	54.97117	36.5318	18.12534	0	0	0	0	0	0	0	0	0
2153.5	803.5695	787.3314	769.2205	749.6825	729.1754	708.1127	686.8175	665.5076	644.3083	623.2791	602.4398	581.7896	561.3181	541.0119	520.857	500.8401	480.9496	461.1748	441.5064	421.9365	402.4576	383.0636	363.7487	344.5079	325.3367	306.2311	287.1874	268.2022	249.2726	230.3957	211.569	192.7903	174.0573	155.368	136.7207	118.1136	99.54502	81.01358	62.51783	44.05646	25.62823	7.23197	0	0	0	0	0	0	0	0
2190	811.9193	795.69	777.5999	758.0857	737.5968	716.5413	695.241	673.915	652.6917	631.6337	610.763	590.0802	569.576	549.2373	529.0503	509.0021	489.0808	469.2758	449.578	429.9792	410.472	391.0502	371.708	352.4404	333.2429	314.1114	295.0421	276.0317	257.0773	238.1759	219.3251	200.5225	181.766	163.0535	144.3831	125.7532	107.1622	88.60852	70.09076	51.60761	33.15784	14.74025	0	0	0	0	0	0	0	0
2226.5	820.2823	804.0615	785.9918	766.5011	746.0305	724.9828	703.678	682.3369	661.0905	640.0044	619.103	598.3883	577.8518	557.481	537.2624	517.1831	497.2314	477.3967	457.6697	438.0423	418.5071	399.0578	379.6887	360.3946	341.171	322.0137	302.9192	283.8839	264.9049	245.9793	227.1046	208.2784	189.4986	170.763	152.0699	133.4175	114.8043	96.22855	77.68901	59.1843	40.71319	22.27448	3.867113	0	0	0	0	0	0	0
2263	828.6579	812.4454	794.3957	774.9282	754.476	733.4364	712.128	690.7726	669.504	648.3907	627.4591	606.713	586.1447	565.7423	545.4924	525.3825	505.4007	485.5365	465.7807	446.125	426.5621	407.0856	387.6898	368.3694	349.12	329.9374	310.8178	291.7579	272.7546	253.8051	234.9067	216.0572	197.2542	178.4959	159.7803	141.1056	122.4703	103.8728	85.31166	66.78562	48.29337	29.83375	11.40563	0	0	0	0	0	0	0
2299.5	837.0455	820.8411	802.8111	783.3665	762.9326	741.9017	720.5903	699.2214	677.9315	656.7917	635.8307	615.0537	594.4541	574.0204	553.7397	533.5995	513.5879	493.6946	473.9103	454.2266	434.6363	415.1329	395.7106	376.3643	357.0893	337.8816	318.7372	299.6529	280.6256	261.6523	242.7305	223.8579	205.0321	186.2512	167.5133	148.8166	130.1594	111.5403	92.95787	74.41069	55.89753	37.41719	18.96856	0.557212	0	0	0	0	0	0
2336	845.4446	829.2482	811.2374	791.8154	771.4	750.3781	729.0644	707.6829	686.3725	665.2068	644.217	623.4097	602.7793	582.3148	562.0036	541.8334	521.7924	501.8703	482.0578	462.3464	442.729	423.1989	403.7505	384.3784	365.0782	345.8455	326.6767	307.5682	288.5171	269.5203	250.5753	231.6798	212.8314	194.0282	175.2682	156.5496	137.8709	119.2304	100.6268	82.05871	63.52483	45.02398	26.55503	8.116929	0	0	0	0	0	0
2372.5	853.8548	837.6661	819.6742	800.2746	779.8775	758.8651	737.5498	716.1565	694.8263	673.6355	652.6175	631.7804	611.1196	590.6247	570.2835	550.0836	530.0136	510.063	490.2225	470.4837	450.8394	431.283	411.8086	392.4111	373.0858	353.8285	334.6354	315.5031	296.4283	277.4083	258.4404	239.5222	220.6514	201.8261	183.0442	164.304	145.6039	126.9423	108.3177	89.7289	71.17449	52.65332	34.16425	15.70621	0	0	0	0	0	0
2409	862.2755	846.0945	828.1211	808.7435	788.3649	767.3621	746.0459	724.6415	703.2923	682.0773	661.0317	640.1653	619.4746	598.9497	578.5787	558.3495	538.2508	518.2719	498.4038	478.6379	458.967	439.3845	419.8845	400.4618	381.1117	361.83	342.6128	323.4568	304.3587	285.3156	266.325	247.3843	228.4914	209.6441	190.8406	172.079	153.3577	134.6752	116.0299	97.42052	78.84578	60.30448	41.79547	23.31768	4.870132	0	0	0	0	0
2445.5	870.7065	854.5329	836.5777	817.2219	796.8616	775.8689	754.5523	733.1375	711.7702	690.5314	669.4589	648.5638	627.8436	607.2891	586.8887	566.6306	546.5034	526.4966	506.6011	486.8084	467.1111	447.5027	427.9773	408.5297	389.155	369.8492	350.6082	331.4287	312.3075	293.2417	274.2285	255.2656	236.3507	217.4818	198.6568	179.874	161.1317	142.4284	123.7626	105.1329	86.53799	67.97674	49.44798	30.95062	12.48365	0	0	0	0	0
2482	879.1472	862.9809	845.0435	825.7092	805.3672	784.3849	763.0684	741.6441	720.2592	698.9975	677.8986	656.9753	636.2261	615.6424	595.213	574.9262	554.7709	534.7365	514.8138	494.9945	475.2712	455.6372	436.0867	416.6143	397.2153	377.8855	358.621	339.4183	320.2742	301.1857	282.1503	263.1654	244.2287	225.3383	206.492	187.6882	168.9252	150.2013	131.5151	112.8652	94.25042	75.66941	57.12108	38.60433	20.11814	1.663594	0	0	0	0
2518.5	887.5965	871.4373	853.5175	834.2044	813.8808	792.909	771.5933	750.16	728.7584	707.4744	686.3497	665.3987	644.6208	624.0083	603.5503	583.2352	563.052	542.9903	523.0408	503.1952	483.446	463.7867	444.2112	424.7143	405.2913	385.9378	366.6499	347.4242	328.2573	309.1465	290.089	271.0822	252.1241	233.2123	214.345	195.5204	176.7368	157.9925	139.2862	120.6163	101.9817	83.38115	64.81342	46.27745	27.77222	9.296759	0	0	0	0
2555	896.0549	879.9027	862.0001	842.7078	822.4025	801.4417	780.1272	758.6857	737.268	715.9623	694.8123	673.8341	653.0282	632.3872	611.9009	591.5578	571.347	551.2582	531.2822	511.4105	491.6357	471.9513	452.3511	432.83	413.3831	394.0061	374.6951	355.4465	336.2572	317.1242	298.0448	279.0165	260.0369	241.1041	222.2159	203.3707	184.5666	165.8022	147.0758	128.3862	109.7321	91.11207	72.52511	53.9701	35.44599	16.95182	0	0	0	0
2591.5	904.5219	888.3766	870.4909	851.2193	830.9322	809.9825	788.6697	767.2205	745.7875	724.4608	703.2862	682.2813	661.4476	640.7786	620.2643	599.8935	579.6554	559.5399	539.5375	519.64	499.8399	480.1305	460.5059	440.9608	421.4902	402.0899	382.756	363.4849	344.2733	325.1183	306.0172	286.9674	267.9667	249.013	230.1042	211.2385	192.4142	173.6297	154.8836	136.1744	117.5008	98.86157	80.25556	61.68167	43.13886	24.62614	6.14261	0	0	0
2628	912.9973	896.8587	878.9896	859.7384	839.4695	818.5311	797.2205	775.7643	754.3165	732.9694	711.7708	690.7397	669.8787	649.182	628.64	608.2419	587.9768	567.8347	547.8063	527.8832	508.058	488.324	468.6752	449.1062	429.6122	410.1888	390.8322	371.5387	352.305	333.1282	314.0056	294.9346	275.913	256.9385	238.0092	219.1233	200.2789	181.4747	162.7089	143.9802	125.2874	106.6291	88.00421	69.41161	50.85025	32.31915	13.81738	0	0	0
2664.5	921.4808	905.3487	887.4959	868.2649	848.014	827.0871	805.7792	784.3166	762.8548	741.4879	720.2657	699.2089	678.321	657.597	637.0277	616.6025	596.3107	576.1423	556.0881	536.1397	516.2896	496.5312	476.8583	457.2657	437.7485	418.3023	398.9231	379.6074	360.3519	341.1535	322.0096	302.9176	283.8752	264.8801	245.9305	227.0245	208.1603	189.3364	170.5512	151.8033	133.0913	114.4141	95.77053	77.15937	58.57962	40.03029	21.51045	3.019826	0	0
2701	929.972	913.8464	896.0096	876.7984	856.5656	835.6504	814.3455	792.8771	771.4018	750.0158	728.7707	707.6885	686.7742	666.0233	645.427	624.975	604.6568	584.4624	564.3826	544.4091	524.5343	504.7517	485.055	465.439	445.8988	426.4299	407.0284	387.6907	368.4135	349.1937	330.0287	310.9158	291.8528	272.8374	253.8677	234.9417	216.0579	197.2144	178.4099	159.6429	140.9121	122.2162	103.554	84.92442	66.32644	47.75904	29.22128	10.71226	0	0
2737.5	938.4707	922.3514	904.5303	885.3388	865.1239	844.2206	822.9192	801.4455	779.9573	758.5528	737.2852	716.1783	695.2379	674.4604	653.8374	633.3589	613.0145	592.7944	572.6893	552.6909	532.7917	512.9851	493.2648	473.6257	454.0626	434.5713	415.1476	395.7881	376.4894	357.2484	338.0624	318.9289	299.8454	280.8098	261.8202	242.8745	223.9711	205.1083	186.2847	167.4988	148.7492	130.0347	111.3541	92.70629	74.09023	55.50491	36.94938	18.42274	0	0
2774	946.9766	930.8634	913.0579	893.8857	873.6887	852.7974	831.4998	810.0214	788.521	767.0985	745.809	724.6777	703.7117	682.908	662.2586	641.7539	621.3836	601.138	581.0078	560.9848	541.0614	521.231	501.4874	481.8252	462.2395	442.7259	423.2803	403.8992	384.5791	365.3171	346.1104	326.9563	307.8526	288.797	269.7876	250.8223	231.8996	213.0176	194.175	175.3703	156.6021	137.8692	119.1704	100.5045	81.87052	63.26742	44.69427	26.15015	7.634219	0
2810.5	955.4894	939.3824	921.592	902.439	882.2598	861.3807	840.0873	818.6046	797.0925	775.6526	754.3417	733.1866	712.1953	691.3657	670.6903	650.1597	629.7638	609.4929	589.3378	569.2904	549.343	529.489	509.7222	490.0372	470.4291	450.8934	431.4261	412.0235	392.6823	373.3995	354.1721	334.9978	315.874	296.7985	277.7694	258.7848	239.8428	220.9419	202.0805	183.2572	164.4705	145.7194	127.0024	108.3186	89.66684	71.04612	52.45548	33.89403	15.3609	0
2847	964.009	947.9079	930.1326	910.9985	890.8368	869.9701	848.6812	827.1948	805.6716	784.2148	762.8831	741.7045	720.6884	699.8333	679.1322	658.5759	638.1546	617.8586	597.679	577.6073	557.6362	537.7588	517.969	498.2614	478.6311	459.0735	439.5846	420.1608	400.7986	381.4951	362.2473	343.0528	323.9091	304.8139	285.7654	266.7615	247.8005	228.8807	210.0007	191.1589	172.354	153.5847	134.8498	116.1482	97.47876	78.84055	60.23258	41.65394	23.10375	4.581409
2883.5	972.5351	956.4398	938.6792	919.5638	899.4197	878.5654	857.2814	835.7918	814.258	792.7849	771.4328	750.2313	729.1907	708.3103	687.5838	667.0022	646.5558	626.235	606.031	585.9353	565.9406	546.04	526.2275	506.4975	486.8451	467.2658	447.7555	428.3106	408.9276	389.6035	370.3355	351.121	331.9575	312.8429	293.775	274.7521	255.7722	236.8337	217.9352	199.075	180.252	161.4647	142.712	123.9928	105.3059	86.65031	68.02514	49.42944	30.86234	12.32301

SOLIDS CONTENT (%)

Time	Height from Bottom (metres)																																																	
days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	48.21507	26.43877	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	50.90568	26.83791	26.10093	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	52.48414	37.68738	29.08397	25.99081	25.9	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	53.60347	41.12871	32.11613	27.75116	25.94424	25.9	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	54.47039	43.672	34.69903	29.8817	27.08271	25.9224	25.9	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	55.17742	45.63104	36.92066	31.79776	28.70602	26.68906	25.9116	25.9	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	55.77405	47.19437	38.8492	33.51623	30.22621	27.98068	26.4366	25.9061	25.9	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	56.28987	48.47848	40.53487	35.07161	31.61802	29.23983	27.48928	26.26695	25.90324	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	56.74399	49.55811	42.01728	36.49016	32.89823	30.41202	28.56117	27.13571	26.15023	25.90173	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	57.14945	50.48322	43.32872	37.79116	34.08365	31.50199	29.57474	28.06505	26.87066	26.06924	25.90093	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	57.51558	51.28836	44.49587	38.98921	35.18772	32.52001	30.52603	28.95771	27.6866	26.66621	26.01316	25.9005	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	57.84924	51.99824	45.54072	40.09592	36.22087	33.47543	31.42057	29.80273	28.48334	27.38869	26.50535	25.97466	25.90027	25.9	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	58.15565	52.63101	46.48146	41.12086	37.19129	34.37606	32.26476	30.60213	29.2438	28.107	27.14853	26.37713	25.94858	25.90015	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	58.43889	53.20034	47.3331	42.07217	38.1055	35.22822	33.06434	31.36009	29.9672	28.79822	27.80111	26.95132	26.27416	25.93117	25.90008	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	58.70215	53.71666	48.10809	42.95697	38.9688	36.03707	33.82421	32.08081	30.65602	29.45921	28.43435	27.54766	26.78703	26.19124	25.91973	25.90004	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	58.94805	54.1882	48.81674	43.7815	39.7856	36.80687	34.54849	32.76805	31.31327	30.09108	29.04297	28.13146	27.33437	26.64863	26.12456	25.91234	25.90002	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	59.17868	54.62145	49.46767	44.55133	40.55965	37.54113	35.24063	33.42509	31.94185	30.69591	29.62691	28.69535	27.87535	27.1526	26.53106	26.07124	25.90763	25.90001	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	59.39582	55.02165	50.06809	45.27145	41.2942	38.24283	35.90356	34.05475	32.54434	31.2759	30.18753	29.23829	28.40051	27.65599	26.99604	26.43058	26.02894	25.90467	25.90001	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	59.60093	55.39308	50.62409	45.94631	41.99209	38.91447	36.53976	34.65944	33.12305	31.83311	30.72645	29.76098	28.90787	28.14719	27.46605	26.86003	26.34438	25.99578	25.90284	25.9	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	59.79525	55.73927	51.14081	46.57993	42.65587	39.55821	37.15138	35.24126	33.67999	32.36942	31.24531	30.26461	29.3976	28.62333	27.92717	27.30006	26.74102	26.27028	25.97013	25.90171	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	59.97984	56.06317	51.62264	47.17587	43.28783	40.17594	37.74024	35.80204	34.21691	32.8865	31.74565	30.75047	29.87049	29.08408	28.37564	27.73428	27.15385	26.63628	26.20661	25.9506	25.90102	25.9	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	60.15562	56.36724	52.07333	47.73739	43.89007	40.7693	38.30793	36.34334	34.73536	33.38582	32.22886	31.21979	30.32755	29.5299	28.81067	28.15802	27.56382	27.0242	26.54367	26.15201	25.93597	25.90061	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	60.32337	56.6536	52.49611	48.26737	44.46449	41.33977	38.85586	36.86655	35.2367	33.86871	32.69617	31.67375	30.76978	29.96155	29.23243	28.57003	27.96528	27.41212	26.90855	26.46149	26.10538	25.9252	25.90036	25.9	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	60.48379	56.92404	52.89376	48.76842	45.01287	41.88866	39.38524	37.3729	35.72213	34.33633	33.14873	32.1134	31.19815	30.37985	29.64146	28.97023	28.35655	27.79338	27.2763	26.80488	26.3884	26.06579	25.9174	25.90021	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	60.63747	57.1801	53.26872	49.2429	45.53681	42.41717	39.89716	37.86345	36.19272	34.78973	33.58754	32.5397	31.61357	30.78559	30.03842	29.35897	28.7373	28.16584	27.63912	27.15403	26.71155	26.3233	26.03245	25.91185	25.90012	25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	60.78496	57.42312	53.62309	49.69291	46.03784	42.92638	40.39261	38.33917	36.64942	35.22985	34.0135	32.95354	32.01686	31.17955	30.42396	29.73675	29.10771	28.52893	27.99442	27.49993	27.04344	26.62723	26.26529	26.00462	25.90797	25.90007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	60.92672	57.65426	53.95873	50.12038	46.51733	43.41728	40.87244	38.80091	37.09308	35.65751	34.42743	33.35569	32.40877	31.56244	30.79874	30.10412	29.46814	28.88268	28.3414	27.83951	27.37373	26.943	26.55082	26.21365	25.98165	25.9053	25.90004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	61.06317	57.87456	54.27727	50.52701	46.97661	43.89082	41.33745	39.24944	37.52447	36.07347	34.83008	33.74687	32.79001	31.93491	31.16338	30.46163	29.81905	29.22733	28.67993	28.17171	27.69882	27.25881	26.85144	26.48143	26.16775	25.96294	25.90348	25.90001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	61.19469	58.08492	54.58016	50.91437	47.41686	44.34783	41.78836	39.68544	37.94426	36.47842	35.2221	34.12774	33.16119	32.29758	31.51845	30.80982	30.16091	29.56325	29.01015	28.49626	28.0174	27.57049	27.15375	26.76771	26.41831	26.12709	25.94789	25.90227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	61.32162	58.28611	54.86868	51.28388	47.83921	44.78913	42.22582	40.10954	38.35308	36.87297	35.60411	34.49889	33.5229	32.65099	31.86448	31.14918	30.49417	29.89083	29.33235	28.81322	28.32908	27.87648	27.45297	27.05737	26.69092	26.36081	26.09121	25.93596	25.90139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	61.44425	58.47887	55.14396	51.63681	48.24417	45.21545	42.65044	40.52231	38.75149	37.25768	35.97665	34.86086	33.87566	32.99566	32.20196	31.48019	30.81926	30.21046	29.64684	29.1228	28.63381	28.17624	27.74727	27.34496	26.96868	26.62032	26.30841	26.05971	25.92665	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	61.56288	58.66381	55.40702	51.97433	48.63433	45.62752	43.06278	40.92427	39.14001	37.63305	36.34024	35.21414	34.21996	33.33206	32.53134	31.80327	31.13661	30.52253	29.95397	29.42525	28.93173	28.46964	28.03596	27.62837	27.24538	26.88682	26.55529	26.26068	26.03226	25.91869	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	61.67774	58.8415	55.65877	52.29749	49.00897	46.02597	43.46336	41.31589	39.51909	37.99955	36.69532	35.55919	34.55623	33.66062	32.85306	32.11884	31.4466	30.82739	30.25407	29.72086	29.22304	28.75676	28.31884	27.90675	27.5186	27.15328	26.81109	26.49529	26.21722	26.00851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	61.78906	59.01245	55.90004	52.60727	49.36948	46.41145	43.85267	41.69761	39.88917	38.35761	37.04233	35.89642	34.88489	33.98175	33.16749	32.42727	31.74959	31.12539	30.54745	30.00992	29.508	29.03775	28.59592	28.17982	27.78735	27.41695	27.06789	26.74086	26.43985	26.17771	25.97731	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	61.89705	59.17712	56.13156	52.90455	49.71665	46.78454	44.23116	42.06983	40.25064	38.70762	37.38165	36.22622	35.20632	34.2958	33.47499	32.72891	32.04592	31.41687	30.83444	30.29272	29.78684	29.31281	28.8673	28.44753	28.05125	27.67667	27.32257	26.98852	26.67561	26.38858	26.14188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	62.0019	59.33593	56.354	53.19012	50.0512	47.1458	44.59926	42.43293	40.60386	39.04993	37.71363	36.54894	35.52085	34.60311	33.7759	33.02408	32.3359	31.70211	31.11532	30.56953	30.05983	29.58217	29.13315	28.70994	28.3102	27.93198	27.57381	27.23471	26.91457	26.61487	26.34115	26.05202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	62.10378	59.48924	56.56797	53.46474	50.37383	47.49575	44.95737	42.78726	40.94916	39.38487	38.03861	36.8649	35.82882	34.90401	34.07053	33.31309	32.61983	31.98142	31.39036	30.84061	30.32721	29.84603	29.39366	28.96719	28.56422	28.18271	27.82104	27.47796	27.15274	26.84554	26.55826	26.29725	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	62.20286	59.6374	56.77401	53.72907	50.68518	47.83489	45.30587	43.13314	41.28686	39.71276	38.35689	37.1744	36.13051	35.19879	34.35916	33.59621	32.89799	32.25504	31.65982	31.10622	30.58921	30.10463	29.64901	29.21943	28.81341	28.42886	28.06405	27.71758	27.38843	27.07609	26.78098	26.50542	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	62.29927	59.78073	56.97264	53.98374	50.98583	48.1637	45.64513	43.47088	41.61723	40.03387	38.66874	37.47773	36.42621	35.48772	34.64206	33.87371	33.17062	32.52324	31.92395	31.36658	30.84605	30.35817	29.89942	29.46683	29.0579	28.67048	28.30279	27.95332	27.62088	27.30463	27.00429	26.7205	26.45606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	62.39317	59.9195	57.1643	54.22933	51.27635	48.48263	45.97549	43.80076	41.94055	40.34847	38.97444	37.77514	36.71617	35.77104	34.91947	34.14584	33.43796	32.78624	32.18297	31.62191	31.09795	30.60685	30.14506	29.70956	29.29783	28.90769	28.5373	28.18508	27.84975	27.53028	27.22603	26.93689	26.66376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	62.48466	60.05399	57.34942	54.46635	51.55726	48.7921	46.29727	44.12306	42.25707	40.6568	39.27423	38.06688	37.00063	36.049	35.19164	34.41281	33.70025	33.04426	32.43709	31.87242	31.34511	30.85087	30.38611	29.9478	29.53337	29.14062	28.76766	28.41288	28.07492	27.75266	27.44525	27.15218	26.87353	26.61046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	62.57388	60.18442	57.52838	54.69531	51.82906	49.09251	46.61079	44.43802	42.56701	40.95909	39.56833	38.35317	37.27982	36.32182	35.45877	34.67484	33.95768	33.29752	32.68651	32.11832	31.58772	31.09041	30.62276	30.18171	29.76466	29.36939	28.99397	28.63677	28.29637	27.97159	27.66146	27.36527	27.08266	26.81387	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	62.66093	60.31103	57.70154	54.91664	52.09218	49.38425	46.91634	44.74591	42.87061	41.25555	39.85694	38.63423	37.55394	36.58971	35.72107	34.93214	34.21046	33.54619	32.93142	32.35977	31.82596	31.32565	30.85517	30.41145	29.99185	29.59414	29.21636	28.85684	28.51415	28.18705	27.87449	27.57564	27.28993	27.01711	26.75761	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	62.7459	60.43401	57.86921	55.13076	52.34707	49.66768	47.2142	45.04693	43.16806	41.54639	40.14028	38.91024	37.82318	36.85285	35.97874	35.18488	34.45877	33.79046	33.17201	32.59695	32.05999	31.55674	31.0835	30.63717	30.2151	29.81501	29.43494	29.0732	28.72833	28.39904	28.08425	27.78306	27.49474	27.21883	26.95522	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	62.8289	60.55356	58.03171	55.33807	52.59413	49.94316	47.50465	45.34132	43.45957	41.83178	40.41853	39.18139	38.08774	37.11142	36.23194	35.43325	34.70277	34.0305	33.40843	32.83003	32.28998	31.78384	31.3079	30.85902	30.43453	30.03213	29.64984	29.28596	28.93899	28.60762	28.29076	27.98742	27.69681	27.41834	27.15163	26.8967	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	62.91001	60.66984	58.18931	55.53892	52.83372	50.211	47.78795	45.62928	43.7453	42.1119	40.69185	39.44786	38.34778	37.36561	36.48085	35.67741	34.94264	34.26647	33.64084	33.05917	32.51608	32.00711	31.52852	31.07714	30.65028	30.24563	29.86118	29.49522	29.14622	28.81288	28.49403	28.1887	27.89603	27.61533	27.34608	27.08802	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	62.98931	60.78303	58.34226	55.73365	53.06622	50.47152	48.06435	45.91101	44.02545	42.38692	40.96041	39.7098	38.60346	37.61556	36.72562	35.91752	35.17853	34.49853	33.86939	33.28449	32.73843	32.22668	31.74549	31.29166	30.86249	30.45563	30.06908	29.70109	29.35013	29.01488	28.69415	28.38694	28.09236	27.80965	27.53822	27.27765	27.0277	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	63.06689	60.89327	58.49081	55.92255	53.29193	50.72501	48.33407	46.1867	44.30018	42.657	41.22437	39.96738	38.85493	37.86142	36.9664	36.15371	35.41057	34.7268	34.09422	33.50616	32.95716	32.44268	31.95894	31.50271	31.07127	30.66226	30.27365	29.90369	29.55083	29.21372	28.89118	28.58218	28.28579	28.00125	27.72787	27.46515	27.21274	0	0	0	0	0	0	0	0	0	0	0	0	0

1788.5	63.1428	61.00071	58.63517	56.10594	53.51119	50.97176	48.59736	46.45654	44.56964	42.92228	41.48387	40.22072	39.10234	38.10335	37.20334	36.38614	35.63892	34.95144	34.31546	33.72428	33.1724	32.65525	32.169	31.71041	31.27674	30.86562	30.475	30.10311	29.7484	29.40949	29.0852	28.77448	28.47638	28.19011	27.91495	27.65034	27.39581	27.15083	0	0	0	0	0	0	0	0	0	0	0	0
1825	63.21713	61.10546	58.77555	56.28406	53.72427	51.21204	48.85443	46.72069	44.83398	43.1829	41.73903	40.46997	39.34583	38.34146	37.43656	36.61493	35.86369	35.17256	34.53324	33.93899	33.38427	32.86448	32.37577	31.91487	31.47902	31.06583	30.67324	30.29947	29.94294	29.60229	29.2763	28.96391	28.66418	28.37627	28.09945	27.83311	27.57673	27.32992	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	63.28993	61.20766	58.91215	56.45718	53.93147	51.4461	49.10548	46.97934	45.09335	43.43899	41.99	40.71525	39.5855	38.5759	37.66619	36.8402	36.08501	35.39028	34.74767	34.1504	33.59289	33.07051	32.57938	32.11621	31.67821	31.26299	30.86847	30.49285	30.13455	29.79219	29.46455	29.15055	28.84924	28.55976	28.28138	28.01343	27.75537	27.50675	27.26186	0	0	0	0	0	0	0	0	0	0	0
1898	63.36127	61.30742	59.04514	56.62553	54.13303	51.67418	49.35073	47.23263	45.34788	43.69068	42.2369	40.95669	39.8215	38.80677	37.89235	37.06208	36.30299	35.60472	34.95887	34.35863	33.79837	33.27344	32.77992	32.31451	31.87441	31.45719	31.06078	30.68335	30.32332	29.97929	29.65004	29.33448	29.03163	28.74065	28.46077	28.19131	27.9317	27.68144	27.44014	0	0	0	0	0	0	0	0	0	0	0
1934.5	63.4312	61.40485	59.17469	56.78934	54.3292	51.89652	49.59036	47.48073	45.59771	43.93809	42.47983	41.19439	40.05393	39.03419	38.11515	37.28066	36.51775	35.81598	35.16695	34.56377	34.00081	33.47336	32.97749	32.50989	32.06771	31.64854	31.25026	30.87106	30.50933	30.16367	29.83285	29.51576	29.21143	28.91899	28.63767	28.36678	28.10571	27.85395	27.61105	0	0	0	0	0	0	0	0	0	0	0
1971	63.49977	61.50005	59.30096	56.9488	54.52022	52.11334	49.82456	47.72379	45.84296	44.18134	42.71891	41.42847	40.28289	39.25826	38.3347	37.49607	36.72938	36.02418	35.372	34.76593	34.2003	33.67037	33.1722	32.70243	32.25822	31.83712	31.43701	31.05607	30.69267	30.34542	30.01306	29.69448	29.3887	29.09485	28.81213	28.53987	28.27742	28.02425	27.77989	27.54393	0	0	0	0	0	0	0	0	0	0
2007.5	63.56704	61.5931	59.42409	57.10412	54.7063	52.32483	50.05351	47.96194	46.08375	44.42052	42.95425	41.65903	40.50849	39.47909	38.55109	37.70839	36.93798	36.22939	35.57412	34.9652	34.39694	33.86458	33.36413	32.89223	32.44601	32.02301	31.62111	31.23846	30.87343	30.5246	30.19073	29.8707	29.56351	29.26828	28.98422	28.71062	28.44685	28.19235	27.94663	27.70926	0	0	0	0	0	0	0	0	0	0
2044	63.63305	61.6841	59.54422	57.25547	54.88764	52.53122	50.27738	48.19534	46.3202	44.65576	43.18593	41.88617	40.73083	39.69678	38.76442	37.91772	37.14366	36.43173	35.7734	35.16168	34.59082	34.05605	33.55336	33.07936	32.63117	32.20631	31.80264	31.4183	31.05167	30.70131	30.36596	30.0445	29.73592	29.43935	29.15398	28.8791	28.61406	28.35829	28.11128	27.87259	27.63591	0	0	0	0	0	0	0	0	0
2080.5	63.69785	61.77314	59.66147	57.40303	55.06445	52.73267	50.49633	48.42411	46.55242	44.88713	43.41406	42.10996	40.95	39.91141	38.97479	38.12415	37.34649	36.63127	35.96993	35.35544	34.78203	34.24489	33.73999	33.26392	32.81378	32.38708	31.98168	31.59568	31.22747	30.8756	30.5388	30.21594	29.90602	29.60813	29.32148	29.04535	28.77908	28.52208	28.27385	28.03392	27.80188	0	0	0	0	0	0	0	0	0
2117	63.76147	61.86029	59.77598	57.54695	55.2369	52.92938	50.71052	48.64838	46.78052	45.11475	43.63873	42.33052	41.16608	40.12307	39.18227	38.32777	37.54657	36.82811	36.16379	35.54657	34.97064	34.43116	33.92408	33.44597	32.99392	32.56541	32.15829	31.77067	31.4009	31.04755	30.70932	30.38509	30.07384	29.77468	29.48678	29.20943	28.94196	28.68378	28.43438	28.19326	27.96002	0	0	0	0	0	0	0	0	0
2153.5	63.82397	61.94562	59.88785	57.68739	55.40518	53.12152	50.9201	48.86829	47.0046	45.3387	43.86001	42.54791	41.37916	40.33184	39.38695	38.52865	37.74397	37.02231	36.35506	35.73515	35.15672	34.61494	34.10571	33.62559	33.17165	32.74136	32.33255	31.94333	31.57204	31.21722	30.8776	30.55202	30.23947	29.93905	29.64993	29.37138	29.10275	28.84343	28.59289	28.35064	28.11626	27.88933	0	0	0	0	0	0	0	0
2190	63.88538	62.0292	59.9972	57.8245	55.56944	53.30926	51.12523	49.08394	47.22477	45.55907	44.078	42.76222	41.58931	40.5378	39.58891	38.72689	37.93876	37.21396	36.54382	35.92124	35.34037	34.7963	34.28495	33.80285	33.34705	32.91501	32.50454	32.11374	31.74094	31.38469	31.04368	30.71678	30.40296	30.1013	29.81098	29.53128	29.26151	29.00107	28.74943	28.5061	28.27062	28.0426	0	0	0	0	0	0	0	0
2226.5	63.94574	62.11111	60.10411	57.9584	55.72984	53.49274	51.32604	49.29546	47.44112	45.77595	44.29277	42.97353	41.79661	40.74103	39.78823	38.92254	38.13103	37.40312	36.73013	36.10493	35.52163	34.97532	34.46188	33.97783	33.52018	33.08641	32.6743	32.28195	31.90767	31.55	31.20764	30.87944	30.56436	30.26149	29.97	29.68915	29.41827	29.15676	28.90405	28.65965	28.42312	28.19406	27.9673	0	0	0	0	0	0	0
2263	64.00507	62.1914	60.2087	58.08923	55.88653	53.67212	51.52266	49.50296	47.65374	45.98941	44.50439	43.1819	42.00114	40.9416	39.98496	39.11568	38.32085	37.58988	36.91407	36.28628	35.70059	35.15206	34.63656	34.15057	33.69112	33.25563	32.84191	32.44802	32.07229	31.71322	31.36953	31.04005	30.72374	30.41968	30.12704	29.84507	29.5731	29.31052	29.05677	28.81135	28.57381	28.34373	28.12074	0	0	0	0	0	0	0
2299.5	64.06342	62.27013	60.31104	58.21711	56.03965	53.84755	51.71522	49.70655	47.86272	46.19954	44.71295	43.38741	42.20296	41.13957	40.17919	39.30638	38.50827	37.77428	37.0957	36.46536	35.8773	35.32658	34.80904	34.32115	33.8599	33.42274	33.00742	32.61202	32.23485	31.87441	31.52941	31.19866	30.88114	30.57591	30.28214	29.99908	29.72604	29.46242	29.20765	28.96124	28.7227	28.49164	28.26767	27.31154	0	0	0	0	0	0
2336	64.12082	62.34735	60.41123	58.34214	56.18934	54.01916	51.90386	49.90634	48.06816	46.40641	44.9185	43.59012	42.40213	41.33502	40.37098	39.4947	38.69337	37.95641	37.27509	36.64222	36.05183	35.49895	34.97939	34.48962	34.02661	33.58778	33.17089	32.774	32.39541	32.03362	31.68732	31.35533	31.03662	30.73024	30.43536	30.15122	29.87714	29.6125	29.35673	29.10934	28.86985	28.63784	28.41292	28.19473	0	0	0	0	0	0
2372.5	64.17728	62.42313	60.50934	58.46445	56.33572	54.18708	52.08869	50.10242	48.27014	46.6101	45.12112	43.7901	42.59873	41.52799	40.56038	39.6807	38.8762	38.13631	37.45229	36.81692	36.22423	35.66922	35.14767	34.65604	34.19129	33.75081	33.33238	32.93402	32.55403	32.19091	31.84333	31.51012	31.19023	30.88271	30.58674	30.30154	30.02643	29.76079	29.50405	29.25571	29.01528	28.78234	28.55651	28.33743	0	0	0	0	0	0
2409	64.23286	62.49751	60.60546	58.58412	56.47891	54.35144	52.26982	50.2949	48.46873	46.81067	45.32087	43.9874	42.7928	41.71856	40.74746	39.86444	39.05683	38.31404	37.62736	36.98953	36.39457	35.83744	35.31393	34.82046	34.35399	33.9119	33.49193	33.09212	32.71075	32.34631	31.99748	31.66306	31.34201	31.03338	30.73633	30.45009	30.17397	29.90735	29.64966	29.40037	29.15903	28.9252	28.69848	28.47851	28.26225	0	0	0	0	0
2445.5	64.28756	62.57054	60.69965	58.70126	56.61903	54.51235	52.44737	50.48387	48.66403	47.00819	45.51781	44.18209	42.98441	41.90678	40.93227	40.04599	39.2353	38.48967	37.80035	37.1601	36.56289	36.00367	35.47822	34.98294	34.51477	34.07107	33.64959	33.24835	32.86562	32.49989	32.14981	31.81421	31.49202	31.18229	30.88418	30.59691	30.3198	30.05221	29.79358	29.54338	29.30114	29.06643	28.83884	28.61802	28.40363	0	0	0	0	0
2482	64.34143	62.64226	60.79198	58.81596	56.75618	54.66993	52.62144	50.66942	48.85611	47.20274	45.71201	44.37423	43.17362	42.0927	41.11487	40.22538	39.41168	38.66324	37.97133	37.32868	36.72924	36.16797	35.6406	35.14353	34.67367	34.2284	33.80543	33.40277	33.01869	32.65168	32.30038	31.96361	31.64029	31.32948	31.03032	30.74205	30.46396	30.19542	29.93587	29.68477	29.44165	29.20608	28.97764	28.75598	28.54077	28.13776	0	0	0	0
2518.5	64.39447	62.71272	60.88252	58.92831	56.89047	54.8243	52.79215	50.85165	49.04504	47.39437	45.90351	44.56386	43.36046	42.27638	41.29531	40.40268	39.58601	38.83481	38.14034	37.49531	36.89369	36.33038	35.80111	35.30226	34.83075	34.38392	33.95947	33.55541	33.17001	32.80174	32.44923	32.1113	31.78687	31.475	31.17481	30.88554	30.60649	30.33702	30.07656	29.82458	29.58059	29.34417	29.11491	28.89244	28.67641	28.46651	0	0	0	0
2555	64.44672	62.78195	60.97133	59.03839	57.022	54.97555	52.95958	51.03064	49.2309	47.58315	46.09237	44.75105	43.545	42.45787	41.47364	40.57794	39.75835	39.00442	38.30742	37.66006	37.05626	36.49094	35.9598	35.4592	34.98605	34.53767	34.11176	33.70633	33.31962	32.9501	32.5964	32.25733	31.93181	31.61888	31.31767	31.02743	30.74743	30.47704	30.21568	29.96283	29.718	29.48075	29.25068	29.02741	28.8106	28.59994	0	0	0	0
2591.5	64.4982	62.85001	61.05847	59.14628	57.15087	55.12378	53.12383	51.20648	49.41375	47.76914	46.27866	44.93583	43.72729	42.63721	41.64991	40.75119	39.92874	39.17213	38.47263	37.82296	37.21702	36.64971	36.11671	35.61439	35.13961	34.68971	34.26236	33.85556	33.46756	33.0968	32.74193	32.40173	32.07513	31.76116	31.45896	31.16774	30.88681	30.61552	30.35328	30.09958	29.85392	29.61585	29.38498	29.16093	28.94335	28.73193	28.52508	0	0	0
2628	64.54893	62.91692	61.144	59.25205	57.27715	55.2691	53.285	51.37925	49.59367	47.95239	46.46242	45.11826	43.90737	42.81445	41.82416	40.92249	40.09722	39.33797	38.63601	37.98406	37.376	36.80672	36.27189	35.76786	35.29148	34.84006	34.41129	34.00315	33.61387	33.24189	32.88586	32.54455	32.21688	31.90189	31.5987	31.30653	31.02468	30.75249	30.48939	30.23484	29.98836	29.7495	29.51785	29.29303	29.07469	28.86253	28.65624	0	0	0
2664.5	64.59894	62.98272	61.22796	59.35578	57.40095	55.41159	53.44318	51.54902	49.77073	48.13297	46.6437	45.29839	44.08529	42.98963	41.99644	41.09189	40.26385	39.50199	38.79761	38.1434	37.53325	36.96202	36.42539	35.91965	35.44169	34.98878	34.55861	34.14913	33.75859	33.38541	33.02823	32.68582	32.3571	32.04109	31.73693	31.44382	31.16106	30.888	30.62404	30.36867	30.12138	29.88173	29.64931	29.42373	29.20466	28.99177	28.78476	28.52918	0	0
2701	64.64823	63.04745	61.31042	59.45753	57.52234	55.55134	53.59844	51.71587	49.94499	48.31093	46.82255	45.47626	44.26108	43.1628	42.16679	41.25941	40.42866	39.66424	38.95746	38.30102	37.6888	37.11565	36.57722	36.06982	35.59028	35.13591	34.70434	34.29355	33.90175	33.52739	33.16907	32.82558	32.49582	32.17881	31.87369	31.57965	31.296	31.02206	30.75727	30.50108	30.25299	30.01257	29.77939	29.55308	29.33328	29.11968	28.91197	28.70986	0	0
2737.5	64.69684	63.11113	61.39141	59.55738	57.6414	55.68844	53.75088	51.87988	50.11651	48.48632	46.99902	45.65192	44.4348	43.33401	42.33525	41.42511	40.59169	39.82474	39.1156	38.45696	37.8427	37.26765	36.72745	36.21839	35.7373	35.28147	34.84852	34.43643	34.0434	33.66786	33.30842	32.96386	32.63307	32.31508	32.00901	31.71406	31.42951	31.15473	30.8891	30.63211	30.38324	30.14205	29.90813	29.68109	29.46058	29.24628	29.03788	28.83511	0	0
2774	64.74477	63.17381	61.47099	59.65538	57.7582	55.82297	53.90057	52.04112	50.28535	48.65921	47.17315	45.8254	44.60648	43.50328	42.50186	41.58903	40.75299	39.98355	39.27208	38.61127	37.99499	37.41806	36.8761	36.36541	35.88278	35.4255	34.9912	34.57782	34.18357	33.80686	33.44632	33.1007	32.7689	32.44993	32.14292	31.84707	31.56165	31.28602	31.01958	30.76179	30.51215	30.27021	30.03556	29.8078	29.58659	29.3716	29.16253	28.95909	28.76048	0
2810.5	64.79206	63.2355	61.5492	59.75159	57.87282	55.955	54.04759	52.19965	50.45158	48.82962	47.34499	45.99675	44.77616	43.67066	42.66666	41.75119	40.91258	40.1407	39.42692	38.76397	38.14569	37.5669	37.02321	36.5109	36.02676	35.56805	35.1324	34.71774	34.32228	33.94443	33.58279	33.23612	32.90332	32.58339	32.27546	31.97871	31.69243	31.41597	31.14872	30.89014	30.63975	30.39707	30.16169	29.93323	29.71133	29.49567	29.28593	29.08184	28.88315	0
2847	64.83871	63.29624	61.62609	59.84607	57.98533	56.08461	54.19201	52.35555	50.61526	48.99763	47.51459	46.16602	44.94388	43.83618	42.82969	41.91165	41.07051	40.29622	39.58018	38.91511	38.29485	37.71422	37.16882	36.6549	36.16926	35.70913	35.27215	34.85624	34.45959	34.0806	33.71788	33.37017	33.03638	32.7155	32.40665	32.10902	31.82189	31.5446	31.27656	31.01721	30.76606	30.52265	30.28656	30.05741	29.83483	29.6185	29.40811	29.20339	29.00406	28.79393
2883.5	64.88474	63.35606	61.70168	59.93887	58.09578	56.21188	54.3339	52.50889	50.77643	49.16327	47.68199	46.33323	45.10968	43.99988	42.99097	42.07042	41.22681	40.45015	39.73187	39.06471	38.4425	37.86006	37.31296	36.79745	36.31032	35.8488	35.4105	34.99334	34.5955	34.21539	33.8516	33.50287	33.1681	32.84628	32.53652	32.23802	31.95006	31.67195	31.40312	31.14301	30.89112	30.64699	30.4102	30.18036	29.95712	29.74013	29.5291	29.32375	29.1238	28.92901

VOID RATIO e

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
36.5	2.846207	7.373159	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
73	2.555706	5.419942	7.502894	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
109.5	2.399144	4.381531	6.461548	7.545913	7.58166	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
146	2.29371	3.793187	5.601304	6.899149	7.564212	7.58166	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
182.5	2.215029	3.417961	4.987102	6.218304	7.134839	7.572819	7.58166	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
219	2.15269	3.157451	4.527553	5.683921	6.581514	7.279163	7.577079	7.58166	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
255.5	2.101314	2.965077	4.171247	5.256617	6.117227	6.82082	7.373982	7.579252	7.58166	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
292	2.057774	2.816344	3.88758	4.905968	5.731296	6.41298	6.990121	7.438722	7.580382	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
328.5	2.020098	2.697258	3.656929	4.612231	5.405144	6.063661	6.628332	7.11573	7.483754	7.580976	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
365	1.986965	2.599269	3.466035	4.362223	5.124988	5.762166	6.310349	6.792348	7.212058	7.515235	7.581292	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
401.5	1.957447	2.516864	3.30561	4.146752	4.881037	5.49883	6.031117	6.501276	6.921419	7.287671	7.537151	7.581461	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
438	1.930873	2.446326	3.168968	3.959152	4.666223	5.266253	5.783966	6.241804	6.653683	7.025526	7.347982	7.55225	7.581552	7.58166	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
474.5	1.906737	2.385054	3.051198	3.794419	4.475324	5.058853	5.563296	6.009529	6.41175	6.778255	7.111116	7.396582	7.562507	7.581601	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
511	1.884652	2.331171	2.948619	3.6487	4.304377	4.872379	5.364676	5.800232	6.193001	6.551956	6.881994	7.182542	7.435956	7.569363	7.581628	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
547.5	1.864315	2.283292	2.858429	3.518965	4.150313	4.703539	5.184624	5.610391	5.994305	6.345488	6.669713	6.969693	7.242847	7.467887	7.573871	7.581643	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
584	1.845484	2.240364	2.778466	3.402786	4.010702	4.549743	5.020379	5.437146	5.812864	6.156596	6.474412	6.77006	7.044753	7.294224	7.49371	7.576787	7.581651	7.58166	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
620.5	1.827964	2.201574	2.707034	3.298195	3.883587	4.408924	4.86973	5.278176	5.646326	5.983072	6.29457	6.584946	6.856607	7.109656	7.338291	7.514459	7.578646	7.581655	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
657	1.811593	2.166286	2.642792	3.203579	3.767367	4.279404	4.730884	5.131588	5.492736	5.822979	6.12846	6.413457	6.680819	6.932011	7.166254	7.376264	7.530975	7.579814	7.581657	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
693.5	1.79624	2.133991	2.584662	3.117601	3.660713	4.159807	4.602373	4.995825	5.35047	5.674666	5.974492	6.254276	6.517052	6.764794	6.998275	7.215961	7.409073	7.543962	7.58054	7.581659	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
730	1.78179	2.104278	2.531771	3.039146	3.56251	4.048989	4.482979	4.869594	5.218173	5.536739	5.831272	6.106101	6.364341	6.608181	6.838968	7.056938	7.259869	7.437444	7.55403	7.580985	7.581659	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
766.5	1.768151	2.076811	2.483406	2.967278	3.471813	3.945988	4.371683	4.751814	5.094709	5.408018	5.6976	5.967756	6.221631	6.461514	6.688997	6.904963	7.109204	7.298838	7.461952	7.56171	7.581257	7.58166	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
803	1.755241	2.051312	2.438977	2.901204	3.387812	3.849989	4.267627	4.64157	4.979114	5.287501	5.572445	5.838205	6.08793	6.323954	6.547983	6.761174	6.964053	7.156026	7.33355	7.483064	7.567471	7.58142	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
839.5	1.74299	2.027549	2.397993	2.840252	3.309811	3.760292	4.170078	4.538087	4.870569	5.174331	5.454924	5.716549	5.962347	6.194668	6.415275	6.625455	6.826037	7.017256	7.198172	7.364553	7.501163	7.571717	7.581518	7.58166	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
876	1.731339	2.005327	2.360043	2.783844	3.237206	3.676294	4.078409	4.4407	4.768371	5.067773	5.344273	5.602007	5.844093	6.072887	6.29018	6.497321	6.695284	6.884645	7.065395	7.236261	7.392291	7.516581	7.574791	7.581577	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
912.5	1.720235	1.98448	2.324777	2.731487	3.169468	3.59747	3.992076	4.348834	4.671914	4.96719	5.239832	5.493897	5.732477	5.957923	6.172037	6.376202	6.571465	6.75856	6.93786	7.109141	7.270803	7.417127	7.529604	7.576979	7.581611	7.58166	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
949	1.709631	1.964866	2.291901	2.682752	3.106135	3.523361	3.910606	4.261991	4.580673	4.872031	5.141025	5.391626	5.62689	5.84916	6.060241	6.261532	6.454118	6.638815	6.816171	6.986387	7.149048	7.302219	7.43936	7.540498	7.578511	7.581632	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
985.5	1.699487	1.946364	2.261161	2.637271	3.046801	3.45356	3.833587	4.179737	4.494189	4.781815	5.04735	5.294672	5.526799	5.746056	5.954247	6.152782	6.342763	6.525049	6.700278	6.868846	7.030813	7.185578	7.330858	7.459237	7.549505	7.579567	7.581644	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1022	1.689768	1.928868	2.232338	2.59472	2.991105	3.387709	3.760652	4.101689	4.412059	4.696118	4.958367	5.20258	5.431731	5.648128	5.85357	6.049468	6.236935	6.416855	6.589912	6.7566	6.917195	7.071627	7.219116	7.357011	7.476968	7.556858	7.580285	7.581657	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1058.5	1.680441	1.912286	2.205244	2.554817	2.938729	3.325489	3.69148	4.027512	4.333928	4.614568	4.873686	5.114944	5.341269	5.55495	5.757775	5.951153	6.136207	6.31383	6.484734	6.649466	6.808407	6.961727	7.10924	7.249988	7.380924	7.49273	7.562778	7.580766	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1095	1.671478	1.896537	2.179714	2.517316	2.889389	3.266614	3.625781	3.956907	4.259484	4.536836	4.792961	5.031406	5.255044	5.46614	5.666472	5.857446	6.040187	6.215594	6.384395	6.547166	6.704346	6.856221	7.002872	7.144003	7.278471	7.402803	7.506679	7.567473	7.58111	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1131.5	1.662852	1.881551	2.155604	2.481998	2.84283	3.210828	3.563301	3.889607	4.188446	4.462628	4.715888	4.951648	5.172726	5.381359	5.579314	5.767993	5.948519	6.121796	6.288558	6.449401	6.604794	6.755087	6.90049	7.040999	7.176214	7.304801	7.422823	7.518952	7.571141	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1168	1.654542	1.867265	2.132788	2.448671	2.798826	3.157899	3.503806	3.825375	4.120566	4.391683	4.642192	4.875386	5.094019	5.300303	5.49599	5.682476	5.860882	6.032112	6.196908	6.355872	6.509494	6.65816	6.802145	6.941591	7.076421	7.20613	7.329179	7.441134	7.529678	7.574283	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1204.5	1.646526	1.853624	2.111154	2.417164	2.757173	3.107618	3.447089	3.763997	4.05562	4.323767	4.571628	4.802363	5.01866	5.2227	5.41622	5.60061	5.776985	5.946252	6.109153	6.266298	6.418186	6.565224	6.707727	6.845909	6.979851	7.109409	7.233971	7.351779	7.457862	7.538975	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1241	1.638785	1.840578	2.090605	2.387326	2.717688	3.059797	3.392961	3.705281	3.993407	4.258668	4.503977	4.732351	4.946412	5.148304	5.339752	5.522135	5.696565	5.863949	6.025027	6.180414	6.330616	6.476051	6.617058	6.753891	6.886714	7.015553	7.140197	7.259928	7.372751	7.473117	7.551211	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1277.5	1.631303	1.828082	2.071052	2.359021	2.680206	3.014264	3.341251	3.649051	3.933746	4.196198	4.43904	4.665143	4.877058	5.076895	5.266357	5.446818	5.619384	5.784959	5.944286	6.097977	6.246545	6.390415	6.529938	6.665396	6.796994	6.92485	7.048941	7.168991	7.284169	7.392223	7.486993	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1314	1.624063	1.816097	2.052417	2.332128	2.644578	2.970861	3.291803	3.59515	3.876473	4.136184	4.376637	4.600553	4.810407	5.008271	5.19583	5.374448	5.545225	5.709064	5.866705	6.018763	6.165751	6.3081	6.446168	6.580252	6.710585	6.837333	6.96057	7.080229	7.195969	7.306838	7.410307	7.521958	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1350.5	1.617051	1.804587	2.03463	2.306538	2.610668	2.929447	3.244473	3.543433	3.821439	4.078471	4.316606	4.538411	4.746281	4.94225	5.127983	5.304831	5.473892	5.636062	5.792082	5.942566	6.088028	6.228902	6.365551	6.498281	6.627342	6.752927	6.875165	6.994094	7.109604	7.221287	7.328062	7.427099	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1387	1.610255	1.79352	2.017628	2.282153	2.578353	2.889889	3.199131	3.493768	3.768508	4.022918	4.258799	4.478562	4.684521	4.878668	5.062645	5.237794	5.405204	5.56577	5.72023	5.869197	6.013186	6.152632	6.287903	6.419308	6.547108	6.671514	6.792685	6.910719	7.025618	7.137231	7.245083	7.347953	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1423.5	1.603661	1.782867	2.001355	2.258885	2.547523	2.852069	3.155657	3.446036	3.717555	3.969394	4.20308	4.420866	4.624981	4.817373	4.999662	5.173175	5.338998	5.49802	5.650978	5.798483	5.941051	6.079116	6.213049	6.343163	6.469724	6.592955	6.713034	6.830091	6.944193	7.055313	7.163257	7.267479	7.366609	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1460	1.59726	1.7726	1.98576	2.236655	2.518074	2.815875	3.113941	3.400124	3.668468	3.917783	4.149327	4.365195	4.567528	4.758227	4.938889	5.110829	5.275124	5.432659	5.584169	5.730265	5.871461	6.008192	6.140828	6.269687	6.395037	6.517109	6.636093	6.752137	6.865347	6.975764	7.083331	7.18781	7.288582	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1496.5	1.591041	1.762696	1.970796	2.215389	2.489916	2.781208	3.07388	3.35593	3.621141	3.867974	4.097427	4.311432	4.51204	4.701105	4.880198	5.050621	5.213443	5.369546	5.519661	5.664397	5.804268	5.939709	6.07109	6.19873	6.322901	6.443836	6.561734	6.676757	6.78903	6.898635	7.005589	7.109806	7.211005	7.308488	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1533	1.584994	1.753133	1.956422	2.195023	2.462962	2.747972	3.035379	3.313362	3.575478	3.81987	4.047276	4.259467	4.458404	4.645889	4.823468	4.992428	5.15383	5.308552	5.45732	5.600744	5.739335	5.873528	6.003694	6.130152	6.253175	6.373001	6.489831	6.603837	6.715158	6.823897	6.930115	7.033807	7.134859	7.232946	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1569.5	1.579111	1.74389	1.942599	2.175496	2.437136	2.716083	2.998352	3.27233	3.531391	3.773378	3.998779	4.209203	4.406517	4.592474	4.76859	4.936137	5.096169	5.249556	5.397025	5.539181	5.676536	5.809522	5.938512	6.063824	6.185733	6.304477	6.420261	6.533263	6.64363	6.751481	6.856901	6.95993	7.060543	7.158598	7.253723	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1606	1.573384	1.734948	1.929292	2.156754	2.412365	2.685461	2.962718	3.232754	3.488798	3.728413	3.951847	4.160547	4.356285	4.540761	4.715462	4.881644	5.040351	5.19245	5.338663	5.479594	5.615753	5.747573	5.875423	5.999624	6.12045	6.238142	6.352906	6.464922	6.574345	6.681301	6.785893	6.888187	6.988208	7.085909	7.181119	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1642.5	1.567804	1.726291	1.916469	2.138746	2.388585	2.656032	2.928401	3.194559	3.447622	3.684897	3.906399	4.113414	4.307619	4.490658	4.663989	4.828851	4.986278	5.137132	5.282131	5.421877	5.556879	5.687569	5.814317	5.93744	6.057216	6.173884	6.287653	6.398705	6.507197	6.613265	6.717018	6.818541	6.917887	7.015064	7.110004	7.202511	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1679	1.562366	1.717903	1.904101	2.121429	2.365736	2.627728	2.895331	3.157675	3.407793	3.642758	3.86236	4.067728	4.26044	4.442083	4.614086	4.777669	4.933857	5.083506	5.227331	5.365931	5.499814	5.62941	5.755088	5.877168	5.995924	6.111597	6.224397	6.334507	6.442088	6.547277	6.650192	6.750929	6.849559	6.946119	7.040602	7.132921	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1715.5	1.557063	1.709769	1.892162	2.104758	2.343761	2.600486	2.863442	3.122036	3.369245	3.601928	3.819661	4.023415	4.21467	4.394957	4.565672	4.728016	4.883004	5.031487	5.174175	5.311665	5.444464	5.573	5.697642	5.818709	5.936476	6.051182	6.163039	6.272231	6.378919	6.483245	6.585331	6.685279	6.783171	6.879066	6.972988	7.064914	7.154755	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1752	1.551888	1.701876	1.880626	2.088696	2.32261	2.574247	2.832675	3.087582	3.331917	3.562345	3.778236	3.980408	4.170241	4.349209	4.518672	4.679814	4.83364	4.980993	5.122579	5.258995	5.390742	5.518251	5.641889	5.761974	5.878779	5.992547	6.103486	6.211783	6.3176	6.42108	6.522349	6.621512	6.718661	6.813865	6.90717	6.99859	7.088087	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1788.5	1.546836	1.694212	1.869472	2.073208	2.302235	2.548957	2.802971	3.054257	3.295752	3.52395	3.738026	3.938644	4.127087	4.304769	4.473016	4.632993	4.785691	4.931948	5.072467	5.20784	5.338569	5.465082	5.587746	5.706876	5.822749	5.935604	6.045651	6.153077	6.258044	6.360696	6.461162	6.55955	6.655957	6.750461	6.843119	6.933969	7.023012	7.110291	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1825	1.541902	1.686765	1.858677	2.05826	2.282593	2.524564	2.774278	3.022005	3.260696	3.486689	3.698973	3.898065	4.085149	4.261577	4.428641	4.587485	4.739089	4.884283	5.023767	5.158129	5.28787	5.413416	5.535133	5.653338	5.768305	5.880273	5.989452	6.096029	6.200167	6.302011	6.40169	6.499317	6.594989	6.688791	6.780789	6.871035	6.959553	7.046333	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1861.5	1.53708	1.679523	1.848223	2.043823	2.263643	2.501022	2.746546	2.990778	3.226698	3.45051	3.661026	3.858617	4.04437	4.219574	4.385486	4.543229	4.69377	4.837932	4.97641	5.109791	5.238573	5.363181	5.48398	5.601286	5.715372	5.826477	5.934812	6.040563	6.143893	6.244949	6.343858	6.440737	6.535684	6.628789	6.720124	6.809748	6.897701	6.984	7.070538	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1898	1.532366	1.672478	1.838091	2.029868	2.245348	2.478286	2.719728	2.960528	3.193713	3.415367	3.624135	3.82025	4.004697	4.178706	4.343495	4.500166	4.649674	4.792834	4.930336	5.062764	5.190615	5.314311	5.434218	5.55065	5.66388	5.774147	5.881661	5.986607	6.08915	6.189435	6.287593	6.383739	6.477974	6.57039	6.661063	6.750059	6.837427	6.9232	7.007386	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1934.5	1.527755	1.66562	1.828266	2.016369	2.227672	2.456315	2.693781	2.931211	3.161696	3.381213	3.588254	3.782914	3.96608	4.138921	4.302615	4.458243	4.606746	4.748932	4.885485	5.016987	5.143933	5.266744	5.385784	5.501366	5.613763	5.723214	5.829929	5.934092	6.035868	6.135402	6.232826	6.328254	6.421791	6.513529	6.603547	6.691914	6.778688	6.863911	6.947607	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1971	1.523243	1.65894	1.81873	2.003302	2.210582	2.435071	2.668662	2.902786	3.130604	3.348008	3.553341	3.746567	3.928475	4.100172	4.262797	4.417408	4.564933	4.706171	4.841802	4.972405	5.09847	5.22042	5.338617	5.453373	5.564961	5.673618	5.779554	5.882954	5.983982	6.082784	6.179491	6.274219	6.367071	6.458142	6.547514	6.635258	6.721435	6.806096	6.889275	6.970995	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2007.5	1.518827	1.65243	1.809471	1.990646	2.194049	2.414517	2.644334	2.875214	3.1004	3.315711	3.519355	3.711166	3.891838	4.062414	4.223995	4.377614	4.524187	4.664503	4.799236	4.928963	5.054173	5.175286	5.292662	5.406614	5.517414	5.625299	5.730477	5.833134	5.933433	6.031521	6.127528	6.22157	6.313753	6.404171	6.492906	6.580033	6.665617	6.749711	6.832359	6.91359	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2044	1.514503	1.646083	1.800474	1.978379	2.178045	2.39462	2.62076	2.848457	3.071046	3.284285	3.486258	3.676671	3.856128	4.025605	4.186165	4.338817	4.484461	4.623879	4.757739	4.886614	5.010992	5.131289	5.247867	5.361037	5.471069	5.578201	5.682641	5.784574	5.884163	5.981554	6.076878	6.170251	6.261779	6.351556	6.439667	6.526187	6.611182	6.694711	6.776821	6.857549	6.938974	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2080.5	1.510266	1.63989	1.791727	1.966481	2.162543	2.375347	2.597907	2.82248	3.042507	3.253696	3.454013	3.643047	3.821307	3.989706	4.149267	4.300975	4.445713	4.584255	4.717265	4.845311	4.968877	5.088382	5.204182	5.31659	5.425875	5.532274	5.635995	5.737222	5.836118	5.93283	6.027487	6.120206	6.211094	6.300244	6.387742	6.473664	6.558079	6.641046	6.722618	6.802835	6.881731	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2117	1.506115	1.633847	1.783219	1.954936	2.147517	2.356671	2.57574	2.797252	3.014751	3.22391	3.422588	3.610259	3.787339	3.95468	4.113263	4.264047	4.407902	4.545591	4.677772	4.805009	4.927786	5.046518	5.161561	5.273227	5.381784	5.487468	5.590488	5.691027	5.789247	5.885296	5.979302	6.071383	6.161644	6.250181	6.337078	6.422414	6.506257	6.588669	6.669705	6.749409	6.82782	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2153.5	1.502045	1.627946	1.774937	1.943725	2.132947	2.338562	2.554231	2.77274	2.987746	3.194896	3.39195	3.578273	3.754191	3.920492	4.078116	4.227998	4.37099	4.507846	4.639219	4.765669	4.887676	5.005654	5.11996	5.230902	5.338749	5.443737	5.546074	5.645941	5.743503	5.838904	5.932275	6.023732	6.113381	6.201318	6.287627	6.372387	6.455669	6.537533	6.618038	6.69723	6.775152	6.851842	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2190	1.498054	1.622181	1.766873	1.932833	2.118809	2.320994	2.533351	2.748914	2.961462	3.166624	3.36207	3.547059	3.72183	3.887108	4.043793	4.192791	4.33494	4.470984	4.601569	4.72725	4.848507	4.965751	5.079338	5.189575	5.29673	5.401039	5.502708	5.601921	5.698839	5.793608	5.886359	5.977207	6.066258	6.153607	6.239341	6.323537	6.406266	6.487593	6.567573	6.646257	6.72369	6.799907	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2226.5	1.494139	1.616548	1.759016	1.922245	2.105083	2.303943	2.513072	2.725748	2.935872	3.139066	3.332918	3.516587	3.690227	3.854499	4.010262	4.158395	4.29972	4.43497	4.564785	4.689717	4.810243	4.926771	5.039655	5.149204	5.255684	5.359331	5.460349	5.558923	5.655213	5.749366	5.84151	5.931763	6.020229	6.107004	6.192175	6.275818	6.358006	6.438803	6.518266	6.596448	6.673394	6.749144	6.825353	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2263	1.490297	1.61104	1.751357	1.911947	2.091751	2.287386	2.493368	2.703215	2.910949	3.112196	3.304468	3.486831	3.659352	3.822634	3.977491	4.124777	4.265296	4.399771	4.528834	4.653035	4.772846	4.888676	5.000876	5.109754	5.215575	5.318575	5.418958	5.516908	5.612585	5.706136	5.797688	5.887359	5.975253	6.061467	6.146086	6.229188	6.310845	6.391122	6.470077	6.547763	6.624228	6.699512	6.773651	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2299.5	1.486526	1.605652	1.743889	1.901927	2.078794	2.271301	2.474217	2.681289	2.886668	3.085988	3.276695	3.457763	3.629181	3.791486	3.945454	4.091909	4.231639	4.365355	4.493685	4.617171	4.736285	4.851433	4.962965	5.071187	5.176366	5.278734	5.378498	5.475838	5.570917	5.663878	5.754852	5.843954	5.93129	6.016954	6.101033	6.183605	6.264742	6.344509	6.422964	6.500162	6.576151	6.650973	6.724666	7.052857	99.999	99.999	99.999	99.999	99.999	99.999
2336	1.482823	1.600381	1.736602	1.892171	2.066197	2.255667	2.455593	2.659947	2.863005	3.060418	3.249573	3.429359	3.599685	3.761029	3.914122	4.059762	4.198719	4.331694	4.459306	4.582095	4.700528	4.81501	4.925889	5.033472	5.138023	5.239774	5.338932	5.435677	5.530171	5.622558	5.712966	5.801512	5.888301	5.973428	6.056979	6.139032	6.219659	6.298925	6.37689	6.453607	6.529127	6.603492	6.676742	6.748919	99.999	99.999	99.999	99.999	99.999	99.999
2372.5	1.479187	1.595221	1.729489	1.882669	2.053943	2.240465	2.437477	2.639166	2.839937	3.035463	3.223081	3.401597	3.570843	3.731238	3.88347	4.02831	4.16651	4.298759	4.42567	4.547777	4.665545	4.779375	4.889618	4.996576	5.100513	5.201662	5.300228	5.396392	5.490314	5.582139	5.671994	5.759997	5.846251	5.930852	6.013886	6.09543	6.175558	6.254333	6.331816	6.408062	6.483119	6.557033	6.629844	6.701588	99.999	99.999	99.999	99.999	99.999	99.999
2409	1.475614	1.590169	1.722543	1.87341	2.042017	2.225676	2.419847	2.618924	2.817442	3.011103	3.197196	3.374452	3.54263	3.702088	3.853473	3.997528	4.134986	4.266524	4.392748	4.514189	4.631306	4.744501	4.854121	4.960468	5.063806	5.164367	5.262355	5.35795	5.451313	5.542588	5.631903	5.719374	5.805105	5.889191	5.971719	6.052766	6.132404	6.210698	6.287709	6.363491	6.438093	6.511563	6.58394	6.655261	6.726464	99.999	99.999	99.999	99.999	99.999
2445.5	1.472104	1.58522	1.715758	1.864383	2.030406	2.211284	2.402684	2.599202	2.7955	2.987315	3.171897	3.347905	3.515025	3.673559	3.82411	3.967392	4.104122	4.234964	4.360516	4.481305	4.597786	4.71036	4.819371	4.925121	5.027873	5.127859	5.225281	5.32032	5.413137	5.503875	5.592661	5.679611	5.764831	5.848414	5.930445	6.011005	6.090163	6.167986	6.244533	6.319859	6.394015	6.467047	6.538996	6.6099	6.679793	99.999	99.999	99.999	99.999	99.999
2482	1.468653	1.580371	1.709128	1.85558	2.019095	2.197271	2.38597	2.579979	2.774092	2.964081	3.147164	3.321935	3.488008	3.645628	3.795357	3.93788	4.073895	4.204055	4.32895	4.4491	4.564959	4.676925	4.785341	4.890507	4.992686	5.092109	5.188979	5.283474	5.375757	5.465968	5.554237	5.640679	5.725397	5.808487	5.890033	5.970115	6.048804	6.126164	6.202257	6.277136	6.350853	6.423454	6.494981	6.565473	6.634964	6.767948	99.999	99.999	99.999	99.999

2518.5	1.46526	1.575618	1.702645	1.84699	2.008074	2.183623	2.369686	2.561237	2.753197	2.941381	3.122979	3.296522	3.461558	3.618275	3.767194	3.908971	4.044284	4.173775	4.298025	4.41755	4.532801	4.644172	4.752005	4.856601	4.95822	5.057092	5.15342	5.247384	5.339144	5.428841	5.516604	5.602547	5.686775	5.769382	5.850453	5.930067	6.008295	6.085202	6.160849	6.23529	6.308576	6.380753	6.451865	6.52195	6.591044	6.659185	99.999	99.999	99.999	99.999
2555	1.461924	1.570958	1.696305	1.838605	1.997329	2.170325	2.353816	2.542958	2.732799	2.919198	3.099324	3.271649	3.435658	3.591482	3.739601	3.880643	4.015267	4.144101	4.26772	4.386633	4.501288	4.612077	4.71934	4.823377	4.924448	5.022782	5.118581	5.212024	5.303272	5.392465	5.479732	5.565188	5.648936	5.73107	5.811676	5.890831	5.968608	6.045071	6.12028	6.194291	6.267153	6.338915	6.409618	6.479303	6.548004	6.615755	99.999	99.999	99.999	99.999
2591.5	1.458642	1.566388	1.690102	1.830417	1.98685	2.157362	2.338345	2.525126	2.71288	2.897515	3.076181	3.247298	3.410288	3.565229	3.712559	3.852878	3.986824	4.115014	4.238013	4.356327	4.470398	4.580617	4.687323	4.790813	4.891347	4.989154	5.084435	5.177369	5.268116	5.356816	5.443598	5.528576	5.611853	5.693524	5.773674	5.85238	5.929714	6.005742	6.080522	6.15411	6.226558	6.29791	6.368212	6.437502	6.505817	6.57319	6.640069	99.999	99.999	99.999
2628	1.455413	1.561904	1.684031	1.822419	1.976626	2.144723	2.323257	2.507725	2.693423	2.876315	3.053535	3.223453	3.385433	3.5395	3.686051	3.825656	3.958936	4.086494	4.208886	4.326611	4.440111	4.549772	4.655932	4.758887	4.858895	4.956186	5.05096	5.143395	5.233651	5.321869	5.408175	5.492685	5.575502	5.656719	5.736421	5.814688	5.891588	5.967188	6.041548	6.114722	6.186761	6.257713	6.327619	6.396521	6.464455	6.531455	6.59755	99.999	99.999	99.999
2664.5	1.452235	1.557503	1.678088	1.814603	1.966648	2.132393	2.308538	2.490738	2.674414	2.855582	3.031368	3.200097	3.361076	3.514277	3.660059	3.798962	3.931586	4.058522	4.180318	4.297468	4.410407	4.519521	4.625146	4.727576	4.827071	4.923856	5.018133	5.11008	5.199855	5.287599	5.37344	5.457492	5.539857	5.620629	5.699894	5.777728	5.854204	5.929385	6.003332	6.076099	6.147738	6.218295	6.287814	6.356335	6.423893	6.490525	6.55626	6.638737	99.999	99.999
2701	1.449107	1.553184	1.672267	1.806962	1.956906	2.120362	2.294174	2.474153	2.655838	2.835301	3.009667	3.177216	3.337201	3.489545	3.634567	3.772777	3.904756	4.031082	4.152292	4.268876	4.381267	4.489845	4.594946	4.696862	4.795852	4.892142	4.985933	5.077401	5.166705	5.253986	5.339371	5.422973	5.504896	5.585232	5.664067	5.741479	5.817537	5.892307	5.965849	6.038218	6.109464	6.179634	6.248771	6.316916	6.384106	6.450375	6.515754	6.580277	99.999	99.999
2737.5	1.446027	1.548942	1.666565	1.799491	1.94739	2.108618	2.280152	2.457953	2.637679	2.815459	2.988416	3.154794	3.313794	3.46529	3.609559	3.747086	3.87843	4.004155	4.124791	4.24082	4.352672	4.460724	4.565311	4.666725	4.765221	4.861026	4.954339	5.045339	5.134181	5.221008	5.305946	5.389107	5.470596	5.550505	5.628919	5.705916	5.781565	5.855932	5.929077	6.001054	6.071914	6.141703	6.210466	6.278243	6.34507	6.410981	6.47601	6.540184	99.999	99.999
2774	1.442994	1.544777	1.660976	1.792181	1.938093	2.09715	2.26646	2.442128	2.619924	2.79604	2.967602	3.132819	3.290841	3.441495	3.585021	3.721873	3.852591	3.977725	4.097797	4.213282	4.324605	4.432142	4.536226	4.637145	4.735157	4.830487	4.923333	5.013873	5.102263	5.188645	5.273144	5.355874	5.436937	5.516427	5.594428	5.671018	5.746266	5.820237	5.892992	5.964584	6.035065	6.104482	6.172877	6.24029	6.30676	6.372321	6.437004	6.500839	6.564034	99.999
2810.5	1.440008	1.540684	1.655498	1.785029	1.929006	2.085949	2.253087	2.426662	2.602561	2.777033	2.947213	3.111276	3.268328	3.418148	3.560938	3.697124	3.827225	3.951779	4.071295	4.186245	4.29705	4.404082	4.507671	4.608107	4.705644	4.800508	4.892896	4.982984	5.070931	5.156876	5.240946	5.323252	5.403898	5.482977	5.560573	5.636763	5.711617	5.785201	5.857573	5.928788	5.998897	6.067946	6.13598	6.203037	6.269156	6.334371	6.398714	6.462214	6.5249	99.999
2847	1.437065	1.536663	1.650127	1.778027	1.920122	2.075004	2.24002	2.411545	2.585576	2.758425	2.927234	3.090153	3.246242	3.395235	3.537297	3.672825	3.802318	3.926299	4.04527	4.159695	4.26999	4.376527	4.479631	4.579593	4.676664	4.771071	4.863009	4.952656	5.040168	5.125685	5.209332	5.291223	5.371461	5.450136	5.527334	5.603133	5.677601	5.750803	5.822799	5.893644	5.963387	6.032077	6.099755	6.166462	6.232236	6.297111	6.361118	6.42429	6.486652	6.553329
2883.5	1.434165	1.53271	1.644858	1.771171	1.911433	2.064306	2.22725	2.396765	2.568957	2.740203	2.907654	3.069438	3.22457	3.372744	3.514085	3.648963	3.777856	3.901274	4.019708	4.133616	4.243412	4.349461	4.452091	4.551586	4.648201	4.742159	4.833657	4.92287	5.009955	5.095052	5.178286	5.25977	5.339605	5.417885	5.494693	5.570107	5.644195	5.717024	5.788651	5.859132	5.928517	5.996852	6.064181	6.130544	6.195979	6.260519	6.324197	6.387044	6.449087	6.510354

E F F E C T I V E S T R E S S (kPa)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	1.297072	0.011506	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	2.190207	0.053789	0.01054	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	2.975078	0.155038	0.022318	0.010241	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	3.69638	0.31657	0.045625	0.016065	0.010117	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	4.373517	0.528971	0.081445	0.027049	0.013571	0.010059	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	5.01724	0.780716	0.131742	0.042406	0.020351	0.012272	0.010031	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	5.634325	1.062068	0.197846	0.062649	0.029363	0.017012	0.011499	0.010016	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	6.229403	1.365481	0.280344	0.088378	0.040682	0.023178	0.015042	0.011005	0.010009	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	6.805826	1.685374	0.379174	0.120153	0.054516	0.030685	0.01964	0.013755	0.010676	0.010005	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	7.366122	2.017586	0.493798	0.158464	0.071095	0.039604	0.02513	0.017373	0.012857	0.010453	0.010003	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	7.912257	2.359061	0.623369	0.203704	0.090648	0.050034	0.031523	0.021642	0.015807	0.0122	0.010301	0.010002	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	8.445805	2.707467	0.766872	0.256165	0.113399	0.062079	0.038863	0.026543	0.019268	0.014665	0.011705	0.010198	0.010001	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	8.968049	3.061026	0.92322	0.316035	0.139556	0.07585	0.047204	0.032094	0.0232	0.017555	0.0138	0.011324	0.010128	0.010001	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	9.480052	3.418331	1.091322	0.38341	0.169313	0.091453	0.0566	0.038321	0.027607	0.020816	0.016267	0.013124	0.011025	0.010082	0.010001	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	9.982709	3.778432	1.270124	0.458296	0.20284	0.108995	0.06711	0.045257	0.032504	0.02444	0.019036	0.015265	0.012584	0.01079	0.010052	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	10.47678	4.140418	1.458631	0.540628	0.240284	0.12858	0.078791	0.052933	0.037907	0.028435	0.022096	0.017662	0.014465	0.012145	0.010605	0.010033	0.01	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	10.96293	4.503643	1.655925	0.630282	0.281772	0.150307	0.091701	0.061383	0.043836	0.03281	0.025447	0.020298	0.016571	0.013814	0.011783	0.010458	0.01002	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	11.44173	4.86764	1.86116	0.727085	0.3274	0.17427	0.105898	0.07064	0.050311	0.037578	0.029094	0.023169	0.018878	0.015686	0.013275	0.011481	0.010343	0.010013	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	11.91367	5.231971	2.073567	0.830829	0.377245	0.200556	0.121438	0.080739	0.057354	0.042753	0.033047	0.026279	0.021381	0.017731	0.014954	0.012822	0.011228	0.010254	0.010008	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	12.37921	5.596307	2.292447	0.941279	0.431357	0.229248	0.138377	0.091714	0.064986	0.048346	0.037312	0.029632	0.024079	0.019942	0.016787	0.01434	0.012437	0.011014	0.010186	0.010005	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	12.83872	5.960377	2.517171	1.058181	0.489766	0.260418	0.15677	0.103598	0.073226	0.054372	0.041899	0.033234	0.026977	0.022318	0.018763	0.015997	0.013819	0.012107	0.010834	0.010134	0.010003	0.01	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	13.29258	6.32397	2.747172	1.181273	0.55248	0.294134	0.176667	0.116425	0.082098	0.060845	0.046818	0.037091	0.030077	0.02486	0.020879	0.017779	0.015327	0.01337	0.011821	0.010681	0.010095	0.010002	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	13.74108	6.686911	2.981938	1.310285	0.619491	0.330453	0.198121	0.130229	0.091622	0.067778	0.052077	0.041209	0.033385	0.02757	0.023136	0.019683	0.016947	0.014752	0.012982	0.011573	0.010552	0.010067	0.010001	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	14.18453	7.049058	3.221005	1.444946	0.69077	0.369424	0.221177	0.145043	0.10182	0.075187	0.057687	0.045596	0.036904	0.030452	0.025536	0.021708	0.018675	0.016235	0.014254	0.012642	0.011357	0.010443	0.010046	0.010001	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	14.62317	7.410299	3.46396	1.58499	0.766279	0.411091	0.245883	0.160899	0.112714	0.083085	0.063657	0.050258	0.04064	0.033509	0.02808	0.023856	0.020508	0.017814	0.01562	0.013819	0.012343	0.011167	0.010353	0.010031	0.010001	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	15.05725	7.770543	3.710427	1.730152	0.845964	0.455487	0.272278	0.177829	0.124324	0.091485	0.069996	0.055202	0.044598	0.036745	0.030772	0.026127	0.022447	0.019485	0.017071	0.015083	0.013436	0.012078	0.011	0.010278	0.010021	0.010001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	15.48697	8.129712	3.960069	1.880178	0.92976	0.502638	0.300404	0.195863	0.136671	0.100404	0.076715	0.060435	0.048782	0.040162	0.033613	0.028523	0.024493	0.02125	0.018605	0.016424	0.01461	0.013096	0.011843	0.010853	0.010216	0.010014	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	15.91254	8.487753	4.21258	2.03482	1.017594	0.552563	0.330296	0.215031	0.149778	0.109854	0.083823	0.065963	0.053197	0.043766	0.036606	0.031047	0.026647	0.023108	0.020221	0.01784	0.015855	0.014191	0.012794	0.011633	0.010725	0.010167	0.010009	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	16.33415	8.844614	4.467683	2.193838	1.109387	0.605274	0.361988	0.235362	0.163663	0.119851	0.091331	0.071794	0.057849	0.047559	0.039755	0.0337	0.028911	0.02506	0.02192	0.019329	0.017169	0.015353	0.013818	0.012522	0.011445	0.010612	0.010127	0.010006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	16.75195	9.200264	4.72513	2.357004	1.205052	0.660776	0.395509	0.256884	0.178348	0.130408	0.099248	0.077934	0.062743	0.051546	0.043062	0.036485	0.031286	0.027108	0.023703	0.020892	0.018548	0.016576	0.014905	0.013484	0.012278	0.011276	0.010513	0.010095	0.010004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	17.16611	9.554672	4.984693	2.524099	1.304497	0.719067	0.430886	0.279623	0.193853	0.141539	0.107583	0.084391	0.067883	0.05573	0.046531	0.039404	0.033775	0.029253	0.025569	0.022529	0.019994	0.01786	0.016049	0.014504	0.013182	0.012057	0.011124	0.010427	0.01007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	17.57676	9.907817	5.246167	2.694915	1.407629	0.780142	0.468142	0.303603	0.210197	0.153258	0.116348	0.091173	0.073276	0.060115	0.050163	0.04246	0.036378	0.031497	0.02752	0.02424	0.021505	0.019203	0.017248	0.015578	0.014143	0.01291	0.011857	0.010987	0.010352	0.010049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	17.98406	10.25969	5.509365	2.869252	1.514349	0.843987	0.507298	0.32885	0.227399	0.16558	0.125551	0.098285	0.078925	0.064705	0.053962	0.045653	0.039099	0.033839	0.029558	0.026027	0.023084	0.020605	0.018501	0.016702	0.015154	0.013817	0.012662	0.011675	0.010863	0.010288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	18.38811	10.61027	5.774117	3.046924	1.624561	0.910586	0.54837	0.355384	0.245477	0.178518	0.135203	0.105734	0.084837	0.069504	0.057931	0.048988	0.041937	0.036283	0.031682	0.02789	0.024729	0.022068	0.019809	0.017875	0.016211	0.01477	0.01352	0.012436	0.011509	0.010752	0.010205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	18.78904	10.95956	6.040268	3.227749	1.738163	0.979917	0.591372	0.383228	0.264451	0.192085	0.145313	0.11353	0.091017	0.074516	0.062073	0.052465	0.044896	0.03883	0.033896	0.02983	0.026442	0.023591	0.02117	0.019098	0.017314	0.015768	0.014422	0.013249	0.01223	0.011357	0.010653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	19.18696	11.30755	6.307679	3.41156	1.855056	1.051955	0.636316	0.4124	0.284336	0.206295	0.155891	0.121677	0.097469	0.079745	0.066391	0.056089	0.047977	0.04148	0.036198	0.031848	0.028224	0.025174	0.022586	0.020371	0.018462	0.016807	0.015366	0.014105	0.013002	0.01204	0.011219	0.010406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	19.58197	11.65425	6.576218	3.598194	1.975141	1.126671	0.68321	0.442919	0.305151	0.221161	0.166947	0.130183	0.1042	0.085194	0.070888	0.059859	0.051182	0.044236	0.038592	0.033945	0.030075	0.026819	0.024056	0.021692	0.019655	0.017888	0.016348	0.014999	0.013815	0.012774	0.011866	0.011092	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	19.97417	11.99965	6.845768	3.787501	2.098318	1.204033	0.732057	0.474801	0.326911	0.236695	0.178491	0.139056	0.111214	0.090868	0.075567	0.06378	0.054513	0.047099	0.041077	0.036121	0.031996	0.028526	0.025582	0.023063	0.020893	0.019011	0.017369	0.01593	0.014664	0.013548	0.012565	0.011705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	20.36365	12.34378	7.116223	3.979336	2.224491	1.284006	0.782862	0.508061	0.349632	0.252912	0.190531	0.148302	0.118516	0.09677	0.080431	0.067854	0.057972	0.05007	0.043656	0.038379	0.033988	0.030296	0.027164	0.024485	0.022176	0.020174	0.018428	0.016897	0.015548	0.014357	0.013303	0.012371	0.011557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	20.7505	12.68662	7.387482	4.173564	2.353562	1.366553	0.835625	0.542713	0.373328	0.269821	0.203078	0.157929	0.126112	0.102905	0.085483	0.072082	0.06156	0.053152	0.046329	0.040719	0.036052	0.032129	0.028802	0.025957	0.023506	0.02138	0.019525	0.017899	0.016466	0.015198	0.014074	0.013076	0.012192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	21.13479	13.02819	7.659456	4.370055	2.485438	1.451635	0.890342	0.578768	0.398014	0.287437	0.216141	0.167943	0.134007	0.109276	0.090726	0.076468	0.06528	0.056345	0.049098	0.043141	0.038188	0.034026	0.030497	0.02748	0.024881	0.022627	0.020661	0.018936	0.017416	0.016071	0.014876	0.013813	0.012866	0.012026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	21.5166	13.36849	7.932061	4.568689	2.620025	1.539211	0.947009	0.616237	0.423703	0.305771	0.229729	0.178352	0.142206	0.115888	0.096163	0.081013	0.069133	0.05965	0.051963	0.045648	0.040398	0.035988	0.03225	0.029054	0.026302	0.023916	0.021834	0.020008	0.018399	0.016974	0.015708	0.014579	0.013571	0.012671	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	21.89602	13.70755	8.205222	4.76935	2.757234	1.62924	1.005621	0.655129	0.450408	0.324833	0.24385	0.189162	0.150715	0.122744	0.101797	0.08572	0.073122	0.063071	0.054927	0.048239	0.042682	0.038016	0.034061	0.030681	0.02777	0.025247	0.023046	0.021116	0.019414	0.017908	0.016568	0.015373	0.014304	0.013346	0.01249	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	22.27309	14.04536	8.478867	4.971931	2.896976	1.721677	1.066167	0.695452	0.478141	0.344636	0.258515	0.20038	0.159538	0.129849	0.107632	0.090592	0.077248	0.066607	0.05799	0.050917	0.045041	0.040109	0.03593	0.03236	0.029286	0.026621	0.024297	0.022259	0.020463	0.018871	0.017456	0.016194	0.015063	0.014048	0.013137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	22.6479	14.38195	8.752932	5.176327	3.039165	1.816479	1.128638	0.737211	0.506912	0.365189	0.273731	0.212013	0.168682	0.137206	0.113669	0.095631	0.081512	0.070261	0.061154	0.053682	0.047477	0.04227	0.037859	0.034092	0.030849	0.028038	0.025587	0.023438	0.021544	0.019866	0.018373	0.017041	0.015848	0.014776	0.013811	0.012942	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	23.0205	14.71731	9.027358	5.382442	3.183718	1.9136	1.193022	0.780413	0.536732	0.386504	0.289508	0.224068	0.17815	0.144819	0.119913	0.100838	0.085918	0.074034	0.06442	0.056534	0.049989	0.044498	0.039848	0.035877	0.03246	0.029499	0.026917	0.024653	0.022658	0.02089	0.019318	0.017915	0.016657	0.015527	0.014508	0.013589	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	23.39096	15.05148	9.302089	5.590185	3.330553	2.012995	1.259305	0.825061	0.567611	0.408589	0.305853	0.236551	0.187949	0.152693	0.126367	0.106218	0.090467	0.077928	0.067789	0.059476	0.052579	0.046795	0.041898	0.037717	0.034119	0.031003	0.028286	0.025904	0.023805	0.021946	0.020292	0.018815	0.017492	0.016302	0.015229	0.014259	0.013382	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	23.75932	15.38445	9.577075	5.799468	3.479592	2.114618	1.327473	0.871157	0.599558	0.431455	0.322776	0.249469	0.198083	0.16083	0.133033	0.111771	0.09516	0.081944	0.071262	0.062508	0.055247	0.04916	0.044008	0.039611	0.035828	0.032551	0.029695	0.027192	0.024985	0.023032	0.021294	0.019742	0.018351	0.0171	0.015971	0.014951	0.014027	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	24.12565	15.71624	9.852269	6.010208	3.630758	2.218423	1.397507	0.918702	0.63258	0.455111	0.340284	0.262829	0.208557	0.169236	0.139914	0.117501	0.1	0.086084	0.074841	0.065631	0.057995	0.051596	0.046181	0.04156	0.037586	0.034144	0.031145	0.028516	0.0262	0.024148	0.022324	0.020695	0.019235	0.017921	0.016736	0.015664	0.014692	0.013808	0	0	0	0	0	0	0	0	0	0	0	0
1825	24.48999	16.04687	10.12763	6.222329	3.783978	2.324364	1.469392	0.967697	0.666685	0.479566	0.358384	0.276636	0.219377	0.177914	0.147014	0.123409	0.104989	0.090349	0.078527	0.068847	0.060824	0.054102	0.048416	0.043565	0.039394	0.035782	0.032636	0.029878	0.027448	0.025297	0.023383	0.021675	0.020143	0.018766	0.017522	0.016397	0.015377	0.014449	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	24.8524	16.37634	10.40311	6.435757	3.939179	2.432395	1.543109	1.018139	0.70188	0.504827	0.377086	0.290898	0.230547	0.186868	0.154336	0.129499	0.110128	0.09474	0.082321	0.072155	0.063733	0.056679	0.050714	0.045626	0.041252	0.037466	0.034167	0.031277	0.02873	0.026476	0.024471	0.022681	0.021077	0.019633	0.018331	0.017152	0.016082	0.015108	0.014202	0	0	0	0	0	0	0	0	0	0	0
1898	25.21291	16.70468	10.67868	6.650421	4.096292	2.54247	1.618637	1.070028	0.738169	0.530904	0.396396	0.305621	0.242072	0.196102	0.161883	0.135772	0.11542	0.099261	0.086224	0.075558	0.066725	0.059328	0.053076	0.047744	0.043161	0.039195	0.03574	0.032713	0.030047	0.027687	0.025589	0.023715	0.022035	0.020524	0.019161	0.017926	0.016806	0.015787	0.014857	0	0	0	0	0	0	0	0	0	0	0
1934.5	25.57159	17.03189	10.95431	6.866256	4.255251	2.654544	1.695957	1.123361	0.775559	0.557802	0.416321	0.32081	0.253959	0.20562	0.169657	0.142232	0.120866	0.103911	0.090238	0.079057	0.069799	0.062051	0.055502	0.049919	0.045121	0.04097	0.037355	0.034188	0.031399	0.02893	0.026735	0.024775	0.023019	0.021439	0.020013	0.018722	0.01755	0.016483	0.01551	0	0	0	0	0	0	0	0	0	0	0
1971	25.92846	17.35799	11.22996	7.083199	4.415991	2.768571	1.775048	1.178132	0.814054	0.58553	0.436868	0.336472	0.26621	0.215426	0.177662	0.14888	0.126468	0.108692	0.094364	0.082651	0.072958	0.064846	0.057993	0.052151	0.047133	0.042792	0.039012	0.035701	0.032785	0.030205	0.027911	0.025863	0.024028	0.022377	0.020887	0.019538	0.018313	0.017198	0.016181	0.015251	0	0	0	0	0	0	0	0	0	0
2007.5	26.28356	17.68299	11.5056	7.30119	4.578449	2.884508	1.855888	1.234337	0.853657	0.614095	0.458045	0.352612	0.278831	0.225522	0.185901	0.155718	0.132229	0.113607	0.098604	0.086344	0.076201	0.067716	0.060549	0.054442	0.049198	0.044661	0.040711	0.037252	0.034207	0.031512	0.029117	0.026978	0.025062	0.023338	0.021782	0.020374	0.019095	0.017931	0.016869	0.015897	0	0	0	0	0	0	0	0	0	0
2044	26.63695	18.00691	11.7812	7.520174	4.742565	3.002309	1.938454	1.29197	0.894371	0.643501	0.479858	0.369237	0.291827	0.235915	0.194377	0.16275	0.13815	0.118656	0.102957	0.090134	0.079529	0.070661	0.063172	0.056792	0.051314	0.046577	0.042453	0.038843	0.035664	0.032852	0.030352	0.028121	0.026121	0.024323	0.0227	0.021231	0.019897	0.018683	0.017574	0.01656	0.015607	0	0	0	0	0	0	0	0	0
2080.5	26.98866	18.32976	12.05675	7.740096	4.90828	3.121932	2.022723	1.351025	0.936199	0.673755	0.502313	0.386352	0.305203	0.246606	0.203093	0.169978	0.144233	0.123842	0.107427	0.094025	0.082944	0.073681	0.065862	0.059202	0.053484	0.048541	0.044239	0.040472	0.037157	0.034224	0.031618	0.029291	0.027207	0.025332	0.02364	0.022109	0.020718	0.019452	0.018297	0.017239	0.01627	0	0	0	0	0	0	0	0	0
2117	27.33872	18.65155	12.33222	7.960905	5.07554	3.243333	2.108674	1.411495	0.979143	0.704863	0.525416	0.403963	0.318963	0.2576	0.212051	0.177404	0.15048	0.129165	0.112014	0.098015	0.086446	0.076778	0.068619	0.061671	0.055708	0.050553	0.046068	0.042142	0.038686	0.03563	0.032914	0.03049	0.028318	0.026365	0.024603	0.023008	0.021559	0.02024	0.019037	0.017935	0.016925	0	0	0	0	0	0	0	0	0
2153.5	27.68717	18.9723	12.60757	8.182555	5.244288	3.36647	2.19628	1.47337	1.023203	0.73683	0.549174	0.422075	0.333112	0.268901	0.221256	0.18503	0.156893	0.134627	0.116719	0.102108	0.090037	0.079952	0.071444	0.064201	0.057986	0.052614	0.047941	0.043851	0.040252	0.037069	0.03424	0.031717	0.029456	0.027422	0.025588	0.023927	0.02242	0.021047	0.019794	0.018647	0.017596	0.016629	0	0	0	0	0	0	0	0
2190	28.03404	19.29201	12.88281	8.404999	5.414474	3.491302	2.28552	1.536643	1.06838	0.769659	0.573591	0.440693	0.347655	0.280512	0.23071	0.19286	0.163474	0.14023	0.121543	0.106303	0.093716	0.083204	0.074338	0.066791	0.060318	0.054724	0.049858	0.0456	0.041854	0.038541	0.035598	0.032972	0.030619	0.028504	0.026595	0.024868	0.0233	0.021872	0.020569	0.019376	0.018282	0.017277	0	0	0	0	0	0	0	0
2226.5	28.37937	19.6107	13.1579	8.628193	5.586046	3.617789	2.376369	1.601304	1.114673	0.803356	0.598674	0.459823	0.362595	0.292437	0.240415	0.200894	0.170224	0.145976	0.126489	0.110602	0.097486	0.086535	0.077301	0.069444	0.062705	0.056883	0.051819	0.04739	0.043493	0.040047	0.036986	0.034255	0.031809	0.02961	0.027626	0.02583	0.0242	0.022716	0.021361	0.020121	0.018984	0.017939	0.016956	0	0	0	0	0	0	0
2263	28.72318	19.92839	13.43283	8.852095	5.758956	3.745889	2.468802	1.667343	1.162083	0.837923	0.624427	0.47947	0.377937	0.30468	0.250375	0.209136	0.177147	0.151865	0.131556	0.115006	0.101346	0.089945	0.080334	0.072158	0.065147	0.059092	0.053826	0.04922	0.045169	0.041587	0.038405	0.035567	0.033026	0.03074	0.028679	0.026813	0.02512	0.023578	0.02217	0.020883	0.019701	0.018615	0.017615	0	0	0	0	0	0	0
2299.5	29.06551	20.24508	13.70758	9.076668	5.933157	3.875563	2.562795	1.73475	1.210607	0.873364	0.650855	0.499638	0.393686	0.317244	0.260593	0.217588	0.184243	0.1579	0.136748	0.119516	0.105298	0.093435	0.083437	0.074935	0.067646	0.061351	0.055878	0.051092	0.046882	0.043161	0.039856	0.036909	0.034269	0.031896	0.029755	0.027818	0.02606	0.024459	0.022998	0.021661	0.020434	0.019307	0.018269	0.014382	0	0	0	0	0	0
2336	29.40639	20.56079	13.98215	9.301874	6.108603	4.006774	2.658324	1.803514	1.260245	0.909683	0.677962	0.520333	0.409846	0.330133	0.271071	0.226253	0.191514	0.164082	0.142063	0.124132	0.109343	0.097007	0.086612	0.077775	0.0702	0.06366	0.057976	0.053005	0.048633	0.04477	0.041339	0.038279	0.035539	0.033076	0.030855	0.028844	0.02702	0.025359	0.023843	0.022455	0.021183	0.020014	0.018936	0.017942	0	0	0	0	0	0
2372.5	29.74584	20.87553	14.2565	9.527676	6.285252	4.139483	2.755365	1.873624	1.310993	0.946881	0.705754	0.541558	0.42642	0.34335	0.281814	0.235132	0.198963	0.170413	0.147505	0.128857	0.113481	0.100659	0.089859	0.080679	0.072812	0.066021	0.060119	0.054959	0.050422	0.046413	0.042853	0.039679	0.036836	0.034281	0.031977	0.029892	0.028	0.026278	0.024706	0.023267	0.021948	0.020735	0.019618	0.018587	0	0	0	0	0	0
2409	30.08389	21.18932	14.53064	9.754041	6.46306	4.273654	2.853892	1.945067	1.36285	0.984961	0.734234	0.563319	0.443414	0.356899	0.292822	0.244228	0.206591	0.176894	0.153074	0.13369	0.117713	0.104394	0.093178	0.083647	0.075481	0.068433	0.062309	0.056956	0.05225	0.048091	0.0444	0.041108	0.038161	0.035512	0.033123	0.030962	0.029001	0.027216	0.025586	0.024095	0.022728	0.021471	0.020313	0.019245	0.018244	0	0	0	0	0
2445.5	30.42057	21.50215	14.80455	9.980937	6.641988	4.409249	2.953881	2.017832	1.415811	1.023924	0.763406	0.585619	0.46083	0.370783	0.3041	0.253543	0.214401	0.183527	0.158772	0.138634	0.122041	0.108213	0.09657	0.08668	0.078208	0.070897	0.064546	0.058995	0.054116	0.049805	0.045978	0.042567	0.039513	0.036768	0.034293	0.032054	0.030022	0.028173	0.026485	0.024941	0.023524	0.022223	0.021023	0.019916	0.018893	0	0	0	0	0
2482	30.7559	21.81405	15.07822	10.20833	6.821996	4.546235	3.055309	2.091907	1.469874	1.063773	0.793274	0.608463	0.478674	0.385006	0.31565	0.263081	0.222393	0.190312	0.164599	0.143689	0.126465	0.112115	0.100036	0.089778	0.080992	0.073413	0.06683	0.061076	0.05602	0.051554	0.04759	0.044056	0.040892	0.03805	0.035487	0.033168	0.031064	0.029149	0.027402	0.025803	0.024337	0.022989	0.021747	0.020602	0.019542	0.01769	0	0	0	0
2518.5	31.08991	22.12503	15.35163	10.4362	7.003046	4.684576	3.15815	2.167278	1.525034	1.104507	0.823841	0.631854	0.496948	0.39957	0.327474	0.272842	0.230571	0.197253	0.170558	0.148856	0.130986	0.116101	0.103577	0.092942	0.083836	0.075982	0.069161	0.063201	0.057964	0.053339	0.049234	0.045575	0.042299	0.039357	0.036704	0.034304	0.032127	0.030145	0.028336	0.026682	0.025165	0.02377	0.022486	0.0213	0.020204	0.019188	0	0	0	0
2555	31.42262	22.4351	15.62479	10.66451	7.185102	4.824239	3.262382	2.243932	1.581287	1.146128	0.85511	0.655798	0.515657	0.41448	0.339577	0.28283	0.238936	0.20435	0.176648	0.154136	0.135604	0.120173	0.107192	0.096172	0.086739	0.078603	0.07154	0.065369	0.059947	0.055159	0.050911	0.047124	0.043735	0.04069	0.037945	0.035463	0.03321	0.03116	0.02929	0.027579	0.026009	0.024567	0.023239	0.022013	0.020879	0.019828	0	0	0	0
2591.5	31.75406	22.74426	15.89767	10.89324	7.368129	4.96519	3.367979	2.321857	1.638628	1.188637	0.887084	0.680297	0.534803	0.429739	0.35196	0.293046	0.247489	0.211605	0.182873	0.159531	0.140322	0.124331	0.110883	0.099469	0.089701	0.081278	0.073967	0.06758	0.06197	0.057016	0.052621	0.048703	0.045198	0.042049	0.039211	0.036644	0.034314	0.032195	0.030261	0.028492	0.02687	0.025379	0.024006	0.022739	0.021566	0.020481	0.019467	0	0	0
2628	32.08424	23.05253	16.17028	11.12235	7.552093	5.107397	3.474919	2.401038	1.697052	1.232033	0.919766	0.705354	0.554392	0.445349	0.364626	0.303493	0.256233	0.219019	0.189232	0.165041	0.145139	0.128576	0.114651	0.102834	0.092723	0.084007	0.076442	0.069836	0.064033	0.058909	0.054364	0.050314	0.04669	0.043435	0.040501	0.037847	0.03544	0.03325	0.031251	0.029423	0.027747	0.026207	0.024788	0.023478	0.022267	0.021145	0.020104	0	0	0
2664.5	32.41319	23.35993	16.4426	11.35184	7.73696	5.250829	3.583177	2.481462	1.756554	1.276315	0.953158	0.730974	0.574425	0.461314	0.377578	0.314173	0.26517	0.226595	0.195728	0.170667	0.150056	0.132909	0.118495	0.106267	0.095806	0.086791	0.078967	0.072135	0.066135	0.060839	0.056141	0.051955	0.04821	0.044847	0.041815	0.039073	0.036587	0.034324	0.03226	0.030372	0.02864	0.027049	0.025584	0.024232	0.022981	0.021822	0.020747	0.019486	0	0
2701	32.74093	23.66645	16.71463	11.58166	7.9227	5.395456	3.692731	2.563116	1.817127	1.321485	0.987262	0.757159	0.594908	0.477637	0.390818	0.325089	0.274301	0.234333	0.202361	0.176411	0.155075	0.137329	0.122416	0.109768	0.09895	0.089628	0.08154	0.074479	0.068279	0.062806	0.057952	0.053627	0.049759	0.046285	0.043154	0.040323	0.037755	0.035418	0.033287	0.031338	0.02955	0.027908	0.026395	0.024999	0.023708	0.022512	0.021402	0.02037	0	0
2737.5	33.06747	23.97211	16.98637	11.81181	8.109283	5.541246	3.803557	2.645986	1.878765	1.367539	1.022081	0.783913	0.615841	0.49432	0.404349	0.336242	0.283628	0.242235	0.209133	0.182274	0.160197	0.141839	0.126416	0.113338	0.102156	0.092521	0.084163	0.076868	0.070463	0.06481	0.059797	0.055331	0.051337	0.04775	0.044517	0.041595	0.038944	0.036533	0.034333	0.032321	0.030477	0.028782	0.027221	0.02578	0.024448	0.023214	0.022069	0.021004	0	0
2774	33.39285	24.27693	17.25779	12.04226	8.296678	5.688171	3.915633	2.730056	1.941463	1.414478	1.057616	0.811238	0.63723	0.511368	0.418175	0.347635	0.293154	0.250302	0.216044	0.188256	0.165421	0.146439	0.130495	0.116978	0.105423	0.09547	0.086836	0.079302	0.072688	0.066851	0.061676	0.057066	0.052943	0.049242	0.045906	0.04289	0.040155	0.037667	0.035398	0.033322	0.03142	0.029671	0.028061	0.026575	0.025201	0.023929	0.022747	0.021649	0.020624	0
2810.5	33.71708	24.5809	17.52891	12.273	8.484857	5.836203	4.028936	2.815314	2.005213	1.462301	1.093868	0.839137	0.659077	0.528782	0.432296	0.35927	0.302879	0.258537	0.223097	0.194359	0.17075	0.151129	0.134653	0.120689	0.108753	0.098474	0.08956	0.081781	0.074954	0.06893	0.063589	0.058833	0.054579	0.05076	0.047319	0.044209	0.041388	0.038822	0.036481	0.034341	0.032379	0.030576	0.028916	0.027384	0.025968	0.024656	0.023438	0.022306	0.021252	0
2847	34.04017	24.88405	17.79971	12.50399	8.673792	5.985313	4.143444	2.901745	2.070009	1.511004	1.130838	0.867613	0.681384	0.546566	0.446716	0.371149	0.312806	0.26694	0.230293	0.200583	0.176183	0.155911	0.138891	0.12447	0.112146	0.101534	0.092334	0.084306	0.077262	0.071047	0.065538	0.060632	0.056244	0.052306	0.048758	0.045551	0.042642	0.039997	0.037584	0.035378	0.033356	0.031498	0.029786	0.028208	0.026748	0.025395	0.02414	0.022974	0.021888	0.020794
2883.5	34.36214	25.18637	18.07019	12.73522	8.863459	6.135475	4.259135	2.989334	2.135844	1.560587	1.168529	0.896669	0.704156	0.564723	0.461438	0.383274	0.322936	0.275514	0.237632	0.20693	0.181723	0.160784	0.14321	0.128322	0.115602	0.104651	0.095158	0.086877	0.079611	0.073202	0.067521	0.062462	0.057939	0.053879	0.050222	0.046916	0.043919	0.041192	0.038706	0.036433	0.034349	0.032435	0.030672	0.029045	0.027541	0.026148	0.024855	0.023653	0.022535	0.021491

P E R M E A B I L I T Y (cm/second)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	4.6E-06	0.000112	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

73	3.21E-06	3.99E-05	0.000119	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	2.59E-06	1.95E-05	7.19E-05	0.000121	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	2.23E-06	1.21E-05	4.45E-05	8.95E-05	0.000122	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	1.99E-06	8.5E-06	3.02E-05	6.32E-05	0.0001	0.000122	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	1.8E-06	6.52E-06	2.18E-05	4.68E-05	7.65E-05	0.000107	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	1.66E-06	5.28E-06	1.66E-05	3.6E-05	5.98E-05	8.62E-05	0.000112	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	1.55E-06	4.44E-06	1.31E-05	2.86E-05	4.81E-05	7.01E-05	9.36E-05	0.000115	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	1.46E-06	3.84E-06	1.07E-05	2.32E-05	3.95E-05	5.81E-05	7.83E-05	9.93E-05	0.000118	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	1.38E-06	3.39E-06	8.91E-06	1.93E-05	3.31E-05	4.9E-05	6.64E-05	8.5E-05	0.000104	0.000119	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	1.31E-06	3.05E-06	7.6E-06	1.62E-05	2.81E-05	4.19E-05	5.71E-05	7.34E-05	9.05E-05	0.000108	0.00012	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	1.25E-06	2.77E-06	6.6E-06	1.39E-05	2.41E-05	3.62E-05	4.96E-05	6.4E-05	7.93E-05	9.52E-05	0.000111	0.000121	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	1.2E-06	2.54E-06	5.81E-06	1.21E-05	2.1E-05	3.16E-05	4.35E-05	5.64E-05	7E-05	8.44E-05	9.91E-05	0.000113	0.000122	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	1.16E-06	2.36E-06	5.18E-06	1.06E-05	1.84E-05	2.79E-05	3.85E-05	5.01E-05	6.23E-05	7.53E-05	8.88E-05	0.000102	0.000115	0.000122	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	1.11E-06	2.2E-06	4.67E-06	9.37E-06	1.63E-05	2.48E-05	3.44E-05	4.48E-05	5.59E-05	6.76E-05	7.99E-05	9.27E-05	0.000105	0.000117	0.000122	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	1.08E-06	2.06E-06	4.24E-06	8.37E-06	1.45E-05	2.22E-05	3.08E-05	4.03E-05	5.04E-05	6.11E-05	7.24E-05	8.41E-05	9.6E-05	0.000108	0.000118	0.000123	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	1.04E-06	1.95E-06	3.89E-06	7.54E-06	1.3E-05	2E-05	2.79E-05	3.65E-05	4.57E-05	5.55E-05	6.58E-05	7.66E-05	8.77E-05	9.9E-05	0.00011	0.000119	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	1.01E-06	1.84E-06	3.59E-06	6.84E-06	1.18E-05	1.81E-05	2.53E-05	3.32E-05	4.17E-05	5.07E-05	6.02E-05	7.01E-05	8.04E-05	9.1E-05	0.000102	0.000112	0.00012	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	9.83E-07	1.75E-06	3.33E-06	6.24E-06	1.07E-05	1.64E-05	2.3E-05	3.03E-05	3.82E-05	4.65E-05	5.53E-05	6.44E-05	7.4E-05	8.38E-05	9.39E-05	0.000104	0.000114	0.000121	0.000123	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	9.57E-07	1.67E-06	3.11E-06	5.73E-06	9.77E-06	1.5E-05	2.11E-05	2.78E-05	3.51E-05	4.28E-05	5.1E-05	5.95E-05	6.83E-05	7.75E-05	8.7E-05	9.66E-05	0.000106	0.000115	0.000121	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	9.33E-07	1.6E-06	2.91E-06	5.29E-06	8.96E-06	1.38E-05	1.94E-05	2.57E-05	3.24E-05	3.96E-05	4.71E-05	5.51E-05	6.33E-05	7.19E-05	8.07E-05	8.98E-05	9.9E-05	0.000108	0.000116	0.000122	0.000123	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	9.1E-07	1.53E-06	2.74E-06	4.91E-06	8.25E-06	1.27E-05	1.79E-05	2.37E-05	3E-05	3.67E-05	4.38E-05	5.12E-05	5.89E-05	6.69E-05	7.52E-05	8.37E-05	9.24E-05	0.000101	0.00011	0.000118	0.000122	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	8.89E-07	1.48E-06	2.59E-06	4.57E-06	7.63E-06	1.17E-05	1.66E-05	2.2E-05	2.79E-05	3.41E-05	4.07E-05	4.77E-05	5.49E-05	6.24E-05	7.02E-05	7.82E-05	8.64E-05	9.48E-05	0.000103	0.000111	0.000119	0.000122	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	8.69E-07	1.42E-06	2.46E-06	4.27E-06	7.08E-06	1.09E-05	1.54E-05	2.04E-05	2.6E-05	3.18E-05	3.8E-05	4.45E-05	5.13E-05	5.84E-05	6.57E-05	7.32E-05	8.1E-05	8.89E-05	9.7E-05	0.000105	0.000113	0.000119	0.000122	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	8.51E-07	1.37E-06	2.33E-06	4.01E-06	6.6E-06	1.01E-05	1.43E-05	1.91E-05	2.42E-05	2.98E-05	3.56E-05	4.17E-05	4.81E-05	5.48E-05	6.16E-05	6.88E-05	7.61E-05	8.36E-05	9.12E-05	9.9E-05	0.000107	0.000114	0.00012	0.000123	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	8.33E-07	1.33E-06	2.23E-06	3.77E-06	6.17E-06	9.41E-06	1.33E-05	1.78E-05	2.27E-05	2.79E-05	3.34E-05	3.92E-05	4.52E-05	5.15E-05	5.8E-05	6.47E-05	7.16E-05	7.87E-05	8.6E-05	9.34E-05	0.000101	0.000108	0.000115	0.000121	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	8.17E-07	1.29E-06	2.13E-06	3.56E-06	5.78E-06	8.8E-06	1.25E-05	1.67E-05	2.13E-05	2.62E-05	3.14E-05	3.69E-05	4.26E-05	4.85E-05	5.46E-05	6.1E-05	6.75E-05	7.43E-05	8.12E-05	8.82E-05	9.54E-05	0.000103	0.00011	0.000116	0.000121	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	8.01E-07	1.25E-06	2.04E-06	3.37E-06	5.43E-06	8.25E-06	1.17E-05	1.57E-05	2E-05	2.47E-05	2.96E-05	3.48E-05	4.02E-05	4.58E-05	5.16E-05	5.76E-05	6.38E-05	7.02E-05	7.68E-05	8.35E-05	9.03E-05	9.73E-05	0.000104	0.000111	0.000117	0.000122	0.000123	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	7.86E-07	1.21E-06	1.96E-06	3.2E-06	5.12E-06	7.75E-06	1.1E-05	1.47E-05	1.88E-05	2.33E-05	2.79E-05	3.28E-05	3.8E-05	4.33E-05	4.88E-05	5.46E-05	6.05E-05	6.65E-05	7.28E-05	7.91E-05	8.57E-05	9.23E-05	9.9E-05	0.000106	0.000112	0.000118	0.000122	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	7.72E-07	1.18E-06	1.88E-06	3.05E-06	4.84E-06	7.3E-06	1.04E-05	1.39E-05	1.78E-05	2.2E-05	2.64E-05	3.11E-05	3.6E-05	4.1E-05	4.63E-05	5.17E-05	5.73E-05	6.31E-05	6.9E-05	7.51E-05	8.13E-05	8.77E-05	9.41E-05	0.000101	0.000107	0.000113	0.000119	0.000122	0.000123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	7.59E-07	1.15E-06	1.81E-06	2.91E-06	4.58E-06	6.89E-06	9.77E-06	1.31E-05	1.68E-05	2.08E-05	2.5E-05	2.95E-05	3.41E-05	3.89E-05	4.39E-05	4.91E-05	5.45E-05	6E-05	6.56E-05	7.14E-05	7.74E-05	8.34E-05	8.96E-05	9.59E-05	0.000102	0.000108	0.000114	0.000119	0.000122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	7.46E-07	1.12E-06	1.75E-06	2.78E-06	4.35E-06	6.52E-06	9.24E-06	1.24E-05	1.59E-05	1.97E-05	2.37E-05	2.8E-05	3.24E-05	3.7E-05	4.18E-05	4.67E-05	5.18E-05	5.71E-05	6.25E-05	6.8E-05	7.37E-05	7.95E-05	8.54E-05	9.14E-05	9.75E-05	0.000104	0.00011	0.000115	0.00012	0.000122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	7.34E-07	1.09E-06	1.69E-06	2.66E-06	4.14E-06	6.18E-06	8.74E-06	1.17E-05	1.51E-05	1.87E-05	2.25E-05	2.66E-05	3.08E-05	3.52E-05	3.98E-05	4.45E-05	4.94E-05	5.44E-05	5.96E-05	6.49E-05	7.03E-05	7.58E-05	8.15E-05	8.73E-05	9.31E-05	9.9E-05	0.000105	0.000111	0.000116	0.000121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	7.23E-07	1.07E-06	1.64E-06	2.55E-06	3.94E-06	5.86E-06	8.29E-06	1.11E-05	1.43E-05	1.78E-05	2.14E-05	2.53E-05	2.93E-05	3.36E-05	3.79E-05	4.25E-05	4.71E-05	5.19E-05	5.69E-05	6.19E-05	6.71E-05	7.24E-05	7.79E-05	8.34E-05	8.9E-05	9.47E-05	0.0001	0.000106	0.000112	0.000117	0.000121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	7.12E-07	1.04E-06	1.58E-06	2.45E-06	3.76E-06	5.58E-06	7.88E-06	1.06E-05	1.36E-05	1.69E-05	2.04E-05	2.41E-05	2.8E-05	3.2E-05	3.62E-05	4.05E-05	4.5E-05	4.96E-05	5.43E-05	5.92E-05	6.42E-05	6.93E-05	7.45E-05	7.98E-05	8.52E-05	9.07E-05	9.62E-05	0.000102	0.000107	0.000113	0.000118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	7.01E-07	1.02E-06	1.54E-06	2.36E-06	3.6E-06	5.31E-06	7.49E-06	1.01E-05	1.3E-05	1.61E-05	1.95E-05	2.3E-05	2.67E-05	3.06E-05	3.46E-05	3.88E-05	4.3E-05	4.75E-05	5.2E-05	5.67E-05	6.14E-05	6.63E-05	7.13E-05	7.64E-05	8.16E-05	8.69E-05	9.22E-05	9.77E-05	0.000103	0.000109	0.000114	0.00012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	6.91E-07	9.99E-07	1.49E-06	2.27E-06	3.44E-06	5.07E-06	7.14E-06	9.59E-06	1.24E-05	1.54E-05	1.86E-05	2.2E-05	2.56E-05	2.93E-05	3.31E-05	3.71E-05	4.12E-05	4.55E-05	4.98E-05	5.43E-05	5.89E-05	6.36E-05	6.84E-05	7.33E-05	7.83E-05	8.33E-05	8.85E-05	9.37E-05	9.9E-05	0.000104	0.00011	0.000115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	6.82E-07	9.78E-07	1.45E-06	2.19E-06	3.3E-06	4.84E-06	6.81E-06	9.15E-06	1.18E-05	1.47E-05	1.78E-05	2.1E-05	2.45E-05	2.8E-05	3.17E-05	3.56E-05	3.95E-05	4.36E-05	4.78E-05	5.21E-05	5.65E-05	6.1E-05	6.56E-05	7.03E-05	7.51E-05	8E-05	8.5E-05	9.01E-05	9.52E-05	0.0001	0.000106	0.000111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	6.72E-07	9.59E-07	1.41E-06	2.12E-06	3.17E-06	4.63E-06	6.5E-06	8.74E-06	1.13E-05	1.4E-05	1.7E-05	2.01E-05	2.34E-05	2.69E-05	3.04E-05	3.41E-05	3.79E-05	4.18E-05	4.59E-05	5E-05	5.42E-05	5.86E-05	6.3E-05	6.76E-05	7.22E-05	7.69E-05	8.17E-05	8.66E-05	9.15E-05	9.65E-05	0.000102	0.000107	0.000112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	6.63E-07	9.41E-07	1.38E-06	2.05E-06	3.05E-06	4.44E-06	6.22E-06	8.35E-06	1.08E-05	1.34E-05	1.63E-05	1.93E-05	2.25E-05	2.58E-05	2.92E-05	3.27E-05	3.64E-05	4.02E-05	4.41E-05	4.81E-05	5.21E-05	5.63E-05	6.06E-05	6.5E-05	6.94E-05	7.4E-05	7.86E-05	8.33E-05	8.81E-05	9.29E-05	9.78E-05	0.000103	0.000108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	6.55E-07	9.23E-07	1.34E-06	1.99E-06	2.94E-06	4.26E-06	5.96E-06	7.99E-06	1.03E-05	1.29E-05	1.56E-05	1.85E-05	2.16E-05	2.47E-05	2.81E-05	3.15E-05	3.5E-05	3.86E-05	4.24E-05	4.62E-05	5.02E-05	5.42E-05	5.83E-05	6.25E-05	6.68E-05	7.12E-05	7.57E-05	8.02E-05	8.48E-05	8.95E-05	9.43E-05	9.9E-05	0.000104	0.000109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	6.46E-07	9.06E-07	1.31E-06	1.93E-06	2.83E-06	4.09E-06	5.71E-06	7.66E-06	9.89E-06	1.23E-05	1.5E-05	1.78E-05	2.07E-05	2.38E-05	2.7E-05	3.03E-05	3.37E-05	3.72E-05	4.08E-05	4.45E-05	4.83E-05	5.22E-05	5.62E-05	6.03E-05	6.44E-05	6.86E-05	7.29E-05	7.73E-05	8.18E-05	8.63E-05	9.09E-05	9.55E-05	0.0001	0.000105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	6.38E-07	8.9E-07	1.28E-06	1.87E-06	2.73E-06	3.93E-06	5.48E-06	7.35E-06	9.48E-06	1.18E-05	1.44E-05	1.71E-05	1.99E-05	2.29E-05	2.6E-05	2.91E-05	3.24E-05	3.58E-05	3.93E-05	4.29E-05	4.66E-05	5.03E-05	5.42E-05	5.81E-05	6.21E-05	6.62E-05	7.04E-05	7.46E-05	7.89E-05	8.33E-05	8.77E-05	9.22E-05	9.68E-05	0.000101	0.000106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	6.31E-07	8.75E-07	1.25E-06	1.82E-06	2.64E-06	3.79E-06	5.26E-06	7.05E-06	9.1E-06	1.14E-05	1.38E-05	1.64E-05	1.92E-05	2.2E-05	2.5E-05	2.81E-05	3.13E-05	3.45E-05	3.79E-05	4.14E-05	4.49E-05	4.85E-05	5.23E-05	5.61E-05	5.99E-05	6.39E-05	6.79E-05	7.2E-05	7.62E-05	8.04E-05	8.47E-05	8.91E-05	9.35E-05	9.79E-05	0.000102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	6.23E-07	8.61E-07	1.22E-06	1.77E-06	2.56E-06	3.65E-06	5.06E-06	6.78E-06	8.75E-06	1.09E-05	1.33E-05	1.58E-05	1.85E-05	2.12E-05	2.41E-05	2.71E-05	3.01E-05	3.33E-05	3.66E-05	3.99E-05	4.34E-05	4.69E-05	5.05E-05	5.41E-05	5.79E-05	6.17E-05	6.56E-05	6.96E-05	7.36E-05	7.77E-05	8.19E-05	8.61E-05	9.04E-05	9.47E-05	9.91E-05	0.000103	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	6.16E-07	8.47E-07	1.2E-06	1.72E-06	2.48E-06	3.52E-06	4.87E-06	6.52E-06	8.42E-06	1.05E-05	1.28E-05	1.52E-05	1.78E-05	2.05E-05	2.32E-05	2.61E-05	2.91E-05	3.22E-05	3.53E-05	3.86E-05	4.19E-05	4.53E-05	4.88E-05	5.23E-05	5.59E-05	5.96E-05	6.34E-05	6.73E-05	7.12E-05	7.51E-05	7.92E-05	8.33E-05	8.74E-05	9.16E-05	9.59E-05	0.0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	6.09E-07	8.33E-07	1.17E-06	1.67E-06	2.4E-06	3.4E-06	4.7E-06	6.27E-06	8.1E-06	1.01E-05	1.23E-05	1.47E-05	1.72E-05	1.97E-05	2.24E-05	2.52E-05	2.81E-05	3.11E-05	3.41E-05	3.73E-05	4.05E-05	4.38E-05	4.71E-05	5.06E-05	5.41E-05	5.77E-05	6.13E-05	6.51E-05	6.88E-05	7.27E-05	7.66E-05	8.06E-05	8.46E-05	8.87E-05	9.28E-05	9.7E-05	0.000101	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	6.02E-07	8.21E-07	1.15E-06	1.63E-06	2.33E-06	3.29E-06	4.53E-06	6.04E-06	7.8E-06	9.76E-06	1.19E-05	1.42E-05	1.66E-05	1.91E-05	2.17E-05	2.44E-05	2.72E-05	3E-05	3.3E-05	3.6E-05	3.92E-05	4.24E-05	4.56E-05	4.9E-05	5.24E-05	5.58E-05	5.94E-05	6.3E-05	6.67E-05	7.04E-05	7.42E-05	7.8E-05	8.19E-05	8.59E-05	8.99E-05	9.39E-05	9.8E-05	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	5.96E-07	8.08E-07	1.12E-06	1.59E-06	2.26E-06	3.18E-06	4.37E-06	5.83E-06	7.52E-06	9.42E-06	1.15E-05	1.37E-05	1.6E-05	1.84E-05	2.09E-05	2.36E-05	2.63E-05	2.91E-05	3.19E-05	3.49E-05	3.79E-05	4.1E-05	4.42E-05	4.74E-05	5.07E-05	5.41E-05	5.75E-05	6.1E-05	6.46E-05	6.82E-05	7.19E-05	7.56E-05	7.94E-05	8.32E-05	8.71E-05	9.11E-05	9.51E-05	9.91E-05	0	0	0	0	0	0	0	0	0	0	0	0
1825	5.89E-07	7.96E-07	1.1E-06	1.55E-06	2.2E-06	3.08E-06	4.22E-06	5.63E-06	7.26E-06	9.09E-06	1.11E-05	1.32E-05	1.55E-05	1.78E-05	2.03E-05	2.28E-05	2.54E-05	2.81E-05	3.09E-05	3.38E-05	3.67E-05	3.97E-05	4.28E-05	4.59E-05	4.91E-05	5.24E-05	5.57E-05	5.91E-05	6.26E-05	6.61E-05	6.97E-05	7.33E-05	7.7E-05	8.07E-05	8.45E-05	8.83E-05	9.22E-05	9.61E-05	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	5.83E-07	7.85E-07	1.08E-06	1.52E-06	2.14E-06	2.98E-06	4.08E-06	5.43E-06	7.01E-06	8.77E-06	1.07E-05	1.28E-05	1.49E-05	1.72E-05	1.96E-05	2.21E-05	2.46E-05	2.72E-05	2.99E-05	3.27E-05	3.56E-05	3.85E-05	4.15E-05	4.45E-05	4.76E-05	5.08E-05	5.41E-05	5.74E-05	6.07E-05	6.41E-05	6.76E-05	7.11E-05	7.47E-05	7.83E-05	8.2E-05	8.57E-05	8.95E-05	9.33E-05	9.72E-05	0	0	0	0	0	0	0	0	0	0	0
1898	5.77E-07	7.74E-07	1.06E-06	1.48E-06	2.08E-06	2.89E-06	3.95E-06	5.25E-06	6.77E-06	8.48E-06	1.03E-05	1.23E-05	1.45E-05	1.67E-05	1.9E-05	2.14E-05	2.39E-05	2.64E-05	2.9E-05	3.17E-05	3.45E-05	3.73E-05	4.02E-05	4.32E-05	4.62E-05	4.93E-05	5.24E-05	5.57E-05	5.89E-05	6.22E-05	6.56E-05	6.9E-05	7.25E-05	7.6E-05	7.96E-05	8.32E-05	8.69E-05	9.06E-05	9.43E-05	0	0	0	0	0	0	0	0	0	0	0
1934.5	5.71E-07	7.63E-07	1.04E-06	1.45E-06	2.02E-06	2.81E-06	3.83E-06	5.08E-06	6.55E-06	8.2E-06	1E-05	1.19E-05	1.4E-05	1.61E-05	1.84E-05	2.07E-05	2.31E-05	2.56E-05	2.82E-05	3.08E-05	3.35E-05	3.62E-05	3.9E-05	4.19E-05	4.49E-05	4.79E-05	5.09E-05	5.4E-05	5.72E-05	6.04E-05	6.37E-05	6.7E-05	7.04E-05	7.38E-05	7.73E-05	8.08E-05	8.44E-05	8.8E-05	9.17E-05	0	0	0	0	0	0	0	0	0	0	0
1971	5.66E-07	7.53E-07	1.03E-06	1.42E-06	1.97E-06	2.73E-06	3.71E-06	4.92E-06	6.33E-06	7.93E-06	9.68E-06	1.16E-05	1.36E-05	1.56E-05	1.78E-05	2.01E-05	2.24E-05	2.48E-05	2.73E-05	2.99E-05	3.25E-05	3.52E-05	3.79E-05	4.07E-05	4.36E-05	4.65E-05	4.95E-05	5.25E-05	5.56E-05	5.87E-05	6.19E-05	6.51E-05	6.84E-05	7.18E-05	7.51E-05	7.86E-05	8.2E-05	8.56E-05	8.91E-05	9.27E-05	0	0	0	0	0	0	0	0	0	0
2007.5	5.6E-07	7.43E-07	1.01E-06	1.39E-06	1.92E-06	2.65E-06	3.6E-06	4.76E-06	6.13E-06	7.68E-06	9.37E-06	1.12E-05	1.31E-05	1.52E-05	1.73E-05	1.95E-05	2.18E-05	2.41E-05	2.65E-05	2.9E-05	3.15E-05	3.42E-05	3.68E-05	3.95E-05	4.23E-05	4.52E-05	4.81E-05	5.1E-05	5.4E-05	5.71E-05	6.02E-05	6.33E-05	6.65E-05	6.98E-05	7.31E-05	7.64E-05	7.98E-05	8.32E-05	8.67E-05	9.02E-05	0	0	0	0	0	0	0	0	0	0
2044	5.55E-07	7.34E-07	9.91E-07	1.36E-06	1.88E-06	2.58E-06	3.49E-06	4.61E-06	5.94E-06	7.44E-06	9.08E-06	1.09E-05	1.27E-05	1.47E-05	1.68E-05	1.89E-05	2.11E-05	2.34E-05	2.58E-05	2.82E-05	3.07E-05	3.32E-05	3.58E-05	3.84E-05	4.11E-05	4.39E-05	4.67E-05	4.96E-05	5.25E-05	5.55E-05	5.85E-05	6.16E-05	6.47E-05	6.79E-05	7.11E-05	7.43E-05	7.76E-05	8.1E-05	8.43E-05	8.77E-05	9.13E-05	0	0	0	0	0	0	0	0	0
2080.5	5.5E-07	7.25E-07	9.75E-07	1.33E-06	1.83E-06	2.51E-06	3.39E-06	4.47E-06	5.75E-06	7.21E-06	8.8E-06	1.05E-05	1.24E-05	1.43E-05	1.63E-05	1.84E-05	2.05E-05	2.27E-05	2.5E-05	2.74E-05	2.98E-05	3.23E-05	3.48E-05	3.74E-05	4E-05	4.27E-05	4.55E-05	4.83E-05	5.11E-05	5.4E-05	5.69E-05	5.99E-05	6.3E-05	6.6E-05	6.92E-05	7.23E-05	7.55E-05	7.88E-05	8.21E-05	8.54E-05	8.88E-05	0	0	0	0	0	0	0	0	0
2117	5.45E-07	7.16E-07	9.6E-07	1.31E-06	1.79E-06	2.44E-06	3.29E-06	4.34E-06	5.58E-06	6.99E-06	8.54E-06	1.02E-05	1.2E-05	1.39E-05	1.58E-05	1.78E-05	1.99E-05	2.21E-05	2.43E-05	2.66E-05	2.9E-05	3.14E-05	3.39E-05	3.64E-05	3.89E-05	4.16E-05	4.42E-05	4.7E-05	4.97E-05	5.26E-05	5.54E-05	5.83E-05	6.13E-05	6.43E-05	6.73E-05	7.04E-05	7.36E-05	7.67E-05	7.99E-05	8.32E-05	8.65E-05	0	0	0	0	0	0	0	0	0
2153.5	5.4E-07	7.07E-07	9.45E-07	1.28E-06	1.75E-06	2.38E-06	3.2E-06	4.21E-06	5.41E-06	6.78E-06	8.28E-06	9.91E-06	1.16E-05	1.35E-05	1.54E-05	1.73E-05	1.94E-05	2.15E-05	2.37E-05	2.59E-05	2.82E-05	3.05E-05	3.29E-05	3.54E-05	3.79E-05	4.05E-05	4.31E-05	4.57E-05	4.84E-05	5.12E-05	5.4E-05	5.68E-05	5.97E-05	6.26E-05	6.56E-05	6.86E-05	7.17E-05	7.48E-05	7.79E-05	8.11E-05	8.43E-05	8.75E-05	0	0	0	0	0	0	0	0
2190	5.35E-07	6.99E-07	9.3E-07	1.26E-06	1.71E-06	2.32E-06	3.11E-06	4.09E-06	5.26E-06	6.58E-06	8.04E-06	9.62E-06	1.13E-05	1.31E-05	1.49E-05	1.69E-05	1.89E-05	2.09E-05	2.3E-05	2.52E-05	2.74E-05	2.97E-05	3.21E-05	3.45E-05	3.69E-05	3.94E-05	4.2E-05	4.45E-05	4.72E-05	4.99E-05	5.26E-05	5.54E-05	5.82E-05	6.1E-05	6.39E-05	6.69E-05	6.98E-05	7.29E-05	7.59E-05	7.9E-05	8.21E-05	8.53E-05	0	0	0	0	0	0	0	0
2226.5	5.3E-07	6.91E-07	9.17E-07	1.23E-06	1.67E-06	2.27E-06	3.03E-06	3.98E-06	5.11E-06	6.39E-06	7.81E-06	9.35E-06	1.1E-05	1.27E-05	1.45E-05	1.64E-05	1.83E-05	2.04E-05	2.24E-05	2.45E-05	2.67E-05	2.9E-05	3.12E-05	3.36E-05	3.6E-05	3.84E-05	4.09E-05	4.34E-05	4.6E-05	4.86E-05	5.13E-05	5.4E-05	5.67E-05	5.95E-05	6.23E-05	6.52E-05	6.81E-05	7.1E-05	7.4E-05	7.7E-05	8.01E-05	8.32E-05	8.64E-05	0	0	0	0	0	0	0
2263	5.26E-07	6.83E-07	9.03E-07	1.21E-06	1.64E-06	2.21E-06	2.95E-06	3.87E-06	4.96E-06	6.21E-06	7.59E-06	9.09E-06	1.07E-05	1.24E-05	1.41E-05	1.6E-05	1.79E-05	1.98E-05	2.18E-05	2.39E-05	2.6E-05	2.82E-05	3.04E-05	3.27E-05	3.51E-05	3.74E-05	3.98E-05	4.23E-05	4.48E-05	4.74E-05	5E-05	5.26E-05	5.53E-05	5.8E-05	6.08E-05	6.36E-05	6.64E-05	6.93E-05	7.22E-05	7.52E-05	7.81E-05	8.12E-05	8.42E-05	0	0	0	0	0	0	0
2299.5	5.21E-07	6.75E-07	8.9E-07	1.19E-06	1.6E-06	2.16E-06	2.88E-06	3.77E-06	4.82E-06	6.03E-06	7.38E-06	8.84E-06	1.04E-05	1.2E-05	1.38E-05	1.55E-05	1.74E-05	1.93E-05	2.13E-05	2.33E-05	2.54E-05	2.75E-05	2.97E-05	3.19E-05	3.42E-05	3.65E-05	3.89E-05	4.13E-05	4.37E-05	4.62E-05	4.88E-05	5.13E-05	5.39E-05	5.66E-05	5.93E-05	6.2E-05	6.48E-05	6.76E-05	7.05E-05	7.33E-05	7.62E-05	7.92E-05	8.22E-05	9.64E-05	0	0	0	0	0	0
2336	5.17E-07	6.68E-07	8.78E-07	1.17E-06	1.57E-06	2.11E-06	2.8E-06	3.67E-06	4.69E-06	5.87E-06	7.18E-06	8.6E-06	1.01E-05	1.17E-05	1.34E-05	1.51E-05	1.69E-05	1.88E-05	2.07E-05	2.27E-05	2.47E-05	2.68E-05	2.89E-05	3.11E-05	3.33E-05	3.56E-05	3.79E-05	4.03E-05	4.27E-05	4.51E-05	4.76E-05	5.01E-05	5.26E-05	5.52E-05	5.79E-05	6.05E-05	6.33E-05	6.6E-05	6.88E-05	7.16E-05	7.44E-05	7.73E-05	8.02E-05	8.32E-05	0	0	0	0	0	0
2372.5	5.13E-07	6.6E-07	8.66E-07	1.15E-06	1.54E-06	2.06E-06	2.74E-06	3.57E-06	4.57E-06	5.71E-06	6.98E-06	8.36E-06	9.84E-06	1.14E-05	1.3E-05	1.47E-05	1.65E-05	1.83E-05	2.02E-05	2.21E-05	2.41E-05	2.62E-05	2.82E-05	3.04E-05	3.25E-05	3.47E-05	3.7E-05	3.93E-05	4.16E-05	4.4E-05	4.64E-05	4.89E-05	5.14E-05	5.39E-05	5.65E-05	5.91E-05	6.18E-05	6.44E-05	6.72E-05	6.99E-05	7.27E-05	7.55E-05	7.84E-05	8.12E-05	0	0	0	0	0	0
2409	5.09E-07	6.53E-07	8.54E-07	1.13E-06	1.51E-06	2.02E-06	2.67E-06	3.48E-06	4.45E-06	5.56E-06	6.79E-06	8.14E-06	9.58E-06	1.11E-05	1.27E-05	1.44E-05	1.61E-05	1.79E-05	1.97E-05	2.16E-05	2.35E-05	2.55E-05	2.76E-05	2.96E-05	3.17E-05	3.39E-05	3.61E-05	3.84E-05	4.07E-05	4.3E-05	4.53E-05	4.78E-05	5.02E-05	5.27E-05	5.52E-05	5.77E-05	6.03E-05	6.29E-05	6.56E-05	6.83E-05	7.1E-05	7.38E-05	7.66E-05	7.94E-05	8.23E-05	0	0	0	0	0
2445.5	5.05E-07	6.47E-07	8.43E-07	1.11E-06	1.48E-06	1.97E-06	2.61E-06	3.39E-06	4.33E-06	5.41E-06	6.62E-06	7.93E-06	9.34E-06	1.08E-05	1.24E-05	1.4E-05	1.57E-05	1.74E-05	1.92E-05	2.11E-05	2.3E-05	2.49E-05	2.69E-05	2.89E-05	3.1E-05	3.31E-05	3.53E-05	3.75E-05	3.97E-05	4.2E-05	4.43E-05	4.66E-05	4.9E-05	5.15E-05	5.39E-05	5.64E-05	5.89E-05	6.15E-05	6.41E-05	6.67E-05	6.94E-05	7.21E-05	7.48E-05	7.76E-05	8.04E-05	0	0	0	0	0
2482	5.01E-07	6.4E-07	8.32E-07	1.1E-06	1.46E-06	1.93E-06	2.55E-06	3.31E-06	4.22E-06	5.27E-06	6.44E-06	7.73E-06	9.1E-06	1.06E-05	1.21E-05	1.37E-05	1.53E-05	1.7E-05	1.88E-05	2.06E-05	2.24E-05	2.43E-05	2.63E-05	2.83E-05	3.03E-05	3.23E-05	3.45E-05	3.66E-05	3.88E-05	4.1E-05	4.33E-05	4.56E-05	4.79E-05	5.03E-05	5.27E-05	5.51E-05	5.76E-05	6.01E-05	6.27E-05	6.52E-05	6.78E-05	7.05E-05	7.31E-05	7.58E-05	7.86E-05	8.4E-05	0	0	0	0
2518.5	4.97E-07	6.34E-07	8.22E-07	1.08E-06	1.43E-06	1.89E-06	2.49E-06	3.23E-06	4.12E-06	5.14E-06	6.28E-06	7.53E-06	8.87E-06	1.03E-05	1.18E-05	1.33E-05	1.49E-05	1.66E-05	1.83E-05	2.01E-05	2.19E-05	2.38E-05	2.57E-05	2.76E-05	2.96E-05	3.16E-05	3.37E-05	3.58E-05	3.79E-05	4.01E-05	4.23E-05	4.46E-05	4.68E-05	4.92E-05	5.15E-05	5.39E-05	5.63E-05	5.88E-05	6.13E-05	6.38E-05	6.63E-05	6.89E-05	7.15E-05	7.42E-05	7.68E-05	7.95E-05	0	0	0	0
2555	4.93E-07	6.27E-07	8.12E-07	1.06E-06	1.4E-06	1.85E-06	2.43E-06	3.15E-06	4.01E-06	5.01E-06	6.12E-06	7.34E-06	8.65E-06	1E-05	1.15E-05	1.3E-05	1.46E-05	1.62E-05	1.79E-05	1.96E-05	2.14E-05	2.32E-05	2.51E-05	2.7E-05	2.89E-05	3.09E-05	3.29E-05	3.5E-05	3.71E-05	3.92E-05	4.14E-05	4.36E-05	4.58E-05	4.81E-05	5.04E-05	5.27E-05	5.51E-05	5.75E-05	5.99E-05	6.24E-05	6.49E-05	6.74E-05	7E-05	7.25E-05	7.52E-05	7.78E-05	0	0	0	0
2591.5	4.89E-07	6.21E-07	8.02E-07	1.05E-06	1.38E-06	1.82E-06	2.38E-06	3.08E-06	3.92E-06	4.89E-06	5.97E-06	7.16E-06	8.44E-06	9.79E-06	1.12E-05	1.27E-05	1.42E-05	1.58E-05	1.75E-05	1.92E-05	2.09E-05	2.27E-05	2.45E-05	2.64E-05	2.83E-05	3.02E-05	3.22E-05	3.42E-05	3.63E-05	3.83E-05	4.05E-05	4.26E-05	4.48E-05	4.7E-05	4.93E-05	5.16E-05	5.39E-05	5.63E-05	5.86E-05	6.1E-05	6.35E-05	6.6E-05	6.85E-05	7.1E-05	7.35E-05	7.61E-05	7.88E-05	0	0	0
2628	4.86E-07	6.15E-07	7.92E-07	1.03E-06	1.36E-06	1.78E-06	2.33E-06	3.01E-06	3.82E-06	4.77E-06	5.82E-06	6.98E-06	8.23E-06	9.56E-06	1.09E-05	1.24E-05	1.39E-05	1.55E-05	1.71E-05	1.87E-05	2.04E-05	2.22E-05	2.4E-05	2.58E-05	2.76E-05	2.95E-05	3.15E-05	3.35E-05	3.55E-05	3.75E-05	3.96E-05	4.17E-05	4.38E-05	4.6E-05	4.82E-05	5.05E-05	5.27E-05	5.5E-05	5.74E-05	5.97E-05	6.21E-05	6.46E-05	6.7E-05	6.95E-05	7.2E-05	7.45E-05	7.71E-05	0	0	0
2664.5	4.82E-07	6.1E-07	7.83E-07	1.02E-06	1.33E-06	1.75E-06	2.28E-06	2.94E-06	3.73E-06	4.65E-06	5.68E-06	6.82E-06	8.03E-06	9.33E-06	1.07E-05	1.21E-05	1.36E-05	1.51E-05	1.67E-05	1.83E-05	2E-05	2.17E-05	2.34E-05	2.52E-05	2.7E-05	2.89E-05	3.08E-05	3.27E-05	3.47E-05	3.67E-05	3.87E-05	4.08E-05	4.29E-05	4.5E-05	4.72E-05	4.94E-05	5.16E-05	5.39E-05	5.62E-05	5.85E-05	6.08E-05	6.32E-05	6.56E-05	6.8E-05	7.05E-05	7.3E-05	7.55E-05	7.87E-05	0	0
2701	4.79E-07	6.04E-07	7.74E-07	1E-06	1.31E-06	1.71E-06	2.23E-06	2.88E-06	3.65E-06	4.54E-06	5.55E-06	6.65E-06	7.84E-06	9.11E-06	1.04E-05	1.18E-05	1.33E-05	1.48E-05	1.63E-05	1.79E-05	1.95E-05	2.12E-05	2.29E-05	2.47E-05	2.65E-05	2.83E-05	3.01E-05	3.2E-05	3.4E-05	3.59E-05	3.79E-05	3.99E-05	4.2E-05	4.41E-05	4.62E-05	4.84E-05	5.06E-05	5.28E-05	5.5E-05	5.73E-05	5.96E-05	6.19E-05	6.43E-05	6.66E-05	6.9E-05	7.15E-05	7.39E-05	7.64E-05	0	0
2737.5	4.75E-07	5.98E-07	7.65E-07	9.89E-07	1.29E-06	1.68E-06	2.19E-06	2.81E-06	3.57E-06	4.44E-06	5.42E-06	6.5E-06	7.66E-06	8.9E-06	1.02E-05	1.16E-05	1.3E-05	1.45E-05	1.6E-05	1.75E-05	1.91E-05	2.08E-05	2.24E-05	2.41E-05	2.59E-05	2.77E-05	2.95E-05	3.14E-05	3.33E-05	3.52E-05	3.71E-05	3.91E-05	4.11E-05	4.32E-05	4.53E-05	4.74E-05	4.95E-05	5.17E-05	5.39E-05	5.61E-05	5.84E-05	6.06E-05	6.29E-05	6.53E-05	6.76E-05	7E-05	7.24E-05	7.49E-05	0	0
2774	4.72E-07	5.93E-07	7.56E-07	9.76E-07	1.27E-06	1.65E-06	2.14E-06	2.75E-06	3.49E-06	4.33E-06	5.29E-06	6.35E-06	7.49E-06	8.7E-06	9.97E-06	1.13E-05	1.27E-05	1.41E-05	1.56E-05	1.71E-05	1.87E-05	2.03E-05	2.2E-05	2.36E-05	2.54E-05	2.71E-05	2.89E-05	3.07E-05	3.26E-05	3.45E-05	3.64E-05	3.83E-05	4.03E-05	4.23E-05	4.43E-05	4.64E-05	4.85E-05	5.06E-05	5.28E-05	5.5E-05	5.72E-05	5.94E-05	6.17E-05	6.4E-05	6.63E-05	6.86E-05	7.1E-05	7.34E-05	7.58E-05	0
2810.5	4.69E-07	5.88E-07	7.48E-07	9.63E-07	1.25E-06	1.62E-06	2.1E-06	2.7E-06	3.41E-06	4.24E-06	5.17E-06	6.2E-06	7.32E-06	8.5E-06	9.75E-06	1.11E-05	1.24E-05	1.38E-05	1.53E-05	1.68E-05	1.83E-05	1.99E-05	2.15E-05	2.31E-05	2.48E-05	2.65E-05	2.83E-05	3.01E-05	3.19E-05	3.37E-05	3.56E-05	3.75E-05	3.95E-05	4.15E-05	4.34E-05	4.55E-05	4.75E-05	4.96E-05	5.17E-05	5.39E-05	5.6E-05	5.82E-05	6.04E-05	6.27E-05	6.5E-05	6.73E-05	6.96E-05	7.19E-05	7.43E-05	0
2847	4.65E-07	5.83E-07	7.4E-07	9.5E-07	1.23E-06	1.59E-06	2.06E-06	2.64E-06	3.33E-06	4.14E-06	5.06E-06	6.06E-06	7.15E-06	8.31E-06	9.54E-06	1.08E-05	1.21E-05	1.35E-05	1.5E-05	1.64E-05	1.79E-05	1.95E-05	2.11E-05	2.27E-05	2.43E-05	2.6E-05	2.77E-05	2.95E-05	3.13E-05	3.31E-05	3.49E-05	3.68E-05	3.87E-05	4.06E-05	4.26E-05	4.46E-05	4.66E-05	4.86E-05	5.07E-05	5.28E-05	5.49E-05	5.71E-05	5.93E-05	6.15E-05	6.37E-05	6.59E-05	6.82E-05	7.05E-05	7.28E-05	7.54E-05
2883.5	4.62E-07	5.78E-07	7.32E-07	9.38E-07	1.21E-06	1.57E-06	2.02E-06	2.59E-06	3.26E-06	4.05E-06	4.94E-06	5.93E-06	6.99E-06	8.13E-06	9.33E-06	1.06E-05	1.19E-05	1.32E-05	1.46E-05	1.61E-05	1.76E-05	1.91E-05	2.06E-05	2.22E-05	2.38E-05	2.55E-05	2.72E-05	2.89E-05	3.06E-05	3.24E-05	3.42E-05	3.61E-05	3.79E-05	3.98E-05	4.17E-05	4.37E-05	4.57E-05	4.77E-05	4.97E-05	5.18E-05	5.39E-05	5.6E-05	5.81E-05	6.03E-05	6.24E-05	6.47E-05	6.69E-05	6.91E-05	7.14E-05	7.37E-05

FSConsol (c) 1994-2011 - version 3.45 GWP Geo Software Inc.
Date and Time of Analysis (mm/dd/yy) 11/11/2013 at 14:40:56
input filename: P:\2013 Projects\133-92505 Cu Flat TSF\Consolidation\Nov 2013\OF-beach.fs1

Overflow - beach (Non-thickened)
Revised flow rates and pond areas 11/11/2013
CDJ

ANALYSIS CONDITIONS
Analysis Type = Pond
Analysis Time = 16.115 years
Maximum Pond Height = 77.42 meters
Number of Filling Rates = 5

Rate	Period
kg/day	yrs
1.33E+07	1
1.54E+07	4
1.42E+07	6
1.32E+07	0.12
0.00E+00	5

Number of Pond Areas = 17

Pond Height	Pond Area
m	sq. km
4.27	0.07
4.57	0.24
3.05	0.41
4.57	0.57
4.57	0.73
4.57	0.82
4.57	0.97
4.57	1.03
4.57	1.13
4.57	1.17
4.57	1.21
4.57	1.23
4.57	1.25
4.57	1.26
7.62	1.27
3.05	1.27
4.57	1.27

Number of Surcharge Episodes = 0

INITIAL CONDITIONS
Initial Height = 0.00000 meters

MATERIAL PROPERTIES
Number of Soil Types = 1

Soil Type #1 duration = 16.11 years
Initial Solids Content = 25.90 %
void ratio @ initial S.C. = 7.582; effective stress @ initial S.C. = 10.00 Pascals
Specific Gravity = 2.65
Compressibility Parameters (stress in kPa)
A = 1.787; B = -0.2983 ; Mconst = 0.5224
Permeability Parameters (cm/second)
C = 1.523e-06; D = 3.035

BOUNDARY CONDITIONS
Bottom Boundary: Impermeable
Top Boundary: Constant Water Cap of: 0.000 m thickness

NUMERICAL TWEAKS
Time Step = 0.050 days
Maximum Stress Difference = 1e+06 kPa

OUTPUT PREFERENCES
Time Step Multiplier = 730
Time Step Units from: Time Step (days)

Time Step Output

Elapsed Time days	Height metres	Ave.Sol.Cont. %	Ave. Normalized Ue %	Ave. Dissipation %	Total Solids (kg)	Solids Flux (kg/d/m2)
0	0	25.9	100	0	0	201.363
36.5	6.098115	39.528	96.536	3.464	4.84E+08	55.9199
73	8.737703	43.656	95.973	4.027	9.69E+08	55.9199
109.5	9.507187	47.682	94.382	5.618	1.45E+09	32.2474
146	10.476951	50.081	93.328	6.672	1.94E+09	32.2474
182.5	11.558634	51.655	92.671	7.329	2.42E+09	32.2474
219	12.236617	53.232	91.655	8.345	2.91E+09	23.1181
255.5	12.810342	54.565	90.672	9.328	3.39E+09	23.1181
292	13.436283	55.614	89.868	10.132	3.87E+09	23.1181
328.5	14.096505	56.462	89.212	10.788	4.36E+09	23.1181
365	14.780841	57.164	88.681	11.319	4.84E+09	26.904
401.5	15.714982	57.566	88.64	11.36	5.41E+09	26.904
438	16.566093	58.003	88.43	11.57	5.97E+09	21.1605
474.5	17.159336	58.556	87.926	12.074	6.53E+09	21.1605
511	17.773119	59.023	87.525	12.475	7.10E+09	21.1605
547.5	18.397756	59.433	87.186	12.814	7.66E+09	21.1605
584	19.030285	59.798	86.897	13.103	8.23E+09	21.1605
620.5	19.668975	60.125	86.649	13.351	8.79E+09	21.1605
657	20.312613	60.421	86.438	13.562	9.35E+09	21.1605
693.5	20.960293	60.689	86.258	13.742	9.92E+09	21.1605
730	21.488683	61.011	85.902	14.098	1.05E+10	18.7619
766.5	22.017166	61.298	85.604	14.396	1.10E+10	18.7619
803	22.551957	61.559	85.34	14.66	1.16E+10	18.7619
839.5	23.091308	61.8	85.105	14.895	1.22E+10	18.7619
876	23.634322	62.023	84.893	15.107	1.27E+10	18.7619
912.5	24.180393	62.229	84.703	15.297	1.33E+10	18.7619
949	24.729068	62.422	84.532	15.468	1.39E+10	18.7619
985.5	25.279985	62.603	84.378	15.622	1.44E+10	18.7619
1022	25.762592	62.813	84.108	15.892	1.50E+10	15.86
1058.5	26.168928	63.039	83.774	16.226	1.56E+10	15.86
1095	26.583726	63.244	83.478	16.522	1.61E+10	15.86
1131.5	27.003419	63.436	83.204	16.796	1.67E+10	15.86
1168	27.426795	63.616	82.95	17.05	1.72E+10	15.86
1204.5	27.853193	63.785	82.711	17.289	1.78E+10	15.86
1241	28.282173	63.946	82.487	17.513	1.84E+10	15.86
1277.5	28.713408	64.098	82.277	17.723	1.89E+10	15.86
1314	29.146638	64.242	82.08	17.92	1.95E+10	15.86
1350.5	29.581652	64.38	81.894	18.106	2.01E+10	15.86
1387	30.018268	64.511	81.72	18.28	2.06E+10	15.86
1423.5	30.42497	64.651	81.498	18.502	2.12E+10	14.9583
1460	30.82099	64.787	81.28	18.72	2.18E+10	14.9583
1496.5	31.21996	64.915	81.079	18.921	2.23E+10	14.9583

1533	31.620997	65.037	80.889	19.111	2.29E+10	14.9583
1569.5	32.023724	65.154	80.709	19.291	2.34E+10	14.9583
1606	32.42791	65.266	80.539	19.461	2.40E+10	14.9583
1642.5	32.833389	65.373	80.378	19.622	2.46E+10	14.9583
1679	33.24003	65.477	80.225	19.775	2.51E+10	14.9583
1715.5	33.647726	65.576	80.079	19.921	2.57E+10	14.9583
1752	34.056384	65.671	79.941	20.059	2.63E+10	14.9583
1788.5	34.465926	65.764	79.81	20.19	2.68E+10	14.9583
1825	34.852455	65.864	79.636	20.364	2.74E+10	12.5521
1861.5	35.144936	65.994	79.325	20.675	2.79E+10	12.5521
1898	35.447468	66.11	79.059	20.941	2.84E+10	12.5521
1934.5	35.754018	66.22	78.81	21.19	2.89E+10	12.5521
1971	36.063325	66.325	78.572	21.428	2.95E+10	12.5521
2007.5	36.374798	66.426	78.345	21.655	3.00E+10	12.5521
2044	36.688086	66.523	78.126	21.874	3.05E+10	12.5521
2080.5	37.002952	66.616	77.914	22.086	3.10E+10	12.5521
2117	37.319222	66.706	77.71	22.29	3.15E+10	12.5521
2153.5	37.636758	66.793	77.513	22.487	3.21E+10	12.5521
2190	37.955451	66.877	77.322	22.678	3.26E+10	12.5521
2226.5	38.275209	66.958	77.137	22.863	3.31E+10	12.5521
2263	38.59595	67.038	76.958	23.042	3.36E+10	12.5521
2299.5	38.917606	67.114	76.785	23.215	3.41E+10	12.5521
2336	39.240116	67.189	76.617	23.383	3.47E+10	12.5521
2372.5	39.548675	67.267	76.425	23.575	3.52E+10	12.1668
2409	39.855497	67.342	76.241	23.759	3.57E+10	12.1668
2445.5	40.163729	67.415	76.064	23.936	3.62E+10	12.1668
2482	40.473023	67.485	75.893	24.107	3.67E+10	12.1668
2518.5	40.783223	67.553	75.728	24.272	3.73E+10	12.1668
2555	41.094232	67.62	75.567	24.433	3.78E+10	12.1668
2591.5	41.405978	67.685	75.411	24.589	3.83E+10	12.1668
2628	41.718406	67.748	75.26	24.74	3.88E+10	12.1668
2664.5	42.031468	67.809	75.113	24.887	3.93E+10	12.1668
2701	42.345125	67.869	74.971	25.029	3.99E+10	12.1668
2737.5	42.65934	67.927	74.832	25.168	4.04E+10	12.1668
2774	42.974082	67.984	74.698	25.302	4.09E+10	12.1668
2810.5	43.28932	68.04	74.567	25.433	4.14E+10	12.1668
2847	43.605029	68.094	74.44	25.56	4.19E+10	12.1668
2883.5	43.918571	68.149	74.309	25.691	4.24E+10	11.7178
2920	44.213906	68.207	74.151	25.849	4.30E+10	11.7178
2956.5	44.511467	68.263	74.005	25.995	4.35E+10	11.7178
2993	44.810075	68.317	73.864	26.136	4.40E+10	11.7178
3029.5	45.109458	68.369	73.728	26.272	4.45E+10	11.7178
3066	45.409486	68.42	73.596	26.404	4.50E+10	11.7178
3102.5	45.710079	68.47	73.468	26.532	4.56E+10	11.7178
3139	46.01118	68.519	73.344	26.656	4.61E+10	11.7178
3175.5	46.312747	68.567	73.222	26.778	4.66E+10	11.7178
3212	46.614745	68.614	73.105	26.895	4.71E+10	11.7178

3248.5	46.917146	68.659	72.99	27.01	4.76E+10	11.7178
3285	47.219924	68.704	72.878	27.122	4.82E+10	11.7178
3321.5	47.523058	68.748	72.769	27.231	4.87E+10	11.7178
3358	47.826528	68.791	72.663	27.337	4.92E+10	11.7178
3394.5	48.130317	68.833	72.559	27.441	4.97E+10	11.7178
3431	48.434408	68.875	72.458	27.542	5.02E+10	11.7178
3467.5	48.730334	68.918	72.344	27.656	5.08E+10	11.527
3504	49.026746	68.96	72.236	27.764	5.13E+10	11.527
3540.5	49.323742	69.001	72.131	27.869	5.18E+10	11.527
3577	49.621177	69.04	72.029	27.971	5.23E+10	11.527
3613.5	49.918983	69.08	71.93	28.07	5.28E+10	11.527
3650	50.21712	69.118	71.834	28.166	5.34E+10	11.527
3686.5	50.515559	69.156	71.74	28.26	5.39E+10	11.527
3723	50.814276	69.193	71.649	28.351	5.44E+10	11.527
3759.5	51.113254	69.229	71.56	28.44	5.49E+10	11.527
3796	51.412476	69.264	71.473	28.527	5.54E+10	11.527
3832.5	51.71193	69.3	71.388	28.612	5.60E+10	11.527
3869	52.011603	69.334	71.305	28.695	5.65E+10	11.527
3905.5	52.311483	69.368	71.224	28.776	5.70E+10	11.527
3942	52.611561	69.401	71.146	28.854	5.75E+10	11.527
3978.5	52.911828	69.434	71.069	28.931	5.80E+10	11.527
4015	53.20818	69.467	70.986	29.014	5.85E+10	10.5821
4051.5	53.463995	69.511	70.833	29.167	5.90E+10	10.5821
4088	53.301506	69.666	69.884	30.116	5.91E+10	0
4124.5	53.129642	69.794	69.049	30.951	5.91E+10	0
4161	52.978348	69.906	68.274	31.726	5.91E+10	0
4197.5	52.839417	70.01	67.527	32.473	5.91E+10	0
4234	52.709426	70.107	66.798	33.202	5.91E+10	0
4270.5	52.586503	70.199	66.079	33.921	5.91E+10	0
4307	52.469474	70.287	65.368	34.632	5.91E+10	0
4343.5	52.357536	70.372	64.661	35.339	5.91E+10	0
4380	52.250103	70.453	63.958	36.042	5.91E+10	0
4416.5	52.14673	70.531	63.257	36.743	5.91E+10	0
4453	52.047066	70.607	62.558	37.442	5.91E+10	0
4489.5	51.950825	70.68	61.86	38.14	5.91E+10	0
4526	51.857772	70.751	61.164	38.836	5.91E+10	0
4562.5	51.767705	70.82	60.468	39.532	5.91E+10	0
4599	51.680452	70.887	59.773	40.227	5.91E+10	0
4635.5	51.59586	70.952	59.079	40.921	5.91E+10	0
4672	51.513796	71.015	58.385	41.615	5.91E+10	0
4708.5	51.43414	71.076	57.693	42.307	5.91E+10	0
4745	51.356784	71.136	57.001	42.999	5.91E+10	0
4781.5	51.281628	71.194	56.31	43.69	5.91E+10	0
4818	51.208581	71.25	55.62	44.38	5.91E+10	0
4854.5	51.137561	71.305	54.932	45.068	5.91E+10	0
4891	51.068488	71.359	54.244	45.756	5.91E+10	0
4927.5	51.001291	71.411	53.559	46.441	5.91E+10	0

4964	50.9359	71.462	52.875	47.125	5.91E+10	0
5000.5	50.872254	71.512	52.193	47.807	5.91E+10	0
5037	50.810289	71.56	51.513	48.487	5.91E+10	0
5073.5	50.749951	71.607	50.836	49.164	5.91E+10	0
5110	50.691184	71.653	50.16	49.84	5.91E+10	0
5146.5	50.633936	71.698	49.488	50.512	5.91E+10	0
5183	50.578159	71.742	48.818	51.182	5.91E+10	0
5219.5	50.523806	71.784	48.151	51.849	5.91E+10	0
5256	50.470832	71.826	47.488	52.512	5.91E+10	0
5292.5	50.419194	71.867	46.827	53.173	5.91E+10	0
5329	50.368851	71.906	46.17	53.83	5.91E+10	0
5365.5	50.319763	71.945	45.517	54.483	5.91E+10	0
5402	50.271894	71.983	44.867	55.133	5.91E+10	0
5438.5	50.225206	72.02	44.221	55.779	5.91E+10	0
5475	50.179665	72.056	43.58	56.42	5.91E+10	0
5511.5	50.135237	72.091	42.942	57.058	5.91E+10	0
5548	50.09189	72.125	42.309	57.691	5.91E+10	0
5584.5	50.049592	72.159	41.68	58.32	5.91E+10	0
5621	50.008314	72.192	41.056	58.944	5.91E+10	0
5657.5	49.968027	72.224	40.437	59.563	5.91E+10	0
5694	49.928703	72.255	39.822	60.178	5.91E+10	0
5730.5	49.890315	72.286	39.213	60.787	5.91E+10	0
5767	49.852837	72.315	38.608	61.392	5.91E+10	0
5803.5	49.816243	72.345	38.008	61.992	5.91E+10	0
5840	49.780511	72.373	37.414	62.586	5.91E+10	0
5876.5	49.745615	72.401	36.825	63.175	5.91E+10	0

Observation Point Data

Number of Observation Points: 50
Number of Observation Point Readings: 162
Observation Point Time Step: 36.50 days

E X C E S S P O R E P R E S S U R E (kPa)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	15.19856	11.46588	6.711455	2.978659	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	24.45406	21.45867	15.7133	10.55992	6.162782	2.277317	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	28.92925	26.48922	20.78805	14.79739	9.493884	4.784822	0.514361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	33.38402	31.3242	25.99595	19.62737	13.65155	8.274096	3.384326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	37.95893	36.17112	31.27491	24.84844	18.41266	12.48729	7.067915	2.061288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	41.18531	39.60138	35.11125	28.81582	22.11204	15.75009	9.873194	4.427845	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	43.88642	42.46116	38.33037	32.26243	25.44949	18.75946	12.49103	6.655035	1.20439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	46.64616	45.34814	41.52964	35.72981	28.92746	22.01274	15.41742	9.233917	3.432744	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	49.45535	48.26183	44.71399	39.192	32.48365	25.43763	18.57988	12.09047	5.979004	0.361527	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	52.30825	51.20223	47.88976	42.63938	36.07897	28.98136	21.92443	15.17067	8.778386	2.744043	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	56.04124	55.00967	51.90305	46.91043	40.53013	33.44543	26.24941	19.27318	12.62852	6.32403	0.568567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	59.55284	58.58546	55.66005	50.90822	44.72496	37.70296	30.42284	23.26597	16.39748	9.854383	3.656081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	62.06778	61.15638	58.39152	53.86282	47.88326	40.96076	33.64506	26.34851	19.2851	12.52562	6.080061	0.258376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	64.60934	63.74724	61.12554	56.80276	51.02694	44.22994	36.91999	29.52287	22.29374	15.33886	8.682789	2.384887	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	67.17514	66.35681	63.86351	59.73053	54.15427	47.50021	40.23015	32.76883	25.40308	18.2738	11.42678	4.884113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	69.76312	68.98395	66.60646	62.6484	57.26506	50.76477	43.56196	36.06942	28.59559	21.31315	14.29171	7.553069	1.294056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	72.37153	71.62763	69.3551	65.55842	60.35994	54.0193	46.90509	39.41049	31.85605	24.44183	17.26199	10.34897	3.768084	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	74.99884	74.28689	72.10995	68.46238	63.44004	57.26128	50.25181	42.78038	35.17126	27.64658	20.32436	13.25205	6.464204	0.410187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	77.64374	76.96087	74.87134	71.36181	66.50669	60.48941	53.59645	46.16957	38.52978	30.91561	23.4672	16.24885	9.291266	2.736004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	79.82888	79.17262	77.16336	73.78186	69.08512	63.22709	56.45886	49.09423	41.44562	33.76231	26.20398	18.85236	11.74395	4.943268	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	81.97079	81.33897	79.40366	76.14117	71.59427	65.89195	59.25378	51.96583	44.32792	36.59492	28.9429	21.47072	14.22478	7.246411	0.896822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	84.12712	83.51784	81.65092	78.49926	74.09402	68.54306	62.03801	54.83821	47.22818	39.46381	31.73414	24.15413	16.78201	9.654028	2.925736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	86.29706	85.70862	83.90514	80.85693	76.5856	71.18111	64.81044	57.7077	50.14044	42.36172	34.57006	26.895	19.40735	12.14591	5.19468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	88.47983	87.91076	86.16628	83.21481	79.0701	73.80689	67.57051	60.57154	53.05975	45.28227	37.44376	29.68641	22.09362	14.71045	7.592494	1.12793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	90.67477	90.12373	88.43427	85.57347	81.54854	76.42129	70.31803	63.4277	55.98205	48.21992	40.349	32.52201	24.83443	17.33944	10.08208	3.246097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	92.88126	92.34704	90.70903	87.93334	84.02181	79.02518	73.0531	66.27474	58.90406	51.16989	43.28019	35.39599	27.62395	20.02625	12.64586	5.58744	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	95.09872	94.58025	92.99046	90.29483	86.49071	81.61943	75.77603	69.11168	61.82316	54.12807	46.23233	38.30302	30.45681	22.76517	15.27339	8.050936	1.47352	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	97.0581	96.55442	95.00992	92.3897	88.68745	83.93637	78.21872	71.66937	64.46873	56.82246	48.93244	40.96968	33.05954	25.28259	17.68882	10.33182	3.405063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	98.64905	98.15926	96.65737	94.10834	90.50276	85.8669	80.27178	73.8376	66.72928	59.14021	51.26668	43.28164	35.31765	27.46397	19.77652	12.30265	5.163027	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	100.2495	99.77283	98.31114	95.82939	92.31564	87.7902	82.31422	75.99468	68.98204	61.45732	53.61003	45.61329	37.60533	29.68342	21.91008	14.33161	7.033581	0.610823	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	101.8591	101.3948	99.97107	97.55302	94.1266	89.70698	84.34663	78.14069	71.22611	63.77177	55.95948	47.96096	39.91866	31.93698	24.08523	16.41167	8.983385	2.125771	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	103.4775	103.0249	101.6371	99.27939	95.93609	91.61789	86.36963	80.2758	73.46088	66.08191	58.3124	50.32136	42.254	34.22093	26.29811	18.53744	10.9964	3.878829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	105.1043	104.6627	103.309	101.0086	97.74452	93.52354	88.38383	82.4003	75.68595	68.38642	60.66656	52.69155	44.60804	36.5318	28.54517	20.70453	13.06299	5.760153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	106.7392	106.3081	104.9866	102.7408	99.55222	95.42448	90.38981	84.51453	77.90109	70.68425	63.02003	55.0689	46.9777	38.86635	30.82308	22.90919	15.17658	7.728424	1.101646	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	108.3818	107.9607	106.67	104.476	101.3595	97.32123	92.38814	86.61889	80.10622	72.97461	65.37121	57.45108	49.36021	41.2216	33.12876	25.14807	17.33221	9.763027	2.759386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	110.032	109.6203	108.3588	106.2143	103.1667	99.21426	94.37938	88.71378	82.30136	75.25687	67.71872	59.83605	51.75301	43.59472	35.4593	27.41812	19.52586	11.85193	4.606722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	111.6893	111.2868	110.0531	107.9558	104.974	101.104	96.36405	90.79965	84.48662	77.53062	70.06144	62.222	54.15381	45.98314	37.812	29.7165	21.75415	13.98729	6.565456	0.31565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	113.3537	112.9597	111.7527	109.7004	106.7817	102.9909	98.34264	92.87694	86.66219	79.79553	72.39846	64.60739	56.56053	48.38445	40.18429	32.04058	24.01407	16.16349	8.602068	1.781632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	114.8959	114.5102	113.3285	111.3193	108.461	104.7463	100.1867	94.81721	88.69942	81.92256	74.60014	66.86197	58.84242	50.66755	42.44492	34.25901	26.17403	18.24736	10.56982	3.43076	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	116.3724	115.9946	114.8372	112.8692	110.0688	106.4274	101.9535	96.67762	90.65529	83.96834	76.72262	69.04133	61.05455	52.88715	44.64837	36.42618	28.28826	20.29214	12.51471	5.160521	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	117.8553	117.485	116.3509	114.4224	111.6776	108.1066	103.7155	98.53076	92.60227	86.00504	78.83762	71.21665	63.26761	55.11355	46.86472	38.61206	30.42663	22.36703	14.50176	6.984451	0.562852	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	119.3443	118.9812	117.8693	115.9787	113.2873	109.7841	105.4731	100.377	94.54068	88.03271	80.94479	73.38709	65.48028	57.34506	49.09204	40.81459	32.58696	24.46945	16.52567	8.876693	1.973498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	120.8392	120.483	119.3925	117.5383	114.8982	111.4603	107.2267	102.2169	96.47084	90.05148	83.04389	75.55199	67.69142	59.58015	51.32853	43.03182	34.76721	26.59709	18.5824	10.82277	3.62249	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	122.3398	121.9904	120.9204	119.1011	116.5103	113.1354	108.9767	104.0506	98.39309	92.06149	85.13478	77.71076	69.90005	61.81743	53.57252	45.26194	36.96548	28.74779	20.66869	12.81345	5.401599	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	123.846	123.503	122.4527	120.667	118.1237	114.8095	110.7233	105.8787	100.3078	94.06293	87.21736	79.86297	72.10528	64.05566	55.82248	47.50324	39.17995	30.91958	22.78185	14.84238	7.267744	0.761028	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	125.3577	125.0208	123.9895	122.2361	119.7385	116.483	112.4668	107.7014	102.2152	96.05603	89.29162	82.00825	74.30637	66.29373	58.07701	49.7541	41.4089	33.11062	24.91952	16.90485	9.198494	2.238728	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	126.8746	126.5436	125.5306	123.8083	121.3548	118.1558	114.2075	109.5191	104.1157	98.04101	91.35758	84.14632	76.5027	68.53064	60.33481	52.01305	43.65072	35.31916	27.07962	18.99722	11.18044	3.931308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	128.3967	128.0714	127.0759	125.3836	122.9726	119.8283	115.9457	111.3321	106.0097	100.0181	93.41531	86.27699	78.69372	70.76551	62.59472	54.27867	45.90389	37.54358	29.26027	21.11655	13.20478	5.746394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	129.9237	129.6039	128.6254	126.962	124.592	121.5006	117.6816	113.1407	107.8974	101.9876	95.46492	88.40012	80.87899	72.99757	64.85565	56.54969	48.16696	39.78233	31.45973	23.26034	15.26535	7.644809	1.035843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	131.3621	131.0476	130.0854	128.4499	126.1195	123.0791	119.3219	114.8516	109.6856	103.8562	97.41298	90.42206	82.96459	75.1326	67.02309	58.73135	50.34502	41.94041	33.58284	25.3329	17.26402	9.511941	2.487844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	132.3623	132.0529	131.1065	129.4979	127.2058	124.2149	120.5174	116.1159	111.0252	105.2748	98.91032	91.99345	84.60089	76.82067	68.74684	60.47323	52.08749	43.66709	35.27875	26.98301	18.84791	10.98577	3.701687	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	133.3671	133.0627	132.1315	130.5489	128.2939	125.3508	121.7113	117.3766	112.3595	106.6866	100.4	93.55717	86.23054	78.50415	70.46899	62.21717	53.83605	45.40396	36.98893	28.65182	20.45707	12.50148	5.029131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	134.3764	134.0768	133.1604	131.6029	129.3837	126.4869	122.9036	118.6339	113.6886	108.0919	101.8822	95.11327	87.85336	80.1826	72.18886	63.96226	55.58958	47.14978	38.71203	30.33779	22.08921	14.05291	6.429942	0.236482	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	135.3901	135.0951	134.193	132.6599	130.4753	127.6233	124.0947	119.8881	115.013	109.4908	103.3571	96.66179	89.46922	81.85567	73.90581	65.70763	57.34707	48.90339	40.44679	32.03947	23.74234	15.63499	7.886487	1.165259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	136.4081	136.1176	135.2292	133.7197	131.5687	128.7602	125.2845	121.1395	116.3328	110.8837	104.8249	98.20285	91.07804	83.52304	75.61929	67.45252	59.10754	50.66369	42.19201	33.75554	25.41464	17.24389	9.388127	2.329593	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	137.4303	137.1441	136.2691	134.7824	132.6639	129.8976	126.4733	122.3881	117.6482	112.2708	106.2858	99.73653	92.67975	85.18445	77.32883	69.19621	60.87009	52.42965	43.94657	35.48475	27.10448	18.87668	10.92763	3.623616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	138.4566	138.1746	137.3126	135.8479	133.7609	131.0356	127.6613	123.6343	118.9595	113.6524	107.7401	101.263	94.27436	86.8397	79.03401	70.93807	62.63392	54.2003	45.70939	37.2259	28.81036	20.53098	12.49973	5.00509	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	139.4869	139.209	138.3595	136.9163	134.8598	132.1742	128.8485	124.8782	120.267	115.0286	109.1879	102.7823	95.86186	88.48863	80.73445	72.67753	64.39826	55.97475	47.47947	38.97788	30.53091	22.20481	14.10041	6.451504	0.27355	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	140.5211	140.2471	139.4098	137.9874	135.9606	133.3135	130.035	126.1199	121.5708	116.3998	110.6295	104.2947	97.4423	90.13112	82.42984	74.41408	66.16241	57.75214	49.25584	40.73961	32.26487	23.89645	15.72649	7.949059	1.238421	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	141.5592	141.289	140.4635	139.0613	137.0633	134.4537	131.221	127.3596	122.8712	117.7661	112.0651	105.8003	99.01574	91.76707	84.11992	76.14726	67.92574	59.5317	51.03759	42.51008	34.01107	25.6044	17.37538	9.488535	2.433681	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	142.601	142.3345	141.5204	140.1378	138.1678	135.5946	132.4066	128.5976	124.1683	119.1278	113.4948	107.2992	100.5822	93.39644	85.80447	77.87666	69.68767	61.31268	52.82388	44.28834	35.76842	27.32729	19.04491	11.06338	3.756964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	143.6464	143.3836	142.5807	141.217	139.2742	136.7364	133.5918	129.8338	125.4623	120.485	114.919	108.7917	102.1419	95.01918	87.48329	79.60192	71.44766	63.0944	54.6139	46.07346	37.53589	29.0639	20.73321	12.6687	5.166686	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	144.6955	144.4362	143.644	142.2989	140.3825	137.8791	134.7768	131.0685	126.7534	121.838	116.3377	110.2779	103.6948	96.6353	89.15625	81.32275	73.20525	64.87624	56.40689	47.86459	39.31252	30.81307	22.43866	14.30073	6.640493	0.398194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	145.7481	145.4922	144.7106	143.3834	141.4926	139.0227	135.9616	132.3018	128.0418	123.187	117.7512	111.758	105.2411	98.24481	90.82322	83.03885	74.95999	66.65762	58.20215	49.66091	41.09739	32.57375	24.15981	15.95646	8.164612	1.422087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	146.7393	146.4867	145.7153	144.4056	142.5398	140.1025	137.0815	133.469	129.2628	124.4672	119.0949	113.1673	106.7161	99.78289	92.41928	84.68516	76.64666	68.37315	59.93416	51.39681	42.82478	34.2801	25.83051	17.56855	9.66497	2.592264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	147.7128	147.4634	146.702	145.4093	143.5679	141.1622	138.1803	134.6139	130.4602	125.7228	120.4127	114.5498	108.1636	101.2934	93.98813	86.30526	78.30869	70.06612	61.64607	53.11534	44.53766	35.97498	27.49337	19.17874	11.17911	3.864752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	148.6896	148.4434	147.6916	146.4155	144.5977	142.223	139.2792	135.7578	131.6554	126.9748	121.7258	115.9267	109.6049	102.7974	95.55081	87.92005	79.96684	71.75715	63.35839	54.83687	46.25631	37.67856	29.16836	20.80637	12.72332	5.21843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	149.6697	149.4266	148.6842	147.4243	145.6295	143.2849	140.3782	136.9007	132.8485	128.2235	123.0345	117.2982	111.04	104.2951	97.1073	89.52939	81.62083	73.44583	65.07057	56.56078	47.98001	39.39002	30.8545	22.44992	14.29354	6.632809	0.410421	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	150.653	150.4128	149.6797	148.4354	146.6631	144.3479	141.4773	138.0427	134.0395	129.4691	124.3389	118.6644	112.4693	105.7864	98.65761	91.13317	83.27044	75.13179	66.78213	58.28644	49.70805	41.10857	32.55086	24.10803	15.88658	8.095219	1.386496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	151.6395	151.4022	150.678	149.449	147.6986	145.412	142.5767	139.1839	135.2287	130.7116	125.6392	120.0255	113.8927	107.2716	100.2017	92.73131	84.91544	76.81469	68.49258	60.01329	51.43978	42.83348	34.25657	25.77945	17.49992	9.597044	2.55778	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	152.629	152.3945	151.6791	150.465	148.736	146.4772	143.6764	140.3245	136.4161	131.9512	126.9356	121.3818	115.3105	108.7506	101.7397	94.32373	86.55567	78.49423	70.20152	61.74079	53.17457	44.56404	35.9708	27.46304	19.13147	11.13207	3.844821	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	153.6215	153.3899	152.6829	151.4834	149.7752	147.5436	144.7765	141.4644	137.6019	133.1882	128.2281	122.7333	116.7228	110.2237	103.2717	95.9104	88.19096	80.17014	71.90856	63.46846	54.91184	46.29958	37.69277	29.15776	20.77946	12.69561	5.212293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	154.6171	154.3881	153.6895	152.5041	150.8162	148.6112	145.8769	142.6038	138.7861	134.4225	129.5171	124.0803	118.1297	111.6909	104.7975	97.49129	89.82119	81.84216	73.61333	65.19583	56.65102	48.03947	39.42174	30.86268	22.44237	14.28402	6.64034	0.434806	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	155.6155	155.3892	154.6987	153.5272	151.8591	149.68	146.9777	143.7428	139.9689	135.6544	130.8025	125.4228	119.5314	113.1523	106.3174	99.06639	91.44624	83.5101	75.31551	66.92246	58.39161	49.78308	41.15702	32.57691	24.11888	15.89438	8.116354	1.425794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	156.6169	156.3931	155.7105	154.5525	152.9038	150.75	148.0791	144.8813	141.1504	136.884	132.0847	126.761	120.928	114.6081	107.8314	100.6357	93.06604	85.17376	77.0148	68.64796	60.1331	51.52986	42.89792	34.29964	25.80779	17.52428	9.631688	2.609511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	157.6211	157.3998	156.7249	155.5802	153.9503	151.8212	149.1809	146.0196	142.3306	138.1113	133.3636	128.0951	122.3198	116.0584	109.3396	102.1992	94.68052	86.83296	78.71093	70.37196	61.87503	53.27926	44.64382	36.0301	27.50804	19.17172	11.18008	3.908173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	158.6281	158.4093	157.7419	156.61	154.9986	152.8937	150.2833	147.1575	143.5097	139.3365	134.6395	129.4253	123.7067	117.5033	110.842	103.757	96.28962	88.48758	80.40366	72.09411	63.61698	55.03076	46.39413	37.76757	29.21866	20.83498	12.7568	5.286907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	159.6378	159.4214	158.7614	157.6421	156.0487	153.9674	151.3862	148.2953	144.6877	140.5598	135.9125	130.7516	125.089	118.943	112.3388	105.3091	97.8933	90.13748	82.09277	73.81411	65.35852	56.78387	48.14827	39.51138	30.93876	22.51258	14.35815	6.726016	0.501375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2883.5	160.6408	160.4267	159.7739	158.6669	157.0911	155.0329	152.4803	149.4235	145.8552	141.7717	137.1732	132.0648	126.4574	120.3681	113.8206	106.846	99.4821	91.7731	83.76861	75.52218	67.08983	58.52866	49.89624	41.25144	32.65805	24.19375	15.97173	8.203486	1.50788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	161.5557	161.344	160.6982	159.6033	158.0447	156.0091	153.4845	150.461	146.9312	142.8912	138.3405	133.2838	127.7308	121.6975	115.2063	108.2867	100.9748	93.31319	85.34983	77.13692	68.72939	60.18354	51.55635	42.90596	34.29461	25.79617	17.51393	9.629658	2.616528	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	162.4734	162.2638	161.6249	160.5418	159.0001	156.9865	154.4892	151.4984	148.0064	144.009	139.5054	134.4994	129	123.022	116.5867	109.7219	102.4621	94.8483	86.9269	78.74869	70.36748	61.83873	53.21876	44.565	35.93835	27.40943	19.07341	11.08963	3.836447	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	163.3936	163.1862	162.5541	161.4824	159.9572	157.9652	155.4947	152.5358	149.0809	145.1252	140.6677	135.7117	130.2651	124.3418	117.9618	111.1515	103.944	96.37838	88.49968	80.35728	72.0038	63.49383	54.883	46.22803	37.5886	29.0326	20.64859	12.57841	5.132523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	164.3163	164.1111	163.4856	162.4252	160.916	158.9452	156.5009	153.5733	150.1546	146.2399	141.8278	136.9207	131.5262	125.657	119.3318	112.5758	105.4204	97.90338	90.06807	81.96249	73.63808	65.14849	56.54863	47.89452	39.24474	30.66486	22.23798	14.09186	6.486457	0.377248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	165.2416	165.0385	164.4194	163.37	161.8766	159.9264	157.5078	154.6109	151.2277	147.3532	142.9856	138.1268	132.7835	126.9677	120.6968	113.9947	106.8915	99.42328	91.63196	83.56414	75.27004	66.80237	58.21525	49.564	40.9062	32.30543	23.84025	15.62681	7.886547	1.290409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	166.1693	165.9682	165.3555	164.3169	162.839	160.909	158.5155	155.6486	152.3003	148.4652	144.1412	139.3299	134.0371	128.274	122.0569	115.4084	108.3572	100.9381	93.19127	85.16206	76.89946	68.45514	59.88246	51.236	42.57243	33.95358	25.45421	17.18074	9.324666	2.392523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	167.0995	166.9004	166.2938	165.2658	163.803	161.8929	159.524	156.6865	153.3723	149.576	145.2949	140.5302	135.2872	129.576	123.4121	116.8169	109.8177	102.4477	94.74591	86.75611	78.5261	70.10652	61.54989	52.91008	44.24289	35.60864	27.07877	18.7516	10.79486	3.607755	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	168.0321	167.835	167.2344	166.2168	164.7688	162.8781	160.5333	157.7246	154.4439	150.6855	146.4466	141.7278	136.5337	130.8739	124.7627	118.2204	111.2729	103.9522	96.29583	88.34616	80.14976	71.75623	63.21721	54.58584	45.91711	37.26996	28.71298	20.33764	12.29258	4.902102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	168.967	168.7719	168.1773	167.1697	165.7363	163.8646	161.5435	158.763	155.5151	151.794	147.5964	142.9227	137.7769	132.1677	126.1087	119.6188	112.7229	105.4516	97.84099	89.93209	81.77026	73.40401	64.88409	56.26289	47.59459	38.93693	30.35598	21.93739	13.81426	6.256291	0.270703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	169.9044	169.7111	169.1223	168.1247	166.7054	164.8524	162.5544	159.8017	156.586	152.9014	148.7445	144.1152	139.0169	133.4577	127.4501	121.0123	114.1679	106.9459	99.38134	91.51381	83.38743	75.04962	66.55022	57.94085	49.2749	40.60898	32.00699	23.54954	15.35703	7.657982	1.147543	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	170.844	170.6526	170.0695	169.0816	167.6763	165.8415	163.5662	160.8407	157.6566	154.0079	149.8909	145.3052	140.2538	134.7438	128.7873	122.4011	115.6077	108.4352	100.9169	93.09124	85.00113	76.69285	68.21532	59.61936	50.9576	42.28559	33.66527	25.17298	16.91851	9.098648	2.233901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	171.7859	171.5963	171.0188	170.0405	168.6488	166.832	164.5789	161.88	158.7269	155.1134	151.0357	146.4929	141.4876	136.0263	130.1201	123.7851	117.0426	109.9194	102.4475	94.66429	86.6112	78.3335	69.87913	61.2981	52.64228	43.96624	35.33016	26.80667	18.49671	10.57207	3.440854	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	172.7301	172.5423	171.9703	171.0013	169.623	167.8237	165.5925	162.9197	159.7971	156.2182	152.179	147.6784	142.7185	137.3052	131.4488	125.1645	118.4725	111.3985	103.9734	96.2329	88.21754	79.97137	71.54138	62.97675	54.32856	45.65046	37.00105	28.44972	20.08995	12.07353	4.730793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	173.6765	173.4905	172.9238	171.964	170.5988	168.8168	166.607	163.9599	160.867	157.3221	153.3209	148.8618	143.9466	138.5806	132.7734	126.5394	119.8977	112.8727	105.4943	97.79703	89.82003	81.6063	73.20184	64.655	56.01608	47.3378	38.67736	30.10129	21.69675	13.59931	6.082916	0.196938	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	174.6252	174.4408	173.8794	172.9286	171.5763	169.8112	167.6224	165.0004	161.9369	158.4254	154.4614	150.0431	145.1719	139.8526	134.0941	127.9098	121.318	114.342	107.0104	99.35664	91.41857	83.23812	74.86031	66.33259	57.70448	49.02784	40.35854	31.76064	23.31586	15.14646	7.484097	1.041784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	175.5375	175.3548	174.7986	173.8566	172.517	170.7684	168.6002	166.0029	162.9682	159.4894	155.562	151.184	146.3561	141.0829	135.3724	129.2374	122.6951	115.768	108.4832	100.8732	92.97456	84.82818	76.47804	67.9707	59.35491	50.68165	42.00558	33.38854	24.90761	16.674	8.886868	2.080055	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3504	176.4479	176.2669	175.7157	174.7824	173.4552	171.7229	169.575	167.0019	163.9954	160.5488	156.6575	152.3189	147.5338	142.3059	136.6429	130.5567	124.0636	117.185	109.9472	102.3811	94.52243	86.41085	78.08935	69.60361	61.00156	52.33335	43.6525	35.01886	26.5055	18.21443	10.31965	3.241715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	177.3605	177.1811	176.6349	175.7101	174.395	172.6787	170.5506	168.0014	165.0227	161.6077	157.7517	153.4521	148.709	143.5259	137.9098	131.8718	125.4276	118.5974	111.4063	103.8844	96.06613	87.99003	79.69808	71.2351	62.64815	53.9866	45.30286	36.65504	28.11267	19.77011	11.78147	4.488249	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	178.2752	178.0974	177.5561	176.6396	175.3365	173.6358	171.5273	169.0014	166.0499	162.6661	158.8448	154.5835	149.8819	144.7429	139.1731	133.1829	126.7871	120.005	112.8607	105.3831	97.60561	89.5656	81.30409	72.86494	64.29442	55.64105	46.95626	38.29651	29.72832	21.33957	13.26822	5.798029	0.085832	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	179.1919	179.0157	178.4792	177.5709	176.2796	174.5943	172.5049	170.002	167.0773	163.724	159.937	155.7133	151.0524	145.957	140.433	134.4901	128.1423	121.408	114.3104	106.8773	99.14083	91.13749	82.90721	74.49293	65.94009	57.29639	48.61228	39.94277	31.35173	22.92149	14.77669	7.157579	0.833487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	180.1108	179.9361	179.4043	178.5041	177.2242	175.5541	173.4835	171.0031	168.1047	164.7815	161.0281	156.8414	152.2208	147.1684	141.6895	135.7933	129.4931	122.8064	115.7554	108.3668	100.6717	92.7056	84.5073	76.11889	67.58493	58.9523	50.27055	41.59335	32.9822	24.5147	16.30433	8.55772	1.84269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	181.0317	180.8585	180.3314	179.439	178.1705	176.5152	174.463	172.0048	169.1323	165.8386	162.1183	157.9681	153.3871	148.377	142.9427	137.0928	130.8398	124.2004	117.1958	109.8517	102.1983	94.26985	86.10425	77.74262	69.22868	60.60851	51.93073	43.24779	34.61911	26.11816	17.84902	9.991817	2.988023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	181.9546	181.7829	181.2603	180.3757	179.1183	177.4776	175.4436	173.0072	170.1601	166.8953	163.2076	159.0933	154.5513	149.583	144.1927	138.3886	132.1823	125.5899	118.6316	111.3321	103.7206	95.83019	87.69794	79.36397	70.87114	62.26472	53.59246	44.90566	36.26186	27.73093	19.40897	11.45487	4.223892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	182.8795	182.7093	182.1912	181.3142	180.0678	178.4413	176.4252	174.0101	171.188	167.9518	164.2961	160.2172	155.7136	150.7864	145.4397	139.6808	133.5208	126.9751	120.0628	112.8079	105.2384	97.38655	89.28826	80.98277	72.5121	63.92068	55.25543	46.56657	37.90992	29.35219	20.98267	12.94298	5.526411	0.011368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	183.8065	183.6376	183.1239	182.2545	181.0187	179.4064	177.4078	175.0137	172.2162	169.0081	165.3838	161.3397	156.874	151.9874	146.6836	140.9694	134.8554	128.3559	121.4896	114.2792	106.7519	98.93889	90.87512	82.5989	74.15137	65.57616	56.91934	48.23011	39.56277	30.98118	22.5688	14.45302	6.880937	0.66749	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	184.7353	184.5679	184.0585	183.1965	181.9713	180.3728	178.3914	176.018	173.2446	170.0641	166.4709	162.461	158.0325	153.186	147.9246	142.2546	136.1861	129.7326	122.9119	115.746	108.261	100.4872	92.45844	84.21221	75.78877	67.2309	58.58389	49.89594	41.21993	32.61722	24.1662	15.98245	8.277622	1.644715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	185.6662	185.5002	184.995	184.1402	182.9253	181.3405	179.376	177.0229	174.2733	171.1199	167.5572	163.5811	159.1894	154.3823	149.1627	143.5365	137.513	131.1051	124.3299	117.2084	109.7658	102.0313	94.03813	85.82259	77.42412	68.88471	60.24881	51.56371	42.88095	34.25967	25.77384	17.52914	9.709417	2.771851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3905.5	186.5989	186.4343	185.9333	185.0856	183.881	182.3095	180.3616	178.0286	175.3023	172.1756	168.6429	164.7	160.3445	155.5764	150.3981	144.8151	138.8361	132.4736	125.7435	118.6663	111.2661	103.5714	95.61414	87.42992	79.05727	70.53736	61.91384	53.23308	44.54542	35.90795	27.39082	19.09129	11.17105	3.995838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	187.5336	187.3703	186.8734	186.0327	184.8381	183.2798	181.3483	179.0349	176.3316	173.2312	169.7281	165.8178	161.498	156.7683	151.6308	146.0905	140.1557	133.838	127.1529	120.1198	112.7621	105.1073	97.1864	89.03411	80.68808	72.18867	63.57873	54.90376	46.21294	37.56154	29.01631	20.66736	12.65842	5.290089	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	188.4702	188.3082	187.8154	186.9816	185.7968	184.2514	182.336	180.0419	177.3612	174.2867	170.8127	166.9346	162.65	157.9581	152.8608	147.3628	141.4717	135.1985	128.5581	121.569	114.2538	106.639	98.75486	90.63506	82.31641	73.83845	65.24324	56.57544	47.88313	39.21992	30.64956	22.25602	14.16829	6.638674	0.527985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	189.3908	189.2301	188.7413	187.9142	186.7392	185.2065	183.3069	181.0319	178.3734	175.3244	171.8789	168.0326	163.7826	159.1281	154.0706	148.6143	142.7664	136.5374	129.9413	122.996	115.7233	108.1488	100.3017	92.21486	83.92429	75.4687	66.88933	58.23002	49.53782	40.86481	32.27207	23.83828	15.68017	8.013218	1.456837	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	190.1205	189.9611	189.4761	188.6557	187.4902	185.97	184.0861	181.8298	179.1931	176.1692	172.7519	168.9368	164.721	160.1033	155.085	149.6699	143.8648	137.6796	131.1276	124.226	116.9957	109.4615	101.6518	93.59843	85.33663	76.90426	68.34179	59.69224	51.00167	42.32076	33.70821	25.23808	17.01687	9.231836	2.375759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	188.845	188.6869	188.2058	187.3919	186.2358	184.7279	182.8593	180.6214	178.0063	175.007	171.6175	167.8332	163.651	159.0696	154.0901	148.7158	142.953	136.8111	130.3029	123.4448	116.2569	108.7631	100.991	92.97156	84.73915	76.33083	67.78628	59.14769	50.46022	41.77323	33.14327	24.64039	16.36263	8.478201	1.556724	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	187.2191	187.0622	186.5849	185.7775	184.6306	183.1349	181.2813	179.0615	176.4676	173.4926	170.1304	166.3765	162.2274	157.6819	152.7406	147.4065	141.6856	135.5868	129.122	122.3072	115.1616	107.7082	99.97395	91.98889	83.78647	75.40297	66.87729	58.25085	49.56788	40.87653	32.23142	23.69919	15.37267	7.440007	0.872517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	185.5951	185.4393	184.9657	184.1647	183.0269	181.5431	179.7044	177.5024	174.9294	171.9782	168.643	164.9189	160.8026	156.2924	151.3888	146.0946	140.4151	134.3588	127.9373	121.1655	114.062	106.6492	98.95299	91.00264	82.83076	74.47282	65.96694	57.35376	48.67663	39.98257	31.32456	22.76728	14.40879	6.508366	0.434185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	183.9728	183.8182	183.3483	182.5536	181.4247	179.9526	178.1285	175.9441	173.3916	170.464	167.1553	163.4606	159.3765	154.9012	150.0348	144.7799	139.1415	133.1274	126.7487	120.0197	112.9583	105.5861	97.92805	90.01276	81.87193	73.54025	65.05506	56.4562	47.78621	39.09113	30.42293	21.84779	13.48231	5.678525	0.15992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	182.3523	182.1989	181.7326	180.944	179.8239	178.3634	176.5537	174.3865	171.8543	168.9498	165.6673	162.0016	157.9492	153.5083	148.6787	143.4627	137.8648	131.8925	125.5563	118.8699	111.8505	104.5188	96.89914	89.0192	80.90991	72.60515	64.14148	55.55799	46.89646	38.20225	29.52771	20.94496	12.59882	4.937605	0.021012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	180.7335	180.5813	180.1186	179.336	178.2246	176.7755	174.9799	172.8298	170.3174	167.4358	164.179	160.5419	156.5209	152.1139	147.3206	142.143	136.5852	130.6543	124.3602	117.7161	110.7385	103.4474	95.86623	88.02194	79.94463	71.66741	63.22607	54.659	46.00737	37.31645	28.64073	20.06238	11.75988	4.274292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	179.1166	178.9655	178.5062	177.7297	176.6268	175.1888	173.4072	171.2739	168.7811	165.922	162.6905	159.0816	155.0914	150.7179	145.9605	140.8208	135.3027	129.4128	123.1606	116.5585	109.6225	102.3719	94.82933	87.02093	78.97604	70.72695	62.30876	53.75921	45.11915	36.43459	27.76396	19.20263	10.96513	3.679611	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	177.5013	177.3514	176.8956	176.1249	175.0304	173.6035	171.8356	169.7187	167.2453	164.4083	161.2018	157.6206	153.661	149.3205	144.5984	139.4962	134.0173	128.1681	121.9573	115.3971	108.5025	101.2923	93.78844	86.01617	78.00408	69.78372	61.3895	52.85871	44.23226	35.55775	26.89923	18.36742	10.21336	3.146442	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	175.8878	175.739	175.2866	174.5217	173.4355	172.0194	170.2651	168.1644	165.71	162.8949	159.713	156.1592	152.2295	147.9216	143.2345	138.1693	132.7292	126.9202	120.7506	114.2318	107.3786	100.2087	92.74358	85.00764	77.02873	68.8377	60.46838	51.95777	43.34733	34.68711	26.04814	17.55784	9.503022	2.669022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	174.276	174.1283	173.6792	172.92	171.842	170.4366	168.6956	166.6109	164.1753	161.3816	158.224	154.6972	150.7972	146.5213	141.8687	136.8401	131.4385	125.6692	119.5404	113.0629	106.2507	99.12116	91.69476	83.99536	76.05002	67.88897	59.54555	51.05677	42.4651	33.82385	25.21206	16.77451	8.832466	2.242569	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	172.6659	172.5193	172.0735	171.3199	170.2499	168.8551	167.1272	165.0583	162.6411	159.8686	156.7349	153.2347	149.3639	145.1198	140.5012	135.5087	130.145	124.4152	118.3268	111.8902	105.119	98.0296	90.64202	82.97935	75.06802	66.93764	58.62129	50.15623	41.58641	32.9691	24.39213	16.01774	8.200014	1.863017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	171.0575	170.9119	170.4694	169.7213	168.6592	167.2748	165.5598	163.5065	161.1075	158.3559	155.2457	151.7717	147.9297	143.7169	139.1319	134.1752	128.8491	123.1582	117.1099	110.714	103.9834	96.93415	89.58542	81.95971	74.08283	65.98394	57.69597	49.25675	40.71214	32.12396	23.58925	15.2876	7.604026	1.526844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4526	169.4508	169.3062	168.8669	168.1243	167.07	165.6958	163.9935	161.9555	159.5744	156.8434	153.7565	150.3083	146.4948	142.3128	137.761	132.8396	127.5506	121.8984	115.8898	109.5343	102.8441	95.83487	88.52505	80.93655	73.09464	65.02813	56.77002	48.35898	39.84317	31.28939	22.80419	14.584	7.042905	1.230944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	167.8457	167.7022	167.266	166.5288	165.4822	164.118	162.4283	160.4054	158.042	155.3313	152.2672	148.8446	145.059	140.9076	136.3885	131.5019	126.2496	120.6357	114.6665	108.351	101.7012	94.73187	87.46103	79.91003	72.10369	64.0706	55.84399	47.46364	38.9804	30.46632	22.03754	13.90671	6.515103	0.972547	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	166.2422	166.0997	165.6667	164.9347	163.8957	162.5415	160.8642	158.8561	156.5101	153.8194	150.7779	147.3804	143.6225	139.5012	135.0145	130.1623	124.9464	119.3703	113.4401	107.1645	100.5547	93.62525	86.39352	78.88038	71.11028	63.11175	54.91843	46.57148	38.12467	29.65556	21.28977	13.25541	6.019124	0.749163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	164.6405	164.4989	164.0689	163.3422	162.3107	160.9663	159.3011	157.3077	154.9789	152.3079	149.2887	145.9159	142.1854	138.0937	133.6389	128.8208	123.6408	118.1022	112.2107	105.9746	99.40484	92.51519	85.32271	77.84785	70.11478	62.15207	53.994	45.68327	37.27683	28.85784	20.5612	12.62968	5.553514	0.558542	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	163.0403	162.8998	162.4728	161.7512	160.727	159.3923	157.7391	155.7602	153.4483	150.7967	147.7994	144.4512	140.7475	136.6851	132.2619	127.4775	122.333	116.8315	110.9785	104.7817	98.25167	91.40186	84.24887	76.81277	69.11759	61.1921	53.07133	44.79977	36.43765	28.0738	19.85209	12.02904	5.116867	0.398656	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	161.4417	161.3022	160.8782	160.1617	159.1448	157.8195	156.1782	154.2135	151.9183	149.2859	146.3103	142.9861	139.309	135.2756	130.8836	126.1324	121.023	115.5583	109.7434	103.5857	97.09541	90.28551	83.17226	75.7755	68.1192	60.23241	52.15113	43.92174	35.60789	27.304	19.16258	11.45298	4.707815	0.267693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	159.8448	159.7062	159.2851	158.5736	157.5638	156.248	154.6184	152.6677	150.3889	147.7754	144.8212	141.5208	137.87	133.8651	129.5039	124.7856	119.711	114.2828	108.5057	102.387	95.93627	89.16638	82.09322	74.73646	67.12009	59.27362	51.23409	43.04992	34.78824	26.54894	18.49273	10.90092	4.325034	0.164058	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	158.2494	158.1117	157.6936	156.987	155.9843	154.6777	153.0596	151.1228	148.8602	146.2654	143.3322	140.0554	136.4304	132.4537	128.1229	123.4372	118.3971	113.005	107.2656	101.1856	94.7745	88.04478	81.01213	73.6961	66.12083	58.31637	50.32092	42.18504	33.97933	25.80901	17.84254	10.37225	3.967237	0.08641	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	156.6556	156.5189	156.1036	155.4019	154.4061	153.1086	151.5019	149.5788	147.3322	144.7557	141.8433	138.5897	134.9903	131.0415	126.7408	122.0873	117.0813	111.7252	106.0231	99.98179	93.61037	86.92106	79.9294	72.65492	65.12199	57.3613	49.41232	41.3278	33.18176	25.08456	17.21192	9.866346	3.633177	0.033713	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	155.0633	154.9276	154.5151	153.8182	152.8293	151.5408	149.9453	148.0356	145.8049	143.2465	140.3547	137.1239	133.5498	129.6285	125.3577	120.736	115.7639	110.4434	104.7786	98.77587	92.4442	85.79558	78.84547	71.61343	64.12417	56.40908	48.50899	40.47884	32.39605	24.37586	16.60076	9.382547	3.321644	0.005366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	153.4727	153.3378	152.9281	152.236	151.2538	149.9742	148.3898	146.4934	144.2782	141.7378	138.8662	135.6581	132.1089	128.2149	123.9735	119.3835	114.445	109.16	103.5323	97.56811	91.27632	84.66876	77.76081	70.5722	63.12798	55.46038	47.6116	39.63879	31.62267	23.6831	16.00885	8.920181	3.031468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	151.8836	151.7496	151.3426	150.6552	149.6797	148.4089	146.8353	144.9521	142.7523	140.2296	137.378	134.1923	130.6677	126.8007	122.5886	118.0299	113.1248	107.875	102.2843	96.35881	90.10712	83.54103	76.67595	69.53179	62.13407	54.51586	46.72081	38.80825	30.86205	23.00645	15.43596	8.478565	2.761519	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	150.296	150.1629	149.7586	149.0758	148.1069	146.8448	145.282	143.4117	141.2271	138.7219	135.8901	132.7265	129.2264	125.3861	121.2029	116.6753	111.8034	106.5888	101.0351	95.14832	88.93699	82.41285	75.59141	68.49279	61.14306	53.57619	45.83725	37.98773	30.11455	22.34598	14.88183	8.057006	2.510705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	148.71	148.5777	148.1762	147.4979	146.5356	145.2819	143.7298	141.8723	139.7028	137.2148	134.4026	131.2609	127.7849	123.9711	119.8166	115.32	110.4811	105.3016	99.78493	93.93701	87.76637	81.28473	74.50774	67.45582	60.1556	52.64199	44.96152	37.17775	29.38047	21.70175	14.34615	7.654811	2.277974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	147.1255	146.9941	146.5952	145.9214	144.9655	143.7203	142.1788	140.3339	138.1792	135.7084	132.9156	129.7955	126.3435	122.5559	118.43	113.9641	109.1582	104.0137	98.53412	92.72528	86.5957	80.15717	73.4255	66.42147	59.17231	51.7139	44.09418	36.37875	28.66009	21.07374	13.82858	7.271284	2.062314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	145.5425	145.412	145.0157	144.3464	143.3969	142.1601	140.6289	138.7966	136.6566	134.2027	131.429	128.3304	124.9022	121.1407	117.0432	112.6079	107.8348	102.7254	97.28304	91.51355	85.42546	79.0307	72.34527	65.39036	58.19382	50.79251	43.23578	35.59114	27.95361	20.4619	13.32874	6.905734	1.862752	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	143.9612	143.8315	143.4378	142.7729	141.8297	140.6011	139.0803	137.2604	135.1349	132.6978	129.9431	126.8658	123.4612	119.7257	115.6563	111.2517	106.5114	101.4371	96.03209	90.30224	84.25615	77.90586	71.26764	64.36308	57.22073	49.8784	42.3868	34.81528	27.26119	19.86614	12.84627	6.557475	1.678354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5146.5	142.3814	142.2526	141.8615	141.2009	140.2639	139.0436	137.5329	135.7253	133.6143	131.1938	128.458	125.4018	122.0207	118.311	114.2698	109.8956	105.1882	100.1491	94.78168	89.09184	83.08827	76.7832	70.19317	63.34025	56.25364	48.97211	41.54771	34.05148	26.58296	19.28633	12.38074	6.225829	1.508227	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	140.8033	140.6753	140.2867	139.6304	138.6997	137.4874	135.9869	134.1914	132.0948	129.6907	126.9737	123.9386	120.5808	116.8968	112.8837	108.54	103.8655	98.86177	93.53222	87.88279	81.92234	75.66327	69.12246	62.32245	55.29311	48.07417	40.71892	33.30003	25.919	18.72233	11.93175	5.910129	1.351516	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	139.2267	139.0996	138.7135	138.0616	137.1369	135.9327	134.4422	132.6589	130.5764	128.1888	125.4905	122.4763	119.1418	115.4834	111.4984	107.1852	102.5438	97.57555	92.28416	86.6756	80.75887	74.54663	68.05608	61.31024	54.33969	47.18505	39.90081	32.56115	25.26935	18.17393	11.49887	5.609721	1.207405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	137.6519	137.5256	137.142	136.4943	135.5758	134.3796	132.8991	131.1278	129.0595	126.6882	124.0084	121.0151	117.7038	114.0711	110.1141	105.8316	101.2232	96.29083	91.03794	85.47075	79.59841	73.43383	66.99459	60.3042	53.3939	46.30521	39.09374	31.83504	24.63401	17.64093	11.08165	5.323963	1.075117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	136.0789	135.9533	135.5722	134.9288	134.0163	132.8281	131.3575	129.5982	127.544	125.1889	122.5277	119.5552	116.2671	112.66	108.7312	104.4794	99.90439	95.00803	89.79405	84.26874	78.44147	72.32542	65.93854	59.30484	52.45622	45.43505	38.298	31.12186	24.01296	17.12309	10.67965	5.05223	0.95391	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	134.5076	134.3829	134.0043	133.3651	132.4586	131.2783	129.8176	128.0703	126.0301	123.6913	121.0485	118.0968	114.832	111.2505	107.35	103.129	98.58756	93.72758	88.55294	83.07007	77.28858	71.22194	64.88846	58.31268	51.52713	44.57497	37.51386	30.42172	23.40613	16.62016	10.29242	4.79391	0.843081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	132.9383	132.8144	132.4382	131.8032	130.9028	129.7304	128.2796	126.5441	124.5179	122.1954	119.571	116.6402	113.3986	109.843	105.9707	101.7808	97.27318	92.44994	87.31508	81.87525	76.14027	70.12391	63.84489	57.32822	50.60705	43.72531	36.74155	29.73471	22.81343	16.13186	9.919516	4.548413	0.741961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	131.3709	131.2478	130.8742	130.2434	129.349	128.1844	126.7435	125.0199	123.0078	120.7014	118.0956	115.1856	111.9674	108.4376	104.5939	100.4351	95.96167	91.17554	86.08096	80.68477	74.99704	69.03185	62.80831	56.3519	49.69638	42.88639	35.98126	29.06087	22.23477	15.65792	9.560487	4.315162	0.649915	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	129.8057	129.6834	129.3122	128.6856	127.7972	126.6406	125.2095	123.4978	121.4997	119.2096	116.6223	113.7333	110.5385	107.0347	103.2197	99.09246	94.65344	89.90484	84.85105	79.49913	73.8594	67.94626	61.77919	55.38417	48.7955	42.05847	35.23317	28.40024	21.67	15.19803	9.214888	4.0936	0.566345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	128.2427	128.1212	127.7525	127.1301	126.2477	125.099	123.6778	121.9781	119.994	117.7202	115.1516	112.2836	109.1123	105.6347	101.8486	97.75314	93.34892	88.63829	83.62583	78.31881	72.72783	66.86761	60.758	54.42544	47.90474	41.24182	34.4974	27.75281	21.11896	14.75189	8.882277	3.883189	0.490683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	126.6821	126.5614	126.1952	125.577	124.7007	123.5599	122.1486	120.4608	118.4909	116.2334	113.6835	110.8367	107.6891	104.2379	100.4809	96.41759	92.04854	87.37634	82.40575	77.14429	71.60282	65.79636	59.74516	53.47607	47.02442	40.43664	33.77405	27.11854	20.58149	14.31918	8.562216	3.68341	0.422392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5548	125.124	125.0041	124.6404	124.0265	123.1562	122.0234	120.622	118.9463	116.9905	114.7496	112.2185	109.3929	106.2692	102.8446	99.11712	95.08621	90.75273	86.11943	81.19129	75.97604	70.48482	64.73296	58.74108	52.53643	46.1548	39.64311	33.0632	26.49738	20.05739	13.89958	8.254275	3.493762	0.360967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	123.5686	123.4496	123.0883	122.4787	121.6145	120.4897	119.0984	117.4347	115.4933	113.2689	110.7567	107.9526	104.8531	101.4553	97.75753	93.7594	89.46192	84.86802	79.98289	74.8145	69.37426	63.67782	57.74613	51.60683	45.29613	38.8614	32.36488	25.88926	19.54646	13.49277	7.958031	3.313762	0.305931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	122.0162	121.898	121.5392	120.9339	120.0758	118.9591	117.5778	115.9264	113.9993	111.7916	109.2986	106.5162	103.4409	100.0702	96.40255	92.43758	88.17653	83.62254	78.78099	73.66011	68.27157	62.63133	56.76066	50.68756	44.44863	38.09162	31.67912	25.29407	19.04848	13.09842	7.67307	3.142948	0.256837	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	120.4668	120.3495	119.9933	119.3922	118.5404	117.4318	116.0607	114.4215	112.509	110.3181	107.8444	105.0838	102.0332	98.68987	95.05258	91.12115	86.89699	82.3834	77.58602	72.51329	67.17715	61.59386	55.78499	49.7789	43.6125	37.33388	31.00591	24.7117	18.56323	12.71621	7.398983	2.980874	0.213263	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	118.9208	118.8043	118.4507	117.854	117.0084	115.908	114.5471	112.9204	111.0225	108.8487	106.3944	103.656	100.6301	97.31454	93.708	89.81052	85.6237	81.15104	76.39839	71.37444	66.09139	60.56575	54.81943	48.88107	42.78789	36.58824	30.34522	24.14202	18.09047	12.3458	7.135376	2.827114	0.174813	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	117.3784	117.2627	116.9117	116.3194	115.4801	114.388	113.0375	111.4233	109.5402	107.3836	104.9491	102.2329	99.23219	95.94464	92.36921	88.50609	84.35707	79.92585	75.2185	70.24394	65.01463	59.54734	53.86425	47.99429	41.97493	35.85477	29.69702	23.58488	17.62996	11.98687	6.881859	2.681259	0.141118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	115.8398	115.725	115.3766	114.7888	113.9558	112.8721	111.5321	109.9305	108.0625	105.9232	103.5086	100.8151	97.83972	94.58053	91.03659	87.20825	83.09749	78.70823	74.04673	69.12216	63.94721	58.53891	52.9197	47.11874	41.17375	35.13348	29.06123	23.04013	17.18145	11.6391	6.638057	2.542918	0.11183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	114.3053	114.1913	113.8456	113.2623	112.4358	111.3606	110.0312	108.4424	106.5895	104.4678	102.0734	99.40272	96.45308	93.2226	89.71052	85.91738	81.84536	77.49855	72.88345	68.00944	62.88945	57.54074	51.98599	46.25458	40.38442	34.42437	28.43778	22.50759	16.74468	11.30215	6.403603	2.411718	0.086626	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	112.7752	112.6621	112.319	111.7403	110.9204	109.8537	108.535	106.9593	105.1217	103.0178	100.6438	97.99626	95.07263	91.8712	88.39137	84.63387	80.60104	76.29718	71.72901	66.90611	61.84164	56.55309	51.06333	45.40195	39.60701	33.72745	27.82656	21.98709	16.31941	10.97572	6.178141	2.287299	0.065204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	111.2497	111.1375	110.7972	110.2231	109.4098	108.3518	107.044	105.4814	103.6593	101.5735	99.22014	96.59603	93.69874	90.52672	87.07953	83.35807	79.36489	75.10447	70.58373	65.81247	60.80405	55.57617	50.15189	44.56097	38.84156	33.04267	27.22747	21.47844	15.90538	10.65949	5.961325	2.169321	0.047284	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NORMALIZED EXCESS PORE PRESSURE (%)

Time | Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	77.8068	97.51546	99.29939	99.36643	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	76.41793	93.65601	98.37343	99.18003	99.29231	98.83386	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	73.45281	89.33196	96.48186	98.40755	98.84564	98.67042	92.41206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	71.67941	85.97399	94.28178	97.42869	98.36836	98.50638	97.68023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	70.6037	83.47434	92.13676	96.29068	97.8255	98.28781	98.12488	95.70726	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	69.20271	81.05413	89.8439	94.82996	97.02283	97.82543	97.90685	96.89835	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	67.86418	78.87937	87.61184	93.19984	96.03859	97.23406	97.55034	96.99477	89.60634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	66.80721	77.07928	85.61212	91.57009	94.96919	96.58432	97.17117	96.96289	94.44979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	65.9615	75.57713	83.84136	89.99731	93.84886	95.87778	96.75592	96.84052	95.65418	75.57119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	65.27819	74.31364	82.28064	88.51357	92.71011	95.12258	96.29969	96.64967	96.09143	91.68067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	65.06636	73.54368	81.1572	87.33502	91.73993	94.46543	95.93171	96.55453	96.47867	95.07059	80.55921	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	64.82075	72.81924	80.11053	86.20235	90.75262	93.74556	95.48014	96.3383	96.54923	95.96512	92.63142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	64.25854	71.87225	78.90576	84.9304	89.61042	92.85311	94.84916	95.92374	96.32653	96.04946	94.18029	68.70935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	63.77497	71.03968	77.82401	83.75422	88.51191	91.95693	94.19223	95.48019	96.06953	96.03493	94.94735	88.42449	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	63.35728	70.30435	76.85047	82.66893	87.46367	91.0678	93.51643	95.00994	95.78096	95.95151	95.33368	92.25575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	62.99521	69.65216	75.97211	81.66841	86.46897	90.19424	92.82883	94.51628	95.46348	95.81635	95.51853	93.80356	82.5861	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	62.68042	69.07148	75.17753	80.74608	85.52876	89.34263	92.13606	94.0031	95.11983	95.63997	95.58281	94.57363	89.99816	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	62.40608	68.55265	74.45688	79.89543	84.64244	88.51749	91.444	93.47458	94.75287	95.42935	95.56725	94.98857	92.5475	71.45301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	62.16653	68.08757	73.80159	79.11019	83.80835	87.72183	90.75768	92.93492	94.36557	95.18954	95.49443	95.21083	93.77083	87.2964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	61.81681	67.53813	73.08341	78.27534	82.92722	86.87209	90.00592	92.32001	93.89581	94.8566	95.29788	95.20262	94.22979	90.41953	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	61.48392	67.0201	72.40641	77.48379	82.08221	86.04327	89.25675	91.69244	93.4045	94.49756	95.06799	95.1322	94.48465	92.03363	76.27977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	61.18178	66.54491	71.78029	76.74471	81.28327	85.24678	88.52254	91.06423	92.90241	94.12266	94.81744	95.02481	94.62663	92.97927	85.97215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	60.90708	66.10815	71.20023	76.05399	80.52815	84.48293	87.80576	90.43863	92.39225	93.73363	94.54807	94.88662	94.68891	93.56206	89.52188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	60.65693	65.70593	70.66197	75.40782	79.81451	83.7515	87.10819	89.81845	91.87662	93.33234	94.2616	94.72217	94.69226	93.92891	91.34053	77.42624	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	60.42884	65.33488	70.16168	74.80269	79.13998	83.0519	86.43107	89.20607	91.358	92.92073	93.95975	94.53492	94.65019	94.15684	92.40816	85.80389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	60.2206	64.99201	69.69599	74.2354	78.50222	82.38328	85.77519	88.60342	90.83864	92.50072	93.64417	94.32765	94.57186	94.28959	93.08053	89.15744	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	60.03029	64.67469	69.26187	73.70299	77.89899	81.74461	85.14095	88.01207	90.32058	92.07419	93.31652	94.10264	94.46373	94.35363	93.51891	90.9556	79.13471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	59.7898	64.31688	68.79604	73.14582	77.27507	81.08579	84.4836	87.3921	89.76751	91.60677	92.94257	93.82416	94.28709	94.30941	93.71875	91.85772	85.1113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	59.47438	63.89375	68.27392	72.53992	76.60767	80.38577	83.78416	86.72666	89.1644	91.08473	92.50961	93.48082	94.03385	94.15983	93.73117	92.2593	87.445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	59.17777	63.49459	67.7798	71.96428	75.97033	79.7127	83.1058	86.07447	88.56621	90.56052	92.06965	93.12776	93.76881	93.99344	93.70868	92.55168	89.02375	67.81613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	58.89856	63.11765	67.31176	71.417	75.36152	79.06577	82.44858	85.43643	87.97447	90.03578	91.62405	92.76589	93.49263	93.81153	93.65621	92.75681	90.09918	79.33413	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	58.63551	62.76135	66.86802	70.89636	74.77978	78.44405	81.81235	84.81322	87.39044	89.51202	91.17412	92.39618	93.20604	93.61526	93.5778	92.89269	90.85198	84.04185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	58.38746	62.42426	66.44697	70.40071	74.2237	77.84662	81.19685	84.2053	86.81518	88.99056	90.72115	92.01962	92.90982	93.40571	93.47672	92.97319	91.38885	86.66348	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1241	58.15337	62.10505	66.04712	69.92855	73.69194	77.27252	80.60171	83.61297	86.24957	88.47263	90.26636	91.63721	92.60476	93.18391	93.35563	93.00881	91.77468	88.32015	72.45495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	57.93229	61.80253	65.66709	69.47846	73.18321	76.72079	80.02647	83.03636	85.6943	87.95926	89.81089	91.24998	92.29171	92.95079	93.21672	93.00746	92.05072	89.44196	80.42999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	57.72334	61.51559	65.30564	69.04913	72.6963	76.19049	79.47061	82.4755	85.14991	87.45138	89.35579	90.85889	91.9715	92.7073	93.06185	92.97516	92.24424	90.2339	84.26325	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	57.52572	61.24323	64.96158	68.63934	72.23006	75.68069	78.9336	81.93031	84.61681	86.94977	88.90203	90.4649	91.64499	92.45432	92.89259	92.91656	92.37396	90.80716	86.54885	60.04843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	57.3387	60.98451	64.63385	68.24795	71.78341	75.19049	78.41484	81.40063	84.09529	86.4551	88.4505	90.06892	91.31301	92.19269	92.71033	92.83532	92.4531	91.22752	88.05578	76.08727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	57.13415	60.71174	64.29538	67.84867	71.33104	74.69579	77.8916	80.86524	83.56562	85.94894	87.98373	89.65396	90.95839	91.90437	92.49527	92.70901	92.45705	91.48175	88.99028	81.16197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	56.9244	60.43674	63.95739	67.45218	70.88308	74.20623	77.37317	80.33311	83.03658	85.43997	87.51032	89.22863	90.59004	91.59908	92.25915	92.55414	92.41464	91.63859	89.63194	83.99747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	56.72442	60.17396	63.63379	67.07182	70.45235	73.73414	76.87141	79.81578	82.51942	84.93921	87.04112	88.80369	90.2188	91.28819	92.01476	92.38684	92.35007	91.74517	90.12151	85.88754	64.03083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	56.53366	59.9227	63.32381	66.70675	70.03801	73.27878	76.38579	79.31296	82.01418	84.447	86.57673	88.37986	89.84538	90.97237	91.76279	92.20818	92.26601	91.8103	90.49528	87.21643	75.52998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	56.35159	59.68232	63.02669	66.35617	69.63927	72.83944	75.91576	78.82435	81.52085	83.96364	86.11767	87.95779	89.47048	90.65225	91.50389	92.01912	92.1647	91.84072	90.77917	88.18716	80.49937	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	56.17774	59.45223	62.74175	66.01936	69.25541	72.41545	75.46077	78.34963	81.03937	83.48933	85.66437	87.53809	89.09474	90.32847	91.2387	91.82055	92.04801	91.8417	90.99203	88.91473	83.4007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	56.01165	59.23188	62.46835	65.6956	68.8857	72.00615	75.0203	77.88844	80.56961	83.02422	85.21723	87.12129	88.71877	90.00165	90.96785	91.61328	91.91752	91.8174	91.1478	89.46916	85.31543	66.36097	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	55.85292	59.02075	62.20589	65.38425	68.52949	71.61092	74.59383	77.44044	80.11145	82.5684	84.77656	86.70787	88.34315	89.67237	90.69195	91.39806	91.7746	91.77118	91.25693	89.8956	86.66723	75.98691	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	55.70115	58.81836	61.95381	65.0847	68.18615	71.22916	74.18084	77.00525	79.66471	82.12193	84.34261	86.29826	87.9684	89.34121	90.41158	91.17562	91.62042	91.70576	91.32736	90.22453	87.66254	80.48952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	55.55598	58.62424	61.71159	64.79637	67.85508	70.8603	73.78085	76.58251	79.22919	81.6848	83.9156	85.89285	87.59502	89.00871	90.12732	90.94662	91.45605	91.62341	91.36526	90.47725	88.41582	83.2049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	55.41707	58.43799	61.47872	64.51871	67.53573	70.50379	73.39336	76.17184	78.80469	81.25699	83.49568	85.49196	87.22345	88.67536	89.8397	90.71169	91.28242	91.52601	91.37546	90.66915	88.99637	85.03446	68.82224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	55.26649	58.24185	61.2377	64.2345	67.21121	70.14322	73.00247	75.75794	78.37652	80.82449	83.0695	85.08276	86.84123	88.32884	89.53621	90.45769	91.08532	91.39766	91.33984	90.78077	89.39768	86.23109	76.07585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	55.03929	57.9716	60.92521	63.88152	66.82061	69.71911	72.55036	75.28474	77.8905	80.335	82.58649	84.61622	86.4004	87.9216	89.16871	90.13463	90.81086	91.17771	91.18626	90.72064	89.49824	86.69749	78.44122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	54.81921	57.70972	60.62222	63.53904	66.44124	69.30667	72.10996	74.82284	77.41485	79.85444	82.11055	84.15456	85.96214	87.51471	88.79964	89.8084	90.53193	90.95189	91.02454	90.64753	89.57448	87.11617	80.5038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	54.60596	57.45586	60.32836	63.20663	66.0727	68.90552	71.68093	74.37198	76.94943	79.38282	81.64184	83.69807	85.52685	87.10864	88.42944	89.47941	90.24885	90.72048	90.85501	90.56205	89.62748	87.47915	82.09302	51.33162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	54.39928	57.2097	60.04327	62.88392	65.71459	68.51526	71.26296	73.93191	76.4941	78.92013	81.18046	83.24701	85.09489	86.70379	88.05853	89.14804	89.96195	90.48377	90.67806	90.46487	89.65867	87.78514	83.32616	66.29981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	54.1989	56.97093	59.76659	62.57053	65.36653	68.13555	70.85569	73.50236	76.04869	78.46632	80.72651	82.80159	84.66658	86.30056	87.68732	88.81468	89.67157	90.24208	90.49405	90.35673	89.66947	88.03795	84.29788	72.59848	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	54.00457	56.73928	59.49802	62.26612	65.02817	67.76603	70.45883	73.08308	75.61303	78.02133	80.28004	82.36199	84.24221	85.89931	87.31621	88.4797	89.37805	89.99574	90.30339	90.2383	89.66132	88.2431	85.07384	76.34381	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	53.81606	56.51445	59.23722	61.97035	64.69915	67.40635	70.07205	72.67381	75.18693	77.58507	79.8411	81.92837	83.82204	85.50037	86.94555	88.14347	89.08173	89.74506	90.10647	90.11024	89.63567	88.40623	85.69964	78.87575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	53.63314	56.2962	58.98392	61.6829	64.37914	67.05618	69.69505	72.27429	74.77021	77.15744	79.40969	81.50085	83.40629	85.10404	86.5757	87.80635	88.78295	89.49038	89.90367	89.97314	89.59389	88.53245	86.20768	80.70997	52.04767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	53.45561	56.08426	58.73782	61.40346	64.06782	66.71522	69.32754	71.88426	74.36268	76.73835	78.9858	81.07953	82.99515	84.7106	86.20698	87.46867	88.48203	89.23203	89.69536	89.82759	89.53727	88.62628	86.62155	82.09729	65.96361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	53.28326	55.87841	58.49867	61.13174	63.76489	66.38316	68.96923	71.50348	73.96413	76.32766	78.5694	80.66447	82.58879	84.32029	85.83968	87.13075	88.17932	88.97033	89.48191	89.67414	89.46702	88.69158	86.95882	83.17745	72.01024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	53.1159	55.67841	58.2662	60.86746	63.47006	66.05969	68.61983	71.13168	73.57438	75.92526	78.16046	80.25572	82.18736	83.93334	85.4741	86.79292	87.87512	88.7056	89.26368	89.51331	89.38424	88.73166	87.23285	84.03565	75.65956	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	52.95335	55.48406	58.04017	60.61037	63.18304	65.74455	68.27907	70.76864	73.19322	75.531	77.75892	79.85333	81.79098	83.54994	85.11048	86.45545	87.56974	88.43817	89.04103	89.34559	89.28992	88.74935	87.45399	84.72729	78.15344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	52.79543	55.29514	57.82035	60.36019	62.90358	65.43745	67.9467	70.41411	72.82046	75.14476	77.3647	79.4573	81.39974	83.17027	84.74907	86.11864	87.26348	88.16833	88.81429	89.17145	89.18499	88.74706	87.63036	85.29022	79.97632	55.05896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	52.64198	55.11146	57.60652	60.1167	62.6314	65.13814	67.62246	70.06786	72.4559	74.76637	76.97773	79.06763	81.01373	82.7945	84.39008	85.78274	86.95663	87.89639	88.5838	88.99134	89.07027	88.72686	87.76846	85.75126	81.36606	66.62748	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	52.48181	54.92187	57.38758	59.86886	62.35559	64.83581	67.29568	69.7194	72.08925	74.38578	76.58817	78.67471	80.62351	82.41334	84.02431	85.43848	86.63968	87.61236	88.33873	88.79315	88.93163	88.67159	87.84679	86.08598	82.35933	71.66439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	52.32239	54.73376	57.17082	59.62388	62.08323	64.53744	66.97325	69.3755	71.72717	74.00956	76.20252	78.28497	80.23553	82.03323	83.65827	85.09252	86.31953	87.32359	88.08722	88.58627	88.78082	88.59752	87.89179	86.34932	83.14418	74.91077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	52.16716	54.55054	56.95961	59.38506	61.81759	64.24625	66.65833	69.03928	71.37278	73.64078	75.82385	77.90153	79.85291	81.65736	83.29519	84.74817	85.99964	87.03371	87.83317	88.37519	88.6233	88.51214	87.91541	86.56567	83.79506	77.22261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	52.016	54.37204	56.75377	59.15221	61.55846	63.96201	66.35069	68.71055	71.02588	73.27932	75.45209	77.52434	79.47568	81.28582	82.93523	84.40565	85.68023	86.74297	87.57687	88.16022	88.45954	88.41635	87.91992	86.74166	84.33644	78.95444	54.37798	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	51.86876	54.1981	56.5531	58.92512	61.30561	63.68451	66.05014	68.3891	70.68629	72.92502	75.08712	77.15336	79.10386	80.9187	82.57854	84.06513	85.36153	86.45161	87.31858	87.94166	88.28997	88.31098	87.90725	86.88256	84.78772	80.29854	65.35872	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	51.72532	54.02857	56.35745	58.70361	61.05886	63.41355	65.75646	68.07473	70.35386	72.57774	74.72885	76.78854	78.73745	80.55605	82.22522	83.7268	85.04374	86.15987	87.05853	87.7198	88.11501	88.19678	87.87909	86.99274	85.16426	81.36803	70.71436	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	51.58555	53.86331	56.16665	58.48751	60.81802	63.14892	65.46945	67.76726	70.02839	72.23734	74.37718	76.42983	78.37646	80.19793	81.87541	83.3908	84.72707	85.86796	86.79699	87.49492	87.93504	88.07443	87.83687	87.07582	85.47819	82.23445	74.08992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	51.44934	53.70219	55.98055	58.27663	60.5829	62.89044	65.18893	67.4665	69.70973	71.90367	74.03198	76.07716	78.02087	79.8444	81.52919	83.05729	84.41169	85.57611	86.53419	87.26731	87.75046	87.94457	87.78187	87.13488	85.73918	82.94559	76.46067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	51.31657	53.54507	55.79899	58.07083	60.35332	62.63792	64.91471	67.17227	69.3977	71.57659	73.69316	75.73046	77.67066	79.49547	81.18664	82.7264	84.09778	85.28451	86.27036	87.03723	87.5616	87.80775	87.71519	87.17255	85.95496	83.53484	78.23013	54.57308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	51.18714	53.39182	55.62184	57.86992	60.12911	62.39119	64.64661	66.8844	69.09215	71.25596	73.36061	75.38966	77.3258	79.15118	80.84785	82.39825	83.78549	84.99335	86.00571	86.80494	87.3688	87.6645	87.63784	87.19109	86.13183	84.02629	79.60317	65.15691	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	51.06093	53.24232	55.44894	57.67378	59.91012	62.15007	64.38445	66.60272	68.79291	70.94164	73.0342	75.05469	76.98627	78.81153	80.51287	82.07294	83.47498	84.70282	85.74045	86.57069	87.17239	87.51531	87.5507	87.19243	86.2749	84.43786	80.69741	70.37623	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	50.93785	53.09645	55.28019	57.48224	59.69618	61.9144	64.12808	66.32706	68.49983	70.63349	72.71383	74.72545	76.65202	78.47653	80.18175	81.75058	83.16638	84.41308	85.4748	86.33472	86.97266	87.36063	87.45456	87.17826	86.38843	84.7832	81.58627	73.68478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	50.8178	52.95411	55.11543	57.29518	59.48714	61.68402	63.87731	66.05726	68.21275	70.33137	72.39938	74.40188	76.323	78.14618	79.85454	81.43124	82.85981	84.12429	85.20893	86.09724	86.76991	87.20087	87.35015	87.15005	86.47596	85.0729	82.31843	76.01925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	50.7007	52.81519	54.95456	57.11245	59.28286	61.45877	63.63201	65.79316	67.93154	70.03515	72.09074	74.08387	75.99916	77.82047	79.53127	81.115	82.5554	83.83661	84.94304	85.85849	86.5644	87.03643	87.23811	87.10909	86.54045	85.31531	82.92773	77.7691	55.59735	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2883.5	50.58497	52.67811	54.79599	56.93246	59.08174	61.23707	63.39057	65.53319	67.65462	69.74329	71.78639	73.76997	75.67908	77.498	79.21058	80.80056	82.25185	83.54876	84.67582	85.61712	86.35475	86.86582	87.11692	87.05392	86.58108	85.51229	83.43032	79.11354	65.22422	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	50.45801	52.53025	54.62712	56.74263	58.87123	61.00641	63.14057	65.26499	67.36973	69.44362	71.47429	73.44822	75.3509	77.16702	78.88079	80.4762	81.93739	83.24877	84.39496	85.36024	86.12716	86.67393	86.96947	86.96444	86.57305	85.63176	83.78429	80.04481	69.66315	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	50.33391	52.38569	54.46196	56.55692	58.66523	60.7806	62.89572	65.00217	67.09038	69.14955	71.16774	73.13185	75.02779	76.84066	78.55502	80.15517	81.62543	82.95037	84.11471	85.10291	85.89795	86.479	86.81706	86.86698	86.55168	85.72688	84.08691	80.8331	72.72909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	50.2126	52.24433	54.30041	56.37522	58.4636	60.5595	62.65587	64.7446	66.81643	68.86096	70.86663	72.82076	74.70968	76.51889	78.2333	79.8375	81.31606	82.65367	83.83521	84.8453	85.66731	86.28128	86.66002	86.76212	86.51807	85.8002	84.34541	81.5025	74.95566	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	50.094	52.10607	54.14236	56.19741	58.26623	60.343	62.42091	64.49213	66.54776	68.57772	70.57085	72.51487	74.39652	76.20168	77.91562	79.52324	81.00934	82.35879	83.5566	84.58757	85.43544	86.081	86.4987	86.65041	86.47325	85.85396	84.56537	82.07174	76.65415	52.12179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	49.97804	51.97085	53.98773	56.02338	58.073	60.13096	62.1907	64.24466	66.28424	68.29973	70.28031	72.21411	74.08825	75.889	77.60199	79.21243	80.70534	82.06581	83.279	84.32988	85.20251	85.87839	86.33341	86.53233	86.41814	85.89009	84.75132	82.5569	77.99454	62.93325	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	49.86463	51.83856	53.83641	55.85303	57.8838	59.92327	61.96512	64.00205	66.02576	68.02686	69.9949	71.91838	73.7848	75.58082	77.2924	78.90507	80.40413	81.77484	83.00253	84.07237	84.9687	85.67366	86.16444	86.40835	86.35357	85.91024	84.90707	82.97124	79.07818	68.24964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	49.75372	51.70913	53.68832	55.68627	57.69852	59.71981	61.74404	63.76418	65.77219	67.75901	69.71453	71.6276	73.48612	75.27709	76.98684	78.60121	80.10575	81.48595	82.72731	83.81517	84.73418	85.46704	85.99208	86.27891	86.28029	85.91584	85.03589	83.32551	79.96986	71.63079	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	49.64523	51.58248	53.54336	55.52299	57.51705	59.52047	61.52737	63.53094	65.52342	67.49606	69.43909	71.34169	73.19212	74.97777	76.6853	78.30085	79.81025	81.19922	82.45343	83.55842	84.49911	85.2587	85.81659	86.14441	86.19895	85.90814	85.14064	83.6284	80.71335	74.02779	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	49.5391	51.45855	53.40146	55.3631	57.33929	59.32515	61.31498	63.30221	65.27934	67.23792	69.16848	71.06056	72.90276	74.68282	76.38775	78.004	79.51768	80.91472	82.181	83.30224	84.26363	85.04886	85.63822	86.0052	86.11017	85.88827	85.22378	83.88701	81.33946	75.83428	49.04917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	49.43527	51.33724	53.26253	55.2065	57.16515	59.13374	61.10676	63.07788	65.03984	66.98447	68.9026	70.78412	72.61795	74.39219	76.09417	77.71066	79.22805	80.6325	81.91009	83.04675	84.0279	84.83768	85.45723	85.86165	86.01449	85.85722	85.28746	84.10717	81.87063	77.25023	61.58948	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	49.33368	51.2185	53.12649	55.05313	56.99454	58.94614	60.90262	62.85784	64.80481	66.73561	68.64137	70.51229	72.33764	74.10583	75.80454	77.42084	78.9414	80.35263	81.64081	82.79205	83.79206	84.62535	85.27383	85.71406	85.91242	85.81589	85.33356	84.29369	82.32367	78.39058	67.30556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	49.23426	51.10226	52.99326	54.90288	56.82735	58.76225	60.70244	62.642	64.57415	66.49124	68.38469	70.245	72.06175	73.82369	75.51882	77.13453	78.65776	80.07515	81.37321	82.53826	83.55623	84.41203	85.08824	85.56275	85.80441	85.7651	85.36373	84.45061	82.71146	79.32718	70.85931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	49.13696	50.98846	52.86278	54.75568	56.6635	58.58198	60.50614	62.43025	64.34776	66.25127	68.13247	69.98214	71.79021	73.54572	75.237	76.85173	78.37713	79.80012	81.10739	82.28548	83.32055	84.19788	84.90067	85.40799	85.69091	85.70556	85.37942	84.58131	83.04409	80.10774	73.35245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	49.04173	50.87702	52.73498	54.61145	56.50291	58.40524	60.31361	62.22249	64.12554	66.01559	67.8846	69.72366	71.52295	73.27186	74.95902	76.57241	78.09954	79.52755	80.84339	82.03378	83.08514	83.98305	84.71132	85.25004	85.57229	85.63796	85.3819	84.68866	83.32955	80.76547	75.22117	46.23582	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	48.94852	50.76789	52.60977	54.47011	56.3455	58.23193	60.12476	62.01862	63.90739	65.78411	67.64102	69.46945	71.25991	73.00207	74.68486	76.29658	77.82499	79.2575	80.58128	81.78326	82.8501	83.76769	84.52035	85.08916	85.44894	85.56289	85.3723	84.77513	83.57432	81.32433	76.68174	60.52622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	48.85178	50.65552	52.48161	54.3261	56.18568	58.05649	59.93402	61.81308	63.68775	65.55129	67.39618	69.21402	70.99559	72.73086	74.40906	76.01877	77.54802	78.98447	80.3155	81.52826	82.60959	83.54568	84.32131	84.91833	85.31306	85.47147	85.34018	84.828	83.76266	81.76777	77.78228	66.27462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	48.75645	50.54484	52.35541	54.18431	56.02836	57.8838	59.74626	61.61074	63.47147	65.32197	67.15491	68.96218	70.73481	72.46307	74.13647	75.74386	77.27356	78.71346	80.05117	81.27404	82.36912	83.32286	84.12045	84.74448	85.17259	85.37319	85.29758	84.86392	83.92079	82.14757	78.69437	69.89816	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	48.66305	50.43635	52.23168	54.04527	55.87404	57.71435	59.56198	61.41206	63.25904	65.09662	66.91771	68.71442	70.47808	72.19921	73.86761	75.47241	77.00218	78.44508	79.78893	81.02128	82.1294	83.1	83.91864	84.56859	85.02866	85.26947	85.24644	84.88588	84.05416	82.47665	79.46502	72.44343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	48.57153	50.33001	52.11036	53.9089	55.72264	57.54807	59.38108	61.21698	63.05038	64.87516	66.68448	68.47068	70.22533	71.93923	73.60244	75.20438	76.73388	78.17934	79.52881	80.77004	81.89053	82.87721	83.71602	84.39082	84.88152	85.16068	85.18738	84.89508	84.16541	82.76194	80.12072	74.35256	39.07302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	48.48185	50.22577	51.99139	53.77514	55.5741	57.38488	59.2035	61.02541	62.84539	64.65752	66.45515	68.23087	69.97648	71.68306	73.34092	74.93976	76.46866	77.91626	79.27085	80.52039	81.65257	82.65459	83.51272	84.21136	84.73141	85.04718	85.121	84.89259	84.25678	83.00899	80.68209	75.84628	58.08122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	48.39397	50.12358	51.87473	53.64392	55.42835	57.22471	59.02916	60.83727	62.644	64.44361	66.22964	67.99492	69.73148	71.43065	73.08301	74.67851	76.2065	77.65585	79.01508	80.27238	81.41562	82.43225	83.30886	84.03037	84.57855	84.9293	85.04782	84.87938	84.33022	83.22241	81.1652	77.0495	64.88125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	48.30784	50.02338	51.7603	53.51519	55.28532	57.06749	58.85797	60.65248	62.44613	64.23334	66.00788	67.76276	69.49026	71.18195	72.82867	74.42061	75.94739	77.39812	78.76154	80.02605	81.17974	82.21028	83.10457	83.848	84.42315	84.80733	84.96833	84.85631	84.38738	83.40608	81.5826	78.03931	68.88335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	48.22342	49.92513	51.64806	53.38889	55.14495	56.91314	58.68987	60.47097	62.25169	64.02665	65.78978	67.53431	69.25276	70.9369	72.57784	74.16603	75.69132	77.14307	78.51024	79.78145	80.94499	81.98877	82.89996	83.66441	84.26541	84.68157	84.88298	84.82412	84.42973	83.56329	81.94424	78.86646	71.62366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	48.14067	49.82878	51.53796	53.26495	55.00717	56.76161	58.52478	60.29266	62.06062	63.82346	65.57528	67.30952	69.0189	70.69544	72.33049	73.91473	75.43827	76.8907	78.26121	79.53862	80.71144	81.7678	82.69515	83.47974	84.10553	84.55229	84.79218	84.78352	84.45856	83.69688	82.25808	79.56603	73.6516	23.67287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	48.05955	49.7343	51.42995	53.14332	54.87192	56.61283	58.36265	60.11748	61.87285	63.62369	65.3643	67.0883	68.78863	70.45753	72.08658	73.66669	75.18823	76.64102	78.01446	79.2976	80.47915	81.54745	82.49023	83.29411	83.94368	84.41974	84.69632	84.73513	84.475	83.80928	82.53059	80.16316	75.22558	56.00049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	47.98002	49.64162	51.32397	53.02396	54.73915	56.46673	58.20339	59.94536	61.68829	63.42728	65.15678	66.8706	68.56189	70.2231	71.84604	73.42188	74.94118	76.39402	77.77001	79.05842	80.24817	81.3278	82.28531	83.10767	83.78004	84.28416	84.59574	84.67951	84.48007	83.90257	82.76708	80.67648	76.48708	63.71047	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	47.90205	49.55073	51.21999	52.9068	54.6088	56.32325	58.04695	59.77623	61.50688	63.23414	64.95263	66.65634	68.3386	69.9921	71.60885	73.18024	74.69709	76.14969	77.52787	78.82112	80.01854	81.10892	82.08047	82.92053	83.61476	84.14577	84.49076	84.61719	84.47468	83.97859	82.97192	81.12013	77.52164	68.03866	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3905.5	47.82561	49.46156	51.11795	52.79179	54.48081	56.18233	57.89326	59.61003	61.32856	63.04422	64.7518	66.44546	68.11873	69.76448	71.37495	72.94176	74.45595	75.90803	77.28806	78.58571	79.79033	80.89087	81.87582	82.73282	83.448	84.00477	84.3817	84.54863	84.45966	84.03894	83.14881	81.50508	78.38468	70.94346	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	47.75065	49.37409	51.01781	52.6789	54.35513	56.04392	57.74226	59.44669	61.15325	62.85745	64.55422	66.2379	67.90219	69.54018	71.1443	72.7064	74.21773	75.66903	77.05057	78.35223	79.56356	80.67372	81.67144	82.54463	83.2799	83.86138	84.26883	84.47427	84.43573	84.08503	83.30085	81.83999	79.11405	73.06997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	47.67715	49.28828	50.91953	52.56806	54.23171	55.90796	57.5939	59.28616	60.9809	62.67376	64.35982	66.03359	67.68894	69.31914	70.91685	72.47412	73.98241	75.43267	76.81541	78.1207	79.33828	80.45753	81.46739	82.35609	83.11061	83.71576	84.15241	84.39451	84.40357	84.11807	83.43067	82.13182	79.73666	74.70983	53.88045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	47.60272	49.20173	50.82071	52.45687	54.10812	55.77202	57.44573	59.12598	60.80905	62.49071	64.16616	65.83008	67.47652	69.09893	70.69017	72.24247	73.74754	75.19652	76.58012	77.88863	79.11197	80.23974	81.26106	82.16444	82.93725	83.56486	84.02913	84.30567	84.35903	84.13337	83.53296	82.37538	80.2543	75.97843	62.41438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	47.50442	49.09142	50.69826	52.32219	53.96118	55.61286	57.27448	58.94286	60.61438	62.28493	63.94987	65.60399	67.24152	68.85609	70.44074	71.98789	73.48944	74.93673	76.32064	77.63164	78.85981	79.99488	81.02614	81.94225	82.73079	83.3775	83.86481	84.16941	84.25771	84.0774	83.53977	82.47801	80.52765	76.65995	65.76081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	47.14423	48.71855	50.31263	51.92379	53.55006	55.18913	56.83832	58.49454	60.15426	61.81346	63.4676	65.11159	66.73978	68.3459	69.92308	71.46385	72.96014	74.40332	75.78425	77.09326	78.32023	79.45453	80.4849	81.39923	82.18398	82.82321	83.29689	83.57774	83.62552	83.37556	82.71351	81.41064	78.91505	73.36309	52.28229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	46.73834	48.29982	49.88099	51.47923	53.09262	54.71891	56.35549	57.99934	59.64702	61.2946	62.93763	64.57113	66.18953	67.78667	69.35575	70.88936	72.37948	73.81745	75.19405	76.49946	77.72324	78.85434	79.88083	80.78962	81.56576	82.19127	82.64295	82.88851	82.87909	82.53394	81.70506	80.08144	76.86191	69.24537	41.01688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	46.33289	47.88153	49.44977	51.03505	52.63549	54.24891	55.87277	57.5041	59.13956	60.77529	62.40694	64.02962	65.63785	67.22555	68.78602	70.31189	71.79516	73.22717	74.5986	75.89945	77.11903	78.24578	79.26712	80.16897	80.93494	81.54488	81.97233	82.17969	82.10901	81.66234	80.65548	78.68984	74.72712	65.32047	31.35783	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	45.9279	47.46368	49.01896	50.59124	52.17868	53.77915	55.39016	57.00884	58.63189	60.25555	61.87555	63.48709	65.08478	66.66261	68.21395	69.7315	71.20726	72.63255	73.99797	75.29335	76.50766	77.62893	78.64386	79.53735	80.29151	80.88399	81.28489	81.45104	81.31484	80.76012	79.56474	77.2446	72.56379	61.62083	21.67474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	45.52335	47.04626	48.58857	50.1478	51.72217	53.3096	54.90767	56.51355	58.12402	59.7354	61.34349	62.94358	64.53035	66.09789	67.6396	69.14825	70.61585	72.03369	73.39226	74.68122	75.88925	77.00388	78.01111	78.89479	79.63551	80.20857	80.58051	80.70233	80.49625	79.82718	78.43525	75.75867	70.40305	58.1062	10.29416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	45.11924	46.62928	48.15859	49.70473	51.26598	52.84029	54.4253	56.01824	57.61596	59.21485	60.81078	62.39911	63.97461	65.53142	67.06302	68.5622	70.021	71.43065	72.78156	74.06318	75.26389	76.37072	77.36896	78.24137	78.96694	79.5186	79.85912	79.93341	79.6532	78.86433	77.27109	74.24386	68.25988	54.73679	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	44.71557	46.21272	47.72901	49.26203	50.8101	52.37121	53.94306	55.52293	57.10773	58.69392	60.27744	61.85372	63.41759	64.96326	66.48427	67.97343	69.42278	70.82352	72.16594	73.43931	74.63166	75.72954	76.71747	77.57713	78.28584	78.81405	79.12065	79.14426	78.78599	77.8731	76.07693	72.70957	66.14128	51.48176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	44.31233	45.7966	47.29984	48.8197	50.35453	51.90237	53.46095	55.02762	56.59934	58.17263	59.74349	61.30742	62.85932	64.39344	65.90339	67.38198	68.82126	70.21237	71.5455	72.80969	73.99266	75.08042	76.05674	76.90215	77.59227	78.09497	78.36516	78.33508	77.89534	76.85557	74.8574	71.16303	64.0506	48.3179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	43.90953	45.38089	46.87107	48.37773	49.89927	51.43376	52.97897	54.53232	56.0908	57.65098	59.20895	60.76025	62.29983	63.82202	65.32043	66.78792	68.2165	69.59729	70.92031	72.17442	73.34697	74.42346	75.38685	76.21649	76.88627	77.36141	77.59279	77.50627	76.98228	75.81405	73.61683	69.60989	61.98959	45.22747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	43.50715	44.96561	46.44269	47.93613	49.44432	50.96539	52.49714	54.03703	55.58211	57.12901	58.67385	60.21223	61.73917	63.24902	64.73544	66.19129	67.60858	68.97833	70.29046	71.53359	72.6947	73.75875	74.70789	75.52026	76.16795	76.61354	76.80381	76.65841	76.04808	74.75101	72.35917	68.05471	59.95928	42.19629	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	43.1052	44.55074	46.01472	47.49489	48.98968	50.49725	52.01545	53.54176	55.07329	56.60671	58.13819	59.66339	61.17736	62.67449	64.14847	65.59217	66.99756	68.35559	69.65604	70.88727	72.03593	73.08639	74.01996	74.81356	75.43746	75.85156	75.99863	75.7923	75.09421	73.66894	71.08804	66.50125	57.96043	39.21245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	42.70367	44.13629	45.58714	47.054	48.53535	50.02935	51.5339	53.04652	54.56435	56.08411	57.60201	59.11375	60.61443	62.09847	63.55957	64.9906	66.38349	67.72912	69.01711	70.23557	71.37077	72.40648	73.32318	74.09653	74.695	75.07579	75.17778	74.90885	74.12224	72.5703	69.80672	64.95275	55.99372	36.26515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4526	42.30255	43.72224	45.15995	46.61348	48.08133	49.5617	51.05251	52.55132	54.0553	55.56121	57.06531	58.56334	60.05041	61.52098	62.96877	64.38663	65.76645	67.099	68.37376	69.57858	70.6993	71.71915	72.6177	73.36937	73.94081	74.28662	74.3419	74.00913	73.13384	71.45751	68.51824	63.41201	54.05977	33.34388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	41.90185	43.30861	44.73315	46.17331	47.62761	49.09429	50.57127	52.05615	53.54614	55.03804	56.52812	58.01217	59.48533	60.94208	62.37613	63.78032	65.14649	66.46531	67.72608	68.91638	70.02166	71.02452	71.90368	72.63229	73.17523	73.48454	73.49175	73.09428	72.13071	70.33289	67.22538	61.88153	52.15923	30.43753	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	41.50156	42.89537	44.30673	45.7335	47.17421	48.62712	50.09018	51.56103	53.03689	54.51459	55.99046	57.46027	58.91922	60.36179	61.78168	63.17172	64.52367	65.82811	67.07415	68.24908	69.33795	70.32274	71.18131	71.88556	72.39862	72.6701	72.62814	72.16553	71.11457	69.19871	65.9307	60.36353	50.29271	27.53339	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	41.10168	42.48254	43.8807	45.29404	46.72111	48.16019	49.60926	51.06596	52.52756	53.9909	55.45233	56.90767	58.35211	59.78015	61.18548	62.56088	63.89807	65.18749	66.41806	67.5768	68.64832	69.614	70.45083	71.1295	71.61144	71.84394	71.75199	71.22415	70.08716	68.05712	64.63658	58.86001	48.4608	24.61596	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	40.70221	42.07011	43.45506	44.85494	46.26833	47.69351	49.12849	50.57094	52.01814	53.46696	54.91376	56.35438	57.78403	59.19719	60.58756	61.94786	63.26974	64.54352	65.75791	66.89965	67.95292	68.89849	69.7125	70.36445	70.81417	71.00675	70.86427	70.27148	69.05019	66.9102	63.34521	57.37279	46.66405	21.66497	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	40.30313	41.65808	43.02979	44.41619	45.81585	47.22708	48.6479	50.07599	51.50866	52.94279	54.37477	55.80043	57.215	58.61296	59.98796	61.33271	62.63876	63.89628	65.09381	66.21777	67.25192	68.17644	68.96661	69.59083	70.00737	70.15929	69.96599	69.30884	68.00535	65.75991	62.05862	55.90349	44.90296	18.65215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	39.90446	41.24644	42.6049	43.97778	45.36367	46.76089	48.16747	49.5811	50.99912	52.4184	53.83536	55.24584	56.64505	58.02748	59.38675	60.7155	62.00519	63.24588	64.42588	65.53131	66.54552	67.44809	68.21351	68.80908	69.19163	69.30235	69.05822	68.33758	66.95429	64.60813	60.77869	54.45358	43.17794	15.53504	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	39.50618	40.83519	42.18038	43.53972	44.9118	46.29495	47.68721	49.08629	50.48952	51.89381	53.29556	54.69063	56.07422	57.4408	58.78396	60.09628	61.36913	62.59241	63.75424	64.84044	65.83394	66.71374	67.45357	68.01969	68.36761	68.43677	68.14202	67.35906	65.89861	63.45663	59.50714	53.02438	41.48934	12.24298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	39.1083	40.42433	41.75624	43.10201	44.46024	45.82926	47.20713	48.59156	49.97989	51.36902	52.75539	54.13483	55.50254	56.85296	58.17965	59.47512	60.73065	61.93599	63.07904	64.14534	65.1174	65.97368	66.68717	67.22318	67.53596	67.56342	67.21849	66.37461	64.83985	62.30707	58.24554	51.61704	39.83743	8.638239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	38.71081	40.01385	41.33247	42.66465	44.00899	45.36383	46.72723	48.09691	49.47021	50.84406	52.21486	53.57846	54.93003	56.264	57.57388	58.85211	60.08986	61.27674	62.40044	63.44622	64.39617	65.22826	65.91477	66.42011	66.69742	66.6832	66.28873	65.38553	63.77952	61.16101	56.99534	50.2326	38.22237	4.33868	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	38.3137	39.60376	40.90907	42.22763	43.55804	44.89864	46.24751	47.60235	48.96052	50.31893	51.674	53.02155	54.35675	55.67398	56.96671	58.22731	59.44685	60.61479	61.71861	62.74328	63.67054	64.47783	65.1368	65.61105	65.85269	65.79701	65.35383	64.3931	62.71902	60.01992	55.75786	48.87194	36.64426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	37.91699	39.19405	40.48604	41.79096	43.1074	44.43372	45.76797	47.10789	48.45082	49.79366	51.13283	52.46413	53.78272	55.08295	56.35822	57.60083	58.80175	59.9503	61.03374	62.03678	62.9408	63.72278	64.35377	64.79663	65.00255	64.90576	64.41489	63.39858	61.65971	58.88516	54.53427	47.53585	35.10308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	37.52066	38.78473	40.06338	41.35463	42.65707	43.96905	45.28864	46.61355	47.94112	49.26827	50.59137	51.90625	53.208	54.49096	55.74847	56.97276	58.15468	59.28341	60.34602	61.32697	62.20728	62.96352	63.56618	63.97745	64.14775	64.01037	63.47296	62.40316	60.60288	57.75798	53.32565	46.22496	33.59875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	37.12471	38.37578	39.64109	40.91865	42.20705	43.50465	44.8095	46.11932	47.43145	48.74277	50.04967	51.34793	52.63265	53.89809	55.13756	56.34321	57.50578	58.61431	59.65569	60.61412	61.47033	62.20046	62.77454	63.15417	63.28905	63.11175	62.5291	61.40801	59.54974	56.63953	52.13295	44.93982	32.13108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	36.72916	37.96722	39.21917	40.48302	41.75736	43.04053	44.33058	45.62524	46.92181	48.21719	49.50774	50.78922	52.0567	53.3044	54.52558	55.71229	56.8552	57.94318	58.96297	59.89853	60.73029	61.43406	61.97941	62.32742	62.42724	62.21079	61.58432	60.41421	58.5014	55.53089	50.957	43.68087	30.69981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	36.33399	37.55905	38.79762	40.04774	41.30798	42.57668	43.85189	45.1313	46.41224	47.69157	48.96563	50.23018	51.48023	52.70998	53.91262	55.08014	56.20309	57.27022	58.26811	59.18049	59.98755	60.66476	61.18132	61.49787	61.56308	61.30838	60.6396	59.42283	57.45895	54.43302	49.79856	42.44845	29.30459	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	35.93921	37.15126	38.37646	39.61282	40.85894	42.11313	43.37343	44.63754	45.90275	47.16593	48.42339	49.67085	50.90332	52.11492	53.29881	54.44689	55.54962	56.59565	57.57136	58.46033	59.2425	59.89304	60.38085	60.66618	60.69733	60.40538	59.69588	58.43485	56.42335	53.34679	48.65825	41.24279	27.945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5146.5	35.54483	36.74387	37.95568	39.17828	40.41024	41.64989	42.89524	44.14397	45.39338	46.64031	47.88105	49.1113	50.32602	51.51931	52.68425	53.81269	54.89499	55.91967	56.87301	57.73838	58.49552	59.11937	59.57854	59.83299	59.83073	59.50262	58.75408	57.45123	55.39552	52.273	47.53662	40.06408	26.62054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	35.15085	36.33687	37.53529	38.74411	39.9619	41.18696	42.41732	43.65062	44.88416	46.11475	47.33867	48.55159	49.74843	50.92325	52.06908	53.17769	54.23937	55.24254	56.17333	57.01498	57.74703	58.34423	58.77495	58.99895	58.96403	58.60091	57.81506	56.47283	54.37629	51.21235	46.43415	38.91238	25.33065	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	34.75728	35.93029	37.1153	38.31033	39.51392	40.72438	41.9397	43.15753	44.37513	45.58931	46.79632	47.9918	49.17064	50.32685	51.45342	52.54207	53.58298	54.56449	55.47262	56.29047	56.99744	57.5681	57.97066	58.16471	58.09793	57.70103	56.87962	55.50048	53.36644	50.16548	45.3512	37.78772	24.0747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	34.36413	35.52414	36.69574	37.87696	39.06634	40.26216	41.46241	42.66472	43.86633	45.06403	46.25405	47.432	48.59274	49.73024	50.83744	51.90599	52.92601	53.88577	54.77117	55.56521	56.24716	56.79147	57.16621	57.33088	57.23312	56.80373	55.94856	54.53495	52.36665	49.13292	44.28809	36.69004	22.85199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	33.97142	35.11842	36.27661	37.44402	38.61917	39.80034	40.98548	42.17223	43.35781	44.53897	45.71194	46.87228	48.01483	49.13354	50.22127	51.26963	52.2687	53.20664	54.06929	54.83956	55.49662	56.01481	56.36214	56.49807	56.37028	55.9097	55.02259	53.57694	51.37756	48.11517	43.24505	35.61922	21.66177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	33.57917	34.71315	35.85793	37.01152	38.17244	39.33893	40.50895	41.68011	42.84961	44.0142	45.17005	46.31274	47.43704	48.53687	49.60507	50.6332	51.61126	52.52737	53.3673	54.11388	54.74622	55.2386	55.55899	55.66688	55.51003	55.01964	54.10241	52.6271	50.39974	47.11263	42.22225	34.5751	20.50322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	33.18739	34.30837	35.43974	36.57951	37.72617	38.87798	40.03286	41.18841	42.34181	43.48978	44.62849	45.75346	46.85947	47.94039	48.98902	49.99687	50.95392	51.84823	52.6655	53.38854	53.99638	54.46331	54.75729	54.83787	54.65299	54.13417	53.18863	51.68603	49.43369	46.12566	41.21979	33.55746	19.37548	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	32.79611	33.90409	35.02205	36.14799	37.28041	38.41752	39.55725	40.69717	41.83445	42.96578	44.08732	45.19456	46.28225	47.34423	48.37327	49.36086	50.29692	51.16948	51.96422	52.66388	53.24752	53.6894	53.95754	54.0116	53.79976	53.25388	52.28185	50.75427	48.47986	45.15454	40.23775	32.56605	18.27762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	32.40536	33.50034	34.60489	35.71702	36.83519	37.95761	39.08218	40.20646	41.32761	42.4423	43.54665	44.63614	45.70551	46.74855	47.75802	48.72537	49.6405	50.49141	51.26376	51.94028	52.50003	52.91731	53.16022	53.18859	52.95086	52.37936	51.38262	49.83231	47.53865	44.1995	39.27611	31.60055	17.20863	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	32.01517	33.09716	34.18831	35.28663	36.39055	37.49828	38.6077	39.71635	40.82136	41.9194	43.00657	44.07833	45.12938	46.15351	47.14344	48.09061	48.9849	49.8143	50.56444	51.21809	51.75431	52.14748	52.36582	52.36936	52.10684	51.5111	50.49144	48.9206	46.61038	43.26074	38.33485	30.66064	16.16748	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	31.62557	32.69458	33.77235	34.85685	35.94654	37.03959	38.13386	39.22689	40.31578	41.39719	42.46719	43.52123	44.554	45.55926	46.52972	47.4568	48.33037	49.13841	49.86657	50.49764	51.01074	51.38033	51.57478	51.55436	51.26818	50.64961	49.60876	48.01952	45.69536	42.33838	37.41387	29.74595	15.15303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5548	31.2366	32.29264	33.35703	34.42775	35.50322	36.5816	37.66074	38.73816	39.81096	40.87575	41.92862	42.96499	43.97951	44.96597	45.91704	46.82414	47.67714	48.46402	49.17047	49.7793	50.2697	50.61627	50.78755	50.74406	50.43534	49.79533	48.73499	47.12944	44.79382	41.43252	36.51307	28.85608	14.1641	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	30.84831	31.8914	32.94243	33.99937	35.06064	36.12437	37.18841	38.25025	39.30697	40.3552	41.39097	42.40971	43.40607	44.3738	45.30559	46.19285	47.02545	47.79141	48.47642	49.06338	49.53156	49.85569	50.00452	49.93889	49.60875	48.94867	47.87051	46.25065	43.90597	40.5432	35.63228	27.99063	13.19939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	30.46075	31.49089	32.52858	33.57177	34.61885	35.66796	36.71693	37.76323	38.80392	39.83562	40.85436	41.85555	42.83383	43.78294	44.69558	45.56315	46.37556	47.12083	47.78474	48.35021	48.79666	49.09896	49.2261	49.13924	48.7888	48.11002	47.01566	45.38342	43.03198	39.67044	34.77132	27.14916	12.25751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	30.07396	31.09119	32.11555	33.14501	34.17794	35.21246	36.24639	37.27718	38.30191	39.31714	40.31892	41.30263	42.26293	43.19354	44.08718	44.93526	45.7277	46.45257	47.0957	47.64011	48.06534	48.34644	48.45265	48.34548	47.97586	47.27971	46.17074	44.52797	42.17195	38.81423	33.92998	26.33122	11.33693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	29.68801	30.69233	31.70339	32.71915	33.73796	34.75793	35.77687	36.79222	37.80102	38.79986	39.78475	40.7511	41.69353	42.60579	43.48059	44.30938	45.0821	45.78687	46.40959	46.93338	47.33792	47.59846	47.68452	47.55798	47.17028	46.45805	45.33601	43.68451	41.32598	37.9745	33.10803	25.53633	10.43597	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	29.30295	30.29439	31.29218	32.29426	33.29899	34.30446	35.30846	36.30841	37.30137	38.28389	39.25201	40.20109	41.12579	42.01986	42.87602	43.68573	44.439	45.12399	45.72667	46.23031	46.61471	46.85535	46.92204	46.77705	46.37236	45.64533	44.51169	42.85318	40.49413	37.15118	32.3052	24.76404	9.552731	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	28.91884	29.89743	30.88198	31.87043	32.86112	33.85213	34.84124	35.82588	36.80307	37.76937	38.72081	39.65276	40.55987	41.43592	42.27363	43.06452	43.79862	44.46416	45.04723	45.53117	45.896	46.11741	46.1655	46.00298	45.58238	44.8418	43.698	42.03412	39.67643	36.34417	31.52123	24.01385	8.685048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	28.53576	29.50152	30.47286	31.44771	32.42441	33.40103	34.37532	35.34471	36.30622	37.2564	38.19128	39.10624	39.99593	40.85414	41.67363	42.44595	43.16118	43.80764	44.37149	44.83625	45.18208	45.38492	45.41521	45.23606	44.80059	44.04767	42.89509	41.22742	38.87287	35.55333	30.75583	23.28528	7.830346	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	28.15377	29.10673	30.0649	31.0262	31.98897	32.95124	33.91079	34.86501	35.81094	36.74512	37.66357	38.56168	39.43412	40.2747	41.0762	41.83022	42.52691	43.15465	43.69972	44.14578	44.47319	44.65814	44.67141	44.47654	44.02723	43.26314	42.10311	40.43314	38.08342	34.77852	30.0087	22.57782	6.985531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	27.77295	28.71315	29.65818	30.60599	31.55487	32.50287	33.44775	34.3869	35.31735	36.23564	37.1378	38.01923	38.8746	39.69776	40.48153	41.21754	41.896	42.5054	43.03214	43.46002	43.7696	43.93733	43.93434	43.72463	43.26249	42.48838	41.32218	39.65134	37.30804	34.01957	29.27951	21.89099	6.146686	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

P O R E P R E S S U R E (kPa)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0.310038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	75.01125	56.09877	36.15474	17.23234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	110.1611	91.98593	71.05095	50.70796	31.12121	12.04614	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	122.1849	104.5651	83.67434	62.49407	42.00096	22.10229	2.642222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	136.1531	118.9135	98.39563	76.83744	55.67201	35.10495	15.02557	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	151.3393	134.3717	114.2859	92.66982	71.04443	49.92945	29.32047	9.124233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	161.2167	144.453	124.7733	103.2882	81.39483	59.84327	38.77676	18.14181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	169.5461	152.941	133.6206	112.3631	90.36051	68.48088	47.02284	25.99724	5.356986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	178.4463	161.9685	142.9604	121.9709	99.97897	77.87463	56.08971	34.71659	13.72581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	187.7323	171.3589	152.6215	131.9099	110.0119	87.7763	65.72895	44.04993	22.74885	1.94177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	197.2985	181.0127	162.5106	142.0706	120.3206	98.03337	75.78683	53.84346	32.26157	11.03762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	210.1954	193.984	175.6878	155.5056	133.9357	111.6614	89.27573	67.1099	45.27563	23.78153	2.83646	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	222.0564	205.9092	187.7942	167.8528	146.4799	124.2683	101.7986	79.45209	57.39399	35.66129	14.27338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	230.3911	214.2999	196.3454	176.6271	155.4579	133.3458	110.8405	88.35434	66.10132	44.15224	22.51707	1.505775	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	238.9538	222.9119	205.1006	185.5882	164.6228	142.6362	120.1366	97.54991	75.13117	52.98668	31.141	9.653495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	247.6473	231.6492	213.9663	194.6437	173.8778	152.0342	129.5745	106.9236	84.3682	62.04931	40.01268	18.28041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	256.4404	240.4814	222.9143	203.7667	183.1937	161.5038	139.1114	116.4293	93.76583	71.29378	49.08274	27.15448	5.705862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	265.3144	249.3907	231.9285	212.9422	192.5542	171.0239	148.7201	126.0359	103.2918	80.688	58.31855	36.21592	14.44543	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	274.2558	258.364	240.9975	222.1603	201.9483	180.58	158.3809	135.7199	112.9211	90.20684	67.69501	45.43309	23.45564	2.212016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	283.2544	267.3917	250.1126	231.4135	211.3687	190.1618	168.0793	145.4628	122.6334	99.82962	77.1916	54.78364	32.63645	10.89158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	290.6231	274.787	257.5881	239.017	219.1307	198.083	176.1252	153.571	130.7327	107.8598	85.11188	62.57066	40.27264	18.28235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	297.9494	282.1378	265.0128	246.5607	226.8242	205.9323	184.1045	161.627	138.7995	115.8768	93.03522	70.37343	47.93788	25.76991	4.230709	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	305.352	289.5629	272.5064	254.1651	234.5703	213.8297	192.1351	169.7456	146.946	123.992	101.0728	78.30313	55.74141	33.42382	11.50592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	312.813	297.0447	280.0517	261.8138	242.3529	221.7588	200.1985	177.9062	155.1493	132.181	109.1997	86.33505	63.65779	41.20674	19.0659	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	320.3227	304.5738	287.6398	269.4987	250.1644	229.7115	208.2856	186.097	163.3956	140.4285	117.4004	94.45342	71.67102	49.09825	26.79068	5.136509	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	327.8746	312.1438	295.2647	277.2143	257.9998	237.6829	216.39	194.3101	171.6748	148.7231	125.6626	102.646	79.76879	57.08419	34.63723	12.61163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	335.4636	319.7496	302.922	284.9567	265.8555	245.6693	224.5076	202.5396	179.9794	157.0556	133.9763	110.9025	87.94081	65.1535	42.5835	20.33548	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	343.0856	327.3873	310.6079	292.7227	273.7289	253.6681	232.635	210.7811	188.303	165.4183	142.3329	119.214	96.17817	73.29693	50.61554	28.20348	6.436452	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	349.7793	334.0958	317.3617	299.5519	280.66	260.7194	239.8121	218.0731	195.6829	172.847	149.7674	126.615	103.5153	80.54872	57.76534	35.21873	13.10237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	355.3564	339.6868	322.9953	305.2567	286.4615	266.636	245.8513	224.2275	201.9296	179.1509	156.0878	132.9131	109.7595	86.71625	63.8392	41.17571	18.84649	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	361.0261	345.3696	328.7183	311.0469	292.3436	272.6285	251.9629	230.4538	208.2515	185.5372	162.5003	139.3139	116.1164	93.00487	70.04192	47.27385	24.78621	3.173839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	366.7529	351.1087	334.4954	316.8877	298.2717	278.6625	258.1125	236.717	214.6128	191.9688	168.9669	145.7788	122.5469	99.37562	76.33426	53.47109	30.8532	8.805975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	372.5246	356.8921	340.3147	322.7674	304.2345	284.7267	264.2888	243.0054	221.0009	198.4323	175.4732	152.2925	129.0356	105.8129	82.70046	59.75018	37.01953	14.71235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	378.3343	362.7129	346.1696	328.6796	310.2259	290.8153	270.486	249.3129	227.4089	204.9198	182.0103	158.8457	135.5726	112.3067	89.13048	66.10024	43.26909	20.77664	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	384.1775	368.5666	352.0555	334.6201	316.2419	296.9246	276.7003	255.6354	233.8323	211.4259	188.5721	165.4313	142.1505	118.8496	95.61669	72.51319	49.59098	26.95321	5.136823	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	390.0505	374.4496	357.9693	340.5857	322.2796	303.0517	282.929	261.9702	240.2679	217.9467	195.1537	172.0439	148.7634	125.4352	102.1528	78.98249	55.97701	33.21822	11.02498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	395.9507	380.3593	363.9081	346.574	328.3368	309.1947	289.1703	268.315	246.713	224.4789	201.7512	178.6789	155.4062	132.0583	108.7333	85.50252	62.42066	39.55712	17.1223	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	401.8755	386.2932	369.8699	352.5829	334.4116	315.352	295.4224	274.6684	253.1658	231.0202	208.3614	185.3323	162.0745	138.7142	115.3535	92.06839	68.91643	45.95996	23.34852	1.909108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	407.8231	392.2493	375.8527	358.6108	340.5025	321.522	301.6842	281.0289	259.6245	237.5683	214.9816	192.0009	168.7644	145.3988	122.009	98.67568	75.45956	52.41937	29.66834	7.658296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	413.355	397.7895	381.4182	364.2194	346.1715	327.2672	307.518	286.9589	265.6515	243.685	221.173	198.2452	175.0361	151.6716	128.2594	104.8838	81.60926	58.49298	35.62584	13.29717	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	418.7165	403.1589	386.8119	369.6543	351.6643	332.8332	313.1698	292.7043	271.4923	249.6158	227.1805	204.3096	181.1332	157.7762	134.3478	110.936	87.60845	64.42271	41.45567	18.91188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	424.1133	408.5632	392.2394	375.1214	357.187	338.4263	318.8457	298.4713	277.3532	255.5664	233.2093	210.3988	187.2601	163.9165	140.478	117.0357	93.66071	70.4115	47.35662	24.64971	3.038503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	429.5364	413.9936	397.6921	380.6119	362.7309	344.0381	324.5375	304.2518	283.2258	261.5282	239.2507	216.5034	193.407	170.0821	146.6395	123.1725	99.75521	76.4481	53.31472	30.47613	8.383324	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	434.9821	419.4462	403.1661	386.1222	368.2925	349.665	330.2418	310.0423	289.1067	267.4977	245.3005	222.619	199.5689	176.268	152.8267	129.3404	105.8862	82.52649	59.32219	36.37295	13.98307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	440.4478	424.9185	408.659	391.65	373.8696	355.3051	335.9568	315.8412	294.994	273.4728	251.3565	228.7429	205.7425	182.4703	159.0358	135.5356	112.0496	88.64225	65.37355	42.3287	19.72724	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	445.9318	430.4089	414.169	397.1937	379.4608	360.957	341.6812	321.647	300.8865	279.452	257.4168	234.8728	211.9255	188.6863	165.2635	141.7547	118.2418	94.79179	71.46445	48.33537	25.57113	3.874806	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	451.4326	435.9159	419.695	402.7519	385.0647	366.6196	347.4138	327.4588	306.783	285.4343	263.4802	241.0073	218.1158	194.9135	171.5072	147.9947	124.4599	100.972	77.59127	54.38699	31.49103	9.341656	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	456.949	441.4382	425.2356	408.3236	390.6805	372.292	353.1541	333.276	312.6831	291.4187	269.5457	247.1448	224.3116	201.1499	177.7645	154.2531	130.7012	107.18	83.75087	60.47886	37.47247	15.03373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	462.48	446.9749	430.7898	413.9079	396.3073	377.9734	358.9012	339.098	318.586	297.4048	275.6124	253.2844	230.5116	207.3937	184.0333	160.5277	136.9633	113.4134	89.94046	66.60713	43.50575	20.85776	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	468.0246	452.5251	436.3569	419.5039	401.9443	383.6633	364.6547	344.9242	324.4913	303.3919	281.6796	259.4252	236.7144	213.6434	190.3119	166.8163	143.244	119.6697	96.15753	72.76853	49.58393	26.77378	4.975208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	473.2548	457.7606	441.6088	424.7836	407.2637	389.0337	370.0868	350.427	330.0713	309.0523	287.4195	265.239	242.5919	219.5703	196.2712	172.7898	149.2139	125.6197	102.0725	78.63294	55.37445	32.43276	10.21906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	477.1243	461.6351	445.4991	428.7009	411.2192	393.0387	374.1516	354.5605	334.2802	313.3402	291.7861	269.6796	247.0974	224.1276	200.8642	177.4009	153.8256	130.2156	106.6376	83.15229	59.82758	36.77583	14.30214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	481.097	465.6127	449.492	432.7198	415.2751	397.1424	378.3133	358.789	338.5823	317.7198	296.2436	274.2112	251.6949	228.7789	205.5541	182.1127	158.542	134.9203	111.3157	87.78894	64.40458	41.25938	18.59742	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	485.1135	469.6341	453.5281	436.781	419.3722	401.2858	382.5129	363.0535	342.9187	322.1323	300.733	278.7745	256.325	233.4646	210.2813	186.8651	163.3028	139.6734	116.046	92.48215	69.04397	45.81806	23.00549	1.622418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	489.1615	473.6867	457.595	440.8723	423.4981	405.4565	386.7382	367.3421	347.2773	326.5656	305.2422	283.3573	260.9751	238.172	215.0325	191.6447	168.0946	144.4613	120.8151	97.21814	73.7314	50.43444	27.49633	5.585496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	493.2351	477.7648	461.6868	444.9876	427.647	409.649	390.9836	371.649	351.6527	331.014	309.7656	287.9539	265.6395	242.8949	219.8016	196.4452	172.9106	149.2771	125.6158	101.9898	78.45926	55.09889	32.05352	9.80538	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	497.3307	481.8646	465.8	449.1237	431.8156	413.8597	395.2458	375.971	356.0415	335.4745	314.2999	292.561	270.3146	247.6297	224.5844	201.2622	177.7465	154.1164	130.4438	106.7923	83.22245	59.80504	36.66638	14.17276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	501.4458	485.984	469.9323	453.2781	436.0015	418.0865	399.5226	380.306	360.4416	339.9449	318.843	297.1762	274.998	252.3738	229.3785	206.0929	182.5992	158.9759	135.2954	111.6223	88.01716	64.54818	41.32732	18.64307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	505.5787	490.1209	474.0818	457.449	440.203	422.3277	403.8124	384.6525	364.8517	344.4237	323.3934	301.7982	279.6881	257.1253	234.1815	210.935	187.4661	163.853	140.1681	116.4769	92.84031	69.32461	46.0306	23.19209	1.824527	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	509.7279	494.2741	478.2472	461.6352	444.4188	426.5821	408.1139	389.0092	369.2706	348.9099	327.95	306.4256	284.3836	261.8828	238.9919	215.7866	192.3453	168.7454	145.0595	121.3537	97.68931	74.13128	50.77172	27.80468	5.904433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	513.8924	498.4424	482.4272	465.8354	448.6478	430.8486	412.4263	393.3754	373.6973	353.4026	332.512	311.0576	289.0834	266.6452	243.8084	220.6461	197.235	173.6513	149.9676	126.2505	102.5619	78.96561	55.54699	32.47053	10.22607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	518.071	502.6247	486.621	470.0488	452.8891	435.1263	416.7487	397.7501	378.1312	357.9011	337.0785	315.6933	293.7867	271.4113	248.6298	225.5123	202.1337	178.5691	154.8907	131.1656	107.4561	83.82532	60.35333	37.18219	14.68617	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	522.2629	506.8203	490.8277	474.2745	457.142	439.4146	421.0804	402.1328	382.5717	362.4048	341.6491	320.3323	298.4929	276.1805	253.4551	230.3841	207.0402	183.4973	159.8272	136.0972	112.37	88.7084	65.18811	41.93399	19.24237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	526.4674	511.0283	495.0465	478.5118	461.4058	443.7127	425.4208	406.523	387.0183	366.9132	346.2233	324.974	303.2012	280.9521	258.2835	235.2603	211.9532	188.4346	164.7757	141.0438	117.3021	93.61302	70.049	46.72147	23.87162	2.439716	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	530.6838	515.2481	499.2769	482.7601	465.6797	448.0202	429.7695	410.9201	391.4705	371.426	350.8007	329.6179	307.9114	285.7254	263.1143	240.1403	216.8718	193.3798	169.7347	146.0039	122.2508	98.53753	74.93397	51.54102	28.55956	6.627429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	534.702	519.2696	503.3086	486.8093	469.7539	452.127	433.9163	415.1142	395.7184	375.7333	355.1713	334.0541	312.4133	290.2905	267.7373	244.8135	221.5854	198.1223	174.4937	150.7668	127.0051	103.2708	79.63164	56.18007	33.08688	10.82457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	538.6854	523.2562	507.3052	490.8229	473.7918	456.1966	438.0251	419.2691	399.9258	379.9987	359.499	338.4465	316.8707	294.8109	272.316	249.4436	226.2574	202.8252	179.2156	155.4952	131.7279	107.9756	84.30442	60.80019	37.61095	15.10699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	542.686	527.26	511.3186	494.8529	477.8455	460.2812	442.1477	423.4367	404.1448	384.2745	363.8359	342.8472	321.3358	299.3387	276.9025	254.0821	230.9393	207.54	183.9516	160.2405	136.4703	112.703	89.00317	65.45157	42.17891	19.48442	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	546.7003	531.2773	515.3454	498.8958	481.9114	464.3772	446.2809	427.6138	408.372	388.5574	368.1788	347.2528	325.8051	303.8705	281.4932	258.7256	235.6275	212.2629	188.698	164.9986	141.2282	117.4486	93.72349	70.1293	46.7833	23.93297	2.520975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	550.7266	535.3066	519.3839	502.95	485.9881	468.4832	450.4231	431.7988	412.6061	392.846	372.5262	351.6621	330.2774	308.4049	286.0865	263.3725	240.3201	216.9919	193.4526	169.7673	145.9993	122.2102	98.46291	74.83047	51.41941	28.43844	6.540111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	554.7641	539.347	523.4332	507.0146	490.0746	472.5983	454.5735	435.9911	416.8463	397.1395	376.8775	356.0743	334.7518	312.9411	290.6817	268.0216	245.0161	221.7258	198.2141	174.5452	150.782	126.9861	103.2196	79.55288	56.08375	32.99126	10.76239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	558.8118	543.3976	527.4925	511.0889	494.1702	476.7218	458.7314	440.1899	421.0919	401.4374	381.2321	360.4888	339.2278	317.4784	295.2779	272.6723	249.7146	226.4635	202.9812	179.3309	155.5751	131.7749	107.9921	84.2947	60.77352	37.58452	15.10766	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	562.8693	547.4578	531.5613	515.1722	498.2743	480.8531	462.8964	444.3947	425.3426	405.7393	385.5896	364.9052	343.705	322.0163	299.8747	277.3238	254.4148	231.2044	207.7532	184.1235	160.3772	136.5754	112.779	89.05434	65.48643	42.21298	19.54005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	566.936	551.5272	535.639	519.264	502.3865	484.9919	467.068	448.6053	429.598	410.0448	389.9497	369.3233	348.1831	326.5547	304.4717	281.9759	259.1162	235.9475	212.5291	188.922	165.1876	141.3864	117.5791	93.8304	70.22049	46.87253	24.03924	2.6441	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	571.0114	555.6053	539.7251	523.3641	506.5063	489.1376	471.2458	452.8212	433.8577	414.3536	394.3121	373.7428	352.6618	331.0931	309.0686	286.6279	263.8182	240.6924	217.3082	193.7256	170.0051	146.207	122.3913	98.62161	74.97397	51.55986	28.59223	6.712061	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	575.0952	559.6916	543.8194	527.4719	510.6335	493.2901	475.4296	457.0422	438.1217	418.6656	398.6767	378.1635	357.1409	335.6314	313.665	291.2797	268.5204	245.4386	222.09	198.5335	174.8291	151.0362	127.2147	103.4268	79.74533	56.27221	33.19001	10.97823	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	579.187	563.786	547.9214	531.5871	514.7676	497.4489	479.619	461.2681	442.3895	422.9806	403.0433	382.5852	361.6202	340.1693	318.2608	295.9308	273.2225	250.1854	226.8737	203.3452	179.6586	155.8732	132.0482	108.2449	84.5332	61.00727	37.82602	15.3645	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	583.2865	567.8879	552.0309	535.7094	518.9084	501.6139	483.8139	465.4985	446.661	427.2983	407.4117	387.0079	366.0997	344.7067	322.8557	300.5811	277.9241	254.9325	231.659	208.1598	184.4931	160.7172	136.891	113.0748	89.33631	65.76302	42.49523	19.83573	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	587.3933	571.9971	556.1475	539.8386	523.0556	505.7847	488.0139	469.7334	450.9361	431.6186	411.7817	391.4313	370.5791	349.2434	327.4497	305.2303	282.6249	259.6795	236.4452	212.9769	189.3317	165.5674	141.7422	117.9157	94.15351	70.53772	47.19369	24.37194	2.957694	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2883.5	591.4721	576.0782	560.2358	543.9393	527.1739	509.9261	492.1839	473.9374	455.1795	435.9064	416.1183	395.8203	375.0233	353.7443	332.0073	309.8431	287.2896	264.391	241.1969	217.7608	194.1389	170.3881	146.566	122.7316	98.94865	75.29474	51.8831	28.92526	7.040041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	595.2844	579.8928	564.0574	547.7729	531.0247	513.7994	496.0852	477.8721	459.1528	439.9231	420.1829	399.9365	379.1939	357.971	336.2902	314.181	291.6795	268.8283	245.6753	222.2728	198.6756	174.9402	151.1234	127.2834	103.4824	79.79439	56.32254	33.24866	11.04593	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	599.121	583.7317	567.9032	551.6305	534.8991	517.6959	500.0091	481.8286	463.1471	443.96	424.2668	404.0712	383.3822	362.2146	340.5897	318.5352	296.0859	273.2825	250.1714	226.8036	203.2328	179.5145	155.7049	131.8615	108.0452	84.32672	60.8011	37.62771	15.18492	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	602.9706	587.5834	571.7617	555.5004	538.7856	521.604	503.9439	485.7954	467.1508	448.0056	428.3585	408.2128	387.5766	366.4638	344.8942	322.8943	300.4971	277.7419	254.6736	231.3416	207.7985	184.0989	160.2985	136.4539	112.6248	88.87924	65.30562	42.04583	19.41034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	606.8303	591.4453	575.6301	559.3801	542.6814	525.5209	507.887	489.7698	471.1615	452.0572	432.4555	412.3588	391.7747	370.7159	349.2011	327.2555	304.9105	282.2038	259.1789	235.8837	212.3697	188.6905	164.901	141.0573	117.2179	93.44844	69.83196	46.49623	23.70122	2.402406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	610.6988	595.3159	579.5072	563.2682	546.5853	529.4455	511.8373	493.7507	475.1779	456.1138	436.5566	416.5082	395.9753	374.9698	353.5094	331.6177	309.3248	286.667	263.6861	240.4286	216.9449	193.2877	169.5109	145.6701	121.8227	98.03229	74.37751	50.97446	28.04459	6.258841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	614.5754	599.1945	583.3921	567.1639	550.4964	533.3769	515.7938	497.7372	479.1993	460.1746	440.661	420.6601	400.1777	379.2249	357.8182	335.9802	313.7394	291.1306	268.1942	244.9754	221.5232	197.8893	174.127	150.2909	126.4377	102.6293	78.94028	55.47721	32.43152	10.30977	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	618.4594	603.0805	587.2843	571.0667	554.4143	537.3145	519.7561	501.7289	483.2251	464.2392	444.7685	424.8142	404.3816	383.4808	362.1273	340.3425	318.1536	295.5941	272.7026	249.5232	226.1036	202.4944	178.7482	154.9188	131.062	107.2381	83.51864	60.00186	36.85551	14.4788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	622.3503	606.9734	591.1833	574.976	558.3384	541.2581	523.7237	505.7254	487.2551	468.3071	448.8785	428.9701	408.5865	387.737	366.4362	344.7043	322.5672	300.0569	277.2109	254.0717	230.6856	207.1025	183.3739	159.5529	135.6946	111.8578	88.11123	64.54628	41.31161	18.73152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	626.2479	610.8729	595.0887	578.8916	562.2685	545.2072	527.6965	509.7264	491.2889	472.3781	452.991	433.1277	412.7923	391.9935	370.7448	349.0653	326.9799	304.519	281.7187	258.6202	235.2688	211.7129	188.0034	164.1926	140.3347	116.4874	92.71683	69.10862	45.79589	23.04831	1.873116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	630.1517	614.7787	599.0003	582.8131	566.2042	549.1616	531.674	513.7316	495.3263	476.4521	457.1056	437.2867	416.9988	396.25	375.0528	353.4254	331.3913	308.9798	286.2256	263.1685	239.8525	216.3251	192.636	168.8371	144.9815	121.126	97.33438	73.68733	50.30521	27.41655	5.716508	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	634.0616	618.6904	602.9177	586.7402	570.1453	553.1209	535.6561	517.7409	499.3672	480.5288	461.2223	441.447	421.2059	400.5064	379.3602	357.7844	335.8014	313.4393	290.7314	267.7161	244.4364	220.9385	197.2714	173.4858	149.6345	125.7728	101.9629	78.28102	54.83695	31.82748	9.773121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	637.9773	622.6079	606.8408	590.6728	574.0916	557.0851	539.6425	521.754	503.4113	484.6082	465.3409	445.6084	425.4135	404.7626	383.6668	362.1422	340.2101	317.8972	295.2358	272.2629	249.0202	225.5529	201.909	178.1383	154.2929	130.4272	106.6016	82.88846	59.38889	36.27464	13.95382	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	641.8985	626.5309	610.7693	594.6107	578.0428	561.0539	543.6331	525.7707	507.4584	488.6899	469.4612	449.771	429.6214	409.0185	387.9725	366.4986	344.6171	322.3534	299.7387	276.8086	253.6036	230.1678	206.5482	182.794	158.9562	135.0885	111.2495	87.50855	63.95917	40.75314	18.2208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	645.8251	630.4593	614.703	598.5536	581.9988	565.0272	547.6278	529.791	511.5086	492.7741	473.5832	453.9345	433.8297	413.2741	392.2773	370.8537	349.0223	326.8078	304.2398	281.3529	258.1863	234.7829	211.1889	187.4524	163.6239	139.756	115.906	92.14029	68.54615	45.2591	22.55309	1.477509	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	649.7569	634.3928	618.6418	602.5013	585.9595	569.0047	551.6263	533.8147	515.5616	496.8604	477.7068	458.099	438.0382	417.5293	396.5811	375.2072	353.4258	331.2603	308.7391	285.8956	262.768	239.3979	215.8305	192.1132	168.2954	144.4292	120.5703	96.78277	73.14839	49.78938	26.93741	5.305489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	653.5722	638.2098	622.4639	606.3323	589.8031	572.8649	555.5072	537.7203	519.4959	500.8275	481.7105	462.1429	442.1254	421.6625	400.7625	379.4378	357.706	335.5892	313.1149	290.3152	267.227	243.891	220.3512	196.6543	172.8489	148.986	125.1204	101.3137	77.64316	54.21995	31.24321	9.24679	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	657.3905	642.0297	626.2889	610.166	593.6491	576.7272	559.3897	541.627	523.4309	504.7948	485.7138	466.1856	446.2109	425.7934	404.9408	383.6649	361.9823	339.9141	317.4866	294.7309	271.6827	248.3815	224.8704	201.195	177.4033	153.5455	129.6751	105.8518	82.14886	58.66818	35.5838	13.31625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	661.2166	645.8574	630.1216	614.0072	597.5025	580.5966	563.2789	545.54	527.3717	508.7672	489.7215	470.2323	450.2996	429.9269	409.1212	387.8936	366.2598	344.2399	321.8593	299.1478	276.1399	252.8742	229.3926	205.74	181.9635	158.1123	134.239	110.4015	86.66956	63.13739	39.95914	17.47631	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	665.0491	649.6915	633.9606	617.8545	601.3618	584.4715	567.1734	549.4579	531.3168	512.7433	493.7325	474.2815	454.3903	434.0618	413.3024	392.1226	370.5371	348.5654	326.2315	303.5643	280.5972	257.3676	233.9165	210.2877	186.5276	162.6846	138.8102	114.9608	91.20305	67.62469	44.36372	21.70393	0.802125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	668.8874	653.5313	637.8052	621.7073	605.2264	588.3515	571.0725	553.3799	535.2656	516.7227	497.7461	478.3328	458.4824	438.1974	417.4837	396.3512	374.8138	352.8899	330.6027	307.9799	285.0539	261.8609	238.4411	214.8372	191.0947	167.2614	143.3877	119.5286	95.74793	72.12809	48.79368	25.98496	4.471262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	672.7309	657.3764	641.6551	625.5652	609.0958	592.236	574.9758	557.3058	539.2178	520.7049	501.762	482.3857	462.5755	442.3334	421.6649	400.5792	379.0894	357.2131	334.9724	312.3942	289.5095	266.3538	242.9659	219.3879	195.6643	171.8421	147.9707	124.1039	100.3031	76.64602	53.24605	30.30983	8.405189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	676.5795	661.2265	645.5098	629.4278	612.9697	596.1248	578.883	561.2352	543.1731	524.6897	505.7798	486.4401	466.6694	446.4697	425.8458	404.8063	383.3637	361.5347	339.3405	316.8068	293.9638	270.8457	247.4905	223.9393	200.2357	176.4259	152.5586	128.686	104.8677	81.17716	57.71841	34.67161	12.4782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	680.4328	665.0813	649.3691	633.295	616.848	600.0176	582.794	565.168	547.1312	528.6769	509.7996	490.4957	470.7641	450.6061	430.0263	409.0325	387.6367	365.8546	343.7067	321.2176	298.4164	275.3365	252.0146	228.491	204.8086	181.0126	157.1507	133.2743	109.4409	85.72035	62.20879	39.06507	16.64449	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	684.2907	668.9407	653.233	637.1664	620.7303	603.9143	586.7086	569.1039	551.0922	532.6664	513.8211	494.5525	474.8593	454.7425	434.2062	413.2577	391.9081	370.1728	348.0709	325.6264	302.8673	279.8258	256.5379	233.0428	209.3825	185.6015	161.7466	137.8682	114.0219	90.27458	66.71546	43.48615	20.87998	0.17533	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	688.153	672.8044	657.1011	641.0421	624.6167	607.8148	590.6265	573.0429	555.0557	536.658	517.8442	498.6104	478.9551	458.8789	438.3855	417.4817	396.1781	374.489	352.433	330.0331	307.3161	284.3135	261.0601	237.5943	213.9572	190.1924	166.3459	142.4671	118.6101	94.83895	71.23696	47.93157	25.16988	3.766825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	692.0196	676.6724	660.9734	644.9217	628.5069	611.7188	594.5477	576.9848	559.0218	540.6516	521.8688	502.6693	483.0513	463.0151	442.5641	421.7045	400.4464	378.8033	356.793	334.4375	311.7629	288.7994	265.5811	242.1453	218.5322	194.7847	170.9481	147.0706	123.2049	99.41262	75.772	52.39864	29.50421	7.681692	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	695.8902	680.5444	664.8496	648.8052	632.4007	615.6262	598.4722	580.9295	562.9902	544.6473	525.895	506.7292	487.1479	467.1512	446.742	425.9262	404.7131	383.1156	361.1508	338.8396	316.2074	293.2834	270.1006	246.6954	223.1074	199.3783	175.5528	151.6781	127.8058	103.9949	80.31943	56.88512	33.87579	11.74862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3905.5	699.7648	684.4203	668.7297	652.6924	636.2982	619.5371	602.3996	584.877	566.961	548.6448	529.9225	510.79	491.2448	471.2871	450.9192	430.1466	408.9781	387.4259	365.5062	343.2394	320.6496	297.7653	274.6184	251.2446	227.6823	203.9728	180.1597	156.2893	132.4121	108.585	84.87824	61.3891	38.27925	15.91443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	703.6432	688.3001	672.6136	656.5833	640.1991	623.4511	606.3301	588.8271	570.9341	552.6442	533.9514	514.8516	495.3421	475.4228	455.0957	434.3658	413.2414	391.7341	369.8594	347.6367	325.0894	302.2449	279.1344	255.7925	232.2569	208.5679	184.7683	160.9308	137.0233	113.1823	89.44749	65.90894	42.71039	20.15245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	707.5254	692.1836	676.5012	660.4778	644.1034	627.3684	610.2634	592.7797	574.9094	556.6453	537.9816	518.914	499.4397	479.5582	459.2714	438.5837	417.503	396.0402	374.2102	352.0315	329.5267	306.7223	283.6485	260.3391	236.8309	213.1633	189.3785	165.5211	141.6391	117.7863	94.02636	70.44322	47.16587	24.44665	3.146354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	711.3533	696.0128	680.3343	664.3177	647.953	631.2307	614.1415	596.6769	578.8288	560.5901	541.9551	522.9192	503.4795	483.6354	463.3883	442.7424	421.7049	400.2863	378.5006	356.3657	333.9034	311.1392	288.1025	264.8261	241.346	217.7008	193.9318	170.0829	146.201	122.3384	98.55608	74.93268	51.58496	28.72841	6.982417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	714.5925	699.2533	683.5787	667.5687	651.2136	634.5038	617.4302	599.9843	582.1581	563.9445	545.3376	526.3329	506.9275	487.1202	466.9123	446.3076	425.3129	403.938	382.1965	360.1053	337.6854	314.9615	291.9622	268.7192	245.2678	221.6459	197.8938	174.0546	150.1744	126.3039	102.5018	78.84204	55.43121	32.45657	10.41089	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	711.723	696.385	680.7143	664.7109	648.3651	631.6677	614.6094	597.1819	579.3772	561.1883	542.6092	523.6353	504.2635	484.4925	464.3233	443.7594	422.807	401.4756	379.7778	357.73	335.3525	312.6691	289.7074	266.4984	243.0763	219.4784	195.7442	171.9161	148.039	124.1624	100.3428	76.65032	53.18295	30.10892	7.997834	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	708.4111	693.0744	677.4074	661.4105	645.074	628.3886	611.3455	593.936	576.1525	557.9879	539.4361	520.4926	501.1539	481.4188	461.2878	440.7642	419.8537	398.5652	376.9109	354.9064	332.5712	309.9283	287.0044	263.8297	240.4377	216.8646	193.1493	169.3332	145.4606	121.5797	97.74498	74.02314	50.507	27.38474	5.627639	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	705.3028	689.9673	674.3041	658.3135	641.9861	625.3126	608.2843	590.8927	573.1301	554.9894	536.4645	517.5508	498.2449	478.5451	458.4519	437.968	417.099	395.8531	374.2419	352.2805	329.9875	307.3851	284.4992	261.3593	237.9978	214.4502	190.7547	166.9519	143.0852	119.2015	95.35393	71.60703	48.05894	24.9689	3.705116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	702.3176	686.9833	671.3238	655.3394	639.0209	622.3592	605.3455	587.9715	570.2294	552.1122	533.6139	514.7296	495.4559	475.7909	455.735	435.2905	414.4624	393.2587	371.6904	349.7718	327.5208	304.959	282.1114	259.0065	235.676	212.1547	188.4799	164.6915	140.8319	116.9472	93.08937	69.32463	45.76955	22.77615	2.067936	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	699.4219	684.0888	668.4328	652.4546	636.145	619.4948	602.4955	585.1388	567.4169	549.3228	530.8506	511.9954	492.7534	473.1229	453.1037	432.698	411.9106	390.7487	369.2228	347.3468	325.1378	302.6165	279.8072	256.7377	233.4388	209.9444	186.2911	162.518	138.6669	114.7831	90.91894	67.14658	43.61084	20.76001	0.653811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	696.5973	681.2653	665.6129	649.6408	633.3398	616.701	599.7159	582.3761	564.6741	546.603	528.1565	509.3298	490.1192	470.5226	450.5397	430.1724	409.4251	388.3046	366.8209	344.9872	322.82	300.3392	277.5684	254.5345	231.2676	207.8008	184.1699	160.4132	136.5719	112.6914	88.82609	65.05813	41.56602	18.89083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	693.8323	678.5014	662.8526	646.8864	630.5939	613.9663	596.9951	579.6721	561.9898	543.9411	525.52	506.7214	487.5417	467.9785	448.0315	427.7022	406.9945	385.915	364.4732	342.6815	320.5559	298.1157	275.3835	252.3855	229.151	205.7123	182.1045	158.3653	134.5357	110.6615	86.80127	63.05033	39.62322	17.14809	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	691.1189	675.7892	660.1438	644.1835	627.8994	611.2829	594.3254	577.0189	559.3558	541.3293	522.9332	504.1624	485.0131	465.483	445.5713	425.2795	404.611	383.5722	362.1718	340.4219	318.3378	295.938	273.2445	250.2826	227.0809	203.6709	180.0871	156.3667	132.5507	108.6866	84.83842	61.11701	37.77333	15.51681	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	688.4515	673.1229	657.4809	641.5263	625.2506	608.6449	591.7009	574.4107	556.7666	538.7619	520.3904	501.647	482.5278	463.0302	443.1535	422.8986	402.269	381.2704	359.9111	338.2028	316.1599	293.8005	271.1457	248.2202	225.0517	201.671	178.1121	154.4119	130.6118	106.762	82.93342	59.25351	36.00908	13.98547	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	685.8256	670.4981	654.8594	638.9106	622.643	606.048	589.1173	571.8431	554.2178	536.2346	517.8873	499.1709	480.0813	460.6159	440.7736	420.5554	399.9641	379.0053	357.6868	336.0197	314.018	291.6988	269.0828	246.1938	223.0589	199.7082	176.1752	152.4968	128.7155	104.8846	81.08325	57.45609	34.32444	12.54493	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	683.2378	667.9114	652.276	636.3328	620.0732	603.4887	586.5712	569.3128	551.7059	533.7439	515.4205	496.7307	477.6703	458.2366	438.4284	418.2463	397.693	376.7736	355.4956	333.8694	311.9085	289.6296	267.0524	244.2001	221.0991	197.7792	174.2732	150.6185	126.8591	103.0522	79.28561	55.72161	32.71428	11.18767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	680.6853	665.3599	649.7277	633.7901	617.5384	600.9643	584.0598	566.8168	549.2282	531.287	512.9872	494.3236	475.292	455.8896	436.115	415.9687	395.4529	374.5725	353.3346	331.7491	309.8289	287.59	265.0516	242.2363	219.1698	195.8813	172.4038	148.7749	125.0407	101.2629	77.53862	54.04736	31.17417	9.907384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4526	678.1657	662.8413	647.2124	631.2802	615.0363	598.4725	581.5806	564.353	546.7823	528.8617	510.5852	491.9474	472.9442	453.5727	433.8313	413.7202	393.2416	372.3998	351.2016	329.6565	307.7767	285.5779	263.0784	240.3003	217.2688	194.0127	170.565	146.9643	123.2589	99.51551	75.8407	52.43091	29.7002	8.698632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	675.6771	660.3537	644.728	628.8011	612.5649	596.0112	579.1319	561.9193	544.3663	526.466	508.2123	489.6001	470.6249	451.2839	431.5752	411.499	391.0571	370.2536	349.0947	327.5897	305.7503	283.5913	261.1308	238.3902	215.3943	192.1716	168.7554	145.1854	121.5126	97.80889	74.1905	50.87006	28.28884	7.55668	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	673.2177	657.8954	642.2727	626.3512	610.1225	593.5787	576.7118	559.5141	541.9785	524.0982	505.8671	487.28	468.3325	449.0215	429.3452	409.3035	388.8979	368.1322	347.0124	325.5472	303.7478	281.6287	259.2074	236.5046	213.5449	190.3568	166.9739	143.4373	119.8009	96.14217	72.58676	49.3628	26.93691	6.477338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	670.786	655.4647	639.8451	623.9288	607.7076	591.1736	574.3189	557.1359	539.6174	521.7568	503.548	484.9857	466.0654	446.7841	427.1398	407.1321	386.7624	366.0342	344.9532	323.5275	301.7681	279.6888	257.3067	234.6423	211.7196	188.5673	165.2196	141.7193	118.1232	94.5146	71.02836	47.90722	25.64145	5.456873	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	668.3808	653.0605	637.4439	621.5327	605.3189	588.7946	571.9518	554.7833	537.2817	519.4406	501.2537	482.7158	463.8226	444.5705	424.9578	404.9837	384.6496	363.9585	342.9159	321.5295	299.8099	277.7704	255.4278	232.8021	209.9174	186.8022	163.4919	140.0307	116.479	92.92551	69.5142	46.50154	24.39976	4.491942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	666.0008	650.6815	635.0679	619.1618	602.9552	586.4404	569.6095	552.4552	534.9703	517.1483	498.9831	480.4694	461.6026	442.3796	422.798	402.8572	382.5582	361.9039	340.8994	319.5521	297.8722	275.8727	253.5698	230.9834	208.1375	185.0611	161.7902	138.3712	114.8678	91.37429	68.04326	45.14406	23.20928	3.579553	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	663.645	648.3266	632.7159	616.8148	600.6155	584.11	567.2908	550.1505	532.6821	514.879	496.7351	478.2452	459.4047	440.2102	420.6594	400.7515	380.4873	359.8695	338.9028	317.5945	295.9542	273.9947	251.7319	229.1855	206.3796	183.3435	160.1143	136.7406	113.2893	89.86036	66.61455	43.83313	22.06763	2.71705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	661.3123	645.9949	630.3871	614.491	598.2986	581.8024	564.9947	547.8683	530.4161	512.6317	494.5089	476.0424	457.2278	438.0615	418.5412	398.6659	378.4361	357.8545	336.9254	315.6558	294.0551	272.1358	249.9135	227.4079	204.643	181.6489	158.4639	135.1384	111.7431	88.38315	65.22707	42.56718	20.97255	1.90212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	659.002	643.6854	628.0805	612.1892	596.0039	579.5168	562.7205	545.6077	528.1715	510.4054	492.3035	473.8602	455.0712	435.9327	416.4425	396.5994	376.4038	355.858	334.9664	313.7354	292.1744	270.2955	248.1142	225.6501	202.9276	179.9773	156.8387	133.5646	110.2289	86.94212	63.87987	41.34469	19.92191	1.132837	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	656.713	641.3974	625.7953	609.9088	593.7303	577.2522	560.4671	543.3678	525.9475	508.1995	490.1181	471.6977	452.9339	433.8231	414.3626	394.5514	374.3897	353.8796	333.0251	311.8328	290.3115	268.4733	246.3336	223.9119	201.233	178.3284	155.2387	132.0189	108.7465	85.5367	62.57199	40.16417	18.91366	0.407777	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	654.4447	639.1301	623.5307	607.649	591.4773	575.008	558.234	541.148	523.7432	506.0132	487.952	469.5543	450.8155	431.7319	412.3009	392.5213	372.3932	351.9185	331.1012	309.9474	288.466	266.6689	244.5713	222.1931	199.5593	176.702	153.6637	130.5012	107.2955	84.16634	61.30248	39.02421	17.94588	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	652.1964	636.8826	621.2861	605.409	589.2439	572.7835	556.0204	538.9475	521.5581	503.8458	485.8046	467.4292	448.7151	429.6585	410.2567	390.5084	370.4137	349.9743	329.1941	308.0789	286.6376	264.8819	242.8272	220.4935	197.9061	175.0983	152.1137	129.0115	105.8757	82.83048	60.07039	37.92338	17.01673	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	649.9674	634.6545	619.0606	603.1882	587.0297	570.5779	553.8256	536.7656	519.3915	501.6966	483.6752	465.322	446.6323	427.6023	408.2295	388.5124	368.4508	348.0466	327.3034	306.227	284.826	263.1123	241.1012	218.813	196.2737	173.5172	150.5886	127.5495	104.4867	81.52854	58.87478	36.86035	16.12444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	647.757	632.4449	616.8538	600.9859	584.8339	568.3907	551.649	534.6019	517.2427	499.5652	481.5633	463.232	444.5664	425.563	406.2189	386.5327	366.5042	346.135	325.4288	304.3913	283.031	261.3598	239.3932	217.1516	194.6618	171.9586	149.0885	126.1151	103.1283	80.25993	57.71472	35.83378	15.26733	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	645.5646	630.2535	614.6649	598.8015	582.656	566.2212	549.4901	532.4556	515.1113	497.4509	479.4684	461.1587	442.5171	423.54	404.2244	384.5689	364.5734	344.2393	323.5701	302.5717	281.2525	259.6243	237.7031	215.5094	193.0707	170.4226	147.6133	124.7083	101.8	79.02405	56.58928	34.84238	14.4438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	643.3898	628.0795	612.4935	596.6346	580.4955	564.069	547.3483	530.3264	512.9968	495.3532	477.39	459.1017	440.4839	421.5328	402.2457	382.6208	362.6581	342.3591	321.7271	300.768	279.4903	257.906	236.0309	213.8864	191.5002	168.9093	146.163	123.3287	100.5016	77.82029	55.49753	33.88491	13.65232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	641.2319	625.9224	610.3391	594.4846	578.3518	561.9336	545.2231	528.2136	510.8986	493.2718	475.3276	457.0606	438.4665	419.5413	400.2823	380.688	360.7582	340.4943	319.8997	298.9802	277.7445	256.2046	234.3768	212.2826	189.9507	167.4187	144.7375	121.9764	99.23268	76.64802	54.43854	32.96014	12.89141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5146.5	639.0905	623.7819	608.2011	592.351	576.2244	559.8144	543.1142	526.117	508.8163	491.2062	473.2808	455.035	436.4643	417.565	398.3342	378.7704	358.8734	338.6447	318.0876	297.2082	276.015	254.5203	232.7407	210.6982	188.422	165.9508	143.3368	120.651	97.99286	75.50662	53.41142	32.0669	12.15969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	636.9652	621.6574	606.0792	590.2334	574.113	557.7111	541.021	524.0359	506.7496	489.156	471.2494	453.0246	434.4773	415.6036	396.4009	376.8676	357.0035	336.8102	316.291	295.452	274.3019	252.8532	231.1228	209.1332	186.9143	164.5057	141.9609	119.3524	96.78173	74.39544	52.41526	31.20403	11.45581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	634.8555	619.5485	603.9728	588.1313	572.017	555.6232	538.9431	521.9702	504.6981	487.1209	469.2329	451.0291	432.505	413.657	394.4824	374.9796	355.1486	334.9908	314.5098	293.7116	272.6053	251.2034	229.5232	207.5878	185.4276	163.0834	140.6095	118.0803	95.59887	73.31384	51.44917	30.37042	10.77849	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	632.761	617.4548	601.8816	586.0444	569.9362	553.5504	536.8803	519.9194	502.6615	485.1006	467.2312	449.0482	430.5474	411.725	392.5785	373.1063	353.3084	333.1864	312.7439	291.9871	270.9251	249.5709	227.9421	206.0621	183.9622	161.6839	139.2828	116.8345	94.44385	72.26116	50.51227	29.56498	10.12653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	630.6813	615.376	599.8053	583.9723	567.8702	551.4923	534.8322	517.8832	500.6394	483.0948	465.2439	447.0818	428.6041	409.8074	390.689	371.2475	351.483	331.397	310.9934	290.2785	269.2616	247.9559	226.3795	204.5561	182.5179	160.3071	137.9805	115.6147	93.31623	71.23675	49.6037	28.78668	9.498751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	628.6162	613.3117	597.7435	581.9147	565.8186	549.4487	532.7984	515.8614	498.6316	481.1032	463.2708	445.1295	426.6751	407.9041	388.8139	369.4033	349.6723	329.6227	309.2584	288.5859	267.6149	246.3586	224.8355	203.0701	181.095	158.9532	136.7025	114.4207	92.21553	70.23996	48.72261	28.03449	8.894057	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	626.5653	611.2616	595.6959	579.8713	563.7813	547.4192	530.7788	513.8537	496.638	479.1258	461.3118	443.1914	424.7602	406.0149	386.9531	367.5735	347.8763	327.8635	307.539	286.9096	265.985	244.779	223.3104	201.6041	179.6933	157.622	135.4486	113.2522	91.14129	69.27011	47.86816	27.30745	8.311389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	624.5284	609.2255	593.6622	577.8418	561.7578	545.4037	528.7731	511.8599	494.6582	477.1622	459.3668	441.2672	422.8594	404.1399	385.1066	365.7583	346.0952	326.1195	305.8353	285.2495	264.3722	243.2174	221.8042	200.1582	178.3131	156.3135	134.2187	112.1087	90.09303	68.32657	47.03953	26.6046	7.749745	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	622.5052	607.2031	591.6423	575.8261	559.7481	543.4018	526.7811	509.8798	492.6921	475.2124	457.4355	439.3569	420.9725	402.2791	383.2744	363.9576	344.329	324.3908	304.1474	283.6059	262.7765	241.6738	220.3171	198.7325	176.9542	155.0275	133.0126	110.9901	89.07025	67.40867	46.23593	25.92503	7.208167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	620.4954	605.1941	589.6358	573.8238	557.7518	541.4135	524.8027	507.9133	490.7397	473.2762	455.518	437.4604	419.0995	400.4323	381.4566	362.1715	342.5777	322.6775	302.4754	281.9788	261.1982	240.1484	218.8491	197.327	175.6167	153.7641	131.8301	109.8959	88.07246	66.51577	45.45656	25.26786	6.685746	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	618.4989	603.1985	587.6426	571.8349	555.7689	539.4385	522.8376	505.9602	488.8007	471.3536	453.6141	435.5776	417.2405	398.5996	379.6531	360.4001	340.8415	320.9797	300.8195	280.3684	259.6373	238.6413	217.4005	195.9418	174.3005	152.5231	130.6709	108.8258	87.09914	65.64722	44.70066	24.63224	6.181616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5548	616.5156	601.216	585.6626	569.8591	553.7992	537.4768	520.8858	504.0205	486.8751	469.4445	451.7238	433.7087	415.3954	396.7811	377.8641	358.6435	339.1204	319.2975	299.1798	278.7749	258.0941	237.1526	215.9711	194.5769	173.0056	151.3044	129.5348	107.7794	86.14981	64.80239	43.96748	24.01736	5.694955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	614.5453	599.2465	583.6956	567.8964	551.8426	535.5282	518.9472	502.094	484.9629	467.5489	449.8472	431.8535	413.5643	394.9769	376.0895	356.9018	337.4147	317.6312	297.5564	277.1985	256.5686	235.6826	214.5613	193.2323	171.732	150.1077	128.4216	106.7563	85.22394	63.98064	43.2563	23.42242	5.22498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	612.5879	597.2899	581.7416	565.9466	549.899	533.5926	517.0217	500.1807	483.064	465.6667	447.9841	430.0121	411.7472	393.1869	374.3296	355.175	335.7244	315.9808	295.9496	275.6391	255.061	234.2311	213.1708	191.9081	170.4796	148.933	127.3309	105.7562	84.32102	63.18136	42.5664	22.84667	4.77095	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	610.6434	595.3462	579.8004	564.0098	547.9683	531.6701	515.1094	498.2806	481.1785	463.798	446.1347	428.1845	409.9442	391.4113	372.5844	353.4634	334.0496	314.3464	294.3594	274.0971	253.5713	232.7984	211.8	190.6043	169.2483	147.78	126.2625	104.7786	83.44055	62.40393	41.8971	22.28938	4.33216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	608.7116	593.4153	577.872	562.0857	546.0505	529.7605	513.2101	496.3937	479.3062	461.9428	444.2989	426.3709	408.1554	389.6502	370.8541	351.767	332.3905	312.7283	292.786	272.5725	252.0998	231.3846	210.4486	189.3207	168.0379	146.6486	125.216	103.8232	82.58202	61.64775	41.24772	21.74985	3.90794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	606.7926	591.4971	575.9564	560.1746	544.1457	527.8639	511.3239	494.52	477.4474	460.1011	442.477	424.5712	406.3809	387.9037	369.1387	350.086	330.7473	311.1265	291.2295	271.0654	250.6465	229.9896	209.1169	188.0573	166.8483	145.5386	124.1912	102.8895	81.74492	60.91223	40.61761	21.22741	3.497656	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	604.8863	589.5917	574.0537	558.2763	542.2537	525.9804	509.4508	492.6596	475.6019	458.2731	440.6689	422.7857	404.6207	386.172	367.4384	348.4205	329.1201	309.5412	289.6901	269.5759	249.2114	228.6135	207.8047	186.8141	165.6795	144.4496	123.1878	101.977	80.92875	60.1968	40.00615	20.7214	3.100707	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	602.9928	587.6991	572.1637	556.3908	540.3747	524.1099	507.5909	490.8125	473.77	456.4587	438.8747	421.0144	402.8751	384.455	365.7534	346.7706	327.509	307.9726	288.1679	268.1042	247.7946	227.2563	206.512	185.5909	164.5312	143.3815	122.2053	101.0855	80.13301	59.50087	39.41272	20.23122	2.716523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	601.1122	585.8193	570.2866	554.5183	538.5087	522.2525	505.7442	488.9788	471.9516	454.6582	437.0945	419.2574	401.1441	382.7531	364.0837	345.1366	325.9141	306.4207	286.6629	266.6504	246.3963	225.9181	205.2388	184.3878	163.4032	142.3341	121.2436	100.2145	79.3572	58.82391	38.83672	19.75627	2.344565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	599.2444	583.9524	568.4225	552.6588	536.6558	520.4083	503.9109	487.1586	470.147	452.8715	435.3285	417.5148	399.4279	381.0663	362.4295	343.5184	324.3356	304.8856	285.1753	265.2144	245.0164	224.5989	203.985	183.2045	162.2955	141.307	120.3022	99.36351	78.60084	58.16535	38.27758	19.29597	1.984322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

S O L I D S   C O N T E N T   (%)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	61.25319	46.06851	34.81518	29.43704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	63.84846	55.54437	45.34537	38.56704	34.36086	31.43891	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	65.27406	59.68427	51.8227	44.84031	40.05051	36.69774	34.12437	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	66.24353	62.04566	55.99396	49.56002	44.49385	40.8195	38.05534	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	66.97139	63.6122	58.81152	53.17992	48.13496	44.24481	41.27897	38.92228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	67.55044	64.75041	60.82063	55.97417	51.16995	47.1816	44.05787	41.57914	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	68.02906	65.62814	62.32444	58.1543	53.70975	49.73867	46.50715	43.91249	41.48918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	68.43555	66.3338	63.49582	59.88225	55.83685	51.97881	48.69493	46.00763	43.77613	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	68.78787	66.91872	64.438	61.27658	57.62201	53.94387	50.66335	47.9103	45.62052	40.37788	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	69.0981	67.415	65.21566	62.42209	59.12693	55.66696	52.43997	49.65084	47.30205	45.08241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	69.37472	67.84388	65.87114	63.37911	60.40392	57.17747	54.04457	51.24985	48.8559	46.77973	41.37703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	69.62396	68.22003	66.43327	64.19088	61.49595	58.50258	55.49306	52.72184	50.29963	48.2095	46.04169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	69.85045	68.55394	66.92233	64.88882	62.43766	59.66726	56.79959	54.07762	51.64514	49.52722	47.61315	40.4203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	70.05777	68.85339	67.35299	65.49609	63.25661	60.69399	57.97745	55.3259	52.90109	50.7613	48.87077	46.47827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	70.24875	69.12425	67.73618	66.03005	63.97466	61.60253	59.0394	56.47433	54.07407	51.92249	50.02032	48.14543	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	70.42561	69.37106	68.08015	66.50395	64.60915	62.40994	59.99753	57.53006	55.16939	53.0172	51.09993	49.33436	45.64819	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

620.5	70.59019	69.59739	68.39132	66.928	65.17387	63.13079	60.86316	58.49997	56.1916	54.05001	52.1218	50.37783	48.27418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	70.74398	69.8061	68.67471	67.31023	65.6799	63.7774	61.64669	59.39083	57.14486	55.02451	53.09189	51.34699	49.5894	42.48341	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	70.88822	69.99952	68.93434	67.65702	66.13615	64.36014	62.35754	60.20917	58.03318	55.94368	54.01395	52.26355	50.60829	47.96706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	71.02396	70.17954	69.17345	67.97347	66.54986	64.88773	63.00412	60.96132	58.86046	56.81018	54.89073	53.13626	51.51321	49.62657	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	71.15209	70.34776	69.39472	68.26377	66.92698	65.3675	63.59389	61.65324	59.63058	57.62648	55.72441	53.9696	52.35568	50.70414	45.78284	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	71.27335	70.50549	69.60032	68.53133	67.27238	65.80563	64.13341	62.29052	60.34738	58.39496	56.51685	54.76633	53.15428	51.59301	49.06801	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	71.3884	70.65386	69.79211	68.77899	67.59013	66.20734	64.6284	62.87833	61.01461	59.118	57.26969	55.5284	53.9171	52.39351	50.51886	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	71.4978	70.79383	69.97162	69.00912	67.88364	66.57704	65.08389	63.42142	61.63592	59.79796	57.98451	56.25732	54.64831	53.14121	51.51856	46.79748	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	71.60206	70.92621	70.14016	69.22372	68.15576	66.91849	65.50424	63.92409	62.2148	60.4372	58.66281	56.95435	55.35035	53.85116	52.34132	49.77707	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	71.70159	71.05173	70.29887	69.42449	68.40892	67.23492	65.89325	64.39023	62.75459	61.0381	59.3061	57.62062	56.02483	54.53062	53.0757	51.17851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	71.79678	71.171	70.44871	69.61288	68.6452	67.52908	66.25425	64.82334	63.25838	61.60296	59.91589	58.25718	56.67296	55.18351	53.75717	52.14252	47.81782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	71.88798	71.28455	70.59051	69.79013	68.86637	67.80333	66.59013	65.22657	63.72911	62.13406	60.4937	58.86504	57.2957	55.81215	54.40195	52.92461	50.39649	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	71.97547	71.39288	70.72501	69.95733	69.07396	68.05973	66.90345	65.60272	64.16948	62.6336	61.04108	59.44519	57.89387	56.41809	55.01825	53.61335	51.69161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	72.05953	71.49639	70.85284	70.11542	69.2693	68.30006	67.19641	65.95431	64.58196	63.1037	61.55954	59.99864	58.46823	57.00238	55.61057	54.24605	52.60849	46.02152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	72.1404	71.59547	70.97457	70.26521	69.45355	68.52589	67.47098	66.28357	64.96886	63.54637	62.05062	60.52641	59.01949	57.56587	56.18158	54.84106	53.35729	49.96047	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	72.21829	71.69044	71.09069	70.40744	69.62771	68.73856	67.72888	66.59252	65.33226	63.96352	62.5158	61.02953	59.54834	58.10923	56.73299	55.40807	54.01409	51.65373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	72.29341	71.78161	71.20165	70.54272	69.79269	68.93927	67.97162	66.88295	65.67408	64.35695	62.95656	61.50904	60.05547	58.63304	57.26594	55.95244	54.61389	52.73567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	72.36593	71.86924	71.30784	70.67164	69.94927	69.12908	68.20055	67.15646	65.99605	64.72834	63.37431	61.96597	60.5416	59.13786	57.78131	56.47734	55.17478	53.55661	48.27489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	72.436	71.95358	71.40961	70.79469	70.09813	69.30893	68.41686	67.41447	66.29975	65.07926	63.77041	62.40138	61.00742	59.62419	58.27973	56.98472	55.70686	54.24158	51.10767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	72.50379	72.03483	71.50728	70.91232	70.23991	69.47964	68.62163	67.65829	66.58664	65.41117	64.14619	62.81628	61.45366	60.09254	58.76174	57.47589	56.21609	54.84628	52.56225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	72.56942	72.11321	71.60114	71.02493	70.37516	69.64194	68.81579	67.88906	66.85801	65.72542	64.50288	63.21169	61.88105	60.54342	59.22781	57.95177	56.70618	55.39896	53.5473	44.02628	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	72.63302	72.18889	71.69143	71.13288	70.50436	69.7965	69.0002	68.10782	67.11505	66.02326	64.84167	63.5886	62.29033	60.97733	59.67835	58.41304	57.17952	55.9152	54.31177	50.02699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	72.6947	72.26203	71.7784	71.23651	70.62797	69.94392	69.17561	68.3155	67.35885	66.30584	65.16368	63.94798	62.68223	61.39479	60.11377	58.86021	57.63772	56.40415	54.95435	52.11124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	72.75456	72.33279	71.86226	71.33609	70.74638	70.08472	69.34272	68.51296	67.5904	66.57424	65.46997	64.29076	63.05748	61.79632	60.53443	59.29372	58.08193	56.87148	55.52176	53.33379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	72.81271	72.4013	71.9432	71.4319	70.85995	70.21937	69.50213	68.70096	67.81058	66.82944	65.76151	64.61784	63.4168	62.18246	60.94073	59.71394	58.51294	57.32081	56.03887	54.21778	46.55612	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	72.86922	72.4677	72.02139	71.52419	70.96902	70.34833	69.65441	68.88018	68.02022	67.07234	66.03924	64.93007	63.76093	62.55373	61.33305	60.12122	58.93139	57.75453	56.52048	54.92598	50.81787	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	72.92419	72.53208	72.097	71.61317	71.07389	70.47197	69.80005	69.05125	68.22006	67.30377	66.30402	65.22827	64.09054	62.91067	61.71177	60.51586	59.33775	58.17432	56.97556	55.52983	52.67719	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	72.97769	72.59457	72.17019	71.69904	71.17481	70.59065	69.93953	69.21474	68.41077	67.52451	66.55666	65.51323	64.40633	63.25383	62.07727	60.89816	59.73241	58.58138	57.40971	56.06617	53.84605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	73.02978	72.65527	72.24107	71.782	71.27204	70.7047	70.07324	69.37117	68.59299	67.73525	66.79791	65.78569	64.70896	63.58372	62.42996	61.26842	60.11572	58.97659	57.8266	56.55588	54.70502	47.77453	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	73.08054	72.71426	72.30978	71.8622	71.36581	70.81441	70.20157	69.52101	68.76727	67.93666	67.02848	66.04634	64.99907	63.90089	62.77023	61.62694	60.48797	59.36062	58.22871	57.0116	55.39536	51.41677	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	73.13003	72.77163	72.37644	71.93982	71.45632	70.92006	70.32488	69.6647	68.93414	68.12932	67.24902	66.29585	65.27727	64.20585	63.09849	61.97402	60.84943	59.73397	58.61777	57.44135	55.98295	53.15412	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	73.17831	72.82745	72.44115	72.01498	71.54376	71.02189	70.44347	69.80263	69.09407	68.3138	67.46014	66.53485	65.54415	64.49912	63.41512	62.30994	61.20037	60.09704	58.99501	57.85046	56.50283	54.27818	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	73.22542	72.88181	72.50402	72.08782	71.62831	71.12013	70.55763	69.93516	69.24751	68.49061	67.6624	66.76393	65.8003	64.78119	63.72055	62.63502	61.54103	60.45019	59.36136	58.24252	56.97537	55.11377	48.96425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	73.27143	72.93478	72.56513	72.15848	71.71013	71.21498	70.66763	70.06262	69.39486	68.66021	67.85632	66.98363	66.04623	65.05255	64.01516	62.94956	61.87165	60.7937	59.71751	58.62008	57.41317	55.78774	52.00804	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	73.31637	72.9864	72.62457	72.22705	71.78937	71.30665	70.77372	70.18532	69.53648	68.82304	68.04241	67.19447	66.28248	65.31368	64.29935	63.25386	62.19248	61.12782	60.06399	58.98496	57.82437	56.36062	53.53035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	73.36029	73.03676	72.68242	72.29365	71.86616	71.39531	70.87612	70.30355	69.67273	68.97951	68.22111	67.39696	66.50953	65.56502	64.57352	63.54824	62.50376	61.4528	60.40124	59.33848	58.2144	56.86374	54.55433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	73.40324	73.08589	72.73876	72.35837	71.94064	71.48112	70.97505	70.41755	69.80391	69.12998	68.39285	67.59153	66.72784	65.80703	64.83804	63.83301	62.80571	61.76886	60.72961	59.68163	58.5869	57.31787	55.34588	44.43253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	73.44525	73.13386	72.79366	72.42131	72.01292	71.56423	71.07068	70.52758	69.93032	69.27481	68.55801	67.77863	66.93786	66.04012	65.0933	64.10846	63.0986	62.07619	61.04938	60.01514	58.94453	57.73694	55.99901	50.36281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	73.48636	73.18072	72.84717	72.48255	72.08311	71.64479	71.16321	70.63384	70.05223	69.41432	68.71698	67.95865	67.14002	66.2647	65.33965	64.37492	63.38265	62.37502	61.36082	60.3396	59.28934	58.12966	56.56124	52.68874	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	73.5266	73.2265	72.89937	72.54216	72.15132	71.72293	71.2528	70.73656	70.16989	69.54879	68.87009	68.13198	67.33469	66.48117	65.57747	64.63268	63.65811	62.66553	61.66414	60.65547	59.62289	58.50166	57.05999	54.09361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	73.56601	73.27126	72.9503	72.60024	72.21764	71.79877	71.33959	70.83591	70.28353	69.67852	69.01766	68.29896	67.52226	66.6899	65.8071	64.88204	63.92523	62.94792	61.95955	60.96315	59.94635	58.85677	57.51235	55.09298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	73.60462	73.31503	73.00003	72.65683	72.28216	71.87242	71.42374	70.93208	70.39336	69.80375	69.15999	68.45993	67.70309	66.89124	66.02887	65.12331	64.18424	63.22239	62.24724	61.26296	60.26059	59.19768	57.92952	55.87118	45.1571	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	73.64246	73.35786	73.0486	72.71202	72.34496	71.94399	71.50538	71.02523	70.4996	69.92472	69.29735	68.6152	67.8775	67.08553	66.24311	65.35677	64.43539	63.48914	62.52739	61.55519	60.56631	59.52633	58.31917	56.51337	50.81453	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	73.67955	73.39978	73.09606	72.76585	72.40613	72.01357	71.58462	71.11551	70.60242	70.04166	69.43001	68.76507	68.04582	67.2731	66.45014	65.5827	64.67892	63.74835	62.80019	61.84009	60.86404	59.8442	58.6867	57.06505	53.11165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	73.71592	73.44082	73.14246	72.81839	72.46573	72.08127	71.6616	71.20307	70.702	70.15478	69.5582	68.9098	68.20833	67.45426	66.65025	65.80139	64.91506	64.00023	63.06581	62.11786	61.1542	60.15237	59.03601	57.55302	54.51109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	73.75161	73.48102	73.18783	72.8697	72.52383	72.14716	71.7364	71.28804	70.7985	70.26427	69.68216	69.04966	68.36533	67.62931	66.84375	66.0131	65.14406	64.24497	63.32442	62.38872	61.43715	60.45171	59.36999	57.99413	55.50886	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	73.78662	73.52041	73.23223	72.91982	72.5805	72.21133	71.80914	71.37054	70.89207	70.37031	69.8021	69.18488	68.51708	67.79851	67.0309	66.2181	65.36615	64.48277	63.57618	62.65283	61.71317	60.74289	59.6908	58.39954	56.28534	46.72554	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	73.82099	73.55902	73.27567	72.96879	72.6358	72.27386	71.87991	71.4507	70.98286	70.47307	69.91821	69.3157	68.66382	67.96215	67.21198	66.41664	65.58155	64.71382	63.82127	62.91037	61.98251	61.02645	60.0001	58.77694	56.92467	51.45683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	73.85474	73.59687	73.31821	73.01668	72.68978	72.33481	71.9488	71.52861	71.071	70.57271	70.03068	69.44232	68.80579	68.12046	67.38724	66.60897	65.79048	64.93832	64.05985	63.16149	62.24539	61.30284	60.29918	59.13178	57.47215	53.57298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	73.88788	73.63399	73.35987	73.06351	72.74251	72.39425	72.01589	71.60439	71.15661	70.66938	70.13969	69.56495	68.94323	68.27369	67.55693	66.79533	65.99318	65.15646	64.29209	63.40636	62.50199	61.5724	60.58905	59.46804	57.95393	54.89703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	73.92043	73.67042	73.40069	73.10933	72.79402	72.45225	72.08125	71.67812	71.2398	70.76321	70.2454	69.68377	69.07633	68.42206	67.72128	66.97595	66.18985	65.36842	64.51814	63.64511	62.75249	61.83545	60.87051	59.78859	58.38704	55.86144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	73.95243	73.70616	73.4407	73.15418	72.84438	72.50886	72.14498	71.74991	71.32069	70.85434	70.34797	69.79896	69.20529	68.56579	67.88052	67.15106	66.38071	65.57441	64.73817	63.8779	62.99705	62.09225	61.1442	60.09565	58.78343	56.62093	47.0797	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	73.98387	73.74125	73.47992	73.19809	72.89361	72.56414	72.20712	71.81982	71.39939	70.9429	70.44753	69.91069	69.33031	68.70509	68.03486	67.32086	66.56596	65.77459	64.95234	64.10486	63.23581	62.34301	61.41064	60.39099	59.15118	57.25017	51.64048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	74.01478	73.7757	73.51838	73.24109	72.94177	72.61815	72.26776	71.88795	71.47598	71.02899	70.54422	70.01912	69.45156	68.84015	68.18451	67.48557	66.7458	65.96916	65.16082	64.32613	63.46891	62.58793	61.67027	60.67601	59.49595	57.79052	53.76146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	74.04518	73.80954	73.55611	73.28323	72.9889	72.67093	72.32694	71.95437	71.55055	71.11273	70.63818	70.12439	69.56921	68.97116	68.32966	67.64539	66.92041	66.1583	65.36375	64.54186	63.69648	62.82718	61.92345	60.9518	59.82181	58.26701	55.11019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	74.07508	73.84279	73.59314	73.32453	73.03503	72.72253	72.38473	72.01915	71.62321	71.19421	70.72953	70.22664	69.68342	69.09828	68.4705	67.8005	67.09	66.34217	65.56129	64.75218	63.91865	63.06093	62.17052	61.21925	60.1318	58.6958	56.09081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	74.1045	73.87545	73.62948	73.36502	73.08021	72.773	72.44118	72.08236	71.69401	71.27355	70.81837	70.32601	69.79433	69.22168	68.60721	67.95108	67.25474	66.52094	65.75361	64.95721	64.13555	63.28933	62.41172	61.47906	60.42823	59.08778	56.8608	47.38491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	74.13344	73.90757	73.66516	73.40472	73.12446	72.82238	72.49635	72.14406	71.76305	71.35081	70.90481	70.42262	69.90209	69.34152	68.73994	68.09733	67.41481	66.6948	65.94084	65.15711	64.34729	63.5125	62.64732	61.73181	60.71289	59.4506	57.49665	51.85692	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	74.16193	73.93914	73.7002	73.44367	73.16782	72.87071	72.55029	72.2043	71.83039	71.4261	70.98896	70.51659	70.00683	69.45796	68.86888	68.23939	67.57037	66.86389	66.12314	65.35199	64.554	63.73058	62.8775	61.97797	60.98718	59.78982	58.04079	53.96858	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	74.18998	73.97018	73.73462	73.48189	73.21031	72.91803	72.60303	72.26315	71.8961	71.49949	71.07092	70.60802	70.10868	69.57112	68.99417	68.37744	67.72158	67.02837	66.30065	65.54198	64.75579	63.9437	63.10245	62.21794	61.25221	60.10952	58.51891	55.31868	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	74.21759	74.00072	73.76844	73.51941	73.25198	72.96437	72.65463	72.32066	71.96025	71.57107	71.15076	70.69703	70.20776	69.68115	69.11595	68.51163	67.86862	67.18841	66.47352	65.72723	64.95279	64.15197	63.32234	62.45206	61.50889	60.41281	58.94759	56.30246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	74.24479	74.03077	73.80168	73.55624	73.29284	73.00977	72.70513	72.37689	72.02289	71.64089	71.22858	70.78372	70.30418	69.78817	69.23436	68.6421	68.01162	67.34414	66.64189	65.90785	65.1451	64.35551	63.53731	62.68061	61.75796	60.70207	59.3381	57.07527	48.00171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2883.5	74.27158	74.06033	73.83436	73.59241	73.33293	73.05426	72.75456	72.43187	72.08409	71.70904	71.30447	70.86817	70.39806	69.89231	69.34955	68.76901	68.15073	67.49571	66.80589	66.08397	65.33285	64.55442	63.74751	62.90383	62.00001	60.97918	59.69832	57.71302	52.16725	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	74.29797	74.08943	73.86649	73.62793	73.37227	73.09787	72.80297	72.48565	72.1439	71.77557	71.37848	70.95048	70.48948	69.99368	69.46163	68.89248	68.2861	67.64327	66.96566	66.25572	65.51613	64.74882	63.95307	63.12195	62.23556	61.24561	60.034	58.25773	54.17709	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	74.32397	74.11808	73.89809	73.66284	73.41088	73.14063	72.85038	72.53828	72.20236	71.84055	71.45071	71.03073	70.57856	70.09239	69.57073	69.01265	68.41786	67.78695	67.12134	66.42321	65.69507	64.93882	64.15409	63.33516	62.46502	61.50255	60.34933	58.73393	55.48677	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	74.34961	74.14628	73.92918	73.69715	73.44879	73.18258	72.89685	72.58981	72.25954	71.90403	71.52121	71.109	70.66538	70.18854	69.67697	69.12963	68.54614	67.92687	67.27304	66.58657	65.86977	65.1245	64.35069	63.54362	62.68876	61.75095	60.64742	59.15919	56.45471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	74.37487	74.17406	73.95976	73.73087	73.48602	73.22373	72.94239	72.64026	72.31547	71.96608	71.59006	71.18537	70.75003	70.28223	69.78044	69.24355	68.67106	68.06318	67.42089	66.74591	66.04034	65.30598	64.54299	63.7475	62.90708	61.99157	60.9308	59.54559	57.22123	47.1187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	74.39978	74.20143	73.98987	73.76402	73.52259	73.26411	72.98704	72.68967	72.37021	72.02675	71.65731	71.25991	70.8326	70.37356	69.88126	69.35453	68.79275	68.19598	67.56502	66.90135	66.20689	65.48335	64.73108	63.94692	63.12024	62.22505	61.20151	59.90134	57.85665	51.83826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	74.42434	74.22838	74.01949	73.79663	73.55852	73.30375	73.03082	72.73809	72.42379	72.08608	71.72303	71.33269	70.91316	70.46262	69.97953	69.46266	68.91131	68.3254	67.70553	67.053	66.36951	65.65671	64.91507	64.14202	63.32846	62.45196	61.46117	60.2323	58.40088	54.04372	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	74.44857	74.25495	74.04866	73.8287	73.59383	73.34268	73.07378	72.78554	72.47625	72.14412	71.78726	71.40378	70.99178	70.54949	70.07533	69.56806	69.02687	68.45156	67.84256	67.20097	66.52833	65.82616	65.09505	64.33291	63.53196	62.67277	61.71108	60.54277	58.87854	55.44919	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	74.47246	74.28113	74.07739	73.86026	73.62854	73.3809	73.11593	72.83206	72.52764	72.20092	71.85007	71.47323	71.06855	70.63426	70.16878	69.67082	69.13952	68.57455	67.9762	67.34537	66.68343	65.9918	65.27111	64.5197	63.73091	62.88787	61.9523	60.836	59.30579	56.47055	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	74.49603	74.30693	74.10568	73.89131	73.66266	73.41845	73.15729	72.87767	72.57798	72.25652	71.91151	71.54111	71.14352	70.71699	70.25994	69.77104	69.24937	68.6945	68.10656	67.4863	66.83491	66.1537	65.44334	64.70251	63.92549	63.09761	62.18568	61.11453	59.69374	57.27035	45.83392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	74.51929	74.33237	74.13354	73.92187	73.69622	73.45535	73.1979	72.92241	72.62732	72.31097	71.97162	71.60748	71.21677	70.79777	70.3489	69.86881	69.35652	68.8115	68.23375	67.62386	66.98288	66.31198	65.61184	64.88142	64.11583	63.30229	62.41192	61.38033	60.05029	57.92791	51.48466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	74.54224	74.35746	74.161	73.95196	73.72924	73.49161	73.23778	72.96631	72.67569	72.3643	72.03044	71.67238	71.28835	70.87667	70.43575	69.96422	69.46106	68.92564	68.35787	67.75817	67.12742	66.46671	65.77668	65.05655	64.30209	63.50217	62.63161	61.635	60.38124	58.48744	53.89919	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	74.56489	74.3822	74.18806	73.98159	73.76171	73.52726	73.27695	73.00939	72.72312	72.41655	72.08803	71.73587	71.35833	70.95375	70.52055	70.05735	69.56308	69.03704	68.47901	67.8893	67.26864	66.61798	65.93796	65.22797	64.48438	63.69747	62.84524	61.8798	60.69095	58.97586	55.3952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	74.58725	74.4066	74.21472	74.01076	73.79367	73.56231	73.31542	73.05168	72.76964	72.46776	72.14443	71.79799	71.42676	71.02907	70.60338	70.14828	69.66266	69.14577	68.59728	68.01736	67.40662	66.76588	66.09576	65.39578	64.66282	63.88839	63.05323	62.11579	60.98276	59.41067	56.46653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	74.60932	74.43067	74.24101	74.0395	73.82512	73.59677	73.35323	73.0932	72.81527	72.51795	72.19967	71.8588	71.49369	71.10271	70.68431	70.23709	69.7599	69.25192	68.71275	68.14244	67.54145	66.9105	66.25016	65.56006	64.83753	64.07512	63.25594	62.34384	61.25929	59.80383	57.29757	44.56369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	74.63111	74.45442	74.26692	74.06781	73.85609	73.63067	73.3904	73.13398	72.86006	72.56717	72.2538	71.91834	71.55918	71.17471	70.7634	70.32385	69.85487	69.35559	68.82553	68.26462	67.67322	67.05192	66.40125	65.72091	65.0086	64.25781	63.45368	62.56467	61.5226	60.1638	57.97608	51.17791	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	74.65264	74.47786	74.29248	74.0957	73.88657	73.66403	73.42693	73.17403	72.90401	72.61545	72.30684	71.97665	71.62327	71.24514	70.84072	70.40862	69.94764	69.45685	68.93568	68.384	67.80201	67.19023	66.5491	65.87839	65.17614	64.4366	63.64672	62.77887	61.77435	60.49678	58.55016	53.75717	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	74.67389	74.50099	74.31768	74.12319	73.91659	73.69685	73.46285	73.21339	72.94717	72.6628	72.35884	72.03377	71.68602	71.31404	70.91633	70.49149	70.03829	69.55577	69.04331	68.50065	67.92791	67.3255	66.69378	66.0326	65.34022	64.61162	63.83528	62.98698	62.01588	60.80738	59.04817	55.31995	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	74.69489	74.52382	74.34254	74.15029	73.94616	73.72915	73.49818	73.25206	72.98954	72.70927	72.40983	72.08974	71.74746	71.38147	70.99028	70.5725	70.12689	69.65245	69.14848	68.61466	68.05101	67.45781	66.83539	66.1836	65.50095	64.783	64.01959	63.18942	62.24831	61.09908	59.48924	56.43041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	74.71563	74.54636	74.36706	74.177	73.97529	73.76095	73.53293	73.29008	73.03117	72.75489	72.45984	72.14459	71.80764	71.44748	71.06264	70.65173	70.21351	69.74694	69.25127	68.72611	68.17136	67.58724	66.97399	66.33148	65.6584	64.95084	64.19982	63.38656	62.47252	61.37466	59.88654	57.28738	41.22203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	74.73612	74.56862	74.39125	74.20334	74.00399	73.79226	73.56712	73.32745	73.07206	72.79966	72.50891	72.19837	71.8666	71.51211	71.13345	70.72923	70.29821	69.83932	69.35177	68.83507	68.28907	67.71387	67.10966	66.47631	65.81265	65.11525	64.37615	63.57875	62.68928	61.63637	60.24918	57.98427	50.4552	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	74.75636	74.59059	74.41513	74.22931	74.03227	73.82309	73.60076	73.3642	73.11224	72.84363	72.55705	72.25111	71.92438	71.57541	71.20276	70.80506	70.38105	69.92965	69.45002	68.94162	68.40419	67.83777	67.24247	66.61815	65.96378	65.27632	64.54871	63.76624	62.89925	61.886	60.58373	58.57196	53.4166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	74.77637	74.61229	74.43869	74.25492	74.06014	73.85346	73.63388	73.40035	73.15174	72.88682	72.6043	72.30283	71.98101	71.63742	71.27062	70.87927	70.4621	70.01801	69.54612	69.04583	68.51681	67.95902	67.37249	66.75708	66.11187	65.43415	64.71764	63.9493	63.10297	62.12501	60.89507	59.08098	55.13178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	74.79615	74.63373	74.46195	74.28019	74.08762	73.88337	73.66648	73.43591	73.19056	72.92924	72.65069	72.35358	72.03654	71.69818	71.33709	70.95192	70.54141	70.10445	69.64012	69.14776	68.62699	68.07767	67.49979	66.89317	66.25699	65.58881	64.88306	64.12815	63.30093	62.3546	61.18693	59.53099	56.32101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	74.81569	74.6549	74.48491	74.30512	74.11471	73.91284	73.69857	73.4709	73.22874	72.97093	72.69624	72.40338	72.091	71.75773	71.40219	71.02305	70.61904	70.18903	69.73209	69.24749	68.73481	68.19382	67.62444	67.02649	66.3992	65.7404	65.0451	64.30298	63.49353	62.57575	61.46221	59.9353	57.22536	33.27187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	74.83501	74.67582	74.50758	74.32971	74.14142	73.94188	73.73018	73.50533	73.26628	73.01189	72.74097	72.45225	72.14442	71.81611	71.46599	71.09272	70.69504	70.27182	69.82208	69.34509	68.84032	68.30751	67.74651	67.1571	66.53857	65.88898	65.20385	64.47397	63.68112	62.78928	61.72319	60.30331	57.95344	49.63434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	74.85412	74.69648	74.52997	74.35398	74.16777	73.97051	73.76131	73.53922	73.30321	73.05217	72.78492	72.50024	72.19682	71.87336	71.52851	71.16106	70.76946	70.35286	69.91017	69.4406	68.9436	68.41882	67.86606	67.28507	66.67518	66.03463	65.35941	64.64128	63.86403	62.99587	61.97173	60.64185	58.56287	53.05574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	74.873	74.71691	74.55208	74.37794	74.19375	73.99872	73.79198	73.57258	73.33954	73.09176	72.8281	72.54735	72.24826	71.92951	71.5898	71.22783	70.84235	70.43221	69.9964	69.5341	69.0447	68.5278	67.98315	67.41045	66.80908	66.17742	65.51188	64.80507	64.04251	63.19612	62.20932	60.95607	59.08761	54.93029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3905.5	74.89168	74.73709	74.57391	74.40158	74.21939	74.02654	73.82219	73.60544	73.37529	73.1307	72.87054	72.59363	72.29874	71.98459	71.64989	71.29336	70.91375	70.50992	70.08084	69.62565	69.1437	68.63454	68.09785	67.53332	66.94034	66.31743	65.66134	64.96544	64.2168	63.39052	62.43719	61.24987	59.54925	56.19897	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	74.91015	74.75704	74.59548	74.42493	74.24468	74.05396	73.85196	73.63779	73.41047	73.16899	72.91225	72.63909	72.3483	72.03864	71.70883	71.3576	70.98372	70.58605	70.16353	69.71529	69.24064	68.73907	68.21022	67.65374	67.06902	66.45471	65.80787	65.12254	64.38712	63.5795	62.65636	61.52631	59.96228	57.15036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	74.92842	74.77676	74.61679	74.44798	74.26963	74.08101	73.88131	73.66965	73.44511	73.20666	72.95326	72.68376	72.39697	72.09168	71.76664	71.42058	71.0523	70.66063	70.24453	69.8031	69.33559	68.84147	68.32031	67.77175	67.19517	66.58933	65.95156	65.27646	64.55366	63.76344	62.86769	61.78782	60.33685	57.90917	48.73669	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	74.94649	74.79626	74.63785	74.47074	74.29426	74.10769	73.91023	73.70104	73.4792	73.24373	72.99358	72.72765	72.44477	72.14375	71.82336	71.48235	71.11952	70.73372	70.32389	69.88911	69.4286	68.94178	68.4282	67.88743	67.31887	66.72136	66.09246	65.42732	64.71658	63.94265	63.0719	62.03635	60.68032	58.53994	52.67565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	74.96437	74.81553	74.65865	74.49322	74.31857	74.13401	73.93875	73.73197	73.51278	73.28021	73.03324	72.7708	72.49173	72.19488	71.87902	71.54293	71.18543	70.80536	70.40166	69.97338	69.51973	69.04007	68.53392	68.00082	67.44016	66.85086	66.23067	65.5752	64.87603	64.11743	63.26961	62.27348	60.99816	59.07913	54.64178	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	74.98205	74.83459	74.67921	74.51542	74.34257	74.15997	73.96687	73.76245	73.54584	73.31611	73.07226	72.81321	72.53788	72.24508	71.93365	71.60237	71.25007	70.87559	70.47787	70.05596	69.60902	69.13639	68.63754	68.11198	67.55911	66.97787	66.36623	65.72019	65.03216	64.28802	63.46134	62.50049	61.29431	59.54556	55.41784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	74.99955	74.85344	74.69953	74.53735	74.36626	74.18559	73.9946	73.79249	73.57842	73.35146	73.11064	72.85492	72.58322	72.2944	71.98729	71.6607	71.31347	70.94446	70.55259	70.13689	69.69653	69.2308	68.73912	68.22097	67.67576	67.10247	66.49923	65.86238	65.18508	64.45465	63.64754	62.71838	61.57004	59.90545	54.72195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	75.01687	74.87208	74.71962	74.55902	74.38965	74.21087	74.02194	73.8221	73.6105	73.38626	73.14841	72.89594	72.62779	72.34285	72.03995	71.71795	71.37567	71.012	70.62585	70.21624	69.78231	69.32333	68.83869	68.32785	67.79017	67.22471	66.62971	66.00185	65.33492	64.61751	63.82854	62.92719	61.8186	60.1306	53.1389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	75.034	74.89052	74.73948	74.58042	74.41276	74.23582	74.04892	73.85129	73.64212	73.42053	73.18559	72.9363	72.67161	72.39045	72.09168	71.77415	71.43671	71.07825	70.69768	70.29403	69.86641	69.41405	68.93633	68.43265	67.9024	67.34464	66.75774	66.13866	65.48177	64.77673	64.00433	63.12533	62.03385	60.24737	50.21582	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	75.05096	74.90875	74.75911	74.60158	74.43557	74.26045	74.07554	73.88008	73.67328	73.45428	73.22218	72.97599	72.7147	72.43724	72.14249	71.82933	71.49662	71.14325	70.76815	70.37032	69.94886	69.503	69.03206	68.53544	68.01249	67.46231	66.88337	66.27289	65.6257	64.93232	64.17443	63.31096	62.21556	60.28012	43.1738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	75.06774	74.9268	74.77852	74.62249	74.45811	74.28477	74.1018	73.90846	73.70399	73.48753	73.25821	73.01506	72.75708	72.48323	72.19241	71.88351	71.55542	71.20703	70.83727	70.44514	70.02973	69.59023	69.12595	68.63626	68.12049	67.57778	67.00667	66.40458	65.76674	65.08412	64.33822	63.48308	62.36635	60.24422	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	75.08436	74.94465	74.79772	74.64315	74.48037	74.30878	74.12771	73.93646	73.73426	73.52029	73.29369	73.0535	72.79876	72.52844	72.24146	71.93674	71.61316	71.26963	70.90509	70.51854	70.10904	69.67578	69.21804	68.73516	68.22646	67.69109	67.12766	66.53375	65.90482	65.2319	64.49515	63.64148	62.48948	60.14862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	75.1008	74.96231	74.81671	74.66358	74.50237	74.33249	74.15329	73.96408	73.76411	73.55258	73.32863	73.09135	72.83978	72.5729	72.28968	71.98903	71.66986	71.33109	70.97165	70.59055	70.18684	69.7597	69.30838	68.83219	68.33044	67.80229	67.24639	66.66042	66.03986	65.37537	64.64486	63.78647	62.58799	59.99796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	75.11709	74.97979	74.83549	74.68377	74.5241	74.3559	74.17854	73.99132	73.79354	73.58439	73.36304	73.1286	72.88013	72.61663	72.33708	72.04041	71.72555	71.39142	71.03698	70.66121	70.26318	69.84204	69.397	68.92739	68.43247	67.91141	67.36287	66.78453	66.17174	65.51433	64.78715	63.91861	62.66451	59.79379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	75.13321	74.99708	74.85406	74.70374	74.54558	74.37903	74.20346	74.01821	73.82256	73.61575	73.39695	73.16529	72.91984	72.65964	72.38368	72.0909	71.78025	71.45067	71.10111	70.73057	70.33809	69.92282	69.48396	69.0208	68.5326	68.01847	67.4771	66.90604	66.30032	65.64857	64.922	64.03861	62.72125	59.53519	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	75.14917	75.0142	74.87244	74.72348	74.56681	74.40187	74.22807	74.04474	73.85119	73.64666	73.43035	73.20141	72.95893	72.70196	72.4295	72.14053	71.83401	71.50887	71.16408	70.79865	70.41161	70.0021	69.5693	69.11246	68.63084	68.1235	67.58906	67.0249	66.4255	65.77798	65.0495	64.14722	62.76002	59.2189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	75.16498	75.03115	74.89061	74.743	74.58779	74.42444	74.25237	74.07092	73.87943	73.67714	73.46328	73.237	72.99742	72.7436	72.47458	72.18933	71.88683	71.56603	71.22592	70.86549	70.48378	70.0799	69.65304	69.20241	68.72722	68.2265	67.69874	67.14103	66.54717	65.90249	65.16979	64.24516	62.78228	58.83922	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4526	75.18064	75.04792	74.9086	74.7623	74.60853	74.44674	74.27636	74.09677	73.90729	73.70719	73.49572	73.27205	73.03531	72.78459	72.51891	72.2373	71.93874	71.6222	71.28666	70.93112	70.55462	70.15627	69.73522	69.29067	68.82178	68.32748	67.8061	67.25439	66.66526	66.02209	65.28309	64.33313	62.78926	58.38743	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	75.19614	75.06453	74.9264	74.7814	74.62903	74.46878	74.30006	74.12228	73.93478	73.73684	73.52771	73.30659	73.07263	72.82492	72.56253	72.28449	71.98978	71.67739	71.34632	70.99557	70.62418	70.23123	69.81588	69.37727	68.91451	68.42642	67.91112	67.36491	66.77972	66.13679	65.38964	64.41177	62.78195	57.85083	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	75.2115	75.08097	74.94402	74.80029	74.64931	74.49055	74.32348	74.14747	73.9619	73.76607	73.55924	73.34062	73.10938	72.86464	72.60546	72.33089	72.03996	71.73164	71.40494	71.05887	70.69248	70.30483	69.89504	69.46223	69.00543	68.52333	68.01378	67.47255	66.89051	66.24665	65.48971	64.48171	62.76116	57.21099	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	75.22671	75.09724	74.96145	74.81897	74.66935	74.51208	74.3466	74.17235	73.98868	73.79491	73.59033	73.37417	73.14559	72.90374	72.64771	72.37655	72.0893	71.78496	71.46254	71.12106	70.75955	70.37707	69.97272	69.54556	69.09454	68.61819	68.11404	67.57729	66.99763	66.35174	65.58356	64.54348	62.72756	56.44066	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	75.24178	75.11336	74.9787	74.83746	74.68917	74.53335	74.36945	74.19691	74.0151	73.82337	73.621	73.40723	73.18126	72.94224	72.68929	72.42147	72.13782	71.83738	71.51915	71.18215	70.82541	70.44799	70.04895	69.62729	69.18185	68.71099	68.21189	67.6791	67.10109	66.45218	65.67147	64.5976	62.68167	55.49798	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	75.25671	75.12932	74.99578	74.85575	74.70878	74.55438	74.39203	74.22117	74.04119	73.85145	73.65124	73.43982	73.21641	72.98017	72.73022	72.46567	72.18555	71.88892	71.57478	71.24216	70.8901	70.51761	70.12374	69.70741	69.26736	68.80172	68.30731	67.77797	67.20092	66.54808	65.75371	64.64454	62.62392	54.31505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	75.2715	75.14513	75.01269	74.87385	74.72817	74.57517	74.41435	74.24514	74.06695	73.87916	73.68107	73.47195	73.25104	73.01752	72.77053	72.50917	72.23251	71.9396	71.62946	71.30113	70.95362	70.58595	70.1971	69.78595	69.35107	68.89038	68.40029	67.87391	67.29716	66.63956	65.83055	64.68474	62.55464	52.77201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	75.28616	75.16079	75.02943	74.89176	74.74735	74.59573	74.4364	74.26881	74.09239	73.9065	73.71049	73.50364	73.28518	73.05433	72.81022	72.55199	72.27871	71.98944	71.68322	71.35907	71.01601	70.65302	70.26906	69.8629	69.43298	68.97696	68.49082	67.96693	67.38986	66.72677	65.90225	64.71859	62.47407	50.62911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	75.30068	75.17629	75.046	74.90949	74.76633	74.61606	74.45819	74.2922	74.11751	73.9335	73.73953	73.53489	73.31884	73.09059	72.84931	72.59413	72.32416	72.03845	71.73606	71.41599	71.07727	70.71885	70.33962	69.93827	69.51309	69.06147	68.57892	68.05704	67.4791	66.80984	65.96907	64.74647	62.38236	47.29344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	75.31507	75.19166	75.06241	74.92703	74.7851	74.63616	74.47974	74.31531	74.14231	73.96015	73.76818	73.56571	73.35201	73.12632	72.88781	72.63563	72.36889	72.08666	71.788	71.47192	71.13742	70.78343	70.40879	70.01207	69.59141	69.14389	68.66458	68.14429	67.56494	66.88892	66.03124	64.7687	62.27963	40.45404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	75.32933	75.20687	75.07866	74.9444	74.80367	74.65605	74.50104	74.33815	74.16682	73.98646	73.79645	73.59611	73.38472	73.16153	72.92573	72.67648	72.4129	72.13408	71.83907	71.52688	71.19648	70.8468	70.47658	70.08431	69.66793	69.22425	68.74783	68.2287	67.64746	66.96416	66.089	64.78562	62.16587	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	75.34347	75.22195	75.09476	74.96159	74.82205	74.67571	74.5221	74.36072	74.19102	74.01244	73.82435	73.6261	73.41698	73.19624	72.96309	72.71671	72.45622	72.18072	71.88926	71.58086	71.25446	70.90894	70.54299	70.15499	69.74267	69.30255	68.82869	68.31032	67.72676	67.03571	66.14257	64.7975	62.04106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	75.35748	75.23689	75.11069	74.97861	74.84024	74.69517	74.54292	74.38302	74.21493	74.03809	73.8519	73.65569	73.44878	73.23044	72.9999	72.75632	72.49885	72.2266	71.93861	71.63389	71.31137	70.96989	70.60805	70.22412	69.81564	69.37879	68.90717	68.38921	67.80292	67.10371	66.19217	64.80463	61.90508	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	75.37136	75.25169	75.12648	74.99546	74.85825	74.71441	74.56351	74.40507	74.23856	74.06343	73.87908	73.68488	73.48015	73.26416	73.03616	72.79532	72.54081	72.27172	71.98711	71.68597	71.36722	71.02963	70.67175	70.2917	69.88683	69.45301	68.98332	68.46542	67.87604	67.16831	66.23801	64.80725	61.75774	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	75.38513	75.26635	75.14212	75.01215	74.87606	74.73345	74.58388	74.42686	74.26191	74.08845	73.90592	73.71369	73.51109	73.2974	73.07188	72.83373	72.5821	72.3161	72.03478	71.73713	71.42202	71.08819	70.73411	70.35776	69.95628	69.52522	69.05717	68.53901	67.94621	67.22964	66.28027	64.80561	61.5988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	75.39877	75.28088	75.15761	75.02867	74.8937	74.75229	74.60402	74.44841	74.28497	74.11317	73.93242	73.74212	73.5416	73.33017	73.10708	72.87155	72.62274	72.35975	72.08163	71.78736	71.47578	71.14558	70.79513	70.42229	70.02398	69.59544	69.12876	68.61005	68.01353	67.28786	66.31914	64.79991	61.42792	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	75.4123	75.29529	75.17295	75.04503	74.91115	74.77093	74.62394	74.46971	74.30777	74.13758	73.95858	73.77017	73.5717	73.36248	73.14177	72.9088	72.66273	72.40267	72.12766	71.83667	71.5285	71.20179	70.85482	70.48531	70.08997	69.66371	69.19813	68.67859	68.07809	67.34309	66.35481	64.79038	61.24471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5146.5	75.42571	75.30956	75.18815	75.06123	74.92843	74.78938	74.64364	74.49077	74.3303	74.1617	73.98442	73.79786	73.60139	73.39432	73.17594	72.94547	72.70208	72.44487	72.1729	71.88508	71.5802	71.25685	70.9132	70.54684	70.15426	69.73005	69.26532	68.74471	68.14	67.39546	66.38743	64.77719	61.04866	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	75.43901	75.3237	75.20321	75.07727	74.94554	74.80763	74.66313	74.5116	74.35257	74.18552	74.00992	73.82518	73.63067	73.42572	73.20961	72.98158	72.7408	72.48637	72.21733	71.93258	71.63089	71.31075	70.97027	70.60688	70.21686	69.79449	69.3304	68.80848	68.19935	67.44511	66.41718	64.76053	60.83917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	75.45219	75.33772	75.21813	75.09317	74.96248	74.82569	74.68241	74.53219	74.37457	74.20906	74.03511	73.85215	73.65955	73.45667	73.24278	73.01713	72.77889	72.52717	72.26097	71.9792	71.68057	71.36351	71.02605	70.66546	70.27782	69.85707	69.39339	68.86996	68.25623	67.49215	66.44419	64.74058	60.61555	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	75.46526	75.35162	75.23291	75.1089	74.97924	74.84357	74.70148	74.55255	74.39632	74.23231	74.05998	73.87876	73.68804	73.48718	73.27546	73.05213	72.81637	72.56727	72.30383	72.02493	71.72925	71.41515	71.08055	70.7226	70.33714	69.91783	69.45436	68.92923	68.31074	67.53672	66.46863	64.71748	60.37695	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	75.47822	75.36539	75.24756	75.12449	74.99584	74.86126	74.72034	74.57268	74.41782	74.25528	74.08453	73.90502	73.71615	73.51726	73.30766	73.08659	72.85323	72.60668	72.34591	72.06979	71.77694	71.46567	71.13379	70.77831	70.39487	69.9768	69.51337	68.98636	68.36297	67.57891	66.49061	64.6914	60.1224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	75.49107	75.37904	75.26207	75.13993	75.01228	74.87877	74.73901	74.59259	74.43907	74.27797	74.10878	73.93094	73.74386	73.5469	73.33937	73.12051	72.88949	72.6454	72.38723	72.11378	71.82365	71.51508	71.18578	70.83262	70.45102	70.03402	69.57045	69.04142	68.41302	67.61884	66.51029	64.66246	59.85075	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	75.50381	75.39257	75.27645	75.15522	75.02855	74.8961	74.75747	74.61228	74.46007	74.30039	74.13272	73.95652	73.7712	73.57613	73.3706	73.15389	72.92514	72.68346	72.42778	72.15691	71.86939	71.56339	71.23654	70.88554	70.50563	70.08954	69.62567	69.09448	68.46096	67.65663	66.52777	64.63082	59.56065	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	75.51644	75.40598	75.2907	75.17037	75.04467	74.91324	74.77574	74.63174	74.48083	74.32253	74.15636	73.98176	73.79816	73.60492	73.40137	73.18674	72.9602	72.72084	72.46758	72.19919	71.91417	71.61063	71.28609	70.93711	70.55873	70.1434	69.67908	69.1456	68.50688	67.69236	66.54319	64.59658	59.25051	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	75.52896	75.41927	75.30482	75.18537	75.06062	74.93022	74.79381	74.65099	74.50134	74.34441	74.17969	74.00666	73.82474	73.6333	73.43166	73.21906	72.99467	72.75755	72.50662	72.24062	71.958	71.6568	71.33444	70.98735	70.61036	70.19563	69.73074	69.19486	68.55087	67.72614	66.55664	64.55987	58.91845	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	75.54138	75.43245	75.3188	75.20023	75.07641	74.94701	74.81168	74.67002	74.52162	74.36602	74.20273	74.03124	73.85095	73.66126	73.46148	73.25086	73.02855	72.7936	72.54493	72.28122	72.00089	71.70191	71.38161	71.03627	70.66053	70.24629	69.78069	69.24232	68.593	67.75806	66.56824	64.5208	58.56223	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	75.55369	75.4455	75.33266	75.21494	75.09204	74.96363	74.82936	74.68884	74.54165	74.38736	74.22547	74.05548	73.8768	73.68882	73.49085	73.28214	73.06185	72.829	72.5825	72.32099	72.04286	71.74599	71.42763	71.08391	70.7093	70.29541	69.829	69.28805	68.63336	67.78821	66.57809	64.47948	58.17919	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5548	75.56589	75.45844	75.34639	75.22952	75.10752	74.98008	74.84685	74.70744	74.56145	74.40844	74.24792	74.07939	73.90228	73.71596	73.51975	73.31291	73.09457	72.86376	72.61934	72.35995	72.08391	71.78905	71.47251	71.1303	70.75669	70.34303	69.87571	69.33211	68.67202	67.81668	66.58629	64.43601	57.7661	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	75.57799	75.47127	75.35999	75.24395	75.12284	74.99636	74.86414	74.72583	74.58101	74.42925	74.27008	74.10298	73.92739	73.74269	73.5482	73.34316	73.12672	72.89787	72.65546	72.39811	72.12406	71.83111	71.51627	71.17546	70.80273	70.3892	69.92088	69.37456	68.70905	67.84355	66.59293	64.39049	57.31907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	75.58998	75.48397	75.37346	75.25824	75.13801	75.01246	74.88125	74.74401	74.60034	74.44981	74.29195	74.12624	73.95214	73.76902	73.5762	73.37291	73.1583	72.93134	72.69087	72.43546	72.16332	71.87217	71.55895	71.21941	70.84747	70.43397	69.96456	69.41547	68.74452	67.86889	66.59809	64.34299	56.83327	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	75.60186	75.49656	75.3868	75.27238	75.15302	75.02839	74.89817	74.76198	74.61943	74.4701	74.31353	74.14919	73.97653	73.79495	73.60375	73.40216	73.18932	72.96419	72.72558	72.47203	72.20171	71.91227	71.60055	71.26219	70.89093	70.47737	70.00679	69.45489	68.77849	67.89278	66.60185	64.29362	56.30273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	75.61364	75.50903	75.40002	75.28639	75.16787	75.04415	74.91489	74.77974	74.6383	74.49014	74.33482	74.17181	74.00057	73.82048	73.63085	73.43091	73.21978	72.99641	72.7596	72.50783	72.23924	71.95141	71.6411	71.30383	70.93315	70.51944	70.04764	69.49288	68.81104	67.9153	66.60431	64.24244	55.71986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	75.62531	75.52139	75.4131	75.30026	75.18257	75.05974	74.93143	74.79729	74.65692	74.50992	74.35582	74.19411	74.02425	73.84561	73.65751	73.45917	73.24969	73.02802	72.79292	72.54286	72.27592	71.98962	71.68063	71.34434	70.97416	70.56023	70.08714	69.52949	68.84222	67.9365	66.60552	64.18954	55.07494	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	75.63687	75.53362	75.42606	75.31398	75.19712	75.07516	74.94778	74.81463	74.67532	74.52944	74.37654	74.2161	74.04757	73.87035	73.68373	73.48693	73.27905	73.05902	72.82557	72.57715	72.31177	72.02691	71.71915	71.38377	71.01401	70.59977	70.12534	69.56478	68.87209	67.95647	66.60557	64.135	54.35515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	75.64833	75.54574	75.43889	75.32757	75.2115	75.0904	74.96394	74.83176	74.69349	74.54871	74.39697	74.23777	74.07055	73.8947	73.70952	73.51421	73.30788	73.08942	72.85756	72.61069	72.34681	72.06331	71.75669	71.42213	71.05271	70.63811	70.16229	69.5988	68.90071	67.97524	66.60452	64.07887	53.54324	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	75.65967	75.55775	75.45159	75.34101	75.22574	75.10548	74.97991	74.84868	74.71143	74.56772	74.41712	74.25912	74.09318	73.91866	73.73487	73.54101	73.33617	73.11923	72.88888	72.6435	72.38104	72.09882	71.79328	71.45946	71.09031	70.67529	70.19803	69.6316	68.92814	67.9929	66.60243	64.02123	52.61521	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	75.67091	75.56963	75.46416	75.35431	75.23982	75.12038	74.99569	74.8654	74.72913	74.58648	74.43699	74.28017	74.11545	73.94223	73.75979	73.56734	73.36393	73.14845	72.91956	72.6756	72.41448	72.13348	71.82893	71.49578	71.12683	70.71133	70.23261	69.66323	68.95442	68.00949	66.59936	63.96215	51.53632	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VOID RATIO e

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
36.5	1.676305	3.102302	4.961623	6.352263	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
73	1.500453	2.120961	3.194036	4.221152	5.062264	5.779045	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
109.5	1.409806	1.790031	2.463589	3.25986	3.966644	4.571153	5.115712	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
146	1.350391	1.621048	2.082654	2.697052	3.305879	3.841996	4.313543	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
182.5	1.306914	1.515867	1.85592	2.333084	2.855354	3.339403	3.769733	4.15844	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
219	1.272994	1.442638	1.707074	2.084326	2.528821	2.966597	3.364817	3.723388	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
255.5	1.245394	1.387902	1.601944	1.906842	2.283927	2.677846	3.048049	3.384729	3.737208	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
292	1.222256	1.344947	1.523503	1.775352	2.09597	2.448232	2.792045	3.109914	3.403527	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
328.5	1.202423	1.310028	1.46248	1.674654	1.948937	2.262514	2.580606	2.88117	3.158789	3.913	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
365	1.185127	1.280876	1.413441	1.595292	1.831883	2.110454	2.403397	2.687272	2.952295	3.228123	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
401.5	1.169835	1.256026	1.373006	1.531188	1.737133	1.984693	2.25336	2.520747	2.774115	3.014846	3.75452	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
438	1.156161	1.23449	1.338965	1.478312	1.659227	1.879715	2.125372	2.37638	2.618429	2.846842	3.105653	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
474.5	1.14382	1.215569	1.309815	1.433908	1.594233	1.791296	2.015527	2.250364	2.48117	2.700593	2.915689	3.906112	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
511	1.132592	1.198757	1.284495	1.396043	1.539285	1.716165	1.920742	2.1398	2.359348	2.570513	2.772464	3.05159	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
547.5	1.122309	1.183676	1.262237	1.363324	1.492265	1.651772	1.838528	2.042397	2.250685	2.453761	2.647847	2.854157	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
584	1.112836	1.170037	1.242471	1.334726	1.451587	1.596118	1.766849	1.956288	2.153388	2.348378	2.535917	2.721509	3.155269	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
620.5	1.104063	1.157614	1.224761	1.309479	1.416047	1.547634	1.70403	1.879917	2.066008	2.252867	2.434245	2.610251	2.839477	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
657	1.095902	1.14623	1.208771	1.286994	1.38472	1.505077	1.64869	1.811969	1.987337	2.166036	2.341346	2.510965	2.693883	3.587729	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
693.5	1.08828	1.13574	1.194238	1.266815	1.356886	1.467455	1.599687	1.751323	1.916353	2.086907	2.25614	2.420455	2.586296	2.874625	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
730	1.081135	1.126029	1.180949	1.24858	1.331977	1.433977	1.556074	1.697019	1.852173	2.014657	2.177773	2.337178	2.494312	2.689881	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
766.5	1.074416	1.117	1.168735	1.232001	1.309539	1.404002	1.517067	1.648233	1.794028	1.948581	2.105546	2.260171	2.411533	2.576398	3.138195	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
803	1.06808	1.108573	1.157454	1.216844	1.28921	1.377011	1.482012	1.604259	1.741243	1.888063	2.038867	2.188739	2.335488	2.486355	2.750668	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
839.5	1.062088	1.10068	1.146991	1.202921	1.270691	1.352578	1.450364	1.564488	1.693222	1.832561	1.977229	2.122333	2.264952	2.407878	2.595565	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
876	1.056408	1.093264	1.13725	1.190072	1.253739	1.330351	1.421668	1.528399	1.649441	1.78159	1.920186	2.060498	2.199189	2.336714	2.493777	3.012699	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
912.5	1.051011	1.086277	1.128149	1.178167	1.238153	1.310041	1.39554	1.495542	1.609436	1.734716	1.867343	2.002849	2.137684	2.270971	2.412922	2.673737	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
949	1.045873	1.079677	1.119619	1.167097	1.223764	1.291404	1.371656	1.465531	1.572799	1.691551	1.818343	1.949048	2.080045	2.209655	2.342869	2.527954	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
985.5	1.040973	1.073427	1.111602	1.156767	1.21043	1.274236	1.349744	1.438034	1.539168	1.651741	1.772867	1.898795	2.025951	2.152159	2.279575	2.432225	2.891867	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1022	1.036291	1.067495	1.104046	1.147098	1.198032	1.258363	1.329568	1.412762	1.508225	1.614972	1.730621	1.851823	1.975129	2.09807	2.221149	2.357123	2.608303	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1058.5	1.03181	1.061855	1.096906	1.138023	1.186468	1.243639	1.310932	1.389467	1.479689	1.580956	1.691339	1.807888	1.927341	2.047075	2.166584	2.292799	2.476557	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1095	1.027515	1.056481	1.090146	1.129482	1.175649	1.229938	1.293663	1.367933	1.453313	1.549437	1.654775	1.766767	1.882376	1.998929	2.115281	2.235148	2.38721	3.108175	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1131.5	1.023393	1.051351	1.083732	1.121425	1.1655	1.217152	1.277614	1.347974	1.428877	1.520183	1.620707	1.728254	1.840042	1.953422	2.066848	2.182146	2.316519	2.654194	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1168	1.01943	1.046448	1.077633	1.113807	1.155956	1.205187	1.262659	1.329426	1.406189	1.492986	1.588928	1.69216	1.800166	1.910377	2.021004	2.132697	2.256127	2.480317	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1204.5	1.015618	1.041753	1.071824	1.106589	1.146959	1.193963	1.248686	1.312146	1.385078	1.467659	1.559252	1.65831	1.762587	1.869636	1.977532	2.086165	2.202246	2.375062	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1241	1.011944	1.037252	1.066281	1.099736	1.13846	1.183408	1.235599	1.296009	1.365392	1.444033	1.531505	1.626541	1.727156	1.831055	1.936258	2.042148	2.152919	2.298035	2.839396	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1277.5	1.008402	1.03293	1.060985	1.093219	1.130414	1.173461	1.223314	1.280907	1.346998	1.421958	1.505532	1.596701	1.693734	1.794505	1.897036	2.00037	2.107044	2.235551	2.535132	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1314	1.004981	1.028776	1.055916	1.087009	1.122784	1.164067	1.211756	1.266741	1.329778	1.401296	1.481189	1.568652	1.662192	1.759865	1.859737	1.960629	2.063953	2.181686	2.391642	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1350.5	1.001676	1.024777	1.051058	1.081084	1.115533	1.155178	1.20086	1.253427	1.313624	1.381926	1.458344	1.542263	1.632409	1.727024	1.82425	1.922768	2.023212	2.133483	2.298896	3.369132	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1387	0.998478	1.020925	1.046397	1.075422	1.108633	1.146752	1.190569	1.24089	1.298444	1.363737	1.436878	1.517413	1.604272	1.695877	1.790471	1.886659	1.984527	2.08932	2.229237	2.647141	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1423.5	0.995383	1.017209	1.041918	1.070003	1.102055	1.13875	1.18083	1.229061	1.284152	1.346631	1.416682	1.493993	1.577674	1.666327	1.758308	1.852193	1.947683	2.048236	2.172184	2.435275	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1460	0.992383	1.013622	1.03761	1.06481	1.095775	1.131138	1.171598	1.217881	1.270675	1.330518	1.397657	1.471898	1.552515	1.638281	1.727674	1.819276	1.912521	2.009629	2.122903	2.318707	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1496.5	0.989475	1.010155	1.033462	1.059827	1.089771	1.123887	1.162833	1.207297	1.257944	1.315318	1.379713	1.451035	1.528703	1.611652	1.698487	1.787825	1.878912	1.973103	2.07886	2.237696	3.042055	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1533	0.986652	1.006802	1.029462	1.05504	1.084023	1.11697	1.154497	1.197261	1.2459	1.300958	1.362766	1.431314	1.50615	1.586358	1.670672	1.757762	1.846755	1.938385	2.038566	2.174675	2.564701	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1569.5	0.983911	1.003556	1.025603	1.050437	1.078514	1.110361	1.146559	1.187729	1.234488	1.287372	1.346741	1.412656	1.484776	1.562322	1.644157	1.729018	1.81596	1.905275	2.001117	2.12221	2.38064	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1606	0.981247	1.000411	1.021876	1.046005	1.073227	1.104038	1.138988	1.178664	1.223659	1.274501	1.33157	1.394985	1.464502	1.53947	1.618873	1.701527	1.786452	1.873622	1.965944	2.076558	2.271438	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1642.5	0.978657	0.997361	1.018274	1.041733	1.068148	1.097983	1.131758	1.170031	1.213369	1.262291	1.31719	1.378232	1.44526	1.517733	1.594757	1.67523	1.758165	1.843308	1.932666	2.035631	2.194163	2.896889	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1679	0.976136	0.994402	1.014788	1.037613	1.063263	1.092176	1.124844	1.161797	1.203577	1.250692	1.303543	1.362334	1.426982	1.497047	1.571746	1.650067	1.731037	1.814239	1.901019	1.998177	2.133794	2.503961	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1715.5	0.973682	0.991529	1.011412	1.033635	1.058559	1.086601	1.118226	1.153935	1.194249	1.239661	1.290578	1.347233	1.409606	1.47735	1.549784	1.625986	1.705012	1.786337	1.870814	1.963401	2.083584	2.335503	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1752	0.971292	0.988738	1.008142	1.02979	1.054027	1.081244	1.111882	1.146419	1.185351	1.229158	1.278246	1.332875	1.393076	1.458583	1.528814	1.602933	1.680039	1.759535	1.841905	1.930776	2.040031	2.232257	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1788.5	0.968962	0.986024	1.00497	1.026072	1.049654	1.07609	1.105795	1.139224	1.176852	1.219144	1.266503	1.319209	1.377338	1.440694	1.508784	1.58086	1.65607	1.733775	1.814183	1.89994	2.001132	2.158235	2.762112	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1825	0.966689	0.983383	1.001892	1.022472	1.045433	1.071127	1.099949	1.132331	1.168727	1.209586	1.25531	1.306191	1.362341	1.42363	1.489644	1.55972	1.63306	1.709005	1.787559	1.870635	1.965666	2.100148	2.445366	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1861.5	0.964472	0.980813	0.998903	1.018986	1.041354	1.066343	1.094328	1.125718	1.160949	1.200455	1.24463	1.293777	1.34804	1.407343	1.471348	1.539467	1.610965	1.685178	1.761961	1.842671	1.932843	2.051864	2.300462	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1898	0.962308	0.97831	0.995998	1.015606	1.03741	1.061729	1.088918	1.119369	1.153497	1.191721	1.234428	1.281928	1.334392	1.391789	1.45385	1.52006	1.589745	1.662252	1.737327	1.815905	1.902138	2.010263	2.207543	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1934.5	0.960195	0.975871	0.993174	1.012327	1.033592	1.057273	1.083707	1.113266	1.146349	1.183358	1.224674	1.27061	1.321356	1.376926	1.437107	1.501457	1.569361	1.640188	1.713605	1.790228	1.873196	1.97334	2.138071	3.314098	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
1971	0.95813	0.973492	0.990427	1.009144	1.029895	1.052967	1.078682	1.107395	1.139487	1.175344	1.215339	1.259787	1.308895	1.362712	1.42108	1.48362	1.549776	1.618947	1.690748	1.765552	1.845752	1.939782	2.082226	2.611819	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2007.5	0.956112	0.971172	0.987753	1.006053	1.026312	1.048803	1.073834	1.101743	1.132892	1.167656	1.206398	1.24943	1.296976	1.349112	1.40573	1.46651	1.530955	1.598496	1.668717	1.741809	1.819606	1.908774	2.035187	2.379538	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2044	0.954138	0.968908	0.985148	1.003048	1.022836	1.044774	1.069152	1.096295	1.126549	1.160275	1.197824	1.23951	1.285564	1.336091	1.391022	1.450093	1.512863	1.5788	1.647474	1.718938	1.794602	1.879786	1.994235	2.248915	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2080.5	0.952207	0.966698	0.98261	1.000126	1.019464	1.040871	1.064627	1.09104	1.120443	1.153181	1.189597	1.230001	1.274631	1.323615	1.376921	1.434335	1.495468	1.559829	1.626984	1.696888	1.77062	1.852456	1.957706	2.16005	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2117	0.950318	0.964538	0.980136	0.997283	1.016188	1.037089	1.060251	1.085968	1.114559	1.146358	1.181695	1.220877	1.264149	1.311655	1.363396	1.419203	1.478739	1.541553	1.607217	1.675615	1.747567	1.826527	1.924525	2.093053	3.218401	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2153.5	0.948468	0.962428	0.977722	0.994515	1.013006	1.033421	1.056015	1.081068	1.108887	1.13979	1.1741	1.212118	1.254092	1.300181	1.350416	1.404668	1.462647	1.523942	1.588142	1.65508	1.72537	1.801811	1.893961	2.039156	2.565044	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2190	0.946656	0.960365	0.975366	0.991818	1.009911	1.029862	1.051912	1.076332	1.103412	1.133462	1.166793	1.203701	1.244435	1.289167	1.337953	1.3907	1.447162	1.50697	1.569732	1.635246	1.703967	1.778165	1.865504	1.993823	2.339489	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2226.5	0.944881	0.958348	0.973067	0.98919	1.006901	1.026406	1.047936	1.071749	1.098126	1.127362	1.159759	1.195607	1.235156	1.278588	1.325979	1.377271	1.432257	1.49061	1.55196	1.616084	1.683308	1.755479	1.838786	1.95445	2.211396	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999

2263	0.943142	0.956373	0.97082	0.986628	1.003971	1.023048	1.04408	1.067314	1.093017	1.121476	1.152982	1.187818	1.226234	1.268419	1.31447	1.364355	1.417907	1.474836	1.534799	1.597563	1.663351	1.733664	1.813535	1.919428	2.124012	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2299.5	0.941437	0.954441	0.968626	0.984129	1.001118	1.019784	1.040338	1.063016	1.088077	1.115793	1.146447	1.180316	1.217649	1.25864	1.303401	1.351927	1.404086	1.459625	1.518227	1.579657	1.644059	1.71265	1.789545	1.887707	2.058153	3.021416	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2336	0.939765	0.95255	0.96648	0.981689	0.998339	1.016609	1.036705	1.058851	1.083295	1.110302	1.140143	1.173088	1.209383	1.249229	1.29275	1.339964	1.390771	1.444952	1.502221	1.562342	1.6254	1.692379	1.766659	1.858571	2.005276	2.499948	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2372.5	0.938125	0.950697	0.964382	0.979308	0.995629	1.01352	1.033175	1.054811	1.078666	1.104993	1.134056	1.166117	1.20142	1.240168	1.282495	1.328443	1.377938	1.430795	1.486756	1.545594	1.607343	1.672802	1.744753	1.831516	1.960929	2.296523	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2409	0.936515	0.948881	0.962329	0.976982	0.992987	1.010512	1.029744	1.05089	1.07418	1.099856	1.128174	1.15939	1.193742	1.231437	1.272618	1.317343	1.365566	1.417133	1.471814	1.529392	1.589865	1.653876	1.723728	1.806175	1.922598	2.17722	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2445.5	0.934936	0.947102	0.96032	0.974708	0.990409	1.007582	1.026407	1.047083	1.069831	1.094884	1.122489	1.152894	1.186336	1.22302	1.263098	1.306644	1.353635	1.403945	1.457372	1.513713	1.57294	1.635568	1.703504	1.782284	1.888679	2.093881	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2482	0.933385	0.945358	0.958354	0.972486	0.987892	1.004726	1.023159	1.043385	1.065612	1.090067	1.116989	1.146618	1.179187	1.214901	1.253918	1.296326	1.342124	1.391211	1.443412	1.49854	1.556546	1.617844	1.684017	1.759637	1.858073	2.030248	2.978753	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2518.5	0.931862	0.943647	0.956428	0.970313	0.985435	1.001942	1.019998	1.039789	1.061517	1.085399	1.111665	1.14055	1.172282	1.207065	1.245062	1.286373	1.331014	1.378911	1.429914	1.483852	1.540664	1.600677	1.665213	1.738072	1.830046	1.978808	2.481633	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2555	0.930366	0.941969	0.954541	0.968187	0.983035	0.999225	1.016919	1.036292	1.057539	1.080871	1.106509	1.134681	1.165609	1.199497	1.236513	1.276765	1.320288	1.367028	1.416861	1.469632	1.525273	1.584043	1.647046	1.717459	1.804085	1.935527	2.279182	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2591.5	0.928896	0.940322	0.952692	0.966107	0.980689	0.996575	1.013918	1.032889	1.053675	1.076478	1.101512	1.128999	1.159156	1.192186	1.228257	1.267488	1.309928	1.355545	1.404235	1.455862	1.510356	1.56792	1.629477	1.697698	1.779823	1.898028	2.158548	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2628	0.927451	0.938705	0.950879	0.96407	0.978396	0.993987	1.010993	1.029577	1.049918	1.072213	1.096667	1.123497	1.152913	1.185117	1.22028	1.258526	1.299918	1.344443	1.392019	1.442527	1.495895	1.552285	1.612471	1.678704	1.756986	1.864804	2.074481	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2664.5	0.926031	0.937118	0.949102	0.962076	0.976153	0.99146	1.00814	1.02635	1.046264	1.06807	1.091967	1.118165	1.14687	1.17828	1.212568	1.249864	1.290243	1.333708	1.380197	1.429609	1.481874	1.53712	1.595997	1.660411	1.735367	1.834853	2.010504	2.942498	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2701	0.924635	0.93556	0.947359	0.960122	0.973958	0.988991	1.005356	1.023206	1.042708	1.064043	1.087405	1.112995	1.141017	1.171664	1.205109	1.241489	1.280887	1.323323	1.368754	1.417093	1.468278	1.522407	1.58003	1.642763	1.714806	1.807482	1.958964	2.460215	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2737.5	0.923262	0.934029	0.945648	0.958207	0.971811	0.986578	1.002639	1.020141	1.039246	1.060128	1.082975	1.107981	1.135345	1.165258	1.197892	1.233388	1.271838	1.313275	1.357674	1.404965	1.45509	1.508129	1.564544	1.625713	1.695176	1.782193	1.915755	2.260264	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2774	0.921911	0.932525	0.94397	0.956331	0.969709	0.984218	0.999985	1.017153	1.035874	1.05632	1.07867	1.103115	1.129846	1.159052	1.190905	1.225547	1.26308	1.30355	1.346944	1.39321	1.442298	1.494271	1.54952	1.609222	1.676374	1.758619	1.878451	2.140425	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2810.5	0.920582	0.931046	0.942322	0.95449	0.96765	0.98191	0.997393	1.014236	1.032589	1.052614	1.074486	1.098389	1.124512	1.153037	1.184137	1.217957	1.254603	1.294133	1.33655	1.381814	1.429886	1.480816	1.534937	1.593255	1.65832	1.736487	1.845518	2.056722	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2847	0.919274	0.929593	0.940704	0.952686	0.965633	0.979651	0.99486	1.01139	1.029386	1.049005	1.070417	1.093799	1.119335	1.147205	1.177579	1.210604	1.246393	1.285012	1.326478	1.370765	1.417842	1.467752	1.520777	1.577783	1.640945	1.715584	1.815934	1.992992	2.870636	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2883.5	0.917987	0.928164	0.939115	0.950915	0.963656	0.977441	0.992383	1.008611	1.026262	1.04549	1.066457	1.089338	1.114308	1.141547	1.171222	1.20348	1.238439	1.276175	1.316716	1.360049	1.406153	1.455063	1.507025	1.56278	1.624193	1.695746	1.788986	1.941685	2.429815	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2920	0.916719	0.926759	0.937554	0.949177	0.961719	0.975277	0.989962	1.005896	1.023214	1.042064	1.062603	1.085	1.109426	1.136056	1.165056	1.196574	1.230731	1.267611	1.307252	1.349655	1.394805	1.442738	1.493664	1.548222	1.608016	1.676841	1.764166	1.898753	2.241366	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2956.5	0.915471	0.925376	0.936019	0.947472	0.959819	0.973157	0.987592	1.003243	1.02024	1.038725	1.05885	1.08078	1.104681	1.130724	1.159073	1.189876	1.223258	1.259307	1.298074	1.339569	1.383788	1.430764	1.48068	1.53409	1.592374	1.658764	1.741101	1.861872	2.125913	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
2993	0.914242	0.924016	0.934512	0.945797	0.957956	0.97108	0.985274	1.00065	1.017336	1.035468	1.055194	1.076673	1.100068	1.125545	1.153266	1.183378	1.216009	1.251254	1.289171	1.329782	1.37309	1.419129	1.46806	1.520363	1.577233	1.641432	1.719518	1.829439	2.044028	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3029.5	0.913031	0.922677	0.933029	0.944153	0.956128	0.969045	0.983004	0.998115	1.014499	1.03229	1.051631	1.072675	1.095581	1.120512	1.147626	1.177071	1.208976	1.243442	1.280533	1.320281	1.362699	1.407821	1.455791	1.507026	1.562562	1.624775	1.699196	1.800371	1.981148	2.974094	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3066	0.911838	0.92136	0.931572	0.942537	0.954335	0.967051	0.980782	0.995635	1.011728	1.029189	1.048157	1.068781	1.091215	1.115619	1.142147	1.170947	1.20215	1.23586	1.272148	1.311056	1.352605	1.39683	1.44386	1.494062	1.548337	1.608735	1.679959	1.773941	1.930286	2.462054	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3102.5	0.910663	0.920063	0.930138	0.94095	0.952574	0.965095	0.978605	0.993208	1.009019	1.026161	1.044769	1.064987	1.086965	1.110859	1.136822	1.164999	1.195522	1.228499	1.264008	1.302098	1.342797	1.386145	1.432257	1.481457	1.534532	1.593261	1.661666	1.749633	1.887603	2.253437	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3139	0.909504	0.918786	0.928728	0.93939	0.950845	0.963176	0.976472	0.990833	1.00637	1.023203	1.041463	1.061288	1.082826	1.106228	1.131644	1.159219	1.189085	1.221351	1.256103	1.293396	1.333266	1.375755	1.42097	1.469198	1.521129	1.578312	1.644204	1.727071	1.850791	2.12915	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3175.5	0.908362	0.917528	0.92734	0.937856	0.949148	0.961294	0.974381	0.988508	1.00378	1.020313	1.038236	1.057682	1.078794	1.101721	1.126609	1.153601	1.182829	1.214407	1.248423	1.28494	1.324001	1.365651	1.409989	1.457272	1.508108	1.563849	1.627484	1.705973	1.818366	2.042712	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3212	0.907237	0.916289	0.925974	0.936349	0.947481	0.959447	0.972332	0.98623	1.001245	1.017489	1.035085	1.054164	1.074865	1.097331	1.121708	1.148137	1.176749	1.20766	1.240961	1.276723	1.314994	1.355823	1.399304	1.445668	1.495451	1.549842	1.611431	1.686121	1.789327	1.977176	3.131744	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3248.5	0.906126	0.915068	0.92463	0.934866	0.945842	0.957634	0.970322	0.983999	0.998764	1.014727	1.032007	1.050731	1.071034	1.093056	1.116939	1.142822	1.170837	1.201101	1.233709	1.268735	1.306235	1.346261	1.388905	1.434374	1.483144	1.536263	1.595984	1.667344	1.762968	1.924651	2.497165	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3285	0.905031	0.913866	0.923307	0.933407	0.944232	0.955854	0.968351	0.981813	0.996336	1.012027	1.029	1.04738	1.067297	1.088889	1.112294	1.13765	1.165087	1.194723	1.226657	1.260968	1.297716	1.336959	1.378783	1.423379	1.471172	1.523086	1.581091	1.649505	1.73878	1.880887	2.266586	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3321.5	0.903952	0.91268	0.922004	0.931972	0.94265	0.954106	0.966417	0.97967	0.993958	1.009384	1.026061	1.044107	1.063652	1.084827	1.10777	1.132615	1.159492	1.188519	1.219799	1.253413	1.289429	1.327905	1.368929	1.412674	1.459522	1.510291	1.566708	1.632496	1.716384	1.843364	2.133808	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3358	0.902886	0.911512	0.92072	0.93056	0.941094	0.952388	0.964519	0.977569	0.991629	1.006799	1.023187	1.040911	1.060094	1.080867	1.103361	1.127712	1.154046	1.182483	1.213127	1.246064	1.281365	1.319093	1.359334	1.402249	1.448182	1.497858	1.552798	1.616226	1.69549	1.810478	2.043046	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3394.5	0.901835	0.91036	0.919456	0.929171	0.939564	0.950701	0.962656	0.975508	0.989346	1.004268	1.020377	1.037788	1.056621	1.077003	1.099064	1.122935	1.148744	1.176609	1.206635	1.238913	1.273517	1.310514	1.34999	1.392095	1.437139	1.485771	1.53933	1.60062	1.675875	1.781154	1.974978	3.296545	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3431	0.900798	0.909224	0.91821	0.927803	0.938059	0.949044	0.960827	0.973487	0.98711	1.001789	1.017627	1.034735	1.053229	1.073232	1.094874	1.118281	1.14358	1.170889	1.200316	1.231952	1.265877	1.302161	1.340889	1.382202	1.426384	1.474012	1.526275	1.585618	1.65736	1.754642	1.92085	2.528015	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3467.5	0.899774	0.908104	0.916983	0.926456	0.936579	0.947414	0.95903	0.971503	0.984917	0.999361	1.014937	1.03175	1.049915	1.069552	1.090786	1.113744	1.138548	1.165319	1.194163	1.225176	1.258439	1.294026	1.332023	1.372563	1.415905	1.46257	1.513608	1.571165	1.639807	1.730398	1.876034	2.279575	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3504	0.898764	0.907	0.915773	0.925129	0.935122	0.945812	0.957265	0.969557	0.982766	0.996983	1.012303	1.02883	1.046676	1.065958	1.086798	1.109319	1.133645	1.159892	1.188171	1.218576	1.251194	1.286102	1.323384	1.363169	1.405695	1.451429	1.501309	1.557219	1.623099	1.708024	1.837861	2.140315	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3540.5	0.897766	0.90591	0.914581	0.923823	0.933688	0.944236	0.955532	0.967646	0.980657	0.994652	1.009724	1.025974	1.043511	1.062448	1.082905	1.105004	1.128864	1.154604	1.182333	1.212148	1.244138	1.278381	1.314965	1.354013	1.395743	1.440579	1.489358	1.54374	1.607144	1.687217	1.804587	2.04605	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3577	0.896782	0.904835	0.913406	0.922536	0.932277	0.942687	0.953828	0.965769	0.978588	0.992367	1.007198	1.023179	1.040415	1.059018	1.079104	1.100793	1.124203	1.14945	1.176644	1.205885	1.237263	1.270858	1.30676	1.345086	1.386041	1.430009	1.477737	1.530697	1.591865	1.667743	1.775035	1.975801	3.778601	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3613.5	0.895809	0.903774	0.912247	0.921268	0.930888	0.941163	0.952153	0.963926	0.976557	0.990127	1.004723	1.020443	1.037388	1.055666	1.075392	1.096683	1.119655	1.144424	1.1711	1.199782	1.230562	1.263526	1.298761	1.336383	1.376581	1.419707	1.466432	1.51806	1.577198	1.64941	1.7484	1.920205	2.602185	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3650	0.894849	0.902727	0.911104	0.920019	0.92952	0.939663	0.950506	0.962116	0.974564	0.98793	1.002299	1.017764	1.034425	1.052389	1.071766	1.09267	1.115218	1.139523	1.165693	1.193832	1.224031	1.256378	1.290962	1.327895	1.367356	1.409665	1.455427	1.505804	1.563087	1.632067	1.724112	1.874349	2.311005	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3686.5	0.8939	0.901694	0.909976	0.918787	0.928173	0.938187	0.948887	0.960337	0.972607	0.985774	0.999922	1.01514	1.031526	1.049184	1.068222	1.088752	1.110887	1.134741	1.160421	1.188031	1.217664	1.249409	1.283356	1.319616	1.358357	1.399873	1.444711	1.493908	1.549485	1.615593	1.701748	1.835369	2.156665	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3723	0.892963	0.900674	0.908864	0.917573	0.926846	0.936734	0.947294	0.958589	0.970685	0.983659	0.997591	1.012569	1.028689	1.046049	1.064758	1.084924	1.106659	1.130074	1.155278	1.182373	1.211454	1.242612	1.275938	1.31154	1.349578	1.390323	1.434271	1.482351	1.536353	1.599887	1.68099	1.801463	2.055172	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3759.5	0.892038	0.899667	0.907767	0.916376	0.925538	0.935304	0.945728	0.95687	0.968798	0.981583	0.995306	1.01005	1.02591	1.042982	1.061371	1.081183	1.102529	1.125519	1.150259	1.176853	1.205397	1.235983	1.268702	1.303661	1.341012	1.381007	1.424096	1.471115	1.523654	1.584867	1.661593	1.771434	1.980814	5.314685	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3796	0.891123	0.898672	0.906685	0.915196	0.92425	0.933896	0.944186	0.955181	0.966944	0.979546	0.993064	1.007581	1.023188	1.03998	1.058058	1.077527	1.098495	1.121071	1.145361	1.171468	1.199488	1.229515	1.261641	1.295971	1.332652	1.371917	1.414177	1.460186	1.511359	1.570466	1.643362	1.744452	1.922636	2.689045	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3832.5	0.890219	0.89769	0.905617	0.914032	0.922981	0.932509	0.942669	0.953519	0.965121	0.977545	0.990864	1.00516	1.020522	1.037041	1.054816	1.073952	1.094553	1.116727	1.140579	1.166211	1.193722	1.223204	1.25475	1.288467	1.324493	1.363046	1.404504	1.449547	1.499441	1.556625	1.626143	1.719919	1.875052	2.344747	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3869	0.889326	0.896721	0.904562	0.912884	0.921729	0.931143	0.941176	0.951885	0.963331	0.97558	0.988705	1.002787	1.017909	1.034163	1.051645	1.070456	1.0907	1.112483	1.135909	1.16108	1.188093	1.217043	1.248025	1.281141	1.316527	1.354387	1.395068	1.439187	1.487877	1.543296	1.609812	1.697393	1.834866	2.174296	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3905.5	0.888444	0.895763	0.903521	0.911752	0.920496	0.929797	0.939707	0.950278	0.96157	0.973649	0.986586	1.000458	1.015347	1.031343	1.04854	1.067036	1.086934	1.108336	1.131347	1.156069	1.182598	1.21103	1.241459	1.273989	1.308749	1.345933	1.38586	1.429092	1.476646	1.530436	1.594265	1.67654	1.800098	2.065389	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3942	0.887571	0.894817	0.902494	0.910635	0.91928	0.928472	0.938259	0.948696	0.959839	0.971753	0.984506	0.998173	1.012836	1.028581	1.0455	1.06369	1.08325	1.104283	1.126891	1.151175	1.177232	1.205158	1.235048	1.267005	1.301154	1.337678	1.376874	1.419252	1.46573	1.51801	1.579419	1.6571	1.769445	1.986891	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
3978.5	0.886709	0.893882	0.901479	0.909533	0.91808	0.927165	0.936834	0.947139	0.958137	0.969889	0.982463	0.995932	1.010374	1.025875	1.042524	1.060415	1.079647	1.10032	1.122536	1.146393	1.171991	1.199424	1.228788	1.260184	1.293736	1.329616	1.368101	1.409656	1.455112	1.505987	1.565202	1.638871	1.742009	1.926132	2.787381	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4015	0.885856	0.892958	0.900478	0.908445	0.916897	0.925877	0.93543	0.945607	0.956463	0.968057	0.980456	0.993731	1.007959	1.023222	1.039608	1.057209	1.076122	1.096445	1.118278	1.141721	1.166871	1.193823	1.222673	1.253521	1.286489	1.321741	1.359534	1.400296	1.444778	1.494339	1.551554	1.621689	1.717149	1.876824	2.380787	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4051.5	0.885013	0.892045	0.899488	0.907371	0.915731	0.924608	0.934048	0.944099	0.954815	0.966256	0.978485	0.991571	1.005589	1.020621	1.036751	1.054069	1.072672	1.092654	1.114116	1.137155	1.161868	1.188351	1.216698	1.247012	1.279409	1.314048	1.351168	1.391162	1.434713	1.483042	1.538425	1.605423	1.694394	1.835509	2.199769	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4088	0.884179	0.891143	0.898511	0.906311	0.91458	0.923356	0.932685	0.942614	0.953195	0.964485	0.976547	0.989449	1.003264	1.01807	1.03395	1.050995	1.069295	1.088946	1.110045	1.132691	1.156978	1.183003	1.210861	1.240652	1.272491	1.306531	1.342994	1.382246	1.424907	1.472074	1.525771	1.589967	1.673403	1.800374	2.131854	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4124.5	0.883354	0.890252	0.897546	0.905265	0.913444	0.922122	0.931343	0.941151	0.9516	0.962743	0.974643	0.987366	1.000982	1.015568	1.031206	1.047982	1.065988	1.085316	1.106063	1.128325	1.152198	1.177776	1.205156	1.234436	1.26573	1.299184	1.335009	1.373541	1.415347	1.461418	1.513554	1.575237	1.654042	1.773638	2.192664	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4161	0.882539	0.88937	0.896592	0.904231	0.912323	0.920905	0.930019	0.939711	0.95003	0.96103	0.972772	0.985319	0.998741	1.013113	1.028514	1.04503	1.062749	1.081764	1.102167	1.124056	1.147524	1.172667	1.199579	1.22836	1.259121	1.292003	1.327205	1.365039	1.406024	1.451056	1.501748	1.561216	1.636735	1.757074	2.336931	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4197.5	0.881732	0.888499	0.89565	0.903211	0.911217	0.919705	0.928715	0.938292	0.948484	0.959345	0.970932	0.983308	0.996541	1.010704	1.025875	1.042137	1.059577	1.078285	1.098355	1.119879	1.142953	1.167671	1.194127	1.22242	1.25266	1.284983	1.319577	1.356734	1.396928	1.440975	1.490345	1.547998	1.621862	1.748532	2.627222	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4234	0.880934	0.887637	0.894718	0.902204	0.910126	0.918521	0.927429	0.936894	0.946962	0.957686	0.969122	0.981331	0.99438	1.008339	1.023286	1.039301	1.056469	1.074879	1.094623	1.115792	1.138482	1.162785	1.188796	1.216613	1.246343	1.278119	1.312121	1.348619	1.388052	1.431172	1.47937	1.535689	1.609385	1.746143	3.487981	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4270.5	0.880145	0.886785	0.893798	0.901208	0.909048	0.917353	0.926162	0.935516	0.945464	0.956054	0.967342	0.979388	0.992257	1.006018	1.020746	1.03652	1.053423	1.071543	1.090969	1.111793	1.134107	1.158006	1.183582	1.210933	1.240166	1.271408	1.30483	1.340689	1.379393	1.421654	1.468858	1.52434	1.599086	1.748762	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4307	0.879364	0.885943	0.892889	0.900225	0.907984	0.9162	0.924911	0.934159	0.943987	0.954447	0.965591	0.977478	0.990172	1.003739	1.018253	1.033792	1.050437	1.068274	1.08739	1.107877	1.129826	1.15333	1.178482	1.205378	1.234123	1.264843	1.297702	1.332941	1.37095	1.41243	1.458836	1.513951	1.590714	1.755754	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4343.5	0.878591	0.88511	0.89199	0.899254	0.906934	0.915063	0.923678	0.93282	0.942533	0.952865	0.963868	0.9756	0.988122	1.001501	1.015807	1.031116	1.04751	1.06507	1.083885	1.104044	1.125636	1.148755	1.173492	1.199943	1.228213	1.258423	1.290732	1.325373	1.362728	1.403514	1.449321	1.504486	1.584039	1.766817	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4380	0.877826	0.884286	0.891101	0.898294	0.905896	0.91394	0.922462	0.931501	0.9411	0.951307	0.962173	0.973753	0.986108	0.999302	1.013405	1.028491	1.044639	1.061931	1.080451	1.100289	1.121534	1.144277	1.168609	1.194626	1.22243	1.252143	1.283918	1.317985	1.354731	1.394917	1.440317	1.495898	1.578869	1.781898	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4416.5	0.877069	0.883471	0.890222	0.897346	0.904872	0.912832	0.921262	0.9302	0.939689	0.949773	0.960504	0.971936	0.984127	0.997141	1.011046	1.025915	1.041823	1.058852	1.077087	1.096612	1.117518	1.139893	1.16383	1.189422	1.216773	1.246	1.277258	1.310778	1.346964	1.386646	1.431821	1.488129	1.575043	1.801149	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4453	0.87632	0.882664	0.889353	0.896409	0.90386	0.911738	0.920078	0.928917	0.938297	0.948262	0.958862	0.970149	0.98218	0.995019	1.00873	1.023386	1.039061	1.055834	1.073789	1.093009	1.113584	1.135601	1.159152	1.18433	1.211238	1.239994	1.270753	1.303755	1.339432	1.378704	1.423821	1.481122	1.572434	1.824922	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4489.5	0.875578	0.881867	0.888494	0.895483	0.90286	0.910658	0.91891	0.927652	0.936926	0.946774	0.957245	0.96839	0.980265	0.992932	1.006455	1.020903	1.03635	1.052874	1.070556	1.089479	1.10973	1.131398	1.154572	1.179346	1.205823	1.234121	1.264401	1.296916	1.332138	1.371092	1.416301	1.474825	1.570936	1.853799	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4526	0.874844	0.881077	0.887644	0.894567	0.901873	0.909592	0.917757	0.926404	0.935573	0.945307	0.955652	0.966659	0.978382	0.990881	1.004219	1.018465	1.03369	1.04997	1.067386	1.086019	1.105955	1.127282	1.150088	1.174469	1.200525	1.228381	1.258203	1.290263	1.325084	1.363808	1.409244	1.469184	1.570467	1.888648	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4562.5	0.874117	0.880296	0.886804	0.893662	0.900897	0.908538	0.916619	0.925173	0.93424	0.943862	0.954083	0.964955	0.976529	0.988864	1.002022	1.01607	1.031078	1.047121	1.064277	1.082627	1.102256	1.12325	1.145698	1.169695	1.195344	1.222773	1.252159	1.283799	1.318271	1.356847	1.40263	1.464155	1.570958	1.930747	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4599	0.873397	0.879523	0.885973	0.892767	0.899933	0.907498	0.915495	0.923959	0.932926	0.942437	0.952538	0.963277	0.974706	0.986881	0.999863	1.013718	1.028514	1.044325	1.061228	1.079302	1.098631	1.1193	1.141399	1.165023	1.190278	1.217296	1.246269	1.277523	1.311698	1.350202	1.396437	1.459693	1.572356	1.981977	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4635.5	0.872685	0.878758	0.88515	0.891882	0.89898	0.90647	0.914386	0.92276	0.931629	0.941033	0.951016	0.961625	0.972912	0.98493	0.997741	1.011407	1.025996	1.041581	1.058236	1.076041	1.095078	1.115431	1.13719	1.160452	1.185325	1.21195	1.240534	1.271436	1.305364	1.343866	1.390647	1.45576	1.574618	2.045197	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4672	0.871979	0.878001	0.884337	0.891007	0.898038	0.905455	0.913291	0.921577	0.93035	0.939649	0.949517	0.959999	0.971146	0.983011	0.995654	1.009136	1.023524	1.038887	1.055301	1.072844	1.091595	1.11164	1.133069	1.155979	1.180484	1.206734	1.234953	1.265537	1.299265	1.33783	1.385238	1.45232	1.577711	2.124948	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4708.5	0.871281	0.877251	0.883532	0.890142	0.897107	0.904452	0.912209	0.92041	0.929089	0.938284	0.948039	0.958397	0.969407	0.981124	0.993602	1.006904	1.021095	1.036243	1.052421	1.069707	1.088181	1.107926	1.129034	1.151604	1.175756	1.201648	1.229526	1.259825	1.293398	1.332083	1.380191	1.449341	1.58161	2.228943	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4745	0.870589	0.876509	0.882736	0.889286	0.896186	0.903461	0.911141	0.919257	0.927844	0.936939	0.946582	0.956819	0.967696	0.979266	0.991584	1.00471	1.018708	1.033646	1.049595	1.066631	1.084834	1.104288	1.125085	1.147326	1.171138	1.196691	1.224253	1.254298	1.287759	1.326617	1.375487	1.446793	1.586297	2.371601	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4781.5	0.869903	0.875775	0.881947	0.88844	0.895276	0.902482	0.910086	0.91812	0.926616	0.935611	0.945146	0.955264	0.966011	0.977438	0.989599	1.002553	1.016363	1.031096	1.046821	1.063614	1.081553	1.100724	1.121219	1.143144	1.16663	1.191862	1.219131	1.248955	1.282342	1.32142	1.371107	1.44465	1.59176	2.584143	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4818	0.869225	0.875047	0.881167	0.887603	0.894376	0.901514	0.909044	0.916996	0.925404	0.934302	0.943731	0.953732	0.964351	0.975638	0.987646	1.000433	1.014059	1.028591	1.044098	1.060653	1.078337	1.097233	1.117436	1.139056	1.162232	1.187161	1.214161	1.243793	1.277142	1.316482	1.367034	1.442887	1.597995	2.953314	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4854.5	0.868552	0.874327	0.880395	0.886774	0.893487	0.900558	0.908015	0.915887	0.924207	0.933011	0.942335	0.952222	0.962716	0.973866	0.985725	0.998347	1.011795	1.026131	1.041425	1.05775	1.075184	1.093814	1.113735	1.135061	1.157941	1.182587	1.20934	1.238807	1.272153	1.311792	1.363252	1.441482	1.605003	3.900644	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4891	0.867886	0.873614	0.879631	0.885955	0.892607	0.899612	0.906997	0.914792	0.923026	0.931736	0.940959	0.950734	0.961106	0.972122	0.983834	0.996296	1.009569	1.023714	1.038801	1.054901	1.072094	1.090466	1.110115	1.13116	1.153759	1.178138	1.204667	1.233996	1.267368	1.307341	1.359744	1.440414	1.612789	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4927.5	0.867226	0.872908	0.87885	0.885144	0.891736	0.898677	0.905992	0.91371	0.921861	0.930479	0.939601	0.949267	0.959519	0.970405	0.981973	0.994279	1.007381	1.02134	1.036225	1.052107	1.069065	1.087185	1.106574	1.127351	1.149682	1.173813	1.200139	1.229355	1.262781	1.303117	1.356497	1.439664	1.621365	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
4964	0.866572	0.872208	0.878126	0.884341	0.890876	0.897753	0.904999	0.912641	0.92071	0.929239	0.938263	0.947821	0.957956	0.968714	0.980142	0.992295	1.00523	1.019008	1.033697	1.049366	1.066097	1.083978	1.103113	1.123632	1.145711	1.169611	1.195754	1.22488	1.258386	1.299111	1.353494	1.439214	1.630747	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5000.5	0.865924	0.871516	0.877385	0.883547	0.890024	0.896839	0.904017	0.911585	0.919574	0.928014	0.936942	0.946396	0.956416	0.967048	0.97834	0.990344	1.003116	1.016718	1.031215	1.046679	1.063189	1.080837	1.09973	1.120004	1.141844	1.165529	1.191508	1.220567	1.254176	1.295313	1.350724	1.439048	1.64096	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5037	0.865282	0.87083	0.876651	0.882761	0.889182	0.895935	0.903047	0.910542	0.918451	0.926806	0.93564	0.94499	0.954898	0.965408	0.976566	0.988424	1.001038	1.014468	1.028778	1.044043	1.06034	1.077764	1.096425	1.116465	1.13808	1.161566	1.1874	1.216411	1.250144	1.291714	1.348173	1.439152	1.652032	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5073.5	0.864646	0.87015	0.875924	0.881983	0.888348	0.895042	0.902088	0.909512	0.917343	0.925613	0.934354	0.943604	0.953403	0.963792	0.97482	0.986536	0.998995	1.012257	1.026387	1.041458	1.05755	1.074757	1.093195	1.113013	1.134418	1.157721	1.183426	1.212408	1.246284	1.288303	1.34583	1.439512	1.663999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5110	0.864016	0.869477	0.875204	0.881213	0.887524	0.894158	0.901139	0.908494	0.916249	0.924435	0.933086	0.942238	0.951929	0.962201	0.973101	0.984678	0.996987	1.010086	1.024041	1.038924	1.054817	1.071817	1.090042	1.109649	1.130855	1.153989	1.179583	1.208553	1.242588	1.285074	1.343682	1.440114	1.676904	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5146.5	0.863391	0.86881	0.874492	0.880451	0.886708	0.893284	0.900202	0.907488	0.915168	0.923273	0.931835	0.94089	0.950476	0.960634	0.971409	0.982851	0.995013	1.007954	1.021739	1.03644	1.052141	1.068941	1.086963	1.10637	1.12739	1.15037	1.175868	1.204842	1.239052	1.282016	1.341719	1.440946	1.6908	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5183	0.862772	0.868149	0.873786	0.879697	0.885901	0.892419	0.899275	0.906493	0.9141	0.922126	0.930601	0.939561	0.949044	0.95909	0.969743	0.981053	0.993073	1.00586	1.019479	1.034005	1.049521	1.06613	1.083958	1.103175	1.124022	1.146861	1.172277	1.20127	1.235668	1.279121	1.339932	1.441999	1.705746	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5219.5	0.862158	0.867494	0.873087	0.87895	0.885102	0.891564	0.898359	0.905511	0.913046	0.920993	0.929383	0.938251	0.947632	0.957569	0.968104	0.979285	0.991166	1.003803	1.017263	1.031619	1.046957	1.063382	1.081025	1.100064	1.120749	1.14346	1.168807	1.197831	1.232429	1.276382	1.338309	1.44326	1.721816	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5256	0.86155	0.866846	0.872394	0.87821	0.884311	0.890718	0.897453	0.90454	0.912004	0.919874	0.928181	0.936958	0.946241	0.956071	0.96649	0.977546	0.989292	1.001784	1.015089	1.029281	1.044448	1.060697	1.078165	1.097034	1.117568	1.140164	1.165455	1.194523	1.229331	1.273792	1.336843	1.444721	1.739092	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5292.5	0.860947	0.866203	0.871709	0.877478	0.883529	0.889882	0.896558	0.90358	0.910975	0.91877	0.926995	0.935683	0.94487	0.954596	0.964902	0.975836	0.98745	0.999802	1.012957	1.026991	1.041994	1.058074	1.075374	1.094085	1.114479	1.136969	1.162217	1.191339	1.226367	1.271342	1.335525	1.446372	1.757675	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5329	0.860349	0.865566	0.87103	0.876753	0.882755	0.889054	0.895672	0.902632	0.909959	0.91768	0.925825	0.934426	0.943519	0.953143	0.963339	0.974154	0.985641	0.997856	1.010867	1.024748	1.039593	1.055512	1.072654	1.091214	1.111478	1.133875	1.159089	1.188276	1.223532	1.269026	1.334346	1.448205	1.77768	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5365.5	0.859757	0.864935	0.870357	0.876036	0.881989	0.888235	0.894796	0.901694	0.908954	0.916603	0.92467	0.933187	0.942188	0.951712	0.961801	0.972501	0.983863	0.995947	1.008817	1.022552	1.037245	1.053011	1.070001	1.088421	1.108565	1.130878	1.156068	1.185328	1.220819	1.266837	1.333299	1.450211	1.799246	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5402	0.85917	0.86431	0.869691	0.875325	0.88123	0.887425	0.89393	0.900768	0.907963	0.915541	0.923531	0.931964	0.940876	0.950303	0.960287	0.970875	0.982117	0.994073	1.006808	1.020401	1.034949	1.050568	1.067415	1.085703	1.105736	1.127975	1.15315	1.182492	1.218225	1.26477	1.332376	1.452385	1.822535	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5438.5	0.858588	0.863691	0.869031	0.874622	0.88048	0.886624	0.893074	0.899853	0.906983	0.914491	0.922406	0.930759	0.939582	0.948915	0.958798	0.969276	0.980402	0.992234	1.004839	1.018296	1.032704	1.048184	1.064896	1.08306	1.102991	1.125164	1.150333	1.179764	1.215742	1.262817	1.331571	1.454717	1.847742	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5475	0.858011	0.863077	0.868378	0.873925	0.879737	0.885831	0.892228	0.898948	0.906015	0.913456	0.921297	0.92957	0.938308	0.947549	0.957333	0.967705	0.978718	0.99043	1.002909	1.016236	1.03051	1.045857	1.062441	1.080489	1.100325	1.122441	1.147612	1.177139	1.213368	1.260974	1.330877	1.457202	1.875101	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5511.5	0.85744	0.862469	0.867731	0.873236	0.879002	0.885047	0.891391	0.898054	0.905059	0.912433	0.920203	0.928398	0.937053	0.946204	0.955891	0.966161	0.977064	0.98866	1.001018	1.01422	1.028366	1.043586	1.060049	1.077988	1.097739	1.119805	1.144985	1.174613	1.211096	1.259234	1.330288	1.459834	1.904893	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5548	0.856873	0.861867	0.86709	0.872554	0.878275	0.884272	0.890563	0.89717	0.904115	0.911424	0.919123	0.927243	0.935817	0.94488	0.954474	0.964643	0.97544	0.986925	0.999166	1.012247	1.026271	1.041371	1.057719	1.075557	1.095229	1.117253	1.142448	1.172183	1.208922	1.257593	1.329798	1.462607	1.937465	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5584.5	0.856312	0.86127	0.866455	0.871878	0.877556	0.883505	0.889745	0.896297	0.903183	0.910428	0.918059	0.926104	0.934598	0.943577	0.953079	0.963152	0.973847	0.985223	0.997351	1.010317	1.024225	1.03921	1.05545	1.073194	1.092793	1.114782	1.139998	1.169844	1.206843	1.256046	1.329402	1.465515	1.973243	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5621	0.855756	0.860679	0.865826	0.871209	0.876844	0.882746	0.888937	0.895435	0.902263	0.909445	0.917008	0.924982	0.933399	0.942294	0.951708	0.961687	0.972282	0.983554	0.995575	1.008429	1.022225	1.037102	1.053241	1.070896	1.09043	1.112389	1.137632	1.167593	1.204853	1.254587	1.329093	1.468553	2.012762	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5657.5	0.855205	0.860094	0.865204	0.870547	0.876139	0.881996	0.888137	0.894583	0.901354	0.908475	0.915973	0.923876	0.932217	0.941032	0.95036	0.960248	0.970747	0.981919	0.993835	1.006583	1.020273	1.035046	1.051089	1.068662	1.088137	1.110072	1.135347	1.165426	1.202949	1.253213	1.328868	1.471716	2.056699	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5694	0.854659	0.859514	0.864588	0.869892	0.875442	0.881255	0.887347	0.893741	0.900456	0.907518	0.914951	0.922786	0.931054	0.93979	0.949035	0.958834	0.969241	0.980315	0.992131	1.004778	1.018366	1.033041	1.048994	1.066491	1.085912	1.107829	1.13314	1.16334	1.201126	1.251919	1.328722	1.474999	2.105935	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5730.5	0.854118	0.85894	0.863978	0.869244	0.874753	0.880521	0.886567	0.892909	0.89957	0.906573	0.913944	0.921712	0.929908	0.938568	0.947732	0.957446	0.967763	0.978744	0.990464	1.003013	1.016504	1.031086	1.046954	1.06438	1.083753	1.105657	1.131008	1.161332	1.199382	1.250701	1.328649	1.478398	2.161626	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5767	0.853582	0.858371	0.863375	0.868603	0.874071	0.879796	0.885795	0.892088	0.898696	0.905642	0.912952	0.920654	0.92878	0.937366	0.946452	0.956083	0.966313	0.977204	0.988832	1.001287	1.014687	1.02918	1.044968	1.062328	1.081658	1.103553	1.128948	1.159399	1.197713	1.249555	1.328646	1.481909	2.225343	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5803.5	0.853052	0.857808	0.862777	0.867968	0.873397	0.87908	0.885033	0.891277	0.897833	0.904723	0.911973	0.919612	0.92767	0.936184	0.945194	0.954745	0.964891	0.975696	0.987234	0.9996	1.012912	1.027322	1.043035	1.060334	1.079626	1.101516	1.126958	1.157537	1.196114	1.248478	1.328709	1.485529	2.299271	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5840	0.852526	0.857251	0.862186	0.867341	0.872731	0.878371	0.88428	0.890476	0.896981	0.903816	0.911008	0.918585	0.926578	0.935022	0.943958	0.953431	0.963497	0.974218	0.985671	0.997952	1.01118	1.025511	1.041153	1.058396	1.077653	1.099543	1.125035	1.155743	1.194584	1.247466	1.328834	1.489252	2.386567	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999
5876.5	0.852006	0.8567	0.861601	0.86672	0.872071	0.877671	0.883536	0.889686	0.89614	0.902923	0.910058	0.917574	0.925503	0.933879	0.942743	0.952142	0.962129	0.97277	0.984142	0.996341	1.009489	1.023745	1.039321	1.056512	1.075739	1.097631	1.123176	1.154016	1.193118	1.246515	1.329017	1.493075	2.492005	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999	99.999

EFFECTIVE STRESS (kPa)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	4.335156	0.292132	0.047353	0.018992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	7.546361	1.453549	0.259813	0.087304	0.043924	0.02687	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	10.45556	3.163349	0.75802	0.239455	0.110874	0.064475	0.042234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	13.19005	5.110306	1.576664	0.518	0.226439	0.125458	0.080373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	15.80444	7.160905	2.669099	0.957215	0.409284	0.217531	0.135064	0.092455	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	18.32871	9.256563	3.969033	1.57101	0.678513	0.350109	0.211079	0.141732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	20.7816	11.36934	5.41985	2.353972	1.049742	0.533636	0.313672	0.206196	0.1397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	23.17589	13.48498	6.979428	3.289275	1.532376	0.778475	0.448829	0.289229	0.20172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	25.52073	15.59588	8.617672	4.355971	2.129076	1.09368	0.622955	0.394459	0.271642	0.116866	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	27.82302	17.69795	10.31319	5.533326	2.836924	1.486022	0.842444	0.525887	0.357066	0.249001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	30.08812	19.78897	12.05068	6.802763	3.649245	1.959512	1.11319	0.687747	0.460923	0.327901	0.137208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	32.32027	21.86782	13.81902	8.148432	4.557319	2.515436	1.440165	0.884311	0.586063	0.41433	0.290831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	34.52293	23.93401	15.61007	9.557136	5.551663	3.152743	1.827116	1.119674	0.73545	0.515182	0.375707	0.117666	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	36.69897	25.98745	17.41775	11.01801	6.62286	3.868601	2.276438	1.397544	0.912099	0.633307	0.462057	0.312202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	38.85078	28.02826	19.23749	12.52216	7.762035	4.658962	2.789189	1.721067	1.118977	0.771028	0.559309	0.409988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	40.98041	30.0567	21.0658	14.06229	8.961082	5.519056	3.365228	2.092706	1.358891	0.9306	0.670529	0.498938	0.272862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	43.08961	32.0731	22.89999	15.63242	10.21274	6.443773	4.003415	2.514183	1.63439	1.114254	0.797733	0.593794	0.418762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	45.1799	34.07784	24.73798	17.2276	11.51059	7.427944	4.701833	2.986482	1.947679	1.324152	0.942716	0.699154	0.520538	0.163878	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	47.25262	36.07131	26.57816	18.84377	12.84899	8.466529	5.458005	3.509892	2.300557	1.56234	1.107217	0.817329	0.617216	0.39815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	49.30894	38.05392	28.41923	20.47754	14.22302	9.554732	6.269079	4.08409	2.69439	1.83069	1.292937	0.949995	0.719146	0.523768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	51.3499	40.02607	30.2602	22.12605	15.62837	10.68807	7.131991	4.708231	3.130093	2.130861	1.501523	1.09863	0.830343	0.627244	0.278879	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	53.37643	41.98813	32.10026	23.78696	17.0613	11.86239	8.043587	5.381057	3.608153	2.464257	1.734534	1.264633	0.952967	0.728961	0.477385	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	55.38936	43.94049	33.93877	25.45824	18.51853	13.07391	9.000712	6.100985	4.128659	2.832008	1.993417	1.449355	1.088557	0.835751	0.608013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	57.38945	45.88349	35.77524	27.13822	19.99723	14.31916	10.00028	6.866206	4.691339	3.234963	2.279477	1.654099	1.238404	0.95081	0.719801	0.32885	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	59.37737	47.81748	37.60927	28.82545	21.49488	15.59501	11.03932	7.674751	5.295617	3.673688	2.593855	1.880102	1.40369	1.076046	0.828299	0.537061	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	61.35376	49.74279	39.44054	30.5187	23.00931	16.89863	12.115	8.524565	5.940658	4.148478	2.937517	2.128523	1.585531	1.212838	0.940075	0.679496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	63.31917	51.65972	41.26879	32.21693	24.53861	18.22744	13.22465	9.413551	6.625423	4.659379	3.311236	2.400428	1.784994	1.362329	1.058484	0.800565	0.38852	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	65.27412	53.56857	43.09384	33.91923	26.08107	19.57914	14.36578	10.33961	7.348709	5.206207	3.715598	2.696769	2.003095	1.525541	1.185545	0.915814	0.595655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	67.21909	55.46962	44.91553	35.62483	27.63522	20.95164	15.53604	11.30069	8.109199	5.788579	4.150999	3.018382	2.240792	1.703427	1.322673	1.032211	0.741286	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	69.15452	57.36312	46.73374	37.33306	29.19975	22.34306	16.73328	12.29478	8.905493	6.40594	4.617658	3.365971	2.498975	1.89689	1.470978	1.153371	0.867211	0.289882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	71.08081	59.24933	48.54841	39.04333	30.77348	23.75171	17.95547	13.31993	9.736141	7.057591	5.115622	3.74011	2.778458	2.106788	1.631409	1.281553	0.987167	0.553746	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	72.99835	61.1285	50.35945	40.75516	32.3554	25.17604	19.20078	14.37431	10.59967	7.742714	5.644785	4.141238	3.07997	2.333932	1.804826	1.418318	1.107244	0.736525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	74.90748	63.00083	52.16684	42.46809	33.94458	26.61467	20.46747	15.45613	11.4946	8.4604	6.204901	4.569665	3.404152	2.579083	1.992025	1.564825	1.230866	0.886422	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	76.80853	64.86655	53.97054	44.18174	35.5402	28.06636	21.75398	16.56373	12.41947	9.209669	6.795601	5.025572	3.75155	2.842945	2.193762	1.722014	1.360203	1.022041	0.418811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	78.7018	66.72586	55.77055	45.8958	37.14155	29.52996	23.05884	17.69552	13.37284	9.98949	7.41641	5.509024	4.122613	3.126165	2.410744	1.890696	1.496768	1.152462	0.671406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	80.58758	68.57895	57.56687	47.60995	38.74795	31.00444	24.38072	18.85002	14.35331	10.7988	8.066765	6.019971	4.517692	3.429321	2.643641	2.071605	1.641705	1.282746	0.860338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	82.46613	70.426	59.3595	49.32396	40.35884	32.48886	25.71837	20.02582	15.35953	11.63652	8.746026	6.558266	4.937048	3.752927	2.893076	2.265419	1.795938	1.415999	1.020382	0.210009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	84.3377	72.2672	61.14846	51.03759	41.97369	33.98239	27.07066	21.22161	16.39018	12.50155	9.453495	7.123666	5.380844	4.097423	3.159628	2.472771	1.960258	1.554288	1.166817	0.559932	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	86.20254	74.10271	62.93378	52.75066	43.59202	35.48423	28.43654	22.43615	17.44402	13.39282	10.18843	7.715851	5.849158	4.463179	3.443826	2.694258	2.135362	1.699088	1.30768	0.796294	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	88.06086	75.93268	64.71547	54.46298	45.21341	36.99369	29.81504	23.66829	18.51984	14.30925	10.95004	8.334428	6.341987	4.850493	3.746149	2.930439	2.321889	1.851522	1.447623	0.983141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	89.91287	77.75728	66.49359	56.17442	46.83748	38.51013	31.20526	24.91696	19.61649	15.24978	11.73753	8.978945	6.85925	5.25959	4.067021	3.181836	2.520428	2.012487	1.589582	1.147638	0.316181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	91.75876	79.57663	68.26815	57.88484	48.46388	40.03294	32.60638	26.18114	20.7329	16.21339	12.55007	9.648897	7.400794	5.69063	4.406813	3.448935	2.731528	2.182735	1.735691	1.301084	0.639369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	93.59873	81.39088	70.03919	59.59413	50.09231	41.56161	34.01764	27.45989	21.86801	17.19908	13.38684	10.34374	7.966407	6.143701	4.76584	3.732179	2.955702	2.362929	1.887495	1.44973	0.877533	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	95.43295	83.20017	71.80676	61.30218	51.72246	43.09562	35.43833	28.75233	23.02085	18.20588	14.247	11.06289	8.555817	6.618833	5.144362	4.031972	3.193431	2.553667	2.046146	1.597491	1.075084	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1642.5	97.26159	85.00462	73.5709	63.00891	53.3541	44.63454	36.86781	30.05763	24.19049	19.23284	15.12973	11.80575	9.168703	7.115992	5.542586	4.348676	3.445165	2.755496	2.212553	1.747001	1.250931	0.385772	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	99.08481	86.80434	75.33165	64.71424	54.98699	46.17794	38.30545	31.37503	25.37605	20.27906	16.03422	12.57169	9.804701	7.635093	5.960662	4.682611	3.71132	2.968921	2.38747	1.90013	1.415084	0.707474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	100.9028	88.59946	77.08905	66.4181	56.62091	47.72544	39.75072	32.70379	26.57668	21.34368	16.95965	13.36007	10.46341	8.175998	6.39869	5.034051	3.992282	3.194408	2.571539	2.058274	1.573514	0.952941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	102.7156	90.39009	78.84315	68.12044	58.25567	49.2767	41.20309	34.04326	27.79161	22.42586	17.90525	14.17024	11.1444	8.738523	6.856721	5.40323	4.288403	3.432391	2.765329	2.22252	1.73008	1.159922	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	104.5234	92.17633	80.59399	69.8212	59.8911	50.83139	42.66207	35.39279	29.02009	23.52481	18.87024	15.00156	11.84721	9.322443	7.334758	5.790337	4.600001	3.683272	2.969351	2.393745	1.887429	1.345439	0.469256	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	106.3264	93.95828	82.34161	71.52035	61.52704	52.38921	44.12722	36.7518	30.26141	24.63975	19.85387	15.85336	12.57136	9.927495	7.832762	6.19552	4.927358	3.947425	3.184072	2.572681	2.047465	1.518815	0.782371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	108.1246	95.73604	84.08606	73.21783	63.16334	53.94988	45.59812	38.11973	31.51491	25.76997	20.85541	16.72501	13.31636	10.55339	8.350649	6.618887	5.270725	4.225194	3.409919	2.759957	2.211621	1.685612	1.017371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	109.9182	97.50971	85.82738	74.91363	64.79987	55.51316	47.07439	39.49607	32.77996	26.91475	21.87417	17.61586	14.08169	11.19979	8.8883	7.060503	5.630314	4.516893	3.647289	2.956122	2.380985	1.848876	1.217942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	111.7074	99.27938	87.56562	76.60771	66.4365	57.0788	48.55567	40.88034	34.05597	28.07345	22.90945	18.52528	14.86685	11.86637	9.44556	7.5204	6.006305	4.822808	3.89655	3.161663	2.556367	2.011387	1.402565	0.224213	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	113.4921	101.0451	89.30081	78.30006	68.07313	58.6466	50.04162	42.27206	35.34237	29.24541	23.96061	19.45265	15.67132	12.55274	10.02224	7.998569	6.398843	5.143197	4.158037	3.377006	2.738469	2.17553	1.578112	0.592301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	115.2725	102.807	91.03301	79.99064	69.70966	60.21634	51.53192	43.67083	36.63865	30.43005	25.027	20.39735	16.49456	13.25854	10.61814	8.494973	6.808041	5.478286	4.43206	3.602541	2.927941	2.342993	1.748721	0.87928	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	117.0488	104.5652	92.76226	81.67945	71.34599	61.78784	53.02629	45.07624	37.94429	31.62679	26.10801	21.3588	17.33606	13.98335	11.233	9.009537	7.233978	5.828275	4.718899	3.838629	3.125367	2.514997	1.917246	1.122828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	118.8209	106.3197	94.48858	83.36648	72.98203	63.36093	54.52445	46.48791	39.25883	32.83506	27.20306	22.33642	18.1953	14.72676	11.86657	9.542162	7.676702	6.19333	5.01881	4.085611	3.331264	2.692474	2.08578	1.340447	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	120.5891	108.0706	96.21204	85.0517	74.61772	64.93545	56.02615	47.90549	40.58182	34.05437	28.31158	23.32963	19.07175	15.48837	12.51856	10.09272	8.136232	6.573592	5.332025	4.343805	3.546091	2.876173	2.255916	1.541937	0.252026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	122.3533	109.8179	97.93266	86.73512	76.25297	66.51124	57.53115	49.32865	41.91283	35.28421	29.43302	24.33789	19.96492	16.26775	13.18869	10.66105	8.612555	6.969172	5.658753	4.613503	3.770257	3.066714	2.428912	1.733428	0.63901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	124.1137	111.5618	99.65049	88.41674	77.88772	68.08817	59.03922	50.75707	43.25148	36.5241	30.56688	25.36067	20.8743	17.06447	13.87662	11.24698	9.105633	7.380157	5.99918	4.89498	4.004133	3.26463	2.60578	1.919046	0.94595	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	125.8704	113.3023	101.3656	90.09654	79.52192	69.66611	60.55015	52.19046	44.59737	37.7736	31.71264	26.39744	21.79939	17.87811	14.58205	11.85032	9.615404	7.806605	6.353467	5.188482	4.248053	3.470386	2.787358	2.101723	1.208653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	127.6233	115.0395	103.0779	91.77452	81.1555	71.24493	62.06375	53.62854	45.95016	39.03227	32.86983	27.44771	22.73972	18.70823	15.30463	12.47084	10.14178	8.248551	6.721756	5.494236	4.502325	3.684396	2.974354	2.283625	1.444266	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	129.3727	116.7734	104.7876	93.45069	82.78842	72.82453	63.57984	55.07105	47.3095	40.29973	34.03799	28.51099	23.6948	19.55441	16.04402	13.10831	10.68465	8.706007	7.104162	5.812447	4.76723	3.907034	3.167373	2.466409	1.662581	0.32502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	131.1186	118.5041	106.4946	95.12505	84.42063	74.4048	65.09824	56.51775	48.67508	41.57556	35.21668	29.58682	24.66417	20.41622	16.79988	13.7625	11.24389	9.178961	7.50078	6.143297	5.043024	4.138639	3.366945	2.651382	1.869808	0.712298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	132.861	120.2316	108.1991	96.79759	86.05209	75.98565	66.61878	57.96839	50.04659	42.85941	36.40548	30.67474	25.64739	21.29326	17.57184	14.43313	11.81935	9.667381	7.911683	6.486949	5.329942	4.379523	3.573535	2.839593	2.070155	1.024964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	134.6	121.956	109.9009	98.46833	87.68275	77.56697	68.14133	59.42277	51.42374	44.15092	37.60399	31.77432	26.644	22.18509	18.35955	15.11994	12.41086	10.17121	8.336923	6.843543	5.628199	4.62997	3.787561	3.031903	2.266341	1.294388	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	136.3357	123.6775	111.6002	100.1373	89.31259	79.14869	69.66572	60.88068	52.80626	45.44977	38.81181	32.88514	27.65358	23.09131	19.16266	15.82266	13.01825	10.69039	8.776531	7.2132	5.93799	4.890245	4.009395	3.228989	2.460535	1.539216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	138.0681	125.3959	113.297	101.8044	90.94158	80.73072	71.19184	62.34191	54.19389	46.75562	40.02858	34.00679	28.67571	24.01152	19.98081	16.54099	13.64132	11.22481	9.23052	7.596023	6.259489	5.160587	4.239368	3.43144	2.654696	1.767997	0.344335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	139.7974	127.1114	114.9914	103.4697	92.56967	82.31299	72.71954	63.80628	55.58639	48.06817	41.25395	35.13888	29.70999	24.94532	20.81364	17.27464	14.27988	11.77439	9.698881	7.992092	6.592854	5.441215	4.47778	3.639805	2.850307	1.986184	0.734867	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	141.5234	128.824	116.6833	105.1333	94.19684	83.89544	74.24871	65.27362	56.98352	49.38714	42.48756	36.28104	30.75601	25.89232	21.66079	18.02333	14.9337	12.33899	10.18159	8.401472	6.938222	5.732332	4.72491	3.854575	3.048513	2.197568	1.059279	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	143.2464	130.5337	118.3728	106.7951	95.82308	85.47799	75.77925	66.74377	58.38505	50.71225	43.72911	37.43289	31.8134	26.85215	22.52192	18.78674	15.60256	12.91848	10.67861	8.824209	7.295713	6.034118	4.981023	4.076187	3.250227	2.404921	1.344577	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	144.9664	132.2407	120.0599	108.4551	97.44835	87.06058	77.31103	68.21655	59.79079	52.04323	44.97827	38.5941	32.88178	27.82443	23.39667	19.56459	16.28623	13.51271	11.18987	9.260331	7.66543	6.346744	5.24636	4.305028	3.456205	2.610339	1.604667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	146.6834	133.9449	121.7447	110.1133	99.07263	88.64316	78.84396	69.69183	61.20052	53.37984	46.23475	39.76432	33.9608	28.8088	24.2847	20.35656	16.98448	14.12153	11.71532	9.709848	8.047459	6.670361	5.521147	4.541445	3.667082	2.815457	1.847872	0.361935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	148.3975	135.6464	123.4271	111.7698	100.6959	90.22566	80.37795	71.16947	62.61405	54.72182	47.49825	40.94323	35.05011	29.8049	25.18567	21.16236	17.69705	14.74476	12.25485	10.17276	8.441871	7.005107	5.805592	4.78575	3.883405	3.021581	2.079664	0.762453	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	150.1086	137.3453	125.1073	113.4246	102.3182	91.80805	81.9129	72.64932	64.03121	56.06896	48.76852	42.13052	36.14937	30.81238	26.09924	21.98168	18.42371	15.38223	12.80838	10.64904	8.848722	7.351105	6.099885	5.038224	4.105649	3.229775	2.303872	1.098433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	151.817	139.0415	126.7852	115.0776	103.9394	93.39028	83.44873	74.13126	65.45183	57.42103	50.04527	43.32589	37.25825	31.83092	27.02509	22.81423	19.16419	16.03376	13.37578	11.13866	9.268053	7.708465	6.4042	5.299126	4.334232	3.440919	2.523304	1.395735	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	153.5225	140.7351	128.4609	116.7289	105.5595	94.97229	84.98535	75.61517	66.87572	58.77782	51.32827	44.52905	38.37643	32.86017	27.96289	23.6597	19.91825	16.69914	13.95694	11.64157	9.69989	8.077279	6.718695	5.568688	4.569529	3.655757	2.740092	1.667789	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	155.2253	142.4262	130.1343	118.3785	107.1786	96.55404	86.5227	77.10093	68.30275	60.13913	52.61726	45.73972	39.50362	33.89983	28.91232	24.5178	20.68562	17.37817	14.55173	12.15772	10.14425	8.457629	7.043514	5.847127	4.811873	3.874923	2.955902	1.922684	0.400422	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2883.5	156.9254	144.1148	131.8056	120.0263	108.7967	98.1355	88.06069	78.58844	69.73275	61.50477	53.91202	46.95764	40.63952	34.94958	29.87308	25.38824	21.46606	18.07066	15.16	12.68703	10.60112	8.849581	7.378785	6.134637	5.061566	4.098966	3.172065	2.16577	0.803961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	158.6229	145.8009	133.4747	121.6725	110.4136	99.71663	89.59926	80.07758	71.16558	62.87455	55.21232	48.18254	41.78383	36.00911	30.84486	26.27072	22.25929	18.77638	15.7816	13.22942	11.07051	9.253188	7.724622	6.4314	5.318882	4.328364	3.389667	2.400676	1.139444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	160.3177	147.4846	135.1417	123.317	112.0294	101.2974	91.13835	81.56827	72.60112	64.24831	56.51796	49.41417	42.9363	37.07814	31.82736	27.16496	23.06507	19.49514	16.41638	13.7848	11.55238	9.668491	8.081129	6.737577	5.584069	4.56354	3.609562	2.62954	1.438535	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	162.0099	149.1658	136.8066	124.9598	113.6441	102.8777	92.67789	83.06039	74.03922	65.62587	57.82871	50.65231	44.09664	38.15639	32.82029	28.07067	23.88314	20.2267	17.06418	14.35307	12.04669	10.09552	8.448392	7.053318	5.857354	4.804852	3.832399	2.854747	1.714889	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	163.6996	150.8447	138.4694	126.6009	115.2577	104.4577	94.21782	84.55387	75.47976	67.00707	59.1444	51.89672	45.2646	39.24356	33.82337	28.98759	24.71324	20.97086	17.72482	14.93412	12.55341	10.53429	8.826488	7.378757	6.138938	5.052607	4.058812	3.078312	1.975521	0.346534	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	165.3868	152.5212	140.1301	128.2404	116.8702	106.0371	95.75808	86.04862	76.92263	68.39176	60.46483	53.14717	46.43994	40.3394	34.83632	29.91543	25.55512	21.72739	18.39813	15.52783	13.07247	10.9848	9.21548	7.714014	6.429001	5.307092	4.289401	3.301722	2.225118	0.760032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	167.0715	154.1955	141.7888	129.8782	118.4815	107.6161	97.29863	87.54455	78.3677	69.77978	61.78981	54.40346	47.62241	41.44365	35.85887	30.85393	26.40852	22.49606	19.08394	16.13408	13.60382	11.44706	9.615419	8.059191	6.727707	5.568578	4.524696	3.526122	2.46704	1.113024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	168.7538	155.8674	143.4455	131.5144	120.0917	109.1945	98.83941	89.04159	79.81487	71.17101	63.11918	55.66539	48.81178	42.55605	36.89076	31.80283	27.2732	23.27667	19.78206	16.75273	14.14736	11.92103	10.02634	8.414383	7.035208	5.837316	4.765161	3.752433	2.7038	1.428843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	170.4336	157.5371	145.1002	133.1489	121.7007	110.7724	100.3804	90.53966	81.26404	72.5653	64.45277	56.93274	50.00783	43.67636	37.93172	32.76186	28.14891	24.06898	20.49231	17.38365	14.70303	12.40671	10.44828	8.779668	7.351646	6.113542	5.011198	3.98142	2.937341	1.719873	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	172.1111	159.2045	146.7528	134.7818	123.3086	112.3498	101.9215	92.03869	82.71511	73.96252	65.79041	58.20534	51.21034	44.80434	38.98151	33.73078	29.0354	24.87278	21.2145	18.0267	15.27073	12.90404	10.88125	9.155117	7.677152	6.397468	5.263165	4.213725	3.169207	1.99366	0.281198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	173.7862	160.8698	148.4036	136.4131	124.9153	113.9265	103.4627	93.53861	84.16797	75.36255	67.13196	59.48299	52.4191	45.93975	40.03989	34.70933	29.93244	25.68784	21.94844	18.68173	15.85036	13.41298	11.32525	9.540791	8.011843	6.689291	5.521375	4.449905	3.40065	2.255234	0.71567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	175.459	162.5328	150.0524	138.0428	126.5208	115.5026	105.0039	95.03936	85.62254	76.76528	68.47726	60.76553	53.63391	47.08239	41.10661	35.69728	30.83979	26.51395	22.69395	19.34859	16.44181	13.93348	11.78029	9.93674	8.355827	6.989187	5.786111	4.69044	3.6327	2.508165	1.085143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	177.1295	164.1937	151.6992	139.6709	128.1252	117.0781	106.5451	96.54087	87.07873	78.17057	69.82617	62.05278	54.85457	48.23203	42.18145	36.69438	31.75721	27.35088	23.45082	20.02711	17.04498	14.46547	12.24635	10.34301	8.709202	7.297318	6.057626	4.935754	3.866225	2.755103	1.415041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	178.7977	165.8525	153.3442	141.2974	129.7284	118.653	108.0864	98.04308	88.53646	79.57833	71.17856	63.34458	56.08089	49.38846	43.26418	37.70042	32.68448	28.19842	24.21886	20.71715	17.65975	15.00889	12.72342	10.75962	9.072052	7.61383	6.336151	5.186223	4.101958	2.998084	1.718607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	180.4638	167.5092	154.9872	142.9223	131.3304	120.2271	109.6275	99.54594	89.99564	80.98844	72.53428	64.64078	57.3127	50.55148	44.35459	38.71514	33.62137	29.05636	24.99789	21.41853	18.28598	15.56366	13.21146	11.18661	9.444452	7.938857	6.621891	5.442181	4.340532	3.238716	2.003791	0.229004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	182.1276	169.1638	156.6284	144.5457	132.9313	121.8006	111.1686	101.0494	91.4562	82.40082	73.89323	65.94121	58.54982	51.72089	45.45236	39.73835	34.56766	29.92448	25.78771	22.1311	18.92357	16.1297	13.71044	11.62398	9.826468	8.272518	6.915037	5.70393	4.582494	3.478298	2.27585	0.679427	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	183.7892	170.8163	158.2678	146.1675	134.531	123.3734	112.7095	102.5534	92.91807	83.81535	75.25526	67.24534	59.79208	52.8965	46.55759	40.76982	35.52313	30.80257	26.58812	22.85469	19.57238	16.70691	14.22032	12.07114	10.21816	8.614922	7.215759	5.971742	4.828325	3.717898	2.538444	1.058484	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	185.4486	172.4668	159.9053	147.7877	136.1294	124.9454	114.2503	104.0578	94.38117	85.23194	76.62028	68.55421	61.03931	54.07813	47.66977	41.80934	36.48757	31.69043	27.39894	23.58914	20.23227	17.2952	14.74105	12.52989	10.61956	8.966164	7.524215	6.245861	5.078448	3.958385	2.793931	1.396053	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	187.106	174.1153	161.5409	149.4064	137.7267	126.5167	115.7908	105.5628	95.84543	86.65052	77.98815	69.86651	62.29135	55.2656	48.78881	42.85671	37.46077	32.58785	28.21997	24.33426	20.9031	17.89448	15.27257	12.99842	11.03072	9.326331	7.840547	6.526511	5.33323	4.200445	3.044512	1.707273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	188.7612	175.7618	163.1748	151.0235	139.3228	128.0873	117.3312	107.0681	97.31079	88.07098	79.35878	71.18248	63.54806	56.45874	49.91452	43.91172	38.44252	33.49462	29.05103	25.08991	21.58475	18.50464	15.81482	13.47732	11.45166	9.695498	8.164884	6.81389	5.592986	4.444712	3.292065	1.999993	0.133839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	190.4143	177.4063	164.8069	152.6392	140.9178	129.6571	118.8713	108.5737	98.77719	89.49324	80.73206	72.50201	64.80928	57.65738	51.04672	44.97418	39.43262	34.41056	29.89192	25.8559	22.27706	19.12558	16.36774	13.96655	11.8824	10.07373	8.497341	7.108178	5.85801	4.691774	3.538019	2.279375	0.60155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	192.0653	179.0488	166.4372	154.2532	142.5115	131.2261	120.4111	110.0797	100.2446	90.91723	82.10788	73.82498	66.07487	58.86135	52.18523	46.0439	40.43088	35.33546	30.74246	26.63207	22.97989	19.75718	16.93125	14.46608	12.32296	10.46109	8.838022	7.409539	6.128572	4.942151	3.783504	2.549063	0.997406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	193.7143	180.6895	168.0657	155.8658	144.104	132.7944	121.9506	111.5859	101.7128	92.34287	83.48616	75.15126	67.34469	60.0705	53.32987	47.12069	41.43709	36.26912	31.60246	27.41824	23.6931	20.39933	17.50528	14.97589	12.77333	10.85761	9.187018	7.718122	6.404925	5.196296	4.029444	2.811753	1.349779	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	195.3613	182.3281	169.6925	157.4769	145.6954	134.3618	123.4898	113.0924	103.182	93.77008	84.86679	76.48075	68.6186	61.28467	54.48048	48.20437	42.45109	37.21137	32.47174	28.21425	24.41654	21.05191	18.08973	15.49592	13.23352	11.26334	9.544413	8.03407	6.687299	5.454609	4.276613	3.069516	1.67345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	197.0062	183.9649	171.3175	159.0864	147.2855	135.9284	125.0286	114.599	104.652	95.19879	86.24969	77.81332	69.89649	62.50372	55.63689	49.29477	43.47267	38.16202	33.35012	29.01994	25.15006	21.7148	18.68454	16.02613	13.70352	11.67831	9.910282	8.35751	6.975905	5.717442	4.525669	3.323987	1.977039	0.036653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	198.6492	185.5998	172.9408	160.6945	148.8744	137.4942	126.5671	116.1058	106.1227	96.62893	87.63476	79.14888	71.17821	63.72751	56.79894	50.39171	44.50166	39.12088	34.23743	29.83513	25.89352	22.38788	19.28959	16.56645	14.1833	12.10254	10.28469	8.688562	7.270933	5.98511	4.77718	3.576485	2.266134	0.524446	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	200.2902	187.2328	174.5624	162.3011	150.4622	139.0592	128.1051	117.6128	107.5941	98.06044	89.02193	80.48732	72.46366	64.95589	57.96647	51.49502	45.53788	40.08777	35.13347	30.65966	26.64676	23.07103	19.9048	17.11684	14.67284	12.53605	10.6677	9.027332	7.57256	6.257894	5.031641	3.828095	2.544626	0.936831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	201.9293	188.864	176.1823	163.9062	152.0488	140.6233	129.6428	119.1198	109.0662	99.49326	90.41111	81.82855	73.75271	66.18873	59.13935	52.60455	46.58117	41.06251	36.03809	31.49336	27.40964	23.76412	20.53008	17.67721	15.17212	12.97884	11.05935	9.373921	7.880944	6.536047	5.289488	4.079726	2.815365	1.302084	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3905.5	203.5664	190.4933	177.8006	165.5098	153.6341	142.1866	131.18	120.6268	110.5389	100.9273	91.80223	83.17246	75.04525	67.4259	60.31741	53.72013	47.63135	42.04495	36.95111	32.33608	28.18201	24.46702	21.16531	18.24752	15.6811	13.43092	11.4597	9.728416	8.196232	6.819801	5.551107	4.332146	3.080522	1.636589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	205.2016	192.1208	179.4171	167.112	155.2183	143.749	132.7168	122.1339	112.0121	102.3625	93.1952	84.51897	76.34117	68.66727	61.50052	54.84161	48.68825	43.0349	37.87236	33.18764	28.96372	25.1796	21.81041	18.82767	16.19974	13.89228	11.86878	10.0909	8.518556	7.109363	5.816841	4.586016	3.341798	1.949669	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	206.8349	193.7465	181.032	168.7127	156.8013	145.3106	134.2531	123.641	113.4859	103.7989	94.58996	85.86798	77.64036	69.91272	62.68855	55.96883	49.75173	44.03219	38.80168	34.04789	29.75462	25.90173	22.46525	19.41759	16.72799	14.36292	12.28661	10.46143	8.848037	7.404923	6.087001	4.841907	3.600562	2.247271	0.451935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	208.4664	195.3705	182.6453	170.3119	158.3831	146.8713	135.7889	125.148	114.9602	105.2363	95.98644	87.21941	78.94273	71.16214	63.88135	57.10166	50.82162	45.03668	39.7389	34.91667	30.55456	26.63329	23.12973	20.01721	17.26581	14.84282	12.71322	10.84009	9.184785	7.706656	6.361865	5.100318	3.857935	2.533484	0.8773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	210.0959	196.9926	184.2569	171.9097	159.9637	148.4311	137.3243	126.655	116.4349	106.6748	97.38456	88.57318	80.24816	72.4154	65.07879	58.23994	51.89776	46.0482	40.68386	35.79382	31.36341	27.37413	23.80375	20.62644	17.81315	15.33197	13.14863	11.22692	9.5289	8.01472	6.641685	5.36169	4.11484	2.810744	1.236969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	211.7237	198.613	185.8668	173.5061	161.5431	149.99	138.8591	128.1619	117.9101	108.1142	98.78427	89.92919	81.55657	73.67239	66.28076	59.38354	52.98002	47.06658	41.6364	36.67919	32.181	28.12413	24.48718	21.24519	18.36994	15.83033	13.59285	11.62198	9.880472	8.329259	6.92669	5.626401	4.371854	3.078293	1.420812	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	213.3496	200.2316	187.4752	175.1011	163.1213	151.5481	140.3933	129.6687	119.3856	109.5545	100.1855	91.28739	82.86786	74.93301	67.48713	60.53233	54.06825	48.09169	42.59638	37.57263	33.00719	28.88315	25.17992	21.87338	18.93613	16.33788	14.04587	12.0253	10.23958	8.650406	7.217078	5.894673	4.627703	3.304403	1.254698	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	214.9736	201.8485	189.082	176.6946	164.6984	153.1052	141.9271	131.1754	120.8614	110.9957	101.5882	92.64768	84.18194	76.19715	68.69778	61.68617	55.16229	49.12337	43.56363	38.47397	33.84185	29.65107	25.88185	22.5109	19.51164	16.85458	14.50771	12.43691	10.6063	8.978271	7.512928	6.165653	4.873084	3.455381	0.950429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	216.5959	203.4637	190.6871	178.2867	166.2742	154.6615	143.4602	132.6819	122.3376	112.4377	102.9922	94.01	85.49872	77.46472	69.91259	62.84494	56.26202	50.16148	44.538	39.38309	34.68482	30.42775	26.59286	23.15767	20.09642	17.3804	14.97834	12.85685	10.98069	9.312872	7.81377	6.436115	5.097634	3.536744	0.577896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	218.2164	205.0772	192.2907	179.8774	167.8489	156.2168	144.9928	134.1882	123.814	113.8805	104.3977	95.37428	86.81812	78.7356	71.13145	64.0085	57.3673	51.20587	45.51936	40.29982	35.53597	31.21306	27.31283	23.81359	20.69039	17.91528	15.45776	13.28512	11.36272	9.653942	8.118261	6.701989	5.296457	3.559947	0.1831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	219.8351	206.6889	193.8927	181.4667	169.4223	157.7713	146.5248	135.6943	125.2906	115.324	105.8044	96.74044	88.14006	80.0097	72.35426	65.17674	58.478	52.2564	46.50755	41.22402	36.39515	32.00686	28.04164	24.47857	21.29347	18.45919	15.94594	13.72167	11.75223	10.00082	8.424532	6.959893	5.46822	3.534518	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	221.4521	208.299	195.4932	183.0546	170.9946	159.3248	148.0563	137.2002	126.7675	116.7683	107.2123	98.10842	89.46445	81.28694	73.5809	66.34955	59.59399	53.31294	47.50244	42.15556	37.26223	32.80904	28.77919	25.1525	21.90559	19.01206	16.44281	14.16638	12.14884	10.35254	8.730626	7.207412	5.613214	3.467796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	223.0674	209.9075	197.0921	184.6411	172.5658	160.8774	149.5871	138.7059	128.2445	118.2131	108.6214	99.47816	90.79122	82.56721	74.81127	67.52679	60.71514	54.37536	48.50388	43.09429	38.13707	33.61945	29.52533	25.83529	22.52666	19.57379	16.94825	14.61899	12.55196	10.70793	9.03473	7.44292	5.732405	3.365517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	224.6809	211.5143	198.6895	186.2262	174.1357	162.429	151.1173	140.2113	129.7217	119.6586	110.0317	100.8496	92.1203	83.85044	76.04528	68.70837	61.84133	55.44351	49.51174	44.04007	39.01953	34.43797	30.27997	26.52681	23.15656	20.14426	17.46203	15.07909	12.96086	11.06577	9.335264	7.665356	5.827007	3.232308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	226.2927	213.1194	200.2853	187.81	175.7045	163.9798	152.6468	141.7164	131.199	121.1047	111.443	102.2227	93.45161	85.13654	77.28282	69.89418	62.97245	56.51729	50.52589	44.99277	39.90948	35.26446	31.04296	27.22693	23.79515	20.72327	17.98387	15.54619	13.3747	11.42484	9.630877	7.874057	5.898308	3.072042	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	227.9028	214.7229	201.8796	189.3924	177.2721	165.5296	154.1758	143.2213	132.6764	122.5513	112.8553	103.5973	94.78508	86.42542	78.5238	71.0841	64.10837	57.59655	51.5462	45.95225	40.80677	36.09879	31.81416	27.93551	24.44225	21.31057	18.51338	16.01967	13.79257	11.78395	9.920434	8.068633	5.947593	2.888069	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	229.5112	216.3248	203.4724	190.9734	178.8385	167.0785	155.7041	144.7258	134.1539	123.9984	114.2687	104.9735	96.12064	87.71701	79.76813	72.27804	65.24898	58.68118	52.57252	46.91837	41.71128	36.94081	32.59342	28.65236	25.09761	21.90583	19.05007	16.49883	14.21353	12.14202	10.20298	8.248895	5.976116	2.68338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4526	231.1179	217.9251	205.0638	192.5531	180.4038	168.6264	157.2317	146.23	135.6314	125.446	115.683	106.3511	97.45823	89.01122	81.01572	73.47589	66.39418	59.77105	53.60474	47.891	42.62284	37.79035	33.38056	29.37726	25.76097	22.50867	19.5934	16.98293	14.63663	12.49802	10.47774	8.414798	5.985091	2.46072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	232.723	219.5238	206.6536	194.1314	181.9679	170.1735	158.7587	147.7338	137.109	126.894	117.0982	107.7302	98.79778	90.30799	82.26648	74.67755	67.54384	60.86605	54.64272	48.86999	43.5413	38.64724	34.17535	30.10995	26.43196	23.11862	20.14276	17.47118	15.06094	12.851	10.74404	8.566412	5.975693	2.222677	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	234.3264	221.1209	208.2419	195.7084	183.5308	171.7195	160.285	149.2373	138.5866	128.3425	118.5143	109.1106	100.1392	91.60723	83.52032	75.88293	68.69785	61.96604	55.68632	49.85518	44.46648	39.51127	34.97755	30.85011	27.11021	23.73517	20.69749	17.96277	15.48554	13.2001	11.00136	8.703892	5.949059	1.971762	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	235.9282	222.7164	209.8288	197.2841	185.0926	173.2647	161.8106	150.7404	140.0641	129.7913	119.9312	110.4923	101.4825	92.90887	84.77716	77.09192	69.85611	63.07089	56.73539	50.8464	45.39818	40.3822	35.78688	31.59739	27.79525	24.35776	21.25687	18.45687	15.90956	13.54454	11.24927	8.827466	5.906292	1.710481	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	237.5284	224.3104	211.4142	198.8584	186.6532	174.8089	163.3355	152.2431	141.5416	131.2405	121.3488	111.8752	102.8276	94.21285	86.03691	78.30442	71.01849	64.18048	57.78977	51.84347	46.33619	41.25977	36.60302	32.3514	28.48659	24.98576	21.82019	18.95265	16.33215	13.88363	11.48744	8.937417	5.848461	1.44144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	239.1269	225.9028	212.9981	200.4314	188.2127	176.3521	164.8598	153.7455	143.0191	132.69	122.7672	113.2594	104.1744	95.51907	87.29948	79.52032	72.18486	65.29465	58.84929	52.84618	47.28026	42.14369	37.4256	33.11169	29.1837	25.61854	22.38669	19.44931	16.75253	14.21674	11.71561	9.034077	5.776606	1.167491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	240.7239	227.4937	214.5806	202.0031	189.771	177.8944	166.3833	155.2474	144.4964	134.1397	124.1864	114.6448	105.5228	96.82746	88.56477	80.73952	73.3551	66.41324	59.91376	53.85431	48.23011	43.03362	38.25422	33.87778	29.88599	26.25541	22.95562	19.94604	17.16995	14.54332	11.93361	9.117815	5.691735	0.891996	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	242.3193	229.0831	216.1617	203.5734	191.3282	179.4358	167.9061	156.7489	145.9737	135.5898	125.6061	116.0312	106.8728	98.13795	89.83268	81.96188	74.52905	67.53607	60.98296	54.8676	49.18545	43.92921	39.08846	34.64914	30.59285	26.89567	23.5262	20.44208	17.58372	14.86288	12.14133	9.189036	5.594827	0.619382	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	243.9131	230.6709	217.7413	205.1425	192.8842	180.9762	169.4282	158.2499	147.4508	137.04	127.0265	117.4187	108.2243	99.45043	91.1031	83.18727	75.70655	68.66296	62.05668	55.88578	50.14594	44.83005	39.92783	35.42523	31.30366	27.53863	24.09769	20.93667	17.99319	15.17502	12.33871	9.248166	5.486832	0.356567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	245.5053	232.2573	219.3195	206.7103	194.4391	182.5157	170.9496	159.7505	148.9278	138.4905	128.4475	118.8072	109.5773	100.7648	92.37591	84.41556	76.88744	69.79369	63.13465	56.90855	51.11123	45.73573	40.77184	36.20547	32.01774	28.18356	24.66935	21.42911	18.39776	15.47936	12.52576	9.295656	5.368669	0.118311	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	247.0959	233.8421	220.8963	208.2767	195.9928	184.0542	172.4703	161.2506	150.4045	139.9411	129.869	120.1966	110.9316	102.081	93.65099	85.64657	78.07151	70.92803	64.21659	57.93557	52.08091	46.64577	41.61995	36.98924	32.73443	28.82975	25.24044	21.91872	18.79692	15.77563	12.70253	9.33197	5.241228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	248.6851	235.4254	222.4717	209.8419	197.5454	185.5917	173.9902	162.7502	151.8811	141.3918	131.2909	121.5868	112.2871	103.3989	94.92819	86.88014	79.25856	72.06573	65.30221	58.96648	53.05458	47.5597	42.47161	37.77594	33.45306	29.47647	25.81026	22.40487	19.19016	16.06358	12.86911	9.357585	5.105366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	250.2726	237.0073	224.0457	211.4057	199.0968	187.1282	175.5093	164.2493	153.3574	142.8425	132.7132	122.9778	113.6438	104.7183	96.20734	88.11608	80.44835	73.20651	66.39118	60.00091	54.03178	48.477	43.32625	38.56492	34.17293	30.12305	26.37814	22.88696	19.57706	16.34302	13.02562	9.372985	4.96191	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	251.8587	238.5876	225.6182	212.9683	200.6471	188.6638	177.0276	165.7478	154.8334	144.2932	134.1359	124.3694	115.0015	106.0391	97.48828	89.35416	81.64063	74.35007	67.48315	61.03845	55.01206	49.39715	44.18327	39.35553	34.89338	30.76877	26.94343	23.36444	19.95723	16.6138	13.17224	9.378659	4.811655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	253.4431	240.1665	227.1894	214.5295	202.1961	190.1983	178.5451	167.2457	156.3091	145.7439	135.5587	125.7616	116.3601	107.3611	98.7708	90.59417	82.83513	75.4961	68.57775	62.07866	55.99492	50.31959	45.04207	40.14714	35.61373	31.413	27.50551	23.8368	20.33034	16.87584	13.30916	9.375097	4.655363	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	255.0261	241.7438	228.7591	216.0895	203.744	191.7318	180.0617	168.743	157.7843	147.1944	136.9817	127.1542	117.7195	108.6843	100.0547	91.83585	84.03156	76.64425	69.67458	63.1211	56.97985	51.24377	45.90204	40.9391	36.33332	32.05507	28.0638	24.30359	20.6961	17.12907	13.43658	9.362786	4.493767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	256.6074	243.3196	230.3273	217.648	205.2907	193.2641	181.5775	170.2395	159.259	148.6447	138.4047	128.5472	119.0794	110.0083	101.3398	93.07894	85.22961	77.79416	70.77323	64.16531	57.96633	52.16911	46.76257	41.73076	37.05151	32.69438	28.61776	24.76436	21.05425	17.37347	13.55474	9.342211	4.327565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5146.5	258.1872	244.8939	231.8941	219.2052	206.836	194.7954	183.0922	171.7353	160.7332	150.0946	139.8277	129.9403	120.4398	111.3329	102.6257	94.32314	86.42893	78.94545	71.87326	65.21078	58.95384	53.09504	47.62304	42.5215	37.76767	33.33034	29.16688	25.21876	21.40461	17.60907	13.6639	9.313849	4.157424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	259.7653	246.4666	233.4594	220.761	208.3801	196.3255	184.6059	173.2302	162.2067	151.5441	141.2503	131.3333	121.8004	112.6581	103.9124	95.56815	87.62919	80.09772	72.97423	66.25704	59.94182	54.02096	48.48284	43.31069	38.4812	33.96239	29.71069	25.66643	21.747	17.8359	13.76432	9.27817	3.98398	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	261.3419	248.0378	235.0232	222.3153	209.9228	197.8544	186.1186	174.7241	163.6795	152.9929	142.6726	132.7262	123.1609	113.9834	105.1993	96.81365	88.83	81.25055	74.07568	67.30357	60.92972	54.94631	49.34138	44.09774	39.19151	34.59001	30.24876	26.10708	22.08129	18.05403	13.85629	9.235634	3.807841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	262.9167	249.6072	236.5853	223.8681	211.4641	199.3819	187.63	176.217	165.1513	154.4411	144.0944	134.1187	124.5213	115.3086	106.4863	98.0593	90.031	82.40353	75.17714	68.34986	61.91701	55.8705	50.19805	44.88205	39.89805	35.2127	30.78069	26.54044	22.4074	18.26357	13.94009	9.186688	3.62958	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	264.4897	251.175	238.1458	225.4193	213.0039	200.908	189.1402	177.7088	166.6221	155.8884	145.5154	135.5106	125.8812	116.6335	107.7731	99.30473	91.23178	83.5562	76.27812	69.3954	62.90313	56.79297	51.0523	45.66307	40.60031	35.83	31.30613	26.9663	22.72526	18.46462	14.01601	9.131769	3.449748	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	266.061	252.741	239.7046	226.9689	214.5421	202.4327	190.6489	179.1992	168.0918	157.3346	146.9354	136.9017	127.2404	117.9578	109.0593	100.5496	92.43193	84.70812	77.37814	70.43965	63.88753	57.71315	51.90354	46.44025	41.29777	36.44151	31.82475	27.38447	23.03484	18.65734	14.08435	9.071299	3.268862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	267.6303	254.3051	241.2616	228.5167	216.0786	203.9557	192.1561	180.6882	169.5601	158.7795	148.3544	138.2918	128.5986	119.2811	110.3446	101.7935	93.63103	85.85884	78.47671	71.48211	64.86967	58.63049	52.75125	47.21307	41.98998	37.04681	32.33628	27.79478	23.33613	18.84187	14.14542	9.005688	3.087418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	269.1977	255.8672	242.8166	230.0626	217.6133	205.477	193.6617	182.1757	171.0268	160.2231	149.7719	139.6805	129.9555	120.6031	111.6286	103.0361	94.82867	87.0079	79.57334	72.52226	65.84904	59.54447	53.59491	47.98106	42.6765	37.64555	32.84044	28.19711	23.62916	19.01837	14.19951	8.93533	2.905884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	270.7629	257.4273	244.3696	231.6065	219.1461	206.9964	195.1654	183.6613	172.4919	161.6649	151.1878	141.0676	131.3109	121.9236	112.9109	104.2769	96.0244	88.15483	80.66754	73.55959	66.8251	60.45457	54.434	48.74374	43.35692	38.23742	33.33704	28.59138	23.91396	19.18704	14.24692	8.860604	2.724709	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	272.3259	258.9852	245.9205	233.1484	220.6768	208.5137	196.6671	185.145	173.9551	163.1049	152.6019	142.4529	132.6643	123.2421	114.1912	105.5155	97.21779	89.29916	81.75883	74.5936	67.79735	61.36028	55.26807	49.50068	44.03087	38.82212	33.82587	28.9775	24.1906	19.34805	14.28796	8.781873	2.544316	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	273.8865	260.5407	247.469	234.6879	222.2052	210.0288	198.1667	186.6265	175.416	164.5427	154.0137	143.8359	134.0156	124.5584	115.4691	106.7516	98.40841	90.44045	82.84673	75.62381	68.76531	62.26113	56.09665	50.25147	44.698	39.39939	34.30678	29.35545	24.45917	19.50162	14.32292	8.699487	2.365115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5548	275.4446	262.0938	249.0151	236.225	223.7312	211.5416	199.6638	188.1056	176.8746	165.9781	155.4232	145.2165	135.3643	125.8719	116.7442	107.9847	99.59581	91.57824	83.93077	76.64974	69.72849	63.15667	56.91932	50.99574	45.35801	39.96899	34.77963	29.72519	24.71974	19.64793	14.35208	8.613777	2.187495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	276.9999	263.6441	250.5585	237.7594	225.2546	213.0517	201.1583	189.5822	178.3306	167.4109	156.83	146.5943	136.7101	127.1825	118.0161	109.2144	100.7796	92.71207	85.01049	77.67092	70.68646	64.04646	57.73568	51.73314	46.01061	40.53074	35.24434	30.08673	24.97244	19.78721	14.37574	8.525063	2.011836	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	278.5524	265.1916	252.0991	239.291	226.7751	214.5589	202.65	191.0558	179.7837	168.8407	158.2337	147.969	138.0526	128.4897	119.2845	110.4403	101.9592	93.8415	86.08544	78.68692	71.63877	64.93009	58.54537	52.46333	46.65554	41.08445	35.7008	30.44009	25.21739	19.91967	14.39417	8.433645	1.838507	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	280.1017	266.736	253.6365	240.8196	228.2926	216.0631	204.1386	192.5263	181.2335	170.2672	159.634	149.3402	139.3916	129.793	120.5488	111.662	103.1344	94.9661	87.15518	79.69729	72.58501	65.80717	59.34802	53.18604	47.29258	41.62997	36.14898	30.78532	25.45472	20.04551	14.40764	8.339811	1.66787	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	281.6477	268.2771	255.1707	242.3449	229.8068	217.564	205.6238	193.9934	182.6799	171.6902	161.0307	150.7077	140.7266	131.0923	121.8088	112.8791	104.3047	96.08545	88.2193	80.70163	73.52478	66.67734	60.14332	53.90098	47.92153	42.1672	36.58882	31.12246	25.68457	20.16496	14.41643	8.243833	1.500288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	283.1902	269.8146	256.7014	243.8666	231.3175	219.0613	207.1054	195.4568	184.1225	173.1093	162.4234	152.0709	142.0572	132.387	123.0641	114.0912	105.4696	97.19913	89.27739	81.69955	74.45771	67.54026	60.93096	54.60793	48.54221	42.69602	37.02033	31.45159	25.9071	20.27824	14.42078	8.14597	1.336132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	284.7288	271.3483	258.2283	245.3845	232.8243	220.5547	208.5831	196.9162	185.5611	174.5242	163.8118	153.4297	143.3832	133.6768	124.3142	115.2978	106.6288	98.30675	90.32905	82.69066	75.38346	68.39561	61.71069	55.30666	49.15447	43.21636	37.44349	31.77279	26.12247	20.38556	14.42094	8.046464	1.175786	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	286.2633	272.878	259.7511	246.8984	234.327	222.044	210.0565	198.3713	186.9952	175.9345	165.1955	154.7836	144.7042	134.9614	125.5587	116.4986	107.7819	99.40792	91.37392	83.67462	76.30169	69.2431	62.48226	55.99698	49.75819	43.72817	37.85834	32.08615	26.33082	20.48714	14.41717	7.945547	1.019661	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	287.7934	274.4033	261.2695	248.4079	235.8253	223.5289	211.5255	199.8218	188.4246	177.34	166.5741	156.1324	146.0197	136.2403	126.7974	117.6932	108.9285	100.5023	92.41164	84.65109	77.21211	70.08247	63.24543	56.67873	50.35325	44.2314	38.2649	32.39179	26.53234	20.58319	14.40969	7.843434	0.868216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	289.3188	275.9239	262.7833	249.9127	237.3189	225.009	212.9896	201.2674	189.8489	178.7403	167.9474	157.4755	147.3294	137.5131	128.0298	118.8813	110.0682	101.5895	93.44187	85.61975	78.11441	70.91345	64.00002	57.35176	50.93959	44.72605	38.66322	32.68981	26.72719	20.67392	14.39874	7.74033	0.721975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

P E R M E A B I L I T Y (cm/second)

Time Height from Bottom (metres)

days	0.001	1.54838	3.09676	4.64514	6.19352	7.7419	9.29028	10.8387	12.387	13.9354	15.4838	17.0322	18.5806	20.1289	21.6773	23.2257	24.7741	26.3225	27.8708	29.4192	30.9676	32.516	34.0644	35.6127	37.1611	38.7095	40.2579	41.8063	43.3546	44.903	46.4514	47.9998	49.5482	51.0965	52.6449	54.1933	55.7417	57.2901	58.8384	60.3868	61.9352	63.4836	65.032	66.5803	68.1287	69.6771	71.2255	72.7739	74.3222	75.8706
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36.5	7.31E-06	4.73E-05	0.000197	0.000417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	5.22E-06	1.49E-05	5.17E-05	0.000121	0.000209	0.000313	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	4.32E-06	8.92E-06	2.35E-05	5.5E-05	9.98E-05	0.000153	0.000216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	3.79E-06	6.6E-06	1.41E-05	3.09E-05	5.74E-05	9.06E-05	0.000129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182.5	3.43E-06	5.38E-06	9.95E-06	1.99E-05	3.68E-05	5.92E-05	8.55E-05	0.000115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	3.17E-06	4.63E-06	7.72E-06	1.42E-05	2.54E-05	4.13E-05	6.06E-05	8.23E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
255.5	2.96E-06	4.12E-06	6.37E-06	1.08E-05	1.87E-05	3.03E-05	4.49E-05	6.16E-05	8.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
292	2.8E-06	3.74E-06	5.47E-06	8.7E-06	1.44E-05	2.31E-05	3.44E-05	4.77E-05	6.27E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
328.5	2.66E-06	3.46E-06	4.83E-06	7.28E-06	1.15E-05	1.82E-05	2.71E-05	3.78E-05	5E-05	9.57E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365	2.55E-06	3.23E-06	4.35E-06	6.29E-06	9.56E-06	1.47E-05	2.18E-05	3.06E-05	4.07E-05	5.34E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
401.5	2.45E-06	3.04E-06	3.99E-06	5.55E-06	8.14E-06	1.22E-05	1.79E-05	2.52E-05	3.37E-05	4.34E-05	8.44E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
438	2.37E-06	2.89E-06	3.69E-06	4.99E-06	7.08E-06	1.03E-05	1.5E-05	2.11E-05	2.83E-05	3.65E-05	4.75E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
474.5	2.29E-06	2.75E-06	3.46E-06	4.55E-06	6.27E-06	8.94E-06	1.28E-05	1.79E-05	2.4E-05	3.11E-05	3.92E-05	9.52E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
511	2.22E-06	2.64E-06	3.26E-06	4.19E-06	5.64E-06	7.85E-06	1.1E-05	1.53E-05	2.06E-05	2.67E-05	3.36E-05	4.5E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547.5	2.16E-06	2.54E-06	3.09E-06	3.9E-06	5.13E-06	6.99E-06	9.67E-06	1.33E-05	1.79E-05	2.32E-05	2.93E-05	3.67E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
584	2.11E-06	2.45E-06	2.94E-06	3.66E-06	4.72E-06	6.3E-06	8.57E-06	1.17E-05	1.56E-05	2.03E-05	2.57E-05	3.18E-05	4.98E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620.5	2.06E-06	2.37E-06	2.82E-06	3.45E-06	4.38E-06	5.73E-06	7.68E-06	1.03E-05	1.38E-05	1.79E-05	2.27E-05	2.8E-05	3.62E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
657	2.01E-06	2.3E-06	2.71E-06	3.28E-06	4.09E-06	5.27E-06	6.95E-06	9.25E-06	1.22E-05	1.59E-05	2.01E-05	2.49E-05	3.08E-05	7.36E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
693.5	1.97E-06	2.24E-06	2.61E-06	3.12E-06	3.85E-06	4.88E-06	6.34E-06	8.34E-06	1.1E-05	1.42E-05	1.8E-05	2.23E-05	2.72E-05	3.75E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	1.93E-06	2.18E-06	2.52E-06	2.99E-06	3.64E-06	4.55E-06	5.83E-06	7.58E-06	9.89E-06	1.28E-05	1.62E-05	2E-05	2.44E-05	3.07E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
766.5	1.89E-06	2.13E-06	2.44E-06	2.87E-06	3.45E-06	4.27E-06	5.4E-06	6.94E-06	8.98E-06	1.15E-05	1.46E-05	1.81E-05	2.2E-05	2.69E-05	4.9E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
803	1.86E-06	2.08E-06	2.37E-06	2.76E-06	3.29E-06	4.02E-06	5.03E-06	6.39E-06	8.2E-06	1.05E-05	1.32E-05	1.64E-05	2E-05	2.42E-05	3.28E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
839.5	1.83E-06	2.04E-06	2.31E-06	2.67E-06	3.15E-06	3.81E-06	4.71E-06	5.92E-06	7.53E-06	9.58E-06	1.21E-05	1.5E-05	1.82E-05	2.19E-05	2.75E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876	1.8E-06	2E-06	2.25E-06	2.58E-06	3.03E-06	3.62E-06	4.43E-06	5.52E-06	6.96E-06	8.79E-06	1.1E-05	1.37E-05	1.67E-05	2E-05	2.44E-05	4.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
912.5	1.77E-06	1.96E-06	2.2E-06	2.51E-06	2.91E-06	3.46E-06	4.19E-06	5.17E-06	6.46E-06	8.11E-06	1.01E-05	1.25E-05	1.53E-05	1.84E-05	2.21E-05	3.01E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	1.75E-06	1.92E-06	2.15E-06	2.43E-06	2.81E-06	3.31E-06	3.97E-06	4.86E-06	6.02E-06	7.51E-06	9.35E-06	1.15E-05	1.41E-05	1.69E-05	2.02E-05	2.54E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
985.5	1.72E-06	1.89E-06	2.1E-06	2.37E-06	2.72E-06	3.18E-06	3.78E-06	4.59E-06	5.64E-06	6.99E-06	8.66E-06	1.07E-05	1.3E-05	1.56E-05	1.86E-05	2.26E-05	3.82E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1022	1.7E-06	1.86E-06	2.06E-06	2.31E-06	2.64E-06	3.06E-06	3.62E-06	4.35E-06	5.3E-06	6.52E-06	8.05E-06	9.88E-06	1.2E-05	1.44E-05	1.72E-05	2.06E-05	2.8E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1058.5	1.67E-06	1.83E-06	2.02E-06	2.25E-06	2.56E-06	2.95E-06	3.46E-06	4.13E-06	5E-06	6.12E-06	7.51E-06	9.19E-06	1.12E-05	1.34E-05	1.59E-05	1.89E-05	2.39E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1095	1.65E-06	1.8E-06	1.98E-06	2.2E-06	2.49E-06	2.85E-06	3.33E-06	3.94E-06	4.74E-06	5.75E-06	7.02E-06	8.57E-06	1.04E-05	1.25E-05	1.48E-05	1.75E-05	2.14E-05	4.76E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1131.5	1.63E-06	1.77E-06	1.94E-06	2.16E-06	2.42E-06	2.77E-06	3.2E-06	3.77E-06	4.5E-06	5.43E-06	6.59E-06	8.01E-06	9.69E-06	1.16E-05	1.38E-05	1.63E-05	1.95E-05	2.95E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1168	1.61E-06	1.75E-06	1.91E-06	2.11E-06	2.36E-06	2.68E-06	3.09E-06	3.61E-06	4.29E-06	5.14E-06	6.21E-06	7.52E-06	9.07E-06	1.09E-05	1.29E-05	1.52E-05	1.8E-05	2.4E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1204.5	1.6E-06	1.72E-06	1.88E-06	2.07E-06	2.31E-06	2.61E-06	2.99E-06	3.47E-06	4.09E-06	4.88E-06	5.86E-06	7.07E-06	8.51E-06	1.02E-05	1.21E-05	1.42E-05	1.67E-05	2.1E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1241	1.58E-06	1.7E-06	1.85E-06	2.03E-06	2.26E-06	2.54E-06	2.89E-06	3.35E-06	3.92E-06	4.65E-06	5.55E-06	6.67E-06	8E-06	9.55E-06	1.13E-05	1.33E-05	1.56E-05	1.9E-05	3.62E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1277.5	1.56E-06	1.68E-06	1.82E-06	2E-06	2.21E-06	2.47E-06	2.81E-06	3.23E-06	3.76E-06	4.43E-06	5.27E-06	6.3E-06	7.54E-06	8.98E-06	1.06E-05	1.25E-05	1.46E-05	1.75E-05	2.56E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1314	1.55E-06	1.66E-06	1.8E-06	1.96E-06	2.16E-06	2.42E-06	2.73E-06	3.12E-06	3.62E-06	4.24E-06	5.02E-06	5.97E-06	7.12E-06	8.47E-06	1E-05	1.18E-05	1.37E-05	1.63E-05	2.15E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350.5	1.53E-06	1.64E-06	1.77E-06	1.93E-06	2.12E-06	2.36E-06	2.65E-06	3.02E-06	3.49E-06	4.07E-06	4.79E-06	5.67E-06	6.74E-06	8E-06	9.44E-06	1.11E-05	1.29E-05	1.52E-05	1.91E-05	6.08E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1387	1.52E-06	1.62E-06	1.75E-06	1.9E-06	2.08E-06	2.31E-06	2.59E-06	2.93E-06	3.36E-06	3.91E-06	4.58E-06	5.4E-06	6.39E-06	7.57E-06	8.92E-06	1.05E-05	1.22E-05	1.43E-05	1.74E-05	2.92E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1423.5	1.5E-06	1.6E-06	1.73E-06	1.87E-06	2.05E-06	2.26E-06	2.52E-06	2.85E-06	3.25E-06	3.76E-06	4.38E-06	5.15E-06	6.08E-06	7.17E-06	8.45E-06	9.89E-06	1.15E-05	1.34E-05	1.6E-05	2.27E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1460	1.49E-06	1.59E-06	1.7E-06	1.84E-06	2.01E-06	2.21E-06	2.46E-06	2.77E-06	3.15E-06	3.62E-06	4.21E-06	4.92E-06	5.79E-06	6.81E-06	8.01E-06	9.37E-06	1.09E-05	1.27E-05	1.5E-05	1.96E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1496.5	1.47E-06	1.57E-06	1.68E-06	1.82E-06	1.98E-06	2.17E-06	2.41E-06	2.7E-06	3.06E-06	3.5E-06	4.05E-06	4.71E-06	5.52E-06	6.48E-06	7.6E-06	8.88E-06	1.03E-05	1.2E-05	1.4E-05	1.76E-05	4.46E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1533	1.46E-06	1.55E-06	1.66E-06	1.79E-06	1.95E-06	2.13E-06	2.36E-06	2.63E-06	2.97E-06	3.38E-06	3.9E-06	4.52E-06	5.28E-06	6.18E-06	7.23E-06	8.44E-06	9.8E-06	1.14E-05	1.32E-05	1.61E-05	2.66E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1569.5	1.45E-06	1.54E-06	1.64E-06	1.77E-06	1.92E-06	2.09E-06	2.31E-06	2.57E-06	2.89E-06	3.28E-06	3.76E-06	4.35E-06	5.06E-06	5.9E-06	6.89E-06	8.03E-06	9.31E-06	1.08E-05	1.25E-05	1.49E-05	2.12E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1606	1.44E-06	1.52E-06	1.63E-06	1.75E-06	1.89E-06	2.06E-06	2.26E-06	2.51E-06	2.81E-06	3.18E-06	3.63E-06	4.18E-06	4.85E-06	5.64E-06	6.57E-06	7.64E-06	8.86E-06	1.02E-05	1.19E-05	1.4E-05	1.84E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1642.5	1.43E-06	1.51E-06	1.61E-06	1.72E-06	1.86E-06	2.02E-06	2.22E-06	2.45E-06	2.74E-06	3.09E-06	3.51E-06	4.03E-06	4.66E-06	5.4E-06	6.28E-06	7.29E-06	8.44E-06	9.75E-06	1.13E-05	1.32E-05	1.65E-05	3.84E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1679	1.42E-06	1.5E-06	1.59E-06	1.7E-06	1.83E-06	1.99E-06	2.18E-06	2.4E-06	2.67E-06	3E-06	3.41E-06	3.89E-06	4.48E-06	5.18E-06	6.01E-06	6.96E-06	8.05E-06	9.29E-06	1.07E-05	1.25E-05	1.52E-05	2.47E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1715.5	1.4E-06	1.48E-06	1.58E-06	1.68E-06	1.81E-06	1.96E-06	2.14E-06	2.35E-06	2.61E-06	2.92E-06	3.3E-06	3.76E-06	4.32E-06	4.98E-06	5.76E-06	6.66E-06	7.69E-06	8.86E-06	1.02E-05	1.18E-05	1.41E-05	2E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1752	1.39E-06	1.47E-06	1.56E-06	1.66E-06	1.79E-06	1.93E-06	2.1E-06	2.31E-06	2.55E-06	2.85E-06	3.21E-06	3.64E-06	4.17E-06	4.79E-06	5.52E-06	6.38E-06	7.36E-06	8.46E-06	9.72E-06	1.12E-05	1.33E-05	1.74E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1788.5	1.38E-06	1.46E-06	1.55E-06	1.65E-06	1.76E-06	1.9E-06	2.07E-06	2.26E-06	2.5E-06	2.78E-06	3.12E-06	3.53E-06	4.02E-06	4.61E-06	5.31E-06	6.11E-06	7.04E-06	8.09E-06	9.29E-06	1.07E-05	1.25E-05	1.57E-05	3.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1825	1.37E-06	1.45E-06	1.53E-06	1.63E-06	1.74E-06	1.88E-06	2.03E-06	2.22E-06	2.44E-06	2.71E-06	3.04E-06	3.43E-06	3.89E-06	4.45E-06	5.11E-06	5.87E-06	6.75E-06	7.75E-06	8.88E-06	1.02E-05	1.18E-05	1.45E-05	2.3E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1861.5	1.36E-06	1.44E-06	1.52E-06	1.61E-06	1.72E-06	1.85E-06	2E-06	2.18E-06	2.4E-06	2.65E-06	2.96E-06	3.33E-06	3.77E-06	4.3E-06	4.92E-06	5.64E-06	6.48E-06	7.42E-06	8.5E-06	9.74E-06	1.13E-05	1.35E-05	1.91E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1898	1.36E-06	1.42E-06	1.5E-06	1.6E-06	1.7E-06	1.83E-06	1.97E-06	2.14E-06	2.35E-06	2.59E-06	2.89E-06	3.24E-06	3.66E-06	4.15E-06	4.74E-06	5.43E-06	6.22E-06	7.12E-06	8.14E-06	9.31E-06	1.07E-05	1.27E-05	1.68E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1934.5	1.35E-06	1.41E-06	1.49E-06	1.58E-06	1.68E-06	1.8E-06	1.94E-06	2.11E-06	2.31E-06	2.54E-06	2.82E-06	3.15E-06	3.55E-06	4.02E-06	4.58E-06	5.23E-06	5.98E-06	6.84E-06	7.81E-06	8.92E-06	1.02E-05	1.2E-05	1.53E-05	5.78E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1971	1.34E-06	1.4E-06	1.48E-06	1.57E-06	1.67E-06	1.78E-06	1.92E-06	2.08E-06	2.26E-06	2.49E-06	2.75E-06	3.07E-06	3.45E-06	3.9E-06	4.43E-06	5.04E-06	5.76E-06	6.57E-06	7.5E-06	8.55E-06	9.79E-06	1.14E-05	1.41E-05	2.81E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007.5	1.33E-06	1.39E-06	1.47E-06	1.55E-06	1.65E-06	1.76E-06	1.89E-06	2.04E-06	2.22E-06	2.44E-06	2.69E-06	2.99E-06	3.35E-06	3.78E-06	4.28E-06	4.87E-06	5.55E-06	6.32E-06	7.21E-06	8.21E-06	9.37E-06	1.08E-05	1.32E-05	2.12E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2044	1.32E-06	1.38E-06	1.46E-06	1.54E-06	1.63E-06	1.74E-06	1.87E-06	2.01E-06	2.19E-06	2.39E-06	2.63E-06	2.92E-06	3.26E-06	3.67E-06	4.15E-06	4.71E-06	5.35E-06	6.09E-06	6.93E-06	7.88E-06	8.99E-06	1.03E-05	1.24E-05	1.78E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2080.5	1.31E-06	1.37E-06	1.44E-06	1.52E-06	1.61E-06	1.72E-06	1.84E-06	1.98E-06	2.15E-06	2.35E-06	2.58E-06	2.85E-06	3.18E-06	3.57E-06	4.02E-06	4.55E-06	5.17E-06	5.87E-06	6.67E-06	7.58E-06	8.63E-06	9.89E-06	1.17E-05	1.58E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2117	1.3E-06	1.36E-06	1.43E-06	1.51E-06	1.6E-06	1.7E-06	1.82E-06	1.96E-06	2.12E-06	2.31E-06	2.53E-06	2.79E-06	3.1E-06	3.47E-06	3.9E-06	4.41E-06	4.99E-06	5.66E-06	6.43E-06	7.3E-06	8.29E-06	9.48E-06	1.11E-05	1.43E-05	5.29E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2153.5	1.3E-06	1.36E-06	1.42E-06	1.5E-06	1.58E-06	1.68E-06	1.8E-06	1.93E-06	2.08E-06	2.27E-06	2.48E-06	2.73E-06	3.03E-06	3.38E-06	3.79E-06	4.27E-06	4.83E-06	5.47E-06	6.2E-06	7.03E-06	7.97E-06	9.1E-06	1.06E-05	1.32E-05	2.66E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2190	1.29E-06	1.35E-06	1.41E-06	1.49E-06	1.57E-06	1.67E-06	1.78E-06	1.9E-06	2.05E-06	2.23E-06	2.43E-06	2.67E-06	2.96E-06	3.29E-06	3.69E-06	4.14E-06	4.68E-06	5.29E-06	5.99E-06	6.78E-06	7.68E-06	8.74E-06	1.01E-05	1.24E-05	2.01E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2226.5	1.28E-06	1.34E-06	1.4E-06	1.47E-06	1.56E-06	1.65E-06	1.76E-06	1.88E-06	2.02E-06	2.19E-06	2.39E-06	2.62E-06	2.89E-06	3.21E-06	3.59E-06	4.02E-06	4.53E-06	5.12E-06	5.78E-06	6.54E-06	7.4E-06	8.4E-06	9.67E-06	1.16E-05	1.69E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2263	1.28E-06	1.33E-06	1.39E-06	1.46E-06	1.54E-06	1.63E-06	1.74E-06	1.86E-06	1.99E-06	2.16E-06	2.35E-06	2.57E-06	2.83E-06	3.13E-06	3.49E-06	3.91E-06	4.4E-06	4.95E-06	5.59E-06	6.31E-06	7.14E-06	8.09E-06	9.28E-06	1.1E-05	1.5E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2299.5	1.27E-06	1.32E-06	1.38E-06	1.45E-06	1.53E-06	1.62E-06	1.72E-06	1.83E-06	1.97E-06	2.12E-06	2.31E-06	2.52E-06	2.77E-06	3.06E-06	3.4E-06	3.8E-06	4.27E-06	4.8E-06	5.41E-06	6.1E-06	6.89E-06	7.8E-06	8.91E-06	1.05E-05	1.36E-05	4.37E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2336	1.26E-06	1.31E-06	1.37E-06	1.44E-06	1.52E-06	1.6E-06	1.7E-06	1.81E-06	1.94E-06	2.09E-06	2.27E-06	2.47E-06	2.71E-06	2.99E-06	3.32E-06	3.7E-06	4.14E-06	4.65E-06	5.24E-06	5.9E-06	6.65E-06	7.52E-06	8.57E-06	9.99E-06	1.26E-05	2.46E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2372.5	1.25E-06	1.31E-06	1.36E-06	1.43E-06	1.5E-06	1.59E-06	1.68E-06	1.79E-06	1.92E-06	2.06E-06	2.23E-06	2.43E-06	2.66E-06	2.93E-06	3.24E-06	3.61E-06	4.03E-06	4.52E-06	5.08E-06	5.71E-06	6.43E-06	7.26E-06	8.25E-06	9.56E-06	1.18E-05	1.9E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2409	1.25E-06	1.3E-06	1.36E-06	1.42E-06	1.49E-06	1.57E-06	1.66E-06	1.77E-06	1.89E-06	2.03E-06	2.2E-06	2.39E-06	2.61E-06	2.86E-06	3.17E-06	3.52E-06	3.92E-06	4.39E-06	4.92E-06	5.53E-06	6.22E-06	7.01E-06	7.95E-06	9.16E-06	1.11E-05	1.62E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2445.5	1.24E-06	1.29E-06	1.35E-06	1.41E-06	1.48E-06	1.56E-06	1.65E-06	1.75E-06	1.87E-06	2.01E-06	2.16E-06	2.35E-06	2.56E-06	2.81E-06	3.09E-06	3.43E-06	3.82E-06	4.27E-06	4.78E-06	5.36E-06	6.02E-06	6.78E-06	7.67E-06	8.8E-06	1.05E-05	1.44E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2482	1.24E-06	1.28E-06	1.34E-06	1.4E-06	1.47E-06	1.54E-06	1.63E-06	1.73E-06	1.85E-06	1.98E-06	2.13E-06	2.31E-06	2.51E-06	2.75E-06	3.03E-06	3.35E-06	3.72E-06	4.15E-06	4.64E-06	5.2E-06	5.83E-06	6.56E-06	7.41E-06	8.46E-06	9.99E-06	1.31E-05	4.18E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2518.5	1.23E-06	1.28E-06	1.33E-06	1.39E-06	1.46E-06	1.53E-06	1.62E-06	1.71E-06	1.83E-06	1.95E-06	2.1E-06	2.27E-06	2.47E-06	2.7E-06	2.96E-06	3.27E-06	3.63E-06	4.04E-06	4.51E-06	5.05E-06	5.66E-06	6.35E-06	7.16E-06	8.15E-06	9.54E-06	1.21E-05	2.4E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2555	1.22E-06	1.27E-06	1.32E-06	1.38E-06	1.45E-06	1.52E-06	1.6E-06	1.7E-06	1.8E-06	1.93E-06	2.07E-06	2.23E-06	2.42E-06	2.65E-06	2.9E-06	3.2E-06	3.54E-06	3.93E-06	4.39E-06	4.9E-06	5.49E-06	6.15E-06	6.93E-06	7.86E-06	9.13E-06	1.13E-05	1.86E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2591.5	1.22E-06	1.26E-06	1.31E-06	1.37E-06	1.44E-06	1.51E-06	1.59E-06	1.68E-06	1.78E-06	1.9E-06	2.04E-06	2.2E-06	2.38E-06	2.6E-06	2.84E-06	3.13E-06	3.46E-06	3.83E-06	4.27E-06	4.76E-06	5.32E-06	5.96E-06	6.7E-06	7.59E-06	8.76E-06	1.07E-05	1.57E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2628	1.21E-06	1.26E-06	1.31E-06	1.36E-06	1.43E-06	1.5E-06	1.57E-06	1.66E-06	1.77E-06	1.88E-06	2.02E-06	2.17E-06	2.35E-06	2.55E-06	2.79E-06	3.06E-06	3.38E-06	3.74E-06	4.16E-06	4.63E-06	5.17E-06	5.79E-06	6.49E-06	7.34E-06	8.43E-06	1.01E-05	1.4E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2664.5	1.21E-06	1.25E-06	1.3E-06	1.35E-06	1.42E-06	1.48E-06	1.56E-06	1.65E-06	1.75E-06	1.86E-06	1.99E-06	2.14E-06	2.31E-06	2.51E-06	2.73E-06	3E-06	3.3E-06	3.65E-06	4.05E-06	4.51E-06	5.03E-06	5.62E-06	6.29E-06	7.1E-06	8.12E-06	9.61E-06	1.27E-05	4.03E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2701	1.2E-06	1.24E-06	1.29E-06	1.35E-06	1.41E-06	1.47E-06	1.55E-06	1.63E-06	1.73E-06	1.84E-06	1.96E-06	2.11E-06	2.27E-06	2.46E-06	2.68E-06	2.94E-06	3.23E-06	3.56E-06	3.95E-06	4.39E-06	4.89E-06	5.45E-06	6.11E-06	6.87E-06	7.83E-06	9.18E-06	1.17E-05	2.34E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2737.5	1.2E-06	1.24E-06	1.29E-06	1.34E-06	1.4E-06	1.46E-06	1.54E-06	1.62E-06	1.71E-06	1.82E-06	1.94E-06	2.08E-06	2.24E-06	2.42E-06	2.63E-06	2.88E-06	3.16E-06	3.48E-06	3.85E-06	4.27E-06	4.75E-06	5.3E-06	5.93E-06	6.66E-06	7.56E-06	8.8E-06	1.1E-05	1.81E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2774	1.19E-06	1.23E-06	1.28E-06	1.33E-06	1.39E-06	1.45E-06	1.52E-06	1.6E-06	1.69E-06	1.8E-06	1.92E-06	2.05E-06	2.21E-06	2.38E-06	2.59E-06	2.82E-06	3.09E-06	3.41E-06	3.76E-06	4.17E-06	4.63E-06	5.15E-06	5.75E-06	6.45E-06	7.31E-06	8.45E-06	1.03E-05	1.53E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2810.5	1.18E-06	1.23E-06	1.27E-06	1.32E-06	1.38E-06	1.44E-06	1.51E-06	1.59E-06	1.68E-06	1.78E-06	1.89E-06	2.02E-06	2.17E-06	2.35E-06	2.54E-06	2.77E-06	3.03E-06	3.33E-06	3.67E-06	4.06E-06	4.51E-06	5.01E-06	5.59E-06	6.26E-06	7.07E-06	8.13E-06	9.78E-06	1.36E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2847	1.18E-06	1.22E-06	1.27E-06	1.31E-06	1.37E-06	1.43E-06	1.5E-06	1.58E-06	1.66E-06	1.76E-06	1.87E-06	2E-06	2.14E-06	2.31E-06	2.5E-06	2.72E-06	2.97E-06	3.26E-06	3.59E-06	3.97E-06	4.39E-06	4.88E-06	5.44E-06	6.08E-06	6.85E-06	7.84E-06	9.31E-06	1.24E-05	3.74E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2883.5	1.17E-06	1.21E-06	1.26E-06	1.31E-06	1.36E-06	1.42E-06	1.49E-06	1.56E-06	1.65E-06	1.74E-06	1.85E-06	1.97E-06	2.12E-06	2.28E-06	2.46E-06	2.67E-06	2.91E-06	3.19E-06	3.51E-06	3.87E-06	4.29E-06	4.75E-06	5.29E-06	5.91E-06	6.64E-06	7.57E-06	8.9E-06	1.14E-05	2.25E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2920	1.17E-06	1.21E-06	1.25E-06	1.3E-06	1.35E-06	1.41E-06	1.48E-06	1.55E-06	1.63E-06	1.73E-06	1.83E-06	1.95E-06	2.09E-06	2.24E-06	2.42E-06	2.63E-06	2.86E-06	3.13E-06	3.43E-06	3.78E-06	4.18E-06	4.63E-06	5.15E-06	5.74E-06	6.44E-06	7.31E-06	8.53E-06	1.07E-05	1.76E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2956.5	1.16E-06	1.2E-06	1.25E-06	1.29E-06	1.34E-06	1.4E-06	1.47E-06	1.54E-06	1.62E-06	1.71E-06	1.81E-06	1.93E-06	2.06E-06	2.21E-06	2.38E-06	2.58E-06	2.81E-06	3.07E-06	3.36E-06	3.7E-06	4.08E-06	4.52E-06	5.01E-06	5.58E-06	6.25E-06	7.08E-06	8.2E-06	1E-05	1.5E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2993	1.16E-06	1.2E-06	1.24E-06	1.29E-06	1.34E-06	1.39E-06	1.46E-06	1.53E-06	1.6E-06	1.69E-06	1.79E-06	1.91E-06	2.03E-06	2.18E-06	2.35E-06	2.54E-06	2.76E-06	3.01E-06	3.29E-06	3.62E-06	3.99E-06	4.41E-06	4.88E-06	5.43E-06	6.07E-06	6.85E-06	7.89E-06	9.53E-06	1.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3029.5	1.16E-06	1.19E-06	1.23E-06	1.28E-06	1.33E-06	1.38E-06	1.45E-06	1.51E-06	1.59E-06	1.68E-06	1.77E-06	1.88E-06	2.01E-06	2.15E-06	2.31E-06	2.5E-06	2.71E-06	2.95E-06	3.23E-06	3.54E-06	3.9E-06	4.3E-06	4.76E-06	5.29E-06	5.9E-06	6.65E-06	7.61E-06	9.07E-06	1.21E-05	4.16E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3066	1.15E-06	1.19E-06	1.23E-06	1.27E-06	1.32E-06	1.38E-06	1.44E-06	1.5E-06	1.58E-06	1.66E-06	1.76E-06	1.86E-06	1.99E-06	2.12E-06	2.28E-06	2.46E-06	2.66E-06	2.9E-06	3.16E-06	3.47E-06	3.81E-06	4.2E-06	4.64E-06	5.15E-06	5.74E-06	6.45E-06	7.35E-06	8.68E-06	1.12E-05	2.35E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3102.5	1.15E-06	1.18E-06	1.22E-06	1.27E-06	1.31E-06	1.37E-06	1.43E-06	1.49E-06	1.57E-06	1.65E-06	1.74E-06	1.84E-06	1.96E-06	2.1E-06	2.25E-06	2.42E-06	2.62E-06	2.84E-06	3.1E-06	3.39E-06	3.73E-06	4.1E-06	4.53E-06	5.02E-06	5.59E-06	6.26E-06	7.11E-06	8.32E-06	1.05E-05	1.79E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3139	1.14E-06	1.18E-06	1.22E-06	1.26E-06	1.31E-06	1.36E-06	1.42E-06	1.48E-06	1.55E-06	1.63E-06	1.72E-06	1.82E-06	1.94E-06	2.07E-06	2.22E-06	2.38E-06	2.58E-06	2.79E-06	3.04E-06	3.33E-06	3.65E-06	4.01E-06	4.42E-06	4.9E-06	5.44E-06	6.08E-06	6.89E-06	8E-06	9.87E-06	1.51E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3175.5	1.14E-06	1.17E-06	1.21E-06	1.25E-06	1.3E-06	1.35E-06	1.41E-06	1.47E-06	1.54E-06	1.62E-06	1.71E-06	1.81E-06	1.92E-06	2.04E-06	2.19E-06	2.35E-06	2.54E-06	2.75E-06	2.99E-06	3.26E-06	3.57E-06	3.92E-06	4.32E-06	4.78E-06	5.3E-06	5.92E-06	6.68E-06	7.71E-06	9.35E-06	1.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	1.13E-06	1.17E-06	1.21E-06	1.25E-06	1.29E-06	1.34E-06	1.4E-06	1.46E-06	1.53E-06	1.61E-06	1.69E-06	1.79E-06	1.9E-06	2.02E-06	2.16E-06	2.32E-06	2.5E-06	2.7E-06	2.93E-06	3.2E-06	3.5E-06	3.84E-06	4.22E-06	4.66E-06	5.17E-06	5.76E-06	6.48E-06	7.44E-06	8.91E-06	1.21E-05	4.87E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248.5	1.13E-06	1.16E-06	1.2E-06	1.24E-06	1.29E-06	1.34E-06	1.39E-06	1.45E-06	1.52E-06	1.59E-06	1.68E-06	1.77E-06	1.88E-06	2E-06	2.13E-06	2.28E-06	2.46E-06	2.66E-06	2.88E-06	3.14E-06	3.43E-06	3.76E-06	4.13E-06	4.55E-06	5.04E-06	5.61E-06	6.29E-06	7.19E-06	8.51E-06	1.11E-05	2.45E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	1.13E-06	1.16E-06	1.2E-06	1.24E-06	1.28E-06	1.33E-06	1.38E-06	1.44E-06	1.51E-06	1.58E-06	1.66E-06	1.75E-06	1.86E-06	1.97E-06	2.1E-06	2.25E-06	2.42E-06	2.61E-06	2.83E-06	3.08E-06	3.36E-06	3.68E-06	4.04E-06	4.45E-06	4.92E-06	5.46E-06	6.12E-06	6.96E-06	8.16E-06	1.04E-05	1.83E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3321.5	1.12E-06	1.15E-06	1.19E-06	1.23E-06	1.27E-06	1.32E-06	1.37E-06	1.43E-06	1.5E-06	1.57E-06	1.65E-06	1.74E-06	1.84E-06	1.95E-06	2.08E-06	2.22E-06	2.39E-06	2.57E-06	2.78E-06	3.02E-06	3.29E-06	3.6E-06	3.95E-06	4.35E-06	4.8E-06	5.32E-06	5.95E-06	6.74E-06	7.85E-06	9.75E-06	1.52E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3358	1.12E-06	1.15E-06	1.19E-06	1.22E-06	1.27E-06	1.31E-06	1.36E-06	1.42E-06	1.48E-06	1.55E-06	1.63E-06	1.72E-06	1.82E-06	1.93E-06	2.05E-06	2.19E-06	2.35E-06	2.53E-06	2.74E-06	2.97E-06	3.23E-06	3.53E-06	3.87E-06	4.25E-06	4.69E-06	5.19E-06	5.79E-06	6.54E-06	7.56E-06	9.23E-06	1.33E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3394.5	1.11E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.31E-06	1.36E-06	1.41E-06	1.47E-06	1.54E-06	1.62E-06	1.7E-06	1.8E-06	1.91E-06	2.03E-06	2.17E-06	2.32E-06	2.5E-06	2.69E-06	2.92E-06	3.17E-06	3.46E-06	3.79E-06	4.16E-06	4.58E-06	5.07E-06	5.64E-06	6.35E-06	7.3E-06	8.78E-06	1.2E-05	5.69E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3431	1.11E-06	1.14E-06	1.18E-06	1.21E-06	1.25E-06	1.3E-06	1.35E-06	1.4E-06	1.46E-06	1.53E-06	1.61E-06	1.69E-06	1.78E-06	1.89E-06	2.01E-06	2.14E-06	2.29E-06	2.46E-06	2.65E-06	2.87E-06	3.12E-06	3.39E-06	3.71E-06	4.07E-06	4.48E-06	4.94E-06	5.5E-06	6.17E-06	7.06E-06	8.39E-06	1.1E-05	2.54E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467.5	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.25E-06	1.29E-06	1.34E-06	1.4E-06	1.45E-06	1.52E-06	1.59E-06	1.67E-06	1.77E-06	1.87E-06	1.98E-06	2.11E-06	2.26E-06	2.42E-06	2.61E-06	2.82E-06	3.06E-06	3.33E-06	3.64E-06	3.98E-06	4.38E-06	4.83E-06	5.36E-06	6E-06	6.83E-06	8.04E-06	1.03E-05	1.86E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	1.1E-06	1.13E-06	1.17E-06	1.2E-06	1.24E-06	1.29E-06	1.33E-06	1.39E-06	1.44E-06	1.51E-06	1.58E-06	1.66E-06	1.75E-06	1.85E-06	1.96E-06	2.09E-06	2.23E-06	2.39E-06	2.57E-06	2.78E-06	3.01E-06	3.27E-06	3.56E-06	3.9E-06	4.28E-06	4.72E-06	5.23E-06	5.84E-06	6.62E-06	7.73E-06	9.66E-06	1.53E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540.5	1.1E-06	1.13E-06	1.16E-06	1.2E-06	1.24E-06	1.28E-06	1.33E-06	1.38E-06	1.44E-06	1.5E-06	1.57E-06	1.65E-06	1.73E-06	1.83E-06	1.94E-06	2.06E-06	2.2E-06	2.36E-06	2.53E-06	2.73E-06	2.96E-06	3.21E-06	3.5E-06	3.82E-06	4.19E-06	4.61E-06	5.1E-06	5.69E-06	6.43E-06	7.45E-06	9.14E-06	1.34E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	1.09E-06	1.12E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.32E-06	1.37E-06	1.43E-06	1.49E-06	1.56E-06	1.63E-06	1.72E-06	1.81E-06	1.92E-06	2.04E-06	2.17E-06	2.32E-06	2.5E-06	2.69E-06	2.91E-06	3.15E-06	3.43E-06	3.75E-06	4.1E-06	4.51E-06	4.98E-06	5.54E-06	6.24E-06	7.19E-06	8.69E-06	1.2E-05	8.61E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3613.5	1.09E-06	1.12E-06	1.15E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.36E-06	1.42E-06	1.48E-06	1.54E-06	1.62E-06	1.7E-06	1.8E-06	1.9E-06	2.02E-06	2.15E-06	2.29E-06	2.46E-06	2.65E-06	2.86E-06	3.1E-06	3.37E-06	3.67E-06	4.02E-06	4.41E-06	4.87E-06	5.41E-06	6.07E-06	6.96E-06	8.3E-06	1.1E-05	2.78E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.31E-06	1.35E-06	1.41E-06	1.47E-06	1.53E-06	1.61E-06	1.69E-06	1.78E-06	1.88E-06	1.99E-06	2.12E-06	2.26E-06	2.43E-06	2.61E-06	2.81E-06	3.04E-06	3.31E-06	3.6E-06	3.94E-06	4.32E-06	4.76E-06	5.28E-06	5.91E-06	6.74E-06	7.96E-06	1.03E-05	1.94E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686.5	1.08E-06	1.11E-06	1.14E-06	1.18E-06	1.21E-06	1.25E-06	1.3E-06	1.35E-06	1.4E-06	1.46E-06	1.52E-06	1.59E-06	1.67E-06	1.76E-06	1.86E-06	1.97E-06	2.1E-06	2.24E-06	2.39E-06	2.57E-06	2.77E-06	2.99E-06	3.25E-06	3.53E-06	3.86E-06	4.23E-06	4.65E-06	5.15E-06	5.75E-06	6.53E-06	7.65E-06	9.62E-06	1.57E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3723	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.25E-06	1.29E-06	1.34E-06	1.39E-06	1.45E-06	1.51E-06	1.58E-06	1.66E-06	1.75E-06	1.84E-06	1.95E-06	2.07E-06	2.21E-06	2.36E-06	2.53E-06	2.73E-06	2.94E-06	3.19E-06	3.47E-06	3.78E-06	4.14E-06	4.55E-06	5.03E-06	5.61E-06	6.34E-06	7.37E-06	9.09E-06	1.36E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3759.5	1.08E-06	1.1E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.29E-06	1.33E-06	1.38E-06	1.44E-06	1.5E-06	1.57E-06	1.65E-06	1.73E-06	1.82E-06	1.93E-06	2.05E-06	2.18E-06	2.33E-06	2.5E-06	2.69E-06	2.9E-06	3.14E-06	3.41E-06	3.71E-06	4.06E-06	4.45E-06	4.92E-06	5.47E-06	6.16E-06	7.11E-06	8.64E-06	1.21E-05	0.000243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.2E-06	1.24E-06	1.28E-06	1.33E-06	1.38E-06	1.43E-06	1.49E-06	1.56E-06	1.63E-06	1.72E-06	1.81E-06	1.91E-06	2.03E-06	2.15E-06	2.3E-06	2.46E-06	2.65E-06	2.85E-06	3.08E-06	3.35E-06	3.64E-06	3.98E-06	4.36E-06	4.81E-06	5.33E-06	5.99E-06	6.88E-06	8.24E-06	1.11E-05	3.07E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3832.5	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.32E-06	1.37E-06	1.42E-06	1.48E-06	1.55E-06	1.62E-06	1.7E-06	1.79E-06	1.89E-06	2E-06	2.13E-06	2.27E-06	2.43E-06	2.61E-06	2.81E-06	3.03E-06	3.29E-06	3.57E-06	3.9E-06	4.27E-06	4.7E-06	5.21E-06	5.83E-06	6.66E-06	7.9E-06	1.03E-05	2.02E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.36E-06	1.41E-06	1.47E-06	1.54E-06	1.61E-06	1.69E-06	1.77E-06	1.87E-06	1.98E-06	2.1E-06	2.24E-06	2.4E-06	2.57E-06	2.76E-06	2.98E-06	3.23E-06	3.51E-06	3.82E-06	4.18E-06	4.6E-06	5.09E-06	5.68E-06	6.46E-06	7.59E-06	9.61E-06	1.61E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3905.5	1.06E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.3E-06	1.35E-06	1.4E-06	1.46E-06	1.53E-06	1.6E-06	1.67E-06	1.76E-06	1.85E-06	1.96E-06	2.08E-06	2.22E-06	2.37E-06	2.53E-06	2.72E-06	2.94E-06	3.18E-06	3.45E-06	3.75E-06	4.1E-06	4.5E-06	4.97E-06	5.54E-06	6.27E-06	7.31E-06	9.07E-06	1.38E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	1.06E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.4E-06	1.45E-06	1.51E-06	1.58E-06	1.66E-06	1.74E-06	1.84E-06	1.94E-06	2.06E-06	2.19E-06	2.33E-06	2.5E-06	2.68E-06	2.89E-06	3.12E-06	3.39E-06	3.68E-06	4.02E-06	4.41E-06	4.86E-06	5.41E-06	6.1E-06	7.05E-06	8.61E-06	1.22E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3978.5	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.25E-06	1.29E-06	1.34E-06	1.39E-06	1.44E-06	1.5E-06	1.57E-06	1.65E-06	1.73E-06	1.82E-06	1.92E-06	2.04E-06	2.16E-06	2.31E-06	2.47E-06	2.64E-06	2.85E-06	3.07E-06	3.33E-06	3.62E-06	3.94E-06	4.32E-06	4.75E-06	5.28E-06	5.93E-06	6.82E-06	8.21E-06	1.11E-05	3.42E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4015	1.05E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.24E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.49E-06	1.56E-06	1.63E-06	1.71E-06	1.8E-06	1.9E-06	2.01E-06	2.14E-06	2.28E-06	2.43E-06	2.61E-06	2.8E-06	3.02E-06	3.27E-06	3.55E-06	3.87E-06	4.23E-06	4.65E-06	5.15E-06	5.78E-06	6.61E-06	7.86E-06	1.03E-05	2.12E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4051.5	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.17E-06	1.2E-06	1.24E-06	1.28E-06	1.32E-06	1.37E-06	1.43E-06	1.48E-06	1.55E-06	1.62E-06	1.7E-06	1.79E-06	1.88E-06	1.99E-06	2.11E-06	2.25E-06	2.4E-06	2.57E-06	2.76E-06	2.98E-06	3.22E-06	3.49E-06	3.8E-06	4.15E-06	4.56E-06	5.04E-06	5.63E-06	6.41E-06	7.55E-06	9.62E-06	1.67E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4088	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.2E-06	1.23E-06	1.27E-06	1.32E-06	1.36E-06	1.42E-06	1.47E-06	1.54E-06	1.61E-06	1.69E-06	1.77E-06	1.87E-06	1.97E-06	2.09E-06	2.22E-06	2.37E-06	2.54E-06	2.72E-06	2.93E-06	3.16E-06	3.43E-06	3.73E-06	4.07E-06	4.46E-06	4.92E-06	5.49E-06	6.22E-06	7.27E-06	9.07E-06	1.52E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124.5	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.36E-06	1.41E-06	1.47E-06	1.53E-06	1.6E-06	1.67E-06	1.76E-06	1.85E-06	1.95E-06	2.07E-06	2.2E-06	2.34E-06	2.5E-06	2.68E-06	2.89E-06	3.11E-06	3.37E-06	3.66E-06	3.99E-06	4.37E-06	4.82E-06	5.36E-06	6.05E-06	7.02E-06	8.67E-06	1.65E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	1.04E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.35E-06	1.4E-06	1.46E-06	1.52E-06	1.58E-06	1.66E-06	1.74E-06	1.83E-06	1.93E-06	2.05E-06	2.17E-06	2.31E-06	2.47E-06	2.65E-06	2.84E-06	3.06E-06	3.31E-06	3.6E-06	3.92E-06	4.28E-06	4.71E-06	5.23E-06	5.89E-06	6.79E-06	8.43E-06	2E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4197.5	1.04E-06	1.06E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.45E-06	1.51E-06	1.57E-06	1.65E-06	1.73E-06	1.82E-06	1.91E-06	2.02E-06	2.15E-06	2.28E-06	2.44E-06	2.61E-06	2.8E-06	3.02E-06	3.26E-06	3.53E-06	3.84E-06	4.2E-06	4.62E-06	5.11E-06	5.74E-06	6.61E-06	8.3E-06	2.86E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.18E-06	1.21E-06	1.25E-06	1.29E-06	1.34E-06	1.38E-06	1.44E-06	1.5E-06	1.56E-06	1.63E-06	1.71E-06	1.8E-06	1.9E-06	2E-06	2.12E-06	2.26E-06	2.41E-06	2.57E-06	2.76E-06	2.97E-06	3.21E-06	3.47E-06	3.78E-06	4.12E-06	4.52E-06	5E-06	5.6E-06	6.46E-06	8.27E-06	6.75E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270.5	1.03E-06	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.24E-06	1.28E-06	1.33E-06	1.38E-06	1.43E-06	1.49E-06	1.55E-06	1.62E-06	1.7E-06	1.78E-06	1.88E-06	1.98E-06	2.1E-06	2.23E-06	2.38E-06	2.54E-06	2.72E-06	2.93E-06	3.16E-06	3.42E-06	3.71E-06	4.04E-06	4.43E-06	4.89E-06	5.48E-06	6.33E-06	8.31E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	1.03E-06	1.05E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.28E-06	1.32E-06	1.37E-06	1.42E-06	1.48E-06	1.54E-06	1.61E-06	1.68E-06	1.77E-06	1.86E-06	1.96E-06	2.08E-06	2.21E-06	2.35E-06	2.51E-06	2.68E-06	2.88E-06	3.11E-06	3.36E-06	3.64E-06	3.97E-06	4.34E-06	4.79E-06	5.36E-06	6.23E-06	8.41E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4343.5	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.2E-06	1.23E-06	1.27E-06	1.32E-06	1.36E-06	1.41E-06	1.47E-06	1.53E-06	1.6E-06	1.67E-06	1.75E-06	1.84E-06	1.94E-06	2.06E-06	2.18E-06	2.32E-06	2.48E-06	2.65E-06	2.84E-06	3.06E-06	3.3E-06	3.58E-06	3.9E-06	4.26E-06	4.7E-06	5.26E-06	6.15E-06	8.57E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4380	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.46E-06	1.52E-06	1.59E-06	1.66E-06	1.74E-06	1.83E-06	1.93E-06	2.04E-06	2.16E-06	2.29E-06	2.44E-06	2.61E-06	2.8E-06	3.01E-06	3.25E-06	3.52E-06	3.83E-06	4.18E-06	4.61E-06	5.17E-06	6.09E-06	8.79E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416.5	1.02E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.35E-06	1.4E-06	1.45E-06	1.51E-06	1.57E-06	1.65E-06	1.72E-06	1.81E-06	1.91E-06	2.01E-06	2.13E-06	2.27E-06	2.41E-06	2.58E-06	2.76E-06	2.97E-06	3.2E-06	3.46E-06	3.76E-06	4.11E-06	4.53E-06	5.09E-06	6.05E-06	9.09E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4453	1.02E-06	1.04E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.44E-06	1.5E-06	1.56E-06	1.63E-06	1.71E-06	1.8E-06	1.89E-06	1.99E-06	2.11E-06	2.24E-06	2.38E-06	2.55E-06	2.72E-06	2.93E-06	3.15E-06	3.41E-06	3.7E-06	4.04E-06	4.45E-06	5.02E-06	6.02E-06	9.45E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4489.5	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.49E-06	1.55E-06	1.62E-06	1.7E-06	1.78E-06	1.87E-06	1.98E-06	2.09E-06	2.22E-06	2.36E-06	2.51E-06	2.69E-06	2.88E-06	3.1E-06	3.35E-06	3.64E-06	3.97E-06	4.38E-06	4.95E-06	6E-06	9.92E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4526	1.01E-06	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.21E-06	1.24E-06	1.28E-06	1.33E-06	1.37E-06	1.43E-06	1.48E-06	1.54E-06	1.61E-06	1.68E-06	1.77E-06	1.86E-06	1.96E-06	2.07E-06	2.19E-06	2.33E-06	2.48E-06	2.65E-06	2.84E-06	3.06E-06	3.3E-06	3.58E-06	3.91E-06	4.31E-06	4.9E-06	5.99E-06	1.05E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4562.5	1.01E-06	1.03E-06	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.28E-06	1.32E-06	1.37E-06	1.42E-06	1.47E-06	1.53E-06	1.6E-06	1.67E-06	1.75E-06	1.84E-06	1.94E-06	2.05E-06	2.17E-06	2.3E-06	2.45E-06	2.62E-06	2.8E-06	3.01E-06	3.25E-06	3.52E-06	3.85E-06	4.25E-06	4.84E-06	6E-06	1.12E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4599	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.11E-06	1.13E-06	1.16E-06	1.2E-06	1.23E-06	1.27E-06	1.31E-06	1.36E-06	1.41E-06	1.46E-06	1.52E-06	1.59E-06	1.66E-06	1.74E-06	1.82E-06	1.92E-06	2.03E-06	2.14E-06	2.28E-06	2.42E-06	2.58E-06	2.77E-06	2.97E-06	3.2E-06	3.47E-06	3.79E-06	4.2E-06	4.8E-06	6.02E-06	1.21E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4635.5	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.51E-06	1.58E-06	1.65E-06	1.72E-06	1.81E-06	1.9E-06	2.01E-06	2.12E-06	2.25E-06	2.39E-06	2.55E-06	2.73E-06	2.93E-06	3.16E-06	3.42E-06	3.73E-06	4.14E-06	4.76E-06	6.04E-06	1.34E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4672	1E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.35E-06	1.39E-06	1.45E-06	1.5E-06	1.57E-06	1.63E-06	1.71E-06	1.79E-06	1.89E-06	1.99E-06	2.1E-06	2.23E-06	2.36E-06	2.52E-06	2.69E-06	2.89E-06	3.11E-06	3.37E-06	3.68E-06	4.1E-06	4.73E-06	6.08E-06	1.5E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4708.5	1E-06	1.02E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.18E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.44E-06	1.49E-06	1.56E-06	1.62E-06	1.7E-06	1.78E-06	1.87E-06	1.97E-06	2.08E-06	2.2E-06	2.34E-06	2.49E-06	2.66E-06	2.85E-06	3.07E-06	3.33E-06	3.64E-06	4.05E-06	4.7E-06	6.12E-06	1.73E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4745	1E-06	1.02E-06	1.04E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.48E-06	1.54E-06	1.61E-06	1.68E-06	1.76E-06	1.85E-06	1.95E-06	2.06E-06	2.18E-06	2.31E-06	2.46E-06	2.63E-06	2.81E-06	3.03E-06	3.28E-06	3.59E-06	4.01E-06	4.67E-06	6.18E-06	2.09E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4781.5	9.98E-07	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.12E-06	1.14E-06	1.18E-06	1.21E-06	1.24E-06	1.28E-06	1.33E-06	1.37E-06	1.42E-06	1.48E-06	1.53E-06	1.6E-06	1.67E-06	1.75E-06	1.84E-06	1.93E-06	2.04E-06	2.16E-06	2.29E-06	2.43E-06	2.59E-06	2.78E-06	2.99E-06	3.24E-06	3.55E-06	3.97E-06	4.65E-06	6.24E-06	2.72E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4818	9.95E-07	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.28E-06	1.32E-06	1.36E-06	1.41E-06	1.47E-06	1.53E-06	1.59E-06	1.66E-06	1.74E-06	1.82E-06	1.91E-06	2.02E-06	2.13E-06	2.26E-06	2.4E-06	2.56E-06	2.74E-06	2.95E-06	3.2E-06	3.51E-06	3.93E-06	4.63E-06	6.32E-06	4.08E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4854.5	9.93E-07	1.01E-06	1.03E-06	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.23E-06	1.27E-06	1.31E-06	1.36E-06	1.41E-06	1.46E-06	1.52E-06	1.58E-06	1.65E-06	1.72E-06	1.81E-06	1.9E-06	2E-06	2.11E-06	2.24E-06	2.38E-06	2.53E-06	2.71E-06	2.92E-06	3.16E-06	3.47E-06	3.9E-06	4.62E-06	6.4E-06	9.48E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4891	9.91E-07	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.51E-06	1.57E-06	1.64E-06	1.71E-06	1.79E-06	1.88E-06	1.98E-06	2.09E-06	2.21E-06	2.35E-06	2.5E-06	2.68E-06	2.88E-06	3.13E-06	3.44E-06	3.87E-06	4.61E-06	6.5E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4927.5	9.88E-07	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.44E-06	1.5E-06	1.56E-06	1.62E-06	1.7E-06	1.78E-06	1.87E-06	1.96E-06	2.07E-06	2.19E-06	2.33E-06	2.48E-06	2.65E-06	2.85E-06	3.09E-06	3.4E-06	3.84E-06	4.6E-06	6.6E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4964	9.86E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.19E-06	1.22E-06	1.26E-06	1.29E-06	1.34E-06	1.38E-06	1.43E-06	1.49E-06	1.55E-06	1.61E-06	1.68E-06	1.76E-06	1.85E-06	1.95E-06	2.05E-06	2.17E-06	2.3E-06	2.45E-06	2.62E-06	2.82E-06	3.06E-06	3.37E-06	3.82E-06	4.6E-06	6.72E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5000.5	9.84E-07	1E-06	1.02E-06	1.05E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.48E-06	1.54E-06	1.6E-06	1.67E-06	1.75E-06	1.83E-06	1.93E-06	2.03E-06	2.15E-06	2.28E-06	2.42E-06	2.59E-06	2.79E-06	3.03E-06	3.34E-06	3.79E-06	4.6E-06	6.85E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	9.82E-07	1E-06	1.02E-06	1.04E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.24E-06	1.28E-06	1.32E-06	1.37E-06	1.42E-06	1.47E-06	1.53E-06	1.59E-06	1.66E-06	1.74E-06	1.82E-06	1.91E-06	2.01E-06	2.13E-06	2.26E-06	2.4E-06	2.57E-06	2.76E-06	3E-06	3.31E-06	3.77E-06	4.6E-06	6.99E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5073.5	9.79E-07	9.99E-07	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.28E-06	1.32E-06	1.36E-06	1.41E-06	1.46E-06	1.52E-06	1.58E-06	1.65E-06	1.72E-06	1.8E-06	1.9E-06	2E-06	2.11E-06	2.23E-06	2.38E-06	2.54E-06	2.73E-06	2.97E-06	3.29E-06	3.75E-06	4.6E-06	7.14E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5110	9.77E-07	9.96E-07	1.02E-06	1.04E-06	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.51E-06	1.57E-06	1.64E-06	1.71E-06	1.79E-06	1.88E-06	1.98E-06	2.09E-06	2.21E-06	2.35E-06	2.51E-06	2.71E-06	2.94E-06	3.26E-06	3.73E-06	4.61E-06	7.31E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5146.5	9.75E-07	9.94E-07	1.01E-06	1.03E-06	1.06E-06	1.08E-06	1.11E-06	1.13E-06	1.16E-06	1.2E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.39E-06	1.45E-06	1.5E-06	1.56E-06	1.63E-06	1.7E-06	1.78E-06	1.86E-06	1.96E-06	2.07E-06	2.19E-06	2.33E-06	2.49E-06	2.68E-06	2.92E-06	3.24E-06	3.72E-06	4.62E-06	7.5E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5183	9.73E-07	9.92E-07	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.44E-06	1.49E-06	1.55E-06	1.61E-06	1.69E-06	1.76E-06	1.85E-06	1.95E-06	2.05E-06	2.17E-06	2.31E-06	2.47E-06	2.66E-06	2.89E-06	3.22E-06	3.7E-06	4.63E-06	7.7E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5219.5	9.71E-07	9.89E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.29E-06	1.34E-06	1.38E-06	1.43E-06	1.48E-06	1.54E-06	1.6E-06	1.67E-06	1.75E-06	1.84E-06	1.93E-06	2.03E-06	2.15E-06	2.29E-06	2.45E-06	2.63E-06	2.87E-06	3.19E-06	3.69E-06	4.64E-06	7.92E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5256	9.69E-07	9.87E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.29E-06	1.33E-06	1.37E-06	1.42E-06	1.47E-06	1.53E-06	1.59E-06	1.66E-06	1.74E-06	1.82E-06	1.91E-06	2.02E-06	2.13E-06	2.27E-06	2.42E-06	2.61E-06	2.85E-06	3.17E-06	3.68E-06	4.65E-06	8.17E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5292.5	9.67E-07	9.85E-07	1E-06	1.02E-06	1.05E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.24E-06	1.28E-06	1.32E-06	1.37E-06	1.41E-06	1.47E-06	1.52E-06	1.58E-06	1.65E-06	1.73E-06	1.81E-06	1.9E-06	2E-06	2.12E-06	2.25E-06	2.4E-06	2.59E-06	2.83E-06	3.16E-06	3.67E-06	4.67E-06	8.44E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5329	9.65E-07	9.83E-07	1E-06	1.02E-06	1.04E-06	1.07E-06	1.09E-06	1.12E-06	1.14E-06	1.17E-06	1.21E-06	1.24E-06	1.28E-06	1.32E-06	1.36E-06	1.41E-06	1.46E-06	1.51E-06	1.57E-06	1.64E-06	1.71E-06	1.79E-06	1.88E-06	1.99E-06	2.1E-06	2.23E-06	2.38E-06	2.57E-06	2.81E-06	3.14E-06	3.66E-06	4.69E-06	8.73E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5365.5	9.63E-07	9.8E-07	9.99E-07	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.23E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.5E-06	1.56E-06	1.63E-06	1.7E-06	1.78E-06	1.87E-06	1.97E-06	2.08E-06	2.21E-06	2.37E-06	2.55E-06	2.79E-06	3.12E-06	3.65E-06	4.71E-06	9.06E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5402	9.61E-07	9.78E-07	9.97E-07	1.02E-06	1.04E-06	1.06E-06	1.08E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.23E-06	1.27E-06	1.3E-06	1.35E-06	1.39E-06	1.44E-06	1.5E-06	1.55E-06	1.62E-06	1.69E-06	1.77E-06	1.86E-06	1.95E-06	2.07E-06	2.2E-06	2.35E-06	2.53E-06	2.77E-06	3.11E-06	3.64E-06	4.73E-06	9.42E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5438.5	9.59E-07	9.76E-07	9.95E-07	1.01E-06	1.03E-06	1.06E-06	1.08E-06	1.11E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.43E-06	1.49E-06	1.55E-06	1.61E-06	1.68E-06	1.76E-06	1.84E-06	1.94E-06	2.05E-06	2.18E-06	2.33E-06	2.52E-06	2.76E-06	3.09E-06	3.63E-06	4.75E-06	9.82E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5475	9.57E-07	9.74E-07	9.92E-07	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.48E-06	1.54E-06	1.6E-06	1.67E-06	1.75E-06	1.83E-06	1.93E-06	2.04E-06	2.16E-06	2.31E-06	2.5E-06	2.74E-06	3.08E-06	3.63E-06	4.78E-06	1.03E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5511.5	9.55E-07	9.72E-07	9.9E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.13E-06	1.15E-06	1.18E-06	1.22E-06	1.25E-06	1.29E-06	1.33E-06	1.37E-06	1.42E-06	1.47E-06	1.53E-06	1.59E-06	1.66E-06	1.73E-06	1.82E-06	1.91E-06	2.02E-06	2.15E-06	2.3E-06	2.48E-06	2.72E-06	3.07E-06	3.62E-06	4.8E-06	1.08E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5548	9.53E-07	9.7E-07	9.88E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.28E-06	1.32E-06	1.37E-06	1.41E-06	1.46E-06	1.52E-06	1.58E-06	1.65E-06	1.72E-06	1.81E-06	1.9E-06	2.01E-06	2.13E-06	2.28E-06	2.47E-06	2.71E-06	3.05E-06	3.62E-06	4.83E-06	1.13E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5584.5	9.51E-07	9.68E-07	9.86E-07	1E-06	1.02E-06	1.05E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.17E-06	1.21E-06	1.24E-06	1.28E-06	1.32E-06	1.36E-06	1.41E-06	1.46E-06	1.51E-06	1.57E-06	1.64E-06	1.71E-06	1.79E-06	1.89E-06	1.99E-06	2.12E-06	2.27E-06	2.45E-06	2.69E-06	3.04E-06	3.61E-06	4.86E-06	1.2E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5621	9.49E-07	9.66E-07	9.84E-07	1E-06	1.02E-06	1.04E-06	1.07E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.5E-06	1.56E-06	1.63E-06	1.7E-06	1.78E-06	1.87E-06	1.98E-06	2.1E-06	2.25E-06	2.44E-06	2.68E-06	3.03E-06	3.61E-06	4.89E-06	1.27E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5657.5	9.47E-07	9.64E-07	9.81E-07	1E-06	1.02E-06	1.04E-06	1.06E-06	1.09E-06	1.11E-06	1.14E-06	1.17E-06	1.2E-06	1.23E-06	1.27E-06	1.3E-06	1.35E-06	1.39E-06	1.44E-06	1.49E-06	1.55E-06	1.62E-06	1.69E-06	1.77E-06	1.86E-06	1.97E-06	2.09E-06	2.24E-06	2.42E-06	2.67E-06	3.02E-06	3.61E-06	4.92E-06	1.36E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5694	9.46E-07	9.62E-07	9.79E-07	9.98E-07	1.02E-06	1.04E-06	1.06E-06	1.08E-06	1.11E-06	1.13E-06	1.16E-06	1.19E-06	1.23E-06	1.26E-06	1.3E-06	1.34E-06	1.39E-06	1.43E-06	1.49E-06	1.55E-06	1.61E-06	1.68E-06	1.76E-06	1.85E-06	1.96E-06	2.08E-06	2.23E-06	2.41E-06	2.66E-06	3.01E-06	3.61E-06	4.95E-06	1.46E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5730.5	9.44E-07	9.6E-07	9.77E-07	9.95E-07	1.01E-06	1.04E-06	1.06E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.26E-06	1.29E-06	1.33E-06	1.38E-06	1.43E-06	1.48E-06	1.54E-06	1.6E-06	1.67E-06	1.75E-06	1.84E-06	1.94E-06	2.07E-06	2.21E-06	2.4E-06	2.64E-06	3E-06	3.61E-06	4.99E-06	1.58E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5767	9.42E-07	9.58E-07	9.75E-07	9.93E-07	1.01E-06	1.03E-06	1.05E-06	1.08E-06	1.1E-06	1.13E-06	1.16E-06	1.19E-06	1.22E-06	1.25E-06	1.29E-06	1.33E-06	1.37E-06	1.42E-06	1.47E-06	1.53E-06	1.59E-06	1.66E-06	1.74E-06	1.83E-06	1.93E-06	2.05E-06	2.2E-06	2.39E-06	2.63E-06	2.99E-06	3.61E-06	5.03E-06	1.73E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5803.5	9.4E-07	9.56E-07	9.73E-07	9.91E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.1E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.25E-06	1.28E-06	1.32E-06	1.37E-06	1.41E-06	1.46E-06	1.52E-06	1.58E-06	1.65E-06	1.73E-06	1.82E-06	1.92E-06	2.04E-06	2.19E-06	2.37E-06	2.62E-06	2.99E-06	3.61E-06	5.06E-06	1.91E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5840	9.38E-07	9.54E-07	9.71E-07	9.89E-07	1.01E-06	1.03E-06	1.05E-06	1.07E-06	1.09E-06	1.12E-06	1.15E-06	1.18E-06	1.21E-06	1.24E-06	1.28E-06	1.32E-06	1.36E-06	1.41E-06	1.46E-06	1.51E-06	1.58E-06	1.64E-06	1.72E-06	1.81E-06	1.91E-06	2.03E-06	2.18E-06	2.36E-06	2.61E-06	2.98E-06	3.61E-06	5.1E-06	2.13E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5876.5	9.37E-07	9.52E-07	9.69E-07	9.87E-07	1.01E-06	1.02E-06	1.05E-06	1.07E-06	1.09E-06	1.12E-06	1.14E-06	1.17E-06	1.2E-06	1.24E-06	1.27E-06	1.31E-06	1.35E-06	1.4E-06	1.45E-06	1.51E-06	1.57E-06	1.64E-06	1.71E-06	1.8E-06	1.9E-06	2.02E-06	2.17E-06	2.35E-06	2.6E-06	2.97E-06	3.61E-06	5.14E-06	2.43E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ATTACHMENT 2
FSCONSOL ERROR CHECKING

1-DIMENSIONAL VERSUS 3-DIMENSIONAL
PERCENT ERROR CACLUATION SUMMARY

Parameters used for modeling

H0 (ft)	H1 (ft)	dh (ft)	Volume (ft^3)	Cum Vol (ft^3)	Area (ft^2)	q (ft/day)
5,196	5,210	14	9,932,193	9,932,193	709,442	2.2121
5,210	5,225	15	38,314,944	48,247,137	2,554,330	0.6144
5,225	5,235	10	44,291,826	92,538,963	4,429,183	0.3543
5,235	5,250	15	92,677,986	185,216,949	6,178,532	0.2540
5,250	5,265	15	117,824,976	303,041,925	7,854,998	0.1998
5,265	5,280	15	132,892,218	435,934,143	8,859,481	0.1771
5,280	5,295	15	157,205,421	593,139,564	10,480,361	0.1497
5,295	5,310	15	166,682,826	759,822,390	11,112,188	0.1412
5,310	5,325	15	182,999,925	942,822,315	12,199,995	0.1286
5,325	5,340	15	188,799,066	1,131,621,381	12,586,604	0.1247
5,340	5,355	15	196,020,810	1,327,642,191	13,068,054	0.1201
5,355	5,370	15	199,271,529	1,526,913,720	13,284,769	0.1181
5,370	5,385	15	201,610,674	1,728,524,394	13,440,712	0.1168
5,385	5,400	15	204,228,243	1,932,752,637	13,615,216	0.1153
5,400	5,425	25	341,505,828	2,274,258,465	13,660,233	0.1149
5,425	5,435	10	136,611,117	2,410,869,582	13,661,112	0.1149
5,435	5,450	15	204,916,743	2,615,786,325	13,661,116	0.1149

Check 1D calc - Volume

Compare volume based on filling time, production rate, & average density w/ stage-curve volume

Time	2,883.50	days		
Production	15,121.0	ton/day		
Total mass	43,601,404	ton		
Void Ratio	3.9303			Note: from FSConsol Time Step Data
Dry Density	33.540	pcf		
Volume	2,599,975,881	ft^3		Note: volume=Qm*t/rho_dry
Cum Vol	2,615,786,325	ft^3	EL 5,448.31	Note: from Rate of Rise Ht vs. Cap Table
Error	-0.60%			

Material Properties

Gs	2.65	
A	5.6895	(1/psf)^B
B	-0.1952	
M	-0.1424	
e0	7.581	
w	286.1%	
s	25.9%	
C	3.91E-04	ft/day
D	3.35	

Production

15,121	t/day
182,886	ft^3/day of dry solids
1,569,366	ft^3/day of tailing
2,883.50	days
7.90	years

Check 1D Calc - height of solids

Compare height of solids based on model inputs and based on the calculated void ratio profile

Stage	Height (ft)	Filling time (day)	q (ft/day)	Hs_production
1	14	17.40	2.2121	4.49
2	29	36.04	0.6144	1.33
3	39	71.95	0.3543	1.48
4	54	157.93	0.2540	2.55
5	69	275.86	0.1998	2.75
6	84	407.95	0.1771	2.73
7	99	554.92	0.1497	2.56
8	114	718.78	0.1412	2.70
9	129	910.33	0.1286	2.87
10	144	1,115.33	0.1247	2.98
11	159	1,334.27	0.1201	3.06
12	174	1,557.63	0.1181	3.07
13	189	1,782.92	0.1168	3.07
14	204	2,042.42	0.1153	3.49
15	229	2,480.92	0.1149	5.87
16	239	2,654.21	0.1149	2.32
17	254	2,883.50	0.1149	3.07
			Total	50.38
			Hs_FSConsol	51.35
			Error	1.93%

Note: based on e profile

1-DIMENSIONAL VERSUS 3-DIMENSIONAL PERCENT ERROR CACLUATION SUMMARY

Check 1D calc - Mass

Calculate total mass based on the void ratio profile and TDF stage storage and compare to mass determined from production rate and total filling time

TIME = 2,883.50

Node	Elev (ft)	Void Ratio	dHs(ft)
1	0.003	1.434	
2	5.080	1.533	2.044
3	10.160	1.645	1.962
4	14.000	1.740	1.426
5	15.240	1.771	0.450
6	20.320	1.911	1.788
7	25.400	2.064	1.700
8	29.000	2.180	1.153
9	30.480	2.227	0.462
10	35.560	2.397	1.534
11	39.000	2.513	0.996
12	40.639	2.569	0.463
13	45.719	2.740	1.390
14	50.799	2.908	1.328
15	54.000	3.010	0.809
16	55.879	3.069	0.465
17	60.959	3.225	1.225
18	66.039	3.373	1.182
19	69.000	3.455	0.671
20	71.119	3.514	0.472
21	76.199	3.649	1.109
22	81.279	3.778	1.078
23	84.000	3.844	0.566
24	86.359	3.901	0.484
25	91.439	4.020	1.024
26	96.519	4.134	1.001
27	99.000	4.187	0.481
28	101.599	4.243	0.498
29	106.678	4.349	0.959
30	111.758	4.452	0.941
31	114.000	4.496	0.409
32	116.838	4.552	0.514
33	121.918	4.648	0.907
34	126.998	4.742	0.892
35	129.000	4.778	0.348
36	132.078	4.834	0.530
37	137.158	4.923	0.864
38	142.238	5.010	0.851
39	144.000	5.039	0.292
40	147.318	5.095	0.547
41	152.398	5.178	0.828
42	157.478	5.260	0.817
43	159.000	5.284	0.243
44	162.558	5.340	0.564
45	167.637	5.418	0.796
46	172.717	5.495	0.787
47	174.000	5.514	0.197
48	177.797	5.570	0.580
49	182.877	5.644	0.769
50	187.957	5.717	0.760
51	189.000	5.732	0.155
52	193.037	5.789	0.597
53	198.117	5.859	0.744
54	203.197	5.929	0.737
55	204.000	5.939	0.116
56	208.277	5.997	0.614
57	213.357	6.064	0.723
58	218.437	6.131	0.716
59	223.517	6.196	0.709
60	228.597	6.261	0.703
61	229.000	6.266	0.056
62	233.677	6.324	0.641
63	238.757	6.387	0.691
64	239.000	6.390	0.033
65	243.836	6.449	0.652
66	248.916	6.510	0.679
67	254.000	7.581	0.632

Calculate total mass of the impoundment based on 1D void ratio profile

	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8	Layer 9
Δ_Height (ft)	14	15.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Height (ft)	14	29	39	54	69	84	99	114	129
Hs (ft)	5.43	5.09	2.99	3.99	3.54	3.22	2.99	2.81	2.66
e_avg	1.58	1.95	2.34	2.76	3.23	3.65	4.02	4.34	4.64
rho_dry (pcf)	64.17	56.12	49.47	43.99	39.06	35.55	32.96	30.95	29.33
Vol (ft^3)	9,932,193	38,314,944	44,291,826	92,677,986	117,824,976	132,892,218	157,205,421	166,682,826	182,999,925
Mass (ton)	318,662	1,075,213	1,095,477	2,038,244	2,300,832	2,362,077	2,590,583	2,579,371	2,683,614

	Layer 10	Layer 11	Layer 12	Layer 13	Layer 14	Layer 15	Layer 16	Layer 17
Δ_Height (ft)	15.0	15.0	15.0	15.0	15.0	25.0	10.0	15.0
Height (ft)	144.0	159.0	174.0	189.0	204.0	229.0	239.0	254.0
Hs (ft)	2.54	2.43	2.34	2.26	2.19	3.52	1.36	1.96
e_avg	4.91	5.16	5.40	5.62	5.84	6.10	6.33	6.64
rho_dry (pcf)	27.98	26.83	25.84	24.97	24.19	23.28	22.57	21.64
Vol (ft^3)	188,799,066	196,020,810	199,271,529	201,610,674	204,228,243	341,505,828	136,611,117	204,916,743
Mass (ton)	2,641,449	2,630,075	2,574,663	2,516,815	2,470,154	3,975,111	1,541,374	2,217,043

Time	2,883.5	days	
Production	15,121	ton/day	
Total mass	43,601,404	ton	Note: based on the time of filling and production rate
TDF - total mass	37,610,756	ton	Note: based on the integration of the void ratio profile
Error (%)	13.74%		

1-DIMENSIONAL VERSUS 3-DIMENSIONAL PERCENT ERROR CACLUATION SUMMARY

Parameters used for modeling

H0 (ft)	H1 (ft)	dh (ft)	Volume (ft^3)	Cum Vol (ft^3)	Area (ft^2)	q (ft/day)
5,196	5,210	14	9,932,193	9,932,193	709,442	2.2121
5,210	5,225	15	38,314,944	48,247,137	2,554,330	0.6144
5,225	5,235	10	44,291,826	92,538,963	4,429,183	0.3543
5,235	5,250	15	92,677,986	185,216,949	6,178,532	0.2540
5,250	5,265	15	117,824,976	303,041,925	7,854,998	0.1998
5,265	5,280	15	132,892,218	435,934,143	8,859,481	0.1771
5,280	5,295	15	157,205,421	593,139,564	10,480,361	0.1497
5,295	5,310	15	166,682,826	759,822,390	11,112,188	0.1412
5,310	5,325	15	182,999,925	942,822,315	12,199,995	0.1286
5,325	5,340	15	188,799,066	1,131,621,381	12,586,604	0.1247
5,340	5,355	15	196,020,810	1,327,642,191	13,068,054	0.1201
5,355	5,370	15	199,271,529	1,526,913,720	13,284,769	0.1181
5,370	5,385	15	201,610,674	1,728,524,394	13,440,712	0.1168
5,385	5,400	15	204,228,243	1,932,752,637	13,615,216	0.1153
5,400	5,425	25	341,505,828	2,274,258,465	13,660,233	0.1149
5,425	5,435	10	136,611,117	2,410,869,582	13,661,112	0.1149
5,435	5,450	15	204,916,743	2,615,786,325	13,661,116	0.1149

Check 1D calc - Volume

Compare volume based on filling time, production rate, & average density w/ stage-curve volume

Time	4,057.00	days			
Production	15,121.0	ton/day			
Total mass	61,345,897	ton			
Void Ratio	1.1581				Note: from FSConsol Time Step Data
Dry Density	76.623	pcf			
Volume	1,601,244,549	ft^3			Note: volume=Qm*t/rho_dry
Cum Vol	1,547,514,922	ft^3	EL	5,371.53	Note: from Rate of Rise Ht vs. Cap Table
Error	3.47%				

Material Properties

Gs	2.65	
A	4.4241	(1/psf)^B
B	-0.2983	
M	0.5224	
e0	7.581	
w	286.1%	
s	25.9%	
C	4.32E-03	ft/day
D	3.04	

Production

15,121	t/day
182,886	ft^3/day of dry solids
1,569,327	ft^3/day of tailing
4,057.00	days
11.12	years

Check 1D Calc - height of solids

Compare height of solids based on model inputs and based on the calculated void ratio profile

Stage	Height (ft)	Filling time (day)	q (ft/day)	Hs_production	
1	14	25.54	2.2121	6.58	
2	29	77.82	0.6144	3.74	
3	39	200.19	0.3543	5.05	
4	54	433.42	0.2540	6.90	
5	69	698.40	0.1998	6.17	
6	84	1,009.95	0.1771	6.43	
7	99	1,401.09	0.1497	6.83	
8	114	1,815.07	0.1412	6.81	
9	129	2,345.37	0.1286	7.95	
10	144	2,880.33	0.1247	7.77	
11	159	3,434.57	0.1201	7.76	
12	174	3,993.71	0.1181	7.70	
13	189	4,057.00	0.1168	0.86	
14	204	4,057.00	0.1153	0.00	
15	229	4,057.00	0.1149	0.00	
16	239	4,057.00	0.1149	0.00	
17	254	4,057.00	0.1149	0.00	
			Total	80.56	
			Hs_FSConsol	81.47	Note: based on e profile
			Error	1.13%	

1-DIMENSIONAL VERSUS 3-DIMENSIONAL PERCENT ERROR CACLUATION SUMMARY

Check 1D calc - Mass

Calculate total mass based on the void ratio profile and TDF stage storage and compare to mass determined from production rate and total filling time

TIME = 4,057.00

Node	Elev (ft)	Void Ratio	dHs(ft)
1	0.003	0.885	
2	5.080	0.892	2.688
3	10.160	0.899	2.680
4	14.000	0.905	2.019
5	15.240	0.907	0.650
6	20.320	0.916	2.658
7	25.400	0.924	2.646
8	29.000	0.931	1.868
9	30.480	0.934	0.766
10	35.560	0.944	2.620
11	39.000	0.951	1.767
12	40.639	0.955	0.839
13	45.719	0.966	2.591
14	50.799	0.978	2.576
15	54.000	0.986	1.615
16	55.879	0.991	0.945
17	60.959	1.005	2.542
18	66.039	1.020	2.524
19	69.000	1.030	1.462
20	71.119	1.036	1.042
21	76.199	1.054	2.484
22	81.279	1.072	2.463
23	84.000	1.083	1.310
24	86.359	1.092	1.130
25	91.439	1.114	2.416
26	96.519	1.136	2.391
27	99.000	1.149	1.158
28	101.599	1.161	1.206
29	106.678	1.188	2.336
30	111.758	1.216	2.307
31	114.000	1.229	1.009
32	116.838	1.246	1.268
33	121.918	1.278	2.246
34	126.998	1.313	2.213
35	129.000	1.328	0.863
36	132.078	1.350	1.316
37	137.158	1.390	2.144
38	142.238	1.433	2.106
39	144.000	1.450	0.722
40	147.318	1.481	1.346
41	152.398	1.537	2.025
42	157.478	1.603	1.977
43	159.000	1.630	0.582
44	162.558	1.691	1.337
45	167.637	1.830	1.840
46	172.717	2.190	1.688
47	174.000	2.340	0.393
48	177.797	2.787	1.066
49	175.533	7.581	-0.366

Calculate total mass of the impoundment based on 1D void ratio profile

	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8	Layer 9
Δ_Height (ft)	14	15.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Height (ft)	14	29	39	54	69	84	99	114	129
Hs (ft)	7.39	7.82	5.15	7.62	7.47	7.30	7.09	6.86	6.59
e_avg	0.90	0.92	0.94	0.97	1.01	1.06	1.11	1.19	1.28
rho_dry (pcf)	87.25	86.22	85.20	84.02	82.38	80.46	78.21	75.60	72.64
Vol (ft^3)	9,932,193	38,314,944	44,291,826	92,677,986	117,824,976	132,892,218	157,205,421	166,682,826	182,999,925
Mass (ton)	433,286	1,651,849	1,886,806	3,893,369	4,853,484	5,346,370	6,147,490	6,300,939	6,646,956

	Layer 10	Layer 11	Layer 12	Layer 13	Layer 14	Layer 15	Layer 16	Layer 17
Δ_Height (ft)	15.0	15.0	15.0	1.5				
Height (ft)	144.0	159.0	174.0	175.5				
Hs (ft)	6.29	5.93	5.26	0.70				
e_avg	1.39	1.53	1.85	1.19				
rho_dry (pcf)	69.32	65.36	57.96	75.44				
Vol (ft^3)	188,799,066	196,020,810	199,271,529	201,610,674				
Mass (ton)	6,543,555	6,406,050	5,775,192	7,605,173				

Time	4,057	days	
Production	15,121	ton/day	
Total mass	61,345,897	ton	Note: based on the time of filling and production rate
TDF - total mass	63,490,519	ton	Note: based on the integration of the void ratio profile
Error (%)	-3.50%		

ATTACHMENT 3
FSCONSOL MODEL SUMMARY

SUMMARY

Input Parameters

Total Mine Tailings	1.12E+08	tons	Total Tailings (Underflow + Overflow)
Cyclone Availability	100.00%		Assumed Plant Operations
Sand Recovery	45.25%		Average Recovery from Cyclone Plant
Slimes Percentage	40.00%		Slimes vs. Beach (Overflow + Whole)
Overflow Percentage	54.75%		Tailings (Overflow + Whole)
Whole Percentage	0.00%		Tailings (Whole versus Total)
Production	27,618	t/day	Total Tailings (Underflow + Overflow)
	15,121	t/day	Tailings Overflow + Whole
	0	t/day	Tailings Whole (Beach + Slimes)
	15,121	t/day	Tailings Overflow (Beach + Slimes)

Overflow

Production	6,048	t/day	Tailings Overflow Slimes
Production	9,073	t/day	Tailings Overflow Beach
Production	0	t/day	Tailings Whole Slimes
Production	0	t/day	Tailings Whole Beach
Capacity	6.13E+07	tons	Tailings Overflow (Beach + Slimes)
Time	4,057	days	Tailings Overflow (Beach + Slimes)
	11.115	years	

FSConsol 1D Percent Errors

	Height	Volume	Mass	Average
OF-slimes	1.93%	0.60%	13.74%	5.42%
OF-beach	1.13%	3.47%	3.50%	2.70%
Whole-slimes	0.00%	0.00%	0.00%	0.00%
Whole-beach	0.00%	0.00%	0.00%	0.00%

FSConsol average densities (for deepest column in TSF)

	Unadjusted		Adjusted	
OF-slimes	33.55	pcf	31.73	pcf
OF-beach	76.65	pcf	74.58	pcf
Whole-slimes	0.00	pcf	0.00	pcf
Whole-beach	0.00	pcf	0.00	pcf

Required Capacity

	5.07E+07	tons	Tailings Underflow Cyclone Sand
	2.45E+07	tons	Tailings Overflow Slimes
	3.68E+07	tons	Tailings Overflow Beach
	0.00E+00	tons	Tailings Whole Slimes
	0.00E+00	tons	Tailings Whole Beach
	1.12E+08	tons	Total Tailings (Underflow + Overflow)
Check	0.0000	tons	OK

Required Volume and Weighted Density

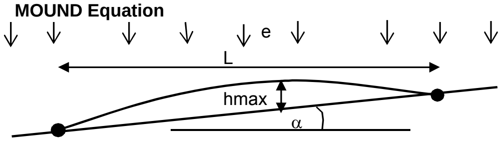
	Unadjusted		Adjusted		Volume	Density	
OF-slimes	1.46E+09	ft^3	1.55E+09	ft^3	61.04%	19.37	pcf
OF-beach	9.60E+08	ft^3	9.87E+08	ft^3	38.96%	29.05	pcf
Whole-slimes	0.00E+00	ft^3	0.00E+00	ft^3	0.00%	0.00	pcf
Whole-beach	0.00E+00	ft^3	0.00E+00	ft^3	0.00%	0.00	pcf
Total	8.97E+07	yd^3	9.38E+07	yd^3	100.00%	48.42	pcf

APPENDIX D
UNDERDRAIN DESIGN CALCULATIONS

APPENDIX D.1
DRAIN PIPE SPACING CALCULATIONS

LCR
4/15/04

MOUND Equation



$$h_{\max} = \frac{L\sqrt{C}}{2}\left[\frac{\tan^2\alpha}{C} + \left(1 - \frac{\tan\alpha}{C}\left(\tan^2\alpha + C\right)^{1/2}\right)\right]$$

Where: L=Drain Spacing
C=Inflow Ratio (e/K)
e=Constant Recharge Rate
k=Drain Media Hydraulic Conductivity
tan α=Slope Between Pipes

h_{max} (ft)	L (ft)	e (cm/sec)	e (ft/day)	k (cm/sec)	k (ft/day)	C	tan α
1.41	45	5.07E-04	1.44E+00	1.00E-01	2.83E+02	5.07E-03	0.01

Assume sand applied over a 600 foot by 100 foot area.
Estimate an equivalent constant recharge rate (e) for the drainage through the sand in the active sand application area
Sand K will be higher but flow will be limited by water in underflow

Estimate Equivalent Constant Recharge Rate (e)

Tons milled	30,000	tpd	
Cyclone recovery	46	percent	
Q sand	13,800	tpd	
Solids content	70	wt percent	
Total underflow	19,714	tpd	
Water in UF	5,914	tpd	
Water in UF	1,042	gpm	
Water retained	42.00%		
Water lost to evap	15.00%		
Seepage	448	gpm	
Application area	600	L (feet)	Estimate
Application area	100	w (feet)	Estimate
Application area	60,000	ft^2	
Application rate	1.66392E-05	feet/sec	
Application rate (e)	**5.07E-04**	**cm/sec**	

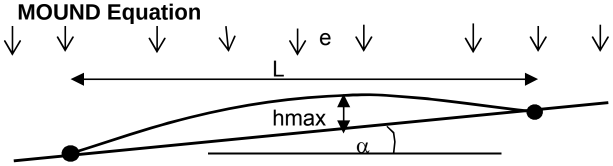
Equivalent flow rate for active sand application area

Masada, T., 1998, "Leachate Flow Mound Equations for Steady-State Flow Over a Landfill Geosynthetic Bottom Liner", Geosynthetics International, Vol. 5, No. 4, pp. 383-397.

Han Ke,[1] Yunmin Chen,[2] and Chuangbing Huang[3]
Estimation of Maximum Liquid Depth in Layered Drainage Blankets over Landfill Barriers
J. Envir. Engrg. Volume 134, Issue 1, pp. 67-76 (January 2008)

LRC
4/15/04

MOUND Equation



$$h_{\max} = \frac{L\sqrt{C}}{2}\left[\frac{\tan^2\alpha}{C} + \left(1 - \frac{\tan\alpha}{C}\left(\tan^2\alpha + C\right)^{1/2}\right)\right]$$

Where: L=Drain Spacing
C=Inflow Ratio (e/K)
e=Constant Recharge Rate
k=Drain Media Hydraulic Conductivity
tan α=Slope Between Pipes

h_{max} (ft)	L (ft)	e (cm/sec)	e (ft/day)	k (cm/sec)	k (ft/day)	C	tan α
1.33	35	2.75E-07	7.80E-04	3.80E-05	1.08E-01	7.24E-03	0.01

K drain test result 3.8e-05 cm/sec, select (native)drain fil
Average of beach and slimes hydraulic conductivity applied (2.75×10^{7} cm/sec).

Masada, T., 1998, "Leachate Flow Mound Equations for Steady-State Flow Over a Landfill Geosynthetic Bottom Liner", Geosynthetics International, Vol. 5, No. 4, pp. 383-397.

Han Ke,[1] Yunmin Chen,[2] and Chuangbing Huang[3]
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J. Envir. Engrg. Volume 134, Issue 1, pp. 67-76 (January 2008)

APPENDIX D.2
DRAIN PIPE DEFLECTION CALCULATIONS

CALCULATIONS

Date:	April 23, 2013	**Made by:**	CDJ
Project No.:	103-92557	**Checked by:**	GM
Subject:	Underdrain Pipe Deflection Calculations	**Reviewed by:**	MJG
Project Short Title:	**COPPER FLAT FEASIBILITY DESIGN**		

1.0 OBJECTIVE

Determine the amount of deflection that will be experienced by the piping system within the tailings storage facility (TSF) underdrains caused by the surcharge load of the ultimate tailings height.

2.0 ASSUMPTIONS

- Underdrain Fill has a cohesion of 0 pounds per square inch (psi) and a friction angle of 39 degrees based on Golder laboratory tests for tailings underflow cyclone sand material.
- Underdrain Fill has a stress versus strain relationship similar to Silty Sand at a relative density of 80 percent per Standard AASHTO compaction specifications.
- Linear relationship between an applied vertical load of 52.1 to 69.4 psi to extrapolate the appropriate strain for an applied vertical load of 200 psi, which is the total vertical stress component imposed by the ultimate tailings height.
- The maximum burial depth is 240 feet.
- All pipes are perforated corrugated polyethylene (PCPE) N-12 pipes with a flexural modulus of 22,000 psi for a 50-year life span.
- The optimum dry density of the tailings underflow cyclone sand in the TSF is 97 pounds per cubic foot (pcf) per laboratory soil density/moisture content compaction proctor tests. As-delivered moisture content is 30 percent for a wet density of 126 pcf. After initial draindown and evaporation, moisture content of approximately 17 percent (optimum water content) for a wet density of 113.5 pcf. Therefore, use the worse-case scenario of 126 pcf for the loading conditions applied to the underdrain.
- Underdrain pipes will be subject to surface loads associated with saturated tailings overflow. The average dry density of the tailings overflow thickened slimes is estimated to be 73 pcf with a wet density of 108 pcf. The loading condition imposed by the cyclone sand dam fill represents the worst-case scenario for pipe deflection analyses.
- Maximum deflection allowed is 15 percent.

3.0 CALCULATION OF PIPE DEFLECTIONS

Golder analyzed the pipe stresses and deformations based on the work of Burns and Richards (Burns and Richards, 1964) and Hoeg (1968) with modifications to the closed-form, plane strain solutions by Lupo (2001). The closed form equations were modified to allow an incremental stress approach and non-linear material compression. Calculations of deflections were completed using an Excel ™ spreadsheet. Calculations are included in Attachment 1.

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4.0 RESULTS

A summary of the maximum deflections of the underdrain collection system pipes within the Underdrain Fill for the TSF is shown below in Table 1.

Table 1: Summary of Maximum Pipe Deflections

Pipe Information	No Interface Slippage Vertical Deflection (%)	Full Slippage Vertical Deflection (%)
4-inch PCPE N-12	12.6	13.5
10-inch PCPE N-12	12.9	13.8
12-inch PCPE N-12	10.9	11.5

5.0 CONCLUSIONS

The calculated deflections of the 4-inch, 10-inch and 12-inch diameter PCPE N-12 pipes proposed for use in the impoundment and embankment underdrains at the Copper Flat TSF is estimated to be within the allowable limits under the anticipated worst-case loading and placement conditions. The maximum deflection is estimated to be 11 to 11.5 percent for 12-inch diameter pipe and 12.5 to 14 percent for 4-inch to 10-inch diameter pipes. The maximum allowable deflection of these pipes is 15 percent.

6.0 REFERENCES

Burns, J.Q. and R.M. Richard, 1964. Attenuation of Stresses for Buried Conduits. Proceedings of the Symposium Soil-Structure Interaction, University of Arizona.

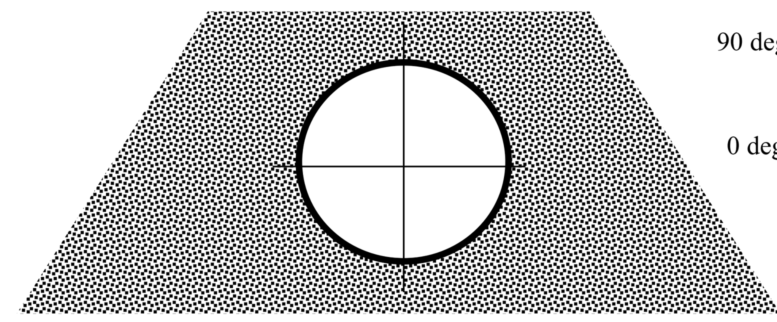
Hoeg, K., 1968. Stresses Against Underground Structural Cylinders. J. Soil Mech. and Foundation Div. ASCE, Vol. 94, No. SM4.

Lupo, J.F., 2001. Stability of HDPE Pipes Under High Heap Loads. SME Annual Meeting, Denver, Colorado. February 26-28, 2001.

ATTACHMENT 1
PIPE DEFLECTION CALCULATION

BURIED PLASTIC PIPE LOADING WORKSHEET V2.0

[With Incremental Stress Analysis (non-linear)]



Model Geometry

Project: Copper Flat
4 IN N-12 PIPE

By: CDJ
Date: 04/23/2013
Note: Compression is positive, tension is negative

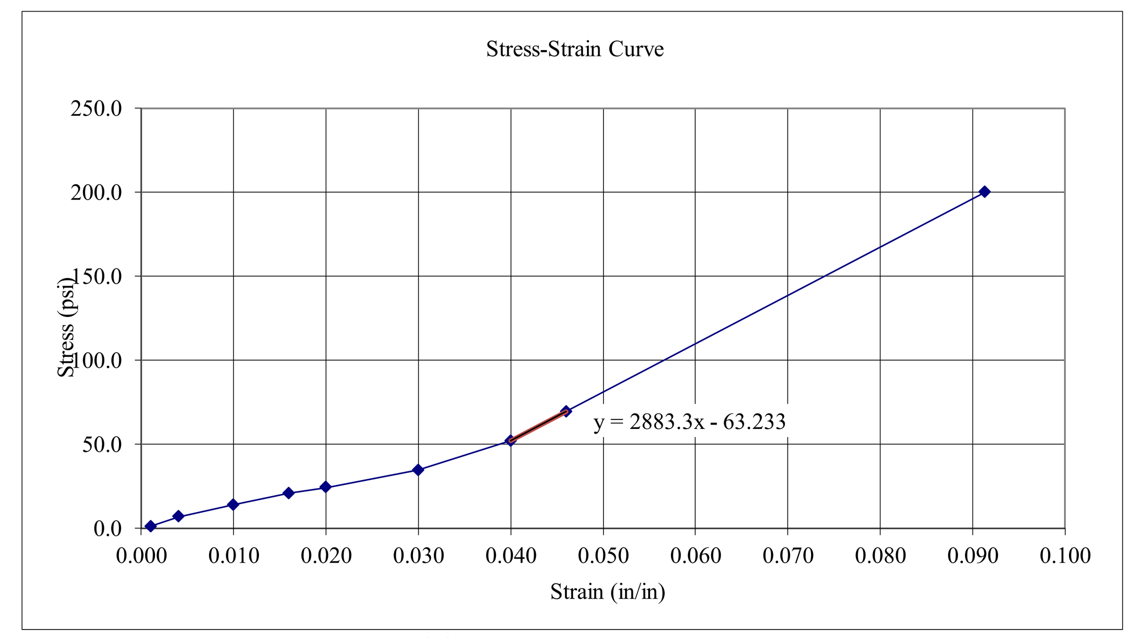
SOIL and PIPE Input Data

Material	Cohesion	Friction Angle	Contrained Modulus (psi)	Lateral Stress Ratio	Lateral Pressure Parameters B	Lateral Pressure Parameters C
Pipe	n/a	n/a				
Soil	0	39	2191	0.39	0.696	0.30

Pipe Diameter OD (in):	4.78		
Pipe ID (in):	4.10		
Weight of Pipe (lb/ft):	0.41		
Pipe Corrugated (y/n):	y		64.50
Prescribed Constrained Modulus (y/n):	n		0.23
Prescribed Constrained Modulus (psi):	na		
Pipe Wall Thickness (in):	0.02		
Pipe Area (in^2/in):	0.07		
Flexural Modulus (psi), E_f =	22,000		
Ring Compression Modulus (psi), E_{rc} =	22,000		
C value (in)	0.29		
Moment of Inertia (in^4/in) non-corrugated:	11.8		
Moment of Inertia (in^4/in) corrugated (input from manufacturer data):	0.0014	selected I:	0.0014
Stiffness Coefficients			
Flexural Stiffness	13.7		
Ring Compression Stiffness	647.1	Ring Stiffness Factor: 2.3	Pipe Stiffness Less Than Soil

Shell-Medium Parameters		
UF	4.72	Extensional Flexibility ratio = Compressibility ratio = relative flexibility of pipe and soil under uniform loading.
VF	97.0	Bending Flexibility ratio = Flexibility ratio = relative flexibility of pipe and soil under varying radial and
		If both UF and VF are zero then a perfectly rigid embedded pipe.

Pipe Mean Radius (in):	2.38	
Depth of Burial (ft):	240.0	
Applied Surface Stress (psf):	0.0	
Soil Density (pcf):	120.0	
Total Vertical Stress Component (psf):	28800.0	Free Field Stress Values
Total Vertical Stress Component (psi):	200.0	



Soil Compression Data		
Applied Vertical Load (psi)	Vertical Strain (in/in)	Constrained Modulus (psi)
1.0	0.001	1000.00
6.9	0.004	1725.00
13.9	0.010	1390.00
20.8	0.016	1300.00
24.3	0.020	1215.00
34.7	0.030	1156.67
52.1	0.040	1302.50
69.4	0.046	1508.70
200.0	0.091	2190.68

Critical Stress For Buckling Failure (psf): 194.7
Ovality: 0.3
Corrected Stress (psf): 58.4

NO INTERFACE SLIPPAGE

Angle	Soil Stresses (psi) Radial	Soil Stresses (psi) Hoop	Soil Stresses (psi) Shear	Pipe Displacements (in) Radial	Pipe Displacements (in) Hoop	Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
0	119.6	308.1	0.0	-0.074	0.00E+00	280.7	7.7	4009.8	0.1823	0.0757	1593	1483	5602	5493
10	117.2	301.5	29.6	-0.054	5.92E-02	274.6	7.3	3923.3	0.1783	0.0741	1516	1412	5440	5335
20	110.3	282.5	55.6	0.005	1.11E-01	257.2	6.3	3674.5	0.1670	0.0694	1297	1208	4972	4882
30	99.7	253.4	75.0	0.095	1.50E-01	230.5	4.6	3293.2	0.1497	0.0622	961	895	4254	4188
40	86.8	217.7	85.2	0.205	1.70E-01	197.8	2.7	2825.5	0.1284	0.0533	549	511	3375	3337
50	73.0	179.7	85.2	0.322	1.70E-01	162.9	0.5	2327.8	0.1058	0.0440	110	103	2438	2431
60	60.0	144.0	75.0	0.433	1.50E-01	130.2	-1.5	1860.1	0.0846	0.0351	-302	-281	1558	1579
70	49.5	114.9	55.6	0.522	1.11E-01	103.5	-3.1	1478.9	0.0672	0.0279	-638	-594	841	885
80	42.6	95.9	29.6	0.581	5.92E-02	86.1	-4.1	1230.0	0.0559	0.0232	-857	-798	373	432
90	40.2	89.3	0.0	0.602	2.12E-17	80.1	-4.5	1143.6	0.0520	0.0216	-933	-869	210	275

Vertical Deflection (%):	12.58		149.93
Horizontal Deflection (%):	-3.11		258.17
Radial Soil Pressure at Crown (psi):	40.2	5788	
Circumferential Shortening (in):	1.95		
Arc length of each sector (in) =	0.42		

Max. Compressive Stress (psi): 5602
Max. Tensile Stress (psi): No Tensile Stress

FULL SLIPPAGE

Angle	Soil Stresses (psi)			Pipe Displacements (in)		Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
	Radial	Hoop	Shear	Radial	Hoop									
0	75.9	81.3	0.0	-0.116	0.00E+00	183.4	8.4	2620.0	0.1191	0.0495	1748	1628	4368	4247
10	76.1	88.4	121.8	-0.093	1.31E-01	183.2	8.0	2617.4	0.1190	0.0494	1663	1548	4280	4165
20	76.8	108.8	229.0	-0.027	2.46E-01	182.7	6.8	2609.8	0.1186	0.0493	1416	1319	4026	3928
30	77.9	140.0	308.5	0.074	3.31E-01	181.9	5.0	2598.3	0.1181	0.0491	1039	967	3637	3566
40	79.2	178.3	350.8	0.198	3.77E-01	180.9	2.8	2584.2	0.1175	0.0488	576	536	3160	3121
50	80.6	219.1	350.8	0.330	3.77E-01	179.8	0.4	2569.2	0.1168	0.0485	83	78	2653	2647
60	81.9	257.4	308.5	0.453	3.31E-01	178.9	-1.8	2555.0	0.1161	0.0482	-379	-353	2176	2202
70	83.0	288.6	229.0	0.554	2.46E-01	178.0	-3.7	2543.5	0.1156	0.0480	-757	-705	1787	1839
80	83.7	309.0	121.8	0.620	1.31E-01	177.5	-4.8	2536.0	0.1153	0.0479	-1003	-934	1533	1602
90	83.9	316.1	0.0	0.643	4.69E-17	177.3	-5.3	2533.4	0.1152	0.0478	-1089	-1013	1445	1520

Vertical Deflection (%):	13.46
Horizontal Deflection (%):	-4.87
Radial Soil Pressure at Crown (psi):	83.9
Circumferential Shortening (in):	1.95
Arc length of each sector (in) =	0.42

12084

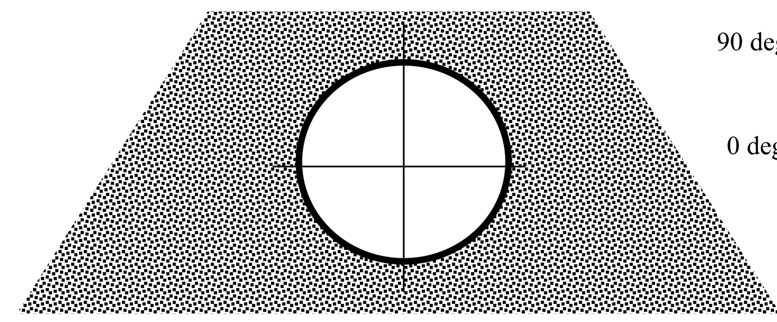
Max. Compressive Stress (psi): 4368
Max. Tensile Stress (psi): No Tensile Stress

Free Field Stress:	200.0	psi
Free Field Stress Times Pipe Radius:	19404	psi

Radius (in)	CROWN				SPRINGLINE			
	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)
2.38	177.3	80.1	316.1	89.3	183.4	280.7	81.3	308.1
2.88	216.6	97.8	198.1	96.5	224.0	342.9	159.9	261.5
3.38	255.9	115.5	147.9	95.9	264.6	405.1	187.5	239.6
3.88	295.2	133.2	123.0	93.6	305.2	467.2	198.2	227.6
4.38	334.4	150.9	109.2	91.4	345.9	529.4	202.6	220.4
4.88	373.7	168.6	100.9	89.4	386.5	591.6	204.3	215.7
5.38	413.0	186.3	95.5	87.8	427.1	653.8	204.9	212.5
5.88	452.3	204.0	91.8	86.5	467.7	716.0	204.9	210.2
6.38	491.5	221.7	89.3	85.4	508.3	778.2	204.7	208.5
6.88	530.8	239.4	87.4	84.6	548.9	840.3	204.4	207.2
7.38	570.1	257.1	85.9	83.8	589.6	902.5	204.0	206.1
7.88	609.4	274.8	84.8	83.2	630.2	964.7	203.7	205.3
8.38	648.6	292.5	84.0	82.7	670.8	1026.9	203.4	204.7
8.88	687.9	310.2	83.3	82.3	711.4	1089.1	203.1	204.1
9.38	727.2	328.0	82.7	81.9	752.0	1151.3	202.9	203.7
9.88	766.5	345.7	82.2	81.6	792.6	1213.4	202.6	203.3
10.38	805.7	363.4	81.9	81.3	833.3	1275.6	202.4	203.0
10.88	845.0	381.1	81.5	81.1	873.9	1337.8	202.2	202.7
11.38	884.3	398.8	81.2	80.9	914.5	1400.0	202.1	202.4
11.88	923.6	416.5	81.0	80.7	955.1	1462.2	201.9	202.2
12.38	962.8	434.2	80.8	80.5	995.7	1524.4	201.8	202.1
12.88	1002.1	451.9	80.6	80.4	1036.3	1586.5	201.7	201.9
13.38	1041.4	469.6	80.4	80.3	1077.0	1648.7	201.6	201.7
13.88	1080.7	487.3	80.3	80.1	1117.6	1710.9	201.5	201.6
14.38	1119.9	505.0	80.2	80.0	1158.2	1773.1	201.4	201.5
Check Values:	648.6	292.5	155.8	92.0	670.8	1026.9	176.9	240.8
Soil Arching:	Positive Arch	Positive Arch	Negative Arch	Negative Arch	Positive Arch	Positive Arch	Positive Arch	Positive Arch

BURIED PLASTIC PIPE LOADING WORKSHEET V2.0

[With Incremental Stress Analysis (non-linear)]



Model Geometry

Project: Copper Flat
10 IN N-12 PIPE

By: CDJ
Date: 04/23/2013
Note: Compression is positive, tension is negative

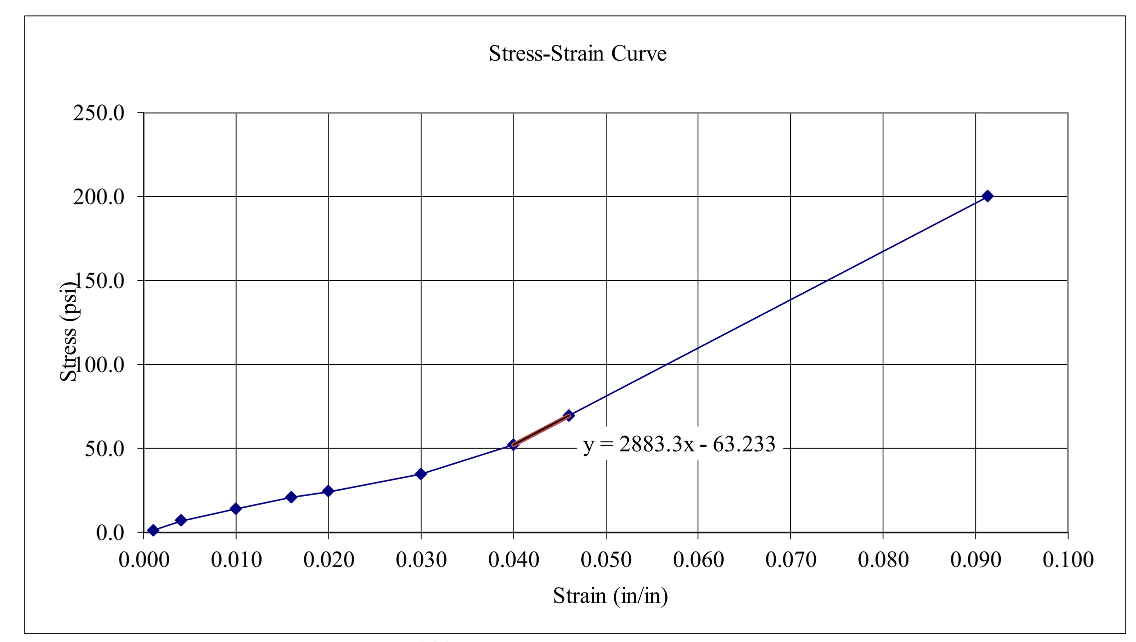
SOIL and PIPE Input Data

Material	Cohesion	Friction Angle	Contrained Modulus (psi)	Lateral Stress Ratio	Lateral Pressure Parameters B	Lateral Pressure Parameters C
Pipe	n/a	n/a				
Soil	0	39	2191	0.39	0.696	0.30

Pipe Diameter OD (in):	11.36		
Pipe ID (in):	9.90		
Weight of Pipe (lb/ft):	2.26		
Pipe Corrugated (y/n):	y		64.50
Prescribed Constrained Modulus (y/n):	n		0.23
Prescribed Constrained Modulus (psi):	na		
Pipe Wall Thickness (in):	0.03		
Pipe Area (in^2/in):	0.15		
Flexural Modulus (psi), E_f =	22,000		
Ring Compression Modulus (psi), E_{rc} =	22,000		
C value (in)	0.34		
Moment of Inertia (in^4/in) non-corrugated:	346.0		
Moment of Inertia (in^4/in) corrugated (input from manufacturer data):	0.0110	selected I:	0.0110
Stiffness Coefficients			
Flexural Stiffness	8.0		
Ring Compression Stiffness	562.9	Ring Stiffness Factor:	1.3 — Pipe Stiffness Less Than Soil

Shell-Medium Parameters		
UF	5.42	Extensional Flexibility ratio = Compressibility ratio = relative flexibility of pipe and soil under uniform loading.
VF	166.7	Bending Flexibility ratio = Flexibility ratio = relative flexibility of pipe and soil under varying radial and
		If both UF and VF are zero then a perfectly rigid embedded pipe.

Pipe Mean Radius (in):	5.67	
Depth of Burial (ft):	240.0	
Applied Surface Stress (psf):	0.0	
Soil Density (pcf):	120.0	
Total Vertical Stress Component (psf):	28800.0	Free Field Stress Values
Total Vertical Stress Component (psi):	200.0	



Soil Compression Data		
Applied Vertical Load (psi)	Vertical Strain (in/in)	Constrained Modulus (psi)
1.0	0.001	1000.00
6.9	0.004	1725.00
13.9	0.010	1390.00
20.8	0.016	1300.00
24.3	0.020	1215.00
34.7	0.030	1156.67
52.1	0.040	1302.50
69.4	0.046	1508.70
200.0	0.091	2190.68

Critical Stress For Buckling Failure (psf):	642.5
Ovality:	0.3
Corrected Stress (psf):	192.8

NO INTERFACE SLIPPAGE

Angle	Soil Stresses (psi) Radial	Soil Stresses (psi) Hoop	Soil Stresses (psi) Shear	Pipe Displacements (in) Radial	Pipe Displacements (in) Hoop	Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
0	118.2	313.4	0.0	-0.172	0.00E+00	652.7	25.6	4501.3	0.2046	0.2024	793	734	5294	5236
10	115.8	306.6	29.3	-0.123	1.41E-01	638.5	24.4	4403.7	0.2002	0.1980	755	699	5159	5103
20	108.7	287.1	55.1	0.019	2.65E-01	597.8	20.9	4122.8	0.1874	0.1854	646	598	4769	4721
30	97.9	257.2	74.2	0.237	3.57E-01	535.4	15.5	3692.3	0.1678	0.1660	479	444	4171	4136
40	84.6	220.6	84.3	0.504	4.06E-01	458.8	8.9	3164.3	0.1438	0.1423	274	254	3439	3418
50	70.4	181.6	84.3	0.788	4.06E-01	377.3	1.8	2602.3	0.1183	0.1170	57	52	2659	2655
60	57.1	144.9	74.2	1.055	3.57E-01	300.8	-4.8	2074.3	0.0943	0.0933	-148	-137	1926	1937
70	46.3	115.1	55.1	1.273	2.65E-01	238.4	-10.2	1643.8	0.0747	0.0739	-315	-292	1329	1352
80	39.2	95.6	29.3	1.415	1.41E-01	197.6	-13.7	1362.9	0.0619	0.0613	-424	-393	939	970
90	36.8	88.8	0.0	1.464	5.05E-17	183.5	-14.9	1265.3	0.0575	0.0569	-462	-428	804	837

Vertical Deflection (%):	12.89		149.93
Horizontal Deflection (%):	-3.03		258.17
Radial Soil Pressure at Crown (psi):	36.8	5295	
Circumferential Shortening (in):	5.19		
Arc length of each sector (in) =	0.99		

Max. Compressive Stress (psi): 5294
Max. Tensile Stress (psi): No Tensile Stress

FULL SLIPPAGE

Angle	Soil Stresses (psi)			Pipe Displacements (in)		Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
	Radial	Hoop	Shear	Radial	Hoop									
0	75.2	82.0	0.0	-0.271	0.00E+00	422.3	28.1	2912.3	0.1324	0.1309	869	805	3781	3717
10	75.3	89.2	123.0	-0.216	3.15E-01	422.0	26.7	2910.6	0.1323	0.1309	826	766	3737	3676
20	75.7	109.9	231.1	-0.057	5.93E-01	421.3	22.8	2905.5	0.1321	0.1306	704	652	3610	3558
30	76.3	141.5	311.4	0.187	7.98E-01	420.2	16.7	2897.8	0.1317	0.1303	517	479	3415	3377
40	77.1	180.4	354.1	0.487	9.08E-01	418.8	9.3	2888.3	0.1313	0.1299	288	266	3176	3155
50	77.9	221.8	354.1	0.805	9.08E-01	417.3	1.4	2878.3	0.1308	0.1294	43	40	2922	2918
60	78.7	260.6	311.4	1.105	7.98E-01	416.0	-6.0	2868.8	0.1304	0.1290	-186	-173	2683	2696
70	79.3	292.3	231.1	1.349	5.93E-01	414.9	-12.1	2861.0	0.1300	0.1286	-373	-346	2488	2515
80	79.7	313.0	123.0	1.508	3.15E-01	414.1	-16.0	2856.0	0.1298	0.1284	-495	-459	2361	2397
90	79.8	320.2	0.0	1.564	1.13E-16	413.9	-17.4	2854.3	0.1297	0.1283	-538	-498	2316	2356

Vertical Deflection (%):	13.76
Horizontal Deflection (%):	-4.79
Radial Soil Pressure at Crown (psi):	79.8
Circumferential Shortening (in):	5.19
Arc length of each sector (in) =	0.99

11497

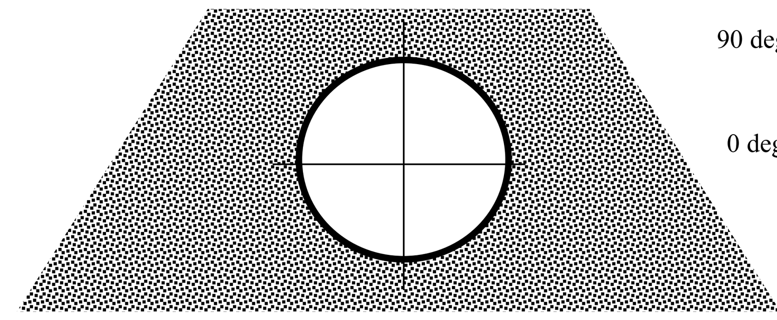
Max. Compressive Stress (psi): 3781
Max. Tensile Stress (psi): No Tensile Stress

Free Field Stress:	200.0	psi
Free Field Stress Times Pipe Radius:	33347	psi

Radius (in)	CROWN				SPRINGLINE			
	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)
5.67	413.9	183.5	320.2	88.8	422.3	652.7	82.0	313.4
6.17	452.2	200.5	256.3	94.2	461.4	713.2	125.7	287.8
6.67	490.6	217.5	213.4	96.5	500.6	773.7	153.0	270.0
7.17	529.0	234.4	183.6	97.1	539.7	834.2	170.5	257.0
7.67	567.3	251.4	162.2	96.9	578.9	894.7	182.0	247.3
8.17	605.7	268.4	146.5	96.2	618.0	955.2	189.7	240.0
8.67	644.0	285.4	134.6	95.3	657.1	1015.8	194.9	234.2
9.17	682.4	302.4	125.5	94.3	696.3	1076.3	198.4	229.6
9.67	720.8	319.4	118.4	93.3	735.4	1136.8	200.8	225.9
10.17	759.1	336.4	112.7	92.4	774.6	1197.3	202.5	222.8
10.67	797.5	353.4	108.2	91.5	813.7	1257.8	203.6	220.3
11.17	835.9	370.4	104.4	90.6	852.9	1318.3	204.3	218.2
11.67	874.2	387.4	101.4	89.8	892.0	1378.8	204.8	216.4
12.17	912.6	404.4	98.8	89.1	931.1	1439.3	205.1	214.8
12.67	950.9	421.4	96.7	88.4	970.3	1499.8	205.2	213.5
13.17	989.3	438.4	94.8	87.8	1009.4	1560.4	205.3	212.3
13.67	1027.7	455.4	93.3	87.2	1048.6	1620.9	205.3	211.3
14.17	1066.0	472.4	91.9	86.7	1087.7	1681.4	205.2	210.4
14.67	1104.4	489.3	90.8	86.2	1126.8	1741.9	205.1	209.6
15.17	1142.7	506.3	89.7	85.8	1166.0	1802.4	205.0	208.9
15.67	1181.1	523.3	88.8	85.4	1205.1	1862.9	204.8	208.3
16.17	1219.5	540.3	88.0	85.0	1244.3	1923.4	204.7	207.8
16.67	1257.8	557.3	87.3	84.6	1283.4	1983.9	204.6	207.3
17.17	1296.2	574.3	86.7	84.3	1322.6	2044.4	204.4	206.8
17.67	1334.6	591.3	86.2	84.0	1361.7	2105.0	204.3	206.4
Check Values:	874.2	387.4	202.4	95.0	892.0	1378.8	156.8	264.2
Soil Arching:	Positive Arch	Positive Arch	Positive Arch	Negative Arch	Positive Arch	Positive Arch	Positive Arch	Positive Arch

BURIED PLASTIC PIPE LOADING WORKSHEET V2.0

[With Incremental Stress Analysis (non-linear)]



90 degrees = Crown

0 degrees = Springline

Model Geometry

Project: Copper Flat
12 IN N-12 PIPE

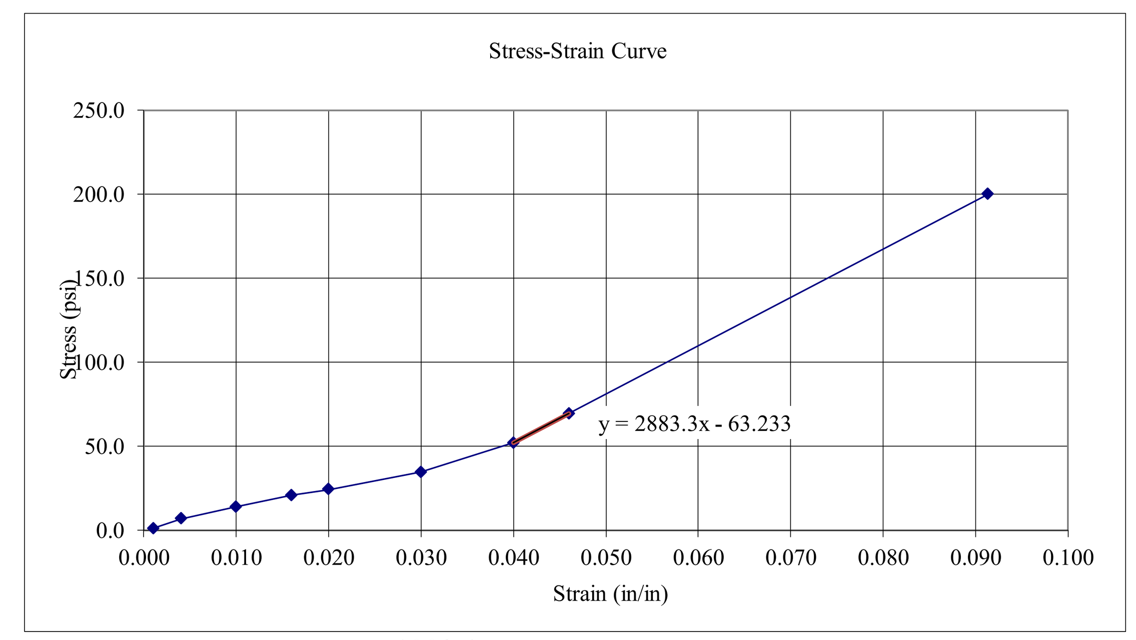
By: CDJ
Date: 04/23/2013
Note: Compression is positive, tension is negative

SOIL and PIPE Input Data

Material	Cohesion	Friction Angle	Contrained Modulus (psi)	Lateral Stress Ratio	Lateral Pressure Parameters B	C
Pipe	n/a	n/a				
Soil	0	39	2191	0.39	0.696	0.30

Pipe Diameter OD (in):	14.45		
Pipe ID (in):	12.15		
Weight of Pipe (lb/ft):	3.19		
Pipe Corrugated (y/n):	y		64.50
Prescribed Constrained Modulus (y/n):	n		0.23
Prescribed Constrained Modulus (psi):	na		
Pipe Wall Thickness (in):	0.04		
Pipe Area (in^2/in):	0.19		
Flexural Modulus (psi), E_f =	22,000		
Ring Compression Modulus (psi), E_{rc} =	22,000		
C value (in)	0.53		
Moment of Inertia (in^4/in) non-corrugated:	1070.4		
Moment of Inertia (in^4/in) corrugated (input from manufacturer data):	0.0410	selected I:	0.0410
Stiffness Coefficients			
Flexural Stiffness	14.5		
Ring Compression Stiffness	573.8	Ring Stiffness Factor:	2.4 Pipe Stiffness Less Than Soil

Shell-Medium Parameters		
UF	5.32	Extensional Flexibility ratio = Compressibility ratio = relative flexibility of pipe and soil under uniform loading.
VF	92.0	Bending Flexibility ratio = Flexibility ratio = relative flexibility of pipe and soil under varying radial and
		If both UF and VF are zero then a perfectly rigid embedded pipe.



Soil Compression Data		
Applied Vertical Load (psi)	Vertical Strain (in/in)	Constrained Modulus (psi)
1.0	0.001	1000.00
6.9	0.004	1725.00
13.9	0.010	1390.00
20.8	0.016	1300.00
24.3	0.020	1215.00
34.7	0.030	1156.67
52.1	0.040	1302.50
69.4	0.046	1508.70
200.0	0.091	2190.68

Pipe Mean Radius (in):	7.21	
Depth of Burial (ft):	240.0	
Applied Surface Stress (psf):	0.0	
Soil Density (pcf):	120.0	
Total Vertical Stress Component (psf):	28800.0	Free Field Stress Values
Total Vertical Stress Component (psi):	200.0	

Critical Stress For Buckling Failure (psf):	1883.1
Ovality:	0.3
Corrected Stress (psf):	564.9

NO INTERFACE SLIPPAGE

Angle	Soil Stresses (psi) Radial	Soil Stresses (psi) Hoop	Soil Stresses (psi) Shear	Pipe Displacements (in) Radial	Pipe Displacements (in) Hoop	Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
0	97.9	343.0	0.0	-0.122	0.00E+00	693.6	63.5	3689.5	0.1677	0.2110	820	766	4510	4456
10	95.8	335.2	25.4	-0.071	1.40E-01	678.0	60.5	3606.5	0.1639	0.2062	782	730	4389	4337
20	90.0	312.9	47.7	0.075	2.64E-01	633.1	51.9	3367.6	0.1531	0.1926	671	627	4039	3994
30	80.9	278.8	64.2	0.301	3.56E-01	564.3	38.8	3001.4	0.1364	0.1716	502	468	3503	3470
40	69.9	236.9	73.0	0.577	4.04E-01	479.8	22.7	2552.3	0.1160	0.1459	293	274	2846	2826
50	58.1	192.3	73.0	0.871	4.04E-01	390.0	5.6	2074.3	0.0943	0.1186	72	67	2146	2141
60	47.1	150.4	64.2	1.147	3.56E-01	305.5	-10.5	1625.2	0.0739	0.0929	-136	-127	1489	1498
70	38.1	116.2	47.7	1.372	2.64E-01	236.7	-23.7	1259.0	0.0572	0.0720	-306	-286	953	973
80	32.2	93.9	25.4	1.519	1.40E-01	191.8	-32.2	1020.1	0.0464	0.0583	-417	-389	603	631
90	30.1	86.2	0.0	1.570	5.03E-17	176.2	-35.2	937.1	0.0426	0.0536	-455	-425	482	512

Vertical Deflection (%):	10.86		149.93
Horizontal Deflection (%):	-1.70		258.17
Radial Soil Pressure at Crown (psi):	30.1	4340	
Circumferential Shortening (in):	5.29		
Arc length of each sector (in) =	1.26		

Max. Compressive Stress (psi): 4510
Max. Tensile Stress (psi): No Tensile Stress

FULL SLIPPAGE

	Soil Stresses (psi)			Pipe Displacements (in)										
Angle	Radial	Hoop	Shear	Radial	Hoop	Circumferential Thrust	Moment Thrust	Ring Compression Stress (psi)	Ring Compression Strain (in/in)	Ring Shortening (in)	Inner Bending Stress (psi)	Outer Bending Stress (psi)	Total Inner Stress (psi)	Total Outer Stress (psi)
0	60.5	96.7	0.0	-0.214	0.00E+00	442.9	68.7	2356.0	0.1071	0.1347	889	830	3245	3186
10	60.7	103.8	122.2	-0.157	3.23E-01	442.4	65.4	2353.4	0.1070	0.1346	846	790	3199	3144
20	61.3	124.3	229.6	0.006	6.07E-01	441.1	56.0	2346.0	0.1066	0.1341	723	676	3069	3022
30	62.2	155.6	309.3	0.255	8.18E-01	438.9	41.4	2334.7	0.1061	0.1335	536	500	2870	2835
40	63.4	194.1	351.7	0.561	9.30E-01	436.3	23.6	2320.7	0.1055	0.1327	305	285	2626	2606
50	64.6	235.0	351.7	0.887	9.30E-01	433.5	4.6	2305.9	0.1048	0.1318	60	56	2366	2362
60	65.8	273.5	309.3	1.192	8.18E-01	430.9	-13.2	2291.9	0.1042	0.1311	-170	-159	2122	2133
70	66.7	304.9	229.6	1.442	6.07E-01	428.8	-27.7	2280.6	0.1037	0.1304	-358	-335	1922	1946
80	67.3	325.3	122.2	1.605	3.23E-01	427.4	-37.2	2273.2	0.1033	0.1300	-481	-449	1792	1824
90	67.6	332.4	0.0	1.661	1.16E-16	426.9	-40.5	2270.6	0.1032	0.1298	-523	-489	1747	1782

Vertical Deflection (%):	11.50
Horizontal Deflection (%):	-2.96
Radial Soil Pressure at Crown (psi):	67.6
Circumferential Shortening (in):	5.29
Arc length of each sector (in) =	1.26

9728

Max. Compressive Stress (psi): 3245
Max. Tensile Stress (psi): No Tensile Stress

Free Field Stress: 200.0 psi
Free Field Stress Times Pipe Radius: 18401 psi

	CROWN				SPRINGLINE			
Radius (in)	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)	Circumferential Thrust (full slip)	Circumferential Thrust (no slip)	Hoop Stress, psi (full slip)	Hoop Stress, psi (no slip)
7.21	426.9	176.2	332.4	86.2	442.9	693.6	96.7	343.0
7.71	458.3	189.1	278.0	93.0	475.5	744.7	131.0	316.0
8.21	489.7	202.0	238.5	96.8	508.1	795.8	154.3	295.9
8.71	521.1	215.0	209.0	98.7	540.7	846.9	170.3	280.6
9.21	552.5	227.9	186.6	99.4	573.3	897.9	181.4	268.6
9.71	583.9	240.8	169.3	99.5	605.9	949.0	189.3	259.1
10.21	615.3	253.8	155.7	99.1	638.5	1000.1	194.9	251.5
10.71	646.8	266.7	144.8	98.5	671.1	1051.2	198.9	245.2
11.21	678.2	279.6	136.0	97.7	703.7	1102.2	201.8	240.1
11.71	709.6	292.6	128.8	96.9	736.3	1153.3	203.8	235.8
12.21	741.0	305.5	122.9	96.0	768.9	1204.4	205.3	232.1
12.71	772.4	318.4	117.9	95.2	801.5	1255.5	206.3	229.0
13.21	803.8	331.4	113.7	94.3	834.1	1306.5	207.0	226.3
13.71	835.2	344.3	110.1	93.5	866.7	1357.6	207.4	224.0
14.21	866.6	357.2	107.1	92.8	899.3	1408.7	207.7	222.0
14.71	898.1	370.2	104.5	92.0	931.9	1459.7	207.8	220.2
15.21	929.5	383.1	102.2	91.4	964.4	1510.8	207.9	218.7
15.71	960.9	396.0	100.2	90.7	997.0	1561.9	207.8	217.3
16.21	992.3	409.0	98.4	90.1	1029.6	1613.0	207.7	216.1
16.71	1023.7	421.9	96.9	89.5	1062.2	1664.0	207.6	215.0
17.21	1055.1	434.8	95.5	89.0	1094.8	1715.1	207.5	214.0
17.71	1086.5	447.8	94.3	88.5	1127.4	1766.2	207.3	213.1
18.21	1118.0	460.7	93.2	88.0	1160.0	1817.3	207.1	212.3
18.71	1149.4	473.6	92.2	87.6	1192.6	1868.3	206.9	211.5
19.21	1180.8	486.6	91.3	87.2	1225.2	1919.4	206.7	210.9
Check Values:	803.8	331.4	224.2	96.1	834.1	1306.5	159.7	287.8
Soil Arching:	Positive Arch	Positive Arch	Positive Arch	Negative Arch	Positive Arch	Positive Arch	Positive Arch	Positive Arch

APPENDIX E
TSF UNDERDRAIN COLLECTION POND
INFLOW ESTIMATION

Golder Associates	Tailings Storage Facility - Underdrain Collection Pond Inflow Estimate				
Client	**New Mexico Copper Corp**	**By**	**GM/DW**	**Date**	**19-Apr-13**
		Checked	**GM**	**Date**	**15-Jul-13**
Project No.	**103-92557 Phase 011**	**Reviewed**	**MJG**	**Date**	

	Requirements	Criteria		
1	Collect downstream embankment face and toe area runoff	100-yr 24 hour storm	3.73	inches
2	Collect Underflow drainage	Upset period	24	hours
3	Collect impoundment seepage	Upset period	24	hours
4	Provide for contact of free water pond with exposed underdrain	Upset period	24	hours

Hydraulic Conductivity-fully consolidated (from slurry consol tests)

Product	k (cm/sec)	K (ft/sec)
Cyclone overflow beach (cob)	5.00E-07	1.64E-08
Cyclone overflow slimes (cos)	5.00E-08	1.64E-09

The above assume fully consolidated material against drain

1) Downstream Dam Face Runoff

Worst case prior to Final Build-out	Runoff Volume	12.1	acre-feet
	See HEC model Output	3,942,528	Gallons

2) Underflow Drainage

Mining Rate		30000	tpd
Underflow percentage	(Cyclone Simulation)	45.5	percent
Underflow solids content	(Cyclone Simulation)	70	percent by weight
Slurry Volume	(Cyclone Simulation)	568	tons per hour max
Water volume	(Cyclone Simulation)	260	tons per hour max

Delivered water (wt water/wt solids)	1042	gpm
Available for Drainage and Evaporation	58.00%	estimate
Entrainment	42.00%	estimate
Evaporative loss	15.00%	estimate
Draindown	43.00%	
Draindown (gpm)	448	gpm

3) Impoundment Interior Seepage

Assume Areal Split — Beach 60% — Slimes 40%

	Total Area (ft3)	Beach Area	Slimes Area
Final Build-out	14,012,401	8,407,441	5,604,960

Assume unit hydraulic gradient — Hydraulic conductivity based on results of slurry consolidation testing

Beach Seepage — K floor (COB) 1.64E-08 ft/sec — Slimes Seepage — K Floor (COS) 1.64E-09 ft/sec

ft^3/sec	gpm	Upset (gal)	ft^3/sec	gpm	upset (gal)
0.1379	62	89,132	0.0092	4.13	5,942

4) Seepage Through Exposed Drain

Area exposed	20	Acre	871,200	ft^3	Assumption/estimate
K drain surface layer	3.8000E-05	cm/sec	1.2467E-06	ft/sec	K drain based on permeability test result
Assume max depth 5 feet, average depth 2.5 feet		i=	2.5		

	cfs	gpm	Upset (gal)
Q	2.7154	1,219	1,754,857

Summary Pond Capacity Requirements	Duration	Storage (gallons)	
Dam exterior Runoff	Event	3,942,528	(HEC runoff estimate)
Beach Seepage	Upset	89,132	
Slimes Seepage	Upset	5,942	
Exposed impoundment Underdrain Seepage	Upset	1,754,857	Can be controlled
Dam underdrainage	Upset	645,206	
Total		6,437,666	

		gpm	
Normal flows	Dam drain	448	gpm
	Beach/slimes	66	gpm
	Free Water Pond seepage	1,219	gpm
	Total	**1,733**	**gpm**

APPENDIX F
HYDROLOGIC CALCULATIONS

APPENDIX F.1
IMPOUNDMENT DIVERSION DITCH CALCULATIONS

Copper Flat Diversions, Copper Flat New Mexico
Hydrologic and Hydraulic Calculations / Calculation of Time Concentration (t_c)
AMC II Moisture Conditions

	Undisturbed		Compacted Cover		Stockpile												
Sub-Basin ID	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Wt. CN	S	L (ft)	H1 (ft)	H2 (ft)	Y (%)	Lag (hr)	t_c (hr)	t_c (min)	Lag (min)	Area (mi^2)
Northeast- PH1	66.41	85	0.00	92	0.00	50	85.0	1.76	5,318	5,537	5,317	4.13	0.50	0.84	50.5	30	0.10376
Southwest- PH1	47.92	85	0.00	92	0.00	50	85.0	1.76	5,835	5,452	5,307	2.48	0.70	1.17	70.2	42	0.07488
SW-Periphery- PH3	26.09	85	0.00	92	0.00	50	85.0	1.76	4,052	5,452	5,346	2.60	0.51	0.85	51.1	31	0.04076

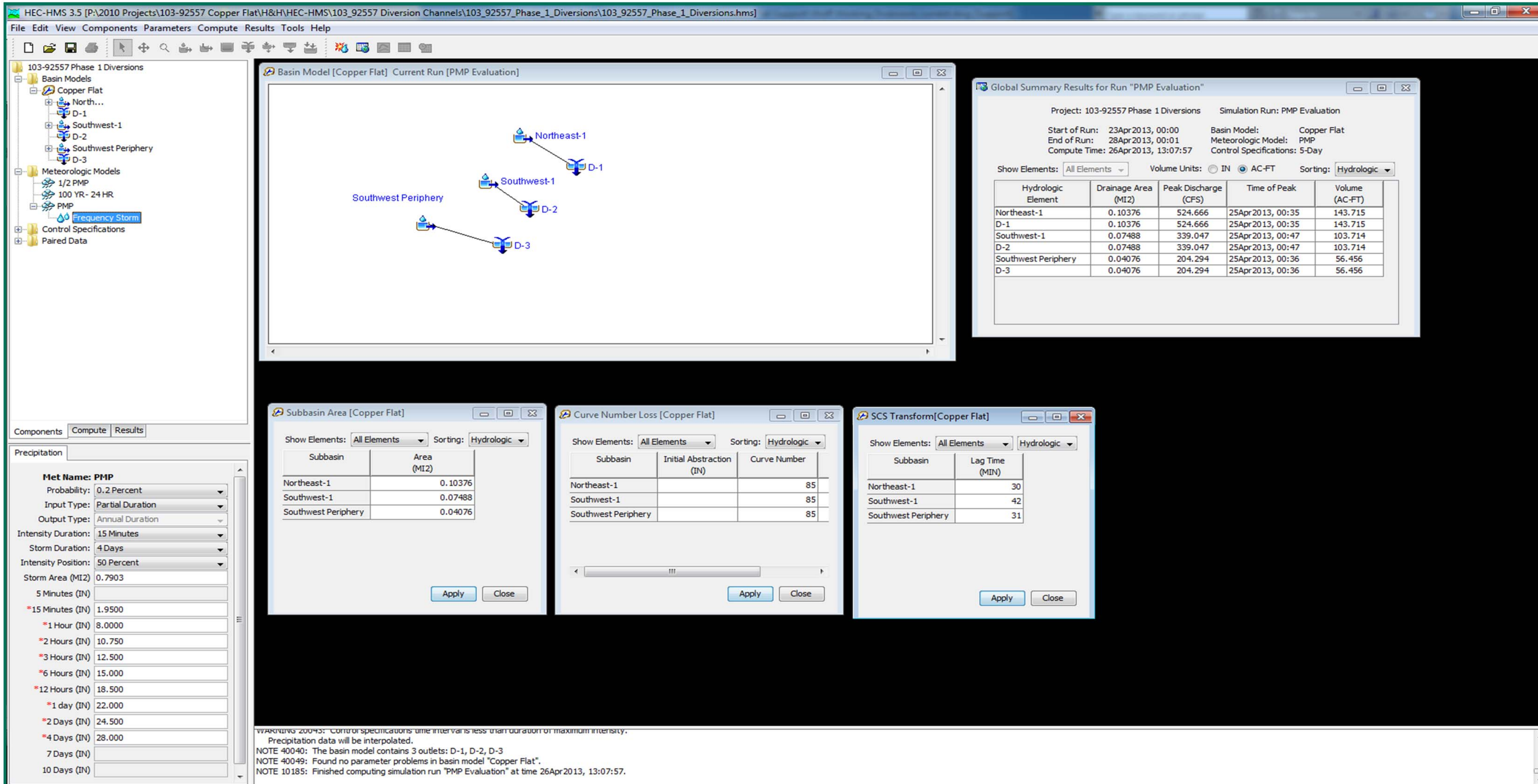
Curve Number Estimation:

Undisturbed Native Ground		*Compacted Cover*		*TSF*	
Arid and semiarid rangelands		Arid and semiarid rangelands		OutSlope	
Cover type =	Desert Shrub / Pinyon-Junip	Cover type =	Fill	Cover type =	Sand
Antecedent condition =	II	Antecedent condition =	II	Antecedent condition =	II
Hydrologic condition =	Poor	Hydrologic condition =	Poor	Hydrologic condition =	Poor
Hydrologic soil group =	C	Hydrologic soil group =	D	Hydrologic soil group =	A
Curve number =	**85**	Curve number =	**92**	Curve number =	**50**

Notes:
ac = acres
CN = curve number
Wt. CN = weighted curve number
S = soil and cover parameter
L = length of longest flow path (feet)
H1 = elevation at top of longest flow path (feet)
H2 = elevation at bottom of longest flow path (feet)
Y = H1-H2/L x 100 = slope (%)
Lag = Lag time (hours)
t_c = time of concentraton (hr or min)

Hydrologic Condition:
Poor: <30% ground cover
Fair: 30 to 70% ground cover
Good: >70% ground cover

Copper Flat Diversions - Hydrologic and Hydraulic Results - PMP Storm Evaluation



103-92557 Copper Flat Stormwater Diversions (PMP) Report

Label	Solve For	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)
D-1 North PMP	Normal Depth	Manning Formula	0.040	0.00500
D-2 West PMP	Normal Depth	Manning Formula	0.045	0.00500
D-3 SW Periphery PMP	Normal Depth	Manning Formula	0.045	0.00500

Normal Depth (ft)	Left Side Slope (ft/ft (H:V))	Right Side Slope (ft/ft (H:V))	Bottom Width (ft)	Discharge (ft³/s)
4.52	3.50	2.00	10.00	525.00
4.15	2.00	2.00	10.00	340.00
3.20	2.00	2.00	10.00	205.00

Flow Area (ft²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Critical Depth (ft)
101.29	36.54	2.77	34.85	3.27
75.89	28.55	2.66	26.59	2.73
52.54	24.32	2.16	22.81	2.04

Critical Slope (ft/ft)	Velocity (ft/s)	Velocity Head (ft)	Specific Energy (ft)	Froude Number
0.01893	5.18	0.42	4.93	0.54
0.02529	4.48	0.31	4.46	0.47
0.02713	3.90	0.24	3.44	0.45

Flow Type	Notes	Messages
Subcritical		
Subcritical		
Subcritical		

APPENDIX F.2
DAM AND TSF UNDERDRAIN COLLECTION POND AREA HYDROLOGIC CALCULATIONS

Copper Flat Dam, Copper Flat, New Mexico
Seepage and Runoff / Calculation of Time Runoff (t_c)
Hydrologic and Hydraulic Calculations
AMC II Moisture Conditions

	Undisturbed		Compacted Cover		Stockpile													Rational method Inputs			
Sub-Basin ID	Area (ac)	CN	Area (ac)	CN	Area (ac)	CN	Wt. CN	S	L (ft)	H1 (ft)	H2 (ft)	Y (%)	Lag (hr)	t_c (hr)	t_c (min)	Lag (min)	Area (mi^2)	Area (acre)	C	Intensity (in/hr)	Q (cfs)
Phase 4	71.09	85	0.00	92	91.82	50	65.3	5.32	8,640	5,385	5,170	2.49	1.71	2.85	171.0	103	0.25454	162.91	0.38	0.907	71.1

Curve Number Estimation:

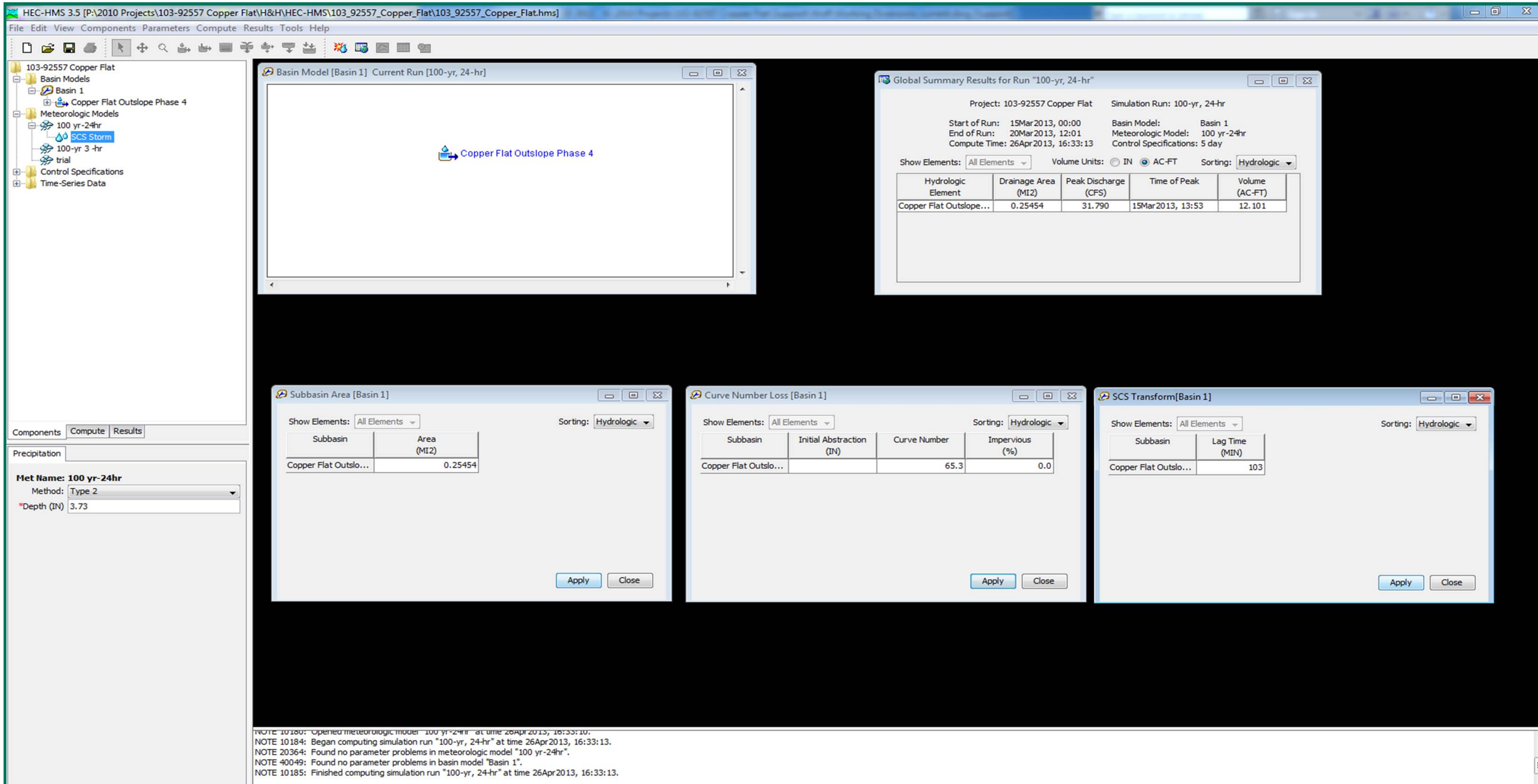
Undisturbed Native Ground		*Compacted Cover*		*TSF*	
Arid and semiarid rangelands		Arid and semiarid rangelands		OutSlope	
Cover type =	Desert Shrub / Pinyon-Juniper	Cover type =	Fill	Cover type =	Sand
Antecedent condition =	II	Antecedent condition =	II	Antecedent condition =	II
Hydrologic condition =	Poor	Hydrologic condition =	Poor	Hydrologic condition =	Poor
Hydrologic soil group =	C	Hydrologic soil group =	D	Hydrologic soil group =	A
Curve number =	**85**	Curve number =	**92**	Curve number =	**50**
C=	**0.43**	C=	**0.46**	C=	**0.35**

Notes:
ac = acres
CN = curve number
Wt. CN = weighted curve number
S = soil and cover parameter
L = length of longest flow path (feet)
H1 = elevation at top of longest flow path (feet)
H2 = elevation at bottom of longest flow path (feet)
Y = H1-H2/L x 100 = slope (%)
Lag = Lag time (hours)
t_c = time of concentation (hr or min)
C = Rational Method Coefficient
C_f = Correction factor for 100-year storm event (1.25)
I = rainfall intensity (inches/hour)
A = Area (acres)

Hydrologic Condition:
Poor: <30% ground cover
Fair: 30 to 70% ground cover
Good: >70% ground cover

Rational Method
Q=CiA
$Q=C_fCiA$ Includes correction factor for 100-yr storm duration.
i= 0.907 100-year, 3 hour storm intensity

Copper Flat Dam Toe / Seepage and Runoff
Hydrologic and Hydraulic Results / 100-yr, 24-h Storm Volume



Worksheet for Dam Toe Seepage & Runoff Collection Trench

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02500	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	71.10	ft³/s

Results

Normal Depth	0.54	ft
Flow Area	5.94	ft²
Wetted Perimeter	12.40	ft
Hydraulic Radius	0.48	ft
Top Width	12.14	ft
Critical Depth	1.08	ft
Critical Slope	0.00226	ft/ft
Velocity	11.98	ft/s
Velocity Head	2.23	ft
Specific Energy	2.77	ft
Froude Number	3.02	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

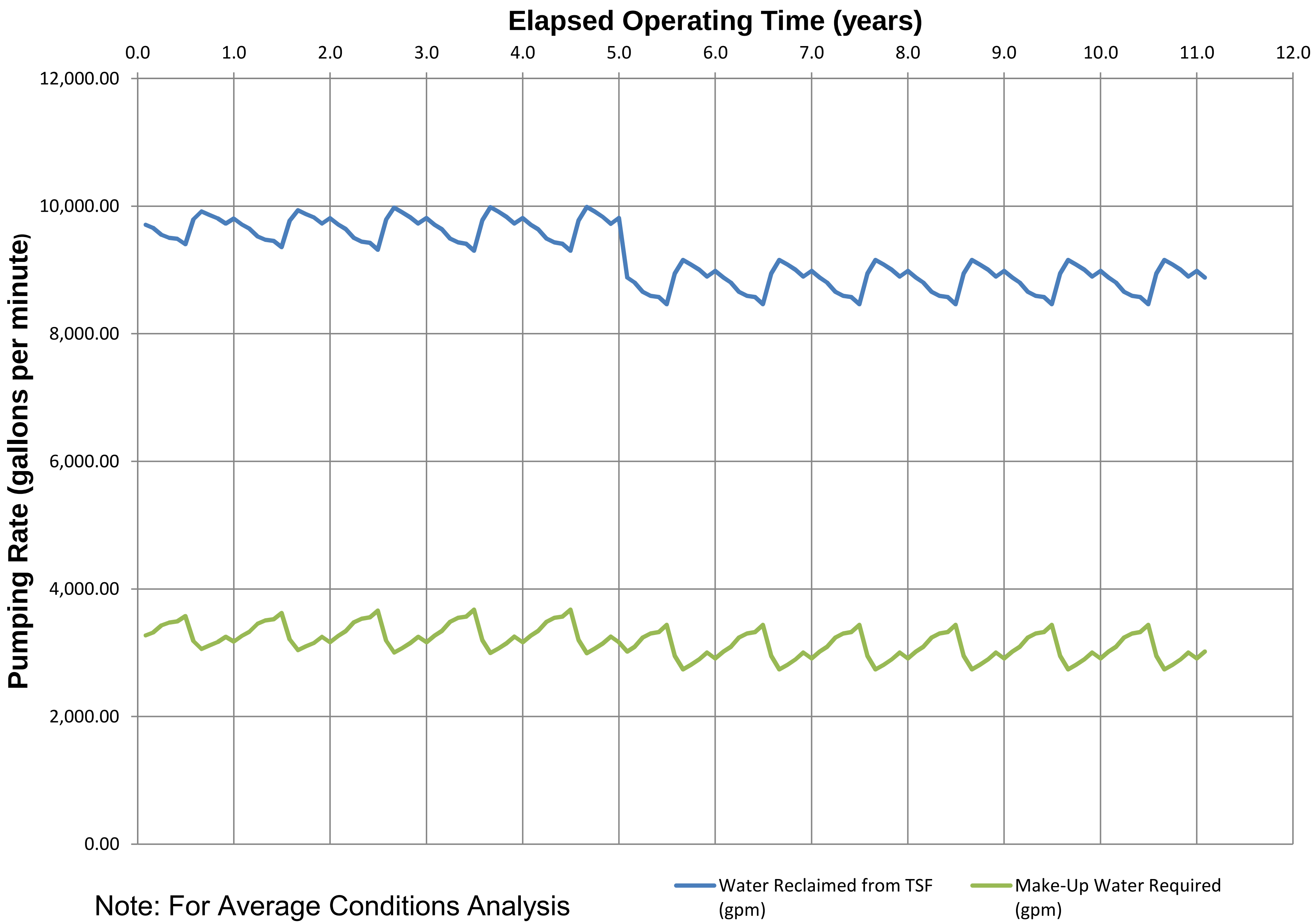
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	1.08	ft
Channel Slope	0.02500	ft/ft

Worksheet for Dam Toe Seepage & Runoff Collection Trench

GVF Output Data

Critical Slope	0.00226	ft/ft

APPENDIX G
WATER BALANCE CALCULATIONS



Note: For Average Conditions Analysis

Table 1: Water Balance Calculations

Date:	12/16/2013	**Made by:**	4/29/2013 RL/GM		
Project No.:	103-92557	**Checked by:**	7/15/2013	GM	
Subject:	Copper Flat Climate Summary	**Reviewed**	7/15/2013	MG	
Project Short Title:	**Copper Flat Feasibility Study, New Mexico**	**Page:**	1	of	3

Elevation at the site is approximately 5180-5270 feet.

Average Precipitation (mm)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Altitude (ft)	Approx Distance to Site (mi)
Hillsboro (1893 - 2010)	0.58	0.56	0.38	0.33	0.53	0.72	2.33	2.46	2.11	1.18	0.55	0.81	12.54	5,270.00	4.00
Caballo Dam (1936-2010)	0.42	0.38	0.27	0.24	0.37	0.70	1.80	2.03	1.55	0.89	0.44	0.56	9.65	4,190.00	12.30
Copper Flat Site Estimate	0.58	0.56	0.38	0.33	0.53	0.72	2.33	2.46	2.11	1.18	0.55	0.81	12.54	5,200.00	

Average Days with Rain

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Altitude (ft)	Approx Distance to Site (mi)
Hillsboro (1893 - 2010)	3	3	2	2	3	3	9	9	6	4	2	3	49	5,270.00	4.00
Caballo Dam (1936-2010)	3	2	2	1	2	3	8	9	6	4	2	3	45	4,190.00	12.30
Copper Flat Site Estimate	3	3	2	2	3	3	9	9	6	4	2	3	49	5,200.00	

Local Normal Evaporation (mm)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Altitude (ft)	Approx Distance to Site (mi)
														4,190.00	
Copper Flat Site Estimate	4.22	5.57	8.55	9.52	11.15	14.25	10.34	5.94	6.18	3.96	3.68	2.74	86.10	5,385.00	

Table 2: Water Balance Calculations Year 1-5 30,000 tpd mine plan

Date:	12/16/2013	**Made by:**	4/29/2013 RL
Project No.:	103-92557	**Checked by:**	11/15/2013 GM
Subject:	Tailings Properties and Flow rates	**Reviewed**	11/15/2013 BNS
Project Short Title:	**Copper Flat Feasibility Study, New Mexico**	**Page:**	2 of 3

Year 1-5

			Design Disacharge Rate	1,333	tph			
			Cyclone Recovery	608.47	tph	Krebs		
Tailings Discharge			Overflow	725	tph			
			Total	1333	tph	Net (post concentrate recovery)	1316.0	tph
						Factor for average TSF inputs	99%	
Cyclone feed solids	29.10%		**Cyclone Discharge**					
			UF Fraction (wt%)	45.60%	Krebs	=input values		
Year 1-5 delivery	31,992 tpd	1,333.0 tph	UF Solids content (wt%)	70.00%	Krebs			
SG	2.64		COF Solids content (wt%)	19.52%	(Krebs)			
			Beach to Slimes Split	60%	Estimate as beach			

Result (entrainment only)		
Average Reclaim	9,749	gpm
Average Make-up	3,229	gpm

Cyclone Feed					**Underflow Tailings**					**Cyclone Overflow (Slimes)**					**Cyclone Overflow (Beach)**				
Total (wt)	109,938	tpd	14,996	gpm	Total (wt)	20,862	tpd	1,963	gpm	Total (wt)	35,633	tpd	5,213	gpm	Total (wt)	53,449	tpd	7,601	gpm
Water (wt)	77,946	tpd	12,978	gpm	Water (wt)	6,258.55	tpd	1,042	gpm	Water (wt)	28,677	tpd	4,775	gpm	Water (wt)	43,016	tpd	7,162	gpm
Solids (wt)	31,992	tpd	2,018	gpm	Solids (wt)	14,603	tpd	921	gpm	Solids (wt)	6,955	tpd	439	gpm	Solids (wt)	10,433	tpd	439	gpm

Post Deposition					**Post Deposition**					**Post Deposition**				
Dry Unit Weight	95.00	pcf			Dry Unit Weight	31.70	pcf	(FSCONSOL)		Dry Unit Weight	74.60	pcf	(FSCONSOL)	
Vsolids	0.58	ft^3	Per unit ft^3		Vsolids	0.19	ft^3	Per unit ft^3		Vsolids	0.45	ft^3	Per unit ft^3	
Vvoids	0.42	ft^3	Per unit ft^3		Vvoids	0.81	ft^3	Per unit ft^3		Vvoids	0.55	ft^3	Per unit ft^3	
Void ratio	0.73				Void ratio	4.20				Void ratio	1.21			
Saturated Moisture (wt%)	28%				Saturated Moisture (wt%)	159%				Saturated Moisture (wt%)	46%			
Assumed Moisture (wt%)	18%				Assumed Moisture (wt%)	159%				Assumed Moisture (wt%)	46%			
Vwater	0.27	ft^3	Per unit ft^3		Vwater	0.81	ft^3	Per unit ft^3		Vwater	0.55	ft^3	Per unit ft^3	
Total weight	112.10	lbs	Per unit ft^3		Total weight	82.09	lbs	Per unit ft^3		Total weight	108.74	lbs	Per unit ft^3	
Entrained Water	84,250	ft^3/day	437.63	gpm	Entrained Water	354,388	ft^3/day	1,841	gpm	Entrained Water	153,045	ft^3/day	795	gpm
Drainage and Evaporation			604.42	gpm										
Evaporation	15.00%		156.31	gpm										
Drainage			448.11	gpm	Free Water			2,934	gpm	Free Water			6,367	gpm

			Design Discharge Rate	1,222	tph			
			Cyclone Recovery	552.15	tph	Krebs		
Tailings Discharge			Overflow	670	tph			
			Total	1222	tph	Net (post concentrate recovery)	1206.0	tph
						Factor for average TSF inputs	99%	
Cyclone feed solids	29.10%		**Cyclone Discharge**					
			UF Fraction (wt%)	45.20%	Krebs	=input values		
Year 6-11 delivery	29,328 tpd	1,222.0 tph	UF Solids content (wt%)	70.00%	Krebs			
SG	2.64		COF Solids content (wt%)	19.64%	(Krebs)			
			Beach to Slimes Split	60%	Estimate as beach			

Result (entrainment only)		
Average Reclaim	8,922	gpm
Average Make-up	2,975	gpm

Cyclone Feed					**Underflow Tailings**					**Cyclone Overflow (Slimes)**					**Cyclone Overflow (Beach)**				
Total (wt)	100,784	tpd	13,747	gpm	Total (wt)	18,931	tpd	1,781	gpm	Total (wt)	32,742	tpd	4,786	gpm	Total (wt)	49,113	tpd	6,977	gpm
Water (wt)	71,456	tpd	11,897	gpm	Water (wt)	5,679.26	tpd	946	gpm	Water (wt)	26,312	tpd	4,381	gpm	Water (wt)	39,467	tpd	6,571	gpm
Solids (wt)	29,328	tpd	1,850	gpm	Solids (wt)	13,252	tpd	836	gpm	Solids (wt)	6,431	tpd	406	gpm	Solids (wt)	9,646	tpd	406	gpm
					Water in	182,027	ft^3/day			Water in	843,320	ft^3/day			Water in	1,264,981	ft^3/day		

Post Deposition					**Post Deposition**					**Post Deposition**				
Dry Unit Weight	95.00	pcf			Dry Unit Weight	31.70	pcf	(FSCONSOL)		Dry Unit Weight	74.60	pcf	(FSCONSOL)	
Vsolids	0.58	ft^3	Per unit ft^3		Vsolids	0.19	ft^3	Per unit ft^3		Vsolids	0.45	ft^3	Per unit ft^3	
Vvoids	0.42	ft^3	Per unit ft^3		Vvoids	0.81	ft^3	Per unit ft^3		Vvoids	0.55	ft^3	Per unit ft^3	
Void ratio	0.73				Void ratio	4.20				Void ratio	1.21			
Saturated Moisture (wt%)	28%				Saturated Moisture (wt%)	159%				Saturated Moisture (wt%)	46%			
Assumed Moisture (wt%)	18%				Assumed Moisture (wt%)	159%				Assumed Moisture (wt%)	46%			
Vwater	0.27	ft^3	Per unit ft^3		Vwater	0.81	ft^3	Per unit ft^3		Vwater	0.55	ft^3	Per unit ft^3	
Total weight	112.10	lbs	Per unit ft^3		Total weight	82.09	lbs	Per unit ft^3		Total weight	108.74	lbs	Per unit ft^3	
Entrained Water	76,452	ft^3/day	397	gpm	Entrained Water	327,642	ft^3/day	1,702	gpm	Entrained Water	141,495	ft^3/day	735	gpm
Drainage and Evaporation			548	gpm										
Evaporation	15.00%		142	gpm					gpm					
Drainage			406.63	gpm	Free Water			2,679	gpm	Free Water			5,836	gpm

Table 3: Water Balance Calculations Rev 1.

Date:	12/16/2013	**Made by:**	4/29/2013 RL
Project No.:	103-92557	**Checked:**	11/15/2013 GM
Subject:	Average Year Rainfall Conditions	**Reviewed**	11/15/2013 BNS
Project Short Title:	**Copper Flat Feasibility Study, New Mexico**	**Page:**	3 of 3

Precipitation and Evaporation Data

2	3	4	5	6	7	8	9	10
Month	Days	Precip. (in)	Pan evap. (in)	Storms/Month	Precip/Storm	S	Runoff/ storm (in)	Monthly runoff (in)
January	31	0.58	4.22	1	0.58	0.87	0.13	0.13
February	28	0.56	5.57	1	0.56	0.87	0.12	0.12
March	31	0.38	8.55	1	0.38	0.87	0.04	0.04
April	30	0.33	9.52	1	0.33	0.87	0.02	0.02
May	31	0.53	11.15	1	0.53	0.87	0.10	0.10
June	30	0.72	14.25	1	0.72	0.87	0.21	0.21
July	31	2.33	10.34	1	2.33	0.87	1.54	1.54
August	31	2.46	5.94	3	0.82	0.87	0.28	0.83
September	30	2.11	6.18	3	0.70	0.87	0.20	0.60
October	31	1.18	3.96	3	0.39	0.87	0.04	0.13
November	30	0.55	3.68	1	0.55	0.87	0.11	0.11
December	31	0.81	2.74	1	0.81	0.87	0.27	0.27

Variables used in Water Balance

Water in Delivered Tailings Year 1-5		12,978	gpm
Water in Delivered Tailings Year 6-11		11,897	gpm
Beach Loss evap factor		50%	of Pan Evap
Surface area subject to wetting		40%	
Net discharge rate factor (post concentrate recovery)		99.0%	
Entrained water (Sand)	Year 1-5	433	gpm
Entrained water (slimes)	Year 1-5	1,822	gpm
Entrained water (beach)	Year 1-5	787	gpm
Entrained water (Sand)	Year 6-11	393	gpm
Entrained water (slimes)	Year 6-11	1,685	gpm
Entrained water (beach)	Year 6-11	728	gpm
TSF Free Water area		40%	of Tailings Area
Maximum Pond Area (Acre)	40	1,742,400	ft2
TSF Free Water Pan Evap. coefficient		75%	
Reclaim Pump capacity		12,978	gpm
Minimum Water Storage		500,000	gal
CN-Native ground areas		92	
Dam Evap (underflow water)	Year 1-5	155	gpm
Dam Evap (underflow water)	Year 6-11	140	gpm

Average Make-up (gpm)	
Result	3,169
Entrainment	2924
Precip/runon	2098
Evap	4931
Water in	12438

elev	Phase	Time	Total Imp. Area	Lined Area (ft^2)	Undiverted Area (ft^2)
5250	1	0.8		8,482,454	3,369,410
5280	2	1.8		10,415,749	1,317,126
5310	3	3.0	13,385,899	12,231,496	1,154,403
5340	4	4.5	13,385,899	12,964,378	421,521
5380	5	6.7	13,385,899	13,385,899	0
5435	6	9.74	13,385,899	13,385,899	

Results: Average Reclaim 9,215 gpm; Average Make-up 3,169 gpm

=input values

Notes:

Tailings direct precip. reports 100% to water balance

Impoundment refers to the interior, cyclone overflow and whole tailings storage area

This model does not consider whole tailings discharge which accounts for approximately 7.5% of inflow, except as noted below.

Average post deposition densities reflect periodic whole tailings discharge

Year	Month	Elapsed Years	Total Impoundment Area (ft^2)	Pond Area (ft^2)	Beach Area (ft^2)	Water Inflows: Tailings Water (gal)	Water Inflows: Direct Precip. (gal)	Water Inflows: Runon from undiverted Area (gal)	Water Losses: Total Entrained Water (UF) (gal)	Water Losses: Free Water Pond Evap (gal)	Water Losses: Impoundment Beach Evap. (gal)	Water Losses: Embankment Evap. (gal)	Monthly Balance at TSF (gal)	Water Reclaimed from TSF (gal)	End of Month Water Storage (gal)	Water Reclaimed from TSF (gpm)	Make-Up Water Required (gpm)
1	Jan-15	0.08	8,482,454	1,742,400	6,740,054	579,339,937	3,066,903	271,525	135,827,440	3,437,732	2,659,608	6,907,787	433,845,798	433,345,798	500,000	9,708	3,270
	Feb-15	0.16	8,482,454	1,742,400	6,740,054	523,274,781	2,961,147	249,348	122,682,849	4,537,481	3,510,430	6,239,291	390,015,225	389,515,225	500,000	9,661	3,317
	Mar-15	0.25	8,482,454	1,742,400	6,740,054	579,339,937	2,009,350	82,934	135,827,440	6,965,074	5,388,542	6,907,787	426,843,379	426,343,379	500,000	9,551	3,427
	Apr-15	0.33	8,482,454	1,742,400	6,740,054	560,651,552	1,744,962	49,893	131,445,910	7,755,264	5,999,873	6,684,955	411,060,405	410,560,405	500,000	9,504	3,474
	May-15	0.41	8,482,454	1,742,400	6,740,054	579,339,937	2,802,514	217,295	135,827,440	9,083,108	7,027,162	6,907,787	424,014,249	423,514,249	500,000	9,487	3,491
	Jun-15	0.50	8,482,454	1,742,400	6,740,054	560,651,552	3,807,189	442,457	131,445,910	11,608,456	8,980,903	6,684,955	406,680,975	406,180,975	500,000	9,402	3,576
	Jul-15	0.58	8,482,454	1,742,400	6,740,054	579,339,937	12,320,488	3,227,141	135,827,440	8,423,259	6,516,669	6,907,787	437,712,411	437,212,411	500,000	9,794	3,184
	Aug-15	0.67	8,482,454	1,742,400	6,740,054	579,339,937	13,007,897	1,735,434	135,827,440	4,838,893	3,743,618	6,907,787	443,265,529	442,765,529	500,000	9,919	3,059
	Sep-15	0.75	8,482,454	1,742,400	6,740,054	560,651,552	11,157,180	1,262,448	131,445,910	5,034,404	3,894,876	6,684,955	426,511,035	426,011,035	500,000	9,861	3,117
	Oct-15	0.83	10,415,749	1,742,400	8,673,349	579,339,937	7,661,662	108,901	135,827,440	3,225,929	3,211,617	6,907,787	438,437,727	437,937,727	500,000	9,810	3,168
	Nov-15	0.92	10,415,749	1,742,400	8,673,349	560,651,552	3,571,114	93,230	131,445,910	2,997,833	2,984,533	6,684,955	420,702,665	420,202,665	500,000	9,727	3,251
	Dec-15	1.00	10,415,749	1,742,400	8,673,349	579,339,937	5,259,277	220,641	135,827,440	2,232,082	2,222,179	6,907,787	438,130,366	437,630,366	500,000	9,804	3,174
2	Jan-16	1.08	10,415,749	1,742,400	8,673,349	579,339,937	3,765,902	106,141	135,827,440	3,437,732	3,422,481	6,907,787	434,116,539	433,616,539	500,000	9,714	3,264
	Feb-16	1.16	10,415,749	1,742,400	8,673,349	523,274,781	3,636,043	97,472	122,682,849	4,537,481	4,517,350	6,239,291	389,531,325	389,031,325	500,000	9,649	3,329
	Mar-16	1.25	10,415,749	1,742,400	8,673,349	579,339,937	2,467,315	32,420	135,827,440	6,965,074	6,934,173	6,907,787	425,705,197	425,205,197	500,000	9,525	3,453
	Apr-16	1.33	10,415,749	1,742,400	8,673,349	560,651,552	2,142,668	19,503	131,445,910	7,755,264	7,720,857	6,684,955	409,706,738	409,206,738	500,000	9,472	3,506
	May-16	1.41	10,415,749	1,742,400	8,673,349	579,339,937	3,441,255	84,942	135,827,440	9,083,108	9,042,811	6,907,787	422,504,988	422,004,988	500,000	9,454	3,525
	Jun-16	1.50	10,415,749	1,742,400	8,673,349	560,651,552	4,674,912	172,960	131,445,910	11,608,456	11,556,955	6,684,955	404,703,147	404,203,147	500,000	9,357	3,621
	Jul-16	1.58	10,415,749	1,742,400	8,673,349	579,339,937	15,128,536	1,261,512	135,827,440	8,423,259	8,385,889	6,907,787	436,685,610	436,185,610	500,000	9,771	3,207
	Aug-16	1.67	10,415,749	1,742,400	8,673,349	579,339,937	15,972,618	678,393	135,827,440	4,838,893	4,817,426	6,907,787	444,099,402	443,599,402	500,000	9,937	3,041
	Sep-16	1.75	10,415,749	1,742,400	8,673,349	560,651,552	13,700,091	493,500	131,445,910	5,034,404	5,012,069	6,684,955	427,167,804	426,667,804	500,000	9,877	3,101
	Oct-16	1.83	12,231,496	1,742,400	10,489,096	579,339,937	8,997,297	95,447	135,827,440	3,225,929	3,883,962	6,907,787	439,087,563	438,587,563	500,000	9,825	3,153
	Nov-16	1.92	12,231,496	1,742,400	10,489,096	560,651,552	4,193,656	81,712	131,445,910	2,997,833	3,609,339	6,684,955	420,688,883	420,188,883	500,000	9,727	3,251
	Dec-16	2.00	12,231,496	1,742,400	10,489,096	579,339,937	6,176,111	193,382	135,827,440	2,232,082	2,687,388	6,907,787	438,554,733	438,054,733	500,000	9,813	3,165
3	Jan-17	2.08	12,231,496	1,742,400	10,489,096	579,339,937	4,422,400	93,028	135,827,440	3,437,732	4,138,970	6,907,787	434,043,436	433,543,436	500,000	9,712	3,266
	Feb-17	2.16	12,231,496	1,742,400	10,489,096	523,274,781	4,269,904	85,430	122,682,849	4,537,481	5,463,048	6,239,291	389,207,446	388,707,446	500,000	9,641	3,337
	Mar-17	2.25	12,231,496	1,742,400	10,489,096	579,339,937	2,897,435	28,414	135,827,440	6,965,074	8,385,827	6,907,787	424,679,658	424,179,658	500,000	9,502	3,476
	Apr-17	2.33	12,231,496	1,742,400	10,489,096	560,651,552	2,516,193	17,094	131,445,910	7,755,264	9,337,202	6,684,955	408,461,509	407,961,509	500,000	9,444	3,534
	May-17	2.41	12,231,496	1,742,400	10,489,096	579,339,937	4,041,159	74,448	135,827,440	9,083,108	10,935,904	6,907,787	421,201,305	420,701,305	500,000	9,424	3,554
	Jun-17	2.50	12,231,496	1,742,400	10,489,096	560,651,552	5,489,876	151,592	131,445,910	11,608,456	13,976,379	6,684,955	403,077,319	402,577,319	500,000	9,319	3,659
	Jul-17	2.58	12,231,496	1,742,400	10,489,096	579,339,937	17,765,850	1,105,660	135,827,440	8,423,259	10,141,457	6,907,787	437,411,503	436,911,503	500,000	9,787	3,191
	Aug-17	2.67	12,231,496	1,742,400	10,489,096	579,339,937	18,757,077	594,582	135,827,440	4,838,893	5,825,943	6,907,787	445,791,532	445,291,532	500,000	9,975	3,003
	Sep-17	2.75	12,231,496	1,742,400	10,489,096	560,651,552	16,088,387	432,531	131,445,910	5,034,404	6,061,335	6,684,955	428,445,866	427,945,866	500,000	9,906	3,072
	Oct-17	2.83	12,231,496	1,742,400	10,489,096	579,339,937	8,997,297	95,447	135,827,440	3,225,929	3,883,962	6,907,787	439,087,563	438,587,563	500,000	9,825	3,153
	Nov-17	2.92	12,231,496	1,742,400	10,489,096	560,651,552	4,193,656	81,712	131,445,910	2,997,833	3,609,339	6,684,955	420,688,883	420,188,883	500,000	9,727	3,251
	Dec-17	3.00	12,231,496	1,742,400	10,489,096	579,339,937	6,176,111	193,382	135,827,440	2,232,082	2,687,388	6,907,787	438,554,733	438,054,733	500,000	9,813	3,165
4	Jan-18	3.08	12,964,378	1,742,400	11,221,978	579,339,937	4,687,380	33,968	135,827,440	3,437,732	4,428,163	6,907,787	433,960,163	433,460,163	500,000	9,710	3,268
	Feb-18	3.16	12,964,378	1,742,400	11,221,978	523,274,781	4,525,746	31,194	122,682,849	4,537,481	5,844,756	6,239,291	389,027,345	388,527,345	500,000	9,636	3,342
	Mar-18	3.25	12,964,378	1,742,400	11,221,978	579,339,937	3,071,042	10,375	135,827,440	6,965,074	8,971,752	6,907,787	424,249,301	423,749,301	500,000	9,493	3,485
	Apr-18	3.33	12,964,378	1,742,400	11,221,978	560,651,552	2,666,958	6,242	131,445,910	7,755,264	9,989,600	6,684,955	407,949,022	407,449,022	500,000	9,432	3,546
	May-18	3.41	12,964,378	1,742,400	11,221,978	579,339,937	4,283,296	27,184	135,827,440	9,083,108	11,700,004	6,907,787	420,632,077	420,132,077	500,000	9,412	3,566
	Jun-18	3.50	12,964,378	1,742,400	11,221,978	560,651,552	5,818,817	55,352	131,445,910	11,608,456	14,952,920	6,684,955	402,333,479	401,833,479	500,000	9,302	3,676
	Jul-18	3.58	12,964,378	1,742,400	11,221,978	579,339,937	18,830,337	403,723	135,827,440	8,423,259	10,850,049	6,907,787	437,065,462	436,565,462	500,000	9,780	3,198
	Aug-18	3.67	12,964,378	1,742,400	11,221,978	579,339,937	19,880,957	217,107	135,827,440	4,838,893	6,233,007	6,907,787	446,130,873	445,630,873	500,000	9,983	2,995
	Sep-18	3.75	12,964,378	1,742,400	11,221,978	560,651,552	17,052,365	157,935	131,445,910	5,034,404	6,484,845	6,684,955	428,711,737	428,211,737	500,000	9,912	3,066
	Oct-18	3.83	12,964,378	1,742,400	11,221,978	579,339,937	9,536,394	34,852	135,827,440	3,225,929	4,155,338	6,907,787	439,294,688	438,794,688	500,000	9,830	3,148
	Nov-18	3.92	12,964,378	1,742,400	11,221,978	560,651,552	4,444,929	29,837	131,445,910	2,997,833	3,861,526	6,684,955	420,636,094	420,136,094	500,000	9,725	3,253
	Dec-18	4.00	12,964,378	1,742,400	11,221,978	579,339,937	6,546,169	70,612	135,827,440	2,232,082	2,875,158	6,907,787	438,614,250	438,114,250	500,000	9,814	3,164
5	Jan-19	4.08	12,964,378	1,742,400	11,221,978	579,339,937	4,687,380	33,968	135,827,440	3,437,732	4,428,163	6,907,787	433,960,163	433,460,163	500,000	9,710	3,268
	Feb-19	4.16	12,964,378	1,742,400	11,221,978	523,274,781	4,525,746	31,194	122,682,849	4,537,481	5,844,756	6,239,291	389,027,345	388,527,345	500,000	9,636	3,342
	Mar-19	4.25	12,964,378	1,742,400	11,221,978	579,339,937	3,071,042	10,375	135,827,440	6,965,074	8,971,752	6,907,787	424,249,301	423,749,301	500,000	9,493	3,485
	Apr-19	4.33	12,964,378	1,742,400	11,221,978	560,651,552	2,666,958	6,242	131,445,910	7,755,264	9,989,600	6,684,955	407,949,022	407,449,022	500,000	9,432	3,546
	May-19	4.41	12,964,378	1,742,400	11,221,978	579,339,937	4,283,296	27,184	135,827,440	9,083,108	11,700,004	6,907,787	420,632,077	420,132,077	500,000	9,412	3,566
	Jun-19	4.50	12,964,378	1,742,400	11,221,978	560,651,552	5,818,817	55,352	131,445,910	11,608,456	14,952,920	6,684,955	402,333,479	401,833,479	500,000	9,302	3,676
	Jul-19	4.58	13,385,899	1,742,400	11,643,499	579,339,937	19,442,582	-	135,827,440	8,423,259	11,257,599	6,907,787	436,866,434	436,366,434	500,000	9,775	3,203
	Aug-19	4.67	13,385,899	1,742,400	11,643,499	579,339,937	20,527,362	-	135,827,440	4,838,893	6,467,132	6,907,787	446,326,046	445,826,046	500,000	9,987	2,991
	Sep-19	4.75	13,385,899	1,742,400	11,643,499	560,651,552	17,606,802	-	131,445,910	5,034,404	6,728,430	6,684,955	428,864,655	428,364,655	500,000	9,916	3,062
	Oct-19	4.83	13,385,899	1,742,400	11,643,499	579,339,937	9,846,458	-	135,827,440	3,225,929	4,311,421	6,907,787	439,413,818	438,913,818	500,000	9,832	3,146
	Nov-19	4.92	13,385,899	1,742,400	11,643,499	560,651,552	4,589,451	-	131,445,910	2,997,833	4,006,573	6,684,955	420,605,732	420,105,732	500,000	9,725	3,253
	Dec-19	5.00	13,385,899	1,742,400	11,643,499	579,339,937	6,759,009	-	135,827,440	2,232,082	2,983,155	6,907,787	438,648,482	438,148,482	500,000	9,815	3,163
6	Jan-20	5.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-20	5.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895	-	113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-20	5.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893	-	125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-20	5.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670	-	121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-20	5.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562	-	125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-20	5.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008	-	121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-20	5.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582	-	125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-20	5.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362		125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-20	5.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802		121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-20	5.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458		125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-20	5.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451		121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-20	6.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009		125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912
7	Jan-21	6.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784		125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-21	6.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895		113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-21	6.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893		125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-21	6.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670		121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-21	6.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562		125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-21	6.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008		121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-21	6.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582		125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-21	6.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362	-	125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-21	6.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802	-	121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-21	6.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458	-	125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-21	6.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451	-	121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-21	7.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009	-	125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912
8	Jan-22	7.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-22	7.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895	-	113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-22	7.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893	-	125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-22	7.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670	-	121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-22	7.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562	-	125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-22	7.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008	-	121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-22	7.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582	-	125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-22	7.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362	-	125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-22	7.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802	-	121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-22	7.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458	-	125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-22	7.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451	-	121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-22	8.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009	-	125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912
9	Jan-23	8.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-23	8.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895	-	113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-23	8.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893	-	125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-23	8.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670	-	121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-23	8.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562	-	125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-23	8.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008	-	121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-23	8.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582	-	125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-23	8.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362	-	125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-23	8.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802	-	121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-23	8.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458	-	125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-23	8.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451	-	121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-23	9.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009	-	125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912

Table 3: Water Balance Calculations Rev 1.

Date:	12/16/2013		**Made by:**	4/29/2013 RL
Project No.:	103-92557		**Checked:**	11/15/2013 GM
Subject:	Average Year Rainfall Conditions		**Reviewed**	11/15/2013 BNS
Project Short Title:	**Copper Flat Feasibility Study, New Mexico**		**Page:**	3 of 3

Precipitation and Evaporation Data

2	3	4	5	6	7	8	9	10
Month	**Days**	**Precip. (in)**	**Pan evap. (in)**	**Storms/Month**	**Precip/Storm**	**S**	**Runoff/ storm (in)**	**Monthly runoff (in)**
January	31	0.58	4.22	1	0.58	0.87	0.13	0.13
February	28	0.56	5.57	1	0.56	0.87	0.12	0.12
March	31	0.38	8.55	1	0.38	0.87	0.04	0.04
April	30	0.33	9.52	1	0.33	0.87	0.02	0.02
May	31	0.53	11.15	1	0.53	0.87	0.10	0.10
June	30	0.72	14.25	1	0.72	0.87	0.21	0.21
July	31	2.33	10.34	1	2.33	0.87	1.54	1.54
August	31	2.46	5.94	3	0.82	0.87	0.28	0.83
September	30	2.11	6.18	3	0.70	0.87	0.20	0.60
October	31	1.18	3.96	3	0.39	0.87	0.04	0.13
November	30	0.55	3.68	1	0.55	0.87	0.11	0.11
December	31	0.81	2.74	1	0.81	0.87	0.27	0.27

Variables used in Water Balance

Water in Delivered Tailings Year 1-5		12,978	gpm
Water in Delivered Tailings Year 6-11		11,897	gpm
Beach Loss evap factor		50%	of Pan Evap
Surface area subject to wetting		40%	
Net discharge rate factor (post concentrate recovery)		99.0%	
Entrained water (Sand)	Year 1-5	433	gpm
Entrained water (slimes)	Year 1-5	1,822	gpm
Entrained water (beach)	Year 1-5	787	gpm
Entrained water (Sand)	Year 6-11	393	gpm
Entrained water (slimes)	Year 6-11	1,685	gpm
Entrained water (beach)	Year 6-11	728	gpm
TSF Free Water area		40%	of Tailings Area
Maximum Pond Area (Acre)	40	1,742,400	ft2
TSF Free Water Pan Evap. coefficient		75%	
Reclaim Pump capacity		12,978	gpm
Minimum Water Storage		500,000	gal
CN-Native ground areas		92	
Dam Evap (underflow water)	Year 1-5	155	gpm
Dam Evap (underflow water)	Year 6-11	140	gpm

elev	Phase	Time	Total Imp. Area	Lined Area (ft^2)	Undiverted Area (ft^2)
5250	1	0.8		8,482,454	3,369,410
5280	2	1.8		10,415,749	1,317,126
5310	3	3.0	13,385,899	12,231,496	1,154,403
5340	4	4.5	13,385,899	12,964,378	421,521
5380	5	6.7	13,385,899	13,385,899	0
5435	6	9.74	13,385,899	13,385,899	

Results: Average Reclaim 9,215 gpm; Average Make-up 3,169 gpm

(yellow) =input values

Average Make-up (gpm)	
Result	3,169
Entrainment	2924
Precip/runon	2098
Evap	4931
Water in	12438

Notes:

Tailings direct precip. reports 100% to water balance

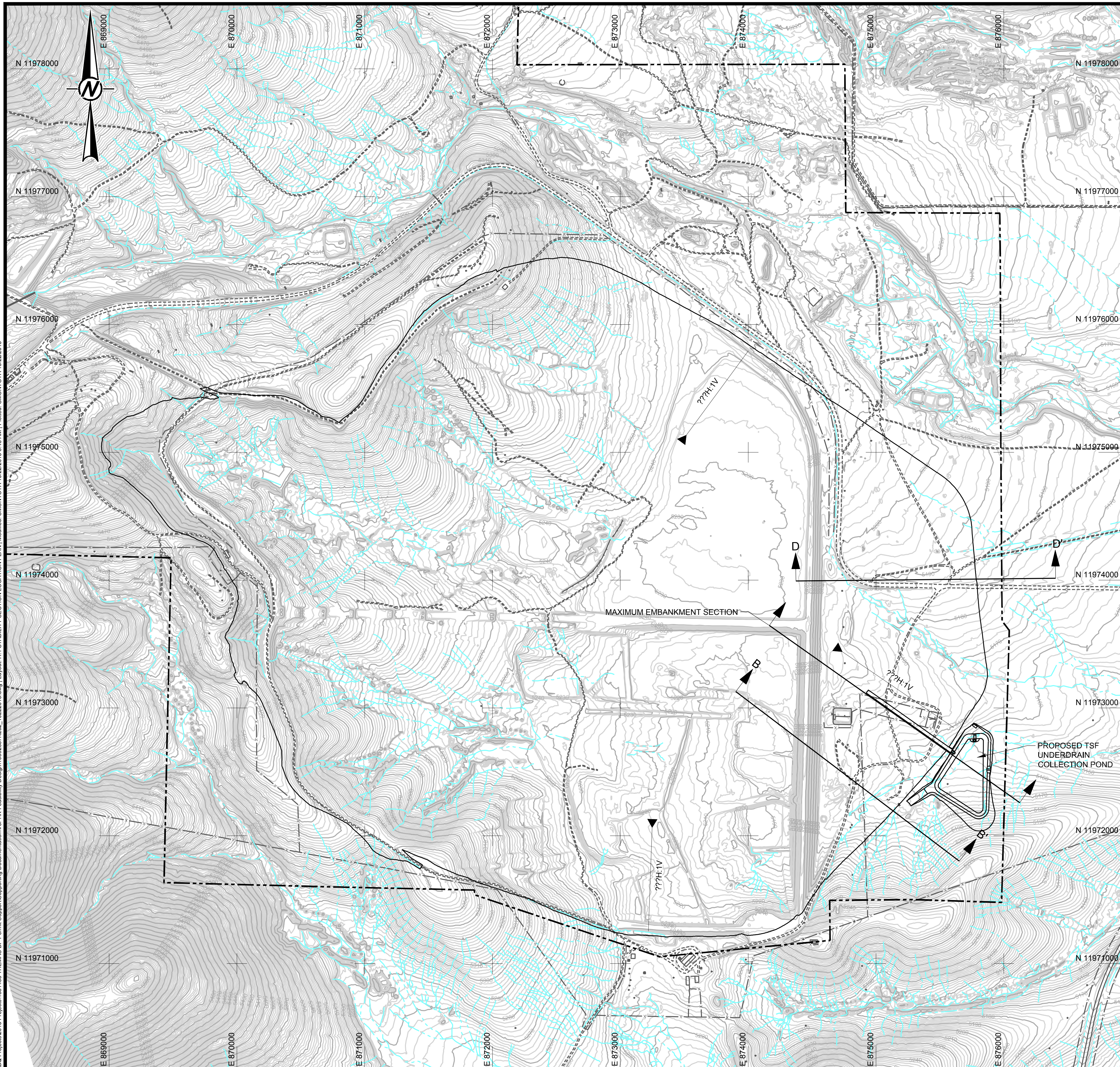
Impoundment refers to the interior, cyclone overflow and whole tailings storage area

This model does not consider whole tailings discharge which accounts for approximately 7.5% of inflow, except as noted below.

Average post deposition densities reflect periodic whole tailings discharge

Year	Month	Elapsed Years	Total Impoundment Area (ft^2)	Pond Area (ft^2)	Beach Area (ft^2)	Water Inflows: Tailings Water (gal)	Water Inflows: Direct Precip. (gal)	Water Inflows: Runon from undiverted Area (gal)	Water Losses: Total Entrained Water (UF) (gal)	Water Losses: Free Water Pond Evap (gal)	Water Losses: Impoundment Beach Evap. (gal)	Water Losses: Embankment Evap. (gal)	Monthly Balance at TSF (gal)	Water Reclaimed from TSF (gal)	End of Month Water Storage (gal)	Water Reclaimed from TSF (gpm)	Make-Up Water Required (gpm)
10	Jan-24	9.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-24	9.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895	-	113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-24	9.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893	-	125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-24	9.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670	-	121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-24	9.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562	-	125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-24	9.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008	-	121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-24	9.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582	-	125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-24	9.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362	-	125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-24	9.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802	-	121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-24	9.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458	-	125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-24	9.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451	-	121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-24	10.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009	-	125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912
11	Jan-25	10.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
	Feb-25	10.16	13,385,899	1,742,400	11,643,499	479,701,263	4,672,895	-	113,125,473	4,537,481	6,064,297	5,661,782	355,485,125	354,985,125	500,000	8,804	3,093
	Mar-25	10.25	13,385,899	1,742,400	11,643,499	531,097,826	3,170,893	-	125,246,059	6,965,074	9,308,750	6,268,402	386,980,435	386,480,435	500,000	8,658	3,240
	Apr-25	10.33	13,385,899	1,742,400	11,643,499	513,965,638	2,753,670	-	121,205,864	7,755,264	10,364,830	6,066,195	371,827,156	371,327,156	500,000	8,596	3,302
	May-25	10.41	13,385,899	1,742,400	11,643,499	531,097,826	4,422,562	-	125,246,059	9,083,108	12,139,481	6,268,402	383,283,338	382,783,338	500,000	8,575	3,322
	Jun-25	10.50	13,385,899	1,742,400	11,643,499	513,965,638	6,008,008	-	121,205,864	11,608,456	15,514,583	6,066,195	366,078,548	365,578,548	500,000	8,462	3,435
	Jul-25	10.58	13,385,899	1,742,400	11,643,499	531,097,826	19,442,582	-	125,246,059	8,423,259	11,257,599	6,268,402	399,845,090	399,345,090	500,000	8,946	2,951
	Aug-25	10.67	13,385,899	1,742,400	11,643,499	531,097,826	20,527,362	-	125,246,059	4,838,893	6,467,132	6,268,402	409,304,702	408,804,702	500,000	9,158	2,740
	Sep-25	10.75	13,385,899	1,742,400	11,643,499	513,965,638	17,606,802	-	121,205,864	5,034,404	6,728,430	6,066,195	393,037,547	392,537,547	500,000	9,087	2,811
	Oct-25	10.83	13,385,899	1,742,400	11,643,499	531,097,826	9,846,458	-	125,246,059	3,225,929	4,311,421	6,268,402	402,392,473	401,892,473	500,000	9,003	2,894
	Nov-25	10.92	13,385,899	1,742,400	11,643,499	513,965,638	4,589,451	-	121,205,864	2,997,833	4,006,573	6,066,195	384,778,624	384,278,624	500,000	8,895	3,002
	Dec-25	11.00	13,385,899	1,742,400	11,643,499	531,097,826	6,759,009	-	125,246,059	2,232,082	2,983,155	6,268,402	401,627,138	401,127,138	500,000	8,986	2,912
12	Jan-26	11.08	13,385,899	1,742,400	11,643,499	531,097,826	4,839,784	-	125,246,059	3,437,732	4,594,494	6,268,402	396,890,923	396,390,923	500,000	8,880	3,018
						542,619,654	**8,173,890**	127,890	127,590,729	5,826,860	7,227,106	6,434,351	404,240,459	403,740,459	500,000	**9,215**	**3,169**
										Average Make-up water				**3,169**	**gpm**		
										Maximum Make-up water				**3,676**	**gpm**		
					Average (gpm)	12,368	186	3	2,909	133	165	147	9,215				

APPENDIX H
STABILITY ANALYSIS SUPPORTING DATA
AND COMPUTER OUTPUT



LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
	EXISTING ROADS
	EXISTING DRAINAGE
	EXISTING FENCELINE
	MINE PERMIT AREA BOUNDARY
3600	REGRADED CONTOURS (ft -MSL)
	GRADE BREAK
B B'	SLOPE STABILITY SECTION LOCATION

NOTES

1. TAILINGS STORAGE FACILITY SHOWN AT FINAL BUILDOUT.

0 400 800 1200
SCALE FEET

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION

Environmentally Responsible. Community-Minded. Local Opportunities.

DRAFT COPPER FLAT PROJECT
30 TPD TAILINGS STORAGE
FACILITY FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

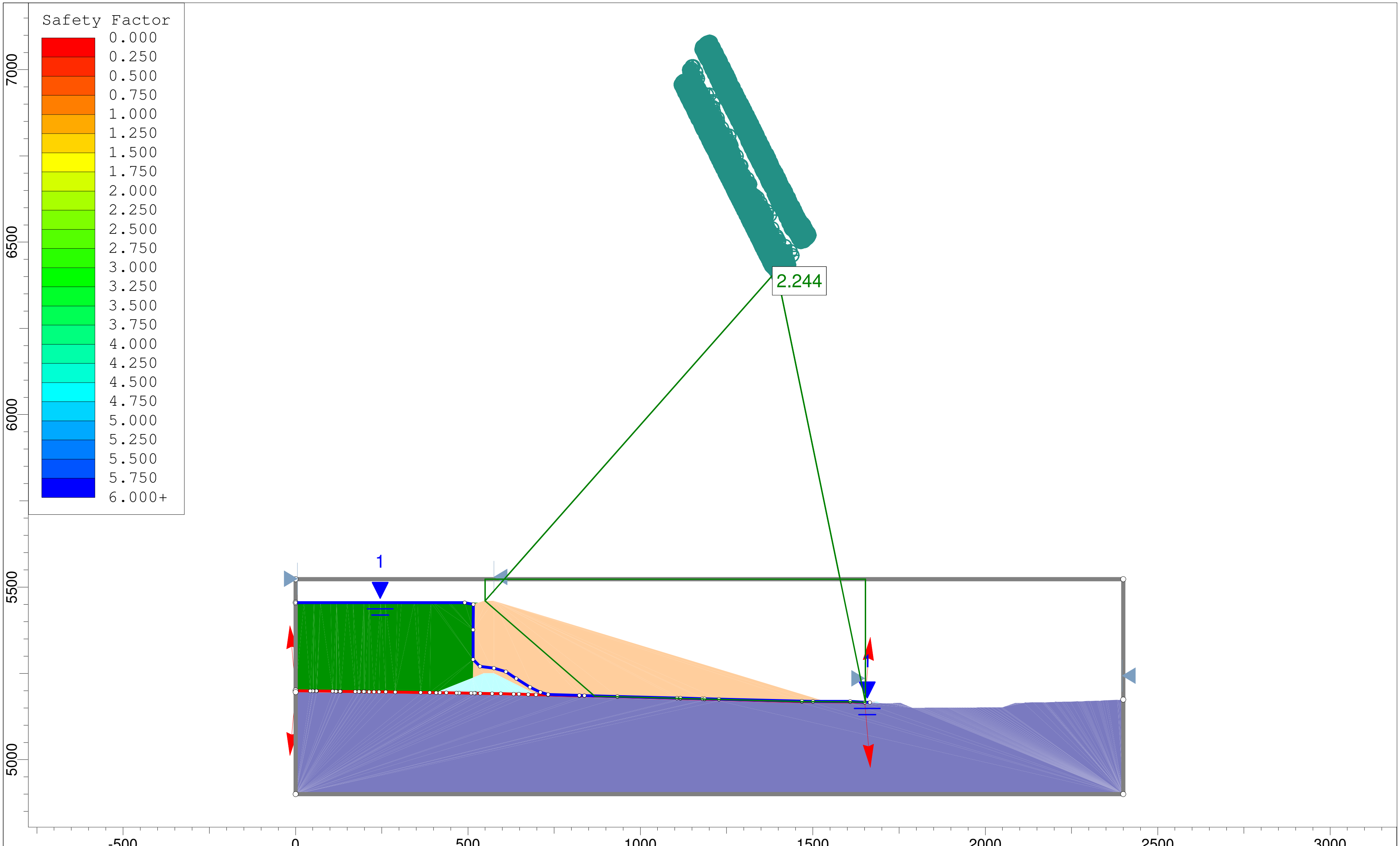
TITLE

STABILITY SECTION LOCATION PLAN

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K202_10222015
DESIGN	DMW	2013-04-30	SCALE AS SHOWN
CADD	JHR	2013-04-30	DRAWING
CHECK	GM	2013-05-07	H.1
REVIEW	DAK	2013-05-07	

APPENDIX H.1
MAXIMUM EMBANKMENT SECTION



Project	Copper Flat		
Analysis Description	Section A Stability: Downstream, Static, Block Failure, Global		
Drawn By	GS	Scale	1:4620
Company	Golder Associates Inc.		
Date	11/4/2013, 3:02:21 PM	File Name	1a - SectionA 5460R DS_S_B_G.slim

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

File Name: 1a - SectionA 5460R DS_S_B_G.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Static, Block Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	26.5	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 2.244240
Axis Location: 1394.865, 6416.541
Left Slip Surface Endpoint: 549.279, 5460.000
Right Slip Surface Endpoint: 1652.746, 5166.147
Left Slope Intercept: 549.279 5522.990
Right Slope Intercept: 1652.746 5522.990
Resisting Moment=8.08765e+009 lb-ft

Driving Moment=3.60374e+009 lb-ft
Resisting Horizontal Force=5.71009e+006 lb
Driving Horizontal Force=2.54433e+006 lb

Global Minimum Coordinates

Method: spencer

X	Y
549.279	5460
868.036	5183.72
933.475	5181.95
1105.87	5177.5
1116.06	5177.23
1179.42	5175.55
1186.08	5175.37
1227.57	5174.27
1468.45	5168.13
1500.4	5168.02
1608.27	5167.61
1623.49	5166.77
1652.75	5166.15
1652.75	5522.99

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 757
Number of Invalid Surfaces: 4064

Error Codes:

Error Code -108 reported for 7 surfaces
Error Code -111 reported for 2282 surfaces
Error Code -112 reported for 19 surfaces
Error Code -116 reported for 1756 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-116 = Not enough slices to analyze the surface Increase the number of slices in the job control in the modeler.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.24424

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	52.9277	124924	Cyclone Underflow	0	39	591.131	1326.64	1638.28	0	1638.28
2	52.9277	315093	Cyclone Underflow	0	39	1658.67	3722.45	4596.85	0	4596.85
3	52.9277	493540	Cyclone Underflow	0	39	2613.17	5864.58	7242.16	0	7242.16
4	52.9277	671986	Cyclone Underflow	0	39	3567.68	8006.72	9887.48	0	9887.48
5	52.9277	850433	Cyclone Underflow	0	39	4522.2	10148.9	12532.8	0	12532.8
6	52.9277	1.02888e+006	Cyclone Underflow	0	39	5476.69	12291	15178.1	0	15178.1
7	1.19075	25204	Liner Interface Zone	0	26.5	4101.89	9205.63	18494.8	31.1774	18463.6
8	65.4393	1.32103e+006	Liner Interface Zone	0	26.5	4296.98	9643.45	19404.1	62.3547	19341.7
9	57.4662	1.0497e+006	Liner Interface Zone	0	26.5	3873.77	8693.66	17499.2	62.3583	17436.9
10	57.4662	946268	Liner Interface Zone	0	26.5	3476.66	7802.45	15711.7	62.3583	15649.3
11	57.4662	842833	Liner Interface Zone	0	26.5	3079.55	6911.24	13924.2	62.3583	13861.8
12	10.1889	138642	Liner Interface Zone	0	26.5	2845.74	6386.52	12871.8	62.3576	12809.4
13	63.358	789325	Liner Interface Zone	0	26.5	2592.07	5817.23	11729.9	62.3559	11667.6
14	6.66227	75711.8	Liner Interface Zone	0	26.5	2350.93	5276.05	10644.5	62.3581	10582.1
15	41.4898	440289	Liner Interface Zone	0	26.5	2184.77	4903.15	9896.55	62.3559	9834.2
16	48.1756	443630	Liner Interface Zone	0	26.5	1875.42	4208.9	8504.11	62.3594	8441.75
17	48.1756	370848	Liner Interface Zone	0	26.5	1542.11	3460.86	7003.76	62.3594	6941.4
18	48.1756	298067	Liner Interface Zone	0	26.5	1208.79	2712.81	5503.4	62.3594	5441.04
19	48.1756	225285	Liner Interface Zone	0	26.5	875.468	1964.76	4003.07	62.3594	3940.71
20	48.1756	152503	Liner Interface Zone	0	26.5	542.148	1216.71	2502.71	62.3594	2440.36
21	31.9454	59717.2	Liner Interface Zone	0	26.5	256.986	576.739	1219.16	62.3993	1156.76

22	53.9361	28069.4	Liner Interface Zone	0	26.5	6.26742	14.0656	90.6102	62.3991	28.2111
23	53.9361	6472.33	Liner Interface Zone	0	26.5	10.742	24.1077	110.752	62.3991	48.3526
24	15.217	1826.04	Liner Interface Zone	0	26.5	0	0	0.432806	62.2097	-61.7769
25	29.2604	1755.63	Liner Interface Zone	0	26.5	2857.95	6413.92	12895.4	31.1049	12864.3

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.24424

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	549.279	5460	1.98387e-022	0	0
2	602.206	5414.12	-113840	11116	-5.57701
3	655.134	5368.25	-69899.2	6825.37	-5.57702
4	708.062	5322.37	28843.8	-2816.47	-5.577
5	760.99	5276.5	182389	-17809.5	-5.57701
6	813.917	5230.62	390735	-38153.7	-5.57702
7	866.845	5184.75	653884	-63849.1	-5.57702
8	868.036	5183.72	664679	-64903.2	-5.57702
9	933.475	5181.95	217883	-21275.3	-5.577
10	990.941	5180.47	-174451	17034.4	-5.57701
11	1048.41	5178.98	-565551	55223.8	-5.57702
12	1105.87	5177.5	-955418	93292.6	-5.57701
13	1116.06	5177.23	-1.02438e+006	100027	-5.57705
14	1179.42	5175.55	-1.45202e+006	141784	-5.57703
15	1186.08	5175.37	-1.49696e+006	146172	-5.57702
16	1227.57	5174.27	-1.77617e+006	173435	-5.57699
17	1275.75	5173.04	-2.10008e+006	205064	-5.57701
18	1323.92	5171.81	-2.42308e+006	236604	-5.57702
19	1372.1	5170.58	-2.74518e+006	268055	-5.57701
20	1420.28	5169.35	-3.06636e+006	299418	-5.57703
21	1468.45	5168.13	-3.38664e+006	330691	-5.57701
22	1500.4	5168.02	-3.59915e+006	351442	-5.57701
23	1554.33	5167.81	-3.83666e+006	374634	-5.57702
24	1608.27	5167.61	-3.84174e+006	375130	-5.57702
25	1623.49	5166.77	-3.86037e+006	376950	-5.57703
26	1652.75	5166.15	6.36684e-021	0	0

List Of Coordinates

Piezoline

X	Y
0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

Block Search Polyline

X	Y
1650.32	5165.28
1608.27	5167.61
1500.4	5168.02
1468.45	5168.13
1227.57	5174.27
1186.08	5175.37
1179.42	5175.55
1116.06	5177.23
1105.87	5177.5
933.475	5181.95
837.37	5184.54
823.107	5184.92
732.639	5187.36
696.805	5188.32
674.437	5188.92
647.545	5189.63

632.517	5190.03
595.395	5191.04
570.193	5191.45
535.401	5192.01
521.537	5192.24
518.618	5192.28
509.317	5192.41
474.418	5192.97
466.941	5193.08
437.521	5193.55
418.604	5193.82
407.909	5193.99
388.869	5194.29
362.969	5194.7
289.277	5195.79
261.362	5196.12
242.453	5196.34
227.348	5196.51
213.325	5196.67
200.27	5196.81
198.026	5196.84
185.964	5196.98
183.907	5197.01
172.729	5197.13
131.064	5197.72
129.194	5197.75
118.942	5197.86
117.225	5197.89
107.708	5198
61.8783	5198.65
60.3563	5198.67
51.8447	5198.77
50.4444	5198.79
42.5304	5198.88
0	5199.5

External Boundary

X	Y
0	4900
2400	4900
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5

0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79
362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23

1179.29	5171.55
1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27
1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54

1863.56	5150.55
1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95
1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6

2079.42	5161.46
2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03
2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455
530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13

183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92
696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

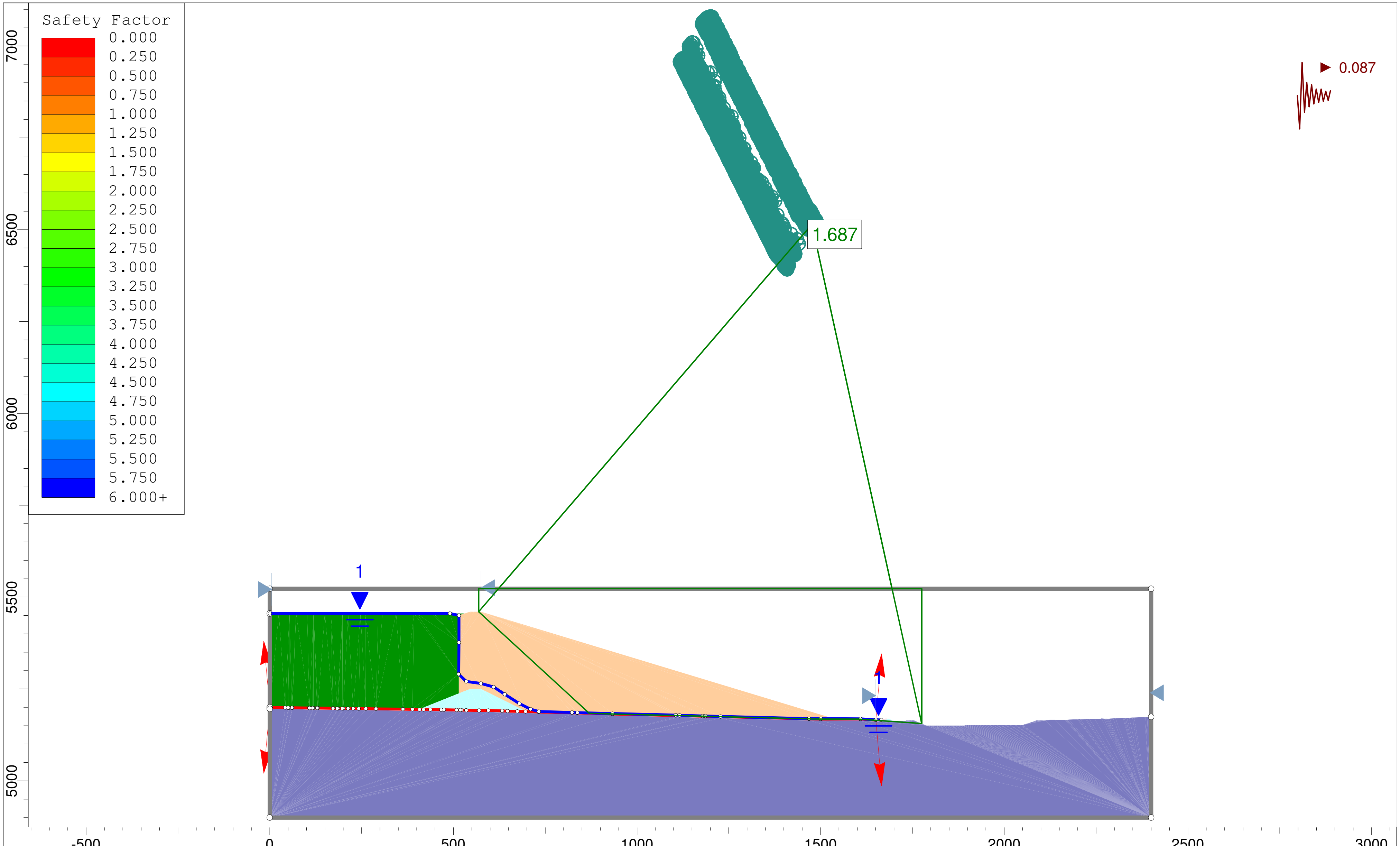
X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32



SLIDEINTERPRET 6.008	Project: Copper Flat		
	Analysis Description: Section A Stability: Downstream, Pseudo Static, Block Failure, Global		
	Drawn By: GS	Scale: 1:4338	Company: Golder Associates Inc.
	Date: 11/4/2013, 3:02:21 PM		File Name: 2a - SectionA 5460R DS_PS_B_G.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 2a - SectionA 5460R DS_PS_B_G.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Pseudo Static, Block Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

> 103-92557
> Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

> Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	26.5	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 1.686520

Axis Location: 1476.350, 6514.282
Left Slip Surface Endpoint: 568.826, 5460.000
Right Slip Surface Endpoint: 1775.261, 5155.693
Left Slope Intercept: 568.826 5522.990
Right Slope Intercept: 1775.261 5522.990
Resisting Moment=8.24296e+009 lb-ft
Driving Moment=4.88754e+009 lb-ft
Resisting Horizontal Force=5.38918e+006 lb
Driving Horizontal Force=3.19543e+006 lb

Global Minimum Coordinates

Method: spencer

X	Y
568.826	5460
870.106	5183.66
933.475	5181.95
1105.87	5177.5
1116.06	5177.23
1179.42	5175.55
1186.08	5175.37
1227.57	5174.27
1468.45	5168.13
1500.4	5168.02
1601.92	5167.63
1775.26	5155.69
1775.26	5522.99

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 518
Number of Invalid Surfaces: 4303

Error Codes:

Error Code -108 reported for 22 surfaces
Error Code -111 reported for 2509 surfaces
Error Code -112 reported for 16 surfaces
Error Code -116 reported for 1756 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-116 = Not enough slices to analyze the surface Increase the number of slices in the job control in the modeler.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.68652

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	50.0261	97432.4	Cyclone Underflow	0	39	554.036	934.392	1153.88	0	1153.88
2	50.0261	271871	Cyclone Underflow	0	39	1829.51	3085.51	3810.28	0	3810.28
3	50.0261	445560	Cyclone Underflow	0	39	3022.48	5097.47	6294.86	0	6294.86
4	50.0261	619248	Cyclone Underflow	0	39	4215.44	7109.43	8779.42	0	8779.42
5	50.0261	792937	Cyclone Underflow	0	39	5408.41	9121.4	11264	0	11264
6	50.0261	966626	Cyclone Underflow	0	39	6601.4	11133.4	13748.6	0	13748.6
7	1.12325	23701.6	Liner Interface Zone	0	26.5	5119.91	8634.83	17350	31.1774	17318.8
8	63.369	1.27719e+006	Liner Interface Zone	0	26.5	5707.87	9626.44	19369.9	62.3547	19307.6
9	57.4662	1.0497e+006	Liner Interface Zone	0	26.5	5154.91	8693.86	17499.6	62.3583	17437.2
10	57.4662	946268	Liner Interface Zone	0	26.5	4626.75	7803.1	15713	62.3583	15650.6
11	57.4662	842833	Liner Interface Zone	0	26.5	4098.59	6912.35	13926.4	62.3583	13864
12	10.1889	138642	Liner Interface Zone	0	26.5	3787.56	6387.79	12874.2	62.3576	12811.9
13	63.358	789325	Liner Interface Zone	0	26.5	3450.05	5818.58	11732.6	62.3559	11670.3
14	6.66227	75711.8	Liner Interface Zone	0	26.5	3129.49	5277.95	10648.3	62.3581	10585.9
15	41.4898	440289	Liner Interface Zone	0	26.5	2908.36	4905.01	9900.29	62.3559	9837.93
16	60.2195	543166	Liner Interface Zone	0	26.5	2441.73	4118.02	8321.82	62.3594	8259.46
17	60.2195	429444	Liner Interface Zone	0	26.5	1887.56	3183.41	6447.29	62.3594	6384.93
18	60.2195	315723	Liner Interface Zone	0	26.5	1333.4	2248.8	4572.76	62.3594	4510.4
			Liner Interface							

			Zone							
20	31.9454	59717.2	Liner Interface Zone	0	26.5	345.09	582.001	1229.71	62.3993	1167.31
21	50.7606	27688.4	Liner Interface Zone	0	26.5	9.96282	16.8025	96.0997	62.3991	33.7006
22	50.7606	6091.28	Liner Interface Zone	0	26.5	14.4972	24.4499	111.438	62.3991	49.0388
23	62.898	13110.9	Liner Interface Zone	0	26.5	0	0	102.782	109.089	-6.30725
24	55.2228	27974.9	Foundation Materials	150	29	213.592	360.228	379.262	0	379.262
25	55.2228	30469.2	Foundation Materials	150	29	2490.45	4200.2	7306.76	0	7306.76

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.68652

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	568.826	5460	1.98387e-022	0	0
2	618.852	5414.12	-147187	14297.2	-5.54809
3	668.878	5368.23	-119420	11600	-5.54809
4	718.904	5322.35	-36557.4	3551.05	-5.54809
5	768.93	5276.46	101402	-9849.77	-5.54807
6	818.957	5230.58	294457	-28602.4	-5.54808
7	868.983	5184.69	542608	-52706.9	-5.54809
8	870.106	5183.66	553563	-53771	-5.54809
9	933.475	5181.95	142080	-13801.1	-5.54808
10	990.941	5180.47	-232631	22596.9	-5.54809
11	1048.41	5178.98	-607567	59016.7	-5.54808
12	1105.87	5177.5	-982726	95458.3	-5.54809
13	1116.06	5177.23	-1.04924e+006	101919	-5.54808
14	1179.42	5175.55	-1.46262e+006	142073	-5.54807
15	1186.08	5175.37	-1.50616e+006	146303	-5.5481
16	1227.57	5174.27	-1.77711e+006	172622	-5.5481
17	1287.79	5172.73	-2.17125e+006	210907	-5.54809
18	1348.01	5171.2	-2.56556e+006	249209	-5.54809
19	1408.23	5169.66	-2.96006e+006	287529	-5.54809
20	1468.45	5168.13	-3.35475e+006	325867	-5.54808
21	1500.4	5168.02	-3.56488e+006	346279	-5.54809
22	1551.16	5167.82	-3.79988e+006	369105	-5.54807
23	1601.92	5167.63	-3.80432e+006	369537	-5.54809
24	1664.82	5163.3	-3.87274e+006	376183	-5.54808
25	1720.04	5159.5	-3.93678e+006	382404	-5.54809
26	1775.26	5155.69	6.74534e-021	0	0

List Of Coordinates

Piezoline

X	Y
0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

Block Search Polyline

X	Y
1650.32	5165.28
1608.27	5167.61
1500.4	5168.02
1468.45	5168.13
1227.57	5174.27
1186.08	5175.37
1179.42	5175.55
1116.06	5177.23
1105.87	5177.5
933.475	5181.95
837.37	5184.54
823.107	5184.92

732.639	5187.36
696.805	5188.32
674.437	5188.92
647.545	5189.63
632.517	5190.03
595.395	5191.04
570.193	5191.45
535.401	5192.01
521.537	5192.24
518.618	5192.28
509.317	5192.41
474.418	5192.97
466.941	5193.08
437.521	5193.55
418.604	5193.82
407.909	5193.99
388.869	5194.29
362.969	5194.7
289.277	5195.79
261.362	5196.12
242.453	5196.34
227.348	5196.51
213.325	5196.67
200.27	5196.81
198.026	5196.84
185.964	5196.98
183.907	5197.01
172.729	5197.13
131.064	5197.72
129.194	5197.75
118.942	5197.86
117.225	5197.89
107.708	5198
61.8783	5198.65
60.3563	5198.67
51.8447	5198.77
50.4444	5198.79
42.5304	5198.88
0	5199.5

External Boundary

X	Y
0	4900
2400	4900
2400	5173.98

2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79
362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92

837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55
1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27
1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5

1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55
1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95
1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61

2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46
2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03
2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83

2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455
530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199

117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13
183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92
696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8

1675.27	5168.86
1680.63	5168.86

Material Boundary

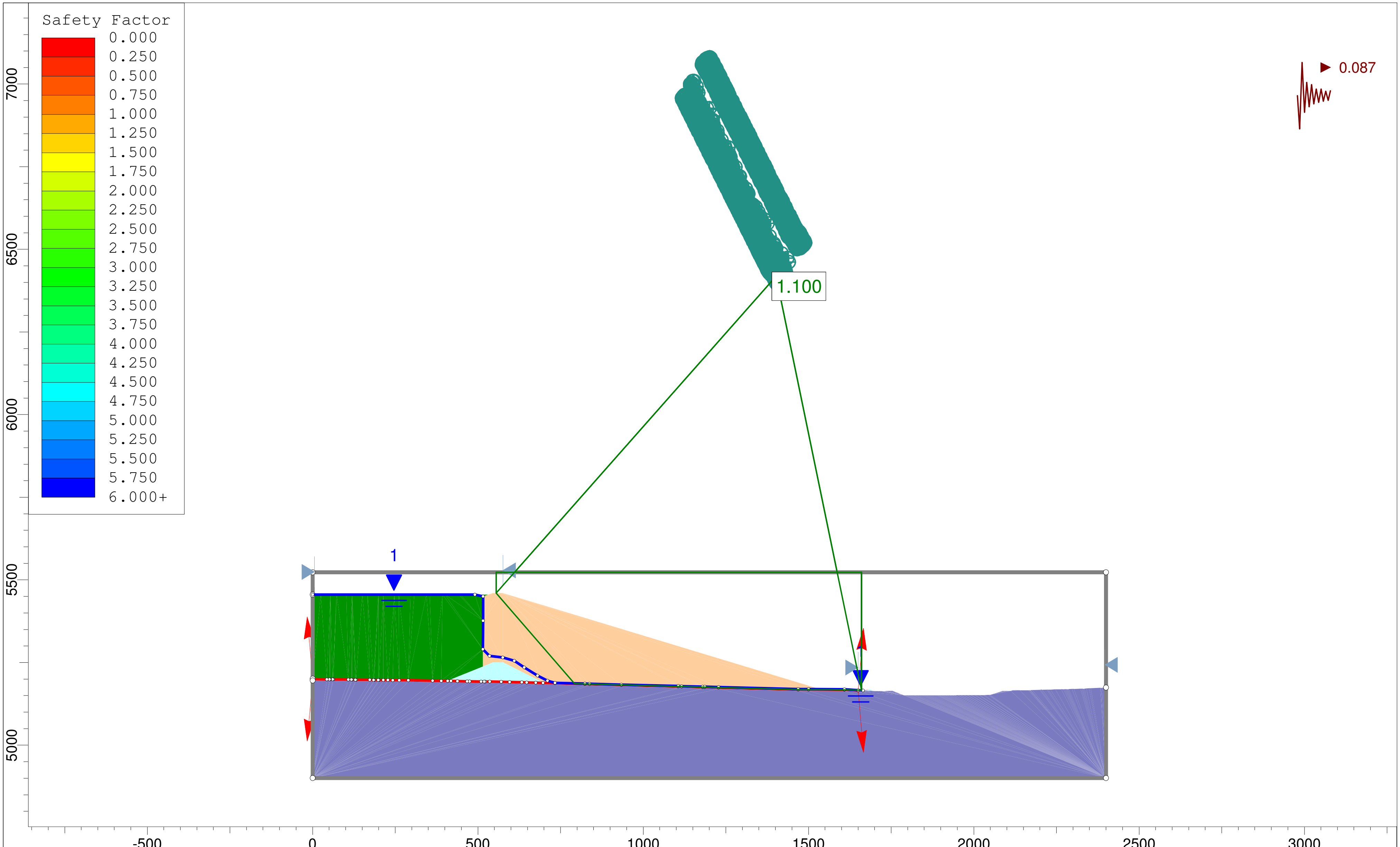
X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32



SLIDEINTERPRET 6.008

Project	Copper Flat
Analysis Description	Section A Stability: Downstream, Pseudo Static, Block Failure, Global
Drawn By GS	*Scale* 1:4820
Company	Golder Associates Inc.
Date 11/4/2013, 3:02:21 PM	*File Name* 3a - SectionA 5460R DS_PS_B_G_min_phi.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 3a - SectionA 5460R DS_PS_B_G_min_phi.slim
Last saved with Slide version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Pseudo Static, Block Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

> 103-92557
> Material Property Edits 12/2013
> Liner interface min phi=13.6deg

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

> Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	13.6	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

List Of Coordinates

Piezoline

X	Y

0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

Block Search Polyline

X	Y
1650.32	5165.28
1608.27	5167.61
1500.4	5168.02
1468.45	5168.13
1227.57	5174.27
1186.08	5175.37
1179.42	5175.55
1116.06	5177.23
1105.87	5177.5
933.475	5181.95
837.37	5184.54
823.107	5184.92
732.639	5187.36
696.805	5188.32
674.437	5188.92
647.545	5189.63
632.517	5190.03

595.395	5191.04
570.193	5191.45
535.401	5192.01
521.537	5192.24
518.618	5192.28
509.317	5192.41
474.418	5192.97
466.941	5193.08
437.521	5193.55
418.604	5193.82
407.909	5193.99
388.869	5194.29
362.969	5194.7
289.277	5195.79
261.362	5196.12
242.453	5196.34
227.348	5196.51
213.325	5196.67
200.27	5196.81
198.026	5196.84
185.964	5196.98
183.907	5197.01
172.729	5197.13
131.064	5197.72
129.194	5197.75
118.942	5197.86
117.225	5197.89
107.708	5198
61.8783	5198.65
60.3563	5198.67
51.8447	5198.77
50.4444	5198.79
42.5304	5198.88
0	5199.5

External Boundary

X	Y
0	4900
2400	4900
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79
362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55

1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27
1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55

1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95
1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46

2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03
2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455
530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13

183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92
696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

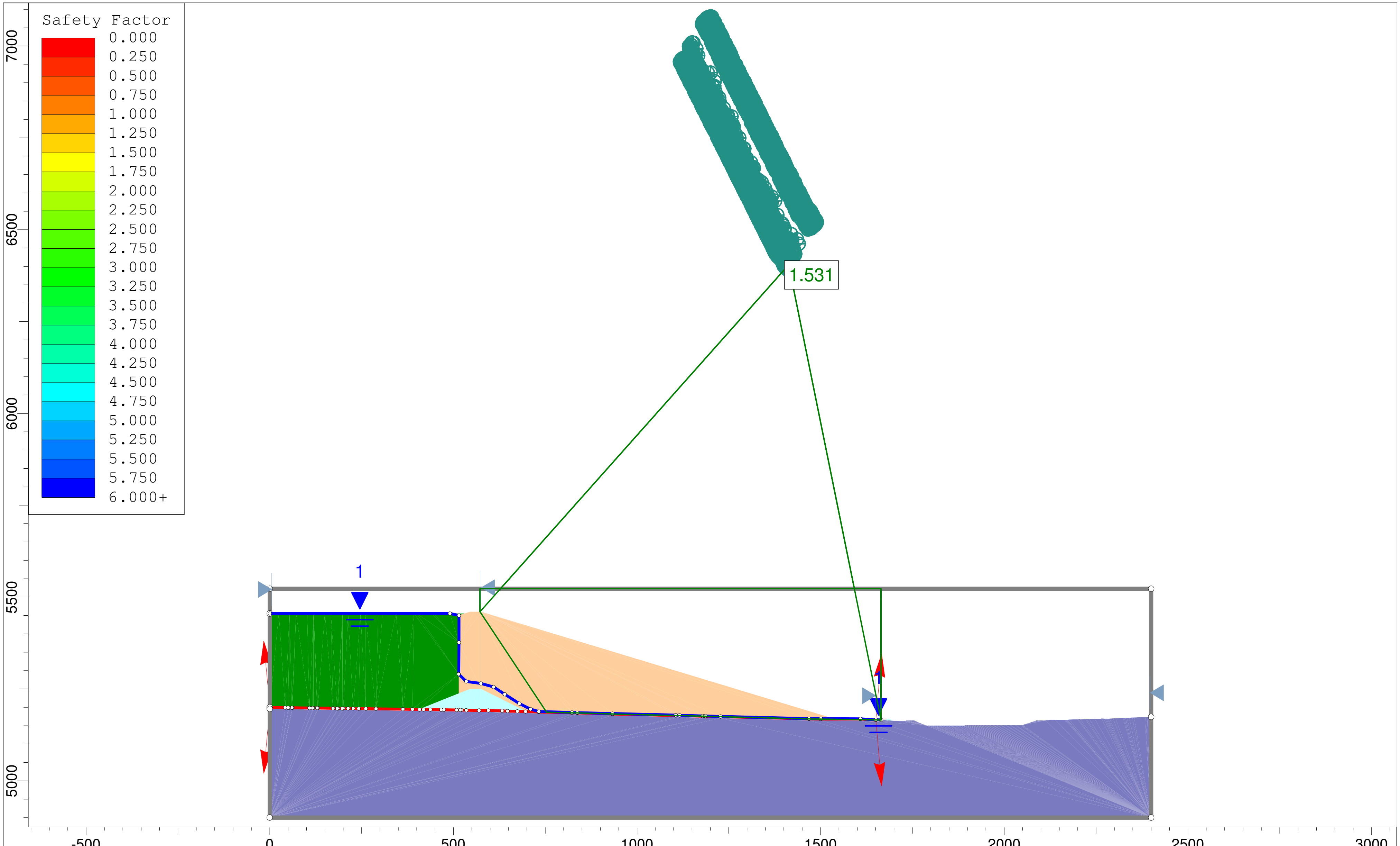
X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32



Project	Copper Flat		
Analysis Description	Section A Stability: Downstream, Static, Block Failure, Global		
Drawn By: GS	Scale: 1:4338	Company	Golder Associates Inc.
Date: 11/4/2013, 3:02:21 PM		File Name	3b - SectionA 5460R DS_S_B_G_min_phi.slim

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

File Name: 3b - SectionA 5460R DS_S_B_G_min_phi.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Static, Block Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

103-92557
Material Property Edits 12/2013
Liner Interface phi =13.6deg

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	13.6	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 1.530610
Axis Location: 1412.961, 6404.397
Left Slip Surface Endpoint: 572.648, 5460.000
Right Slip Surface Endpoint: 1664.291, 5165.509
Left Slope Intercept: 572.648 5522.990
Right Slope Intercept: 1664.291 5522.990
Resisting Moment=5.18841e+009 lb-ft

Driving Moment=3.38976e+009 lb-ft
Resisting Horizontal Force=3.37882e+006 lb
Driving Horizontal Force=2.20749e+006 lb

Global Minimum Coordinates

Method: spencer

X	Y
572.648	5460
753.658	5186.79
823.107	5184.92
837.37	5184.54
933.475	5181.95
1105.87	5177.5
1116.06	5177.23
1179.42	5175.55
1186.08	5175.37
1227.57	5174.27
1456.16	5168.44
1664.29	5165.51
1664.29	5522.99

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1279
Number of Invalid Surfaces: 3542

Error Codes:

Error Code -108 reported for 11 surfaces
Error Code -111 reported for 1763 surfaces
Error Code -112 reported for 12 surfaces
Error Code -116 reported for 1756 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-116 = Not enough slices to analyze the surface Increase the number of slices in the job control in the modeler.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.53061

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	45.0838	142718	Cyclone Underflow	0	39	872.365	1335.25	1648.9	0	1648.9
2	45.0838	419922	Cyclone Underflow	0	39	2833.01	4336.24	5354.81	0	5354.81
3	45.0838	696992	Cyclone Underflow	0	39	4722.56	7228.4	8926.34	0	8926.34
4	45.0838	974063	Cyclone Underflow	0	39	6612.14	10120.6	12497.8	0	12497.8
5	0.674563	16680.5	Liner Interface Zone	0	13.6	3447.02	5276.04	21839.8	31.1774	21808.6
6	69.4483	1.64551e+006	Liner Interface Zone	0	13.6	3646.43	5581.26	23132.6	62.3548	23070.2
7	14.2633	319322	Liner Interface Zone	0	13.6	3440.05	5265.38	21826.8	62.3568	21764.5
8	48.0526	1.02905e+006	Liner Interface Zone	0	13.6	3286.15	5029.81	20853.1	62.3547	20790.8
9	48.0526	957013	Liner Interface Zone	0	13.6	3049.14	4667.05	19353.6	62.3547	19291.3
10	57.4662	1.0497e+006	Liner Interface Zone	0	13.6	2788.59	4268.24	17705.2	62.3583	17642.8
11	57.4662	946268	Liner Interface Zone	0	13.6	2504.03	3832.69	15904.8	62.3583	15842.4
12	57.4662	842833	Liner Interface Zone	0	13.6	2219.46	3397.13	14104.4	62.3583	14042.1
13	10.1889	138642	Liner Interface Zone	0	13.6	2051.94	3140.72	13044.6	62.3576	12982.2
14	63.358	789325	Liner Interface Zone	0	13.6	1870.22	2862.57	11894.8	62.3559	11832.4
15	6.66227	75711.8	Liner Interface Zone	0	13.6	1697.36	2597.99	10801.2	62.3581	10738.8
16	41.4898	440289	Liner Interface Zone	0	13.6	1578.34	2415.83	10048.2	62.3559	9985.82
17	45.7181	422762	Liner Interface Zone	0	13.6	1362.68	2085.73	8683.74	62.3594	8621.38
18	45.7181	357216	Liner Interface Zone	0	13.6	1136.02	1738.8	7249.7	62.3594	7187.34
19	45.7181	291670	Liner Interface Zone	0	13.6	909.35	1391.86	5815.63	62.3594	5753.27
20	45.7181	226124	Liner Interface Zone	0	13.6	682.689	1044.93	4381.59	62.3594	4319.23
21	45.7181	160579	Liner Interface Zone	0	13.6	456.025	697.997	2947.52	62.3594	2885.17
			Liner Interface							

			Zone							
23	52.032	22869.3	Liner Interface Zone	0	13.6	5.72276	8.75932	132.838	96.6312	36.2067
24	52.032	12959.2	Liner Interface Zone	0	13.6	16.2967	24.9439	233.108	130.003	103.105
25	52.032	6697.29	Liner Interface Zone	0	13.6	1011.39	1548.04	6465.57	66.7275	6398.84

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.53061

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	572.648	5460	1.98387e-022	0	0
2	617.732	5391.95	-106388	9073.38	-4.87472
3	662.816	5323.9	59899.5	-5108.59	-4.87473
4	707.9	5255.86	372435	-31763.5	-4.87473
5	752.984	5187.81	831219	-70891.4	-4.87474
6	753.658	5186.79	849640	-72462.5	-4.87474
7	823.107	5184.92	472351	-40285	-4.87474
8	837.37	5184.54	393696	-33576.8	-4.87474
9	885.422	5183.25	126906	-10823.3	-4.87473
10	933.475	5181.95	-143674	12253.4	-4.87474
11	990.941	5180.47	-473336	40368.9	-4.87473
12	1048.41	5178.98	-808251	68932.5	-4.87473
13	1105.87	5177.5	-1.14842e+006	97944.2	-4.87473
14	1116.06	5177.23	-1.20925e+006	103132	-4.87473
15	1179.42	5175.55	-1.59087e+006	135679	-4.87473
16	1186.08	5175.37	-1.63143e+006	139138	-4.87473
17	1227.57	5174.27	-1.88531e+006	160790	-4.87472
18	1273.29	5173.1	-2.16872e+006	184961	-4.87472
19	1319.01	5171.94	-2.45542e+006	209413	-4.87473
20	1364.73	5170.77	-2.74542e+006	234146	-4.87473
21	1410.44	5169.6	-3.03871e+006	259160	-4.87474
22	1456.16	5168.44	-3.3353e+006	284454	-4.87472
23	1508.2	5167.71	-3.67744e+006	313635	-4.87474
24	1560.23	5166.97	-3.86453e+006	329590	-4.87473
25	1612.26	5166.24	-3.87412e+006	330409	-4.87474
26	1664.29	5165.51	6.38965e-021	0	0

List Of Coordinates

Piezoline

X	Y

0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

Block Search Polyline

X	Y
1650.32	5165.28
1608.27	5167.61
1500.4	5168.02
1468.45	5168.13
1227.57	5174.27
1186.08	5175.37
1179.42	5175.55
1116.06	5177.23
1105.87	5177.5
933.475	5181.95
837.37	5184.54
823.107	5184.92
732.639	5187.36
696.805	5188.32
674.437	5188.92
647.545	5189.63
632.517	5190.03

595.395	5191.04
570.193	5191.45
535.401	5192.01
521.537	5192.24
518.618	5192.28
509.317	5192.41
474.418	5192.97
466.941	5193.08
437.521	5193.55
418.604	5193.82
407.909	5193.99
388.869	5194.29
362.969	5194.7
289.277	5195.79
261.362	5196.12
242.453	5196.34
227.348	5196.51
213.325	5196.67
200.27	5196.81
198.026	5196.84
185.964	5196.98
183.907	5197.01
172.729	5197.13
131.064	5197.72
129.194	5197.75
118.942	5197.86
117.225	5197.89
107.708	5198
61.8783	5198.65
60.3563	5198.67
51.8447	5198.77
50.4444	5198.79
42.5304	5198.88
0	5199.5

External Boundary

X	Y
0	4900
2400	4900
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79
362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55

1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27
1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55

1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95
1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46

2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03
2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455
530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13

183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92
696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

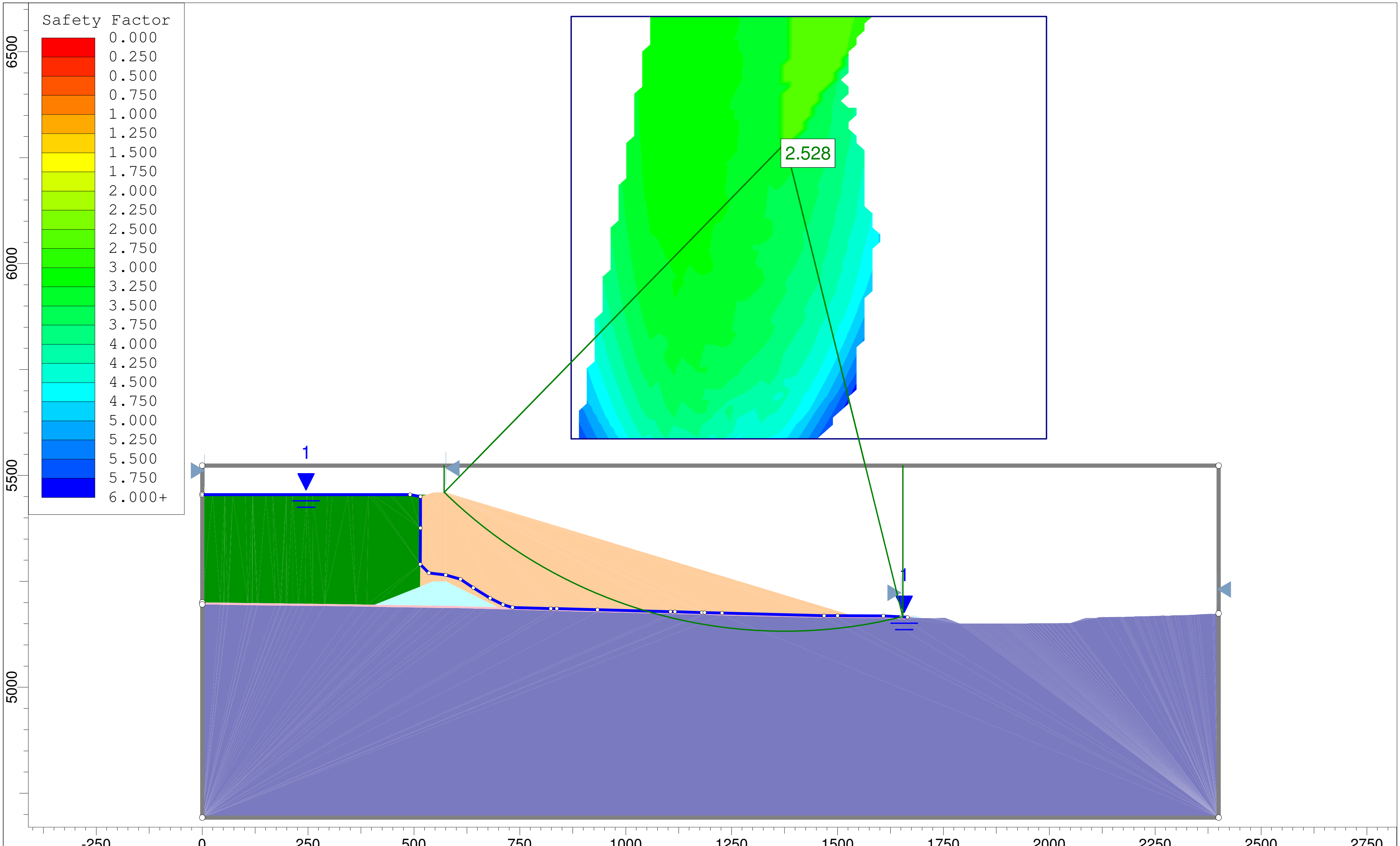
X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32



rocscience SLIDEINTERPRET 6.008	*Project* Copper Flat		
	Analysis Description Section A Stability: Downstream, Static, Circular Failure, Global		
	Drawn By GS	*Scale* 1:3762	*Company* Golder Associates Inc.
	Date 11/4/2013, 3:02:21 PM		*File Name* 4a - SectionA 5460R DS_S_C_G.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 4a - SectionA 5460R DS_S_C_G.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Static, Circular Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	26.5	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 2.527760
Center: 1376.188, 6284.432
Radius: 1152.416
Left Slip Surface Endpoint: 570.971, 5460.000
Right Slip Surface Endpoint: 1654.244, 5166.064
Left Slope Intercept: 570.971 5522.990
Right Slope Intercept: 1654.244 5522.990
Resisting Moment=8.33108e+009 lb-ft
Driving Moment=3.29583e+009 lb-ft
Resisting Horizontal Force=6.7452e+006 lb

Driving Horizontal Force=2.66845e+006 lb

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 11730
Number of Invalid Surfaces: 29201

Error Codes:

Error Code -101 reported for 408 surfaces
Error Code -103 reported for 2326 surfaces
Error Code -108 reported for 4317 surfaces
Error Code -110 reported for 440 surfaces
Error Code -111 reported for 3813 surfaces
Error Code -1000 reported for 17897 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.52776

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	47.6079	86369.8	Cyclone Underflow	0	39	377.216	953.512	1177.49	0	1177.49
2	47.6079	233141	Cyclone Underflow	0	39	1249.89	3159.43	3901.57	0	3901.57
3	47.6079	356305	Cyclone Underflow	0	39	1954.83	4941.33	6102.03	0	6102.03
4	47.6079	458937	Cyclone Underflow	0	39	2561.02	6473.65	7994.29	0	7994.29
5	47.6079	543134	Cyclone Underflow	0	39	3074.2	7770.84	9596.18	0	9596.18

6	47.6079	610541	Cyclone Underflow	0	39	3499.06	8844.78	10922.4	0	10922.4
7	47.6079	662469	Cyclone Underflow	0	39	3839.45	9705.2	11984.9	0	11984.9
8	47.6079	699974	Cyclone Underflow	0	39	4098.49	10360	12793.5	0	12793.5
9	47.6079	723916	Cyclone Underflow	0	39	4278.69	10815.5	13356	0	13356
10	47.6079	734997	Cyclone Underflow	0	39	4381.94	11076.5	13678.4	0	13678.4
11	19.0295	294789	Liner Interface Zone	0	26.5	2816.41	7119.2	14434.9	155.948	14278.9
12	43.9418	677489	Foundation Materials	150	29	3185.32	8051.73	14255.1	0	14255.1
13	43.9418	666065	Foundation Materials	150	29	3142.02	7942.28	14057.7	0	14057.7
14	43.9418	645159	Foundation Materials	150	29	3052.52	7716.04	13649.5	0	13649.5
15	43.9418	614993	Foundation Materials	150	29	2917.32	7374.28	13032.9	0	13032.9
16	43.9418	575744	Foundation Materials	150	29	2736.7	6917.73	12209.3	0	12209.3
17	43.9418	527526	Foundation Materials	150	29	2510.7	6346.44	11178.7	0	11178.7
18	43.9418	470419	Foundation Materials	150	29	2239.12	5659.95	9940.21	0	9940.21
19	43.9418	404462	Foundation Materials	150	29	1921.59	4857.32	8492.24	0	8492.24
20	43.9418	329659	Foundation Materials	150	29	1557.52	3937.03	6831.97	0	6831.97
21	43.9418	246078	Foundation Materials	150	29	1146.59	2898.3	4958.07	0	4958.07
22	43.9418	156715	Foundation Materials	150	29	744.157	1881.05	3122.9	0	3122.9
23	43.9418	104701	Foundation Materials	150	29	581.701	1470.4	2382.07	0	2382.07
24	43.9418	56711	Foundation Materials	150	29	328.326	829.93	1226.63	0	1226.63
25	16.9217	5084.26	Liner Interface Zone	0	26.5	4370.71	11048.1	22314.9	155.762	22159.1

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.52776

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	570.971	5460	1.98387e-022	0	0
2	618.579	5416.05	-146707	13731.9	-5.34735

3	666.187	5376.71	-127700	11952.8	-5.34734
4	713.795	5341.41	-93307	8733.58	-5.34733
5	761.402	5309.7	-62718.8	5870.51	-5.34733
6	809.01	5281.25	-50008.5	4680.82	-5.34733
7	856.618	5255.79	-65397.2	6121.21	-5.34733
8	904.226	5233.09	-116109	10867.9	-5.34735
9	951.834	5212.99	-206964	19371.9	-5.34732
10	999.442	5195.34	-340792	31898.3	-5.34733
11	1047.05	5180.02	-518731	48553.5	-5.34734
12	1066.08	5174.52	-568159	53179.9	-5.34733
13	1110.02	5163.18	-727759	68118.6	-5.34733
14	1153.96	5153.65	-924346	86519.3	-5.34734
15	1197.9	5145.89	-1.15617e+006	108218	-5.34733
16	1241.85	5139.87	-1.42056e+006	132965	-5.34733
17	1285.79	5135.57	-1.71391e+006	160423	-5.34734
18	1329.73	5132.95	-2.03175e+006	190173	-5.34734
19	1373.67	5132.02	-2.36865e+006	221707	-5.34734
20	1417.61	5132.76	-2.71825e+006	254430	-5.34734
21	1461.56	5135.18	-3.07316e+006	287649	-5.34733
22	1505.5	5139.29	-3.42492e+006	320574	-5.34733
23	1549.44	5145.11	-3.67939e+006	344392	-5.34732
24	1593.38	5152.67	-3.72663e+006	348815	-5.34734
25	1637.32	5161.99	-3.78937e+006	354686	-5.34732
26	1654.24	5166.06	6.3698e-021	0	0

List Of Coordinates

Piezoline

X	Y
0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5

1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

External Boundary

X	Y
-0.000101814	4692.74
2400	4692.74
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79

362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55
1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27

1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55
1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95

1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46
2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03

2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455

530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13
183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92

696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

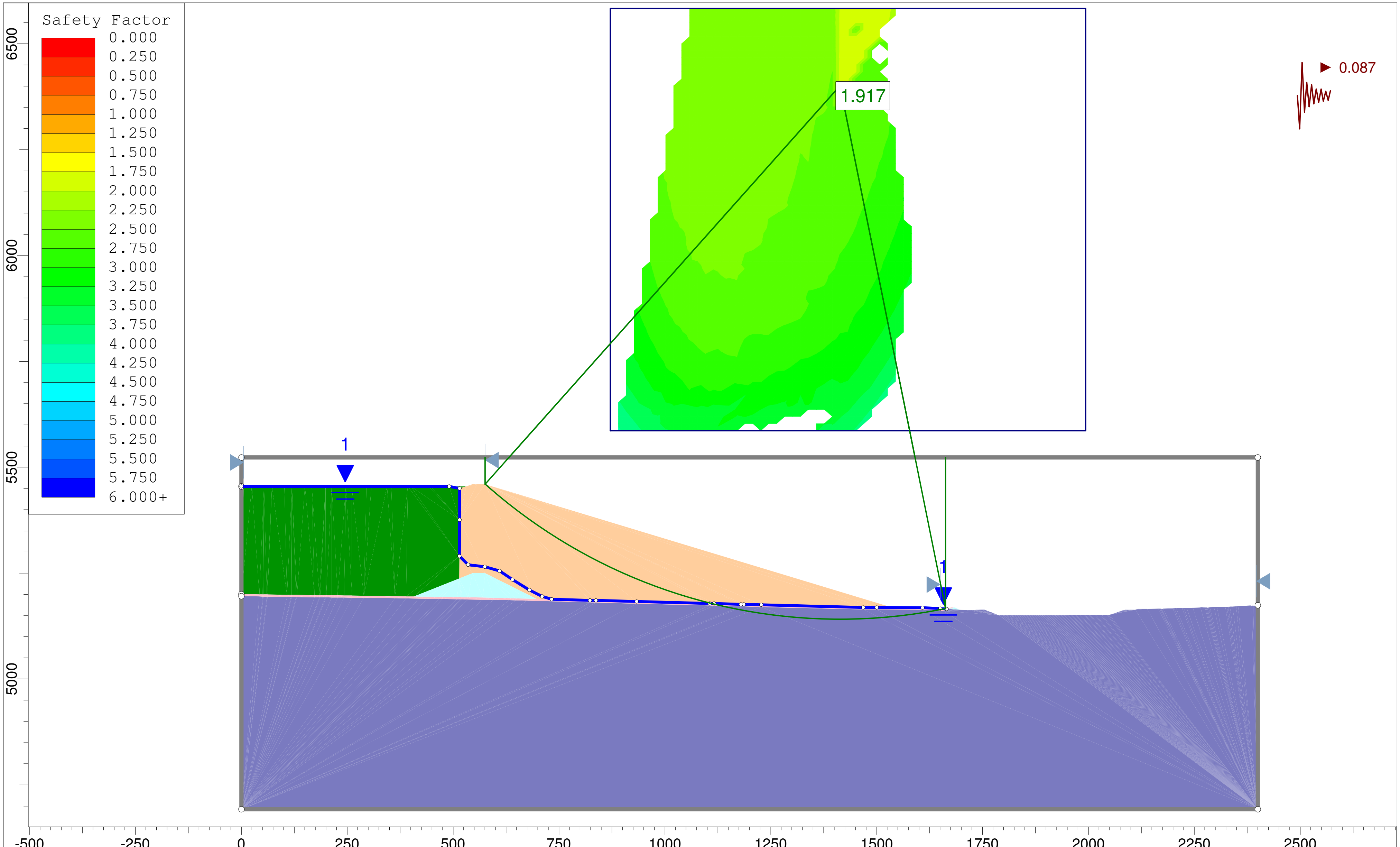
X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32



SLIDEINTERPRET 6.008

Project Copper Flat

Analysis Description Section A Stability: Downstream, Pseudo Static, Circular Failure, Global

Drawn By GS | *Scale* 1:3762 | *Company* Golder Associates Inc.

Date 11/4/2013, 3:02:21 PM | *File Name* 5a - SectionA 5460R DS_PS_C_G.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 5a - SectionA 5460R DS_PS_C_G.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Pseudo Static, Circular Failure, Global
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	26.5	
Tau/Sigma Ratio						0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 1.916600
Center: 1413.608, 6400.750
Radius: 1259.972
Left Slip Surface Endpoint: 575.445, 5460.000

Right Slip Surface Endpoint: 1662.506, 5165.607
Left Slope Intercept: 575.445 5522.990
Right Slope Intercept: 1662.506 5522.990
Resisting Moment=7.97722e+009 lb-ft
Driving Moment=4.16218e+009 lb-ft
Resisting Horizontal Force=5.93993e+006 lb
Driving Horizontal Force=3.0992e+006 lb

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 10557
Number of Invalid Surfaces: 30374

Error Codes:

Error Code -101 reported for 408 surfaces
Error Code -103 reported for 2326 surfaces
Error Code -108 reported for 4489 surfaces
Error Code -110 reported for 440 surfaces
Error Code -111 reported for 4814 surfaces
Error Code -1000 reported for 17897 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.9166

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	44.3652	60862.7	Cyclone Underflow	0	39	321.259	615.725	760.358	0	760.358
2	44.3652	174209	Cyclone Underflow	0	39	1244.73	2385.64	2946.02	0	2946.02
			Cyclone							

			Underflow							
4	44.3652	354600	Cyclone Underflow	0	39	2655.19	5088.94	6284.31	0	6284.31
5	44.3652	424335	Cyclone Underflow	0	39	3230.76	6192.08	7646.58	0	7646.58
6	44.3652	481812	Cyclone Underflow	0	39	3723.19	7135.87	8812.07	0	8812.07
7	44.3652	527840	Cyclone Underflow	0	39	4134.48	7924.15	9785.52	0	9785.52
8	44.3652	563095	Cyclone Underflow	0	39	4466.28	8560.07	10570.8	0	10570.8
9	44.3652	588143	Cyclone Underflow	0	39	4719.87	9046.11	11171	0	11171
10	44.3652	603459	Cyclone Underflow	0	39	4896.24	9384.13	11588.4	0	11588.4
11	44.3652	609444	Cyclone Underflow	0	39	4996.03	9575.4	11824.6	0	11824.6
12	44.3652	606436	Cyclone Underflow	0	39	5019.62	9620.6	11880.4	0	11880.4
13	23.4132	316539	Liner Interface Zone	0	26.5	3196.81	6127.01	12445	156.077	12288.9
14	46.4639	615182	Foundation Materials	150	29	3573.33	6848.64	12084.7	0	12084.7
15	46.4639	590270	Foundation Materials	150	29	3445.2	6603.07	11641.7	0	11641.7
16	46.4639	555377	Foundation Materials	150	29	3255.27	6239.06	10985	0	10985
17	46.4639	510675	Foundation Materials	150	29	3003.43	5756.37	10114.2	0	10114.2
18	46.4639	456280	Foundation Materials	150	29	2689.22	5154.15	9027.73	0	9027.73
19	46.4639	392275	Foundation Materials	150	29	2311.95	4431.08	7723.26	0	7723.26
20	46.4639	318701	Foundation Materials	150	29	1870.65	3585.29	6197.43	0	6197.43
21	46.4639	235654	Foundation Materials	150	29	1364.61	2615.41	4447.71	0	4447.71
22	46.4639	146214	Foundation Materials	150	29	861.912	1651.94	2709.57	0	2709.57
23	46.4639	98503.8	Foundation Materials	150	29	693.875	1329.88	2128.55	0	2128.55
24	46.4639	56028.4	Foundation Materials	150	29	408.79	783.486	1142.84	0	1142.84
25	20.1633	6058.23	Liner Interface Zone	0	26.5	4794.2	9188.57	18585.2	155.762	18429.4

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.9166

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	575.445	5460	1.98387e-022	0	0
2	619.81	5422.28	-162525	15041.2	-5.28749
3	664.175	5387.89	-170970	15822.8	-5.2875
4	708.54	5356.52	-168647	15607.8	-5.2875
5	752.906	5327.9	-167853	15534.3	-5.28749
6	797.271	5301.82	-178146	16486.9	-5.2875
7	841.636	5278.09	-206894	19147.4	-5.28749
8	886.001	5256.57	-259659	24030.7	-5.2875
9	930.366	5237.13	-340500	31512.3	-5.2875
10	974.731	5219.68	-452179	41847.8	-5.28749
11	1019.1	5204.13	-596323	55187.9	-5.28749
12	1063.46	5190.41	-773548	71589.6	-5.2875
13	1107.83	5178.45	-983538	91023.5	-5.28749
14	1131.24	5172.83	-1.06166e+006	98253.7	-5.2875
15	1177.7	5163.06	-1.26537e+006	117106	-5.28748
16	1224.17	5155.1	-1.50305e+006	139103	-5.2875
17	1270.63	5148.92	-1.77205e+006	163998	-5.28749
18	1317.1	5144.48	-2.06868e+006	191450	-5.28749
19	1363.56	5141.77	-2.38827e+006	221027	-5.28749
20	1410.02	5140.78	-2.7251e+006	252200	-5.28749
21	1456.49	5141.51	-3.07236e+006	284338	-5.2875
22	1502.95	5143.95	-3.42212e+006	316707	-5.28749
23	1549.42	5148.12	-3.68084e+006	340651	-5.2875
24	1595.88	5154.03	-3.72095e+006	344363	-5.28749
25	1642.34	5161.71	-3.78664e+006	350442	-5.28749
26	1662.51	5165.61	6.38612e-021	0	0

List Of Coordinates

Piezoline

X	Y
0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195

732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

External Boundary

X	Y
-0.000101814	4692.74
2400	4692.74
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81

213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79
362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55
1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164

1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27
1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55
1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85

1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95
1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46
2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42

2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03
2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455

441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455
530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13
183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01

570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92
696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

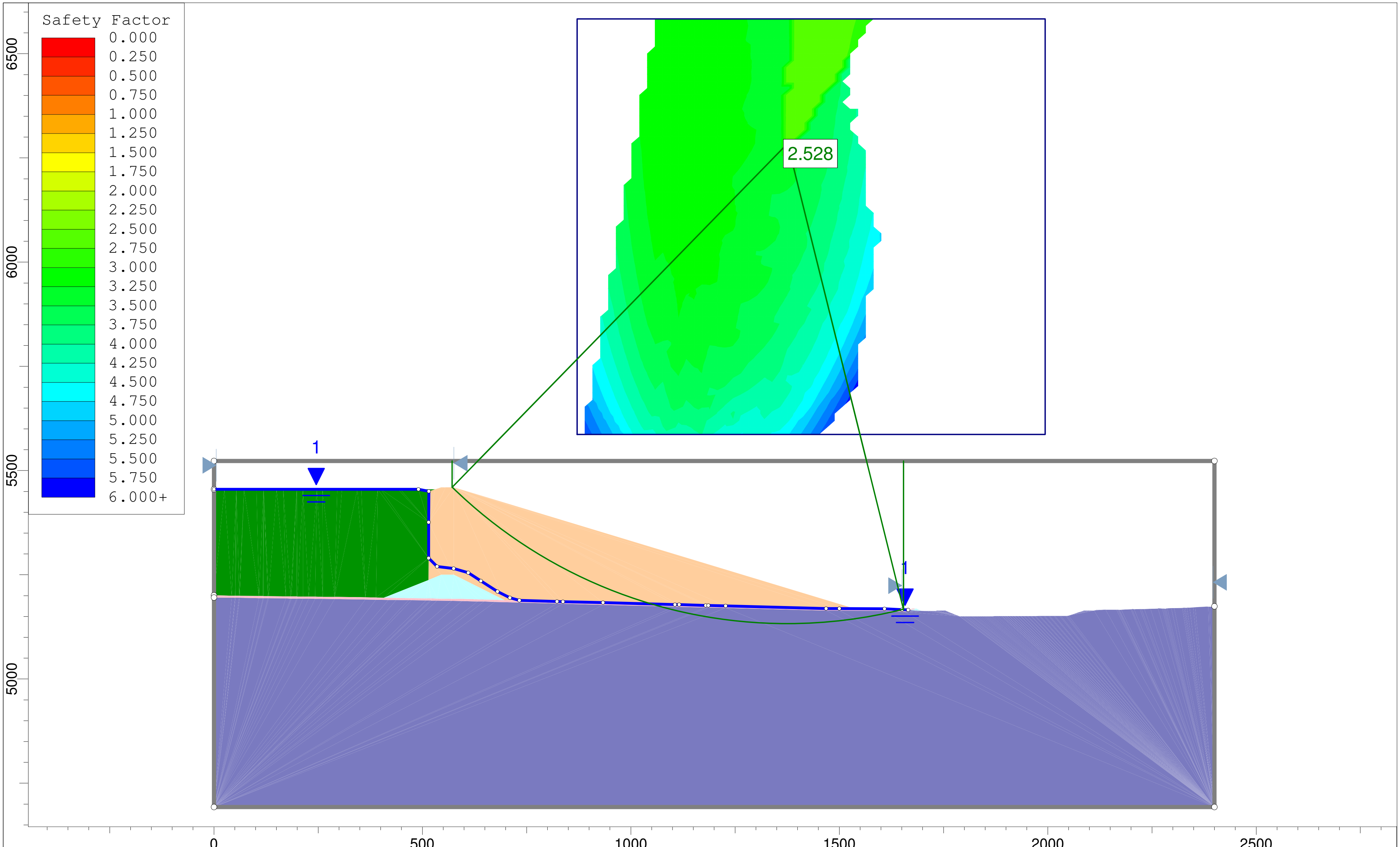
Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63

545.445	5250
575.445	5250
696.805	5189.32



Project	Copper Flat		
Analysis Description	Section A Stability: Downstream, Static, Block Failure, Global, Post Liquefaction Strength		
Drawn By GS	*Scale* 1:3822	*Company*	Golder Associates Inc.
Date 11/4/2013, 3:02:21 PM		*File Name*	6a - SectionA 5460R DS_S_C_G_postliq.slim

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

File Name: 6a - SectionA 5460R DS_S_C_G_postliq.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section A Stability: Downstream, Static, Block Failure, Global, Post Liquefaction Strength
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 3:02:21 PM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Cyclone Overflow
Color						
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	108
Cohesion [psf]		0	0	150	0	
Friction Angle [deg]		39	29	29	26.5	
Tau/Sigma Ratio						0.05
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated	Automatically Calculated
Ru Value	0		0	0		

Global Minimums

Method: spencer

FS: 2.527620
Center: 1376.188, 6284.432
Radius: 1152.416
Left Slip Surface Endpoint: 570.971, 5460.000
Right Slip Surface Endpoint: 1654.244, 5166.064
Left Slope Intercept: 570.971 5522.990
Right Slope Intercept: 1654.244 5522.990
Resisting Moment=8.3306e+009 lb-ft
Driving Moment=3.29583e+009 lb-ft
Resisting Horizontal Force=6.74519e+006 lb

Driving Horizontal Force=2.6686e+006 lb

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 11802
Number of Invalid Surfaces: 29129

Error Codes:

Error Code -101 reported for 408 surfaces
Error Code -103 reported for 2326 surfaces
Error Code -108 reported for 4262 surfaces
Error Code -110 reported for 440 surfaces
Error Code -111 reported for 3796 surfaces
Error Code -1000 reported for 17897 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.52762

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	47.6079	86369.8	Cyclone Underflow	0	39	377.344	953.782	1177.82	0	1177.82
2	47.6079	233141	Cyclone Underflow	0	39	1249.93	3159.35	3901.47	0	3901.47
3	47.6079	356305	Cyclone Underflow	0	39	1954.88	4941.2	6101.88	0	6101.88
4	47.6079	458937	Cyclone Underflow	0	39	2561.11	6473.51	7994.12	0	7994.12
5	47.6079	543134	Cyclone Underflow	0	39	3074.33	7770.73	9596.06	0	9596.06

6	47.6079	610541	Cyclone Underflow	0	39	3499.23	8844.72	10922.3	0	10922.3
7	47.6079	662469	Cyclone Underflow	0	39	3839.67	9705.22	11984.9	0	11984.9
8	47.6079	699974	Cyclone Underflow	0	39	4098.76	10360.1	12793.7	0	12793.7
9	47.6079	723916	Cyclone Underflow	0	39	4279.01	10815.7	13356.3	0	13356.3
10	47.6079	734997	Cyclone Underflow	0	39	4382.34	11076.9	13678.8	0	13678.8
11	19.0295	294789	Liner Interface Zone	0	26.5	2816.62	7119.35	14435.1	155.948	14279.2
12	43.9418	677489	Foundation Materials	150	29	3185.59	8051.96	14255.5	0	14255.5
13	43.9418	666065	Foundation Materials	150	29	3142.32	7942.59	14058.2	0	14058.2
14	43.9418	645159	Foundation Materials	150	29	3052.84	7716.42	13650.2	0	13650.2
15	43.9418	614993	Foundation Materials	150	29	2917.65	7374.71	13033.7	0	13033.7
16	43.9418	575744	Foundation Materials	150	29	2737.05	6918.22	12210.2	0	12210.2
17	43.9418	527526	Foundation Materials	150	29	2511.05	6346.98	11179.6	0	11179.6
18	43.9418	470419	Foundation Materials	150	29	2239.47	5660.53	9941.26	0	9941.26
19	43.9418	404462	Foundation Materials	150	29	1921.94	4857.93	8493.33	0	8493.33
20	43.9418	329659	Foundation Materials	150	29	1557.85	3937.65	6833.1	0	6833.1
21	43.9418	246078	Foundation Materials	150	29	1146.9	2898.93	4959.21	0	4959.21
22	43.9418	156715	Foundation Materials	150	29	744.38	1881.51	3123.73	0	3123.73
23	43.9418	104701	Foundation Materials	150	29	581.769	1470.49	2382.23	0	2382.23
24	43.9418	56711	Foundation Materials	150	29	328.39	830.044	1226.83	0	1226.83
25	16.9217	5084.26	Liner Interface Zone	0	26.5	4364.66	11032.2	22282.9	155.762	22127.2

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.52762

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	570.971	5460	1.98387e-022	0	0
2	618.579	5416.05	-146699	13710.3	-5.33928

3	666.187	5376.71	-127697	11934.4	-5.33928
4	713.795	5341.41	-93312.8	8720.9	-5.33928
5	761.402	5309.7	-62734.3	5863.08	-5.33929
6	809.01	5281.25	-50034.2	4676.14	-5.33929
7	856.618	5255.79	-65433.1	6115.3	-5.33929
8	904.226	5233.09	-116155	10855.7	-5.33928
9	951.834	5212.99	-207020	19347.9	-5.3393
10	999.442	5195.34	-340860	31856.3	-5.33927
11	1047.05	5180.02	-518810	48487.4	-5.33929
12	1066.08	5174.52	-568241	53107.1	-5.33928
13	1110.02	5163.18	-727848	68023.8	-5.33929
14	1153.96	5153.65	-924444	86397.4	-5.33928
15	1197.9	5145.89	-1.15628e+006	108064	-5.33926
16	1241.85	5139.87	-1.42067e+006	132774	-5.33928
17	1285.79	5135.57	-1.71404e+006	160192	-5.33928
18	1329.73	5132.95	-2.03189e+006	189898	-5.33929
19	1373.67	5132.02	-2.36881e+006	221386	-5.33928
20	1417.61	5132.76	-2.71843e+006	254061	-5.33928
21	1461.56	5135.18	-3.07335e+006	287232	-5.33929
22	1505.5	5139.29	-3.42512e+006	320108	-5.33929
23	1549.44	5145.11	-3.67961e+006	343892	-5.33929
24	1593.38	5152.67	-3.72686e+006	348308	-5.33929
25	1637.32	5161.99	-3.7896e+006	354171	-5.33928
26	1654.24	5166.06	6.3698e-021	0	0

List Of Coordinates

Piezoline

X	Y
0	5455
490.734	5455
515.445	5450
515.2	5376
514.77	5289.93
535	5270
575	5265
610	5255
640	5235
680	5210
710	5195
732.639	5188.36
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5

1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47

External Boundary

X	Y
-0.000101814	4692.74
2400	4692.74
2400	5173.98
2400	5522.99
0	5522.99
0	5455
0	5200.5
0	5195.5

Material Boundary

X	Y
0	5195.5
42.4655	5194.88
50.3797	5194.79
51.7799	5194.77
60.2917	5194.67
61.8068	5194.65
107.644	5194
117.161	5193.89
118.878	5193.87
129.13	5193.75
130.993	5193.72
172.665	5193.13
183.844	5193.01
185.901	5192.98
197.963	5192.84
200.207	5192.81
213.269	5192.67
227.292	5192.51
242.397	5192.34
261.303	5192.12
289.21	5191.79

362.895	5190.7
388.79	5190.29
418.529	5189.82
437.446	5189.55
466.866	5189.08
474.342	5188.97
509.241	5188.41
518.548	5188.28
521.461	5188.24
535.319	5188.01
570.113	5187.45
595.286	5187.04
632.38	5186.03
647.412	5185.63
674.306	5184.92
822.972	5180.92
837.238	5180.55
933.343	5177.96
1105.74	5173.5
1115.93	5173.23
1179.29	5171.55
1185.95	5171.38
1227.44	5170.27
1468.38	5164.13
1500.38	5164.02
1608.12	5163.61
1657.48	5160.88
1670.47	5165.17
1672.7	5165.9
1675.59	5166.86
1680.63	5166.86
1680.63	5168.86
1685.27	5168.86
1688.99	5167
1692.54	5165.23
1695.8	5163.83
1708.19	5163.3
1719.82	5162.97
1727.18	5162.95
1731.2	5162.93
1734.43	5164
1745.27	5164
1754.46	5164
1769.87	5157.85
1778.92	5154.23
1783.82	5152.27

1788.35	5150.47
1789.76	5150.47
1794.29	5150.46
1798.56	5150.46
1800.71	5150.46
1804.88	5150.46
1807.87	5150.46
1811.79	5150.46
1816.58	5150.46
1819.25	5150.47
1822.8	5150.47
1827.21	5150.47
1831.13	5150.48
1835.72	5150.49
1840.51	5150.49
1844.97	5150.5
1848.9	5150.51
1852.34	5150.52
1855.93	5150.53
1859.66	5150.54
1863.56	5150.55
1867.64	5150.56
1871.9	5150.57
1876.36	5150.59
1881.03	5150.6
1885.93	5150.62
1889.81	5150.64
1891.08	5150.64
1895.17	5150.66
1896.49	5150.67
1900.82	5150.68
1902.18	5150.69
1906.77	5150.71
1908.19	5150.72
1913.04	5150.74
1914.52	5150.75
1919.68	5150.77
1921.22	5150.78
1926.7	5150.81
1928.31	5150.82
1934.14	5150.85
1935.83	5150.86
1942.04	5150.89
1943.81	5150.9
1950.44	5150.94
1952.31	5150.95

1959.4	5151
1961.37	5151.01
1968.96	5151.06
1971.06	5151.07
1979.2	5151.12
1981.43	5151.14
1990.18	5151.2
1992.56	5151.22
2001.99	5151.28
2004.53	5151.3
2014.73	5151.37
2017.46	5151.39
2028.5	5151.48
2031.44	5151.5
2043.44	5151.59
2046.62	5151.61
2049.97	5151.64
2058.45	5154.47
2063.14	5156.03
2073.87	5159.6
2079.42	5161.46
2087.05	5164
2097.36	5164
2111.05	5164
2115.66	5165.28
2117.08	5165.67
2123.79	5165.76
2138.52	5166
2164.62	5166.2
2167.74	5166.23
2170.31	5166.24
2171.83	5166.27
2176.22	5166.42
2199.06	5167.14
2202.11	5167.23
2205.69	5167.35
2207.13	5167.37
2221.2	5167.76
2224.83	5167.83
2231.54	5168
2246.4	5168.42
2264.49	5168.76
2267.13	5168.9
2271.07	5168.97
2274.87	5169.01
2277.68	5169.03

2280.46	5169.04
2283.27	5169.13
2286.68	5169.27
2296.4	5169.81
2303.08	5170.12
2323.1	5170.72
2326.63	5170.79
2329.88	5170.83
2333.96	5170.96
2340.37	5171.27
2348.81	5171.75
2353.59	5172
2382.36	5173.52
2385.05	5173.4
2388.88	5173.53
2393.87	5173.83
2396.71	5174
2400	5173.98

Material Boundary

X	Y
0	5455
5.2718	5455
24.9095	5455
53.5041	5455
72.0583	5455
101.782	5455
119.16	5455
150.112	5455
166.208	5455
198.502	5455
213.195	5455
246.959	5455
260.112	5455
295.495	5455
306.947	5455
344.123	5455
353.689	5455
392.858	5455
400.319	5455
441.72	5455
446.819	5455
490.734	5455
517.25	5455
518.848	5455

530.445	5455
545.445	5460
556.072	5460
575.445	5460
1536.14	5168.88

Material Boundary

X	Y
0	5200.5
42.5304	5199.88
50.4444	5199.79
51.8447	5199.77
60.3563	5199.67
61.8783	5199.65
107.708	5199
117.225	5198.89
118.942	5198.86
129.194	5198.75
131.064	5198.72
172.729	5198.13
183.907	5198.01
185.964	5197.98
198.026	5197.84
200.27	5197.81
213.325	5197.67
227.348	5197.51
242.453	5197.34
261.362	5197.12
289.277	5196.79
362.969	5195.7
388.869	5195.29
407.909	5194.99
418.604	5194.82
437.521	5194.55
466.941	5194.08
474.418	5193.97
509.317	5193.41
518.618	5193.28
521.537	5193.24
535.401	5193.01
570.193	5192.45
595.395	5192.04
632.517	5191.03
647.545	5190.63
674.437	5189.92

696.805	5189.32
823.107	5185.92
837.37	5185.54
933.475	5182.95
1105.87	5178.5
1116.06	5178.23
1179.42	5176.55
1186.08	5176.37
1227.57	5175.27
1468.45	5169.13
1500.4	5169.02
1536.14	5168.88
1608.27	5168.61
1650.32	5166.28
1665.01	5165.47
1672.07	5167.8
1675.27	5168.86
1680.63	5168.86

Material Boundary

X	Y
1670.47	5165.17
1685.26	5164.35
1695.8	5163.83

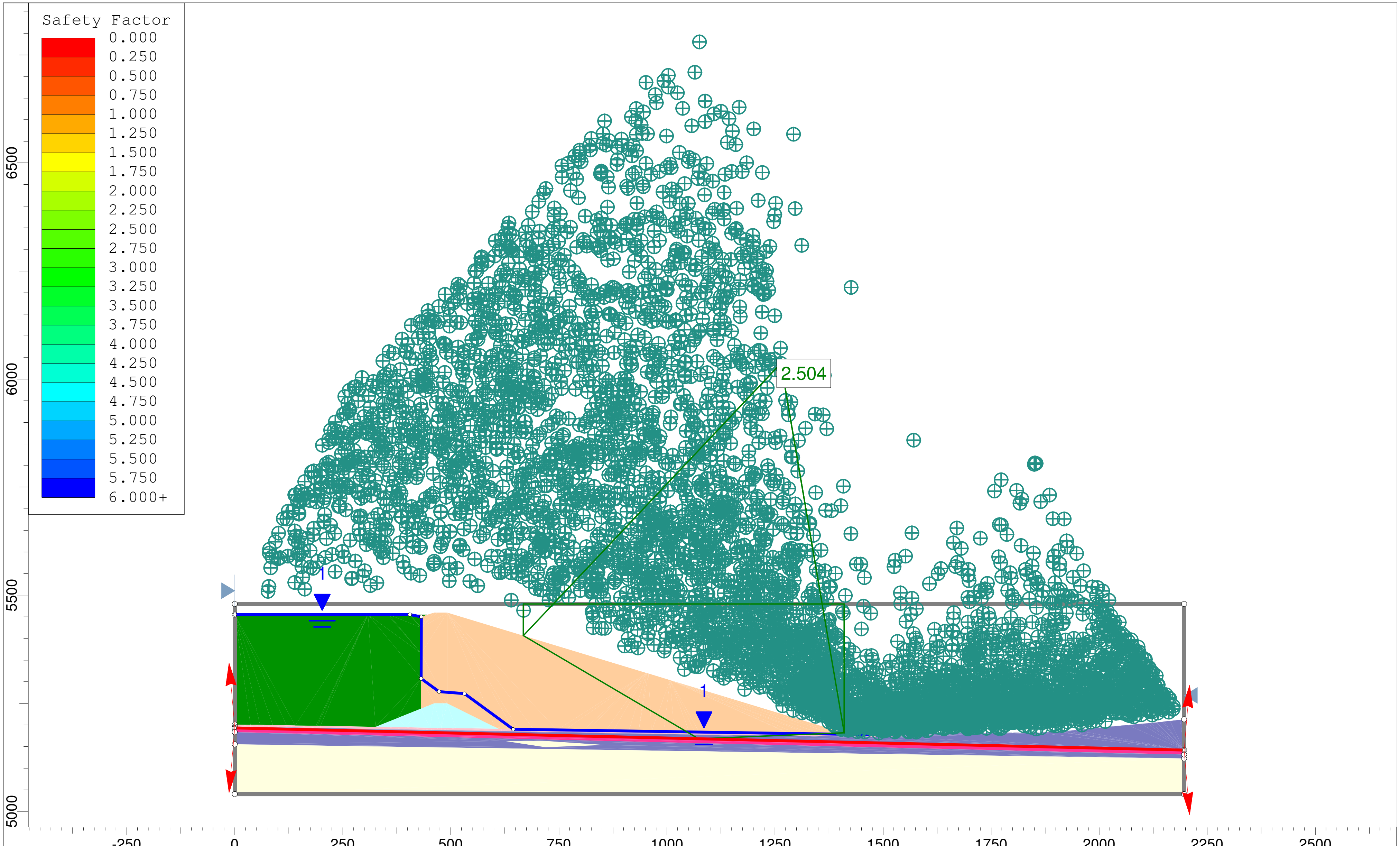
Material Boundary

X	Y
407.909	5194.99
514.508	5237.63
514.77	5289.93
515.2	5376
515.445	5450
519.684	5451.41
530.445	5455

Material Boundary

X	Y
514.508	5237.63
545.445	5250
575.445	5250
696.805	5189.32

APPENDIX H.2
STABILITY SECTION B-B’



SLIDEINTERPRET 6.008

Project	Copper Flat		
Analysis Description	Section B-B' Stability: Downstream, Static, Block Failure		
Drawn By GS	*Scale* 1:3686	*Company*	Golder Associates Inc.
Date	11/4/2013, 11:49:04 AM	*File Name*	1 - Section B 5460R - DS_S_B.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 1 - Section B 5460R - DS_S_B.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section B-B' Stability: Downstream, Static, Block Failure
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 11:49:04 AM
Comments:

103-92557
Material Property Edits 12/13

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Soft Clay	Clay	Cyclone Overflow
Color								
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	127	108
Cohesion [psf]		0	0	150	0			
Friction Angle [deg]		39	29	29	26.5			
Tau/Sigma Ratio								0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated			Automatically Calculated
Ru Value	0		0	0		0	0	

Shear Normal Functions

Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765

2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5

22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7

42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6

62656.7	15211.8

Global Minimums

Method: spencer

FS: 2.504180
Axis Location: 1263.734, 6036.472
Left Slip Surface Endpoint: 667.648, 5406.642
Right Slip Surface Endpoint: 1409.947, 5181.705
Left Slope Intercept: 667.648 5480.000
Right Slope Intercept: 1409.947 5480.000
Resisting Moment=2.81387e+009 lb-ft
Driving Moment=1.12367e+009 lb-ft
Resisting Horizontal Force=3.03106e+006 lb
Driving Horizontal Force=1.2104e+006 lb

Global Minimum Coordinates

Method: spencer

X	Y
667.648	5406.64
1073.18	5168.06
1409.95	5181.7
1409.95	5480

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 584
Number of Invalid Surfaces: 4416

Error Codes:

Error Code -106 reported for 2 surfaces
Error Code -107 reported for 1331 surfaces
Error Code -108 reported for 2123 surfaces
Error Code -110 reported for 70 surfaces
Error Code -111 reported for 595 surfaces
Error Code -112 reported for 295 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the

driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.50418

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	31.651	16148	Cyclone Underflow	0	39	25.4457	63.7207	78.6884	0	78.6884
2	31.651	48443.9	Cyclone Underflow	0	39	393.5	985.395	1216.86	0	1216.86
3	31.651	80739.8	Cyclone Underflow	0	39	671.529	1681.63	2076.63	0	2076.63
4	31.651	113036	Cyclone Underflow	0	39	949.556	2377.86	2936.4	0	2936.4
5	31.651	145332	Cyclone Underflow	0	39	1227.58	3074.09	3796.18	0	3796.18
6	31.651	177628	Cyclone Underflow	0	39	1505.61	3770.32	4655.95	0	4655.95
7	31.651	209923	Cyclone Underflow	0	39	1783.64	4466.55	5515.73	0	5515.73
8	31.651	242219	Cyclone Underflow	0	39	2061.66	5162.78	6375.5	0	6375.5
9	31.651	274515	Cyclone Underflow	0	39	2339.69	5859.01	7235.27	0	7235.27
10	31.651	306847	Cyclone Underflow	0	39	2618.13	6556.28	8096.33	0	8096.33
11	31.651	339198	Cyclone Underflow	0	39	2896.61	7253.64	8957.49	0	8957.49
12	31.651	371504	Cyclone Underflow	0	39	3174.66	7949.91	9817.32	0	9817.32
13	8.75148	108572	Liner Interface Zone	0	26.5	2185.06	5471.78	11170.6	195.919	10974.6
14	16.9638	218358	Foundation Materials	150	29	2579.64	6459.89	11383.3	0	11383.3
15	30.2226	380408	Foundation Materials	150	29	2774.58	6948.05	12264	0	12264
16	30.2226	344600	Foundation Materials	150	29	2511.83	6290.08	11077	0	11077
17	30.2226	308792	Foundation Materials	150	29	2249.09	5632.12	9890.02	0	9890.02
18	30.2226	272984	Foundation Materials	150	29	1986.34	4974.16	8703	0	8703
19	30.2226	237176	Foundation Materials	150	29	1723.6	4316.2	7516.03	0	7516.03
20	30.2226	201368	Foundation Materials	150	29	1460.85	3658.23	6329.01	0	6329.01
21	31.0757	169713	Liner Interface Zone	0	26.5	967.095	2421.78	5130.02	272.678	4857.34
22	31.0757	131843	Liner Interface Zone	0	26.5	745.37	1866.54	3908.11	164.386	3743.72
23	31.0757	93991.2	Liner Interface Zone	0	26.5	523.772	1311.62	2686.8	56.0937	2630.7
24	31.1043	56349.3	Cyclone Underflow	0	39	474.407	1188	1467.06	0	1467.06
25	31.1043	18783.1	Cyclone Underflow	0	39	1844.88	4619.92	5705.13	0	5705.13

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.50418

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	667.648	5406.64	2.69073e-022	0	0
2	699.299	5388.02	-214017	13186.2	-3.5257
3	730.95	5369.4	-256320	15792.6	-3.5257
4	762.601	5350.78	-297148	18308.2	-3.52571
5	794.252	5332.16	-336500	20732.8	-3.52571
6	825.903	5313.53	-374377	23066.5	-3.52571
7	857.554	5294.91	-410779	25309.3	-3.5257
8	889.205	5276.29	-445705	27461.2	-3.52571
9	920.856	5257.67	-479156	29522.2	-3.5257
10	952.507	5239.05	-511131	31492.3	-3.52571
11	984.158	5220.43	-541429	33359	-3.5257
12	1015.81	5201.81	-570296	35137.6	-3.5257
13	1047.46	5183.19	-597825	36833.8	-3.52571
14	1056.21	5178.04	-590828	36402.6	-3.5257
15	1073.18	5168.06	-583080	35925.3	-3.52571
16	1103.4	5169.28	-796681	49085.8	-3.5257
17	1133.62	5170.51	-1.00613e+006	61990.4	-3.52569
18	1163.84	5171.73	-1.21142e+006	74639.1	-3.5257
19	1194.07	5172.96	-1.41256e+006	87031.9	-3.5257
20	1224.29	5174.18	-1.60955e+006	99168.8	-3.52569
21	1254.51	5175.41	-1.80238e+006	111050	-3.52571
22	1285.59	5176.66	-1.98927e+006	122565	-3.52571
23	1316.66	5177.92	-2.17327e+006	133902	-3.52572
24	1347.74	5179.18	-2.35439e+006	145061	-3.52571
25	1378.84	5180.44	-2.53815e+006	156383	-3.52571
26	1409.95	5181.7	4.449e-021	0	0

List Of Coordinates

Piezoline

X	Y
5.68e-014	5455
405.014	5455
431.537	5450
430.947	5307.07
472.744	5276.98
531.255	5272.32
644.321	5190
1526.22	5176.48

Block Search Lines

X	Y

0	5193.11
2196.33	5141.83

External Boundary

X	Y
2196.33	5040
2196.33	5122.6
2196.33	5131.83
2196.33	5141.83
2196.33	5213.03
2196.33	5480
0	5480
5.68434e-014	5454.95
0	5200.91
0	5195.91
0	5193.11
0	5183.11
0	5154.97
0	5040

Material Boundary

X	Y
0	5200.91
36.2762	5200.37
58.5636	5200.04
87.9203	5199.6
119.749	5199.12
139.564	5198.83
187.898	5198.1
191.209	5198.05
198.411	5197.94
325.671	5195.68
352.127	5195.21
395.214	5194.44
451.434	5193.44
477.974	5192.93
511.46	5192.3
610.156	5190.74
613.497	5190.69
617.098	5190.63
644.321	5190
655.674	5189.8
692.306	5189.18
745.298	5188.28
762.917	5188
805.444	5187.28

814.51	5187.13
858.316	5186.39
875.648	5186.09
911.187	5185.49
934.659	5185.09
964.059	5184.6
992.27	5184.12
1016.93	5183.7
1051.65	5183.11
1064.32	5182.9
1074.91	5182.72
1281.77	5180.05
1284.77	5180
1300.41	5179.72
1324.81	5179.5
1334.95	5179.32
1357.91	5179.08
1383.32	5178.96
1399.69	5178.64
1420.91	5178.38
1449.11	5178.05
1457.41	5177.99
1463.99	5177.94
1481.34	5177.51
1528.55	5176.42

Material Boundary

X	Y
0	5195.91
36.2013	5195.37
58.4887	5195.04
87.8455	5194.6
119.674	5194.12
139.49	5193.83
187.823	5193.1
191.134	5193.05
198.329	5192.94
352.038	5190.21
395.126	5189.44
451.342	5188.44
477.88	5187.93
511.373	5187.3
613.418	5185.69
617.004	5185.63
644.218	5185
655.588	5184.8
692.222	5184.18

745.216	5183.28
762.837	5183
805.359	5182.28
814.425	5182.13
858.231	5181.39
875.564	5181.09
911.103	5180.49
934.574	5180.09
963.974	5179.6
992.185	5179.12
1016.85	5178.7
1051.56	5178.12
1064.24	5177.9
1074.84	5177.72
1281.7	5175.05
1284.68	5175
1300.34	5174.72
1324.74	5174.5
1334.87	5174.32
1357.87	5174.08
1383.26	5173.96
1399.61	5173.64
1449.07	5173.05
1457.37	5172.99
1463.91	5172.95
1481.22	5172.51
1529.3	5171.41

Material Boundary

X	Y
1528.55	5176.42
1530.07	5176.92
1540.17	5180.24
1544.4	5180.22
1545.81	5180.22
1550.23	5180.21
1558.65	5175.99

Material Boundary

X	Y
1529.3	5171.41
1531.63	5172.17
1540.96	5175.24
1544.53	5175.72

Material Boundary

X	Y
5.68434e-014	5454.95
308.07	5454.95
353.349	5454.95
356.571	5454.95
403.471	5454.95
405.014	5454.95
446.545	5454.95

Material Boundary

X	Y
1544.53	5175.72
1551.96	5176.06
1555.99	5176
1558.65	5175.99
1560.71	5175.98
1562.45	5175.97
1564.47	5175.96
1567.8	5175.98
1568.92	5175.98
1570.4	5176
1572.7	5176.05
1575.12	5176.1
1577.64	5176.05
1584.69	5177.23
1587.52	5178
1589.43	5178
1595.33	5178.02
1598	5178.02
1599.51	5178.02
1601.92	5178.01
1604.21	5178.01
1606.06	5178.02
1611.05	5178.02
1612.65	5178.02
1615.58	5178.03
1624.1	5178.74
1634.72	5179.56
1676.06	5181.61
1677.91	5181.69
1679.85	5181.31
1689.42	5179.73
1695.55	5179.88
1719.81	5180.46
1722.1	5180.51
1724.26	5180.55
1729.33	5180.77

1736.44	5181.05
1758.17	5181.51
1760.86	5181.57
1763.13	5181.59
1770	5181.77
1776.96	5182
1778.16	5182
1781.4	5182
1786.04	5182
1790.15	5181.96
1792.18	5181.97
1793.61	5181.99
1797.47	5181.99
1801.67	5181.97
1805.2	5181.98
1807.73	5182
1809.68	5182.03
1810.98	5182.03
1812.91	5182
1815.24	5182
1817.46	5182
1820.77	5182
1825.08	5182.06
1827.32	5182.1
1830.04	5182.06
1834	5182.21
1835.24	5182.23
1837.14	5182.32
1847.73	5182.9
1853.36	5183.11
1862.09	5181.97
1863.34	5182
1868.11	5183.18
1878.92	5184
1881.28	5184.04
1882.78	5184.04
1886.78	5184.25
1895.53	5184.46
1902.77	5184.55
1904.49	5184.67
1907.81	5184.94
1915.56	5185.57
1918.57	5185.89
1922.54	5186
1936.83	5187.52
1942.58	5188
1944.05	5188.08
1945.48	5188.13

1980.15	5191.45
1985.49	5192
2003.82	5193.85
2005.48	5194.02
2024.8	5196
2030.13	5196.52
2035.72	5197.07
2041.65	5197.59
2046.56	5198.01
2056.52	5198.85
2066.29	5199.61
2077.93	5200.73
2090.84	5201.99
2097.45	5202.54
2111.64	5204
2118.78	5204.74
2132.35	5206
2146.46	5207.55
2150.18	5208
2163.74	5209.5
2187.21	5212
2196.33	5213.03

Material Boundary

X	Y
430.6	5237.63
430.947	5307.07
431.24	5365.55
431.537	5425
431.537	5449.95
446.545	5454.95
461.554	5460
468.536	5460
491.57	5460
952.795	5320.23
956.93	5318.98
1007.34	5303.73
1420.91	5178.38

Material Boundary

X	Y
325.671	5195.68
377.088	5216.23
430.6	5237.63
461.554	5250
482.872	5250

491.57	5250
601.751	5194.94
610.156	5190.74

Material Boundary

X	Y
0	5193.11
2196.33	5141.83

Material Boundary

X	Y
0	5183.11
2196.33	5131.83

Material Boundary

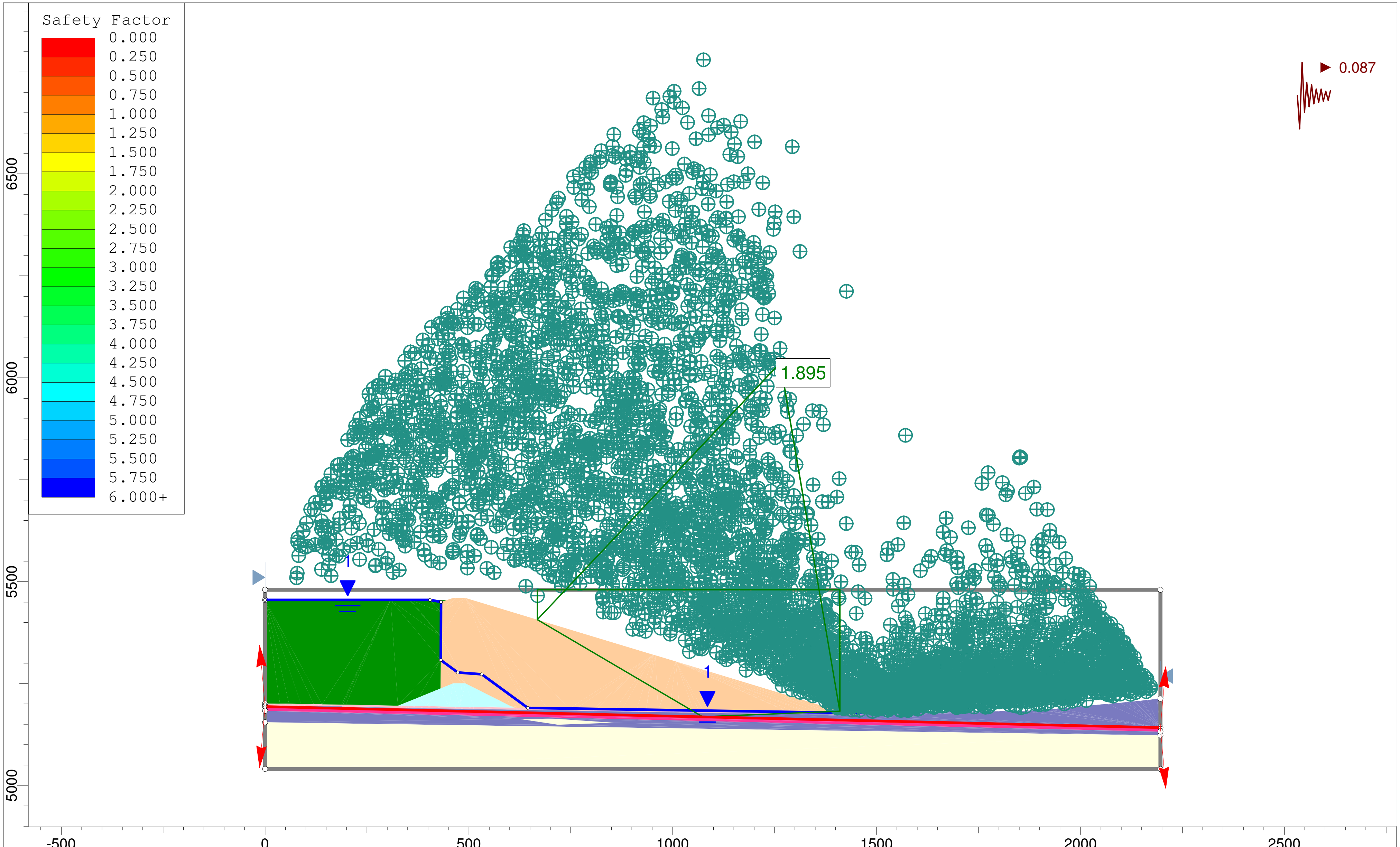
X	Y
0	5154.97
2196.33	5122.6

Material Boundary

X	Y
712.872	5163.35
624.336	5162.59
718.366	5148.52
856.143	5153.54
712.872	5163.35

Material Boundary

X	Y
1544.4	5180.22
1544.53	5175.72



SLIDEINTERPRET 6.008

Project	Copper Flat
Analysis Description	Section B-B' Stability: Downstream, Pseudo Static, Block Failure
Drawn By	GS
Scale	1:3908
Company	Golder Associates Inc.
Date	11/4/2013, 11:49:04 AM
File Name	2 - Section B 5460R - DS_PS_B.slim

Slide Analysis Information

Copper Flat

Project Summary

File Name: 2 - Section B 5460R - DS_PS_B.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section B-B' Stability: Downstream, Pseudo Static, Block Failure
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 11:49:04 AM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Non-Circular Block Search
Number of Surfaces: 5000
Pseudo-Random Surfaces: Enabled
Convex Surfaces Only: Disabled
Left Projection Angle (Start Angle): 95
Left Projection Angle (End Angle): 265
Right Projection Angle (Start Angle): 85
Right Projection Angle (End Angle): -85
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Soft Clay	Clay	Cyclone Overflow
Color								
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	127	108
Cohesion [psf]		0	0	150	0			
Friction Angle [deg]		39	29	29	26.5			
Tau/Sigma Ratio								0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated			Automatically Calculated
Ru Value	0		0	0		0	0	

Shear Normal Functions

Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186

835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2

20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7

40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765

60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

Global Minimums

Method: spencer

FS: 1.895340
Axis Location: 1263.734, 6036.472
Left Slip Surface Endpoint: 667.648, 5406.642
Right Slip Surface Endpoint: 1409.947, 5181.705
Left Slope Intercept: 667.648 5480.000
Right Slope Intercept: 1409.947 5480.000
Resisting Moment=2.74873e+009 lb-ft
Driving Moment=1.45026e+009 lb-ft
Resisting Horizontal Force=2.96703e+006 lb
Driving Horizontal Force=1.56543e+006 lb

Global Minimum Coordinates

Method: spencer

X	Y
667.648	5406.64
1073.18	5168.06
1409.95	5181.7
1409.95	5480

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 562
Number of Invalid Surfaces: 4438

Error Codes:

Error Code -106 reported for 2 surfaces
Error Code -107 reported for 578 surfaces
Error Code -108 reported for 2726 surfaces
Error Code -110 reported for 101 surfaces
Error Code -111 reported for 671 surfaces
Error Code -112 reported for 360 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.89534

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	31.651	16148	Cyclone Underflow	0	39	0	0	-57.4289	0	-57.4289
2	31.651	48443.9	Cyclone Underflow	0	39	484.264	917.844	1133.44	0	1133.44
3	31.651	80739.8	Cyclone Underflow	0	39	833.882	1580.49	1951.75	0	1951.75
4	31.651	113036	Cyclone Underflow	0	39	1183.5	2243.14	2770.05	0	2770.05
5	31.651	145332	Cyclone Underflow	0	39	1533.12	2905.79	3588.35	0	3588.35
6	31.651	177628	Cyclone Underflow	0	39	1882.74	3568.44	4406.65	0	4406.65
7	31.651	209923	Cyclone Underflow	0	39	2232.36	4231.08	5224.95	0	5224.95
8	31.651	242219	Cyclone Underflow	0	39	2581.98	4893.73	6043.25	0	6043.25
9	31.651	274515	Cyclone Underflow	0	39	2931.6	5556.38	6861.55	0	6861.55
10	31.651	306847	Cyclone Underflow	0	39	3281.79	6220.1	7681.19	0	7681.19
11	31.651	339198	Cyclone Underflow	0	39	3631.96	6883.8	8500.79	0	8500.79
12	31.651	371504	Cyclone Underflow	0	39	3981.57	7546.43	9319.07	0	9319.07
13	8.75148	108572	Liner Interface Zone	0	26.5	2802.54	5311.77	10849.7	195.919	10653.8
14	16.9638	218358	Foundation Materials	150	29	3293.35	6242.01	10990.3	0	10990.3
15	30.2226	380408	Foundation Materials	150	29	3636.26	6891.94	12162.8	0	12162.8
16	30.2226	344600	Foundation Materials	150	29	3288.53	6232.88	10973.8	0	10973.8
17	30.2226	308792	Foundation Materials	150	29	2940.8	5573.81	9784.82	0	9784.82
18	30.2226	272984	Foundation Materials	150	29	2593.07	4914.75	8595.82	0	8595.82
19	30.2226	237176	Foundation Materials	150	29	2245.34	4255.68	7406.86	0	7406.86
20	30.2226	201368	Foundation Materials	150	29	1897.61	3596.62	6217.86	0	6217.86
21	31.0757	169713	Liner Interface Zone	0	26.5	1250.03	2369.24	5024.65	272.678	4751.98
22	31.0757	131843	Liner Interface Zone	0	26.5	956.103	1812.14	3798.98	164.386	3634.59
23	31.0757	93991.2	Liner Interface Zone	0	26.5	662.33	1255.34	2573.92	56.0937	2517.83
24	31.1043	56349.3	Cyclone Underflow	0	39	574.915	1089.66	1345.62	0	1345.62
25	31.1043	18783.1	Cyclone Underflow	0	39	3181.77	6030.54	7447.09	0	7447.09

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.89534

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	667.648	5406.64	2.69073e-022	0	0
2	699.299	5388.02	-214342	17977.3	-4.79429
3	730.95	5369.4	-256846	21542.3	-4.79432
4	762.601	5350.78	-298096	25002	-4.79431
5	794.252	5332.16	-338091	28356.5	-4.79431
6	825.903	5313.53	-376832	31605.8	-4.79431
7	857.554	5294.91	-414318	34749.8	-4.79431
8	889.205	5276.29	-450549	37788.6	-4.79431
9	920.856	5257.67	-485526	40722.2	-4.79431
10	952.507	5239.05	-519248	43550.5	-4.79431
11	984.158	5220.43	-551514	46256.8	-4.79431
12	1015.81	5201.81	-582571	48861.6	-4.79431
13	1047.46	5183.19	-612510	51372.6	-4.79431
14	1056.21	5178.04	-603106	50583.9	-4.79431
15	1073.18	5168.06	-592352	49682	-4.79432
16	1103.4	5169.28	-798697	66988.6	-4.79431
17	1133.62	5170.51	-1.00144e+006	83993.1	-4.79431
18	1163.84	5171.73	-1.20058e+006	100696	-4.79434
19	1194.07	5172.96	-1.39612e+006	117096	-4.79432
20	1224.29	5174.18	-1.58806e+006	133194	-4.7943
21	1254.51	5175.41	-1.7764e+006	148990	-4.79428
22	1285.59	5176.66	-1.95716e+006	164151	-4.79429
23	1316.66	5177.92	-2.13608e+006	179158	-4.79431
24	1347.74	5179.18	-2.31317e+006	194011	-4.79431
25	1378.84	5180.44	-2.49498e+006	209260	-4.79431
26	1409.95	5181.7	4.449e-021	0	0

List Of Coordinates

Piezoline

X	Y
5.68e-014	5455
405.014	5455
431.537	5450
430.947	5307.07
472.744	5276.98
531.255	5272.32
644.321	5190
1526.22	5176.48

Block Search Lines

X	Y
0	5193.11
2196.33	5141.83

External Boundary

X	Y
2196.33	5040
2196.33	5122.6
2196.33	5131.83
2196.33	5141.83
2196.33	5213.03
2196.33	5480
0	5480
5.68434e-014	5454.95
0	5200.91
0	5195.91
0	5193.11
0	5183.11
0	5154.97
0	5040

Material Boundary

X	Y
0	5200.91
36.2762	5200.37
58.5636	5200.04
87.9203	5199.6
119.749	5199.12
139.564	5198.83
187.898	5198.1
191.209	5198.05
198.411	5197.94
325.671	5195.68
352.127	5195.21
395.214	5194.44
451.434	5193.44
477.974	5192.93
511.46	5192.3
610.156	5190.74
613.497	5190.69
617.098	5190.63
644.321	5190
655.674	5189.8

692.306	5189.18
745.298	5188.28
762.917	5188
805.444	5187.28
814.51	5187.13
858.316	5186.39
875.648	5186.09
911.187	5185.49
934.659	5185.09
964.059	5184.6
992.27	5184.12
1016.93	5183.7
1051.65	5183.11
1064.32	5182.9
1074.91	5182.72
1281.77	5180.05
1284.77	5180
1300.41	5179.72
1324.81	5179.5
1334.95	5179.32
1357.91	5179.08
1383.32	5178.96
1399.69	5178.64
1420.91	5178.38
1449.11	5178.05
1457.41	5177.99
1463.99	5177.94
1481.34	5177.51
1528.55	5176.42

Material Boundary

X	Y
0	5195.91
36.2013	5195.37
58.4887	5195.04
87.8455	5194.6
119.674	5194.12
139.49	5193.83
187.823	5193.1
191.134	5193.05
198.329	5192.94
352.038	5190.21
395.126	5189.44
451.342	5188.44
477.88	5187.93
511.373	5187.3
613.418	5185.69

617.004	5185.63
644.218	5185
655.588	5184.8
692.222	5184.18
745.216	5183.28
762.837	5183
805.359	5182.28
814.425	5182.13
858.231	5181.39
875.564	5181.09
911.103	5180.49
934.574	5180.09
963.974	5179.6
992.185	5179.12
1016.85	5178.7
1051.56	5178.12
1064.24	5177.9
1074.84	5177.72
1281.7	5175.05
1284.68	5175
1300.34	5174.72
1324.74	5174.5
1334.87	5174.32
1357.87	5174.08
1383.26	5173.96
1399.61	5173.64
1449.07	5173.05
1457.37	5172.99
1463.91	5172.95
1481.22	5172.51
1529.3	5171.41

Material Boundary

X	Y
1528.55	5176.42
1530.07	5176.92
1540.17	5180.24
1544.4	5180.22
1545.81	5180.22
1550.23	5180.21
1558.65	5175.99

Material Boundary

X	Y
1529.3	5171.41
1531.63	5172.17

1540.96	5175.24
1544.53	5175.72

Material Boundary

X	Y
5.68434e-014	5454.95
308.07	5454.95
353.349	5454.95
356.571	5454.95
403.471	5454.95
405.014	5454.95
446.545	5454.95

Material Boundary

X	Y
1544.53	5175.72
1551.96	5176.06
1555.99	5176
1558.65	5175.99
1560.71	5175.98
1562.45	5175.97
1564.47	5175.96
1567.8	5175.98
1568.92	5175.98
1570.4	5176
1572.7	5176.05
1575.12	5176.1
1577.64	5176.05
1584.69	5177.23
1587.52	5178
1589.43	5178
1595.33	5178.02
1598	5178.02
1599.51	5178.02
1601.92	5178.01
1604.21	5178.01
1606.06	5178.02
1611.05	5178.02
1612.65	5178.02
1615.58	5178.03
1624.1	5178.74
1634.72	5179.56
1676.06	5181.61
1677.91	5181.69
1679.85	5181.31
1689.42	5179.73

1695.55	5179.88
1719.81	5180.46
1722.1	5180.51
1724.26	5180.55
1729.33	5180.77
1736.44	5181.05
1758.17	5181.51
1760.86	5181.57
1763.13	5181.59
1770	5181.77
1776.96	5182
1778.16	5182
1781.4	5182
1786.04	5182
1790.15	5181.96
1792.18	5181.97
1793.61	5181.99
1797.47	5181.99
1801.67	5181.97
1805.2	5181.98
1807.73	5182
1809.68	5182.03
1810.98	5182.03
1812.91	5182
1815.24	5182
1817.46	5182
1820.77	5182
1825.08	5182.06
1827.32	5182.1
1830.04	5182.06
1834	5182.21
1835.24	5182.23
1837.14	5182.32
1847.73	5182.9
1853.36	5183.11
1862.09	5181.97
1863.34	5182
1868.11	5183.18
1878.92	5184
1881.28	5184.04
1882.78	5184.04
1886.78	5184.25
1895.53	5184.46
1902.77	5184.55
1904.49	5184.67
1907.81	5184.94
1915.56	5185.57
1918.57	5185.89

1922.54	5186
1936.83	5187.52
1942.58	5188
1944.05	5188.08
1945.48	5188.13
1980.15	5191.45
1985.49	5192
2003.82	5193.85
2005.48	5194.02
2024.8	5196
2030.13	5196.52
2035.72	5197.07
2041.65	5197.59
2046.56	5198.01
2056.52	5198.85
2066.29	5199.61
2077.93	5200.73
2090.84	5201.99
2097.45	5202.54
2111.64	5204
2118.78	5204.74
2132.35	5206
2146.46	5207.55
2150.18	5208
2163.74	5209.5
2187.21	5212
2196.33	5213.03

Material Boundary

X	Y
430.6	5237.63
430.947	5307.07
431.24	5365.55
431.537	5425
431.537	5449.95
446.545	5454.95
461.554	5460
468.536	5460
491.57	5460
952.795	5320.23
956.93	5318.98
1007.34	5303.73
1420.91	5178.38

Material Boundary

X	Y

325.671	5195.68
377.088	5216.23
430.6	5237.63
461.554	5250
482.872	5250
491.57	5250
601.751	5194.94
610.156	5190.74

Material Boundary

X	Y
0	5193.11
2196.33	5141.83

Material Boundary

X	Y
0	5183.11
2196.33	5131.83

Material Boundary

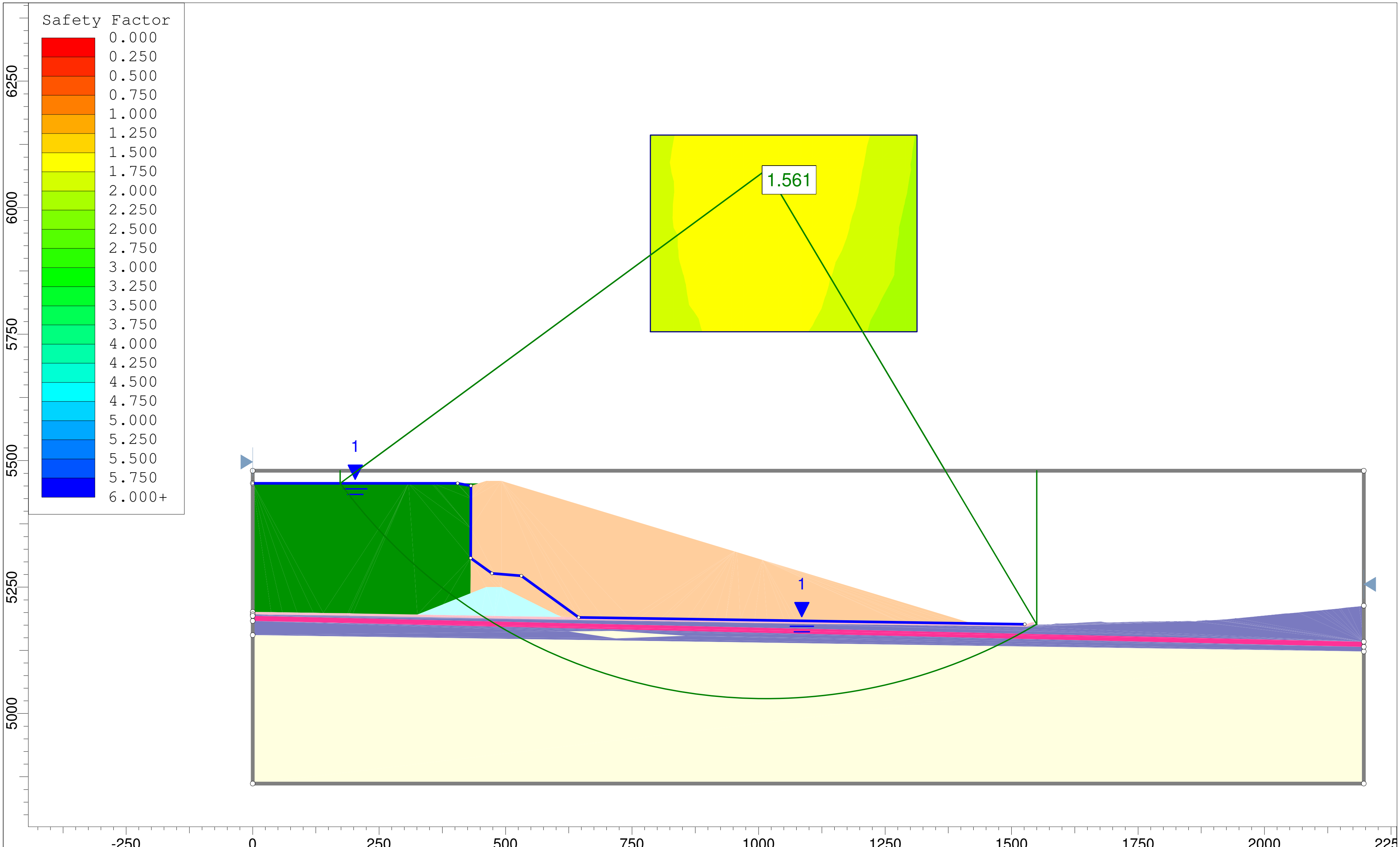
X	Y
0	5154.97
2196.33	5122.6

Material Boundary

X	Y
712.872	5163.35
624.336	5162.59
718.366	5148.52
856.143	5153.54
712.872	5163.35

Material Boundary

X	Y
1544.4	5180.22
1544.53	5175.72



Project	Copper Flat		
Analysis Description	Section B-B' Stability: Downstream, Static, Circular Failure		
Drawn By GS	*Scale* 1:3149	*Company*	Golder Associates Inc.
Date	11/4/2013, 11:49:04 AM	*File Name*	3 - Section B 5460R - DS_S_C.slim

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

File Name: 3 - Section B 5460R - DS_S_C.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section B-B' Stability: Downstream, Static, Circular Failure
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 11:49:04 AM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v.3

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Soft Clay	Clay	Cyclone Overflow
Color								
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	127	108
Cohesion [psf]		0	0	150	0			
Friction Angle [deg]		39	29	29	26.5			
Tau/Sigma Ratio								0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated			Automatically Calculated
Ru Value	0		0	0		0	0	

Shear Normal Functions

Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3

3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8

23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8

43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

Global Minimums

Method: spencer

FS: 1.560970
Center: 1015.357, 6074.806
Radius: 1045.828
Left Slip Surface Endpoint: 173.020, 5454.947
Right Slip Surface Endpoint: 1550.009, 5175.971
Left Slope Intercept: 173.020 5480.000
Right Slope Intercept: 1550.009 5480.000
Resisting Moment=1.06294e+010 lb-ft
Driving Moment=6.80947e+009 lb-ft
Resisting Horizontal Force=9.56258e+006 lb
Driving Horizontal Force=6.12606e+006 lb

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2506
Number of Invalid Surfaces: 2246

Error Codes:

Error Code -103 reported for 588 surfaces
Error Code -108 reported for 568 surfaces
Error Code -110 reported for 58 surfaces
Error Code -111 reported for 1032 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.56097

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	76.7812	384179	Cyclone Overflow	421.855	0	270.252	421.855	3388.77	2894.28	494.494
2	76.7812	1.07712e+006	Cyclone Overflow	1183.95	0	758.471	1183.95	10074.5	8108.62	1965.9
3	76.7812	1.63914e+006	Cyclone Overflow	1802.07	0	1154.46	1802.07	16242.9	12337.8	3905.11
4	49.0448	1.33572e+006	Structural Fill Liner Interface	0	29	7124.22	11120.7	20062.4	0	20062.4

			Zone							
6	9.92233	312599	Foundation Materials	150	29	8606.51	13434.5	23965.9	0	23965.9
7	17.4329	567165	Soft Clay	851.163	13.3468	4488.85	7006.95	25946.3	0	25946.3
8	44.5694	1.5136e+006	Foundation Materials	150	29	9663.09	15083.8	26941.3	0	26941.3
9	67.0136	2.36955e+006	Clay	958.267	13.1388	5094.31	7952.07	29962.1	0	29962.1
10	67.0136	2.45379e+006	Clay	1025.15	13.0217	5445.36	8500.05	32321.5	0	32321.5
11	67.0136	2.50548e+006	Clay	1089.15	12.9174	5739.42	8959.07	34313.8	0	34313.8
12	67.0136	2.50972e+006	Clay	1124.79	12.8623	5943.34	9277.38	35704	0	35704
13	67.0136	2.47166e+006	Clay	1148.83	12.8262	6062.3	9463.07	36518	0	36518
14	67.0136	2.39734e+006	Clay	1148.83	12.8262	6103.92	9528.04	36803.3	0	36803.3
15	67.0136	2.28693e+006	Clay	1148.83	12.8262	6063.17	9464.42	36524	0	36524
16	67.0136	2.13981e+006	Clay	1124.79	12.8623	5933.03	9261.28	35633.4	0	35633.4
17	67.0136	1.95593e+006	Clay	1072.75	12.9435	5704.6	8904.71	34077.2	0	34077.2
18	67.0136	1.7351e+006	Clay	1017.45	13.0347	5367	8377.72	31793.1	0	31793.1
19	67.0136	1.47639e+006	Clay	923.265	13.2038	4903.36	7653.99	28688	0	28688
20	67.0136	1.1784e+006	Clay	802.785	13.4506	4288.2	6693.74	24631.1	0	24631.1
21	67.0136	839198	Clay	656.503	13.8133	3481.23	5434.09	19431.3	0	19431.3
22	67.0136	496697	Clay	415.25	14.6733	2204.49	3441.14	11555.9	0	11555.9
23	29.3922	131593	Foundation Materials	150	29	3334.74	5205.43	9120.25	0	9120.25
24	17.8998	52163.6	Soft Clay	192.084	16.2309	1043.45	1628.79	4935.28	0	4935.28
25	32.0382	41314	Foundation Materials	150	29	0	0	-38306.9	0	-38306.9

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.56097

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	173.02	5454.95	3.13838e-023	0	0
2	249.802	5362.29	273636	97200.6	19.556
3	326.583	5287.82	965550	342981	19.556
4	403.364	5226.74	1.86896e+006	663889	19.556
5	452.409	5193.42	2.19051e+006	778111	19.556
6	460.564	5188.26	2.26451e+006	804395	19.556
7	470.486	5182.13	2.32639e+006	826376	19.556
8	487.919	5171.72	2.51812e+006	894484	19.556
9	532.488	5147.12	2.72923e+006	969472	19.556
10	599.502	5115.21	3.28961e+006	1.16853e+006	19.556
11	666.515	5088.87	3.69589e+006	1.31285e+006	19.556
12	733.529	5067.67	3.93299e+006	1.39707e+006	19.556
13	800.543	5051.28	3.98821e+006	1.41669e+006	19.556
14	867.556	5039.47	3.85556e+006	1.36957e+006	19.556
15	934.57	5032.1	3.53467e+006	1.25558e+006	19.556
16	1001.58	5029.07	3.03059e+006	1.07652e+006	19.556
17	1068.6	5030.33	2.35334e+006	835950	19.556

18	1135.61	5035.91	1.52056e+006	540130	19.5559
19	1202.62	5045.88	558004	198213	19.5559
20	1269.64	5060.36	-497755	-176812	19.556
21	1336.65	5079.55	-1.59529e+006	-566675	19.5559
22	1403.67	5103.74	-2.6616e+006	-945449	19.556
23	1470.68	5133.3	-3.26006e+006	-1.15803e+006	19.5559
24	1500.07	5148.09	-3.50629e+006	-1.2455e+006	19.556
25	1517.97	5157.67	-3.58004e+006	-1.2717e+006	19.556
26	1550.01	5175.97	4.62169e-021	0	0

List Of Coordinates

Piezoline

X	Y
5.68e-014	5455
405.014	5455
431.537	5450
430.947	5307.07
472.744	5276.98
531.255	5272.32
644.321	5190
1526.22	5176.48

External Boundary

X	Y
2196.33	4861.27
2196.33	5122.6
2196.33	5131.83
2196.33	5141.83
2196.33	5213.03
2196.33	5480
0	5480
5.68434e-014	5454.95
0	5200.91
0	5195.91
0	5193.11
0	5183.11
0	5154.97
0	4861.27

Material Boundary

X	Y
0	5200.91
36.2762	5200.37
58.5636	5200.04

87.9203	5199.6
119.749	5199.12
139.564	5198.83
187.898	5198.1
191.209	5198.05
198.411	5197.94
325.671	5195.68
352.127	5195.21
395.214	5194.44
451.434	5193.44
477.974	5192.93
511.46	5192.3
610.156	5190.74
613.497	5190.69
617.098	5190.63
644.321	5190
655.674	5189.8
692.306	5189.18
745.298	5188.28
762.917	5188
805.444	5187.28
814.51	5187.13
858.316	5186.39
875.648	5186.09
911.187	5185.49
934.659	5185.09
964.059	5184.6
992.27	5184.12
1016.93	5183.7
1051.65	5183.11
1064.32	5182.9
1074.91	5182.72
1281.77	5180.05
1284.77	5180
1300.41	5179.72
1324.81	5179.5
1334.95	5179.32
1357.91	5179.08
1383.32	5178.96
1399.69	5178.64
1420.91	5178.38
1449.11	5178.05
1457.41	5177.99
1463.99	5177.94
1481.34	5177.51
1528.55	5176.42

Material Boundary

X	Y
0	5195.91
36.2013	5195.37
58.4887	5195.04
87.8455	5194.6
119.674	5194.12
139.49	5193.83
187.823	5193.1
191.134	5193.05
198.329	5192.94
352.038	5190.21
395.126	5189.44
451.342	5188.44
477.88	5187.93
511.373	5187.3
613.418	5185.69
617.004	5185.63
644.218	5185
655.588	5184.8
692.222	5184.18
745.216	5183.28
762.837	5183
805.359	5182.28
814.425	5182.13
858.231	5181.39
875.564	5181.09
911.103	5180.49
934.574	5180.09
963.974	5179.6
992.185	5179.12
1016.85	5178.7
1051.56	5178.12
1064.24	5177.9
1074.84	5177.72
1281.7	5175.05
1284.68	5175
1300.34	5174.72
1324.74	5174.5
1334.87	5174.32
1357.87	5174.08
1383.26	5173.96
1399.61	5173.64
1449.07	5173.05
1457.37	5172.99
1463.91	5172.95
1481.22	5172.51
1529.3	5171.41

Material Boundary

X	Y
1528.55	5176.42
1530.07	5176.92
1540.17	5180.24
1544.4	5180.22
1545.81	5180.22
1550.23	5180.21
1558.65	5175.99

Material Boundary

X	Y
1529.3	5171.41
1531.63	5172.17
1540.96	5175.24
1544.53	5175.72

Material Boundary

X	Y
5.68434e-014	5454.95
308.07	5454.95
353.349	5454.95
356.571	5454.95
403.471	5454.95
405.014	5454.95
446.545	5454.95

Material Boundary

X	Y
1544.53	5175.72
1551.96	5176.06
1555.99	5176
1558.65	5175.99
1560.71	5175.98
1562.45	5175.97
1564.47	5175.96
1567.8	5175.98
1568.92	5175.98
1570.4	5176
1572.7	5176.05
1575.12	5176.1
1577.64	5176.05
1584.69	5177.23
1587.52	5178
1589.43	5178

1595.33	5178.02
1598	5178.02
1599.51	5178.02
1601.92	5178.01
1604.21	5178.01
1606.06	5178.02
1611.05	5178.02
1612.65	5178.02
1615.58	5178.03
1624.1	5178.74
1634.72	5179.56
1676.06	5181.61
1677.91	5181.69
1679.85	5181.31
1689.42	5179.73
1695.55	5179.88
1719.81	5180.46
1722.1	5180.51
1724.26	5180.55
1729.33	5180.77
1736.44	5181.05
1758.17	5181.51
1760.86	5181.57
1763.13	5181.59
1770	5181.77
1776.96	5182
1778.16	5182
1781.4	5182
1786.04	5182
1790.15	5181.96
1792.18	5181.97
1793.61	5181.99
1797.47	5181.99
1801.67	5181.97
1805.2	5181.98
1807.73	5182
1809.68	5182.03
1810.98	5182.03
1812.91	5182
1815.24	5182
1817.46	5182
1820.77	5182
1825.08	5182.06
1827.32	5182.1
1830.04	5182.06
1834	5182.21
1835.24	5182.23
1837.14	5182.32

1847.73	5182.9
1853.36	5183.11
1862.09	5181.97
1863.34	5182
1868.11	5183.18
1878.92	5184
1881.28	5184.04
1882.78	5184.04
1886.78	5184.25
1895.53	5184.46
1902.77	5184.55
1904.49	5184.67
1907.81	5184.94
1915.56	5185.57
1918.57	5185.89
1922.54	5186
1936.83	5187.52
1942.58	5188
1944.05	5188.08
1945.48	5188.13
1980.15	5191.45
1985.49	5192
2003.82	5193.85
2005.48	5194.02
2024.8	5196
2030.13	5196.52
2035.72	5197.07
2041.65	5197.59
2046.56	5198.01
2056.52	5198.85
2066.29	5199.61
2077.93	5200.73
2090.84	5201.99
2097.45	5202.54
2111.64	5204
2118.78	5204.74
2132.35	5206
2146.46	5207.55
2150.18	5208
2163.74	5209.5
2187.21	5212
2196.33	5213.03

Material Boundary

X	Y
430.6	5237.63
430.947	5307.07

431.24	5365.55
431.537	5425
431.537	5449.95
446.545	5454.95
461.554	5460
468.536	5460
491.57	5460
952.795	5320.23
956.93	5318.98
1007.34	5303.73
1420.91	5178.38

Material Boundary

X	Y
325.671	5195.68
377.088	5216.23
430.6	5237.63
461.554	5250
482.872	5250
491.57	5250
601.751	5194.94
610.156	5190.74

Material Boundary

X	Y
0	5193.11
2196.33	5141.83

Material Boundary

X	Y
0	5183.11
2196.33	5131.83

Material Boundary

X	Y
0	5154.97
2196.33	5122.6

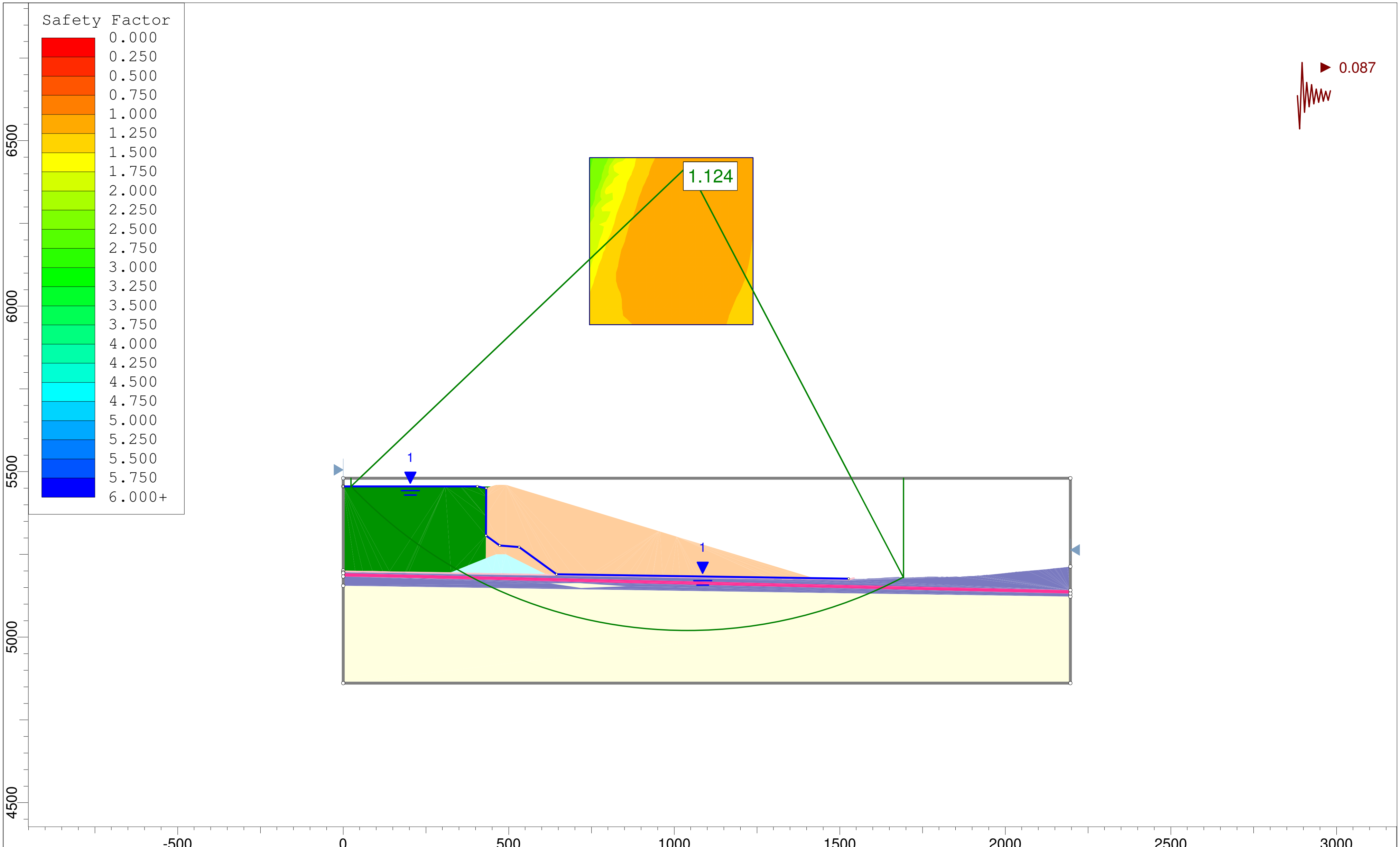
Material Boundary

X	Y
712.872	5163.35
624.336	5162.59
718.366	5148.52
856.143	5153.54

712.872	5163.35

Material Boundary

X	Y
1544.4	5180.22
1544.53	5175.72



Project	Copper Flat		
Analysis Description	Section B-B' Stability: Downstream, Pseudo Static, Circular Failure		
Drawn By GS	*Scale* 1:4812	*Company*	Golder Associates Inc.
Date	11/4/2013, 11:49:04 AM	*File Name*	4 - Section B 5460R - DS_PS_C.slim

rocscience
SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

File Name: 4 - Section B 5460R - DS_PS_C.slim
Slide Modeler Version: 6.008
Project Title: Copper Flat
Analysis: Section B-B' Stability: Downstream, Pseudo Static, Circular Failure
Author: GS
Company: Golder Associates Inc.
Date Created: 11/4/2013, 11:49:04 AM
Comments:

103-92557
Material Property Edits 12/2013

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Spencer

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check malpha < 0.2: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft3
Advanced Groundwater Method: None

Random Numbers

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius Increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Soft Clay	Clay	Cyclone Overflow
Color								
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	127	108
Cohesion [psf]		0	0	150	0			
Friction Angle [deg]		39	29	29	26.5			
Tau/Sigma Ratio								0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated			Automatically Calculated
Ru Value	0		0	0		0	0	

Shear Normal Functions

Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2

3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2

24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4

45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

Global Minimums

Method: spencer

FS: 1.123810
Center: 1040.108, 6423.072
Radius: 1403.939
Left Slip Surface Endpoint: 23.360, 5454.947
Right Slip Surface Endpoint: 1692.275, 5179.801

Left Slope Intercept : 23.360 5480.000
Right Slope Intercept: 1692.275 5480.000
Resisting Moment=1.63529e+010 lb-ft
Driving Moment=1.45513e+010 lb-ft
Resisting Horizontal Force=1.11859e+007 lb
Driving Horizontal Force=9.95361e+006 lb

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces : 2962
Number of Invalid Surfaces : 1889

Error Codes:

Error Code -103 reported for 157 surfaces
Error Code -108 reported for 295 surfaces
Error Code -110 reported for 45 surfaces
Error Code -111 reported for 1392 surfaces

Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-110 = The water table or a piezoline does not span the slip region for a given slip surface, when Water Surfaces is specified as the method of pore pressure calculation. If this error occurs, check that the water table or piezoline(s) span the appropriate soil cells.
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (spencer) - Safety Factor : 1.12381

Slice Number	Width [ft]	Weight [lbs]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	80.3806	338316	Cyclone Overflow	354.754	0	315.671	354.754	2810.07	2435.16	374.913
2	80.3806	966296	Cyclone Overflow	1014.48	0	902.715	1014.48	8202.01	6949.1	1252.91
3	80.3806	1.5053e+006	Cyclone Overflow	1580.74	0	1406.59	1580.74	13358.7	10823.5	2535.17
4	80.3806	1.96936e+006	Cyclone Overflow	2068.26	0	1840.4	2068.26	18204.1	14159.1	4044.96
5	14.7401	408360	Structural Fill	0	29	10033.1	11275.3	20341.2	0	20341.2
6	9.40962	268825	Liner Interface Zone	0	26.5	2406.31	2704.24	21804.5	16380.7	5423.85
7	10.4923	307067	Foundation Materials	150	29	10909.5	12260.2	21847.4	0	21847.4
8	20.0216	607488	Soft Clay	768.583	13.5284	5661.07	6361.96	23247.3	0	23247.3

9	52.3188	1.7336e+006	Foundation Materials	150	29	12811.5	14397.7	25703.6	0	25703.6
10	87.5896	3.31297e+006	Clay	981.666	13.0967	7249.48	8147.04	30799.3	0	30799.3
11	87.5896	3.42764e+006	Clay	1064.65	12.9565	7827.68	8796.82	33608	0	33608
12	87.5896	3.45984e+006	Clay	1124.79	12.8623	8245.76	9266.67	35657	0	35657
13	87.5896	3.42991e+006	Clay	1148.83	12.8262	8547.47	9605.73	37144.6	0	37144.6
14	87.5896	3.32815e+006	Clay	1184.63	12.774	8701.54	9778.88	37907.3	0	37907.3
15	87.5896	3.16781e+006	Clay	1184.63	12.774	8724.24	9804.39	38019.8	0	38019.8
16	87.5896	2.94728e+006	Clay	1166.63	12.8001	8598.76	9663.37	37398.2	0	37398.2
17	87.5896	2.66563e+006	Clay	1131.43	12.8523	8305.25	9333.52	35949.8	0	35949.8
18	87.5896	2.32292e+006	Clay	1064.65	12.9565	7819.93	8788.11	33570.1	0	33570.1
19	87.5896	1.9181e+006	Clay	972.667	13.1128	7106.85	7986.75	30110.9	0	30110.9
20	87.5896	1.44952e+006	Clay	826.586	13.3987	6110.62	6867.18	25358.4	0	25358.4
21	87.5896	1.02444e+006	Clay	594.901	13.9943	4365.68	4906.19	17299	0	17299
22	87.5896	671946	Clay	428.518	14.6125	3167.86	3560.08	12011.5	0	12011.5
23	31.1337	150429	Foundation Materials	150	29	6197.87	6965.23	12295	0	12295
24	20.4885	72741.5	Soft Clay	207.685	16.0664	1567.3	1761.35	5394.65	0	5394.65
25	50.1223	80817.9	Foundation Materials	150	29	0	0	-30536.4	0	-30536.4

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.12381

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	23.3603	5454.95	3.13838e-023	0	0
2	103.741	5377	203560	91903.5	24.2983
3	184.122	5310.27	762585	344293	24.2983
4	264.502	5252.82	1.54812e+006	698948	24.2983
5	344.883	5203.36	2.47237e+006	1.11623e+006	24.2983
6	359.623	5195.07	2.52886e+006	1.14174e+006	24.2984
7	369.032	5189.91	2.64233e+006	1.19296e+006	24.2982
8	379.525	5184.25	2.67833e+006	1.20922e+006	24.2984
9	399.546	5173.78	2.8615e+006	1.29191e+006	24.2982
10	451.865	5148.31	3.00094e+006	1.35487e+006	24.2983
11	539.455	5111.44	3.77111e+006	1.70259e+006	24.2983
12	627.044	5081.27	4.31978e+006	1.9503e+006	24.2983
13	714.634	5057.38	4.62901e+006	2.08991e+006	24.2983
14	802.224	5039.43	4.68003e+006	2.11295e+006	24.2983
15	889.813	5027.2	4.46182e+006	2.01443e+006	24.2983
16	977.403	5020.53	3.97363e+006	1.79402e+006	24.2983
17	1064.99	5019.35	3.22395e+006	1.45555e+006	24.2982
18	1152.58	5023.65	2.23282e+006	1.00808e+006	24.2984
19	1240.17	5033.46	1.0351e+006	467329	24.2983
20	1327.76	5048.92	-315412	-142403	24.2983
21	1415.35	5070.21	-1.73811e+006	-784727	24.2984
22	1502.94	5097.62	-2.56212e+006	-1.15675e+006	24.2983
23	1590.53	5131.53	-3.16905e+006	-1.43077e+006	24.2983
24	1621.66	5145.25	-3.50713e+006	-1.5834e+006	24.2982

25	1642.15	5154.77	-3.55818e+006	-1.60645e+006	24.2983
26	1692.27	5179.8	4.50597e-021	0	0

List Of Coordinates

Piezoline

X	Y
5.68e-014	5455
405.014	5455
431.537	5450
430.947	5307.07
472.744	5276.98
531.255	5272.32
644.321	5190
1526.22	5176.48

External Boundary

X	Y
2196.33	4861.27
2196.33	5122.6
2196.33	5131.83
2196.33	5141.83
2196.33	5213.03
2196.33	5480
0	5480
5.68434e-014	5454.95
0	5200.91
0	5195.91
0	5193.11
0	5183.11
0	5154.97
0	4861.27

Material Boundary

X	Y
0	5200.91
36.2762	5200.37
58.5636	5200.04
87.9203	5199.6
119.749	5199.12
139.564	5198.83
187.898	5198.1
191.209	5198.05
198.411	5197.94
325.671	5195.68
352.127	5195.21
395.214	5194.44

451.434	5193.44
477.974	5192.93
511.46	5192.3
610.156	5190.74
613.497	5190.69
617.098	5190.63
644.321	5190
655.674	5189.8
682.306	5189.18
745.298	5188.28
762.917	5188
805.444	5187.28
814.51	5187.13
858.316	5186.39
875.648	5186.09
911.187	5185.49
934.659	5185.09
964.059	5184.6
992.27	5184.12
1016.93	5183.7
1051.65	5183.11
1064.32	5182.9
1074.91	5182.72
1281.77	5180.05
1284.77	5180
1300.41	5179.72
1324.81	5179.5
1334.95	5179.32
1357.91	5179.08
1383.32	5178.96
1399.69	5178.64
1420.91	5178.38
1449.11	5178.05
1457.41	5177.99
1463.99	5177.94
1481.34	5177.51
1528.55	5176.42

Material Boundary

X	Y
0	5195.91
36.2013	5195.37
58.4887	5195.04
87.8455	5194.6
119.674	5194.12
139.49	5193.83
187.823	5193.1
191.134	5193.05
198.329	5192.94
352.038	5190.21

395.126	5189.44
451.342	5188.44
477.88	5187.93
511.373	5187.3
613.418	5185.69
617.004	5185.63
644.218	5185
655.588	5184.8
682.222	5184.18
745.216	5183.28
762.837	5183
805.359	5182.28
814.425	5182.13
858.231	5181.39
875.564	5181.09
911.103	5180.49
934.574	5180.09
963.974	5179.6
992.185	5179.12
1016.85	5178.7
1051.56	5178.12
1064.24	5177.9
1074.84	5177.72
1281.7	5175.05
1284.68	5175
1300.34	5174.72
1324.74	5174.5
1334.87	5174.32
1357.87	5174.08
1383.26	5173.96
1399.61	5173.64
1449.07	5173.05
1457.37	5172.99
1463.91	5172.95
1481.22	5172.51
1529.3	5171.41

Material Boundary

X	Y
1528.55	5176.42
1530.07	5176.92
1540.17	5180.24
1544.4	5180.22
1545.81	5180.22
1550.23	5180.21
1558.65	5175.99

Material Boundary

X	Y

1529.3	5171.41
1531.63	5172.17
1540.96	5175.24
1544.53	5175.72

Material Boundary

X	Y
5.68434e-014	5454.95
308.07	5454.95
353.349	5454.95
356.571	5454.95
403.471	5454.95
405.014	5454.95
446.545	5454.95

Material Boundary

X	Y
1544.53	5175.72
1551.96	5176.06
1555.99	5176
1558.65	5175.99
1560.71	5175.98
1562.45	5175.97
1564.47	5175.96
1567.8	5175.98
1568.92	5175.98
1570.4	5176
1572.7	5176.05
1575.12	5176.1
1577.64	5176.05
1584.69	5177.23
1587.52	5178
1589.43	5178
1595.33	5178.02
1598	5178.02
1599.51	5178.02
1601.92	5178.01
1604.21	5178.01
1606.06	5178.02
1611.05	5178.02
1612.65	5178.02
1615.58	5178.03
1624.1	5178.74
1634.72	5179.56
1676.06	5181.61
1677.91	5181.69
1679.85	5181.31
1689.42	5179.73
1695.55	5179.88

1719.81	5180.46
1722.1	5180.51
1724.26	5180.55
1729.33	5180.77
1736.44	5181.05
1758.17	5181.51
1760.86	5181.57
1763.13	5181.59
1770	5181.77
1776.96	5182
1778.16	5182
1781.4	5182
1786.04	5182
1790.15	5181.96
1792.18	5181.97
1793.61	5181.99
1797.47	5181.99
1801.67	5181.97
1805.2	5181.98
1807.73	5182
1809.68	5182.03
1810.98	5182.03
1812.91	5182
1815.24	5182
1817.46	5182
1820.77	5182
1825.08	5182.06
1827.32	5182.1
1830.04	5182.06
1834	5182.21
1835.24	5182.23
1837.14	5182.32
1847.73	5182.9
1853.36	5183.11
1862.09	5181.97
1863.34	5182
1868.11	5183.18
1878.92	5184
1881.28	5184.04
1882.78	5184.04
1886.78	5184.25
1895.53	5184.46
1902.77	5184.55
1904.49	5184.67
1907.81	5184.94
1915.56	5185.57
1918.57	5185.89
1922.54	5186
1936.83	5187.52
1942.58	5188
1944.05	5188.08

1945.48	5188.13
1980.15	5191.45
1985.49	5192
2003.82	5193.85
2005.48	5194.02
2024.8	5196
2030.13	5196.52
2035.72	5197.07
2041.65	5197.59
2046.56	5198.01
2056.52	5198.85
2066.29	5199.61
2077.93	5200.73
2090.84	5201.99
2097.45	5202.54
2111.64	5204
2118.78	5204.74
2132.35	5206
2146.46	5207.55
2150.18	5208
2163.74	5209.5
2187.21	5212
2196.33	5213.03

Material Boundary

X	Y
430.6	5237.63
430.947	5307.07
431.24	5365.55
431.537	5425
431.537	5449.95
446.545	5454.95
461.554	5460
468.536	5460
491.57	5460
952.795	5320.23
956.93	5318.98
1007.34	5303.73
1420.91	5178.38

Material Boundary

X	Y
325.671	5195.68
377.088	5216.23
430.6	5237.63
461.554	5250
482.872	5250
491.57	5250
601.751	5194.94

610.156	5190.74

Material Boundary

X	Y
0	5193.11
2196.33	5141.83

Material Boundary

X	Y
0	5183.11
2196.33	5131.83

Material Boundary

X	Y
0	5154.97
2196.33	5122.6

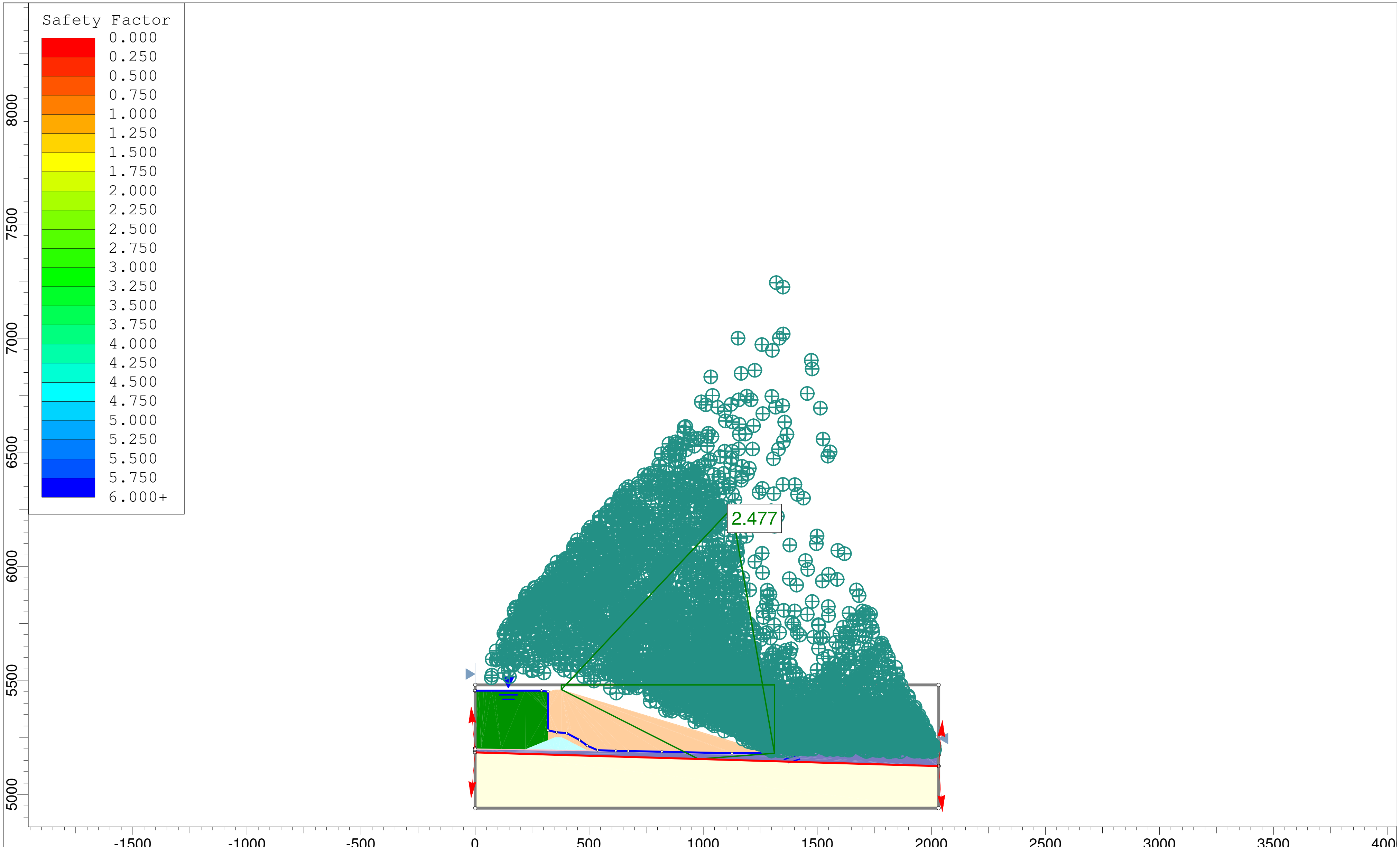
Material Boundary

X	Y
712.872	5163.35
624.336	5162.59
718.366	5148.52
856.143	5153.54
712.872	5163.35

Material Boundary

X	Y
1544.4	5180.22
1544.53	5175.72

APPENDIX H.3
STABILITY SECTION D-D’



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SLIDEINTERPRET 6.008

Project	Copper Flat
Analysis Description	Section D-D' Stability: Downstream, Static, Block Failure
Drawn By	GS
Scale	1:6984
Company	Golder Associates
Date	11/4/2013, 1:11:49 PM
File Name	1 - Section D 5460R - DS_S_B.slim

Slide Analysis Information

Copper Flat

Project Summary

- File Name: 1 - Section D 5460R - DS_S_B.slim
- Last saved with Slide version: 6.008
- Project Title: Copper Flat
- Analysis: Section D-D' Stability: Downstream, Static, Block Failure
- Author: GS
- Company: Golder Associates
- Date Created: 11/4/2013, 1:11:49 PM
- Comments:
    - 103-92557
    - Material Property Edits 12/2013

General Settings

- Units of Measurement: Imperial Units
- Time Units: days
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 62.4 lbs/ft3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 265
- Right Projection Angle (Start Angle): 85
- Right Projection Angle (End Angle): -85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Clay	Cyclone Overflow
Color							
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	108
Cohesion [psf]		0	0	150	0		
Friction Angle [deg]		39	29	29	26.5		
Tau/Sigma							0.2

Ratio							
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated		Automatically Calculated
Ru Value	0		0	0		0	

Shear Normal Functions

- Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9

12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6

26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7

40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

List Of Coordinates

Piezoline

X	Y
-8.88178e-016	5455
291.649	5455
319.83	5450
319.649	5281.62
357.393	5272.94
401.861	5268.39
458.094	5238.85
491.717	5213.7
536.883	5193.72
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1279.93	5180.24
1353.21	5180.5
1354	5180.55
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1388.41	5182.87

Block Search Lines

X	Y
0	5184.09
2031.79	5123.76

External Boundary

X	Y
2031.79	4940
2031.79	5123.76
2031.79	5123.76
2031.79	5172.24
2031.79	5172.24
2031.79	5480
0	5480
-8.88178e-016	5455
-3.55271e-015	5201.58
-3.55271e-015	5201.58
-7.10543e-015	5196.58
-7.10543e-015	5196.58
0	5184.09
0	5184.09
0	4940

Material Boundary

X	Y
1406.35	5183.84
1408.84	5183.95
1410.54	5184.06
1414.71	5184.02
1418.24	5184
1421.09	5183.84
1426.9	5183.53
1435.44	5183.45
1446.75	5183.04

1450.41	5182.94
1453.47	5182.87
1477.47	5182.4
1490.36	5182.08
1497.22	5182.06
1503.44	5182.02
1504.84	5182.01
1506.36	5181.99
1507.61	5181.99
1539.7	5181.03
1562.99	5180.38
1590.77	5179.52
1604.77	5179.2
1626.36	5179.14
1657.9	5178.67
1691.72	5178.02
1694.27	5178.02
1699.51	5178
1701.22	5177.98
1702.96	5177.97
1709.66	5177.96
1721.49	5177.64
1740.86	5177.19
1748.22	5177.04
1762.45	5176.63
1778.98	5176.04
1786.55	5175.98
1791.65	5175.94
1792.96	5175.93
1802.43	5175.92
1809.8	5175.69
1828.02	5175.27
1831.2	5175.26
1834.51	5175.24
1842.98	5175.12
1849.95	5175.02
1853.03	5175.01
1856.22	5174.99
1878.02	5174.81
1913.35	5174.36
1921.87	5174.26
1934.29	5174.01
1945.09	5173.97
1947.38	5173.97
1949.12	5173.96
1950.59	5173.96
1961.99	5173.92
1965.58	5173.92
1968.23	5173.92
1981.99	5173.38
1998.24	5173.03
2031.79	5172.24

Material Boundary

X	Y
318.893	5237.63
319.552	5369.37
319.83	5450
325.925	5452.03
334.831	5455
349.832	5460
369.265	5460
379.833	5460
1302.77	5180.32

Material Boundary

X	Y
-3.55271e-015	5201.58
26.3295	5201.18
114.486	5199.85
220.393	5198.23
229.978	5198.08
339.831	5196.4
363.815	5196.12
399.834	5195.69
458.245	5194.82
491.186	5194.33
513.77	5193.99
588.916	5192.09
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1137.58	5179.74
1279.93	5180.24
1302.77	5180.32
1345.35	5180.47
1353.6	5180.52
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1387.79	5182.66
1392.43	5184.19
1403.23	5187.77
1406.35	5187.77
1413.26	5187.76
1416.88	5185.95
1418.29	5185.25
1421.09	5183.84

Material Boundary

X	Y
-7.10543e-015	5196.58
26.2539	5196.18
114.41	5194.85
229.902	5193.08
339.764	5191.4
363.756	5191.12
399.767	5190.69
458.17	5189.82
513.67	5188.99
588.796	5187.09
617.104	5186.46
671.463	5185.23
818.576	5181.92
1126.37	5175
1137.53	5174.74
1279.95	5175.24

1345.37	5175.47
1353.84	5175.53
1368.19	5176.44
1376.37	5176.96
1380.17	5177.05
1385.31	5177.07
1386.81	5177.14
1389.36	5177.91
1394	5179.45
1404.03	5182.77
1406.35	5182.77

Material Boundary

X	Y
220.393	5198.23
299.17	5229.74
318.893	5237.63
349.832	5250
375.024	5250
379.833	5250
413.352	5233.24
421.524	5229.16
434.805	5222.52
491.186	5194.33

Material Boundary

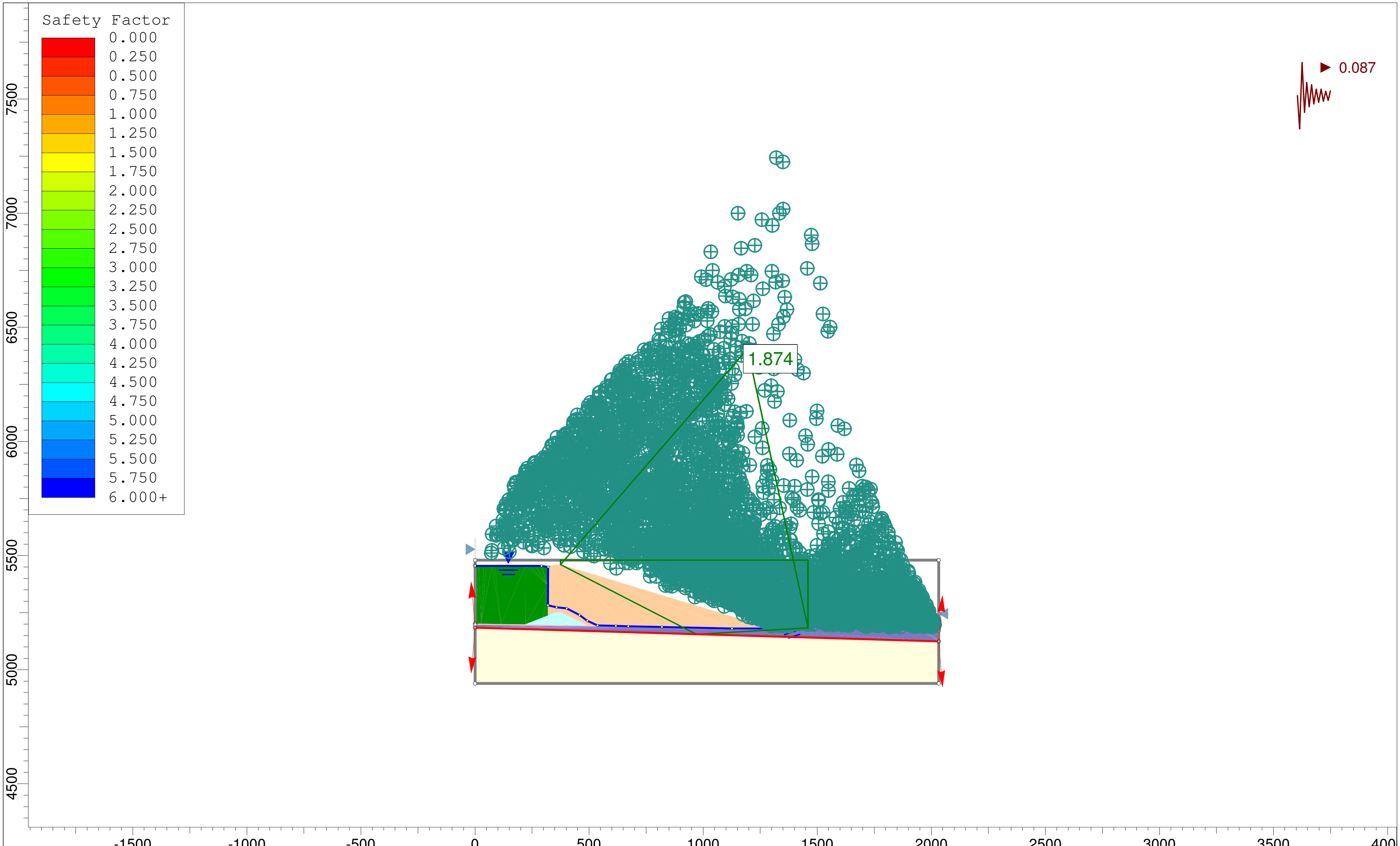
X	Y
-8.88178e-016	5455
3.52609	5455
16.375	5455
38.2237	5455
50.9444	5455
72.93	5455
85.5063	5455
219.596	5455
235.945	5455
243.614	5455
261.097	5455
267.631	5455
286.669	5455
291.649	5455
312.952	5455
315.667	5455
334.831	5455

Material Boundary

X	Y
1406.35	5182.77
1406.35	5183.84
1406.35	5187.77

Material Boundary

X	Y
0	5184.09
2031.79	5123.76



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SLIDEINTERPRET 6.008

Project	Copper Flat
Analysis Description	Section D-D' Stability: Downstream, Pseudo Static, Block Failure
Drawn By GS	*Scale* 1:6984
Company	Golder Associates
Date 11/4/2013, 1:11:49 PM	*File Name* 2 - Section D 5460R - DS_PS_B.slim

Slide Analysis Information

Copper Flat

Project Summary

- File Name: 2 - Section D 5460R - DS_PS_B.slim
- Last saved with Slide version: 6.008
- Project Title: Copper Flat
- Analysis: Section D-D' Stability: Downstream, Pseudo Static, Block Failure
- Author: GS
- Company: Golder Associates
- Date Created: 11/4/2013, 1:11:49 PM
- Comments:
    - 103-92557
    - Material properties edits 12/2013

General Settings

- Units of Measurement: Imperial Units
- Time Units: days
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 62.4 lbs/ft3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Non-Circular Block Search
- Number of Surfaces: 5000
- Pseudo-Random Surfaces: Enabled
- Convex Surfaces Only: Disabled
- Left Projection Angle (Start Angle): 95
- Left Projection Angle (End Angle): 265
- Right Projection Angle (Start Angle): 85
- Right Projection Angle (End Angle): -85
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Loading

- Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Clay	Cyclone Overflow
Color							
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Strength=F(overburden)
Unit Weight	1e-025	113	120	120	120	127	108

[lbs/ft3]							
Cohesion [psf]		0	0	150	0		
Friction Angle [deg]		39	29	29	26.5		
Tau/Sigma Ratio							0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated		Automatically Calculated
Ru Value	0		0	0		0	

Shear Normal Functions

- Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2

32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

List Of Coordinates

Piezoline

X	Y
-8.88178e-016	5455
291.649	5455
319.83	5450
319.649	5281.62
357.393	5272.94
401.861	5268.39
458.094	5238.85
491.717	5213.7
536.883	5193.72
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1279.93	5180.24
1353.21	5180.5
1354	5180.55
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1388.41	5182.87

Block Search Lines

X	Y
0	5184.09
2031.79	5123.76

External Boundary

X	Y
2031.79	4940
2031.79	5123.76
2031.79	5123.76
2031.79	5172.24
2031.79	5172.24
2031.79	5480
0	5480
-8.88178e-016	5455
-3.55271e-015	5201.58
-3.55271e-015	5201.58
-7.10543e-015	5196.58

-7.10543e-015	5196.58
0	5184.09
0	5184.09
0	4940

Material Boundary

X	Y
1406.35	5183.84
1408.84	5183.95
1410.54	5184.06
1414.71	5184.02
1418.24	5184
1421.09	5183.84
1426.9	5183.53
1435.44	5183.45
1446.75	5183.04
1450.41	5182.94
1453.47	5182.87
1477.47	5182.4
1490.36	5182.08
1497.22	5182.06
1503.44	5182.02
1504.84	5182.01
1506.36	5181.99
1507.61	5181.99
1539.7	5181.03
1562.99	5180.38
1590.77	5179.52
1604.77	5179.2
1626.36	5179.14
1657.9	5178.67
1691.72	5178.02
1694.27	5178.02
1699.51	5178
1701.22	5177.98
1702.96	5177.97
1709.66	5177.96
1721.49	5177.64
1740.86	5177.19
1748.22	5177.04
1762.45	5176.63
1778.98	5176.04
1786.55	5175.98
1791.65	5175.94
1792.96	5175.93
1802.43	5175.92
1809.8	5175.69
1828.02	5175.27
1831.2	5175.26
1834.51	5175.24
1842.98	5175.12
1849.95	5175.02
1853.03	5175.01
1856.22	5174.99
1878.02	5174.81
1913.35	5174.36
1921.87	5174.26
1934.29	5174.01
1945.09	5173.97
1947.38	5173.97
1949.12	5173.96
1950.59	5173.96
1961.99	5173.92
1965.58	5173.92
1968.23	5173.92
1981.99	5173.38
1998.24	5173.03
2031.79	5172.24

Material Boundary

X	Y
318.893	5237.63
319.552	5369.37
319.83	5450
325.925	5452.03
334.831	5455
349.832	5460
369.265	5460
379.833	5460
1302.77	5180.32

Material Boundary

X	Y
-3.55271e-015	5201.58
26.3295	5201.18
114.486	5199.85
220.393	5198.23
229.978	5198.08
339.831	5196.4
363.815	5196.12
399.834	5195.69
458.245	5194.82
491.186	5194.33
513.77	5193.99
588.916	5192.09
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1137.58	5179.74
1279.93	5180.24
1302.77	5180.32
1345.35	5180.47
1353.6	5180.52
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1387.79	5182.66
1392.43	5184.19
1403.23	5187.77
1406.35	5187.77
1413.26	5187.76
1416.88	5185.95
1418.29	5185.25
1421.09	5183.84

Material Boundary

X	Y
-7.10543e-015	5196.58
26.2539	5196.18
114.41	5194.85
229.902	5193.08
339.764	5191.4
363.756	5191.12
399.767	5190.69
458.17	5189.82
513.67	5188.99
588.796	5187.09
617.104	5186.46
671.463	5185.23
818.576	5181.92
1126.37	5175
1137.53	5174.74
1279.95	5175.24
1345.37	5175.47
1353.84	5175.53
1368.19	5176.44
1376.37	5176.96
1380.17	5177.05
1385.31	5177.07
1386.81	5177.14
1389.36	5177.91
1394	5179.45
1404.03	5182.77
1406.35	5182.77

Material Boundary

X	Y
220.393	5198.23
299.17	5229.74
318.893	5237.63
349.832	5250
375.024	5250
379.833	5250
413.352	5233.24
421.524	5229.16
434.805	5222.52

491.186	5194.33

Material Boundary

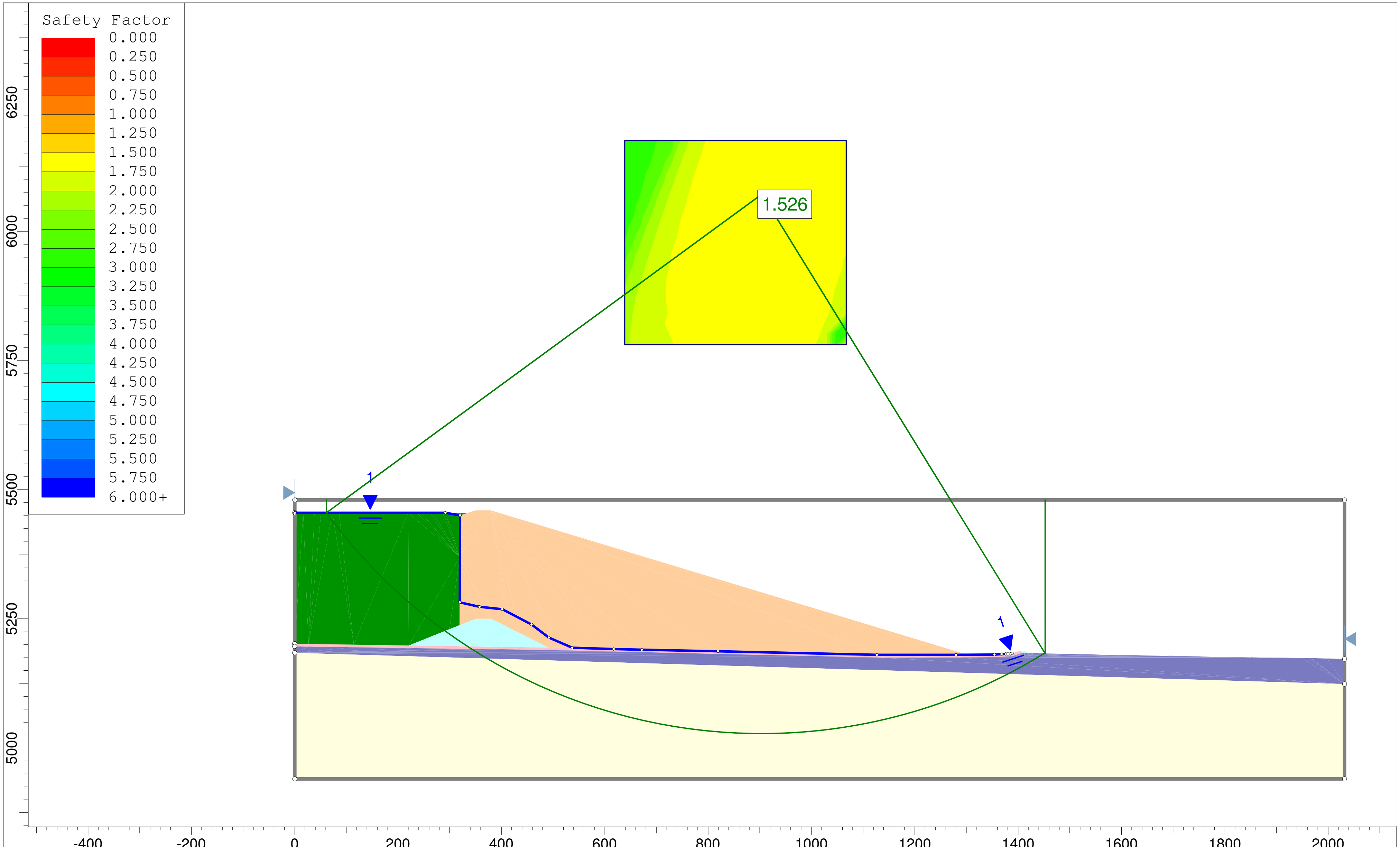
X	Y
-8.88178e-016	5455
3.52609	5455
16.375	5455
38.2237	5455
50.9444	5455
72.93	5455
85.5063	5455
219.596	5455
235.945	5455
243.614	5455
261.097	5455
267.631	5455
286.669	5455
291.649	5455
312.952	5455
315.667	5455
334.831	5455

Material Boundary

X	Y
1406.35	5182.77
1406.35	5183.84
1406.35	5187.77

Material Boundary

X	Y
0	5184.09
2031.79	5123.76



SLIDEINTERPRET 6.008

Project	Copper Flat		
Analysis Description	Section D-D' Stability: Downstream, Static, Circular Failure		
Drawn By GS	*Scale* 1:3083	*Company*	Golder Associates
Date	11/4/2013, 1:11:49 PM	*File Name*	3 - Section D 5460R - DS_S_C.slim

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

- File Name: 3 - Section D 5460R - DS_S_C.slim
- Last saved with Slide version: 6.008
- Project Title: Copper Flat
- Analysis: Section D-D' Stability: Downstream, Static, Circular Failure
- Author: GS
- Company: Golder Associates
- Date Created: 11/4/2013, 1:11:49 PM
- Comments:

    - 103-92557
    - Material Property Edits 12/2013

General Settings

- Units of Measurement: Imperial Units
- Time Units: days
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

    - Spencer

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 62.4 lbs/ft3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 10
- Composite Surfaces: Disabled
- Reverse Curvature: Create Tension Crack
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Clay	Cyclone Overflow
Color							
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	108
Cohesion [psf]		0	0	150	0		
Friction Angle [deg]		39	29	29	26.5		
Tau/Sigma Ratio							0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	Piezometric Line 1

Hu Value		Automatically Calculated			Automatically Calculated		Automatically Calculated
Ru Value	0		0	0		0	

Shear Normal Functions

- Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8
36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5

43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

List Of Coordinates

Piezoline

X	Y
-8.88178e-016	5455
291.649	5455
319.83	5450
319.649	5281.62
357.393	5272.94
401.861	5268.39
458.094	5238.85
491.717	5213.7
536.883	5193.72
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1279.93	5180.24
1353.21	5180.5
1354	5180.55
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1388.41	5182.87

Block Search Lines

X	Y
0	5184.09
2031.79	5123.76

External Boundary

X	Y
2031.79	4940
2031.79	5123.76
2031.79	5123.76
2031.79	5172.24
2031.79	5172.24
2031.79	5480
0	5480
-8.88178e-016	5455
-3.55271e-015	5201.58
-3.55271e-015	5201.58
-7.10543e-015	5196.58
-7.10543e-015	5196.58
0	5184.09
0	5184.09
0	4940

Material Boundary

X	Y
1406.35	5183.84
1408.84	5183.95
1410.54	5184.06
1414.71	5184.02
1418.24	5184
1421.09	5183.84
1426.9	5183.53
1435.44	5183.45
1446.75	5183.04
1450.41	5182.94
1453.47	5182.87
1477.47	5182.4
1490.36	5182.08
1497.22	5182.06
1503.44	5182.02
1504.84	5182.01

1506.36	5181.99
1507.61	5181.99
1539.7	5181.03
1562.99	5180.38
1590.77	5179.52
1604.77	5179.2
1626.36	5179.14
1657.9	5178.67
1691.72	5178.02
1694.27	5178.02
1699.51	5178
1701.22	5177.98
1702.96	5177.97
1709.66	5177.96
1721.49	5177.64
1740.86	5177.19
1748.22	5177.04
1762.45	5176.63
1778.98	5176.04
1786.55	5175.98
1791.65	5175.94
1792.96	5175.93
1802.43	5175.92
1809.8	5175.69
1828.02	5175.27
1831.2	5175.26
1834.51	5175.24
1842.98	5175.12
1849.95	5175.02
1853.03	5175.01
1856.22	5174.99
1878.02	5174.81
1913.35	5174.36
1921.87	5174.26
1934.29	5174.01
1945.09	5173.97
1947.38	5173.97
1949.12	5173.96
1950.59	5173.96
1961.99	5173.92
1965.58	5173.92
1968.23	5173.92
1981.99	5173.38
1998.24	5173.03
2031.79	5172.24

Material Boundary

X	Y
318.893	5237.63
319.552	5369.37
319.83	5450
325.925	5452.03
334.831	5455
349.832	5460
369.265	5460
379.833	5460
1302.77	5180.32

Material Boundary

X	Y
-3.55271e-015	5201.58
26.3295	5201.18
114.486	5199.85
220.393	5198.23
229.978	5198.08
339.831	5196.4
363.815	5196.12
399.834	5195.69
458.245	5194.82
491.186	5194.33
513.77	5193.99
588.916	5192.09
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1137.58	5179.74
1279.93	5180.24
1302.77	5180.32
1345.35	5180.47
1353.6	5180.52
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1387.79	5182.66
1392.43	5184.19
1403.23	5187.77
1406.35	5187.77
1413.26	5187.76
1416.88	5185.95
1418.29	5185.25
1421.09	5183.84

Material Boundary

X	Y
-7.10543e-015	5196.58
26.2539	5196.18
114.41	5194.85
229.902	5193.08
339.764	5191.4
363.756	5191.12
399.767	5190.69
458.17	5189.82
513.67	5188.99
588.796	5187.09
617.104	5186.46
671.463	5185.23
818.576	5181.92
1126.37	5175
1137.53	5174.74
1279.95	5175.24
1345.37	5175.47
1353.84	5175.53
1368.19	5176.44
1376.37	5176.96
1380.17	5177.05
1385.31	5177.07
1386.81	5177.14

1389.36	5177.91
1394	5179.45
1404.03	5182.77
1406.35	5182.77

Material Boundary

X	Y
1406.35	5182.77
1406.35	5183.84
1406.35	5187.77

Material Boundary

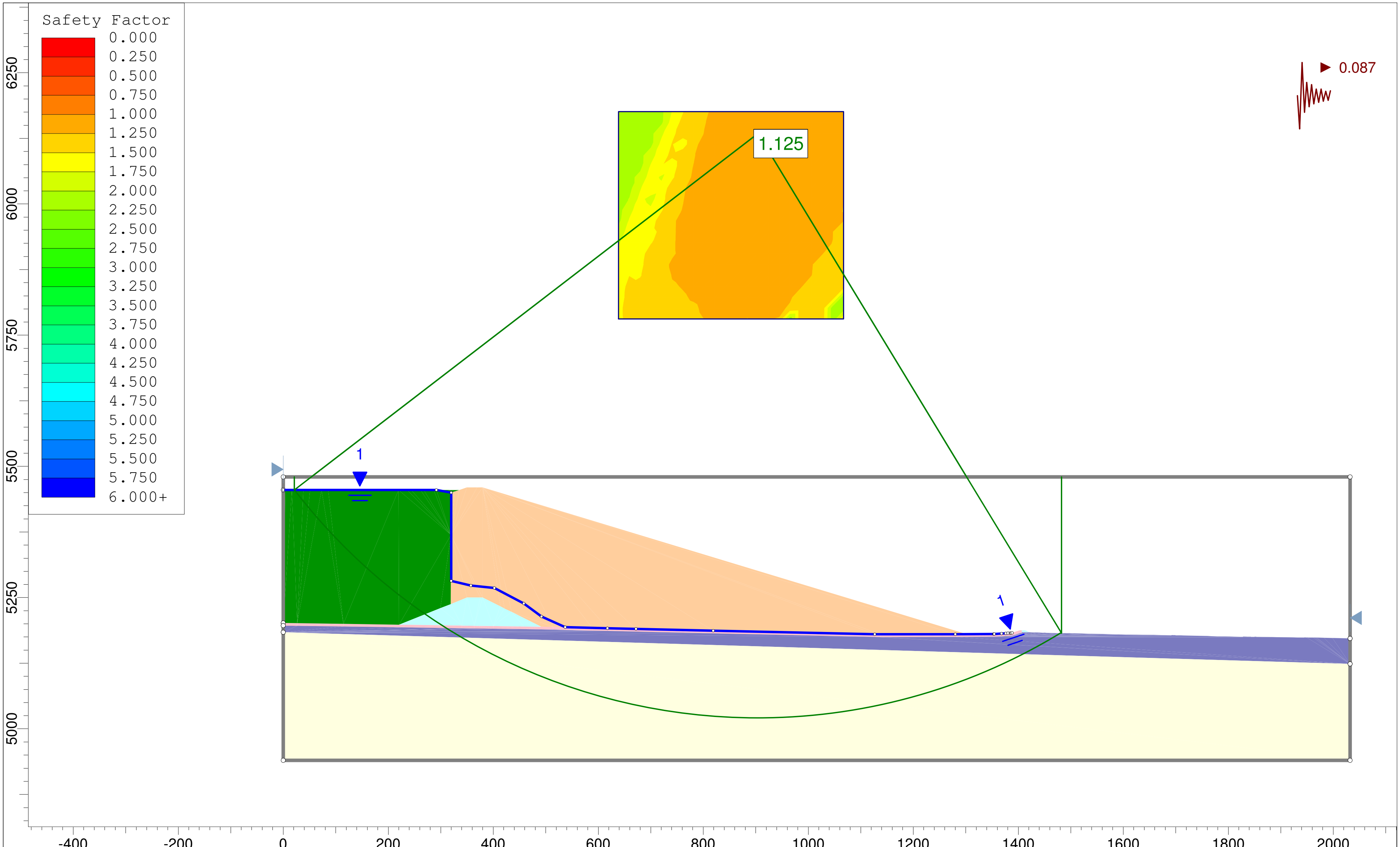
X	Y
220.393	5198.23
299.17	5229.74
318.893	5237.63
349.832	5250
375.024	5250
379.833	5250
413.352	5233.24
421.524	5229.16
434.805	5222.52
491.186	5194.33

Material Boundary

X	Y
0	5184.09
2031.79	5123.76

Material Boundary

X	Y
-8.88178e-016	5455
3.52609	5455
16.375	5455
38.2237	5455
50.9444	5455
72.93	5455
85.5063	5455
219.596	5455
235.945	5455
243.614	5455
261.097	5455
267.631	5455
286.669	5455
291.649	5455
312.952	5455
315.667	5455
334.831	5455



Project	Copper Flat		
Analysis Description	Section D-D' Stability: Downstream, Pseudo Static, Circular Failure		
Drawn By GS	*Scale* 1:3035	*Company*	Golder Associates
Date	11/4/2013, 1:11:49 PM	*File Name*	4 - Section D 5460R - DS_PS_C.slim

SLIDEINTERPRET 6.008

SLIDEINTERPRET 6.008

Slide Analysis Information

Copper Flat

Project Summary

- File Name: 4 - Section D 5460R - DS_PS_C.slim
- Last saved with Slide version: 6.008
- Project Title: Copper Flat
- Analysis: Section D-D' Stability: Downstream, Pseudo Static, Circular Failure
- Author: GS
- Company: Golder Associates
- Date Created: 11/4/2013, 1:11:49 PM
- Comments:
    - 103-92557
    - Material Property Edits 12/2013

General Settings

- Units of Measurement: Imperial Units
- Time Units: days
- Permeability Units: feet/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Spencer

- Number of slices: 50
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 62.4 lbs/ft3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 10
- Composite Surfaces: Disabled
- Reverse Curvature: Create Tension Crack
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Loading

- Seismic Load Coefficient (Horizontal): 0.087

Material Properties

Property	Air	Cyclone Underflow	Structural Fill	Foundation Materials	Liner Interface Zone	Clay	Cyclone Overflow
Color							
Strength Type	No strength	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Shear Normal function	Strength=F(overburden)
Unit Weight [lbs/ft3]	1e-025	113	120	120	120	127	108
Cohesion [psf]		0	0	150	0		

Friction Angle [deg]		39	29	29	26.5		
Tau/Sigma Ratio							0.2
Water Surface	None	Piezometric Line 1	None	None	Piezometric Line 1	None	Piezometric Line 1
Hu Value		Automatically Calculated			Automatically Calculated		Automatically Calculated
Ru Value	0		0	0		0	

Shear Normal Functions

- Name: User Defined 1

Normal (psf)	Shear (psf)
0.417709	0.4
418.126	186
835.835	342
1253.54	488.3
1671.25	628.8
2088.96	765
2506.67	897.9
2924.38	1028.2
3342.09	1156.3
3759.8	1282.4
4177.5	1406.8
4595.21	1529.8
5012.92	1651.4
5430.63	1771.7
5848.34	1891
6266.05	2009.2
6683.76	2126.5
7101.46	2242.9
7519.17	2358.5
7936.88	2473.3
8354.59	2587.3
8772.3	2700.7
9190.01	2813.5
9607.72	2925.6
10025.4	3037.1
10443.1	3148.1
10860.8	3258.5
11278.5	3368.5
11696.3	3477.9
12114	3586.8
12531.7	3695.4
12949.4	3803.4
13367.1	3911.1
13784.8	4018.3
14202.5	4125.2
14620.2	4231.7
15037.9	4337.8
15455.6	4443.5
15873.3	4548.9
16291.1	4654
16708.8	4758.8
17126.5	4863.2
17544.2	4967.3
17961.9	5071.1
18379.6	5174.7
18797.3	5277.9
19215	5380.9
19632.7	5483.6
20050.4	5586.1
20468.1	5688.2
20885.8	5790.2
21303.6	5891.9
21721.3	5993.3
22139	6094.5
22556.7	6195.5
22974.4	6296.3
23392.1	6396.8
23809.8	6497.1
24227.5	6597.2
24645.2	6697.1
25062.9	6796.8
25480.6	6896.3
25898.4	6995.6
26316.1	7094.7
26733.8	7193.6
27151.5	7292.4
27569.2	7390.9
27986.9	7489.3
28404.6	7587.5
28822.3	7685.5
29240	7783.3
29657.7	7881
30075.4	7978.5
30493.1	8075.8
30910.9	8173
31328.6	8270
31746.3	8366.9
32164	8463.6
32581.7	8560.2
32999.4	8656.6
33417.1	8752.9
33834.8	8849
34252.5	8945
34670.2	9040.8
35087.9	9136.5
35505.6	9232.1
35923.4	9327.5
36341.1	9422.8

36758.8	9517.9
37176.5	9613
37594.2	9707.9
38011.9	9802.6
38429.6	9897.3
38847.3	9991.8
39265	10086.2
39682.7	10180.5
40100.4	10274.7
40518.2	10368.7
40935.9	10462.6
41353.6	10556.4
41771.3	10650.1
42189	10743.7
42606.7	10837.2
43024.4	10930.5
43442.1	11023.8
43859.8	11116.9
44277.5	11210
44695.2	11302.9
45112.9	11395.7
45530.7	11488.4
45948.4	11581
46366.1	11673.6
46783.8	11766
47201.5	11858.3
47619.2	11950.5
48036.9	12042.6
48454.6	12134.7
48872.3	12226.6
49290	12318.4
49707.7	12410.2
50125.4	12501.8
50543.2	12593.4
50960.9	12684.8
51378.6	12776.2
51796.3	12867.5
52214	12958.7
52631.7	13049.8
53049.4	13140.8
53467.1	13231.7
53884.8	13322.6
54302.5	13413.3
54720.2	13504
55138	13594.6
55555.7	13685.1
55973.4	13775.5
56391.1	13865.9
56808.8	13956.1
57226.5	14046.3
57644.2	14136.4
58061.9	14226.5
58479.6	14316.4
58897.3	14406.3
59315	14496.1
59732.7	14585.8
60150.5	14675.5
60568.2	14765
60985.9	14854.5
61403.6	14943.9
61821.3	15033.3
62239	15122.6
62656.7	15211.8

List Of Coordinates

Piezoline

X	Y
-8.88178e-016	5455
291.649	5455
319.83	5450
319.649	5281.62
357.393	5272.94
401.861	5268.39
458.094	5238.85
491.717	5213.7
536.883	5193.72
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1279.93	5180.24
1353.21	5180.5
1354	5180.55
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1388.41	5182.87

Block Search Lines

X	Y
0	5184.09
2031.79	5123.76

External Boundary

X	Y
2031.79	4940
2031.79	5123.76
2031.79	5123.76
2031.79	5172.24
2031.79	5172.24
2031.79	5480
0	5480
-8.88178e-016	5455
-3.55271e-015	5201.58
-3.55271e-015	5201.58
-7.10543e-015	5196.58
-7.10543e-015	5196.58
0	5184.09
0	5184.09
0	4940

Material Boundary

X	Y

1406.35	5183.84
1408.84	5183.95
1410.54	5184.06
1414.71	5184.02
1418.24	5184
1421.09	5183.84
1426.9	5183.53
1435.44	5183.45
1446.75	5183.04
1450.41	5182.94
1453.47	5182.87
1477.47	5182.4
1490.36	5182.08
1497.22	5182.06
1503.44	5182.02
1504.84	5182.01
1506.36	5181.99
1507.61	5181.99
1539.7	5181.03
1562.99	5180.38
1590.77	5179.52
1604.77	5179.2
1626.36	5179.14
1657.9	5178.67
1691.72	5178.02
1694.27	5178.02
1699.51	5178
1701.22	5177.98
1702.96	5177.97
1709.66	5177.96
1721.49	5177.64
1740.86	5177.19
1748.22	5177.04
1762.45	5176.63
1778.98	5176.04
1786.55	5175.98
1791.65	5175.94
1792.96	5175.93
1802.43	5175.92
1809.8	5175.69
1828.02	5175.27
1831.2	5175.26
1834.51	5175.24
1842.98	5175.12
1849.95	5175.02
1853.03	5175.01
1856.22	5174.99
1878.02	5174.81
1913.35	5174.36
1921.87	5174.26
1934.29	5174.01
1945.09	5173.97
1947.38	5173.97
1949.12	5173.96
1950.59	5173.96
1961.99	5173.92
1965.58	5173.92
1968.23	5173.92
1981.99	5173.38
1998.24	5173.03
2031.79	5172.24

Material Boundary

X	Y
318.893	5237.63
319.552	5369.37
319.83	5450
325.925	5452.03
334.831	5455
349.832	5460
369.265	5460
379.833	5460
1302.77	5180.32

Material Boundary

X	Y
-3.55271e-015	5201.58
26.3295	5201.18
114.486	5199.85
220.393	5198.23
229.978	5198.08
339.831	5196.4
363.815	5196.12
399.834	5195.69
458.245	5194.82
491.186	5194.33
513.77	5193.99
588.916	5192.09
617.217	5191.45
671.576	5190.23
818.688	5186.92
1126.48	5180
1137.58	5179.74
1279.93	5180.24
1302.77	5180.32
1345.35	5180.47
1353.6	5180.52
1367.88	5181.43
1376.15	5181.96
1380.11	5182.05
1385.14	5182.07
1386.21	5182.14
1387.79	5182.66
1392.43	5184.19
1403.23	5187.77
1406.35	5187.77
1413.26	5187.76
1416.88	5185.95
1418.29	5185.25
1421.09	5183.84

Material Boundary

X	Y
-7.10543e-015	5196.58
26.2539	5196.18
114.41	5194.85
229.902	5193.08
339.764	5191.4
363.756	5191.12
399.767	5190.69

458.17	5189.82
513.67	5188.99
588.796	5187.09
617.104	5186.46
671.463	5185.23
818.576	5181.92
1126.37	5175
1137.53	5174.74
1279.95	5175.24
1345.37	5175.47
1353.84	5175.53
1368.19	5176.44
1376.37	5176.96
1380.17	5177.05
1385.31	5177.07
1386.81	5177.14
1389.36	5177.91
1394	5179.45
1404.03	5182.77
1406.35	5182.77

Material Boundary

X	Y
220.393	5198.23
299.17	5229.74
318.893	5237.63
349.832	5250
375.024	5250
379.833	5250
413.352	5233.24
421.524	5229.16
434.805	5222.52
491.186	5194.33

Material Boundary

X	Y
-8.88178e-016	5455
3.52609	5455

16.375	5455
38.2237	5455
50.9444	5455
72.93	5455
85.5063	5455
219.596	5455
235.945	5455
243.614	5455
261.097	5455
267.631	5455
286.669	5455
291.649	5455
312.952	5455
315.667	5455
334.831	5455

Material Boundary

X	Y
1406.35	5182.77
1406.35	5183.84
1406.35	5187.77

Material Boundary

X	Y
0	5184.09
2031.79	5123.76

APPENDIX I
FOUNDATION SETTLEMENT POTENTIAL EVALUATION

APPENDIX I.1
SETTLEMENT POTENTIAL, COPPER FLAT TAILINGS EMBANKMENT FOUNDATION

Golder Associates

CALCULATIONS

Date:	April 23, 2013	**Made by:**	DP
Project No.:	103-92557	**Checked by:**	GM
Subject:	Settlement Potential, Copper Flat Tailings Embankment Foundation	**Reviewed by:**	MJG
Project Short Title:	**COPPER FLAT FEASIBILITY STUDY TAILINGS DISPOSAL FACILITY DESIGN**		

1.0 OBJECTIVE

Evaluate the consolidation characteristics of the soil strata, and estimate the post-construction subgrade settlement under the containment embankments for the Copper Flat Tailings Impoundment.

2.0 BACKGROUND

Golder is completing the feasibility level designing of the Copper Flat tailings impoundment embankment which will impound slurried tailings to an estimated maximum depth of approximately 230 feet at the impoundment embankment. An earthen starter dam will be constructed to a height of approximately 50 feet and the remainder of the dam will be constructed with sand recovered from the tailings in a cyclone plant. A geotechnical investigation was performed in the vicinity of the proposed embankment, which included standard penetration testing and sample collection from the surface to a depth of 53 feet. Drilling indicated that the tailings embankment area consists primarily of alluvial deposits that include silt, sand and gravel, underlain by clay.

For the settlement analysis, representative samples of the foundation strata were analyzed in Golder's geotechnical laboratory for index properties, gradation, and Atterberg limits. Additionally, select samples were remolded in the laboratory, and the remolded samples were subjected to one-dimensional consolidation testing. The results are summarized in the following sections.

Drill hole logs were input onto a site plan and cross-sections through the embankment were developed. Two cross-sections (B-B' and D-D') were further developed for settlement potential analyses with the addition of information from the site investigation conducted in 1980 for the former Quintana mining operation (*Tailings Dam and Disposal Area, Quintana Minerals Corporation, Copper Flats Project, Golddust, New Mexico*, Sergent Hauskins and Beckwith, 1980). Generalized soil and rock designations were assigned to the strata.

Settlement calculations were developed for the post-construction embankment, which represents the worst-case condition. Staged settlement was not analyzed because the results for the post-construction condition demonstrate that the amount of predicted settlement (approximately 2.1 feet under the heaviest loaded portion of embankment) is tolerable, and, will be adequately mitigated by fill placement during ongoing embankment construction.

Settlement calculations were performed using the computer model SETTLE3D v. 2.0, a computer program developed by Rocscience, Inc. for the analysis of settlement and consolidation under foundations and embankments.

The results of the consolidation tests performed on the samples obtained during geotechnical investigations are included in Attachment 1. Tables summarizing the laboratory consolidation test results and the computer modeling input parameters are included in Attachment 2. The SETTLE3D computer model output files are included in Attachment 3. Figures depicting the two embankment sections

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analyzed for foundation settlement, as well as a graphical representation of the analysis results, are included in Attachment 4.

3.0 LABORATORY ANALYSIS

Laboratory one-dimensional consolidation analyses were performed on representative samples obtained during the geotechnical investigation. The results of the geotechnical laboratory analyses are summarized in the Tables included in Attachment 1. Consolidation tests were generally conducted on the fine grain fraction of the soil- strata, on remolded drill hole samples.

As shown, the soil strata generally have compression index values (Cc) ranging from 0.035 to 0.09, and estimated initial void ratio values ranging from 0.71 to 0.75. The compression index results were obtained from review of the laboratory graphs of void ratio versus stress, and were obtained for loads ranging from 16 to 32 kilopounds per square foot (ksf).

4.0 COMPUTER MODELING

Computer modeling was performed using SETTLE3D v. 2.0. The results of the modeling are included in Attachment 3.

The following parameters were incorporated into the analyses:

- Settlement Index (Cc) values obtained from laboratory testing of soil fraction of field samples.
- Initial void ratio (e_0) values estimated from review of the consolidation test graphs.
- Unit weights estimated from the consolidation test results, and based on previous experience with similar soils.
- An overconsolidation ratio (OCR) of 1.0 assumed.
- A Poisson's Ratio of 0.3 was assumed, based on a published range of values from 0.2 to 0.4 for sandy clays.
- The model was initialized for primary consolidation, with non-linear settlement characteristics.

A conservative value of 4,000 ksf was assigned for the constrained modulus of the coarse sand and gravel, caliche and weathered basalt layers. The constrained modulus was assigned to represent inter-particle consolidation in the gravels and sands. Settlement in these layers was demonstrated to be minimal, even with the conservative modulus value used in the model. (Reference: US Army Corps of Engineers, EM 1110-1-1904, 1990).

Modeling was performed on an individual point basis, at a minimum of 5 analysis points on each embankment cross-section. The model was initialized for 1-dimensional Boussinesq Methodology.

5.0 RESULTS

5.1 Settlement Beneath Embankment

The results of the consolidation analyses are summarized on Figures 5 and 7 in Attachment 4. As shown on the figures, calculated settlement beneath the impoundment embankment ranges from approximately 2.1 to 0.2 feet, with settlement decreasing as the weight of post-construction loading decreases towards the outer toe of the embankment. The results of the consolidation testing indicate the various soils at the site exhibit generally similar consolidation characteristics. Based on the consolidation testing and computer modeling, settlement beneath the embankment is projected to be generally uniform.

The consolidation analyses results are considered conservative, as the laboratory consolidation testing was performed on the fine-grained fraction of soil samples. The effects of inter-particle bearing contact within the gravel-rich strata, which will reduce the estimated settlement, have not been considered in the analyses. Based on the field Standard Penetration Testing (SPT) results, which showed the strata to generally be very dense to hard, actual post-construction consolidation settlement of less than 1 foot is anticipated.

As the embankment will be constructed continuously, it is anticipated that observed settlement will be accommodated by managing dam fill placement during embankment construction.

5.2 Settlement Beneath Outlet Piping

Section F-F' was developed along the proposed outlet pipe alignment, as shown on Figure 9. The pipe will be comprised of 14-inch diameter Schedule 80 carbon steel, encased in a minimum 42-inch by 42-inch concrete-filled trench.

From review of Section F-F', it appears the inlet of the outlet pipe will be founded within clay overlaying a basalt rock layer. Settlement of the outlet pipe foundation may be reduced at the inlet side by the basalt, which appears to transition to soil-gravel strata at some undefined location along the pipe downstream of the inlet. Stresses induced by the limited differential settlement are expected to be negligible, and limited by the concrete backfill and steel pipe strength. The pipe currently is proposed with a vertical drop of approximately 31 feet along the 1290-foot length of pipe. Post consolidation pipe slope (assuming a worst-case settlement of 2.1 feet at the pipe inlet) would average 2.3 percent along the length of the pipe. As described above, field standard penetration tests suggest actual post-construction settlement will be less than that calculated on the basis of consolidation test results.

Attachments

Attachment 1 – Laboratory Test Summary Tables and Consolidation Test Results
Attachment 2 – Consolidation Testing Summary and SETTLE 3D Model Input Tables
Attachment 3 – SETTLE 3D Output Files
Attachment 4 – Embankment Analysis Cross-sections with Graphical Output Results (Sections B-B' and D-D' only)

ATTACHMENT 1
LABORATORY TEST SUMMARY TABLES AND CONSOLIDATION TEST RESULTS

	Initial		Final	
Height =	0.994	in	0.960	in
Diameter =	2.499	in	2.499	in
Area =	4.905	in^2	4.905	in^2
Volume =	4.875	in^3	4.709	in^3
Water Content =	14.4%		4.8%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5641	in	0.5641	in
Void Ratio =	0.762		0.702	
Degree of Saturation =	51.1%		18.5%	
Wet Mass =	0.308	lb	0.282	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	109.3	pcf	103.6	pcf
Dry Unit Weight =	95.5	pcf	98.9	pcf

Notes

USCS description (ASTM D2487):	Lean clay with sand, yellowish red, moist				
Atterberg Limits (ASTM D4318):	LL = 47		PL = 20		PI = 27
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 99%		No. 200 = 81%
Specimen Type:	[ ]	Intact	[X]	Reconstituted	
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture	
Water Content of Trimmings (ASTM D2216):	14.6%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	[X]	Not inundated	[ ]	Inundated	
Test Method:	[ ]	A	[X]	B	
Apparatus:	Frame No.	1	(Wykeham Farrance 24251)		
Final Water Content Specimen:	[X]	Entire	[ ]	Partial	
Final Differential Height:	-0.0158 in				
Estimated Preconsolidation Stress:	Not Computed				

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1058					0.0000	0.9901	0.00	0.755				
1	0.25	1410					0.0083	0.9818	0.84	0.740				
2	0.50	1410					0.0174	0.9726	1.75	0.724				
3	1.00	1440					0.0254	0.9647	2.55	0.710				
4	2.00	1470					0.0315	0.9585	3.17	0.699				
5	4.00	1425					0.0361	0.9540	3.63	0.691				
6	8.00	1425					0.0390	0.9510	3.93	0.686				
7	16.00	1425	0.0410	0.9491	4.12	0.683	0.0431	0.9470	4.33	0.679	2 (Root time)	0.683	3.650	0.5
8	32.00	1440	0.0474	0.9426	4.77	0.671	0.0502	0.9398	5.05	0.666	2 (Root time)	0.672	2.520	0.5
9	8.00	95					0.0485	0.9415	4.88	0.669				
10	2.00	120					0.0473	0.9427	4.76	0.671				
11	0.50	95					0.0464	0.9436	4.67	0.673				
12	0.10	70					0.0459	0.9442	4.62	0.674				

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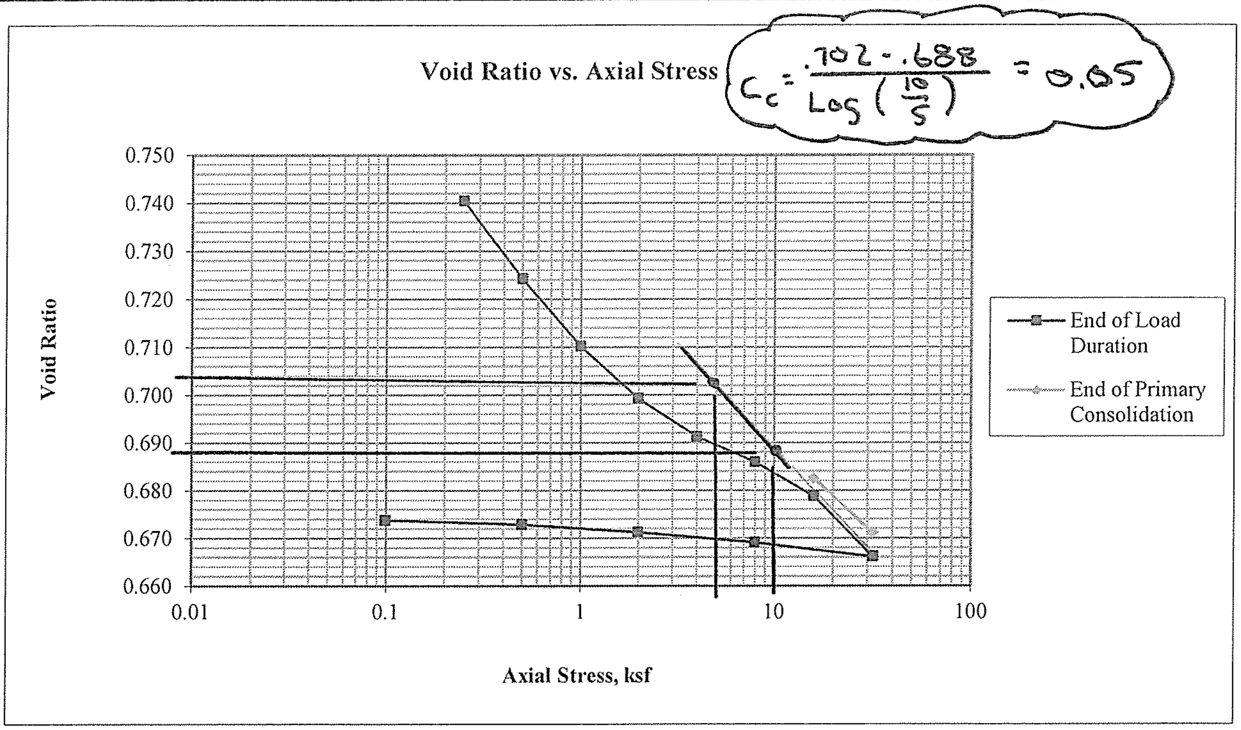
Denver, Colorado

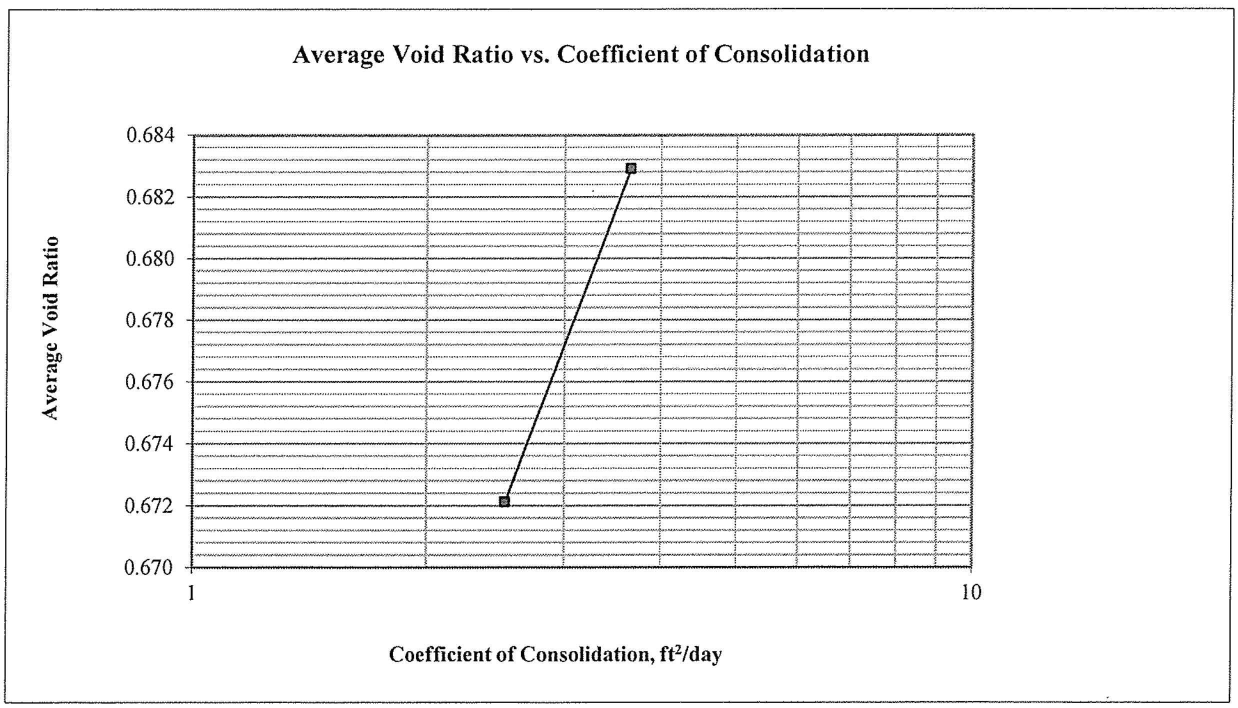
Job Short Title: Copper Flat Tailings Design Study

Sample: BH-10 @ 19-33 ft

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

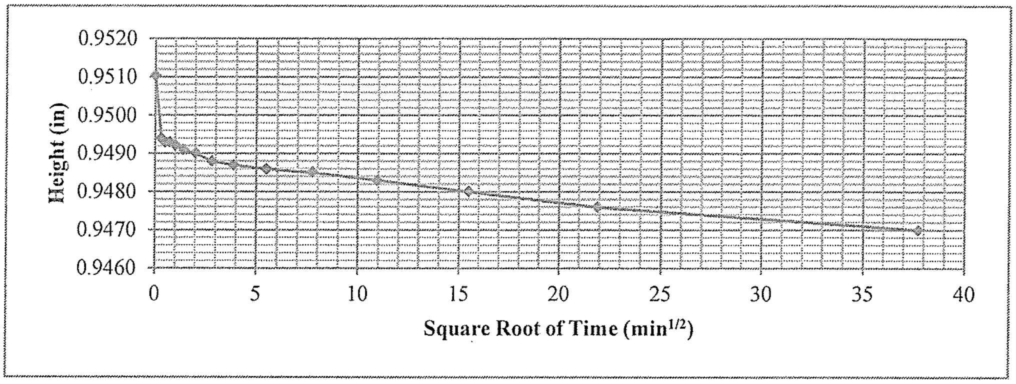
Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/11/2013	103-92557.006	1



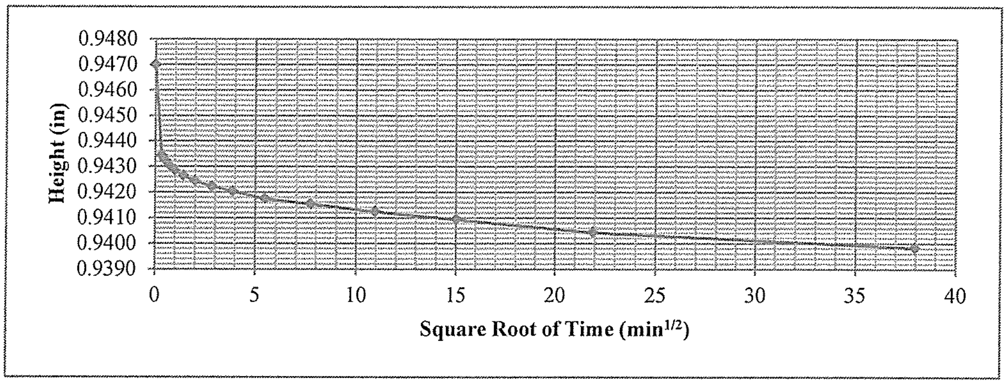


Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-10 @ 19-33 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 2

16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-10 @ 19-33 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/11/2013	**Job Number:** 103-92557.006	**Figure:** 3

	Initial		Final	
Height =	0.997	in	0.905	in
Diameter =	2.496	in	2.496	in
Area =	4.893	in^2	4.893	in^2
Volume =	4.878	in^3	4.428	in^3
Water Content =	25.9%		6.4%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5215	in	0.5215	in
Void Ratio =	0.912		0.735	
Degree of Saturation =	76.7%		23.5%	
Wet Mass =	0.313	lb	0.264	lb
Dry Mass =	0.248	lb	0.248	lb
Wet Unit Weight =	110.8	pcf	103.2	pcf
Dry Unit Weight =	88.0	pcf	97.0	pcf

Notes

USCS description (ASTM D2487):	Fat clay, dark red, moist				
Atterberg Limits (ASTM D4318):	LL = 66		PL = 31		PI = 35
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 100%		No. 200 = 90%
Specimen Type:		Intact	X	Reconstituted	
Remold Targets:	86.0	pcf (dry) at	29.0%	moisture	
Water Content of Trimmings (ASTM D2216):	28.8%				
Trimming Procedure:	Speciment remolded in ring				
Inundation:	X	Not inundated		Inundated	
Test Method:		A	X	B	
Apparatus:	Frame No.	4	(ELE C-320A)		
Final Water Content Specimen:	X	Entire		Partial	
Final Differential Height:	-0.0304	in			
Estimated Preconsolidation Stress:	Not Computed				

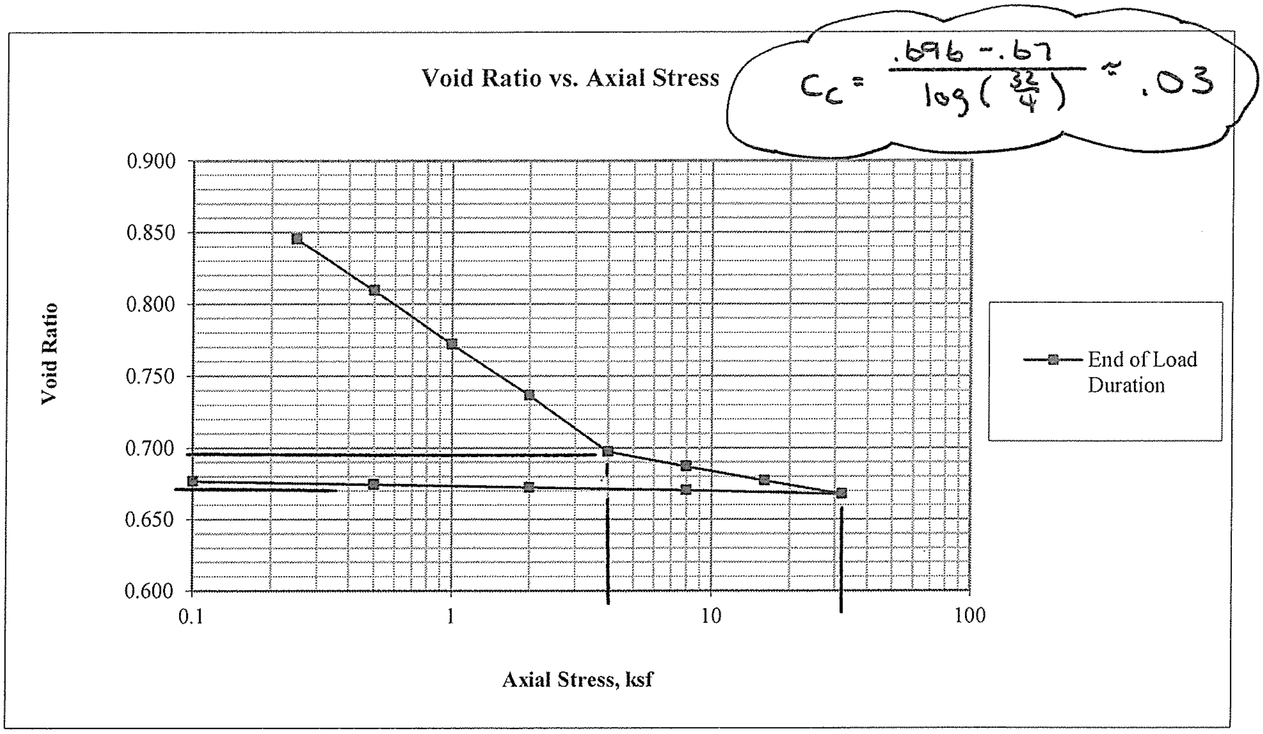
			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1019					0.0000	0.9822	0.00	0.883				
1	0.25	1410					0.0197	0.9625	1.98	0.845				
2	0.50	1410					0.0385	0.9437	3.86	0.809				
3	1.00	1430					0.0579	0.9242	5.81	0.772				
4	2.00	1470					0.0764	0.9057	7.66	0.737				
5	4.00	1415					0.0968	0.8853	9.71	0.698				
6	8.00	1420					0.1023	0.8798	10.26	0.687				
7	16.00	1425					0.1074	0.8747	10.77	0.677				
8	32.00	1440					0.1123	0.8699	11.26	0.668				
9	8.00	90					0.1109	0.8712	11.13	0.670				
10	2.00	115					0.1099	0.8722	11.02	0.672				
11	0.50	100					0.1089	0.8733	10.92	0.674				
12	0.10	70					0.1076	0.8746	10.79	0.677				

Golder Associates Inc.
Denver, Colorado

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Job Short Title: Copper Flat Tailings Design Study

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-12 @ 33.5-48.5 ft	RJM	CCS	3/11/2013	103-92557.006	1



Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-12 @ 33.5-48.5 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 2

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix I Foundation Settlement Potential Evaluation

	Initial		Final	
Height =	0.993	in	0.887	in
Diameter =	2.500	in	2.500	in
Area =	4.909	in^2	4.909	in^2
Volume =	4.874	in^3	4.354	in^3
Water Content =	14.1%		1.7%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5636	in	0.5636	in
Void Ratio =	0.762		0.574	
Degree of Saturation =	49.8%		8.0%	
Wet Mass =	0.307	lb	0.274	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	108.9	pcf	108.7	pcf
Dry Unit Weight =	95.5	pcf	106.9	pcf

Notes

USCS description (ASTM D2487):	Clayey sand with gravel, yellowish brown, dry				
Atterberg Limits (ASTM D4318):	LL = 23		PL = 14		PI = 9
Percent Finer (ASTM D422):	3/4 in. = 98%		No. 4 = 83%		No. 200 = 36%
Specimen Type:		Intact	X	Reconstituted	
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture	
Water Content of Trimmings (ASTM D2216):	14.7%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	X	Not inundated		Inundated	
Test Method:		A	X	B	
Apparatus:	Frame No.	1	(Wykeham Farrance 24251)		
Final Water Content Specimen:	X	Entire		Partial	
Final Differential Height:	0.0528	in			
Estimated Preconsolidation Stress:	16.4	ksf			

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1055					0.0000	0.9877	0.00	0.752				
1	0.25	1425					0.0077	0.9800	0.78	0.739				
2	0.50	1425					0.0129	0.9747	1.30	0.730				
3	1.00	1440					0.0173	0.9704	1.74	0.722				
4	2.00	1410					0.0219	0.9657	2.21	0.714				
5	4.00	2785	0.0229	0.9647	2.31	0.712	0.0283	0.9594	2.85	0.702	2 (Root time)	0.712	8.212	0.4
6	8.00	1425					0.0309	0.9567	3.12	0.698				
7	16.00	1430	0.0321	0.9555	3.24	0.695	0.0343	0.9534	3.45	0.692	2 (Root time)	0.696	10.130	0.3
8	32.00	1440	0.0457	0.9420	4.60	0.671	0.0498	0.9378	5.02	0.664	2 (Root time)	0.675	4.980	0.4
9	8.00	105					0.0487	0.9389	4.91	0.666				
10	2.00	90					0.0484	0.9392	4.88	0.667				
11	0.50	180					0.0478	0.9398	4.82	0.668				

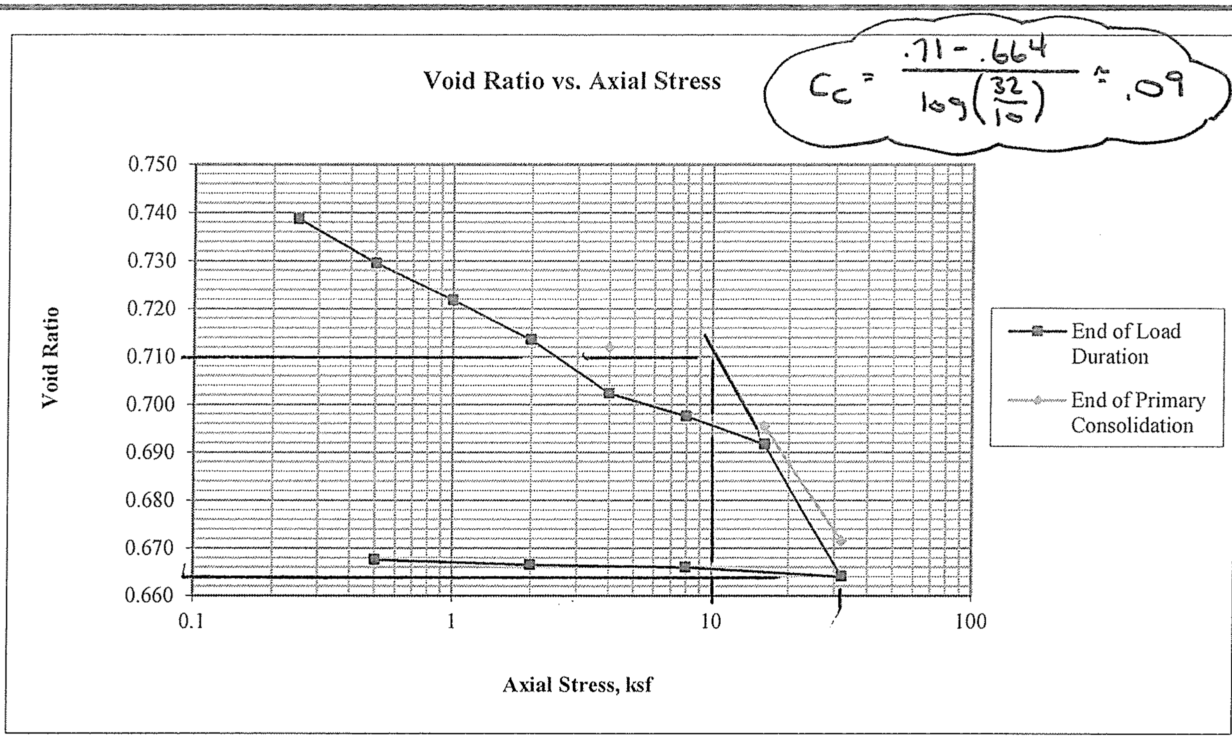
Golder Associates Inc.
Denver, Colorado

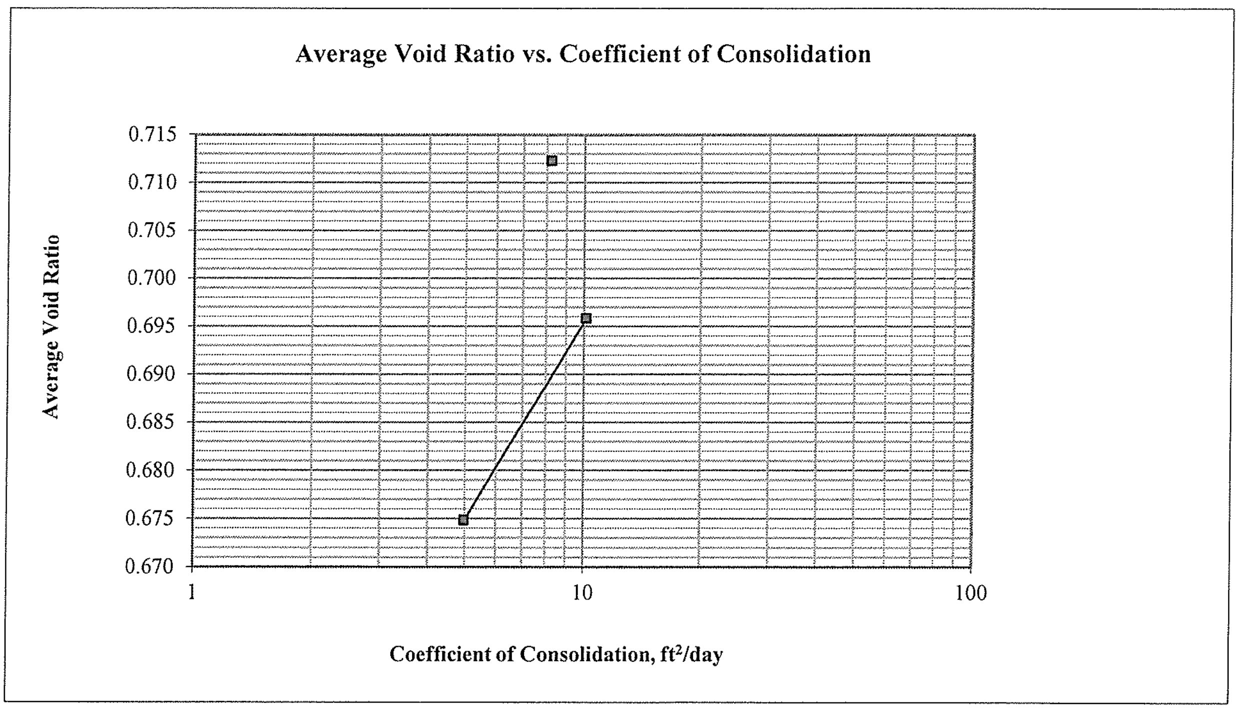
Job Short Title: Copper Flat Tailings Design Study

Sample: BH-16 @ 29-34 ft

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/25/2013	103-92557.006	I

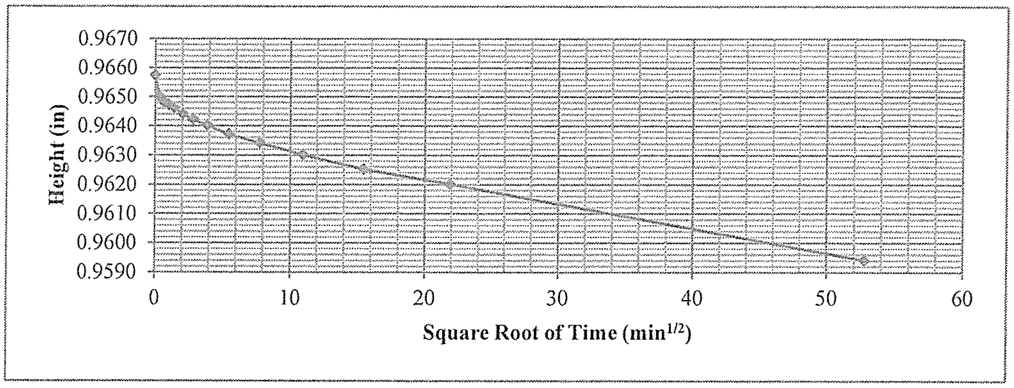




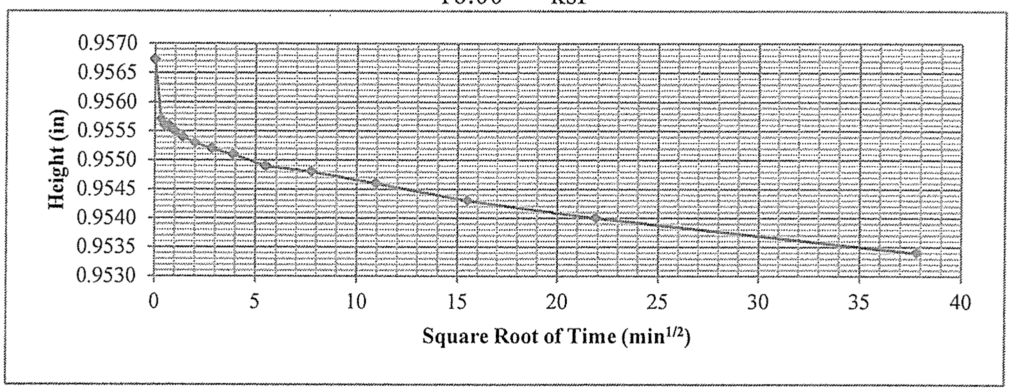
Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS
Job Short Title: Copper Flat Tailings Design Study	

Sample:	Technician:	Reviewed:	Start Date:	Job Number:	Figure:
BH-16 @ 29-34 ft	RJM	CCS	3/25/2013	103-92557.006	2

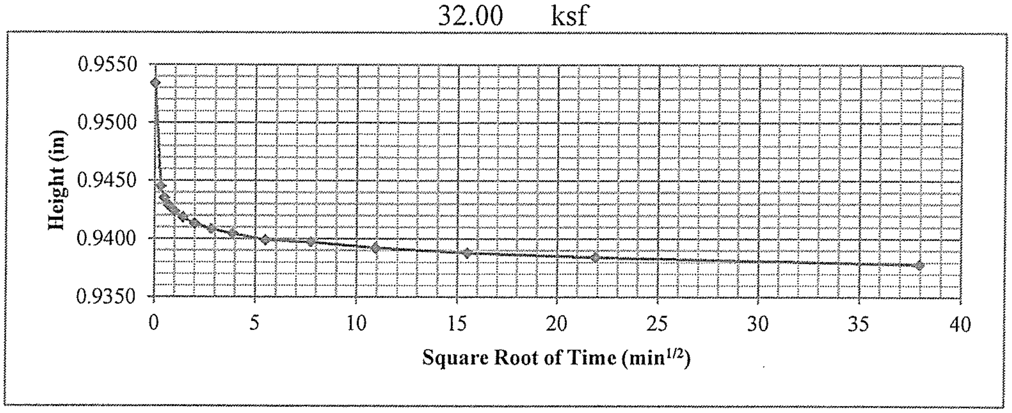
4.00 ksf



16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-16 @ 29-34 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/25/2013	Job Number: 103-92557.006	Figure: 3

	Initial		Final	
Height =	0.997	in	0.960	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.886	in^3	4.705	in^3
Water Content =	14.5%		2.7%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5638	in	0.5638	in
Void Ratio =	0.768		0.703	
Degree of Saturation =	51.1%		10.4%	
Wet Mass =	0.308	lb	0.276	lb
Dry Mass =	0.269	lb	0.269	lb
Wet Unit Weight =	109.0	pcf	101.5	pcf
Dry Unit Weight =	95.1	pcf	98.8	pcf

Notes

USCS description (ASTM D2487):	Sandy lean clay, reddish brown, moist				
Atterberg Limits (ASTM D4318):	LL = 25		PL = 14		PI = 11
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 95%		No. 200 = 52%
Specimen Type:		Intact	X	Reconstituted	
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture	
Water Content of Trimmings (ASTM D2216):	14.7%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	X	Not inundated		Inundated	
Test Method:		A	X	B	
Apparatus:	Frame No.	4	(ELE C-320A)		
Final Water Content Specimen:	X	Entire		Partial	
Final Differential Height:	0.0045 in				
Estimated Preconsolidation Stress:	14.7 ksf				

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	1025					0.0000	0.9894	0.00	0.755				
1	0.25	1425					0.0070	0.9824	0.70	0.742				
2	0.50	1425					0.0117	0.9777	1.17	0.734				
3	1.00	1440					0.0145	0.9748	1.46	0.729				
4	2.00	1410					0.0161	0.9732	1.62	0.726				
5	4.00	2780					0.0179	0.9714	1.80	0.723				
6	8.00	1425					0.0187	0.9706	1.88	0.722				
7	16.00	1420					0.0210	0.9683	2.11	0.717				
8	32.00	1440	0.0256	0.9638	2.57	0.709	0.0273	0.9621	2.74	0.706	2 (Root time)	0.710	5.423	0.5
9	8.00	105					0.0263	0.9630	2.64	0.708				
10	2.00	90					0.0255	0.9638	2.56	0.710				
11	0.50	180					0.0249	0.9645	2.49	0.711				

Golder Associates Inc.
Denver, Colorado

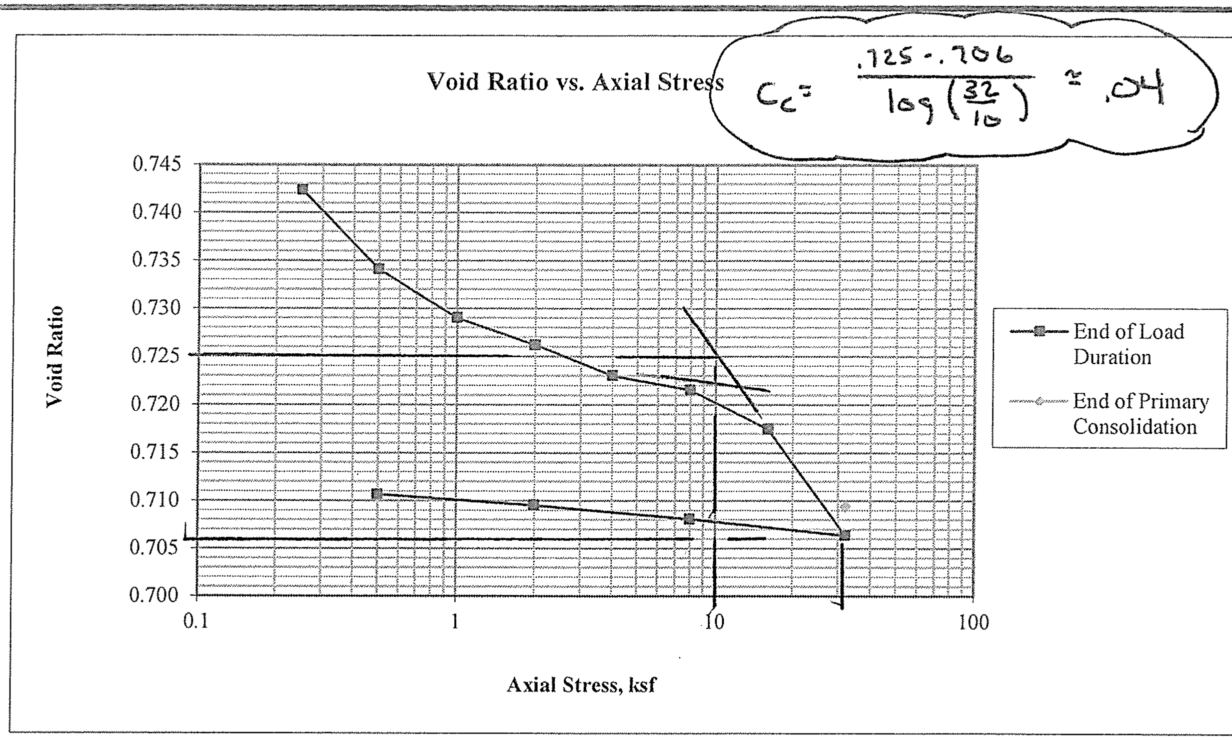
Job Short Title: Copper Flat Tailings Design Study

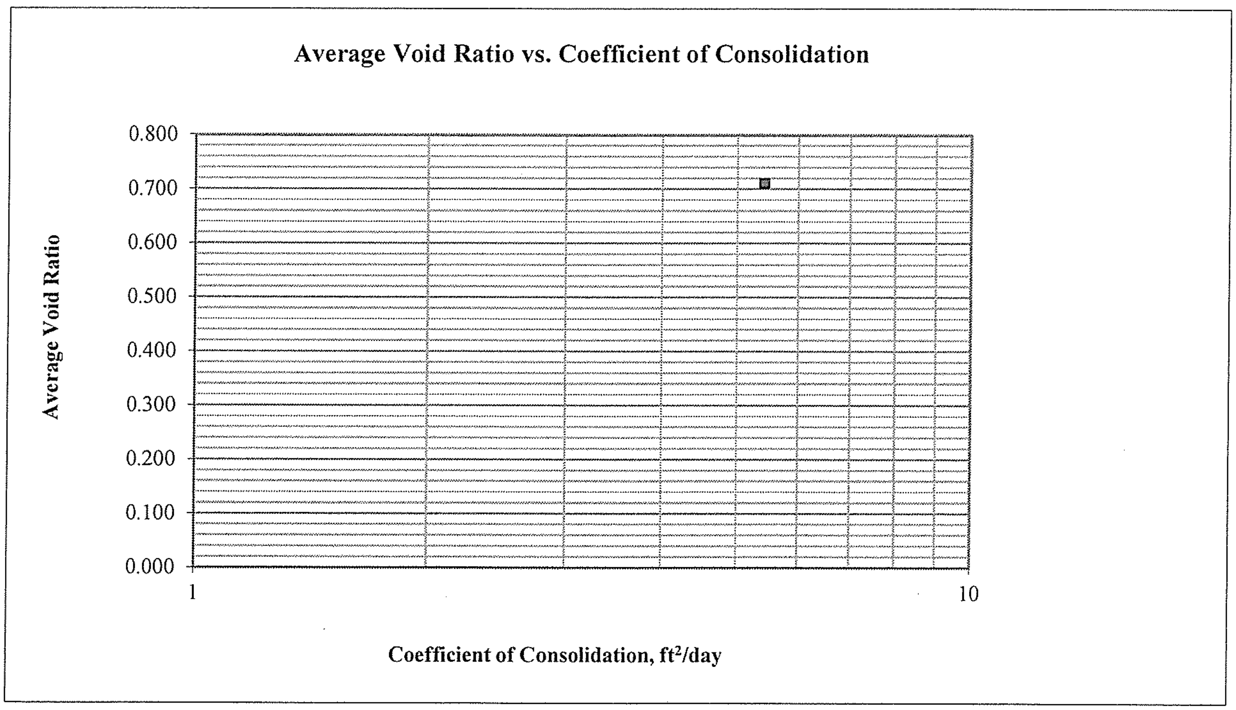
Sample: BH-18 @ 23-33.5 ft

Title:

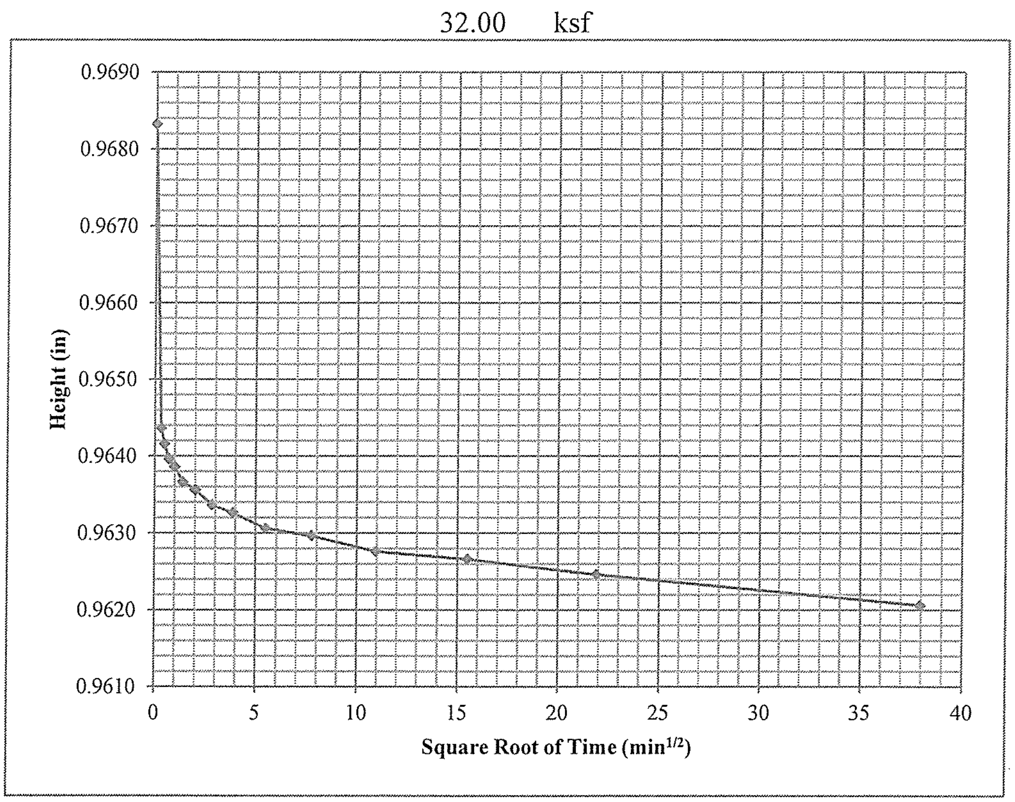
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/25/2013	103-92557.006	1





Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-18 @ 23-33.5 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/25/2013	Job Number: 103-92557.006	Figure: 2



Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-18 @ 23-33.5 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/25/2013	**Job Number:** 103-92557.006	**Figure:** 3

	Initial		Final	
Height =	0.994	in	0.924	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.871	in^3	4.528	in^3
Water Content =	28.9%		9.0%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5085	in	0.5085	in
Void Ratio =	0.955		0.817	
Degree of Saturation =	81.7%		29.7%	
Wet Mass =	0.313	lb	0.264	lb
Dry Mass =	0.243	lb	0.243	lb
Wet Unit Weight =	110.9	pcf	100.9	pcf
Dry Unit Weight =	86.1	pcf	92.6	pcf

Notes

USCS description (ASTM D2487): Fat clay with sand, dark red, wet

Atterberg Limits (ASTM D4318): LL = 62 PL = 20 PI = 42

Percent Finer (ASTM D422): 3/4 in. = 100% No. 4 = 100% No. 200 = 82%

Specimen Type: [ ] Intact [X] Reconstituted

Remold Targets: 86.0 pcf (dry) at 29.0% moisture

Water Content of Trimmings (ASTM D2216): 29.1%

Trimming Procedure: Specimen remolded in ring

Inundation: [X] Not inundated [ ] Inundated

Test Method: [ ] A [X] B

Apparatus: Frame No. 5 (ELE C-320A)

Final Water Content Specimen: [X] Entire [ ] Partial

Final Differential Height: -0.0246 in

Estimated Preconsolidation Stress: -- ksf

-- indicates test was not performed

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	At End of Primary Consolidation: Specimen Height (in)	At End of Primary Consolidation: Axial Strain (%)	At End of Primary Consolidation: Void Ratio	At End of Load Duration: Deformation (in)	At End of Load Duration: Specimen Height (in)	At End of Load Duration: Axial Strain (%)	At End of Load Duration: Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	990					0.0000	0.9933	0.00	0.953				
1	0.25	1425					0.0154	0.9779	1.55	0.923				
2	0.50	1825					0.0307	0.9626	3.09	0.893				
3	1.00	1440					0.0463	0.9470	4.66	0.862				
4	2.00	1410					0.0600	0.9333	6.04	0.835				
5	4.00	2775					0.0778	0.9155	7.82	0.800				
6	8.00	1425					0.0843	0.9090	8.48	0.788				
7	16.00	1425					0.0897	0.9036	9.02	0.777				
8	32.00	1440					0.0960	0.8973	9.65	0.765				
9	8.00	105					0.0950	0.8983	9.55	0.767				
10	2.00	105					0.0948	0.8985	9.54	0.767				
11	0.50	165					0.0939	0.8994	9.45	0.769				

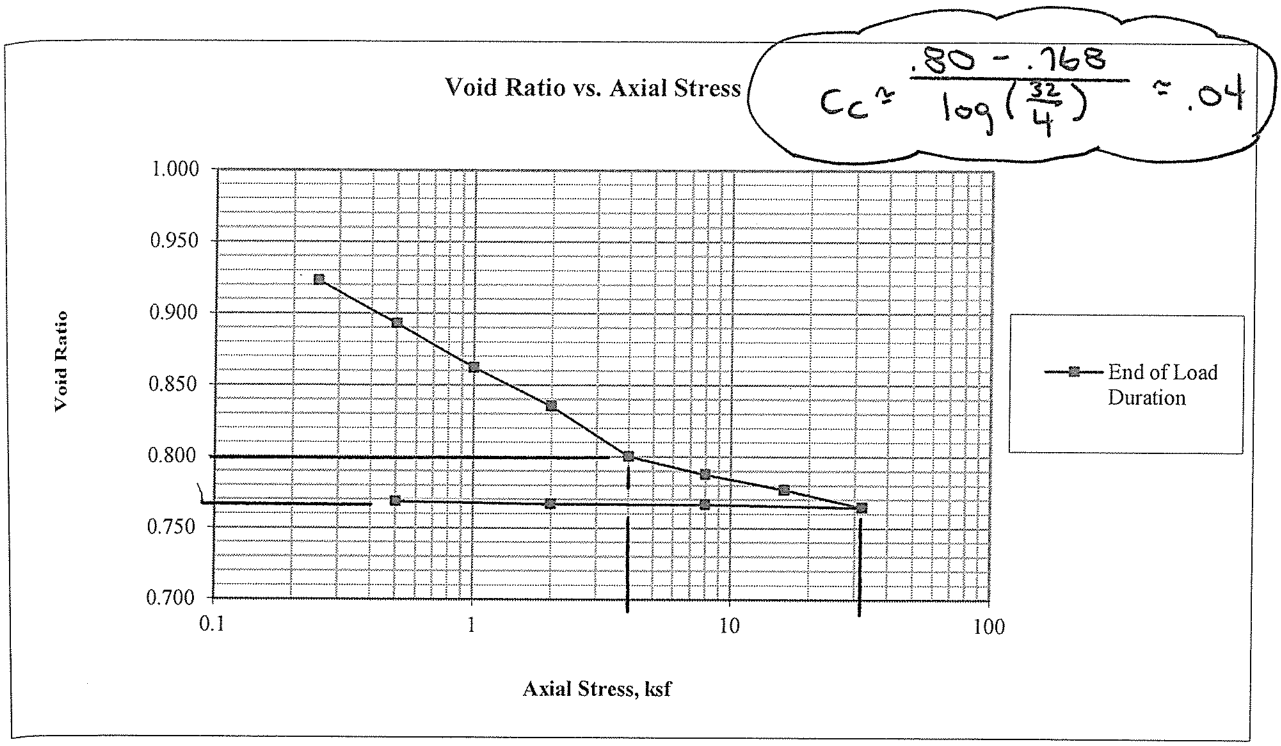
Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

Sample: BH-18 @ 43.5-48.5 ft

Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT SPECIMEN AND SUMMARY DATA

Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/25/2013	103-92557.006	1



Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-18 @ 43.5-48.5 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/25/2013	Job Number: 103-92557.006	Figure: 2

	Initial		Final	
Height =	1.000	in	0.981	in
Diameter =	2.497	in	2.497	in
Area =	4.897	in^2	4.897	in^2
Volume =	4.897	in^3	4.804	in^3
Water Content =	9.7%		1.1%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5363	in	0.5363	in
Void Ratio =	0.865		0.829	
Degree of Saturation =	30.3%		3.6%	
Wet Mass =	0.281	lb	0.259	lb
Dry Mass =	0.256	lb	0.256	lb
Wet Unit Weight =	99.0	pcf	93.0	pcf
Dry Unit Weight =	90.2	pcf	92.0	pcf

Notes

USCS description (ASTM D2487):	Sandy silty clay, brownish yellow, moist				
Atterberg Limits (ASTM D4318):	LL = 25		PL = 21		PI = 4
Percent Finer (ASTM D422):	3/4 in. = 99%		No. 4 = 99%		No. 200 = 52%
Specimen Type:	[ ]	Intact	X	Reconstituted	
Remold Targets:	90.0	pcf (dry) at	10.0%	moisture	
Water Content of Trimmings (ASTM D2216):	9.4%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	X	Not inundated	[ ]	Inundated	
Test Method:	[ ]	A	X	B	
Apparatus:	Frame No.	6	(ELE C-320A)		
Final Water Content Specimen:	X	Entire	[ ]	Partial	
Final Differential Height:	-0.0094	in			
Estimated Preconsolidation Stress:	13.0	ksf			

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	944					0.0000	0.9957	0.00	0.857				
1	0.25	1410					0.0031	0.9926	0.31	0.851				
2	0.50	1410					0.0064	0.9893	0.64	0.845				
3	1.00	1440					0.0086	0.9871	0.86	0.841				
4	2.00	1470					0.0097	0.9860	0.97	0.838				
5	4.00	1410					0.0103	0.9854	1.03	0.837				
6	8.00	1410					0.0119	0.9838	1.19	0.834				
7	16.00	1425	0.0152	0.9805	1.52	0.828	0.0164	0.9794	1.64	0.826	2 (Root time)	0.829	23.310	0.3
8	32.00	1470	0.0275	0.9682	2.75	0.805	0.0300	0.9657	3.00	0.801	2 (Root time)	0.807	3.521	0.4
9	8.00	75					0.0278	0.9679	2.78	0.805				
10	2.00	95					0.0263	0.9694	2.63	0.807				
11	0.50	1315					0.0248	0.9709	2.48	0.810				
12	0.10	195					0.0241	0.9716	2.41	0.812				

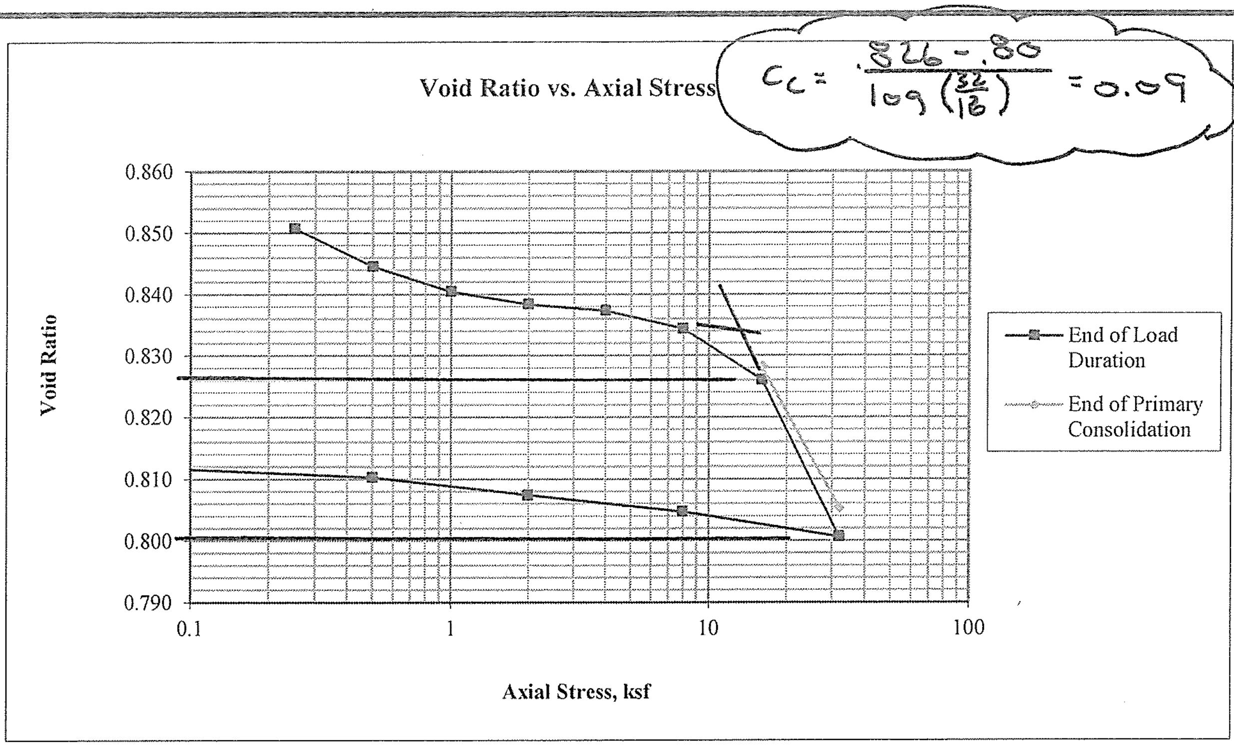
Golder Associates Inc.
Denver, Colorado

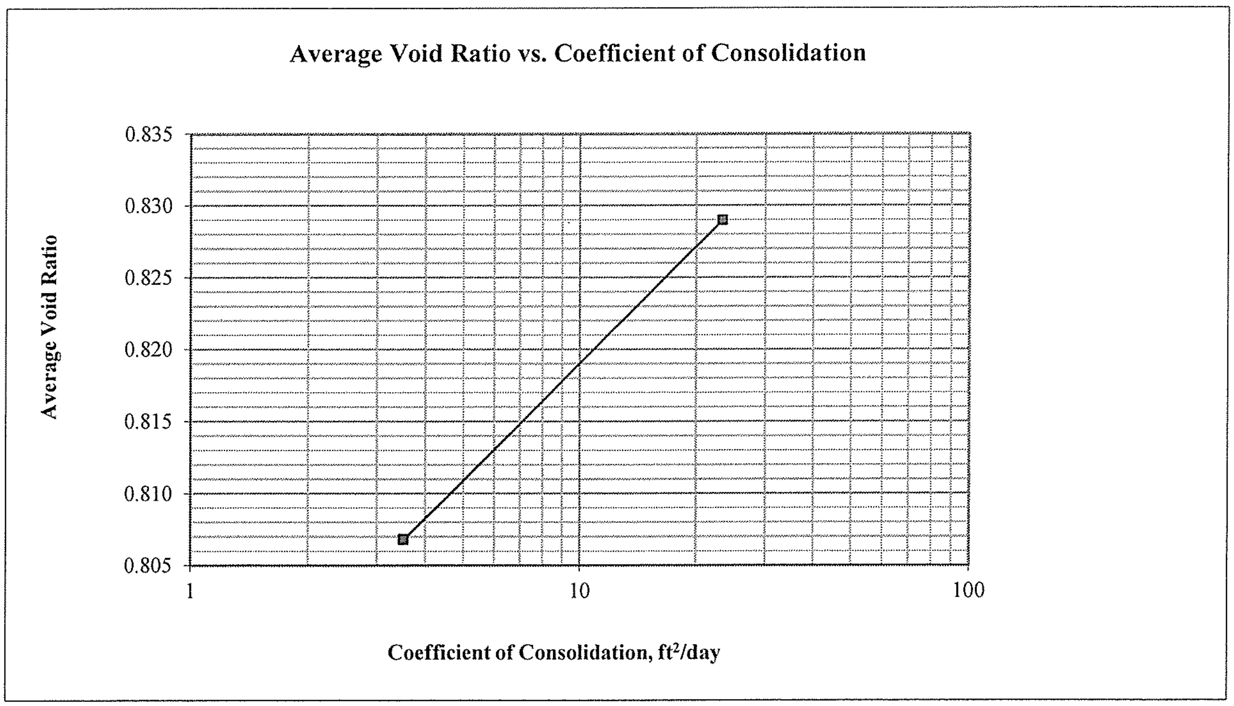
Job Short Title: Copper Flat Tailings Design Study

Sample: BH-22 @ 0-8.5 ft

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/11/2013	103-92557.006	1

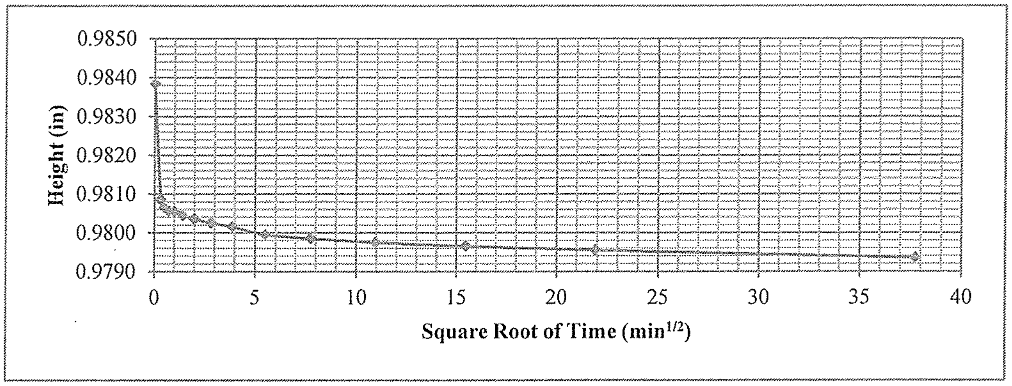




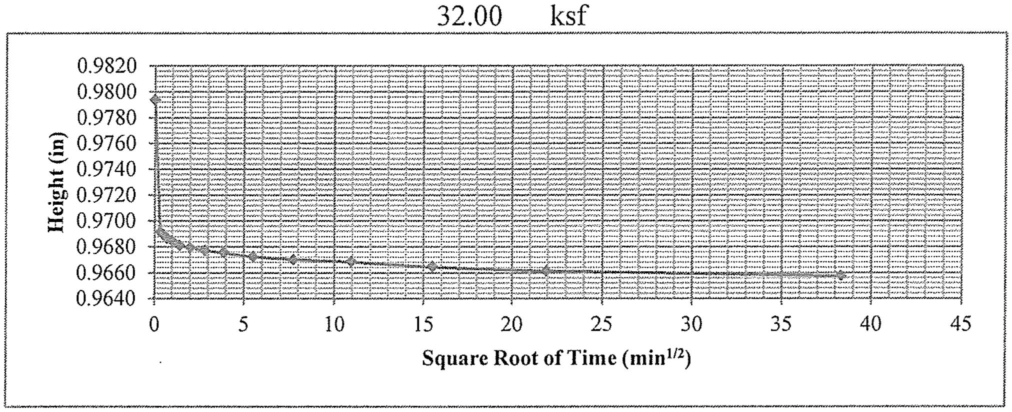
Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-22 @ 0-8.5 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 2

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix I Foundation Settlement Potential Evaluation

16.00 ksf



32.00 ksf



Golder Associates Inc. **Denver, Colorado**	**Title:** **ASTM D2435** **ONE-DIMENSIONAL CONSOLIDATION TEST REPORT** **TIME-DEFORMATION PLOTS**				
Job Short Title: **Copper Flat Tailings Design Study**					
Sample: **BH-22 @ 0-8.5 ft**	**Technician:** **RJM**	**Reviewed:** **CCS**	**Start Date:** **3/11/2013**	**Job Number:** **103-92557.006**	**Figure:** **3**

	Initial		Final	
Height =	0.997	in	0.924	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.886	in^3	4.528	in^3
Water Content =	14.2%		2.9%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5690	in	0.5690	in
Void Ratio =	0.752		0.624	
Degree of Saturation =	50.8%		12.6%	
Wet Mass =	0.310	lb	0.279	lb
Dry Mass =	0.272	lb	0.272	lb
Wet Unit Weight =	109.6	pcf	106.6	pcf
Dry Unit Weight =	96.0	pcf	103.6	pcf

Notes

Visual description (Golder procedure):	CLAYEY SAND, pale red, moist				
Atterberg Limits (ASTM D4318):	LL = 36		PL = 18		PI = 18
Percent Finer (ASTM D422):	3/4 in. = 98%		No. 4 = 82%		No. 200 = 37%
Specimen Type:		Intact	X	Reconstituted	
Remold Targets:	95.0	pcf (dry) at	15.0%	moisture	
Water Content of Trimmings (ASTM D2216):	14.5%				
Trimming Procedure:	Specimen remolded in ring				
Inundation:	X	Not inundated		Inundated	
Test Method:		A	X	B	
Apparatus:	Frame No.	5	(ELE C-320A)		
Final Water Content Specimen:	X	Entire		Partial	
Final Differential Height:	0.0184 in				
Estimated Preconsolidation Stress:	14.5 ksf				

	Axial Stress (ksf)	Load Duration (min)	At End of Primary Consolidation: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	At End of Load Duration: Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	980					0.0000	0.9843	0.00	0.730				
1	0.25	1410					0.0077	0.9766	0.77	0.716				
2	0.50	1410					0.0119	0.9724	1.20	0.709				
3	1.00	1440					0.0156	0.9687	1.57	0.702				
4	2.00	1470					0.0188	0.9655	1.89	0.697				
5	4.00	1410					0.0207	0.9636	2.07	0.693				
6	8.00	1415					0.0229	0.9614	2.29	0.690				
7	16.00	1425	0.0267	0.9576	2.67	0.683	0.0290	0.9553	2.91	0.679	2 (Root time)	0.684	31.272	0.3
8	32.00	1440	0.0436	0.9407	4.37	0.653	0.0470	0.9373	4.71	0.647	2 (Root time)	0.655	3.684	0.4
9	8.00	75					0.0455	0.9388	4.56	0.650				
10	2.00	130					0.0444	0.9399	4.46	0.652				
11	0.50	100					0.0433	0.9410	4.34	0.654				
12	0.10	70					0.0419	0.9424	4.20	0.656				

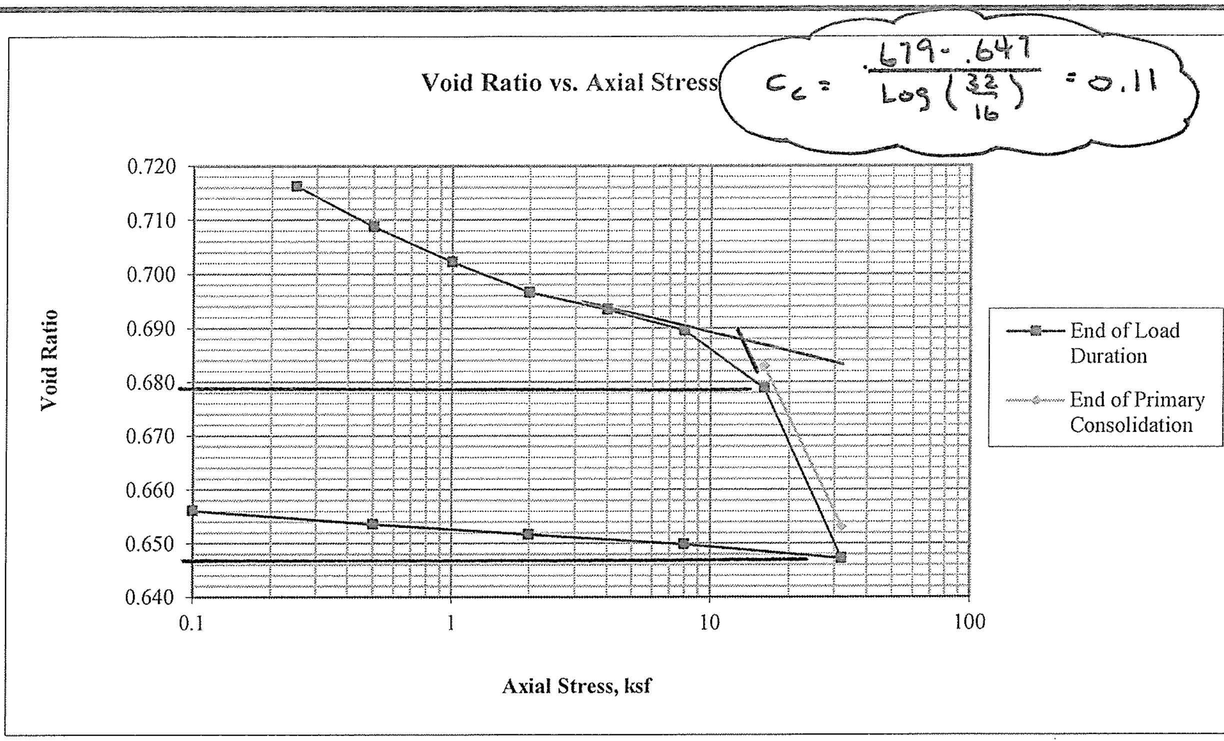
Golder Associates Inc.
Denver, Colorado

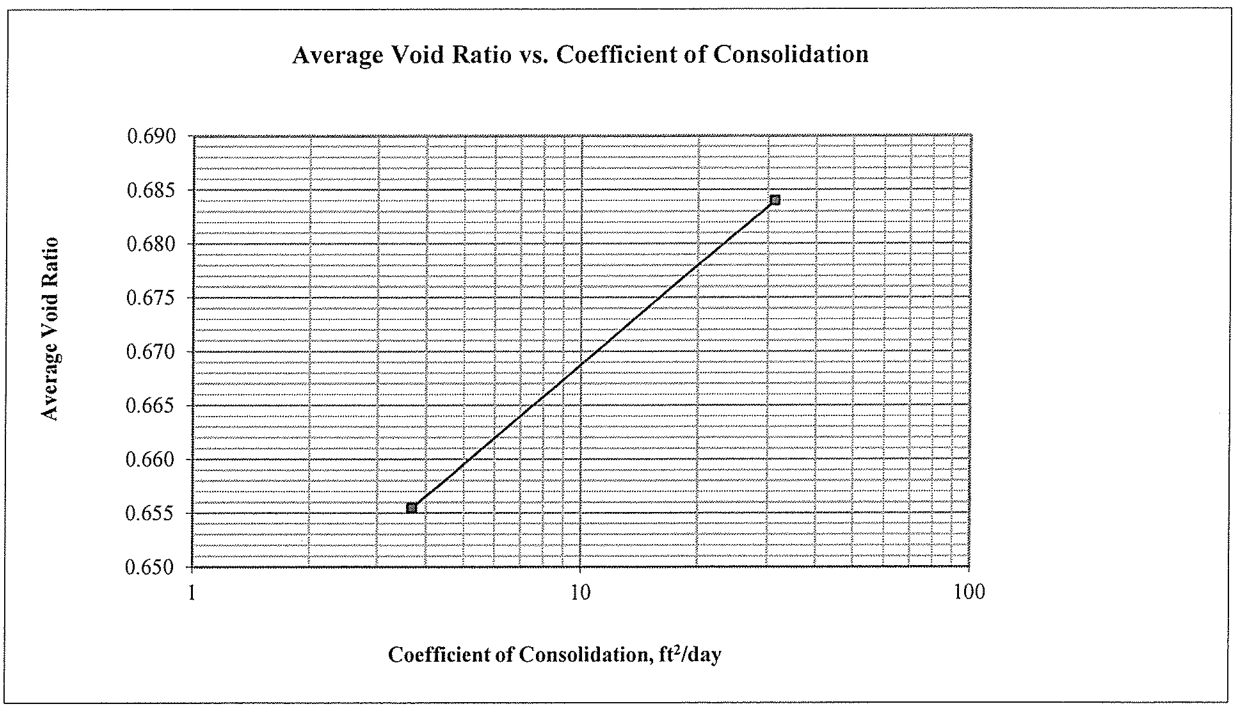
Job Short Title: Copper Flat Tailings Design Study

Title: ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

Sample: BH-22 @ 28-30 ft

Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/11/2013	103-92557.006	1

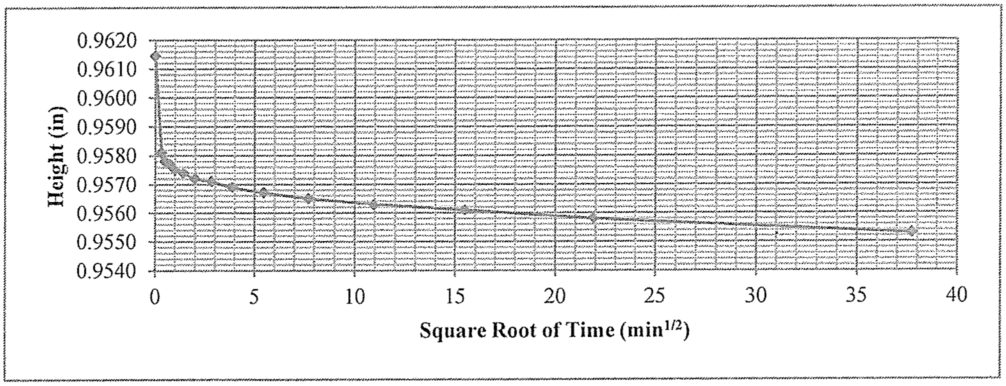




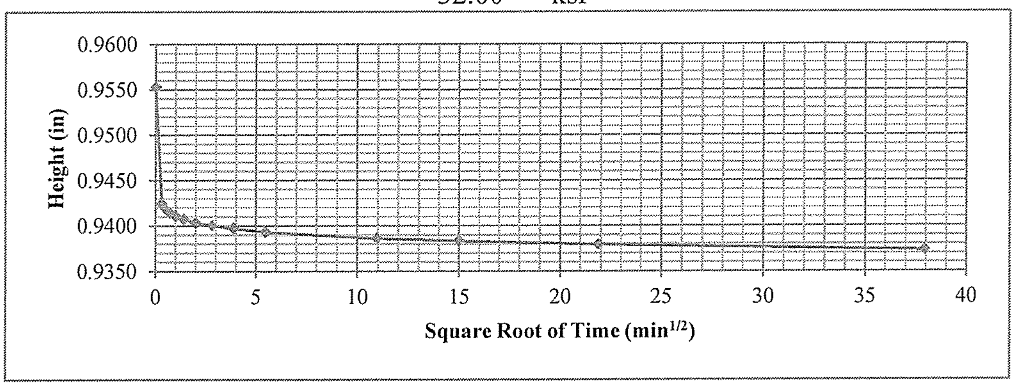
Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-22 @ 28-30 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/11/2013	**Job Number:** 103-92557.006	**Figure:** 2

X:\Tucson\Projects\13proj\133-92505 Copper Flat TSF\30,000 TPD Report\Appendix I Foundation Settlement Potential Evaluation

16.00 ksf



32.00 ksf



Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-22 @ 28-30 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/11/2013	Job Number: 103-92557.006	Figure: 3

	Initial		Final	
Height =	1.000	in	0.973	in
Diameter =	2.498	in	2.498	in
Area =	4.901	in^2	4.901	in^2
Volume =	4.901	in^3	4.769	in^3
Water Content =	9.8%		4.2%	
Specific Gravity =	2.70	(Assumed)	2.70	(Assumed)
Height of Solids =	0.5558	in	0.5558	in
Void Ratio =	0.799		0.751	
Degree of Saturation =	33.0%		15.1%	
Wet Mass =	0.291	lb	0.276	lb
Dry Mass =	0.265	lb	0.265	lb
Wet Unit Weight =	102.7	pcf	100.1	pcf
Dry Unit Weight =	93.5	pcf	96.1	pcf

Notes

USCS description (ASTM D2487):	Clayey sand, reddish brown, moist					
Atterberg Limits (ASTM D4318):	LL = 37		PL = 17		PI = 20	
Percent Finer (ASTM D422):	3/4 in. = 100%		No. 4 = 95%		No. 200 = 39%	
Specimen Type:		Intact	X	Reconstituted		
Remold Targets:	93.0	pcf (dry) at	10.0%	moisture		
Water Content of Trimmings (ASTM D2216):	9.9%					
Trimming Procedure:	Specimen remolded in ring					
Inundation:	X	Not inundated		Inundated		
Test Method:		A	X	B		
Apparatus:	Frame No.	6	(ELE C-320A)			
Final Water Content Specimen:	X	Entire		Partial		
Final Differential Height:	-0.0136 in					
Estimated Preconsolidation Stress:	13.8 ksf					

			At End of Primary Consolidation				At End of Load Duration							
	Axial Stress (ksf)	Load Duration (min)	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Deformation (in)	Specimen Height (in)	Axial Strain (%)	Void Ratio	Time Deformation Method	Average Void Ratio	Coefficient of Consolidation (ft^2/day)	Time to 50% Consolidation (min)
Seating	0.10	960					0.0000	0.9894	0.00	0.780				
1	0.25	1440					0.0066	0.9828	0.66	0.768				
2	0.50	1425					0.0096	0.9798	0.96	0.763				
3	1.00	1440					0.0116	0.9778	1.16	0.759				
4	2.00	1410					0.0129	0.9765	1.29	0.757				
5	4.00	2770					0.0146	0.9748	1.46	0.754				
6	8.00	1410					0.0159	0.9735	1.59	0.752				
7	16.00	1410	0.0191	0.9703	1.91	0.746	0.0203	0.9692	2.03	0.744	2 (Root time)	0.746	1.313	0.9
8	32.00	1440	0.0304	0.9590	3.04	0.726	0.0330	0.9564	3.30	0.721	2 (Root time)	0.727	3.137	0.5
9	8.00	80					0.0312	0.9582	3.12	0.724				
10	2.00	100					0.0305	0.9589	3.05	0.725				
11	0.50	180					0.0300	0.9594	3.00	0.726				

Golder Associates Inc.
Denver, Colorado

Job Short Title: Copper Flat Tailings Design Study

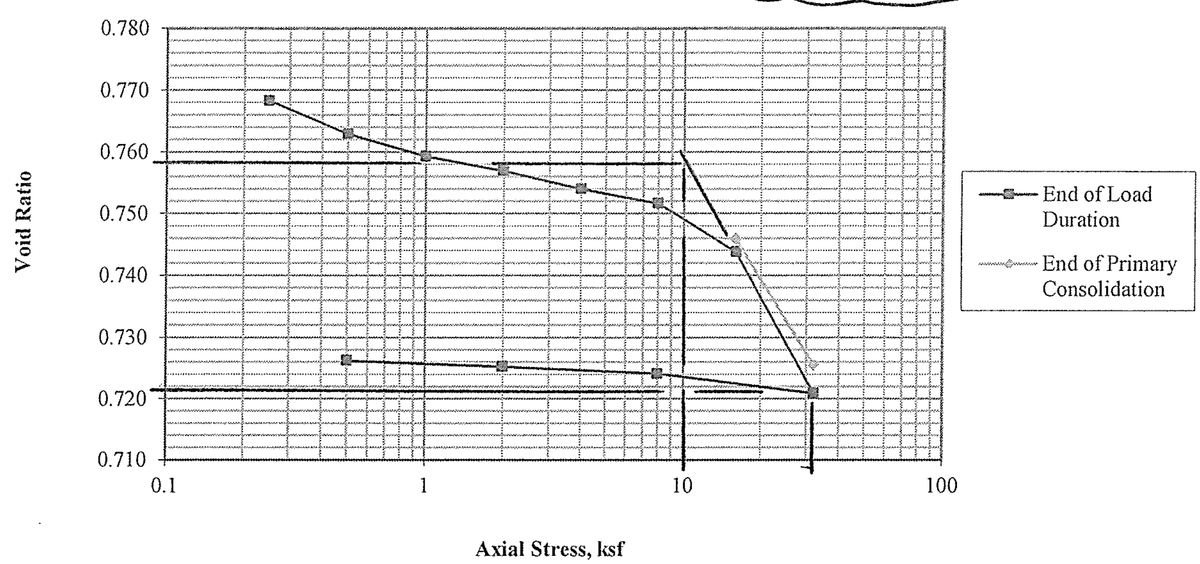
Sample: BH-25 @ 22-34 ft

Title:
ASTM D2435
ONE-DIMENSIONAL CONSOLIDATION TEST REPORT
SPECIMEN AND SUMMARY DATA

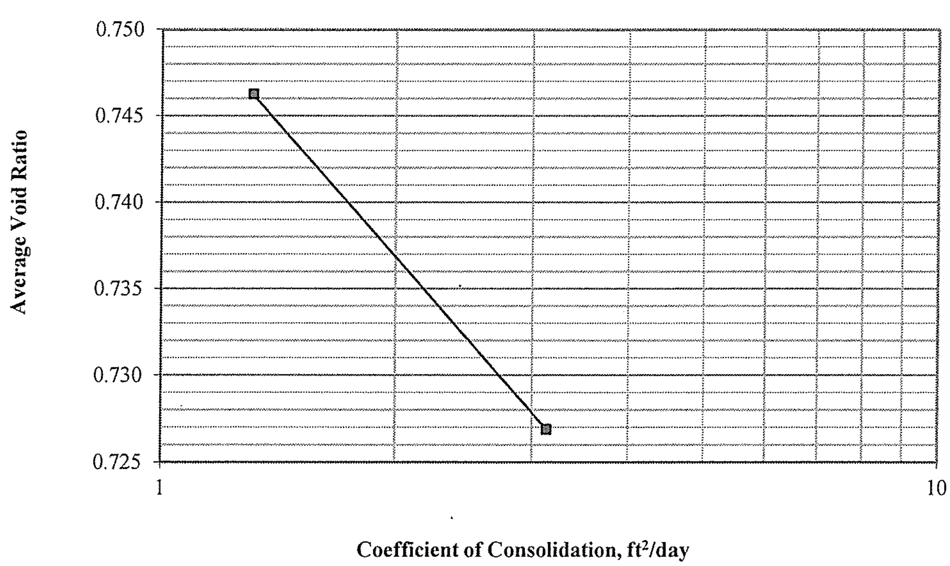
Technician:	Reviewed:	Start Date:	Job Number:	Figure:
RJM	CCS	3/25/2013	103-92557.006	1

$$C_c = \frac{.758 - .721}{\log\left(\frac{32}{10}\right)} \approx .07$$

Void Ratio vs. Axial Stress

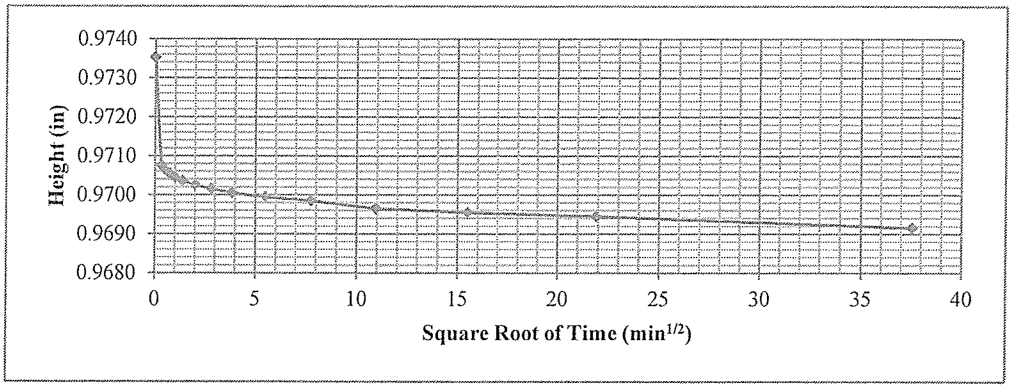


Average Void Ratio vs. Coefficient of Consolidation

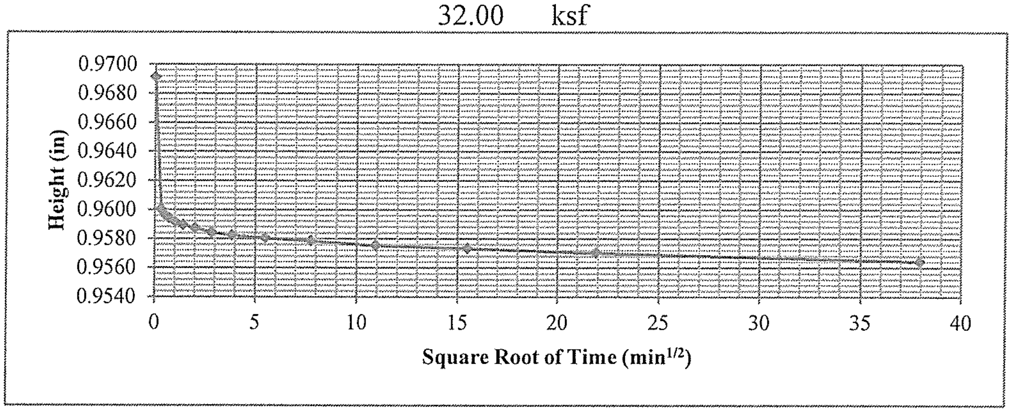


Golder Associates Inc. **Denver, Colorado**	**Title:** ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT CONSOLIDATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 22-34 ft	**Technician:** RJM	**Reviewed:** CCS	**Start Date:** 3/25/2013	**Job Number:** 103-92557.006	**Figure:** 2

16.00 ksf



32.00 ksf



Golder Associates Inc. Denver, Colorado	Title: ASTM D2435 ONE-DIMENSIONAL CONSOLIDATION TEST REPORT TIME-DEFORMATION PLOTS				
Job Short Title: Copper Flat Tailings Design Study					
Sample: BH-25 @ 22-34 ft	Technician: RJM	Reviewed: CCS	Start Date: 3/25/2013	Job Number: 103-92557.006	Figure: 3

ATTACHMENT 2
CONSOLIDATION TESTING SUMMARY AND SETTLE 3D MODEL INPUT TABLES

Table 1: Summary Results Of Consolidation Tests -- Copper Flat, Sierra County, New Mexico

Boring No.	Sample Depth	In-situ Overburden Pressure at Midpoint of Tested Stratum (kips, Note 1)	Material Classification	Void Ratio, min	Void Ratio, max	Void Ratio, mean	Estimated Initial Void Ratio (from consolidation curve)	Cc for Analysis (Note 2)	Estimated Moist Density (final) (pcf) (Note 3)
BH-10	19-33	2.86	CL	0.666	0.74	0.703	0.69	0.05	104
BH-12	33.5-48.5	4.51	CH	0.67	0.845	0.7575	0.69	0.3	104
BH-16	29-34	3.465	SC	0.664	0.738	0.701	0.704	0.09	110
BH-18	23-33.5	3.1075	CL	0.706	0.742	0.724	0.724	0.04	103
BH-18	43.5-48.5	5.06	CH	0.767	0.925	0.846	0.79	0.04	102
BH-22	0-8.5	0.4675	ML	0.8	0.85	0.825	0.844	0.09	98
BH-22	28-30	3.19	SC	0.646	0.716	0.681	0.695	0.11	108
BH-25	22-34	3.08	SC	0.727	0.746	0.7365	0.756	0.07	101

Notes

1. Based on an assumed unit weight of 110 pcf.
2. Generally based on portion of curve developed for loading between 16 and 32 kips.
3. Moist Density estimated for water content ranging from 3 to 6 percent.

Table 2: Stratum Parameters For Settlement Analaysis -- Copper Flat, Sierra County, New Mexico

Stratum Designation	Soil Types	Assumed Initial Void Ratio	Assumed Cc Value	Referenced Consolidation Tests	Assumed Unit Weight (pcf)	Young's Modulus (ksf)
1	ML, CL-ML, SM	0.74	0.09	BH-16, BH-22 (2), BH-25	106	NA
2	CL	0.71	0.045	BH-10, BH-18	104	NA
3	CH, MH	0.75	0.035	BH-12, BH-18	103	NA
4 (Note 1)	Gravel, Sand	NA	NA	Ref. 1	110	4000
5 (Note 2)	Basalt, Caliche	NA	NA	Ref. 1	125	4000
6 (Note 3)	Embankment Fill	NA	NA	NA	97	NA
7 (Note 4)	Tailings	NA	NA	NA	97	NA

Notes

1. Settlement within embankment fill not calculated for foundation settlement evaluation.
2. Settlement within tailings not analyzed for foundation settlement evaluation.

References

1. US Army Corps of Engineer, EM-1110-1904, 1990.

Table 3A: SETTLE3D Input Parameters -- Copper Flat, Sierra County, New Mexico

Cross-Section	Analysis Section	Stratum Number	Thickness (ft)	Unit Weight (kcf)	Loading Pressure (rectangular, ksf)	Assumed Poisson Ratio (Note 1)	Cc	Cr (Note 2)	e0	OCR
B-B'	1	6	234.4	0.097	22.7	na	na	na	na	na
" "	" "	2	19.3	0.104		0.3	0.045	0.1	0.71	1
" "	" "	2	39.8	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	27.6	0.103		0.3	0.035	0.1	0.75	1
B-B'	2	6	143	0.097	13.9	na	na	na	na	na
" "	" "	2	66.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	2	9	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	12	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	14	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28	0.103		0.3	0.035	0.1	0.75	1
B-B'	3	6	137	0.097	13.3	na	na	na	na	na
" "	" "	2	15.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	2.1	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	28.3	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28.6	0.103		0.3	0.035	0.1	0.75	1
B-B'	4	6	75.2	0.097	7.3	na	na	na	na	na
" "	" "	2	12.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	4.9	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	23	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28	0.103		0.3	0.035	0.1	0.75	1
B-B'	5	6	9.8	0.097	1.0	na	na	na	na	na
" "	" "	1	18.8	0.106		0.3	0.09	0.1	0.74	1
" "	" "	3	5.9	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	19.2	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	25.1	0.103		0.3	0.035	0.1	0.75	1

Notes

1. Poisson Ratio of 0.3 is approximation, based on published values ranging from 0.2 to 0.4 for sandy clays.
2. Cr value of 0.1 loaded into program, although rebound is not projected for the project.

Table 3A: SETTLE3D Input Parameters -- Copper Flat, Sierra County, New Mexico

Cross-Section	Analysis Section	Stratum Number	Thickness (ft)	Unit Weight (kcf)	Loading Pressure (rectangular, ksf)	Assumed Poisson Ratio (Note 1)	Cc	Cr (Note 2)	e0	OCR
B-B'	1	6	234.4	0.097	22.7	na	na	na	na	na
" "	" "	2	19.3	0.104		0.3	0.045	0.1	0.71	1
" "	" "	2	39.8	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	27.6	0.103		0.3	0.035	0.1	0.75	1
B-B'	2	6	143	0.097	13.9	na	na	na	na	na
" "	" "	2	66.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	2	9	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	12	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	14	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28	0.103		0.3	0.035	0.1	0.75	1
B-B'	3	6	137	0.097	13.3	na	na	na	na	na
" "	" "	2	15.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	2.1	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	28.3	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28.6	0.103		0.3	0.035	0.1	0.75	1
B-B'	4	6	75.2	0.097	7.3	na	na	na	na	na
" "	" "	2	12.5	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	4.9	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	23	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	28	0.103		0.3	0.035	0.1	0.75	1
B-B'	5	6	9.8	0.097	1.0	na	na	na	na	na
" "	" "	1	18.8	0.106		0.3	0.09	0.1	0.74	1
" "	" "	3	5.9	0.103		0.3	0.035	0.1	0.75	1
" "	" "	2	19.2	0.104		0.3	0.045	0.1	0.71	1
" "	" "	3	25.1	0.103		0.3	0.035	0.1	0.75	1

Notes

1. Poisson Ratio of 0.3 is approximation, based on published values ranging from 0.2 to 0.4 for sandy clays.
2. Cr value of 0.1 loaded into program, although rebound is not projected for the project.

ATTACHMENT 3
SETTLE 3D OUTPUT FILES

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section B-B', Line 1.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.49066 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.97303
Consolidation Settlement [ft]	0	1.97303
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	22.7
Total Stress [ksf]	0	31.6782
Total Strain	-0	0.10667
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.020072	31.6754
Over-consolidation Ratio	1	1
Void Ratio	0.527594	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 22.7 ksf
Depth: 0 ft

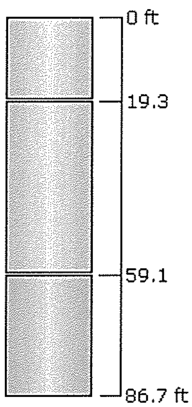
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 2	19.3	0
2	Soil Stratum 2	39.8	19.3
3	Soil Stratum 3	27.6	59.1



Soil Properties

Property	Soil Stratum 3	Soil Stratum 2
Color		
Unit Weight [kips/ft^3]	0.103	0.104
Primary Consolidation	Enabled	Enabled
Material Type	Non-Linear	Non-Linear
Cc	0.035	0.045
Cr	0.1	0.1
e0	0.75	0.71
OCR	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 55

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section B-B', Line 2.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.646645 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.98619
Consolidation Settlement [ft]	0	1.98619
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	13.9
Total Stress [ksf]	0	27.3058
Total Strain	-0	0.0869309
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.006916	27.303
Over-consolidation Ratio	1	1
Void Ratio	0.561348	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 13.9 ksf
Depth: 0 ft

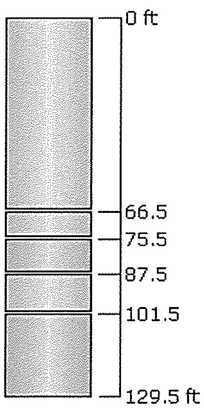
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 2	66.5	0
2	Soil Stratum 2	9	66.5
3	Soil Stratum 3	12	75.5
4	Soil Stratum 2	14	87.5
5	Soil Stratum 3	28	101.5



Soil Properties

Property	Soil Stratum 3	Soil Stratum 2
Color		
Unit Weight [kips/ft^3]	0.103	0.104
Primary Consolidation	Enabled	Enabled
Material Type	Non-Linear	Non-Linear
Cc	0.035	0.045
Cr	0.1	0.1
e0	0.75	0.71
OCR	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 59

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information
Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section B-B', Line 3.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.561914 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.4179
Consolidation Settlement [ft]	0	1.4179
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	13.3
Total Stress [ksf]	0	21.0132
Total Strain	-0	0.103067
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.01612	21.0103
Over-consolidation Ratio	1	1
Void Ratio	0.533756	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 13.3 ksf
Depth: 0 ft

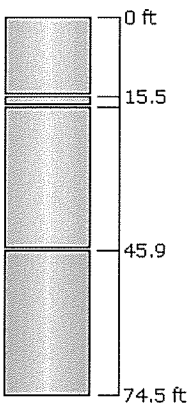
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 2	15.5	0
2	Soil Stratum 3	2.1	15.5
3	Soil Stratum 2	28.3	17.6
4	Soil Stratum 3	28.6	45.9



Soil Properties

Property	Soil Stratum 3	Soil Stratum 2
Color		
Unit Weight [kips/ft^3]	0.103	0.104
Primary Consolidation	Enabled	Enabled
Material Type	Non-Linear	Non-Linear
Cc	0.035	0.045
Cr	0.1	0.1
e0	0.75	0.71
OCR	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 61

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section B-B', Line 4.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.491452 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.00705
Consolidation Settlement [ft]	0	1.00705
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	7.3
Total Stress [ksf]	0	14.379
Total Strain	-0	0.0723724
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.065	14.3761
Over-consolidation Ratio	1	1
Void Ratio	0.586243	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 7.3 ksf
Depth: 0 ft

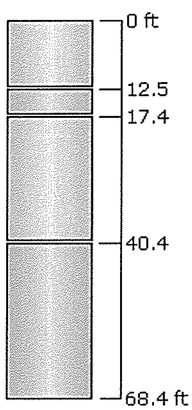
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 2	12.5	0
2	Soil Stratum 3	4.9	12.5
3	Soil Stratum 2	23	17.4
4	Soil Stratum 3	28	40.4



Soil Properties

Property	Soil Stratum 3	Soil Stratum 2
Color		
Unit Weight [kips/ft^3]	0.103	0.104
Primary Consolidation	Enabled	Enabled
Material Type	Non-Linear	Non-Linear
Cc	0.035	0.045
Cr	0.1	0.1
e0	0.75	0.71
OCR	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 53

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section B-B', Line 5.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.562388 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.508677
Consolidation Settlement [ft]	0	0.508677
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	1
Total Stress [ksf]	0	8.18236
Total Strain	-0	0.139728
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.019928	8.17977
Over-consolidation Ratio	1	1
Void Ratio	0.496874	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 1 ksf
Depth: 0 ft

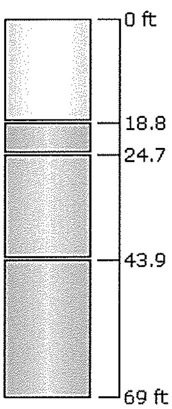
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	18.8	0
2	Soil Stratum 3	5.9	18.8
3	Soil Stratum 2	19.2	24.7
4	Soil Stratum 3	25.1	43.9



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2
Color			
Unit Weight [kips/ft^3]	0.106	0.103	0.104
Primary Consolidation	Enabled	Enabled	Enabled
Material Type	Non-Linear	Non-Linear	Non-Linear
Cc	0.09	0.035	0.045
Cr	0.1	0.1	0.1
e0	0.74	0.75	0.71
OCR	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 61

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section D-D', Line 1.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.499416 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	2.11072
Consolidation Settlement [ft]	0	2.11072
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	23.4
Total Stress [ksf]	0	28.7145
Total Strain	-0	0.211235
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.019292	28.7127
Over-consolidation Ratio	1	1
Void Ratio	0.372451	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 23.4 ksf
Depth: 0 ft

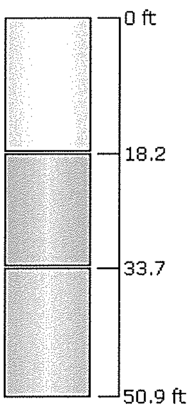
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	18.2	0
2	Soil Stratum 3	15.5	18.2
3	Soil Stratum 2	17.2	33.7



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2
Color			
Unit Weight [kips/ft^3]	0.106	0.103	0.104
Primary Consolidation	Enabled	Enabled	Enabled
Material Type	Non-Linear	Non-Linear	Non-Linear
Cc	0.09	0.035	0.045
Cr	0.1	0.1	0.1
e0	0.74	0.75	0.71
OCR	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 55

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information
Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section D-D', Line 2.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.498987 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.98358
Consolidation Settlement [ft]	0	1.98358
Immediate Settlement [ft]	0	0
Loading Stress [ksf]	0	18.5
Total Stress [ksf]	0	24.1716
Total Strain	-0	0.206331
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.018974	24.1698
Over-consolidation Ratio	1	1
Void Ratio	0.380985	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 18.5 ksf
Depth: 0 ft

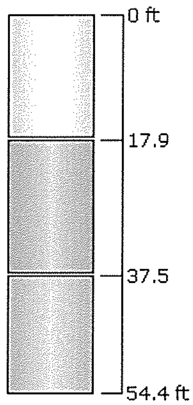
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	17.9	0
2	Soil Stratum 3	19.6	17.9
3	Soil Stratum 2	16.9	37.5



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2
Color			
Unit Weight [kips/ft^3]	0.106	0.103	0.104
Primary Consolidation	Enabled	Enabled	Enabled
Material Type	Non-Linear	Non-Linear	Non-Linear
Cc	0.09	0.035	0.045
Cr	0.1	0.1	0.1
e0	0.74	0.75	0.71
OCR	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 55

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section D-D', Line 3.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.576466 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	1.40443
Consolidation Settlement [ft]	0	1.35522
Immediate Settlement [ft]	0	0.0492125
Loading Stress [ksf]	0	12.7
Total Stress [ksf]	0	18.5709
Total Strain	-0	0.203888
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.014522	18.5692
Over-consolidation Ratio	1	1
Void Ratio	0	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 12.7 ksf
Depth: 0 ft

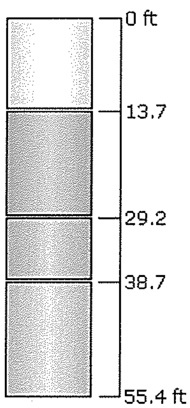
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	13.7	0
2	Soil Stratum 4	15.5	13.7
3	Soil Stratum 3	9.5	29.2
4	Soil Stratum 2	16.7	38.7



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2	Soil Stratum 4
Color				
Unit Weight [kips/ft^3]	0.106	0.103	0.104	0.11
Immediate Settlement	Disabled	Disabled	Disabled	Enabled
Es [ksf]				4000
Esur [ksf]				4000
Primary Consolidation	Enabled	Enabled	Enabled	Disabled
Material Type	Non-Linear	Non-Linear	Non-Linear	
Cc	0.09	0.035	0.045	
Cr	0.1	0.1	0.1	
e0	0.74	0.75	0.71	
OCR	1	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions
1	15.349, 19.014	Auto: 65

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section D-D', Line 4.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.636294 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.948079
Consolidation Settlement [ft]	0	0.914599
Immediate Settlement [ft]	0	0.03348
Loading Stress [ksf]	0	6.2
Total Stress [ksf]	0	12.7328
Total Strain	-0	0.141231
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.05777	12.7313
Over-consolidation Ratio	1	1
Void Ratio	0	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 6.2 ksf
Depth: 0 ft

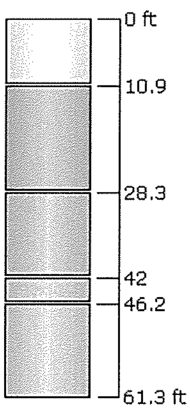
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	10.9	0
2	Soil Stratum 4	17.4	10.9
3	Soil Stratum 3	13.7	28.3
4	Soil Stratum 5	4.2	42
5	Soil Stratum 2	15.1	46.2



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2	Soil Stratum 4	Soil Stratum 5
Color					
Unit Weight [kips/ft^3]	0.106	0.103	0.104	0.11	0.115
Immediate Settlement	Disabled	Disabled	Disabled	Enabled	Enabled
Es [ksf]				4000	4000
Esur [ksf]				4000	4000
Primary Consolidation	Enabled	Enabled	Enabled	Disabled	Disabled
Material Type	Non-Linear	Non-Linear	Non-Linear		
Cc	0.09	0.035	0.045		
Cr	0.1	0.1	0.1		
e0	0.74	0.75	0.71		
OCR	1	1	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions

1	15.349, 19.014	Auto: 71

Field Point Grid

Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

Settle3D Analysis Information

Copper Flat Embankment Post-Construction Settlement

Project Settings

Document Name: Section D-D', Line 5.s3z
Project Title: Copper Flat Embankment Post-Construction Settlement
Analysis: 1-D Boussinesq
Author: David Poe, P.E.
Company: Golder Associates
Date Created: 4/25/2013, 2:08:28 PM
Stress Computation Method: Boussinesq
Use average properties to calculate layered stresses

Stage Settings

Stage #	Name
1	Stage 1

Results

Time taken to compute: 0.583683 seconds

Stage: Stage 1

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.175852
Consolidation Settlement [ft]	0	0.173272
Immediate Settlement [ft]	0	0.00257999
Loading Stress [ksf]	0	0.4
Total Stress [ksf]	0	7.63261
Total Strain	-0	0.0875971
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.04134	7.61899
Over-consolidation Ratio	1	1
Void Ratio	0	0.75
Hydroconsolidation Settlement [ft]	0	0

Loads

1. Rectangular Load

Length: 2000 ft
Width: 2000 ft
Rotation angle: 0 degrees
Load Type: Flexible
Area of Load: 4e+006 ft^2
Load: 0.4 ksf
Depth: 0 ft

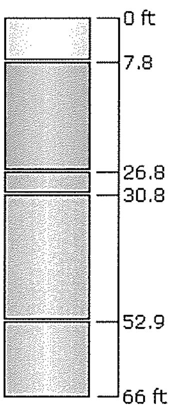
Installation Stage: Stage 1

Coordinates

X [ft]	Y [ft]
-984.651	-980.986
1015.35	-980.986
1015.35	1019.01
-984.651	1019.01

Soil Layers

Layer #	Type	Thickness [ft]	Depth [ft]
1	Soil Stratum 1	7.8	0
2	Soil Stratum 4	19	7.8
3	Soil Stratum 3	4	26.8
4	Soil Stratum 5	22.1	30.8
5	Soil Stratum 2	13.1	52.9



Soil Properties

Property	Soil Stratum 1	Soil Stratum 3	Soil Stratum 2	Soil Stratum 4	Soil Stratum 5
Color					
Unit Weight [kips/ft^3]	0.106	0.103	0.104	0.11	0.115
Immediate Settlement	Disabled	Disabled	Disabled	Enabled	Enabled
Es [ksf]				4000	13000
Esur [ksf]				4000	13000
Primary Consolidation	Enabled	Enabled	Enabled	Disabled	Disabled
Material Type	Non-Linear	Non-Linear	Non-Linear		
Cc	0.09	0.035	0.045		
Cr	0.1	0.1	0.1		
e0	0.74	0.75	0.71		
OCR	1	1	1	1	1

Query Points

Point #	(X,Y) Location	Number of Divisions

1	15.349, 19.014	Auto: 63

Field Point Grid

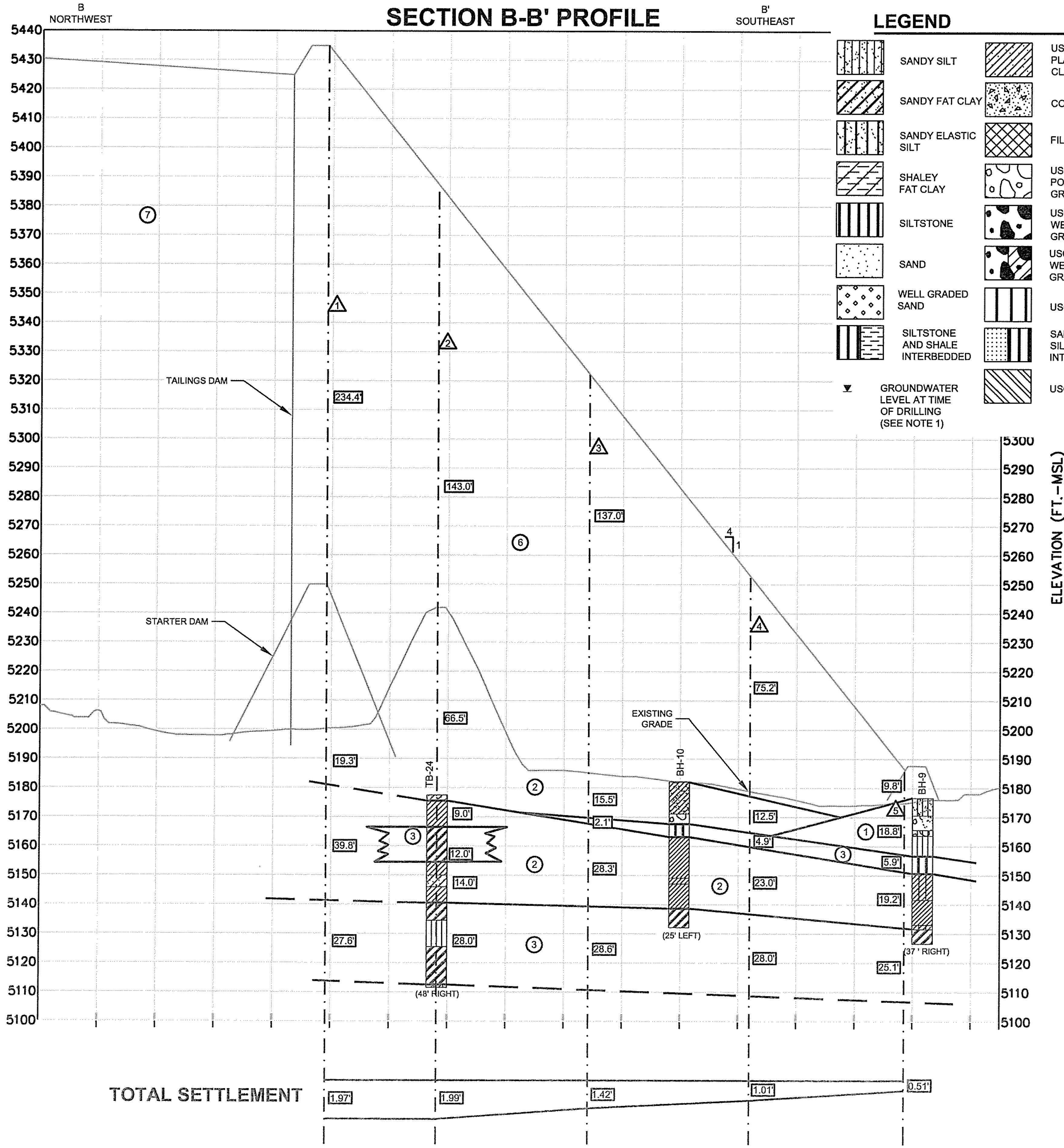
Number of points: 289
Expansion Factor: 2

Grid Coordinates

X [ft]	Y [ft]
2015.35	2019.01
2015.35	-1989.31
-1989.58	-1989.31
-1989.58	2019.01

ATTACHMENT 4
EMBANKMENT ANALYSIS CROSS-SECTIONS WITH GRAPHICAL OUTPUT RESULTS
(SECTIONS B-B’ AND D-D’ ONLY)

SECTION B-B' PROFILE



LEGEND

- SANDY SILT
- SANDY FAT CLAY
- SANDY ELASTIC SILT
- SHALEY FAT CLAY
- SILTSTONE
- SAND
- WELL GRADED SAND
- SILTSTONE AND SHALE INTERBEDDED
- GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- USCS LOW PLASTICITY SANDY CLAY
- CONCRETE
- FILL (MADE GROUND)
- USCS POORLY-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL WITH CLAY
- USCS ELASTIC SILT
- SANDSTONE AND SILTSTONE INTERBEDDED
- USCS CL-CH
- CLAYEY SAND
- USCS HIGH PLASTICITY CLAY
- USCS LOW PLASTICITY CLAY
- SANDSTONE
- SANDSTONE AND SHALE
- WELL GRADED SAND WITH CLAY
- SHALE
- SHALEY ELASTIC SILT
- POORLY GRADED SAND WITH SILT

STRATUM DESCRIPTORS

1. ML, CL-ML, SM
2. CL
3. CH, MH
4. GRAVEL, SAND
5. BASALT, CALICHE
6. EMBANKMENT FILL
7. TAILINGS (CONSOLIDATED)

△ ANALYSIS SECTION

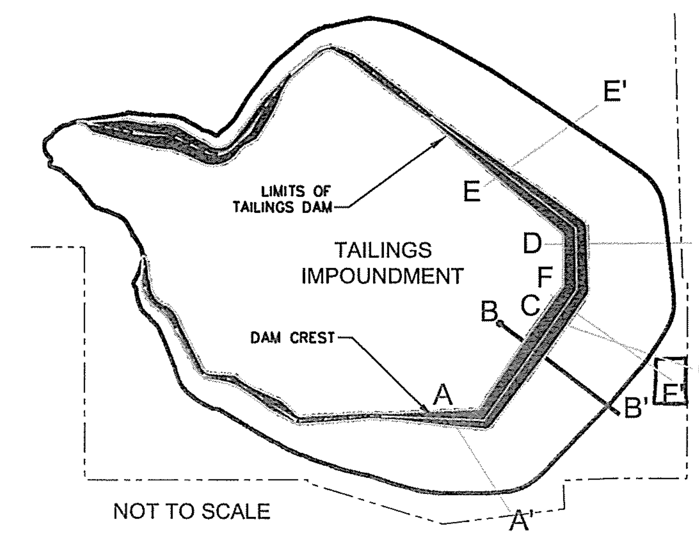
12.0' STRATUM/FILL THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. EXISTING FIVE (5) FOOT TOPOGRAPHY AND PERMIT BOUNDARY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. TOPOGRAPHY IN THE MINE AREA AND TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.

200 0 200
HORIZONTAL SCALE FEET

40 0 40
VERTICAL SCALE FEET



NOT TO SCALE

DRAFT

PROJECT: COPPER FLAT PROJECT
TAILINGS STORAGE FACILITY
SIERRA COUNTY, NEW MEXICO

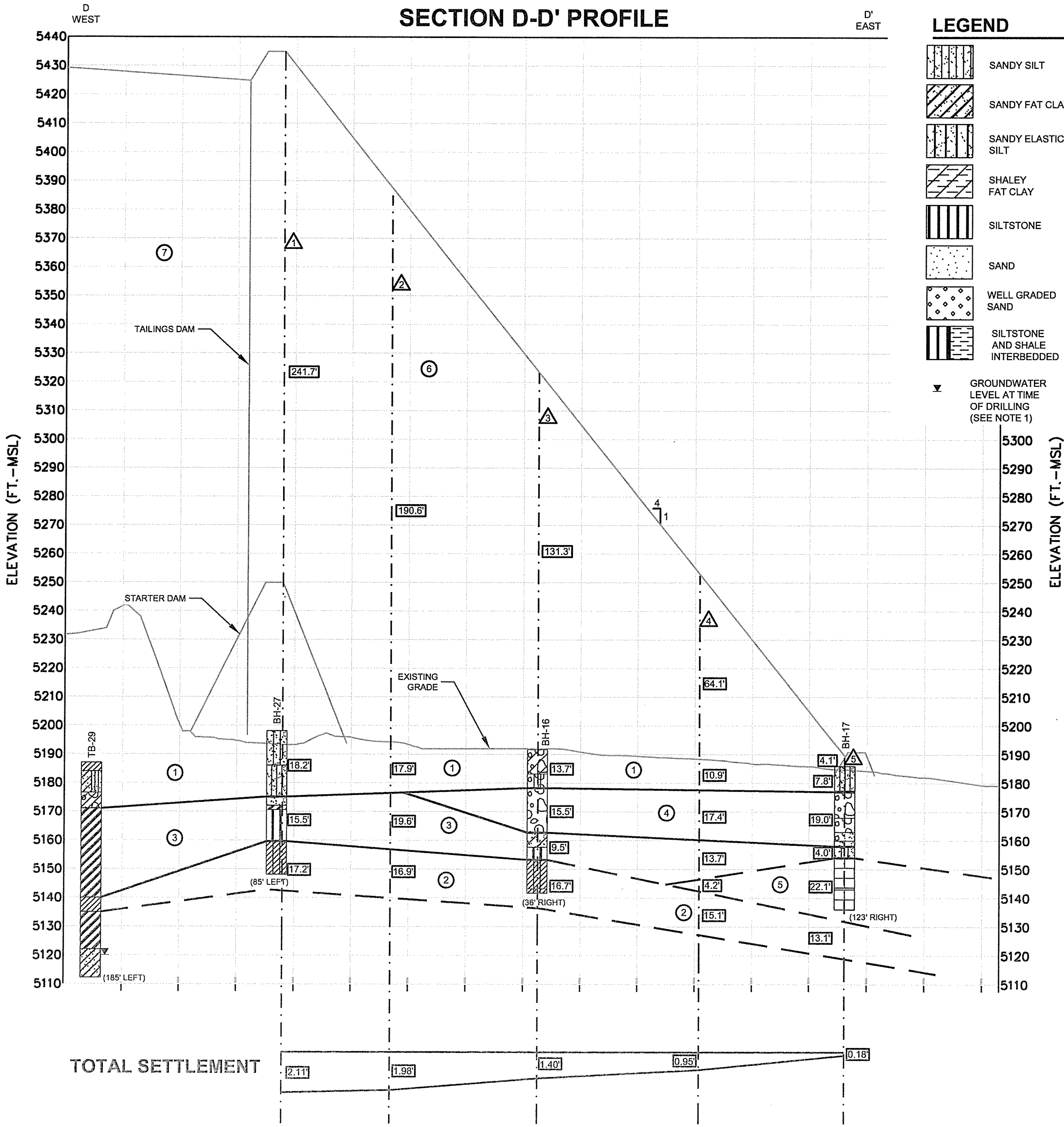
TITLE: GEOLOGIC CROSS SECTION B-B'

Golder Associates

PROJECT No.		10392557	FILE No.	10392557A003
DESIGN	CMT	2/21/13	SCALE	AS SHOWN
CADD	CMT	2/21/13	FIGURE	
CHECK	DEP	2/21/13		5
REVIEW	GM	2/21/13		

14731

SECTION D-D' PROFILE



LEGEND

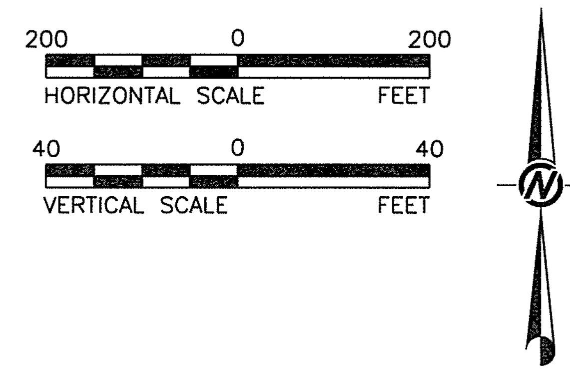
- SANDY SILT
- SANDY FAT CLAY
- SANDY ELASTIC SILT
- SHALEY FAT CLAY
- SILTSTONE
- SAND
- WELL GRADED SAND
- SILTSTONE AND SHALE INTERBEDDED
- GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- USCS LOW PLASTICITY SANDY CLAY
- CONCRETE
- FILL (MADE GROUND)
- USCS POORLY-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL WITH CLAY
- USCS ELASTIC SILT
- SANDSTONE AND SILTSTONE INTERBEDDED
- CALICHE
- CLAYEY SAND
- USCS HIGH PLASTICITY CLAY
- USCS LOW PLASTICITY CLAY
- SANDSTONE
- SANDSTONE AND SHALE
- WELL GRADED SAND WITH CLAY
- SHALE
- SHALEY ELASTIC SILT
- POORLY GRADED SAND WITH SILT

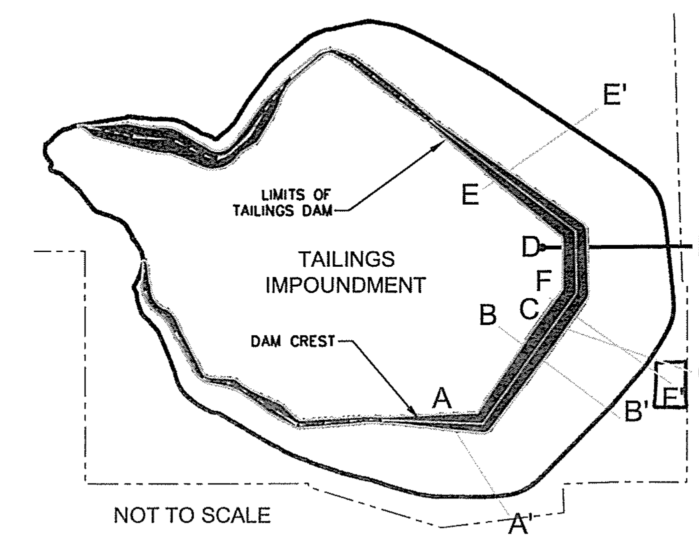
STRATUM DESCRIPTORS

①	ML, CL-ML, SM
②	CL
③	CH, MH
④	GRAVEL, SAND
⑤	BASALT, CALICHE
⑥	EMBANKMENT FILL
⑦	TAILINGS (CONSOLIDATED)
△6	ANALYSIS SECTION
12.0'	STRATUM/FILL THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. EXISTING FIVE (5) FOOT TOPOGRAPHY AND PERMIT BOUNDARY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. TOPOGRAPHY IN THE MINE AREA AND TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.





DRAFT

PROJECT
COPPER FLAT PROJECT
TAILINGS STORAGE FACILITY
SIERRA COUNTY, NEW MEXICO

TITLE
GEOLOGIC CROSS SECTION D-D'

Golder Associates

PROJECT No.		10392557	FILE No.	10392557A005
DESIGN	CMT	2/21/13	SCALE	AS SHOWN
CADD	CMT	2/21/13	FIGURE	
CHECK	DEP	2/21/13		7
REVIEW	GM	2/21/13		

14732

APPENDIX I.2
SETTLEMENT & GEOMEMBRANE STRAIN ANALYSIS

SETTLEMENT & GEOMEMBRANE STRAIN ANALYSIS

Made By: JL
Checked by: GM
Reviewed by: MP

1.0 OBJECTIVE

Estimate the tensile strain caused by differential settlement of the in-situ subsurface materials inferred below the proposed Copper Flat tailing facility.

2.0 METHODOLOGY

The proposed geomembrane liner system may experience tensile strain because of differential settlement caused from the loading (tailings and embankment) of the subsurface soils.

2.1 Settlement Analysis

Settlement was calculated using the finite element software SigmaW from the 2012 GeoStudio package. Cross sections A and B (both shown in plan view on Figure 1 and in profile view in Figure 2) showing the proposed tailing facility and tailings embankment layout/dimensions, inferred subsurface soils and boundaries were imported into the software for analyses. Geotechnical properties for each subsurface material layer were selected from previous reports (Refs. 1 and 2) and from experience with similar soils. The geotechnical properties were incorporated into the software and used for the settlement analyses. Table 1 below provides a list of the geotechnical subsurface material layers and properties.

Table 1: Geotechnical Subsurface Material Layers and Properties

Material No.	Material Name	Geotechnical Properties		
		Unit Weight (lb/ft^3)	Poisson's Ratio (-)	Effective Modulus (lb/ft^2)
0	Tailings/Embankment	97	0.49	10,000,000
1	Well-Graded Gravel	110	0.30	4,000,000
2	Well-Graded Sand with Silt and Gravel	110	0.30	4,000,000
3	Conglomerate	130	0.30	5,000,000
4	Basalt	160	0.30	100,000,000
5	Lean Clay, Fat Clay, Silty Clay	104	0.30	790,600
6	Silt	106	0.30	671,400
7	Caliche	125	0.30	100,000,000
8	Bedrock	175	0.30	100,000,000

2.1 Tensile Strain from Differential Settlement

Settlement results from the SigmaW runs were used to calculate the induced strain in the geomembrane liner system along Cross Section A and B shown in Figure 1 and Figure 2.

The tensile strain of a base liner system caused by differential settlement can be estimated by the following equation:

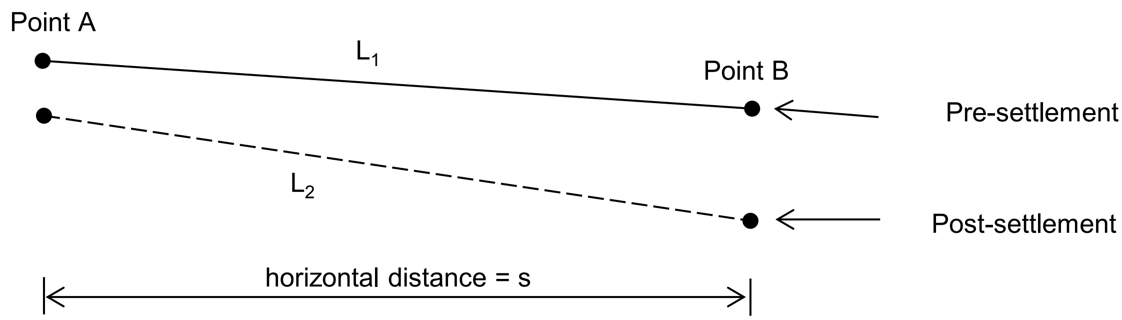


Illustration: Liner Differential Settlement

$$\varepsilon = \frac{L_2 - L_1}{L_1}$$

$$L = \sqrt{(Elev.A\ - Elev.B)^2 + s^2}$$

Where:
- ε = Tensile strain in liner system between Points A and B
- L_1 = Distance between Points A and B, pre-settlement
- L_2 = Distance between Points A and B, post-settlement
- s = Horizontal distance between Points A and B

3.0 CALCULATIONS AND RESULTS

3.1 Tensile Strain from Differential Settlement

The settlement results for Cross Section A and Cross Section B are illustrated below. Points for liner strain evaluation were selected at locations where peaks or valleys were observed in the results. The liner strain evaluations due to differential settlement of the subsurface materials are summarized in Table 2 and Table 3.

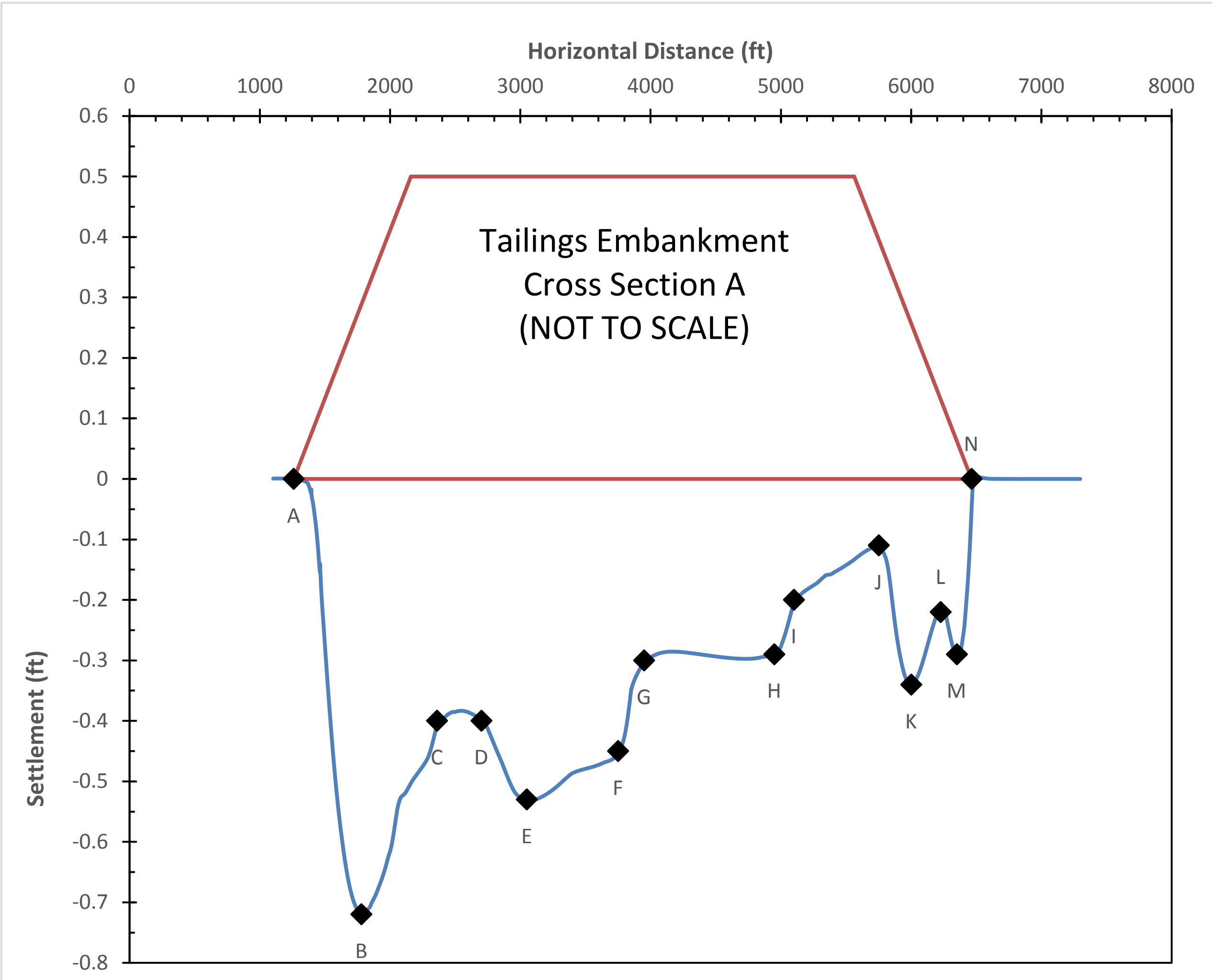


Illustration: Settlement Profile - Cross Section A
(refer to Figure 2 for location along horizontal distance)

Table 2: Liner Integrity Analysis Results - Cross Section A

Points	Elevations		Settlement, feet	Horizontal Distance (s), feet	Pre-settlement Dist. (L_1), feet	Post-settlement Dist. (L_2), feet	Tensile Strain
	Pre-settlement, feet	Post-settlement, feet					
A B	5383.4 5311.7	5383.4 5311.0	0.00 0.72	520.00	524.920	525.019	0.0188%
B C	5311.7 5275.5	5311.0 5275.1	0.72 0.40	580.00	581.129	581.109	Under Compression
D E	5267.5 5251.8	5267.1 5251.3	0.40 0.53	350.00	350.352	350.358	0.0017%
E F	5251.8 5230.0	5251.3 5229.6	0.53 0.45	700.00	700.339	700.337	Under Compression
F G	5230.0 5230.2	5229.6 5229.9	0.45 0.30	200.00	200.000	200.000	0.0001%
H I	5239.6 5197.3	5239.3 5197.1	0.29 0.20	150.00	155.850	155.826	Under Compression
I J	5197.3 5185.2	5197.1 5185.1	0.20 0.11	650.00	650.113	650.111	Under Compression
J K	5185.2 5180.4	5185.1 5180.1	0.11 0.34	250.00	250.046	250.051	0.0018%
K L	5180.4 5176.7	5180.1 5176.5	0.34 0.22	225.00	225.030	225.028	Under Compression
L M	5176.7 5173.3	5176.5 5173.0	0.22 0.29	125.00	125.046	125.048	0.0015%
M N	5173.3 5168.5	5173.0 5168.5	0.29 0.00	113.00	113.102	113.090	Under Compression
			Maximum Tensile Strain due to Differential Settlement =				0.0188%

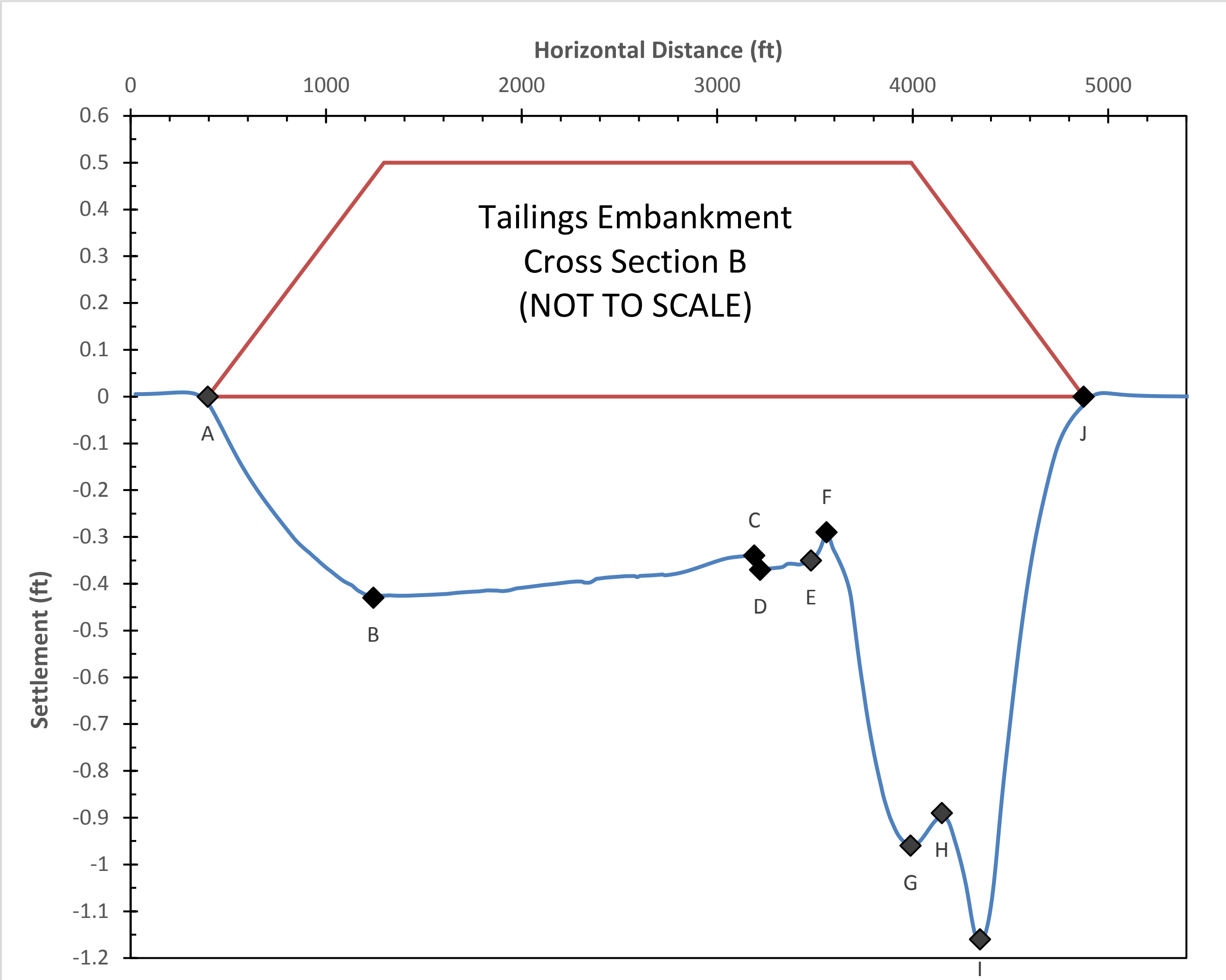


Illustration: Settlement Profile - Cross Section B
(refer to Figure 2 for location along horizontal distance)

Table 3: Liner Integrity Analysis Results - Cross Section B

Points	Elevations		Settlement, feet	Horizontal Distance (s), feet	Pre-settlement Dist. (L_1), feet	Post-settlement Dist. (L_2), feet	Tensile Strain
	Pre-settlement, feet	Post-settlement, feet					
A	5280.2	5280.2	0.00	847.00	848.707	848.734	0.0032%
B	5226.4	5226.0	0.43				
C	5213.7	5213.4	0.34	30.00	34.000	33.986	Under Compression
D	5229.7	5229.3	0.37				
E	5239.3	5239.0	0.35	79.00	83.716	83.696	Under Compression
F	5211.6	5211.3	0.29				
F	52116.0	52115.7	0.29	430.00	46921.770	46922.440	0.0014%
G	5196.2	5195.2	0.96				
G	5196.2	5195.2	0.96	160.00	160.004	160.004	0.0003%
H	5197.3	5196.4	0.89				
H	5197.3	5196.4	0.89	195.00	195.004	195.003	Under Compression
I	5198.6	5197.4	1.16				
I	5198.6	5197.4	1.16	530.00	530.000	530.003	0.0005%
J	5199.3	5199.3	0.00				
Maximum Tensile Strain due to Differential Settlement =							0.0032%

4.0 DISCUSSION AND CONCLUSIONS

It is understood that the liner system will consist of HDPE 80 mil geomembrane liner between a liner bedding fill layer and tailings. The minimum allowable tensile strain for geomembrane is 10% (Refs. 3). Based on the analysis performed herein and available information at the time of this calculation, the estimated tensile strain along Cross Section A and Cross Section B are less then the allowable tensile strain. The allowable strain is presented in Table 4.

Table 4: Summary of Allowable Liner Strains

Cross Section	Max. Tensile Strain from Differential Settlement	Liner Component	Allowable Tensile Strain	Tensile Strain less than Allowable?
A	0.0188%	Geomembrane	10%	Yes
B	0.0032%			Yes

The potential strain of the geomembrane liner system was analyzed for overall differential settlement along two cross sections (Cross Section A and B) within the proposed Copper Flat tailing facility. Based on the available information, experience with similar subsurface materials and conservative assumptions, the maximum liner strain is estimated to be 0.02%, from differential settlement which is less than the allowable strain for geomembrane liners.

5.0 REFERENCES

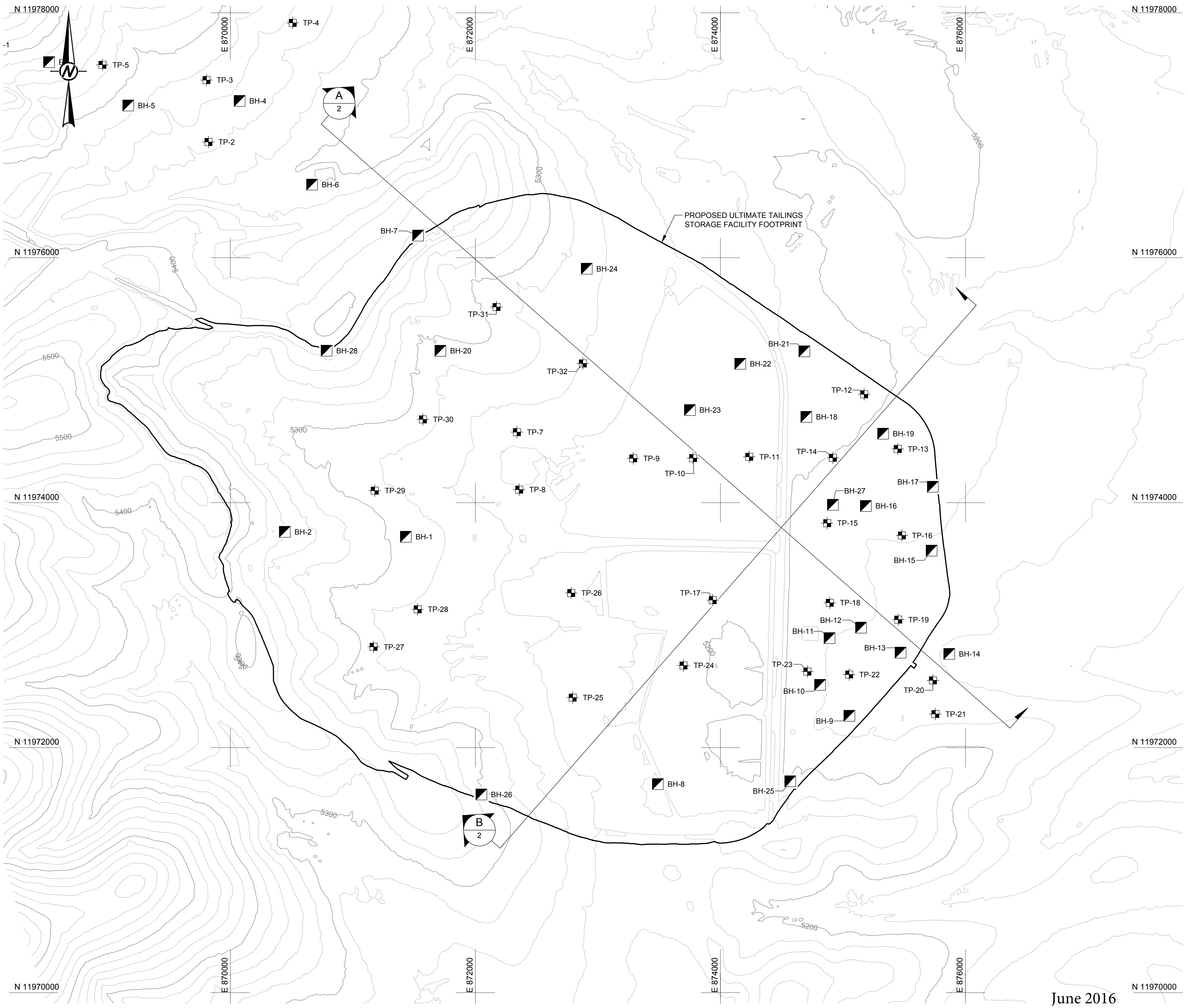
1. - Golder 2013, Feasibility Study Copper Flat Project, Sierra County, New Mexico, Volume 1 - Tailings Storage Facility, report dated July 2013, Golder Project No. 103-92557.011
2. - SHB (Sergent, Hauskins and Beckwith), 1980. Tailings Dam and Disposal Area - Quintana Minerals Corporation - Copper Flats Project - Golddust, New Mexico. October 14, 1980
3. - Robert M. Koerner (2005) Designing with Geosynthetics, Fifth Edition, Pearson/Prentice Hall.

GeoStudio File Names	Description
Full Cross Section A.gsz	Cross Section A Settlement Analysis
Full Cross Section B.gsz	Cross Section B Settlement Analysis

Attachments

Figure 1: Cross Section Location Plan

Figure 2: Geologic Cross Sections



LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
BH-11	HOLLOW STEM AUGER (HSA) BOREHOLE
TP-8	TEST PIT
A / 2	CROSS-SECTION CALLOUT SECTION ID DRAWING SHEET LOCATION

0 250 500
1" = 500' FEET

CLIENT
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PROJECT
COPPER FLAT

SIERRA COUNTY, NEW MEXICO

TITLE
CROSS-SECTION LOCATION PLAN

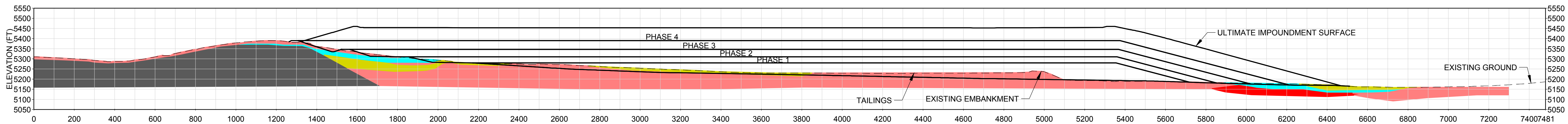
CONSULTANT
Golder Associates

YYYY-MM-DD	2016-05-11
DESIGNED	JS
PREPARED	JHR
REVIEWED	JL
APPROVED	GM

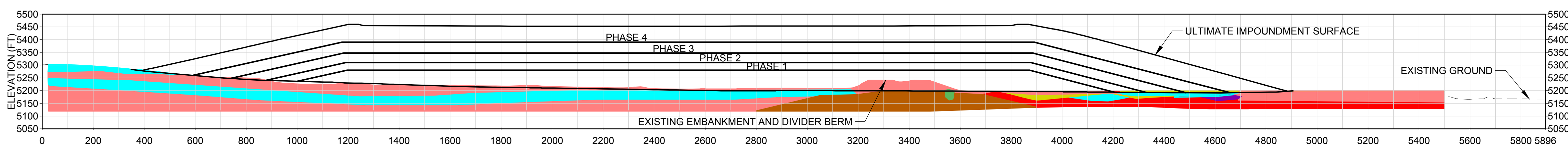
PROJECT NO.	CONTROL	REV.	FIGURE
1531453	0001	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Path: \\tucson\cadd\CHEVRON\QUESTA\99_PROJECTS\1531453_0001_FIG_001.dwg



SCALE 1" = 500' A 2 CROSS-SECTION A



SCALE 1" = 500' B 2 CROSS-SECTION B

0 250 500
1" = 500' FEET

LEGEND

- WELL-GRADED GRAVEL
- WELL-GRADED SAND WITH SILT AND GRAVEL
- CONGLOMERATE
- BASALT
- LEAN CLAY, FAT CLAY, SILTY CLAY
- SILT
- CALICHE
- BEDROCK

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PROJECT
COPPER FLAT

SIERRA COUNTY, NEW MEXICO

TITLE
GEOLOGIC CROSS-SECTIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-05-11
DESIGNED	JS
PREPARED	JHR
REVIEWED	JL
APPROVED	GM

PROJECT NO.	CONTROL	REV.	FIGURE
1531453	0001	A	2

June 2016

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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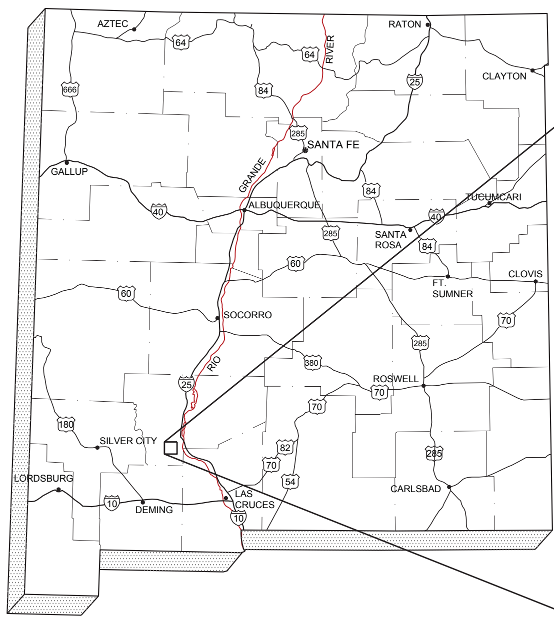
APPENDIX J
DRAWINGS

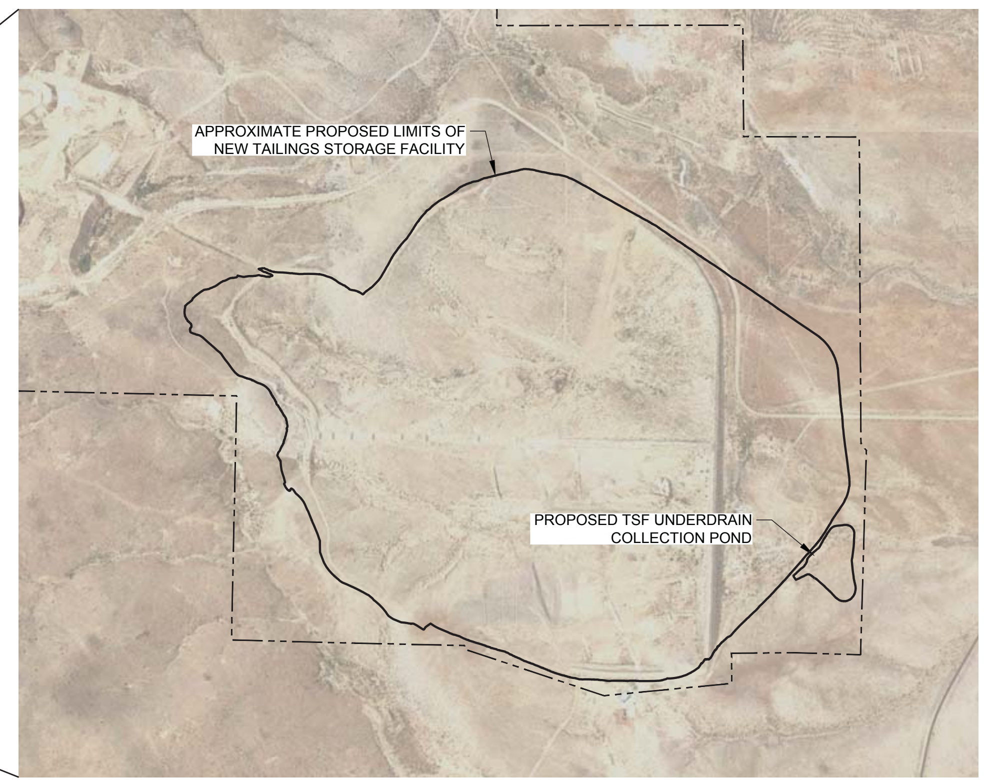
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO
NOVEMBER 2015

DRAWING LIST

No.	DRAWING TITLE
1	TITLE SHEET AND LOCATION MAP
2	EXISTING CONDITIONS AND PROPOSED FACILITIES PLAN
3	GEOTECHNICAL TEST AND GEOLOGIC CROSS-SECTION LOCATIONS
4	GEOLOGIC CROSS-SECTION A-A'
5	GEOLOGIC CROSS-SECTION B-B'
6	GEOLOGIC CROSS-SECTION C-C'
7	GEOLOGIC CROSS-SECTION D-D'
8	GEOLOGIC CROSS-SECTION E-E'
9	GEOLOGIC CROSS-SECTION F-F'
10	TAILINGS STORAGE FACILITY GRADING PLAN
11	TAILINGS STORAGE FACILITY PHASE 1 PLAN
12	TAILINGS STORAGE FACILITY AT FINAL BUILDOUT
13	TAILINGS STORAGE FACILITY CROSS-SECTIONS
14	TAILINGS STORAGE FACILITY DETAILS
15	DAM AND IMPOUNDMENT UNDERDRAIN PLAN
16	DAM UNDERDRAIN DETAILS (1 of 2)
17	DAM UNDERDRAIN DETAILS (2 of 2)
18	TSF UNDERDRAIN COLLECTION POND PLAN
19	TSF UNDERDRAIN COLLECTION POND CROSS-SECTION AND DETAILS(1 OF 2)
20	TSF UNDERDRAIN COLLECTION POND CROSS-SECTION AND DETAILS(2 OF 2)
21	CYCLONE STATION, SURGE POND AND PROCESS AREA PLAN
22	SURGE POND PLAN, CROSS-SECTIONS, AND DETAILS
23	GENERAL PROCESS FLOW DIAGRAM
24	TAILINGS DELIVERY AND DISTRIBUTION PIPING PLAN
25	TAILINGS DISTRIBUTION PLAN AND PROFILE (1 OF 2)
26	TAILINGS DISTRIBUTION PLAN AND PROFILE (2 OF 2)
27	WATER RECLAIM SYSTEM PIPING PLAN
28	WATER RECLAIM SYSTEM DETAILS
29	TAILINGS DISTRIBUTION AND SECONDARY CONTAINMENT DETAILS AND SECTIONS



STATE OF NEW MEXICO
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

GENERAL REFERENCES

1. 2-FOOT TOPOGRAPHY DEVELOPED BY COOPER AERIAL SURVEY CO. BASED ON JUNE 18, 2011 AERIAL SURVEY AND PROVIDED BY THEMAC RESOURCES.
2. COORDINATE SYSTEM IS IN UTM ZONE 13 NAD83 U.S. FOOT.

NOTES

1. DRAWINGS TO BE READ IN CONJUNCTION WITH FEASIBILITY LEVEL DESIGN, 30,000 TPD TAILINGS STORAGE FACILITY, SIERRA COUNTY, NEW MEXICO.

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TITLE SHEET AND LOCATION MAP

PROJECT No.		103-92557	FILE No.	10392557K001
DESIGN	DW	2013-04-08	SCALE	NOT TO SCALE
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		1
REVIEW	DAK	2013-07-17		

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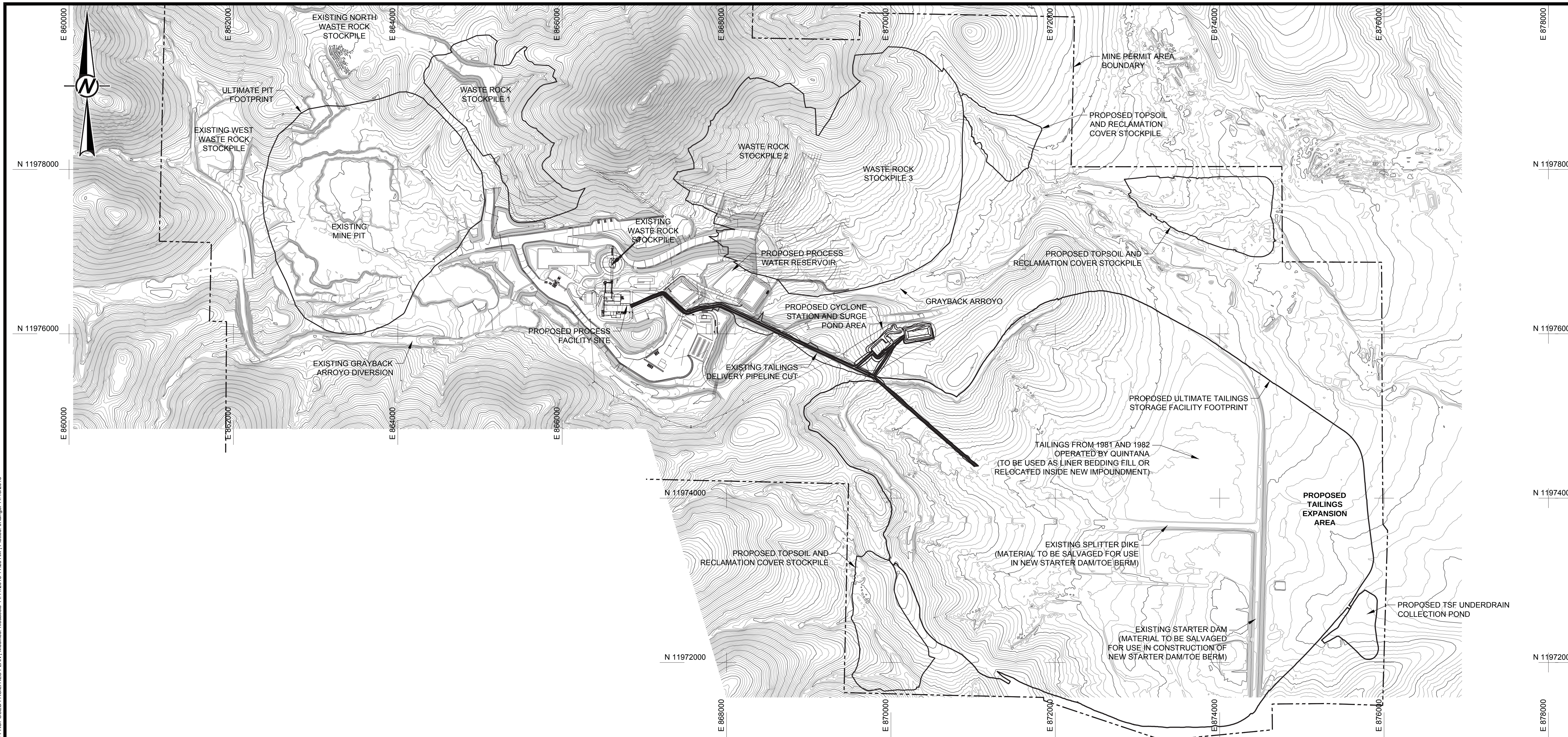

NOTES

1. EXISTING FIVE (5) FOOT TOPOGRAPHY AND PERMIT BOUNDARY PROVIDED BY NEW MEXICO COPPER CORPORATION.

2. TOPOGRAPHY IN THE MINE AREA AND TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.

0 600 1200 1800
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

EXISTING CONDITIONS AND PROPOSED FACILITIES PLAN

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K002
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
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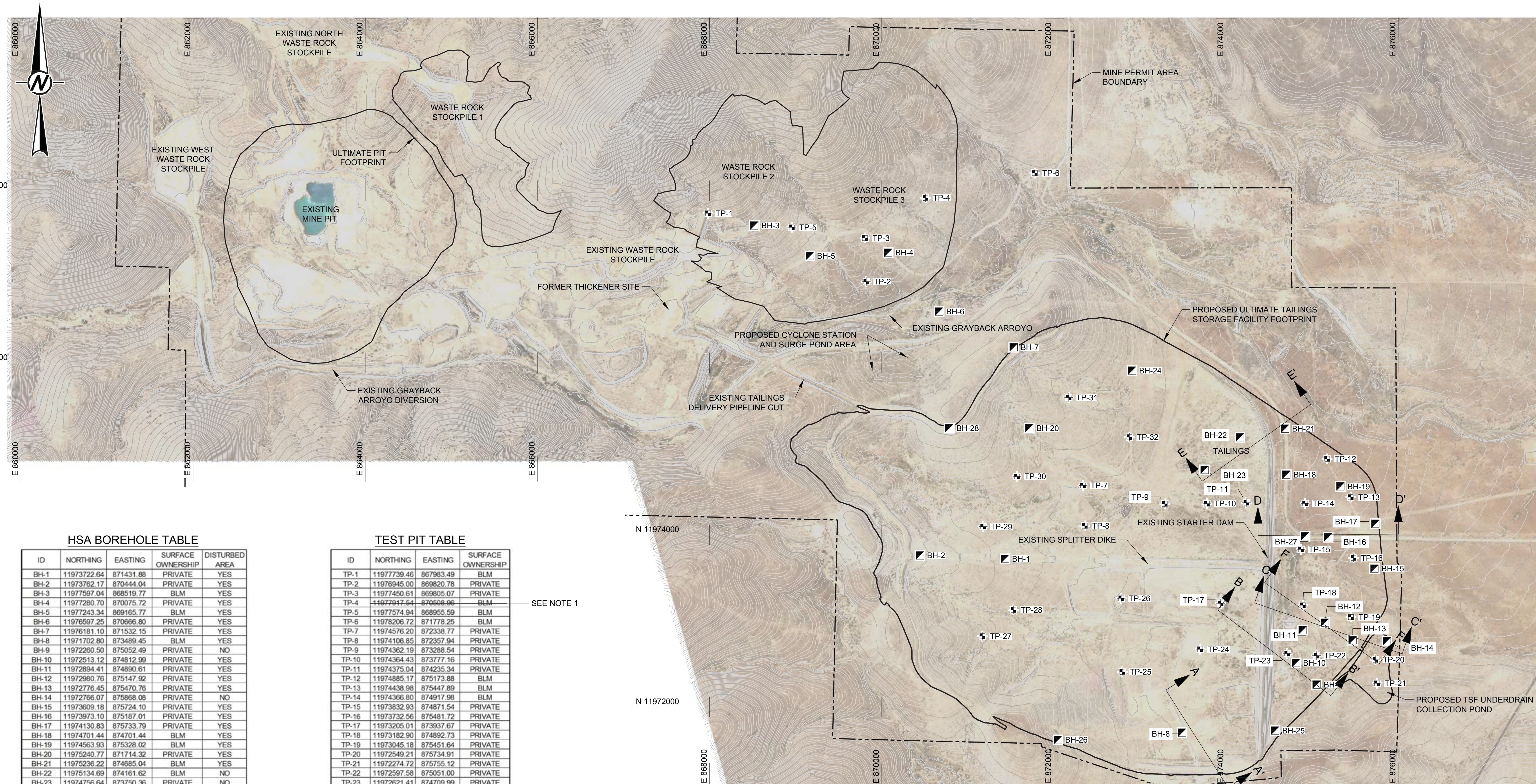
REVIEW	DAK	2013-07-17		



HSA BOREHOLE TABLE

ID	NORTHING	EASTING	SURFACE OWNERSHIP	DISTURBED AREA
BH-1	11973722.64	871431.88	PRIVATE	YES
BH-2	11973762.17	870444.04	PRIVATE	YES
BH-3	11977597.04	868519.77	BLM	YES
BH-4	11977280.70	870075.72	PRIVATE	YES
BH-5	11977243.34	869165.77	BLM	YES
BH-6	11976597.25	870666.80	PRIVATE	YES
BH-7	11976181.10	871532.15	PRIVATE	YES
BH-8	11971702.80	873489.45	BLM	YES
BH-9	11972260.50	875052.49	PRIVATE	NO
BH-10	11972513.12	874812.99	PRIVATE	YES
BH-11	11972894.41	874890.61	PRIVATE	YES
BH-12	11972980.76	875147.92	PRIVATE	YES
BH-13	11972776.45	875470.76	PRIVATE	YES
BH-14	11972766.07	875868.08	PRIVATE	NO
BH-15	11973609.18	875724.10	PRIVATE	YES
BH-16	11973973.10	875187.01	PRIVATE	YES
BH-17	11974130.83	875733.79	PRIVATE	YES
BH-18	11974701.44	874701.44	BLM	YES
BH-19	11974563.93	875328.02	BLM	YES
BH-20	11975240.77	871714.32	PRIVATE	YES
BH-21	11975236.22	874685.04	BLM	YES
BH-22	11975134.69	874161.62	BLM	NO
BH-23	11974756.64	873750.36	PRIVATE	NO
BH-24	11975910.38	872908.33	BLM	YES
BH-25	11971725.72	874570.21	BLM	YES
BH-26	11971618.08	872048.45	BLM	YES
BH-27	11973982.94	874917.98	PRIVATE	YES
BH-28	11975241.04	870785.44	PRIVATE	YES

TEST PIT TABLE

ID	NORTHING	EASTING	SURFACE OWNERSHIP
TP-1	11977739.46	867983.49	BLM
TP-2	11976945.00	869820.78	PRIVATE
TP-3	11977450.61	869805.07	PRIVATE
TP-4	~~11977917.54~~	~~870508.96~~	~~BLM~~
TP-5	11977574.94	868955.59	BLM
TP-6	11978206.72	871778.25	BLM
TP-7	11974576.20	872338.77	PRIVATE
TP-8	11974106.85	872357.94	PRIVATE
TP-9	11974362.19	873288.54	PRIVATE
TP-10	11974364.43	873777.16	PRIVATE
TP-11	11974375.04	874235.34	PRIVATE
TP-12	11974885.17	875173.88	BLM
TP-13	11974438.98	875447.89	BLM
TP-14	11974366.80	874917.98	BLM
TP-15	11973832.93	874871.54	PRIVATE
TP-16	11973732.56	875481.72	PRIVATE
TP-17	11973205.01	873937.67	PRIVATE
TP-18	11973182.90	874892.73	PRIVATE
TP-19	11973045.18	875451.64	PRIVATE
TP-20	11972549.21	875734.91	PRIVATE
TP-21	11972274.72	875755.12	PRIVATE
TP-22	11972597.58	875051.00	PRIVATE
TP-23	11972621.41	874709.99	PRIVATE
TP-24	11972670.75	873699.23	PRIVATE
TP-25	11972408.78	872794.31	PRIVATE
TP-26	11973262.64	872782.60	PRIVATE
TP-27	11972823.18	871169.18	PRIVATE
TP-28	11973129.48	871528.89	PRIVATE
TP-29	11974098.42	871178.07	PRIVATE
TP-30	11974680.06	871571.56	PRIVATE
TP-31	11975597.72	872172.62	BLM
TP-32	11975136.61	872876.80	BLM

SEE NOTE 1

LEGEND

— · — · — MINE PERMIT AREA BOUNDARY

BH-1 HOLLOW STEM AUGER (HSA) BOREHOLE

TP-29 TEST PIT

NOTES

1. TP-4 TEST PIT NOT EXCAVATED DUE TO LACK OF ACCESS.

REFERENCES

1. EXISTING FIVE (5) FOOT TOPOGRAPHY AND PERMIT BOUNDARY PROVIDED BY NEW MEXICO COPPER CORPORATION.
2. TOPOGRAPHY IN THE MINE AREA AND TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.

0 600 1200 1800
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES | NEW MEXICO COPPER CORPORATION
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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

GEOTECHNICAL TEST AND GEOLOGIC CROSS-SECTION LOCATIONS

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K003
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		3
REVIEW	DAK	2013-07-17		

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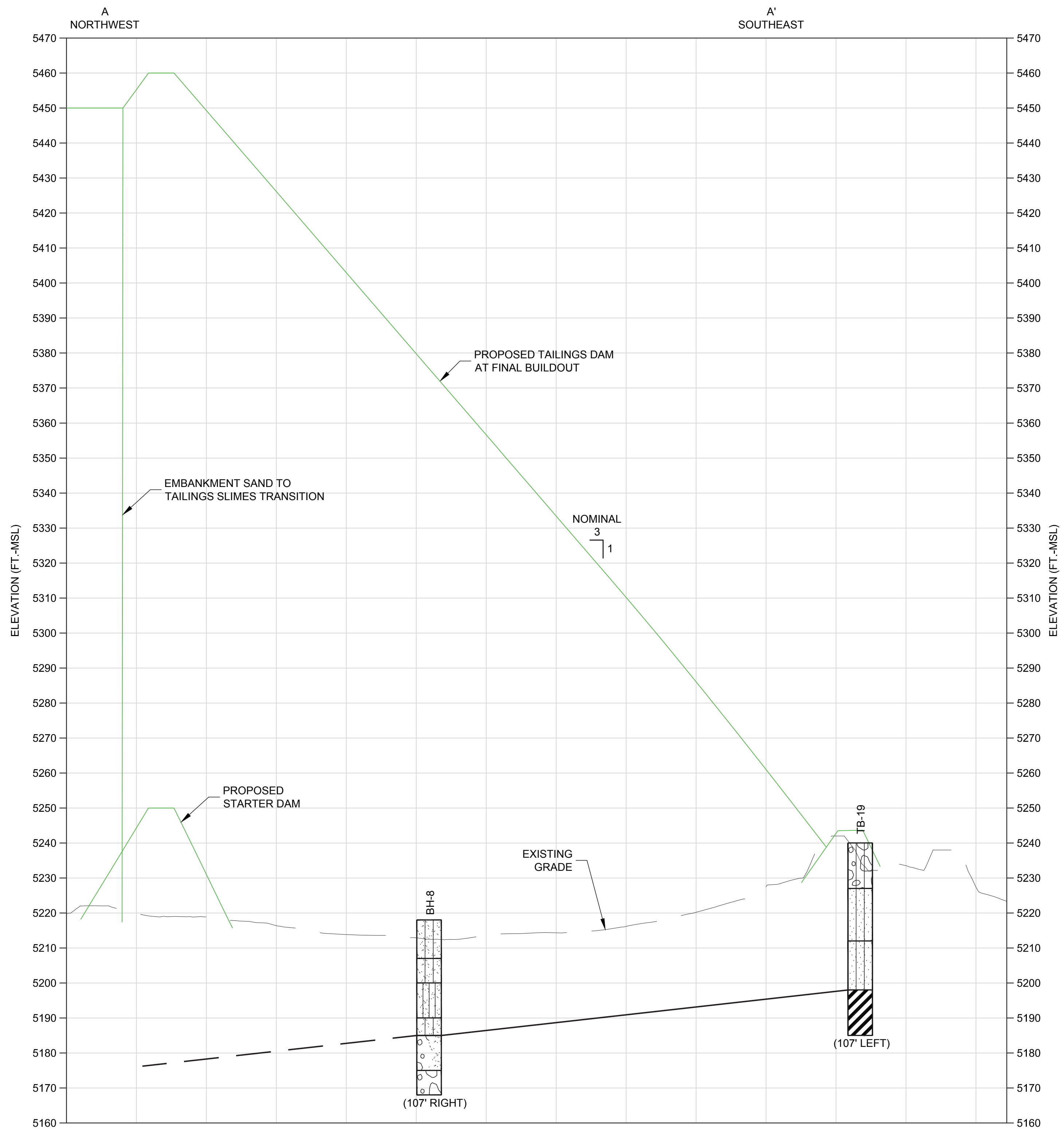
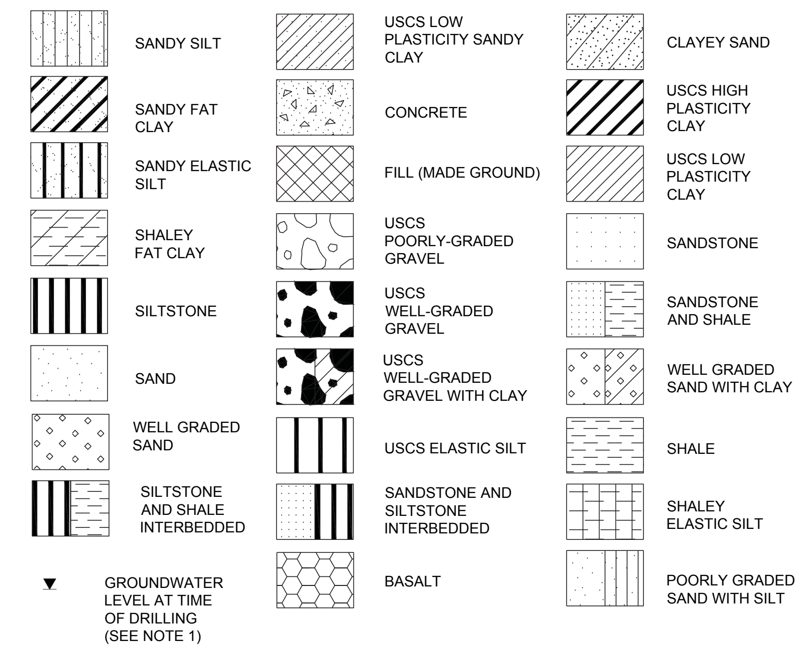


NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. PROFILE OF EXISTING GROUND BASED ON FIVE (5) FOOT TOPOGRAPHY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. PROFILE IN THE TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.
4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND



0 100 200 300
HORIZONTAL SCALE FEET

0 20 40 60
VERTICAL SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES | NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

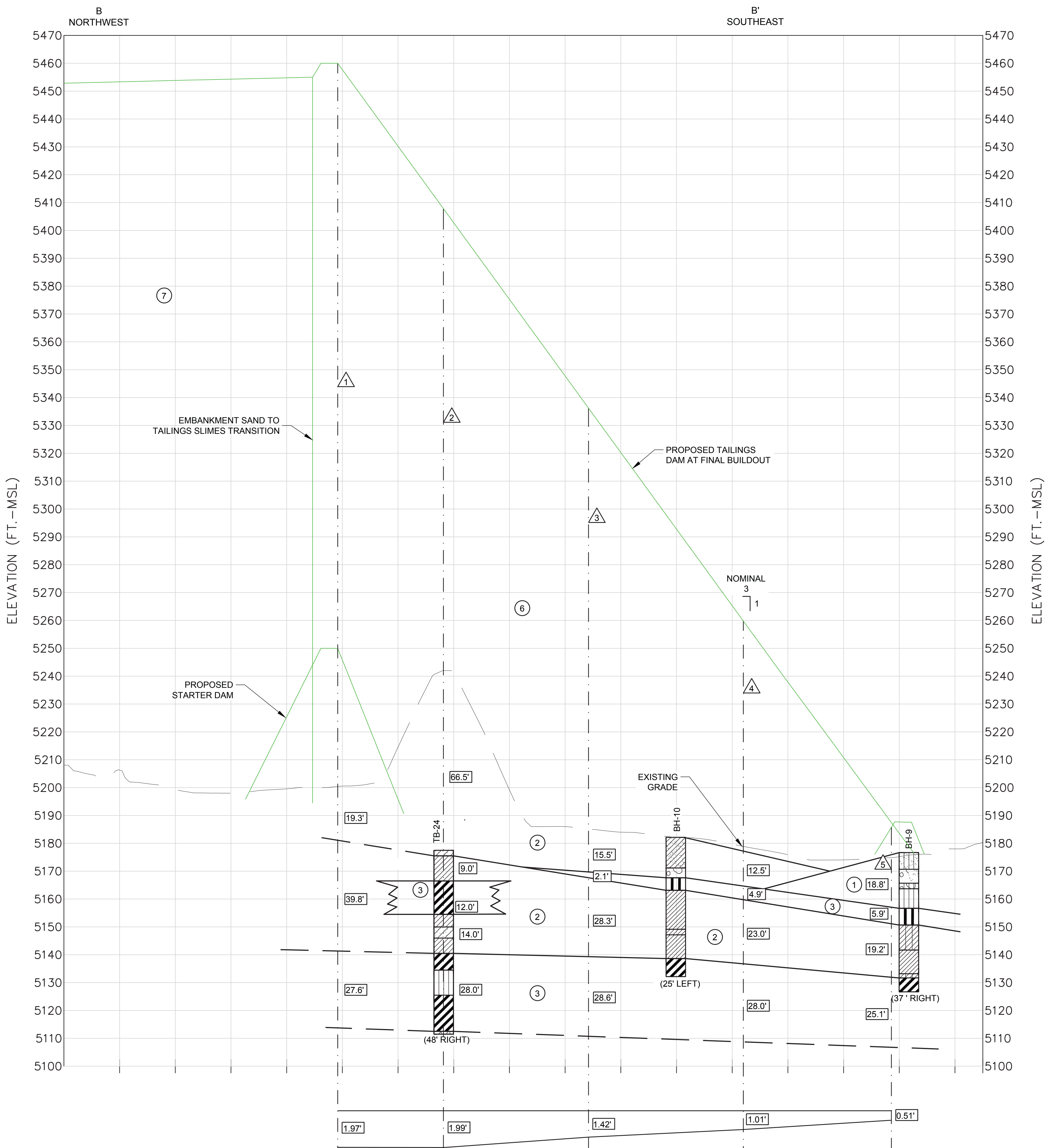
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

GEOLOGIC CROSS-SECTION A-A'

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K004
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	4
REVIEW	DAK	2013-07-17	



STRATUM DESCRIPTORS

1. ML, CL-ML, SM
2. CL
3. CH, MH
4. GRAVEL, SAND
5. BASALT, CALICHE
6. EMBANKMENT FILL
7. TAILINGS (CONSOLIDATED)

12.0' STRATUM THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. PROFILE OF EXISTING GROUND BASED ON FIVE (5) FOOT TOPOGRAPHY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. PROFILE IN THE TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.
4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND

- SANDY SILT
- USCS LOW PLASTICITY SANDY CLAY
- CLAYEY SAND
- SANDY FAT CLAY
- CONCRETE
- USCS HIGH PLASTICITY CLAY
- SANDY ELASTIC SILT
- FILL (MADE GROUND)
- USCS LOW PLASTICITY CLAY
- SHALEY FAT CLAY
- USCS POORLY-GRADED GRAVEL
- SANDSTONE
- SILTSTONE
- USCS WELL-GRADED GRAVEL
- SANDSTONE AND SHALE
- SAND
- USCS WELL-GRADED GRAVEL WITH CLAY
- WELL GRADED SAND WITH CLAY
- WELL GRADED SAND
- USCS ELASTIC SILT
- SHALE
- SILTSTONE AND SHALE INTERBEDDED
- SANDSTONE AND SILTSTONE INTERBEDDED
- SHALEY ELASTIC SILT
- GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- BASALT
- POORLY GRADED SAND WITH SILT
- SETTLEMENT SECTION LINE AND IDENTIFIER

HORIZONTAL SCALE 0 100 200 300 FEET

VERTICAL SCALE 0 20 40 60 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

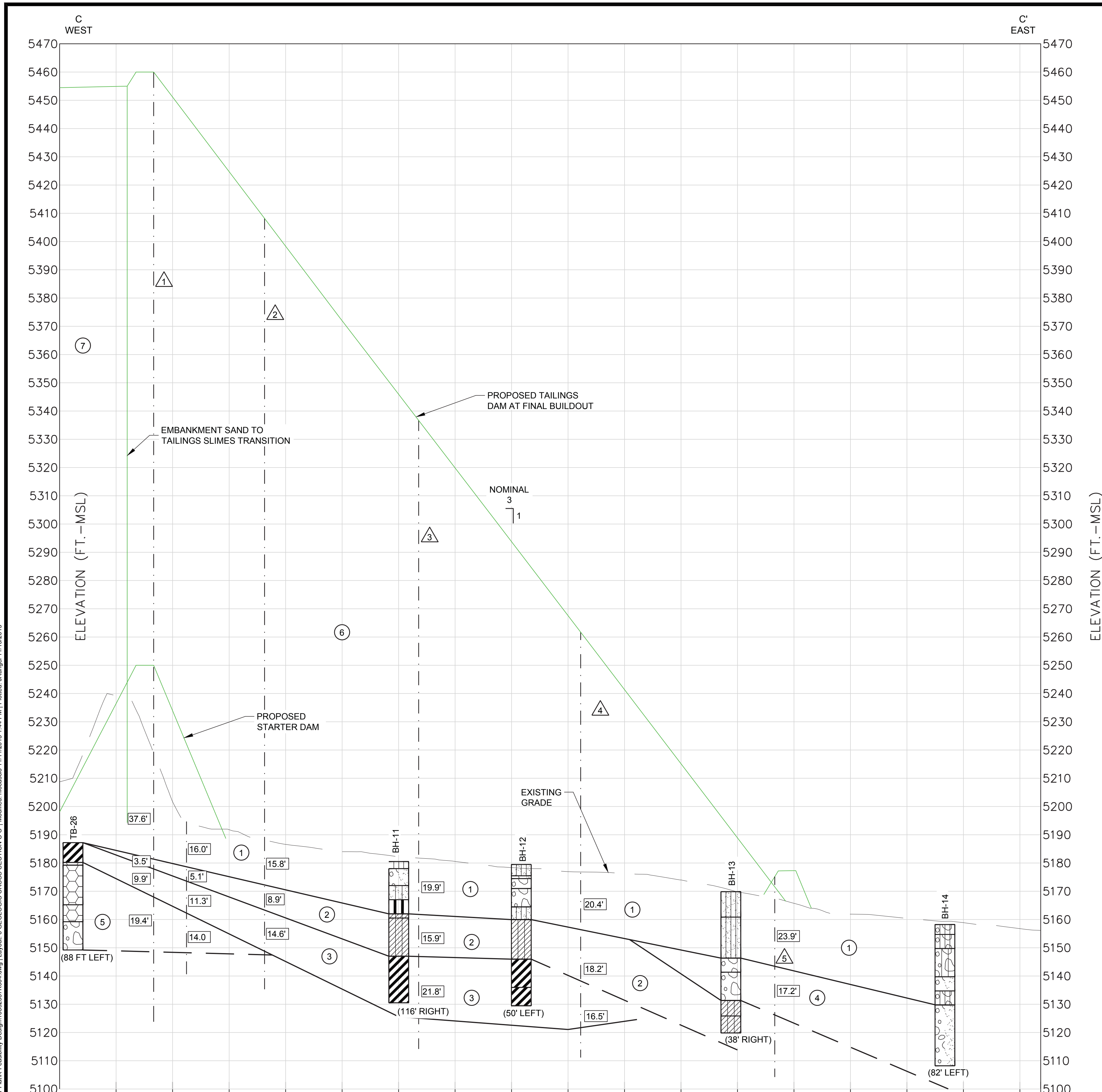
TITLE

GEOLOGIC CROSS-SECTION B-B'

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K004
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		5
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K004.dwg | Layout: 5 GEOLOGIC CROSS-SECTION B-B' | Modified: rlocascio 11/11/2015 1:44 PM | Plotted: JRangel 11/13/2015



STRATUM DESCRIPTORS

1. ML, CL-ML, SM
2. CL
3. CH, MH
4. GRAVEL, SAND
5. BASALT, CALICHE
6. EMBANKMENT FILL
7. TAILINGS (CONSOLIDATED)

12.0' STRATUM THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. PROFILE OF EXISTING GROUND BASED ON FIVE (5) FOOT TOPOGRAPHY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. PROFILE IN THE TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.
4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND

- SANDY SILT
- USCS LOW PLASTICITY SANDY CLAY
- CLAYEY SAND
- SANDY FAT CLAY
- CONCRETE
- USCS HIGH PLASTICITY CLAY
- SANDY ELASTIC SILT
- FILL (MADE GROUND)
- USCS LOW PLASTICITY CLAY
- SHALEY FAT CLAY
- USCS POORLY-GRADED GRAVEL
- SANDSTONE
- SILTSTONE
- USCS WELL-GRADED GRAVEL
- SANDSTONE AND SHALE
- SAND
- USCS WELL-GRADED GRAVEL WITH CLAY
- WELL GRADED SAND WITH CLAY
- WELL GRADED SAND
- USCS ELASTIC SILT
- SHALE
- SILTSTONE AND SHALE INTERBEDDED
- SANDSTONE AND SILTSTONE INTERBEDDED
- SHALEY ELASTIC SILT
- GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- BASALT
- POORLY GRADED SAND WITH SILT
- SETTLEMENT SECTION LINE AND IDENTIFIER

0 100 200 300
HORIZONTAL SCALE FEET

0 20 40 60
VERTICAL SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES
NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

GEOLOGIC CROSS-SECTION C-C'

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K004
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		6
REVIEW	DAK	2013-07-17		

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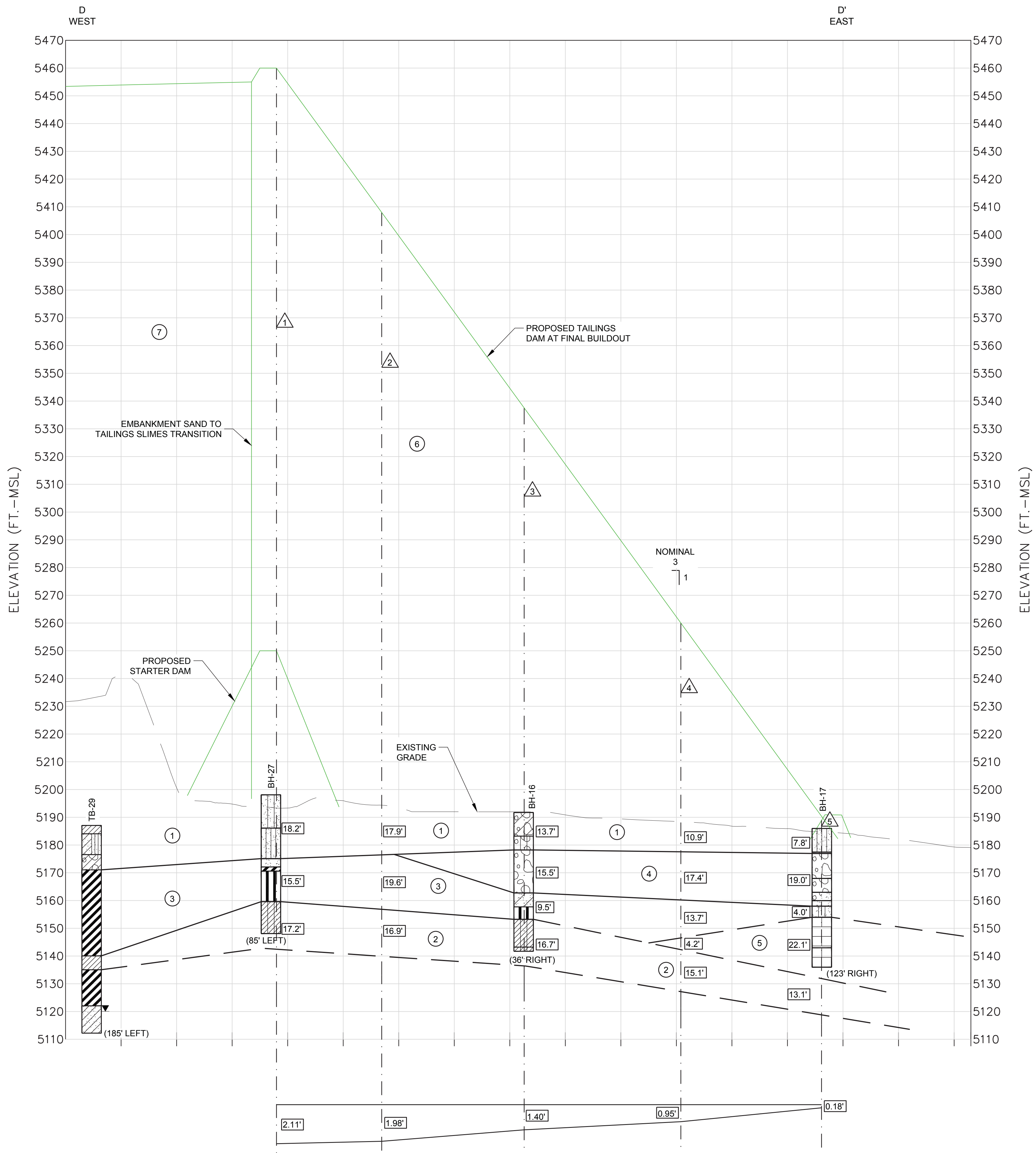

STRATUM DESCRIPTORS

1. ML, CL-ML, SM
2. CL
3. CH, MH
4. GRAVEL, SAND
5. BASALT, CALICHE
6. EMBANKMENT FILL
7. TAILINGS (CONSOLIDATED)

12.0' STRATUM THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
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4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND

- SANDY SILT
- SANDY FAT CLAY
- SANDY ELASTIC SILT
- SHALEY FAT CLAY
- SILTSTONE
- SAND
- WELL GRADED SAND
- SILTSTONE AND SHALE INTERBEDDED
- USCS LOW PLASTICITY SANDY CLAY
- CONCRETE
- FILL (MADE GROUND)
- USCS POORLY-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL
- USCS WELL-GRADED GRAVEL WITH CLAY
- USCS ELASTIC SILT
- SANDSTONE AND SILTSTONE INTERBEDDED
- BASALT
- CLAYEY SAND
- USCS HIGH PLASTICITY CLAY
- USCS LOW PLASTICITY CLAY
- SANDSTONE
- SANDSTONE AND SHALE
- WELL GRADED SAND WITH CLAY
- SHALE
- SHALEY ELASTIC SILT
- POORLY GRADED SAND WITH SILT
- GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- SETTLEMENT SECTION LINE AND IDENTIFIER

0 100 200 300
HORIZONTAL SCALE FEET

0 20 40 60
VERTICAL SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES | NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

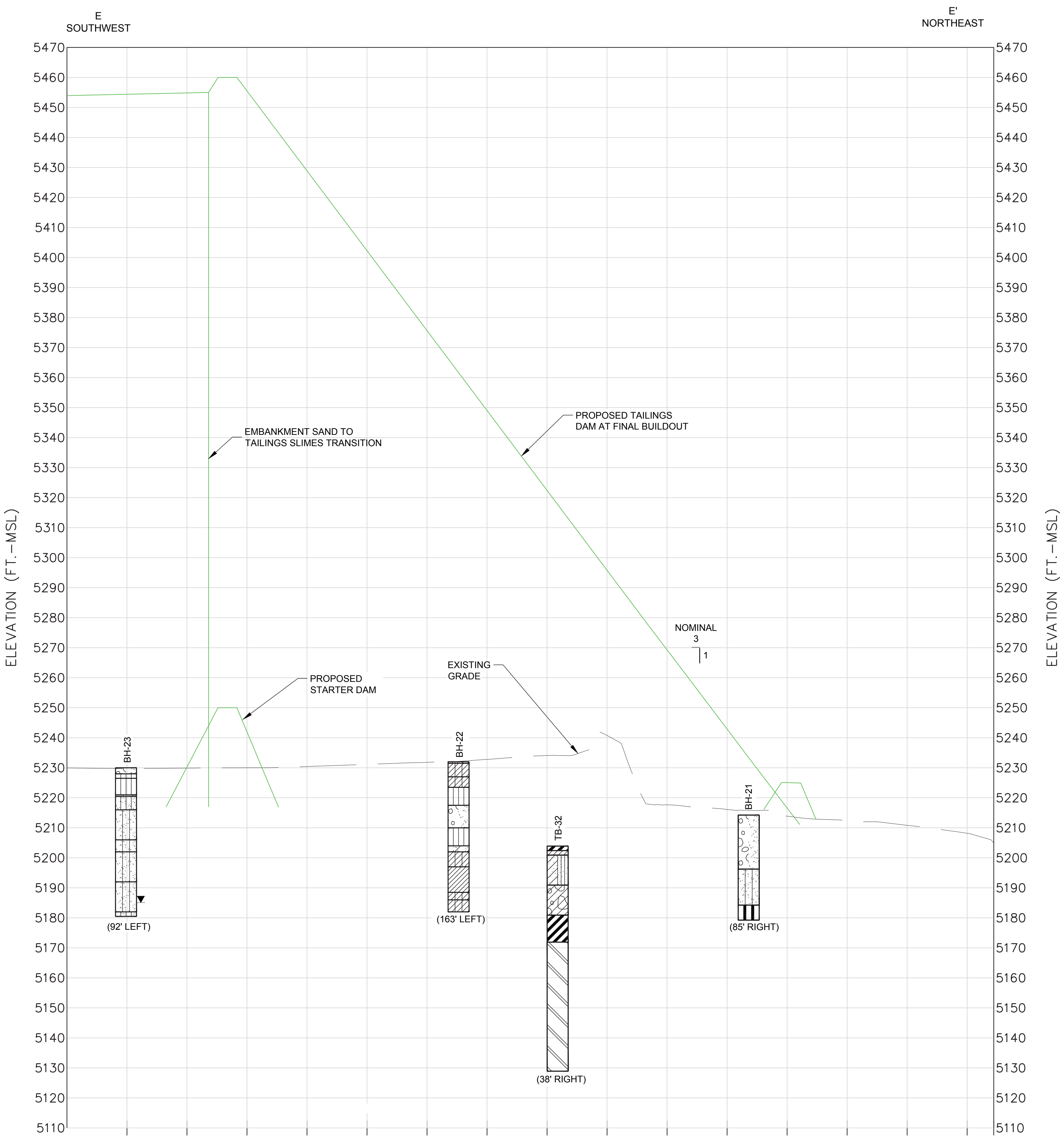
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
GEOLOGIC CROSS-SECTION D-D'

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K004
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	7
REVIEW	DAK	2013-07-17	

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K004.dwg | Layout: 7 GEOLOGIC CROSS-SECTION D-D' | Modified: nlocascio 11/11/2015 1:44 PM | Plotted: JRangel 11/13/2015



NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
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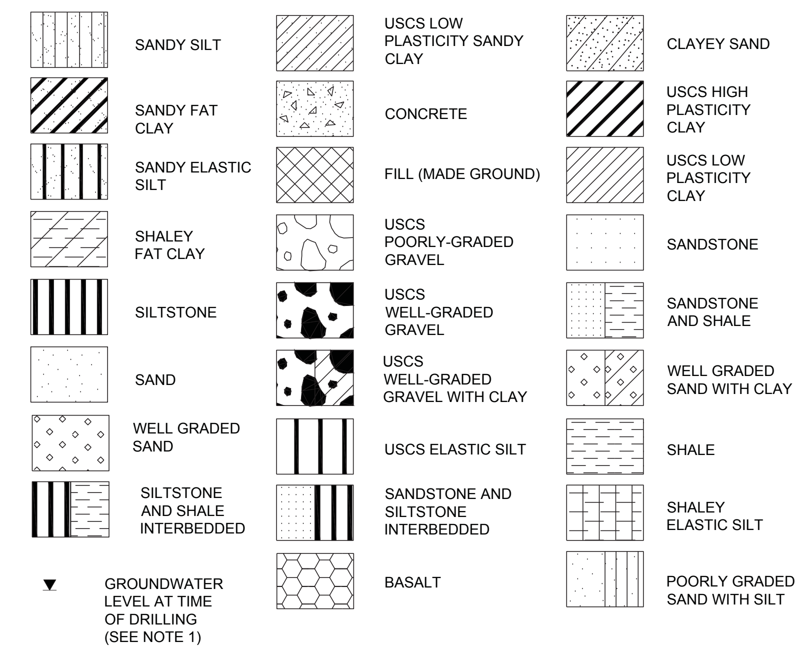
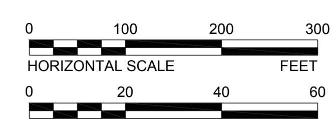
4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND





REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES | NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

GEOLOGIC CROSS-SECTION E-E'

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K004
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	8
REVIEW	DAK	2013-07-17	

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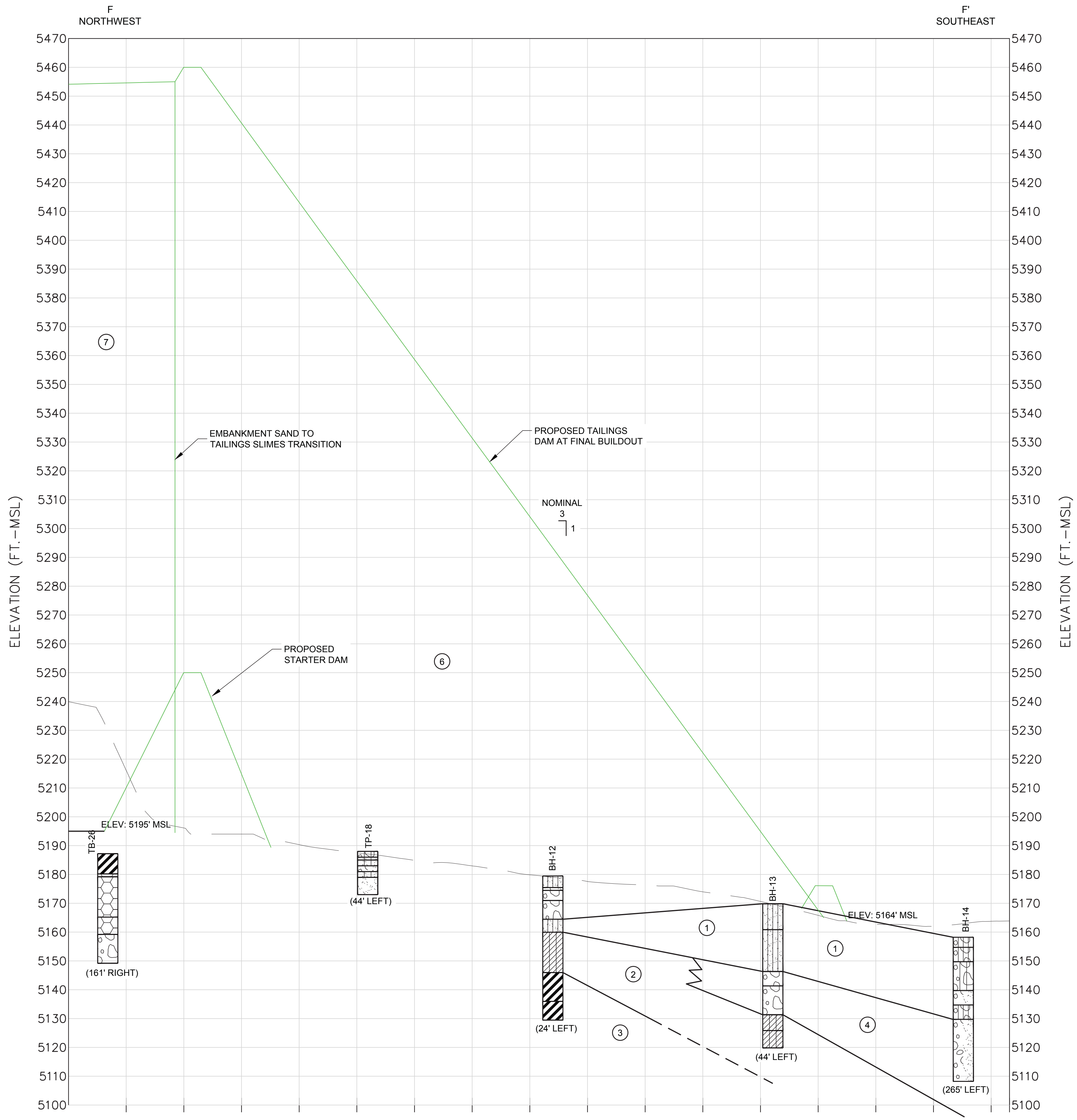

STRATUM DESCRIPTORS

1	ML, CL-ML, SM
2	CL
3	CH, MH
4	GRAVEL, SAND
5	BASALT, CALICHE
6	EMBANKMENT FILL
7	TAILINGS (CONSOLIDATED)
12.0'	STRATUM THICKNESS

NOTES

1. FOR BORINGS WITHOUT STATIC AND/OR INITIAL WATER LEVELS, NO WATER LEVEL OBSERVATIONS WERE MADE AT THE TIME OF THE INVESTIGATIONS.
2. PROFILE OF EXISTING GROUND BASED ON FIVE (5) FOOT TOPOGRAPHY PROVIDED BY NEW MEXICO COPPER CORPORATION.
3. PROFILE IN THE TAILINGS STORAGE FACILITY REPRESENTS EXISTING CONDITIONS AND DISTURBANCE ASSOCIATED WITH QUINTANA 1981-82 MINING OPERATIONS.
4. SEE DRAWING 3 FOR LOCATION OF INDIVIDUAL CROSS-SECTION LINES.

LEGEND

- SANDY SILT
- USCS LOW PLASTICITY SANDY CLAY
- CLAYEY SAND
- SANDY FAT CLAY
- CONCRETE
- USCS HIGH PLASTICITY CLAY
- SANDY ELASTIC SILT
- FILL (MADE GROUND)
- USCS LOW PLASTICITY CLAY
- SHALEY FAT CLAY
- USCS POORLY-GRADED GRAVEL
- SANDSTONE
- SILTSTONE
- USCS WELL-GRADED GRAVEL
- SANDSTONE AND SHALE
- SAND
- USCS WELL-GRADED GRAVEL WITH CLAY
- WELL GRADED SAND WITH CLAY
- WELL GRADED SAND
- USCS ELASTIC SILT
- SHALE
- SILTSTONE AND SHALE INTERBEDDED
- SANDSTONE AND SILTSTONE INTERBEDDED
- SHALEY ELASTIC SILT
- ▼ GROUNDWATER LEVEL AT TIME OF DRILLING (SEE NOTE 1)
- BASALT
- POORLY GRADED SAND WITH SILT

HORIZONTAL SCALE: 0 200 400 600 FEET
VERTICAL SCALE: 0 20 40 60 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

GEOLOGIC CROSS-SECTION F-F'

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K004
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		9
REVIEW	DAK	2013-07-17		

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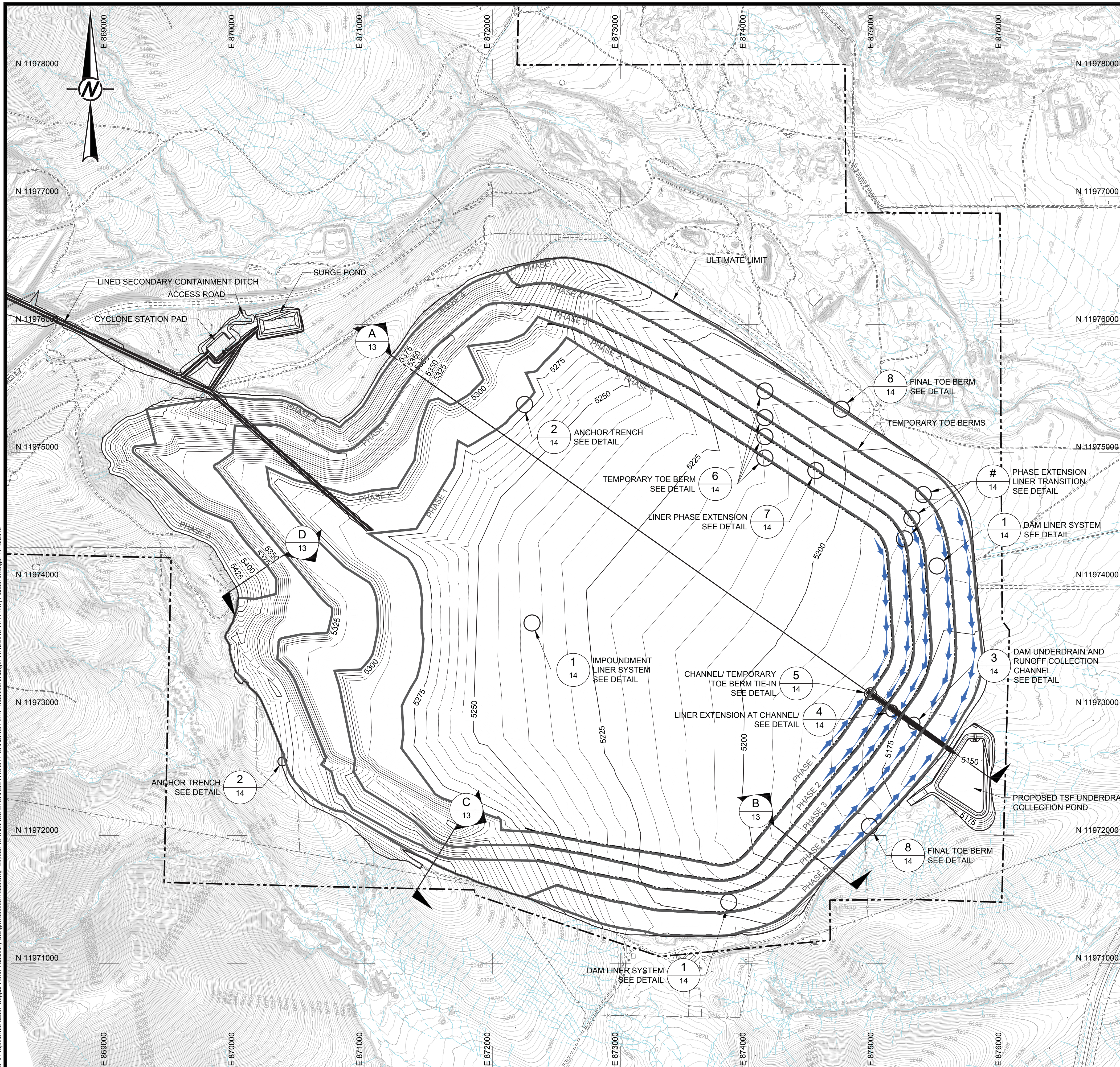

LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
	EXISTING ROADS
	EXISTING DRAINAGE
	EXISTING FENCELINE
	MINE PERMIT AREA BOUNDARY
3600	REGRADED CONTOURS (ft -MSL)
	TEMPORARY TOE BERM CENTERLINE
PHASE 1	PHASE BOUNDARY
	GRADE BREAK
	DRAINAGE
	SLOPE INDICATOR
3H:1V or 3H/1V	3 HORIZONTAL TO 1 VERTICAL SLOPE
5%	GRADE INDICATOR
1 / 14	DETAIL CALLOUT DETAIL ID DRAWING SHEET LOCATION
A / 13	CROSS-SECTION CALLOUT SECTION ID DRAWING SHEET LOCATION

0 400 800 1200
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

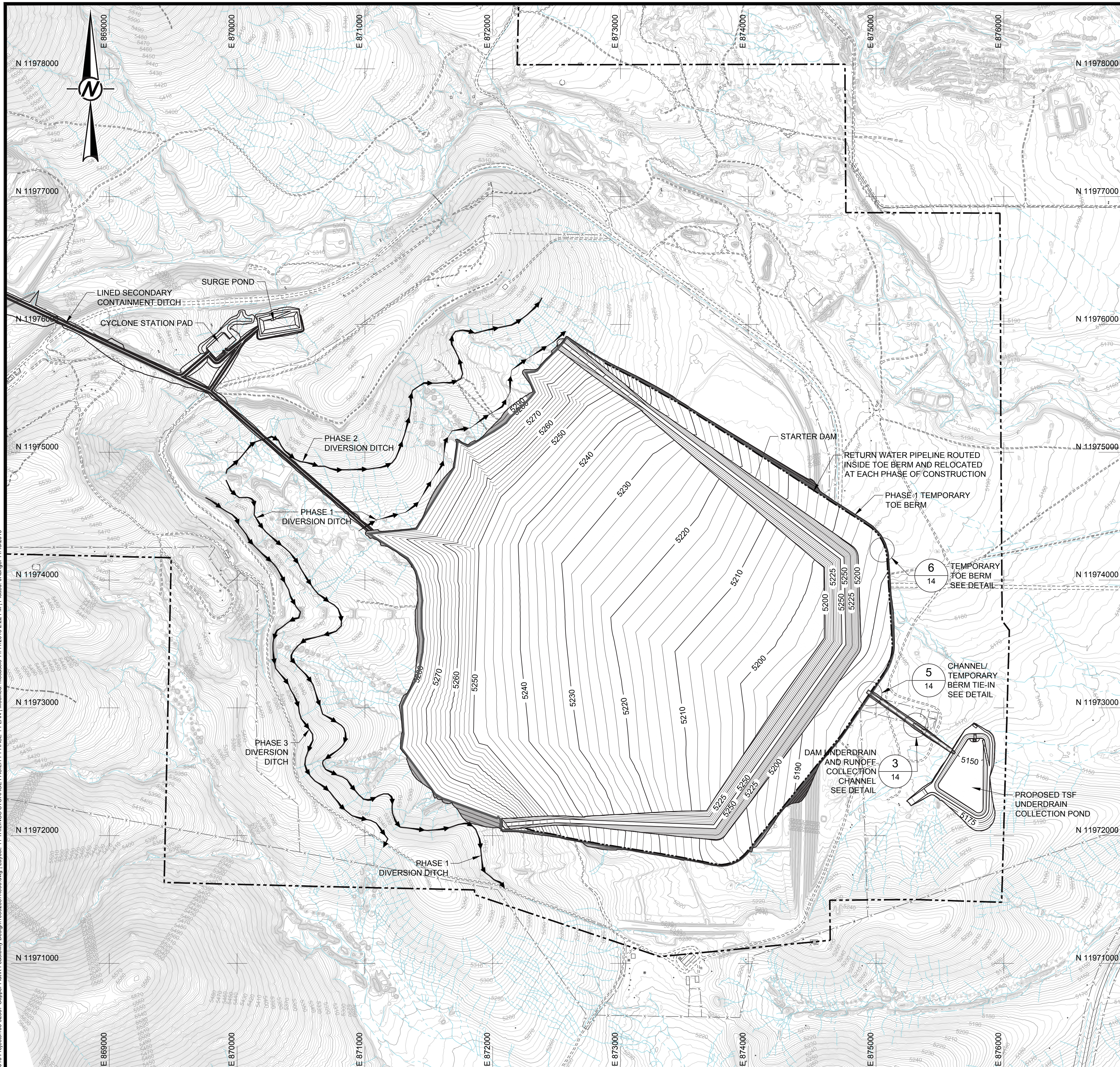
TITLE

TAILINGS STORAGE FACILITY GRADING PLAN

PROJECT No.		103-92557	FILE No.	10392557K005
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		10
REVIEW	DAK	2013-07-17		

Golder Associates

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K005.dwg | Layout: 10 TAILINGS STORAGE FACILITY GRADING PLAN | Modified: JRangel 11/12/2015 11:41 AM | Plotted: JRangel 11/13/2015



LEGEND

- 3600 EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 REGRADED CONTOURS (ft -MSL)
- TEMPORARY TOE BERM CENTERLINE
- PHASE 1 PHASE BOUNDARY
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% GRADE INDICATOR
- 1/14 DETAIL CALLOUT, DETAIL ID, DRAWING SHEET LOCATION
- A/13 CROSS-SECTION CALLOUT, SECTION ID, DRAWING SHEET LOCATION

0 400 800 1200
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
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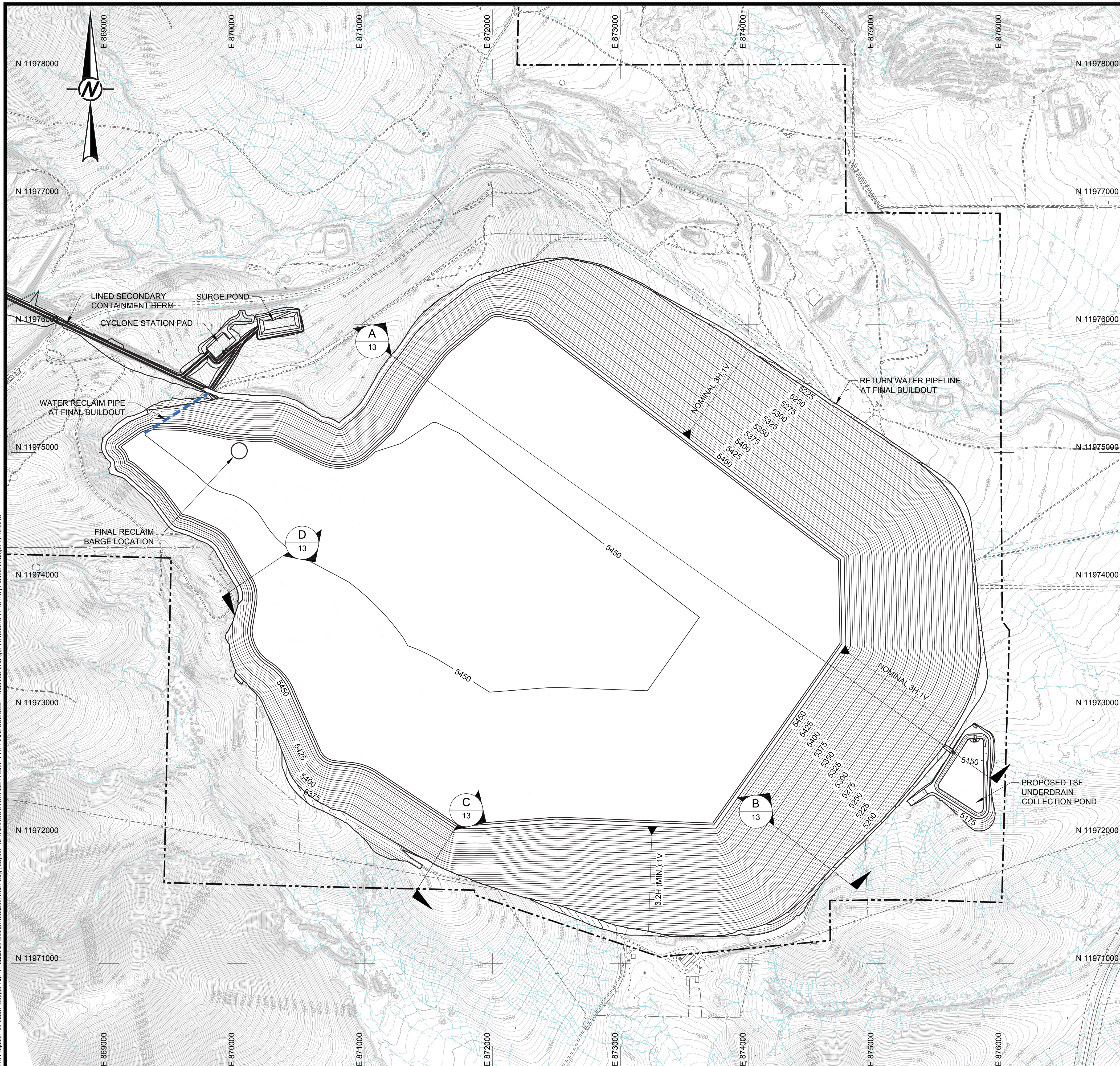
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TAILINGS STORAGE FACILITY PHASE 1 PLAN

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K006
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	
REVIEW	DAK	2013-07-17	11

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K006.dwg | Layout: 11 TAILINGS STORAGE FACILITY PHASE 1 PLAN | Modified: rdiocascio 11/11/2015 2:22 PM | Plotted: JRangel 11/13/2015



LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
	EXISTING ROADS
	EXISTING DRAINAGE
	EXISTING FENCELINE
	MINE PERMIT AREA BOUNDARY
3600	REGRADED CONTOURS (ft -MSL)
	GRADE BREAK
	SLOPE INDICATOR
3H:1V or 3H/1V	3 HORIZONTAL TO 1 VERTICAL SLOPE
5%	GRADE INDICATOR
1 / 14	DETAIL CALLOUT DETAIL ID DRAWING SHEET LOCATION
A / 13	CROSS-SECTION CALLOUT SECTION ID DRAWING SHEET LOCATION

0 400 800 1200
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION

Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

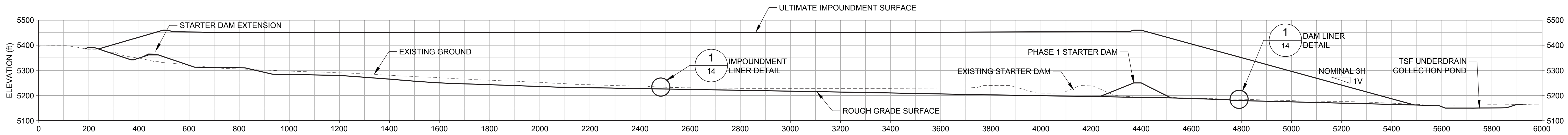
TITLE

TAILINGS STORAGE FACILITY AT FINAL BUILDOUT

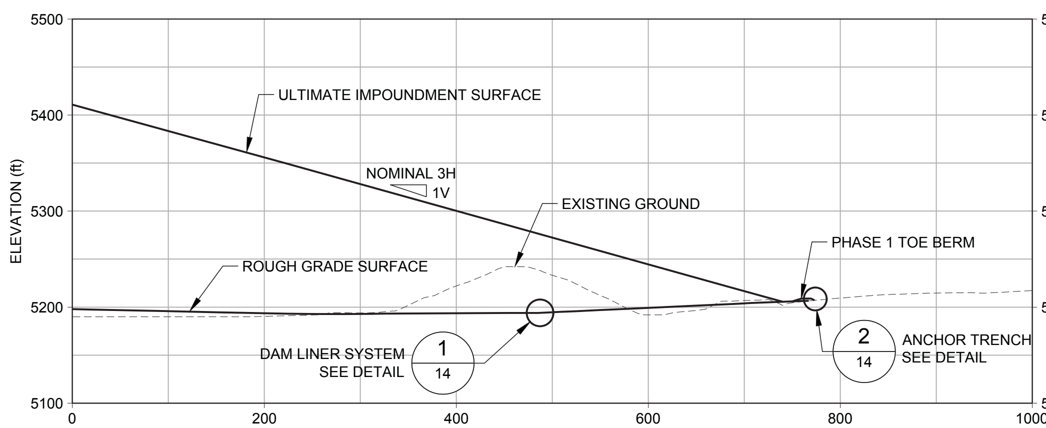
Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K007
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		12
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K007.dwg | Layout: 12 TAILINGS STORAGE FACILITY AT FINAL BUILDOUT | Modified: JRangel 11/13/2015 11:45 AM | Plotted: JRangel 11/13/2015



SCALE A **A** 13 CROSS-SECTION A



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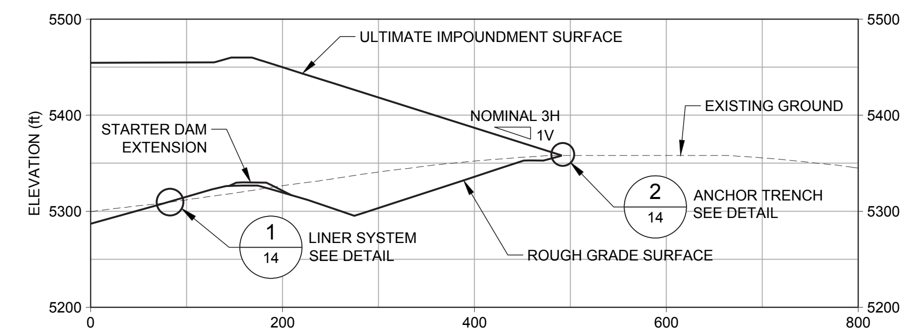
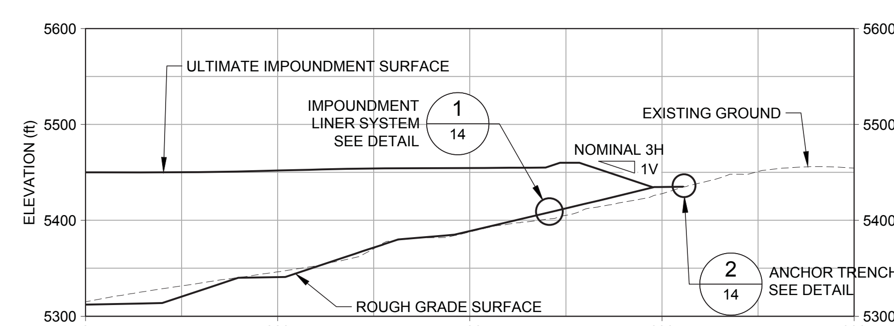


SCALE B **C** 13 CROSS-SECTION C



NOTE: STARTER DAM EXTENSION TO BE SHOWN ON DETAILED DESIGN DRAWINGS.

SCALE B **D** 13 CROSS-SECTION D

0 100 200 300
SCALE B FEET

0 200 400 600
SCALE A FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES
NEW MEXICO COPPER CORPORATION
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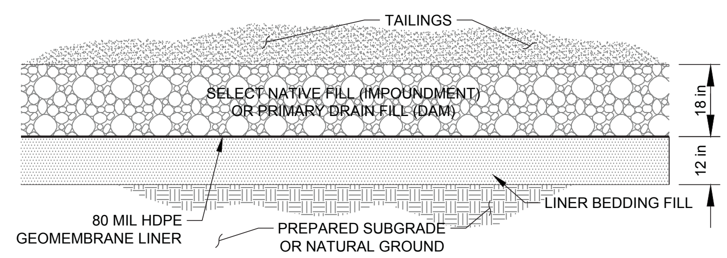
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TAILINGS STORAGE FACILITY CROSS-SECTIONS

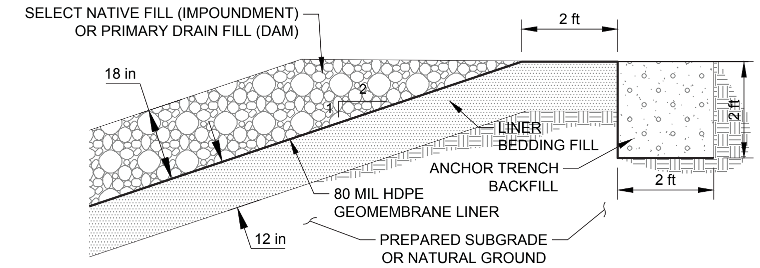
Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K008
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		13
REVIEW	DAK	2013-07-17		

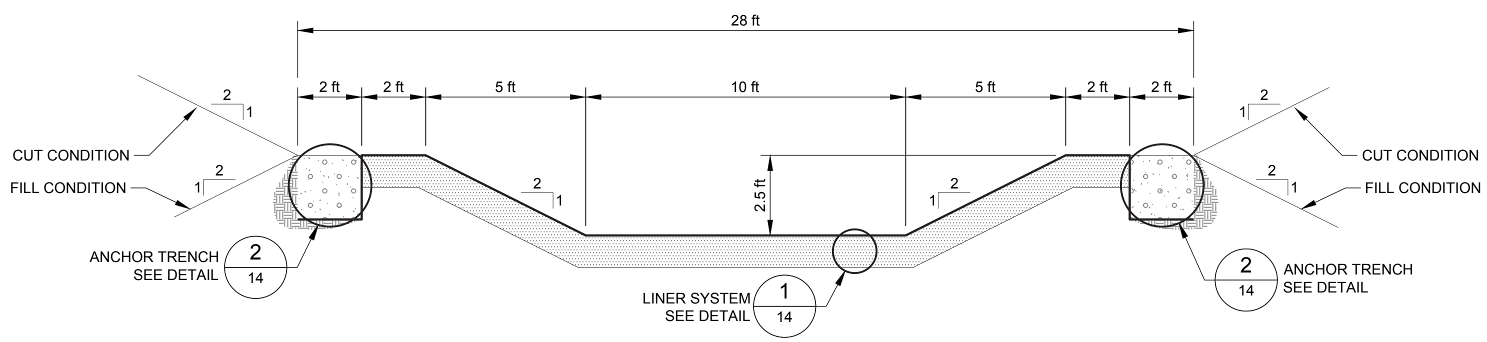
K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K008.dwg | Layout: 13 TAILINGS STORAGE FACILITY CROSS-SECTIONS | Modified: nlocascio 11/11/2015 2:43 PM | Plotted: JRangel 11/13/2015



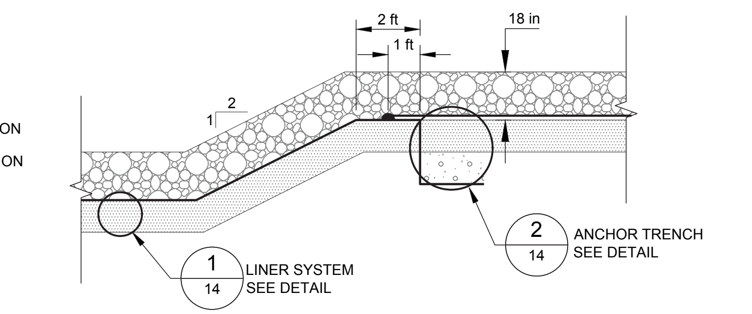
SCALE: N.T.S. 1/14 IMPOUNDMENT LINER SYSTEM DETAIL



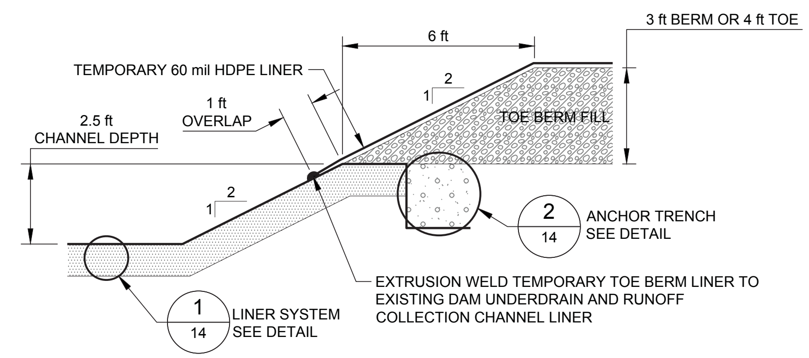
SCALE: N.T.S. 2/14 ANCHOR TRENCH DETAIL



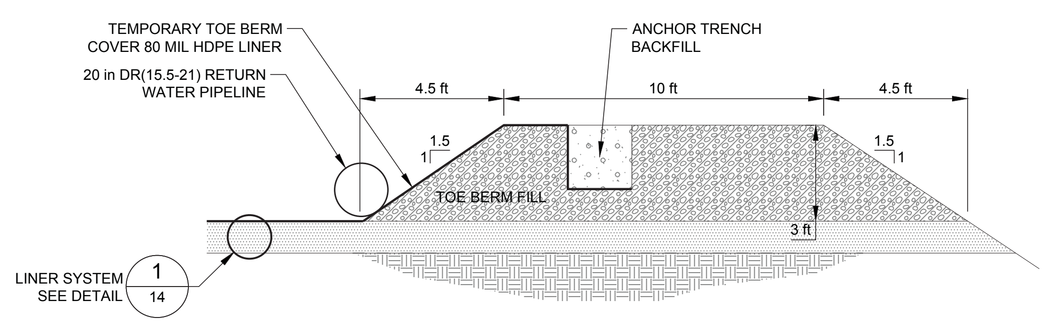
SCALE: N.T.S. 3/14 DAM UNDERDRAIN AND RUNOFF COLLECTION CHANNEL DETAIL



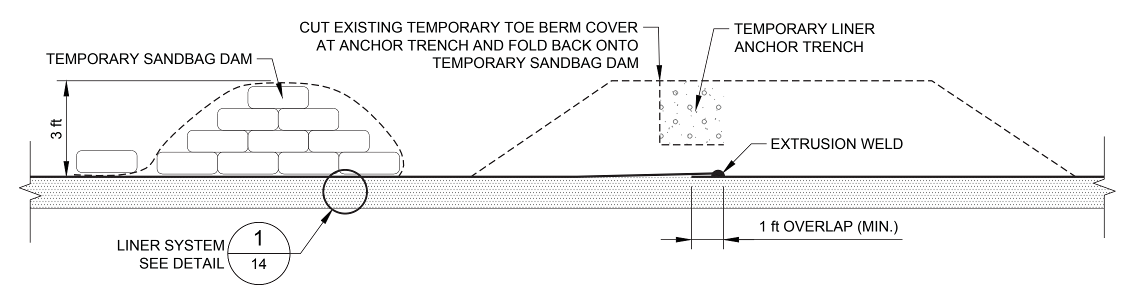
SCALE: N.T.S. 4/14 LINER EXTENSION WITH CHANNEL ANCHOR DETAIL



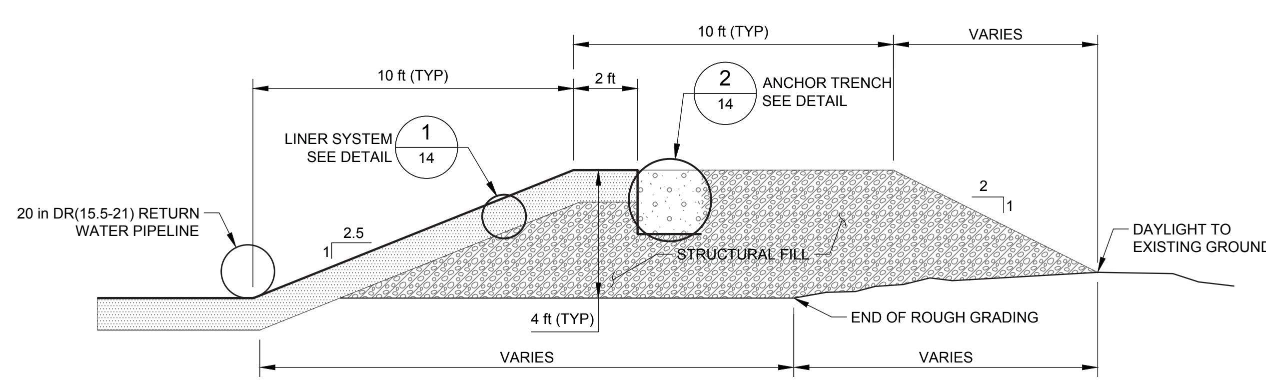
SCALE: N.T.S. 5/14 CHANNEL/TEMPORARY BERM TIE-IN DETAIL



SCALE N.T.S. 6/14 TEMPORARY TOE BERM DETAIL



SCALE N.T.S. 7/14 PHASE EXTENSION LINER TIE-IN AT TOE BERM DETAIL



SCALE: N.T.S. 8/14 FINAL TOE BERM DETAIL

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION

Environmentally Responsible. Community-Minded. Local Opportunities.

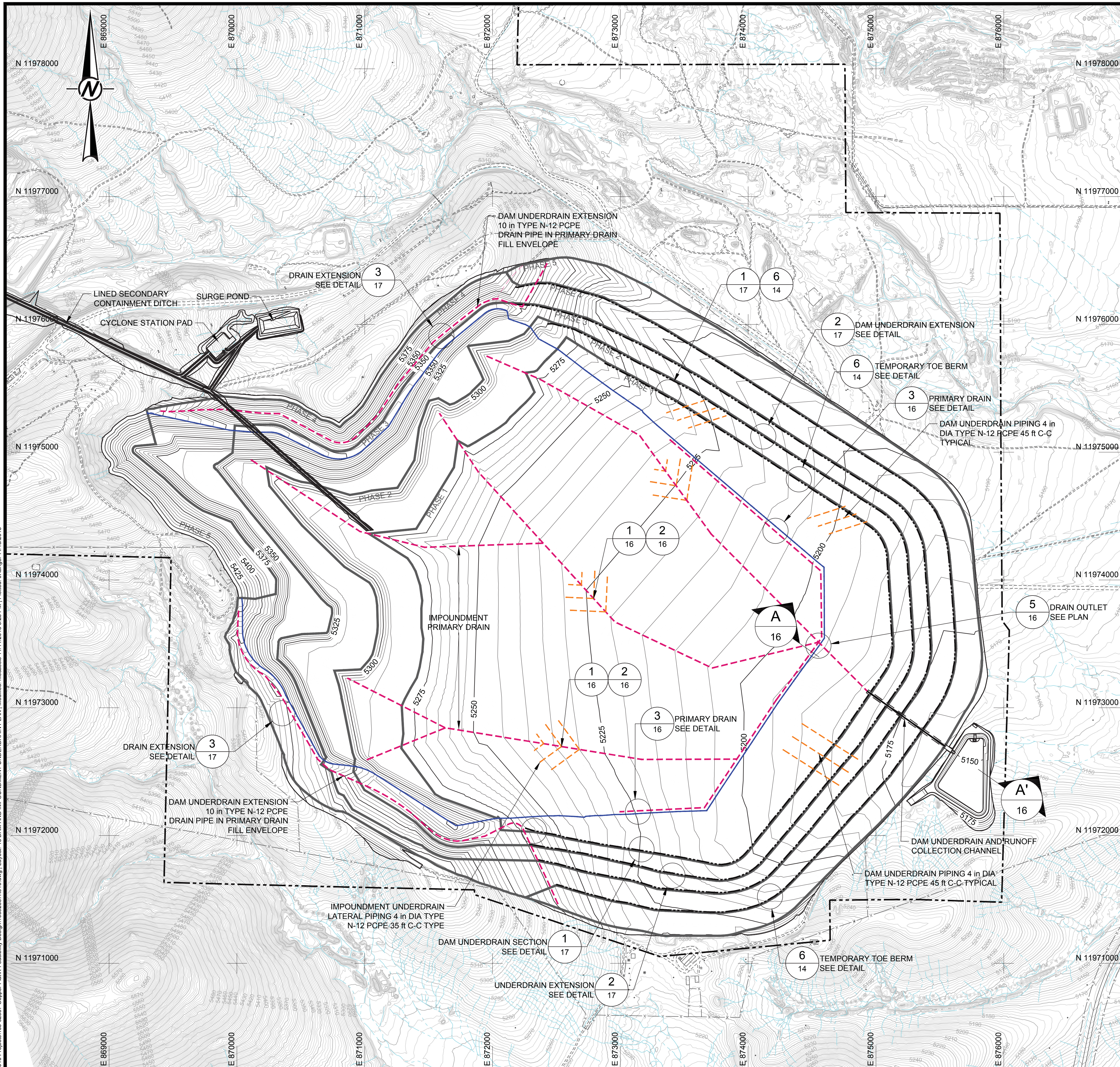
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

TAILINGS STORAGE FACILITY DETAILS

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K009
DESIGN	DW	2013-04-08	SCALE	NOT TO SCALE
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		14
REVIEW	DAK	2013-07-17		



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LEGEND

- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 10 IN. DIA. N-12 PCPE PIPE
- 12 IN. DIA. N-12 PCPE PIPE
- 14 in SCH80 STEEL
- 4 IN. DIA. N-12 PCPE PIPE
- LIMIT IMPOUNDMENT UNDERDRAIN SYSTEMS
- 3600 — REGRADED CONTOURS (ft -MSL)
- TEMPORARY TOE BERM CENTERLINE
- PHASE 1 — PHASE BOUNDARY
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- 1/14 — DETAIL CALLOUT: DETAIL ID, DRAWING SHEET LOCATION
- A/13 — CROSS-SECTION CALLOUT: SECTION ID, DRAWING SHEET LOCATION

NOTES

1.) TYPICAL ORIENTATION FOR 4 in UNDERDRAIN PIPING SHOWN. COVERAGE WILL BE AT 35 ft C-C SPACING OVER IMPOUNDMENT UNDERDRAIN AREA. COVERAGE WILL BE 45 ft C-C OVER DAM UNDERDRAIN AREA.

2.) THE MAIN BODY OF THE EMBANKMENT WILL BE UNDERLAIN WITH A BLANKET DRAIN WITH INTERNAL 4 in PCPE PIPE NETWORK. DAM UNDERDRAIN EXTENSION IN PHASE 2 THROUGH PHASE 5 WILL INCLUDE A 10 in DIAMETER PCPE DRAIN CONSTRUCTED ON THE OUTER TOE OF THE STARTER DAM

SCALE 0 400 800 1200 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION

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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

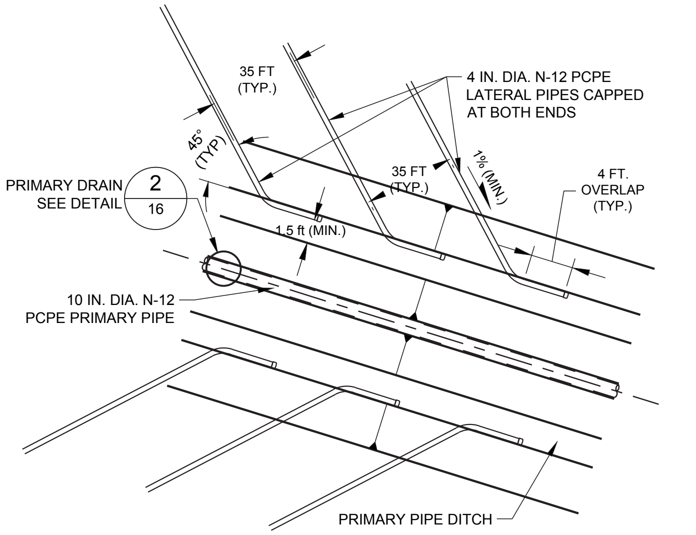
TITLE

DAM AND IMPOUNDMENT UNDERDRAIN PLAN

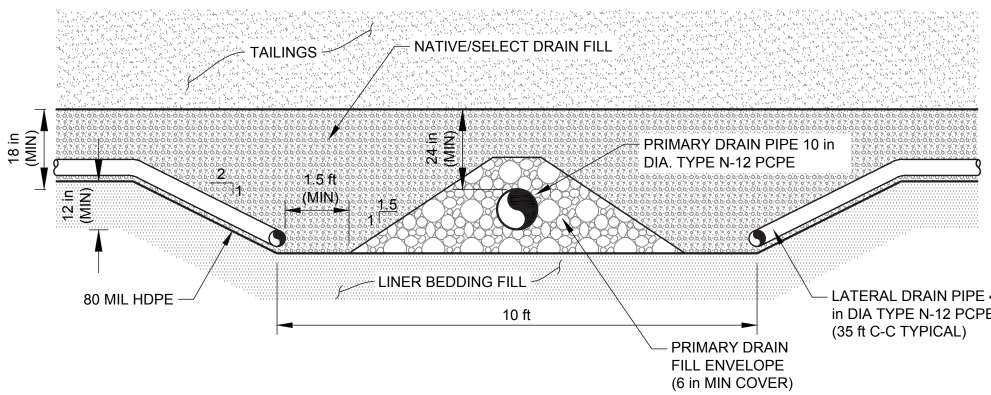
Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K010
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		15
REVIEW	DAK	2013-07-17		

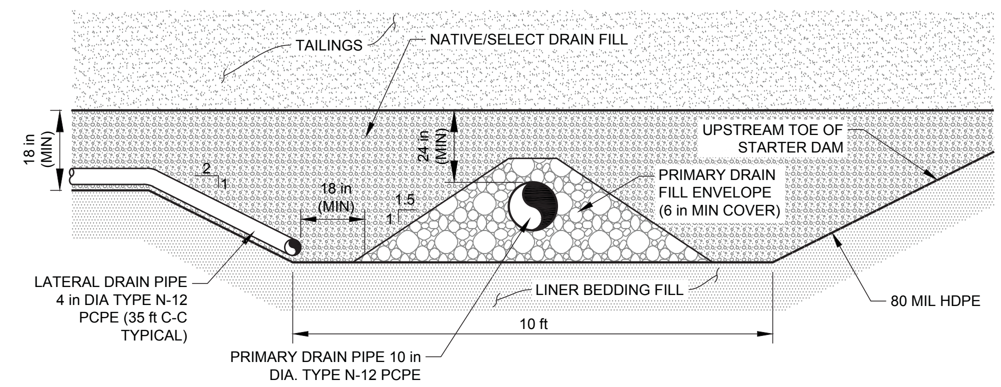
14758



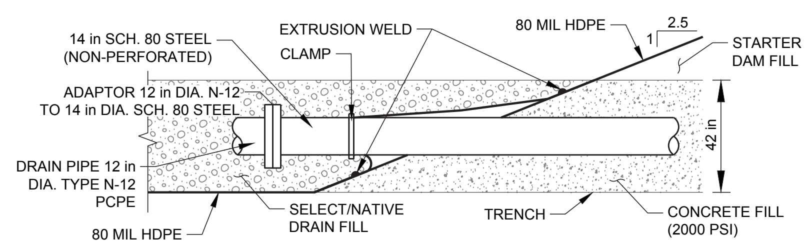
NTS 1/16 IMPOUNDMENT DRAIN PLACEMENT



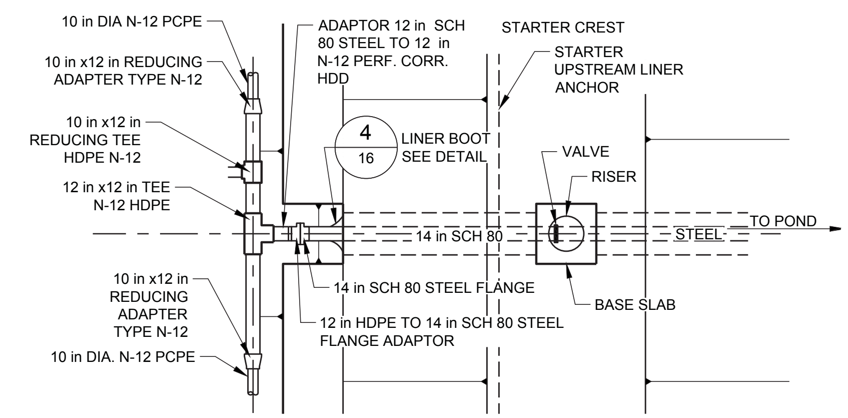
NTS 2/16 PRIMARY DRAIN PLACEMENT



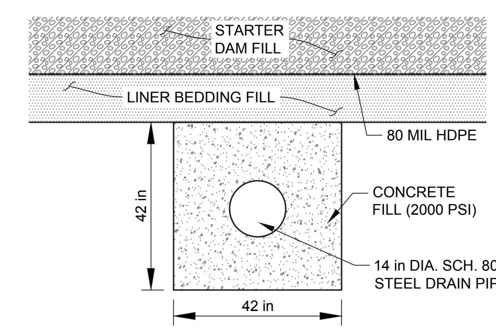
NTS 3/16 PRIMARY DRAIN PLACEMENT AT STARTER DAM TOE



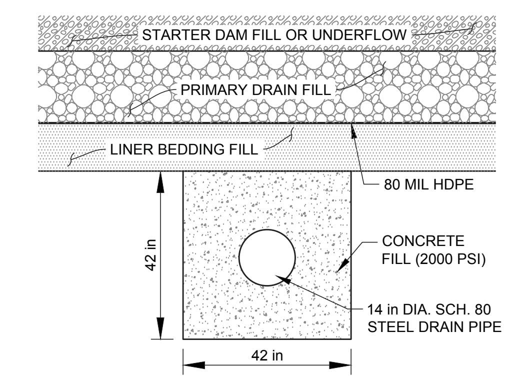
NTS 4/16 DETAIL DRAIN PIPE TO STARTER DAM ENTRY



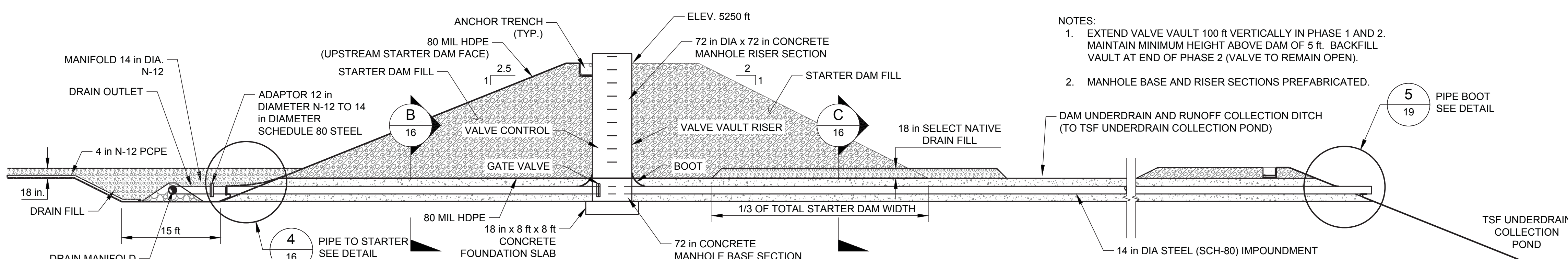
NTS 5/16 DRAIN OUTLET PLAN



NTS B/16 SECTION B-B



NTS C/16 SECTION C-C



NTS A/16 SECTION A-A DRAIN OUTLET

NOTES:
1. EXTEND VALVE VAULT 100 ft VERTICALLY IN PHASE 1 AND 2. MAINTAIN MINIMUM HEIGHT ABOVE DAM OF 5 ft. BACKFILL VAULT AT END OF PHASE 2 (VALVE TO REMAIN OPEN).
2. MANHOLE BASE AND RISER SECTIONS PREFABRICATED.

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
DAM UNDERDRAIN DETAILS (1 of 2)

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K011
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	16
REVIEW	DAK	2013-07-17	

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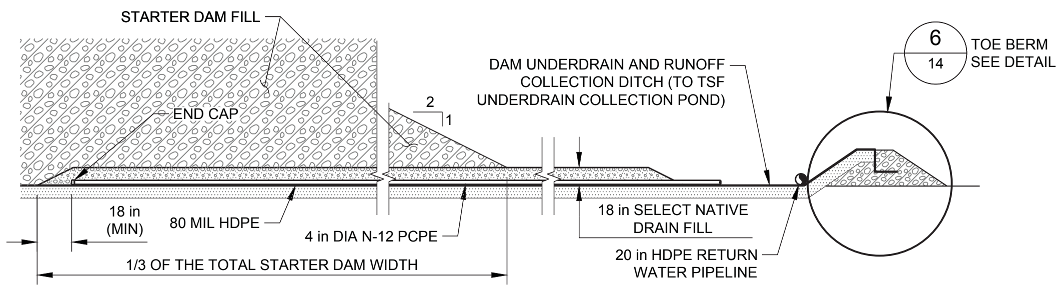
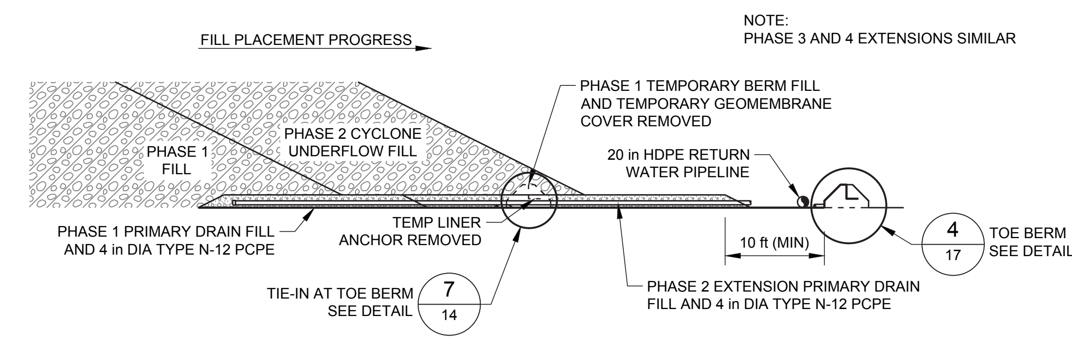
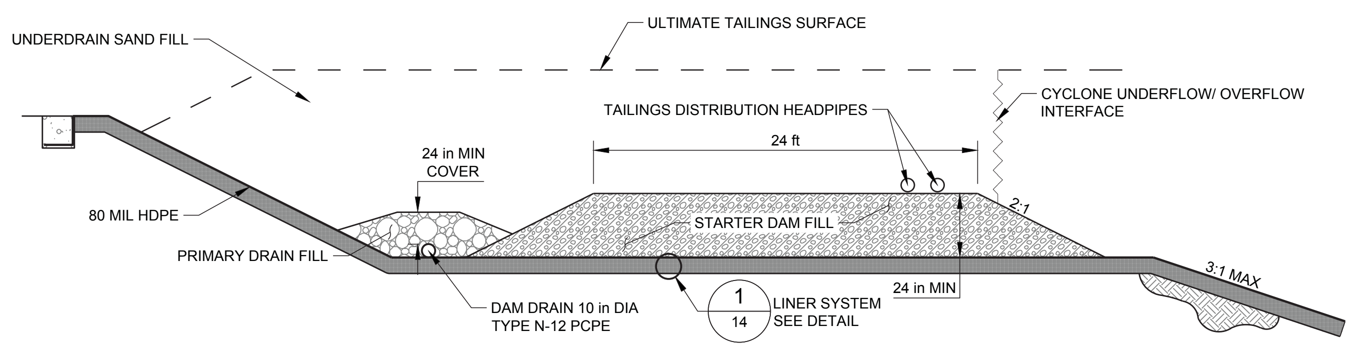


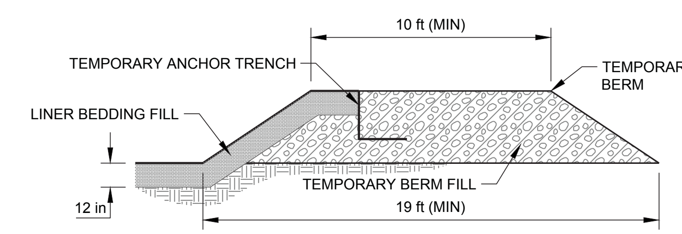
NTS 1/17 DAM UNDERDRAIN SECTION



NTS 2/17 PHASE 1 TO PHASE 2 TSF LINER AND DAM UNDERDRAIN EXTENSION



NTS 3/17 DAM UNDERDRAIN 10 IN PCPE DRAIN EXTENSION



NTS 4/17 TEMPORARY PERIMETER BERM

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES / NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

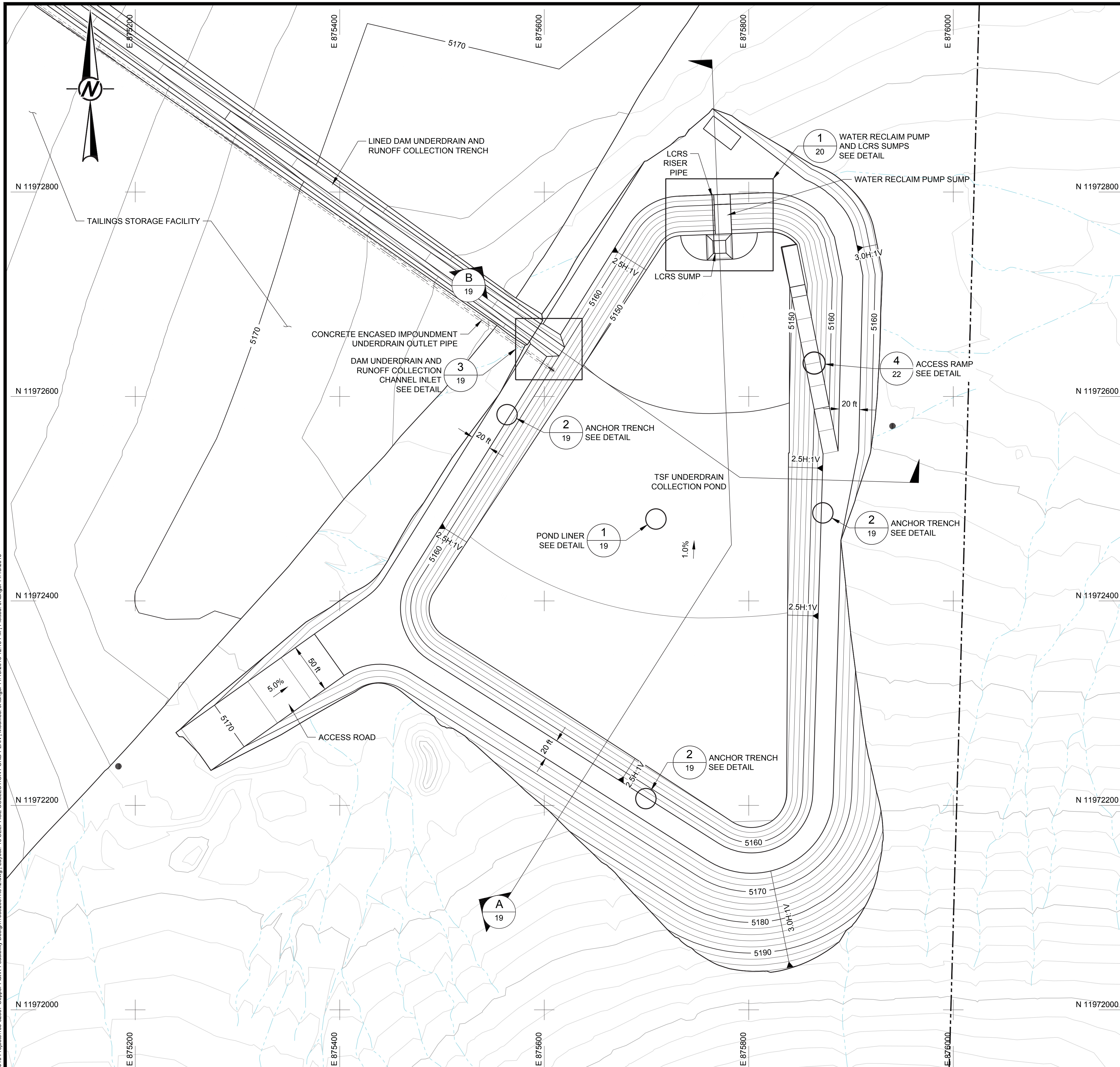
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

DAM UNDERDRAIN DETAILS (2 of 2)

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K011
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		17
REVIEW	DAK	2013-07-17		



LEGEND

- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 — REGRADED CONTOURS (ft -MSL)
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- DETAIL CALLOUT (1 / 14): DETAIL ID / DRAWING SHEET LOCATION
- CROSS-SECTION CALLOUT (A / 13): SECTION ID / DRAWING SHEET LOCATION

0 50 100 150
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

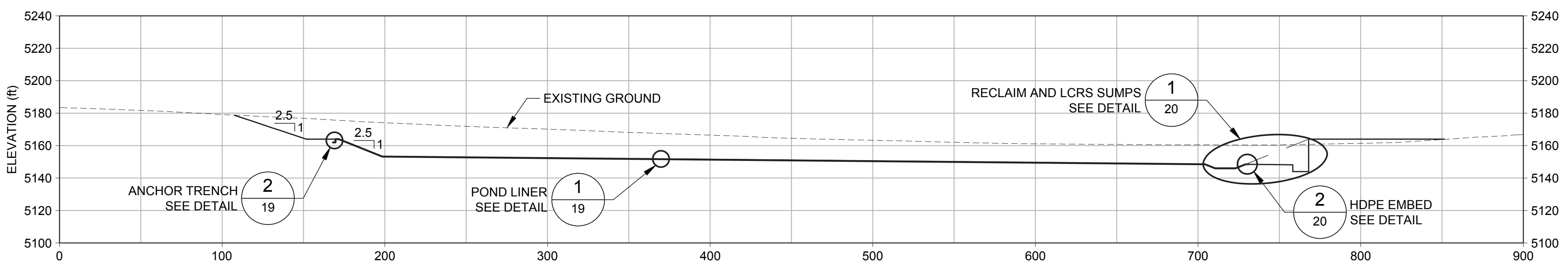
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TSF UNDERDRAIN COLLECTION POND PLAN

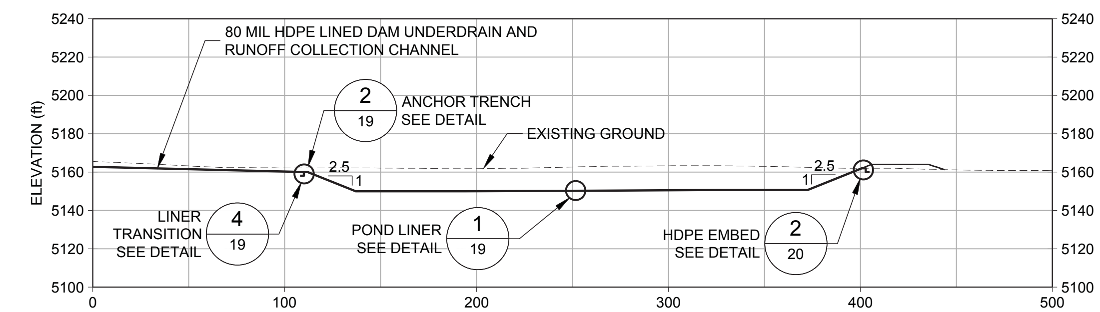
Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K012
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	18
CHECK	GM	2013-07-16		
REVIEW	DAK	2013-07-17		

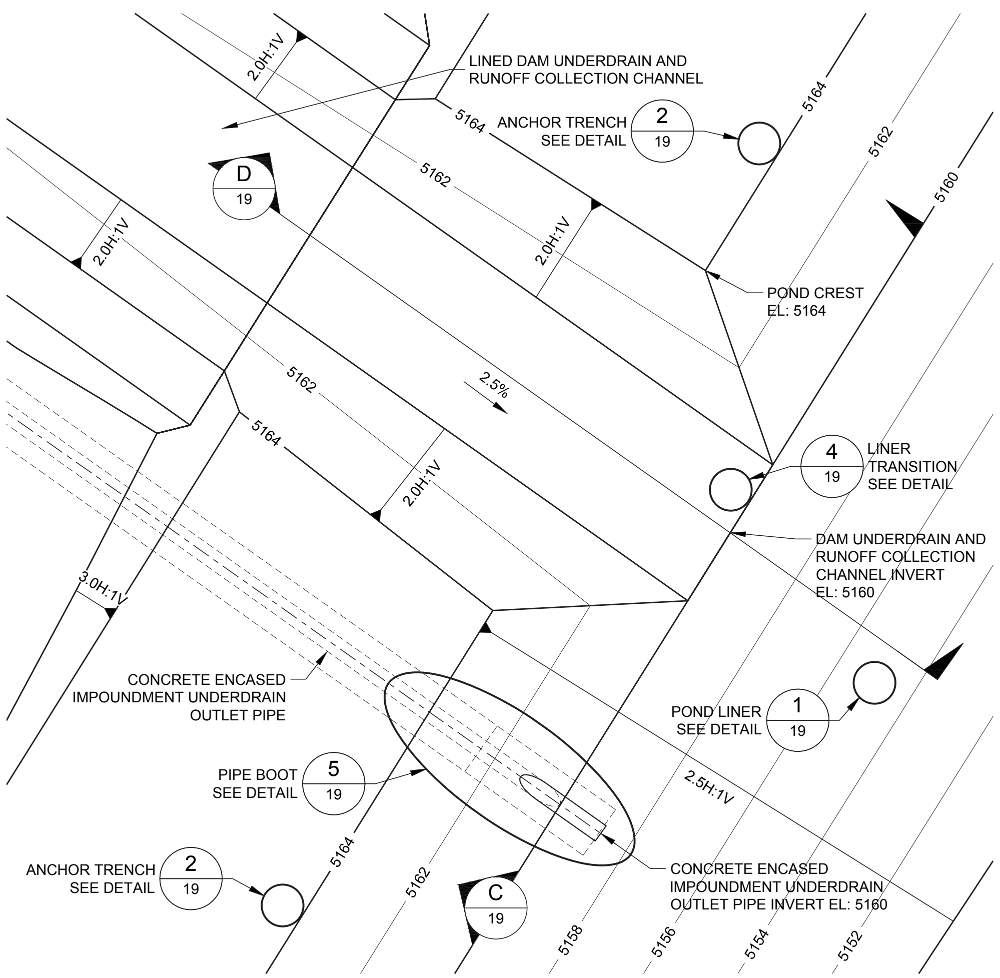
K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K012.dwg | Layout: 18 SEEPAGE COLLECTION POND PLAN | Modified: JRangel 11/13/2015 12:15 PM | Plotted: JRangel 11/13/2015



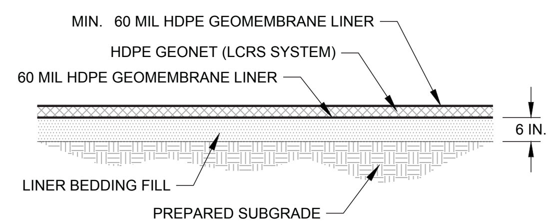
SCALE A (A/19) CROSS-SECTION A



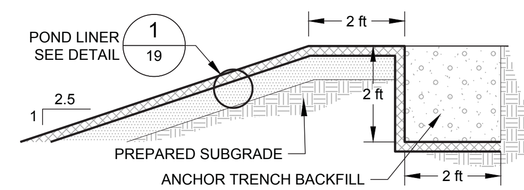
SCALE A (B/19) CROSS-SECTION B



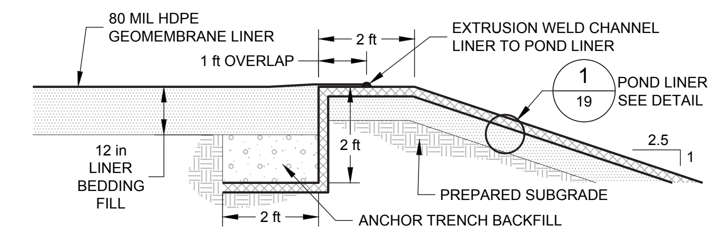
SCALE B (3/19) DAM UNDERDRAIN AND RUNOFF COLLECTION CHANNEL INLET TO POND



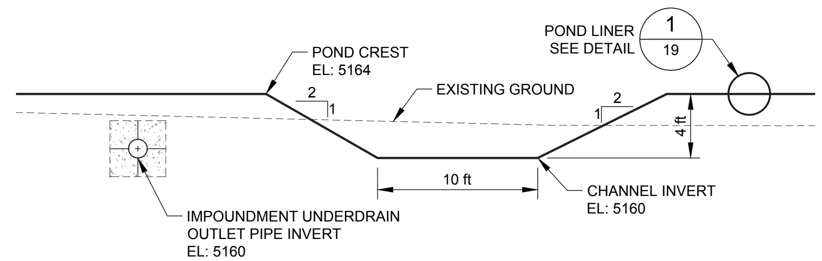
N.T.S. (1/19) POND LINER SYSTEM DETAIL



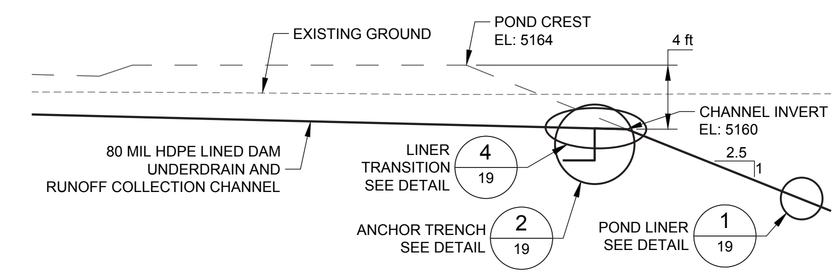
N.T.S. (2/19) POND ANCHOR TRENCH DETAIL



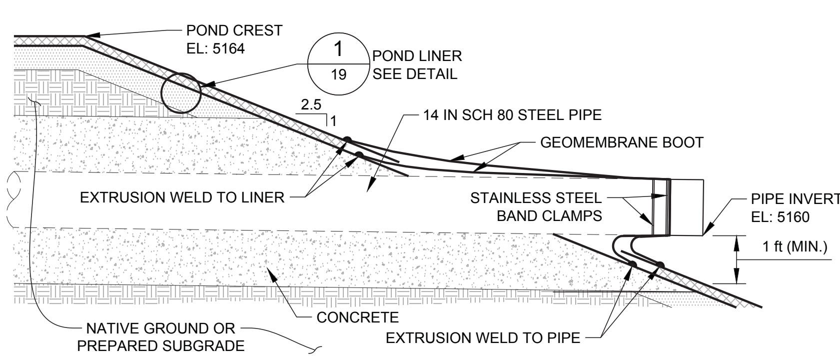
N.T.S. (4/19) CHANNEL LINER TO POND LINER TRANSITION DETAIL



N.T.S. (C/19) DAM UNDERDRAIN AND RUNOFF COLLECTION CHANNEL ELEVATION SECTION



N.T.S. (D/19) DAM UNDERDRAIN AND RUNOFF COLLECTION CHANNEL INLET SECTION



N.T.S. (5/19) IMPOUNDMENT UNDERDRAIN OUTLET PIPE BOOT DETAIL

SCALE B: 0 6 12 18 FEET

SCALE A: 0 50 100 150 FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

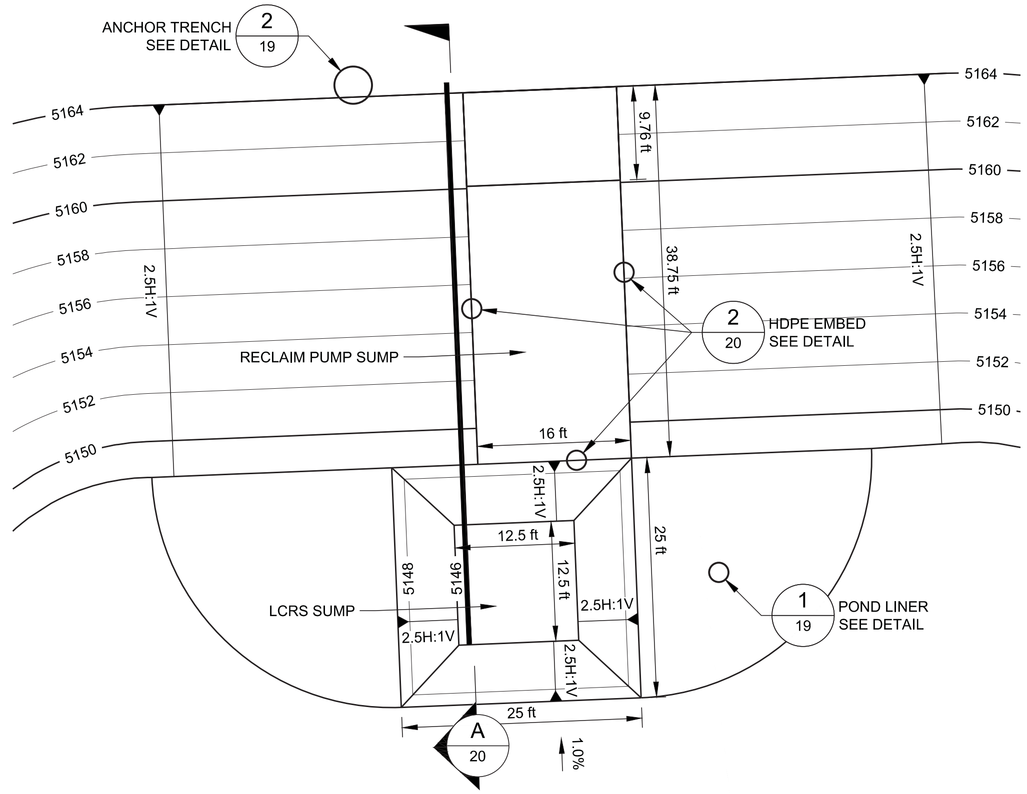
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TSF UNDERDRAIN COLLECTION POND CROSS-SECTION AND DETAILS(1 OF 2)

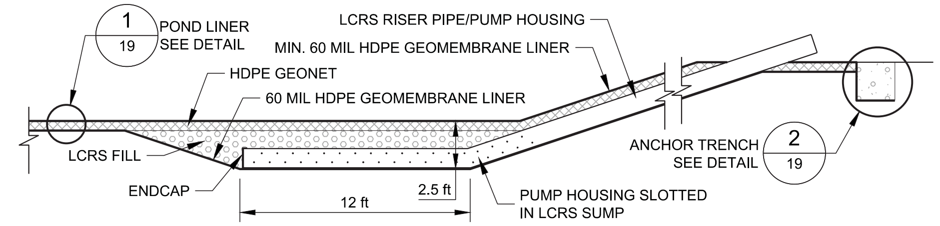
Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K013
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		19
REVIEW	DAK	2013-07-17		

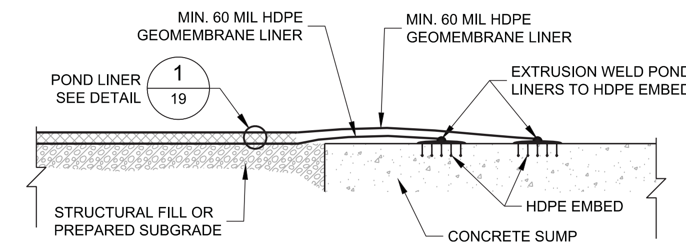
K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K013.dwg | Layout: 19 SEEPAGE COLLECTION POND CROSS-SECTION AND DETAILS(1 OF 2) | Modified: nlocascio 11/11/2015 4:21 PM | Plotted: JRangel 11/13/2015



SCALE A 1/20 RECLAIM PUMP SUMP AND LCRS SUMP DETAIL



N.T.S. A/20 LCRS SUMP SECTION



N.T.S. 2/20 CONCRETE DOUBLE EMBED DETAIL

0 10 20 30
SCALE A FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
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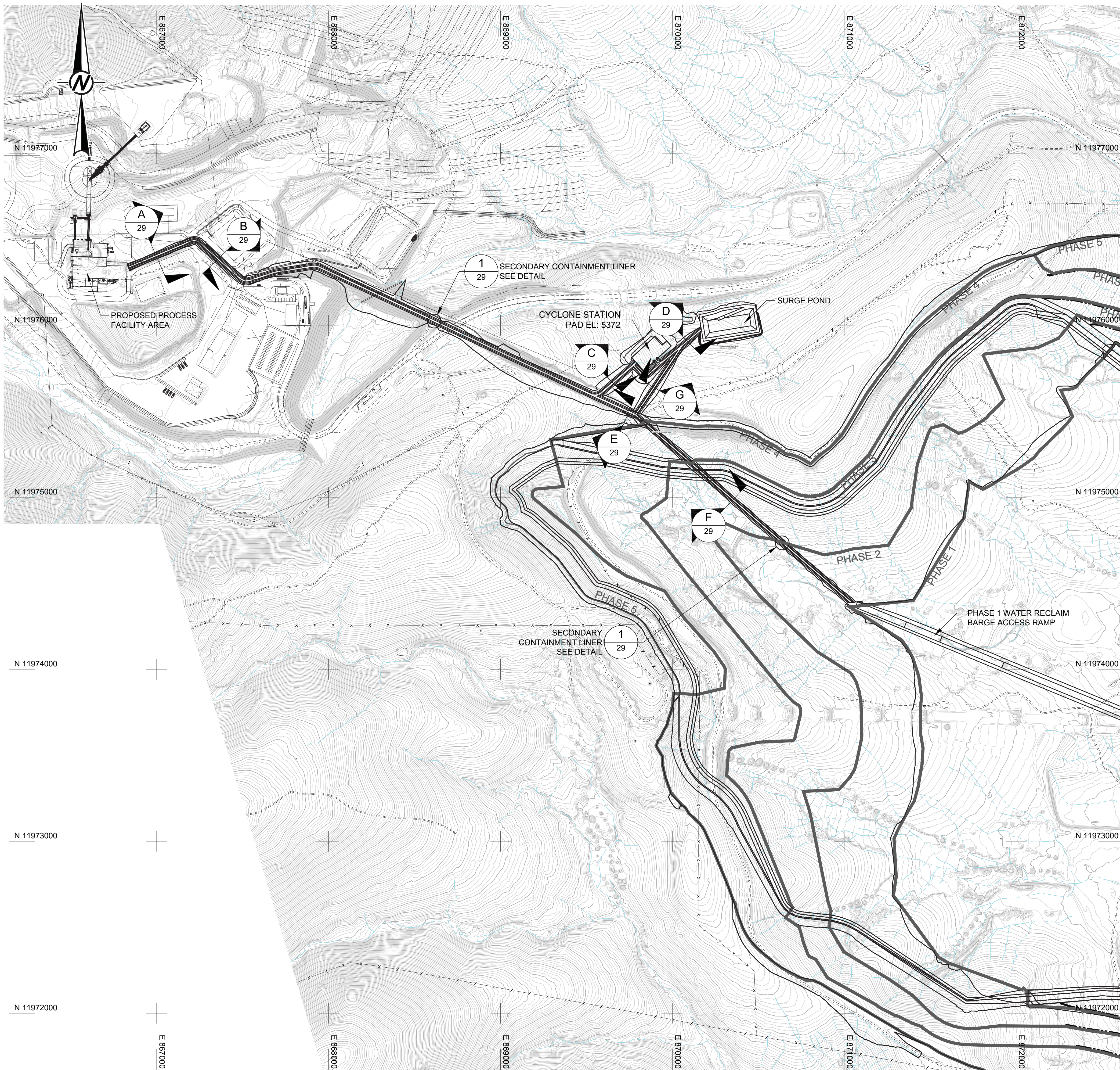
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

TSF UNDERDRAIN COLLECTION POND CROSS-SECTION AND DETAILS(2 OF 2)

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K013
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		20
REVIEW	DAK	2013-07-17		



LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
	EXISTING ROADS
	EXISTING DRAINAGE
x x x	EXISTING FENCELINE
3600	REGRADED CONTOURS (ft -MSL)
	GRADE BREAK
	SLOPE INDICATOR
3H:1V or 3H/1V	3 HORIZONTAL TO 1 VERTICAL SLOPE
5%	GRADE INDICATOR
1 / 14	DETAIL CALLOUT DETAIL ID DRAWING SHEET LOCATION
A / 13	CROSS-SECTION CALLOUT SECTION ID DRAWING SHEET LOCATION

0 300 600 900
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

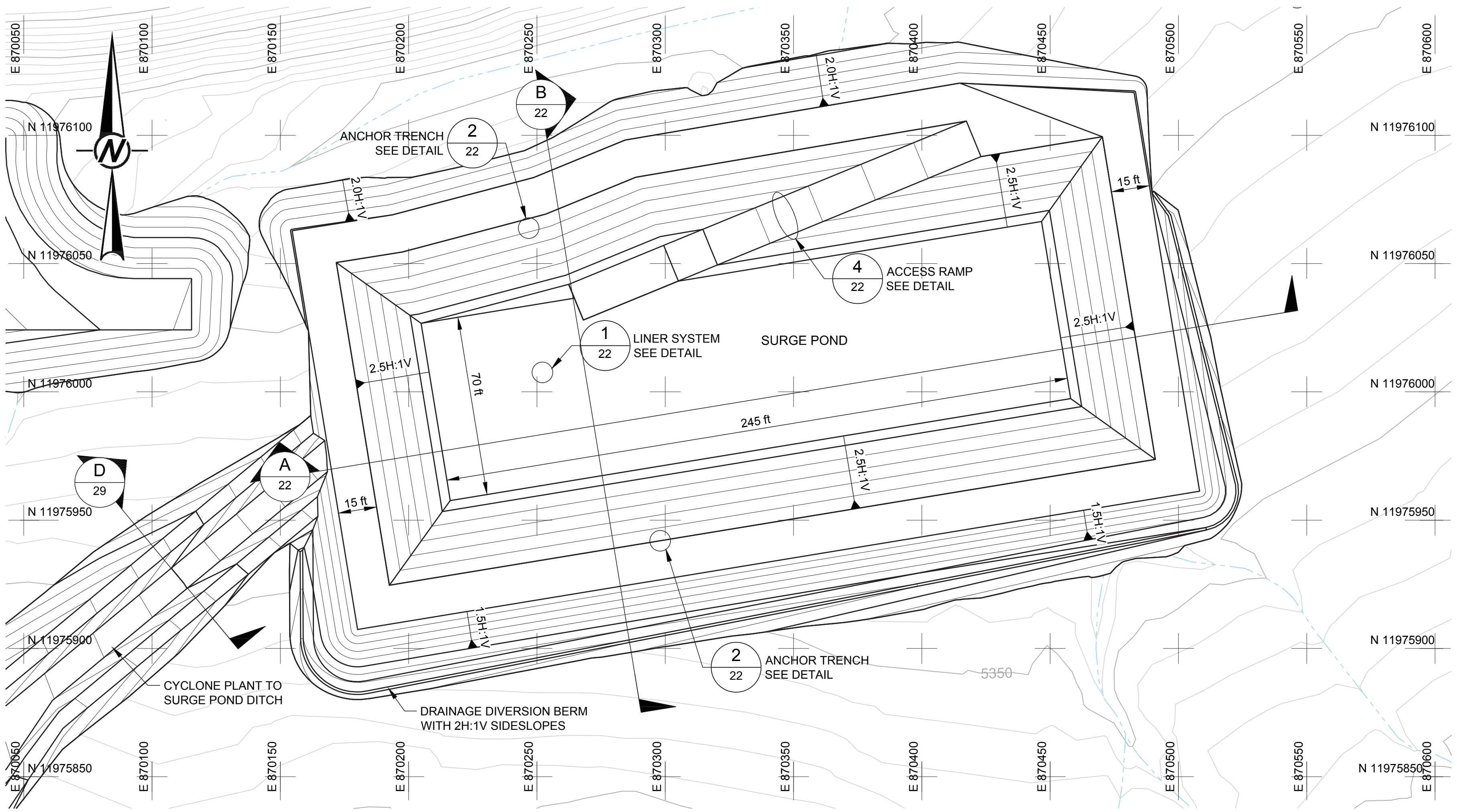
TITLE

CYCLONE STATION, SURGE POND AND PROCESS AREA PLAN

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K014
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	21
REVIEW	DAK	2013-07-17	

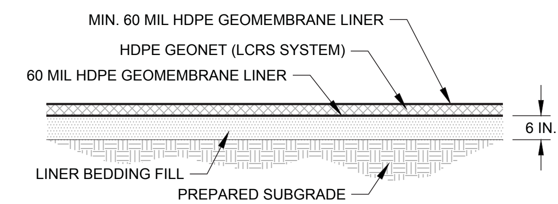
K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K014.dwg | Layout: 21 CYCLONE STATION, SURGE POND AND PROCESS AREA PLAN | Modified: nlocascio 11/11/2015 4:45 PM | Plotted: JRangel 11/13/2015



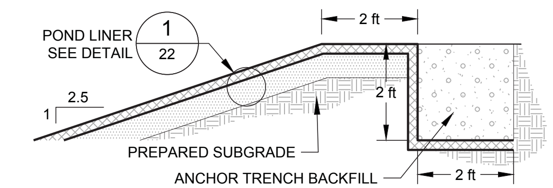
SURGE POND PLAN
SCALE A

LEGEND

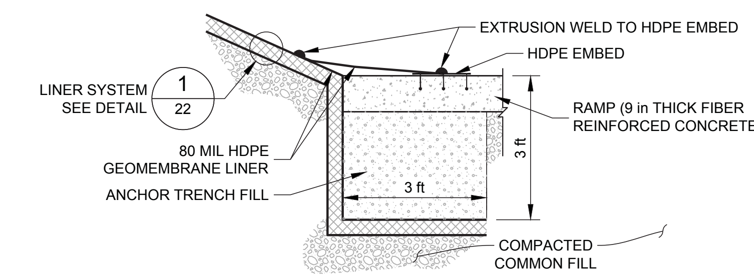
- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- 3600 — REGRADED CONTOURS (ft -MSL)
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- 1 / 2-315 — DETAIL CALLOUT: DETAIL ID, DRAWING SHEET LOCATION
- A / 2-313 — CROSS-SECTION CALLOUT: SECTION ID, DRAWING SHEET LOCATION



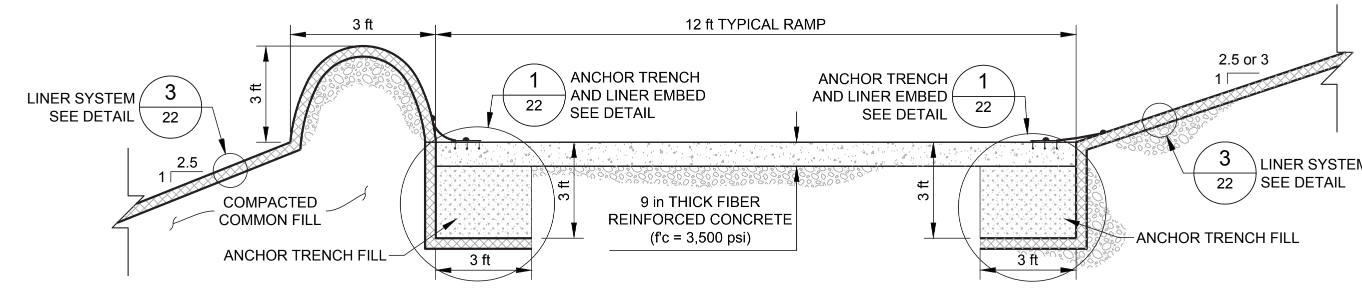
N.T.S. 1 / 22 SURGE POND LINER SYSTEM DETAIL



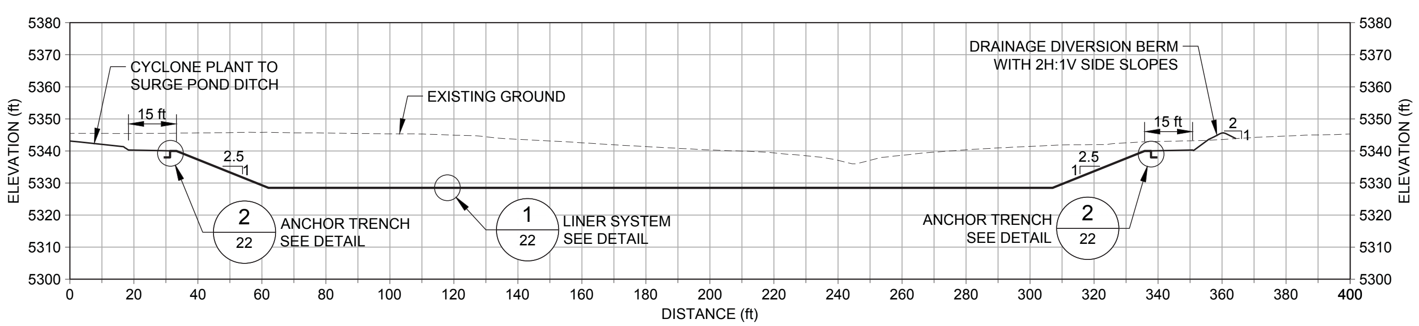
N.T.S. 2 / 22 SURGE POND ANCHOR TRENCH DETAIL



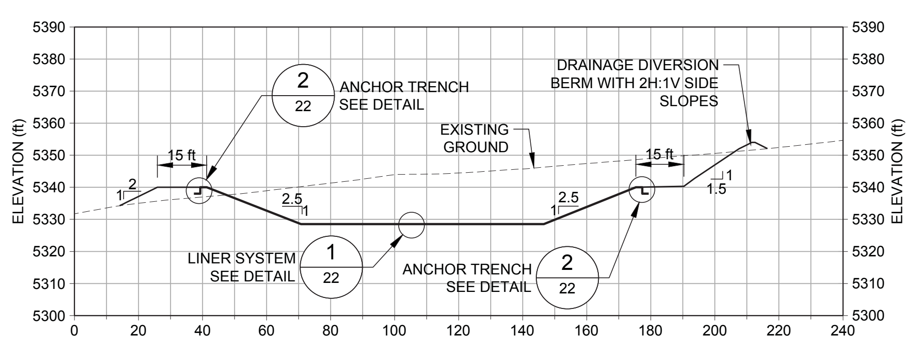
N.T.S. 3 / 22 TYPICAL ANCHOR TRENCH AND LINER EMBED DETAIL



N.T.S. 4 / 22 TYPICAL ACCESS RAMP DETAIL



SCALE A A / 22 CROSS-SECTION A



SCALE A B / 22 CROSS-SECTION B

0 30 60 90
SCALE A FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE
PRELIMINARY
FOR AGENCY REVIEW

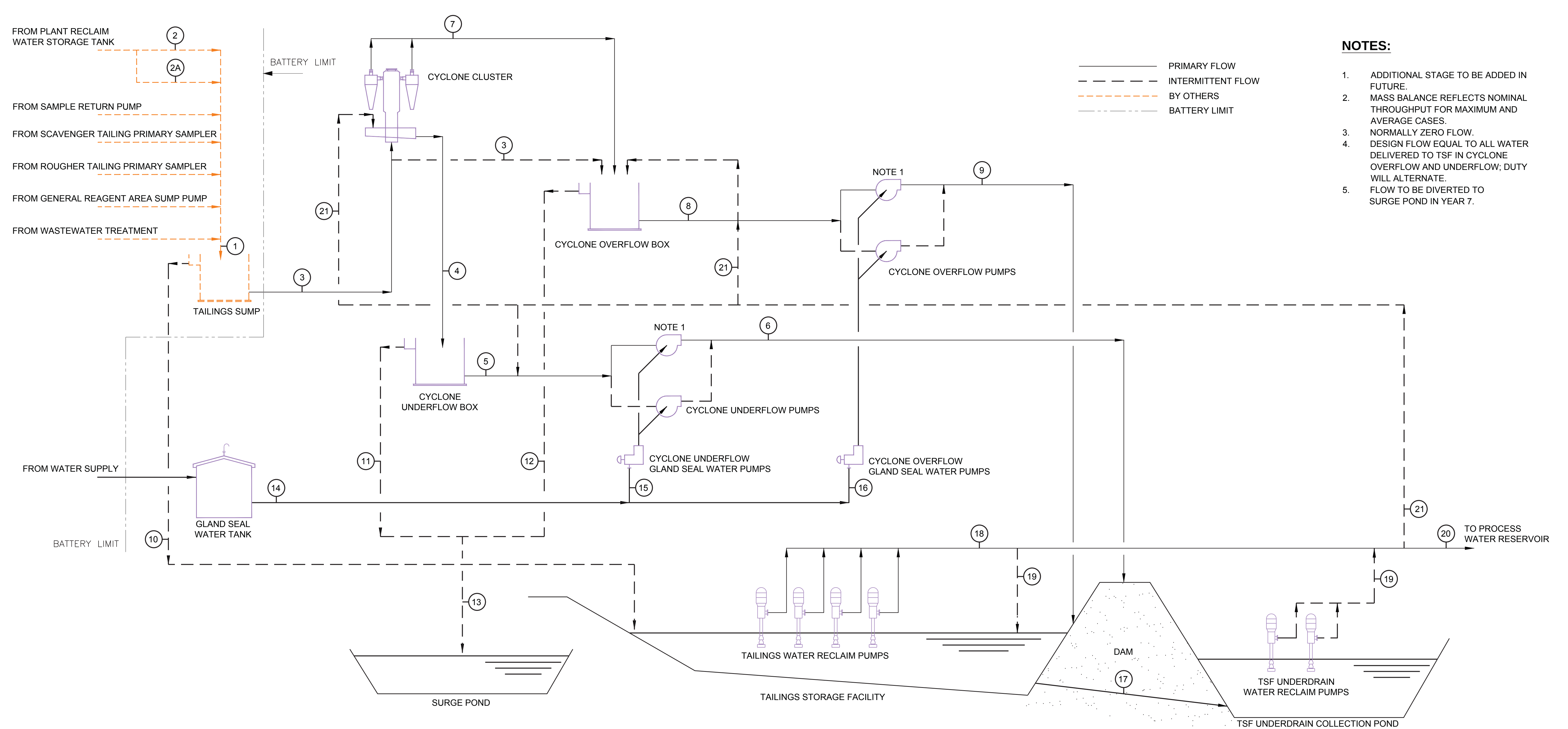
PROJECT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.
COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
SURGE POND PLAN, CROSS-SECTIONS, AND DETAILS

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K015
DESIGN	DW	2013-05-03	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		22
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K015.dwg | Layout: 22 SURGE POND PLAN CROSS-SECTIONS AND DETAILS | Modified: nlocascio 11/12/2015 7:55 AM | Plotted: JRangel 11/13/2015



NOTES:

1. ADDITIONAL STAGE TO BE ADDED IN FUTURE.
2. MASS BALANCE REFLECTS NOMINAL THROUGHPUT FOR MAXIMUM AND AVERAGE CASES.
3. NORMALLY ZERO FLOW.
4. DESIGN FLOW EQUAL TO ALL WATER DELIVERED TO TSF IN CYCLONE OVERFLOW AND UNDERFLOW; DUTY WILL ALTERNATE.
5. FLOW TO BE DIVERTED TO SURGE POND IN YEAR 7.

Note 2	Tailings Sump Feed	Tailings Sump Flush Water Note 3	Dilution Water Note 3	Tailings Sump Outlet/ Cyclone Inlet	Cyclone Underflow	Cyclone Underflow Box Discharge	Cyclone Underflow Pump Discharge	Cyclone Overflow	Cyclone Overflow Box Discharge	Cyclone Overflow Pump Discharge	Tailings Sump Overflow Note 3, 5	Cyclone Underflow Box Overflow Note 3	Cyclone Overflow Box Overflow Note 3	Cyclone Area Surge Discharge Note 3	Gland Seal Water Supply Header	Cyclone Underflow Pump Gland Seal Water	Cyclone Overflow Pump Gland Seal Water	TSF Under-flow	TSF Reclaim Water Note 4	TSF Underdrain Collection Pond Reclaim Water Note 4	Reclaim Water to Plant	Cyclone Area Flush Water from TSF Note 3
Stream	1	2	2A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
TPD (solids)	32000			32000	14550	14550	14550	17450	17450	17450	32000	14550	32000	32000								
Solids (t/h)	1333			1333	606	606	606	727	727	727	1333	606	1333	1333								
Solution (t/h)	3249	3755	0	3249	260	260	264	2989	2989	3001	3249	260	3249	3249	17	4	13	3267	3267	1001	3267	490
Slurry (t/h)	4582			4582	866	866	870	3716	3716	3728	4582	866	4582	4582								
Solids (%) Cw	29.1%			29.1%	70.0%	70.0%	69.7%	19.6%	19.6%	19.5%	29.1%	70.0%	29.1%	29.1%								
Solids (gpm)	2018			2018	918	918	918	1101	1101	1101	2018	918	2018	2018								
Solution (gpm)	12981	14999	0	12981	1038	1038	1054	11943	11943	11993	12981	1038	12981	12981	66	16	50	13047	13047	4000	13047	1956
Slurry (gpm)	14999			14999	1956	1956	1972	13044	13044	13094	14999	1956	14999	14999								
Solids (%) Cv	13.5%			13.5%	46.9%	46.9%	46.5%	8.4%	8.4%	8.4%	13.5%	46.9%	13.5%	13.5%								
Solids SG	2.64			2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64								
Solution SG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Slurry SG	1.22			1.22	1.77	1.77	1.76	1.14	1.14	1.14	1.22	1.77	1.77	1.22								

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
C	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
B	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	MJG

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES
NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

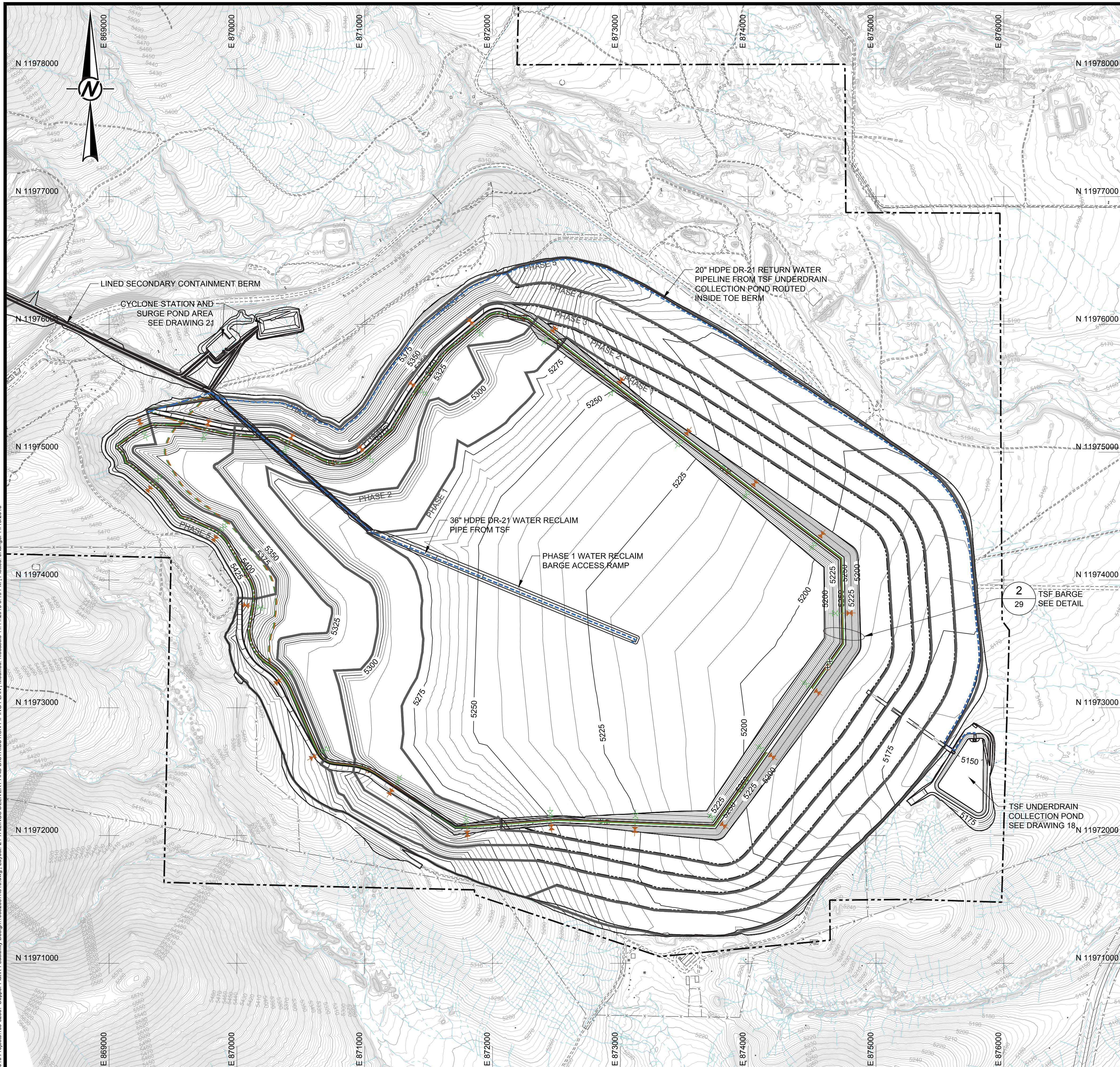
TITLE

GENERAL PROCESS FLOW DIAGRAM

Golder Associates

PROJECT No.		103-92557	FILE No. 10392557K023
DESIGN	DMW	2013-04-08	SCALE NTS
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	23
REVIEW	DAK	2013-07-17	

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K023.dwg | Layout: 23 GENERAL PROCESS FLOW DIAGRAM | Modified: rlocascio 11/11/2015 6:09 PM | Plotted: JRangel 11/13/2015



LEGEND

3600	EXISTING GROUND CONTOUR (ft -MSL)
	EXISTING ROADS
	EXISTING DRAINAGE
	EXISTING FENCELINE
	MINE PERMIT AREA BOUNDARY
3600	REGRADED CONTOURS (ft -MSL)
PHASE 1	PHASE BOUNDARY
	12 IN. DIA. DR-9 HDPE CYLONE UNDERFLOW PIPELINE - PERMANENT ALIGNMENT
	12 IN. DIA. DR-9 HDPE CYCLONE UNDERFLOW PIPELINE - TEMPORARY ALIGNMENT
	12 IN. DIA. DR-9 HDPE CYCLONE UNDERFLOW PIPELINE - FINAL ALIGNMENT
	30 IN. DIA. DR-17 HDPE CYCLONE OVERFLOW PIPELINE - PERMANENT ALIGNMENT
	30 IN. DIA. DR-17 HDPE CYCLONE OVERFLOW PIPELINE - TEMPORARY ALIGNMENT
	30 IN. DIA. DR-17 HDPE CYCLONE OVERFLOW PIPELINE - FINAL ALIGNMENT
	PINCH VALVES
	KNIFE GATES
	GRADE BREAK
	SLOPE INDICATOR
3H:1V or 3H/1V	3 HORIZONTAL TO 1 VERTICAL SLOPE
5%	GRADE INDICATOR
1 / 14	DETAIL CALLOUT DETAIL ID DRAWING SHEET LOCATION
A / 13	CROSS-SECTION CALLOUT SECTION ID DRAWING SHEET LOCATION

NOTES

1. PHASE 1 TAILINGS DISTRIBUTION BEGINS AT EL: 5250 AND ENDS AT EL: 5280.
2. KNIFE GATE VALVES ON CYCLONE UNDERFLOW AND CYCLONE OVERFLOW DISTRIBUTION PIPES AT 2000 ft SPACING. (SHOWN SPACED FOR CLARITY)
3. SPIGOTS ON CYCLONE OVERFLOW PIPE AT 660 ft SPACING. (SHOWN SPACED FOR CLARITY)
4. SPIGOTS ON CYCLONE UNDERFLOW PIPE AT 330 ft SPACING. (SHOWN SPACED FOR CLARITY)

0 400 800 1200
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY
FOR AGENCY REVIEW

PROJECT

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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

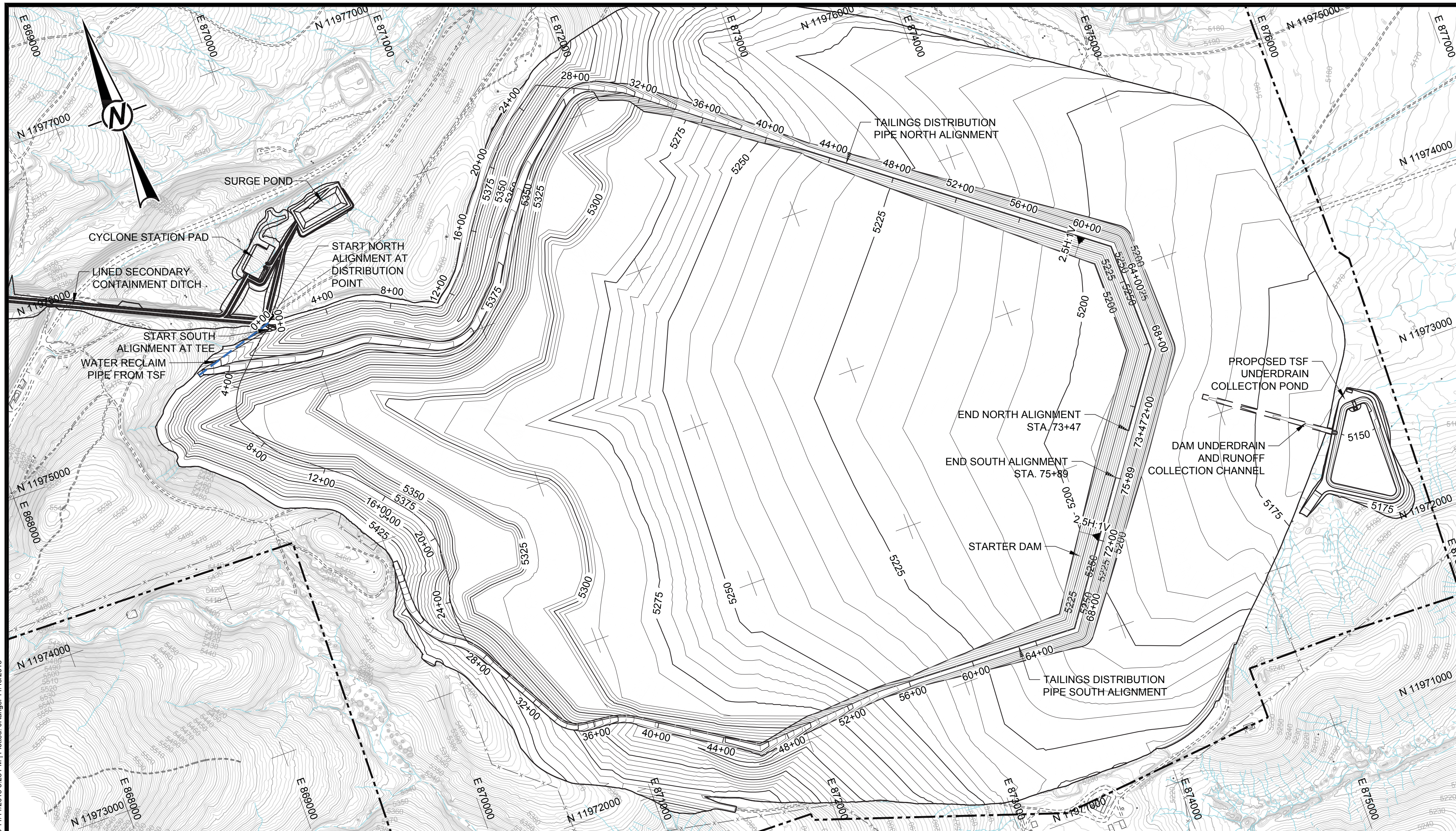
TITLE

TAILINGS DELIVERY AND DISTRIBUTION PIPING PLAN

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K016
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		24
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K016.dwg | Layout: 24 TAILINGS DELIVERY AND DISTRIBUTION PIPING PLAN | Modified: rdiscascio 11/11/2015 5:19 PM | Plotted: JRangel 11/13/2015

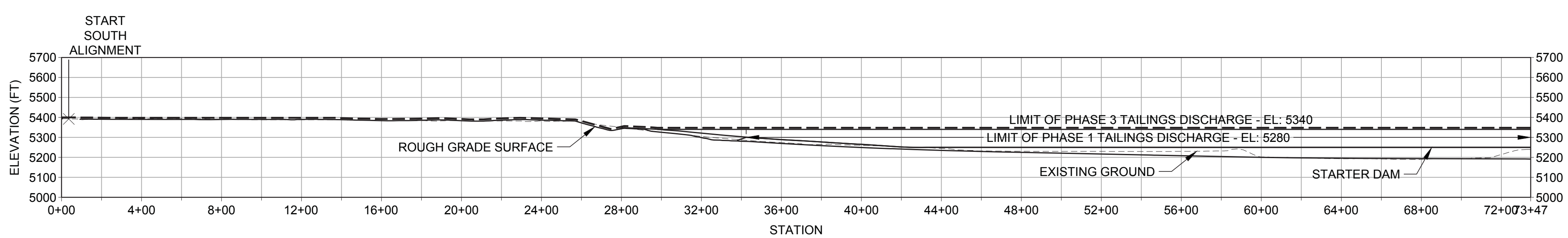


PHASES 1-3 TAILINGS DISTRIBUTION PLAN

SCALE A

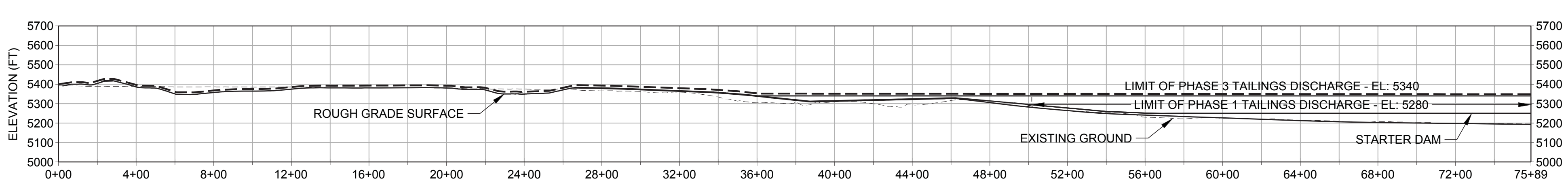
LEGEND

- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 — REGRADED CONTOURS (ft -MSL)
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- TAILINGS DELIVERY AND DISTRIBUTION PIPE AT PHASE 3 LIMITS
- WATER RECLAIM PIPE



PHASES 1-3 TAILINGS DISTRIBUTION NORTH ALIGNMENT PROFILE

SCALE A



PHASES 1-3 TAILINGS DISTRIBUTION SOUTH ALIGNMENT PROFILE

SCALE A

0 400 800 1200
SCALE A FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
C	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

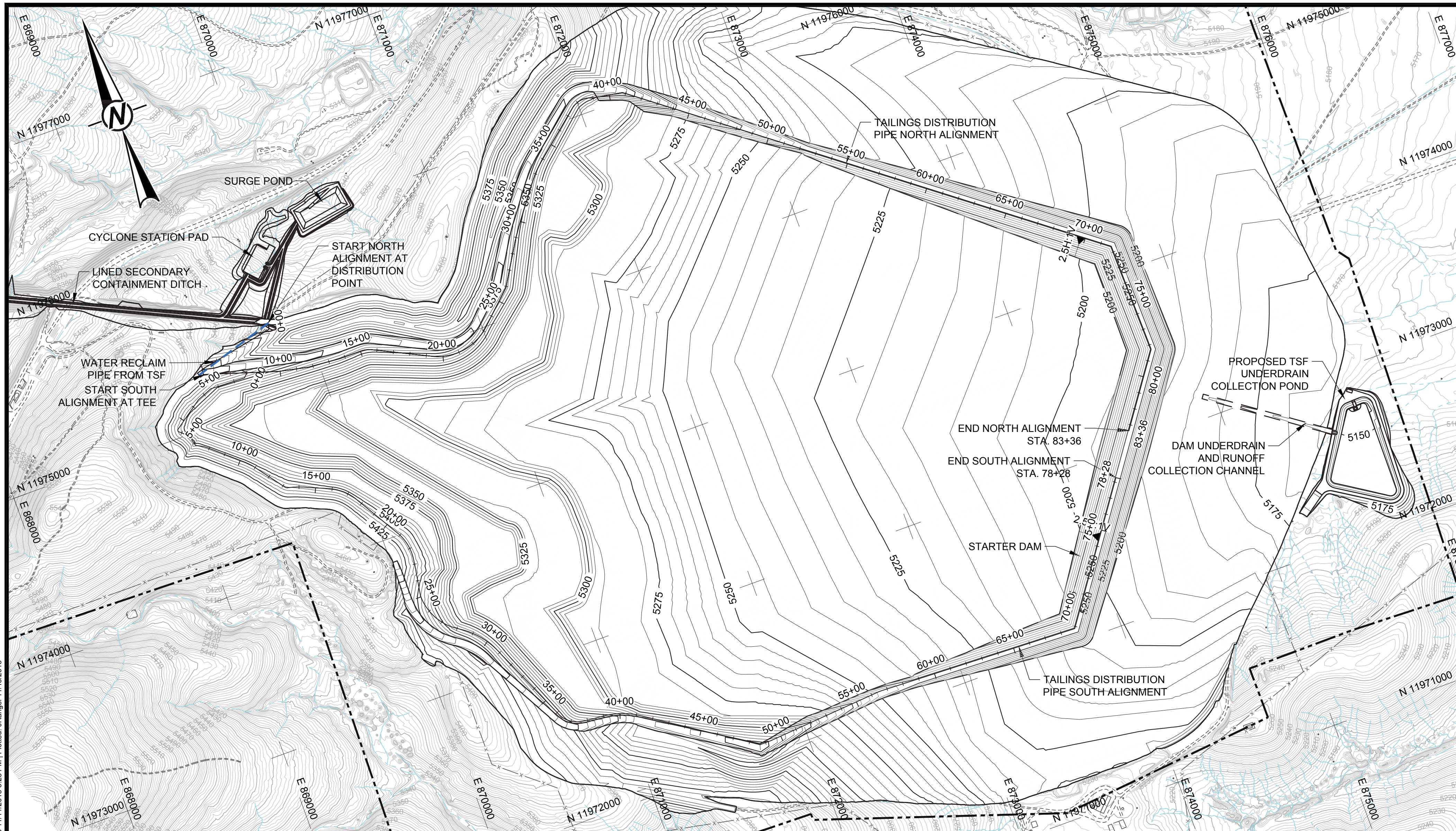
TITLE

TAILINGS DISTRIBUTION PLAN AND PROFILE (1 OF 2)

Golder Associates

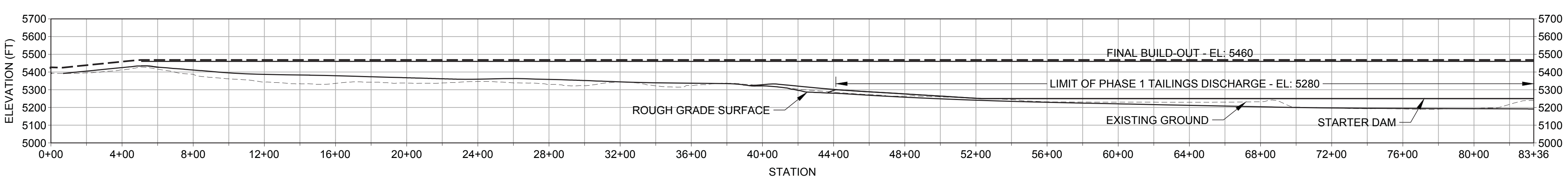
PROJECT No.		103-92557	FILE No.	10392557K017
DESIGN	DW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		25
REVIEW	DAK	2013-07-17		

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K017.dwg | Layout: 25 TAILINGS DISTRIBUTION PLAN AND PROFILE (1 OF 2) | Modified: nlocascio 11/11/2015 5:25 PM | Plotted: JRangel 11/13/2015



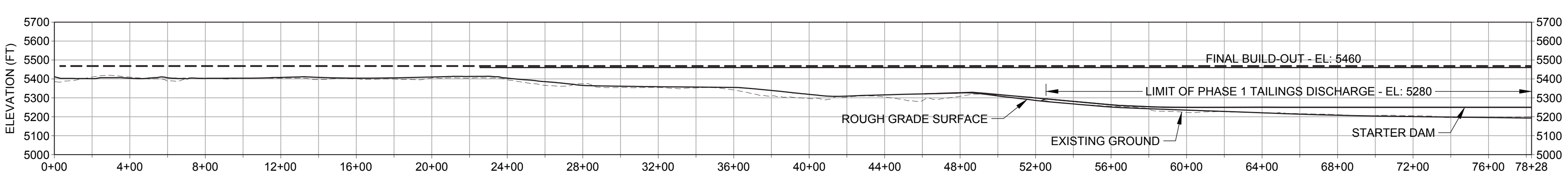
PHASES 4-5 TAILINGS DISTRIBUTION PLAN

SCALE A



PHASES 4-5 TAILINGS DISTRIBUTION NORTH ALIGNMENT PROFILE

SCALE A



PHASES 4-5 TAILINGS DISTRIBUTION SOUTH ALIGNMENT PROFILE

SCALE A

LEGEND

- 3600 EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 REGRADED CONTOURS (ft -MSL)
- PHASE BOUNDARY
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% GRADE INDICATOR
- TAILINGS DELIVERY AND DISTRIBUTION PIPE AT FINAL BUILD-OUT
- WATER RECLAIM PIPE

0 400 800 1200

SCALE A FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
E	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DW	NIL	GM	DAK

DRAWING USE

PRELIMINARY

FOR AGENCY REVIEW

PROJECT

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COPPER FLAT PROJECT
30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

TAILINGS DISTRIBUTION PLAN AND PROFILE (2 OF 2)

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K017
DESIGN	DMW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		26
REVIEW	DAK	2013-07-17		

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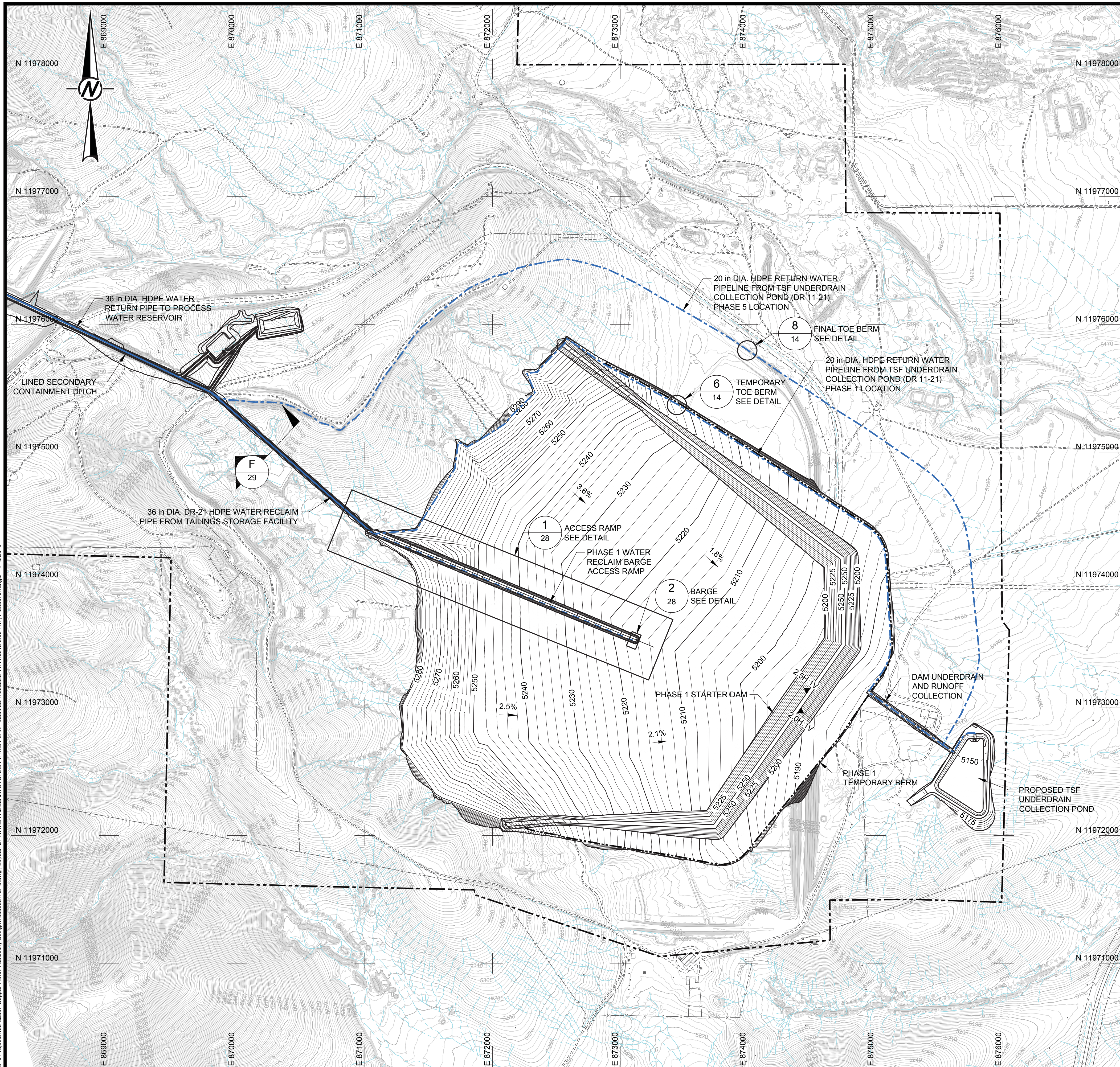

LEGEND

- 3600 — EXISTING GROUND CONTOUR (ft -MSL)
- EXISTING ROADS
- EXISTING DRAINAGE
- EXISTING FENCELINE
- MINE PERMIT AREA BOUNDARY
- 3600 — REGRADED CONTOURS (ft -MSL)
- INTERMEDIATE TOE BERM CENTERLINE
- GRADE BREAK
- SLOPE INDICATOR
- 3H:1V or 3H/1V — 3 HORIZONTAL TO 1 VERTICAL SLOPE
- 5% — GRADE INDICATOR
- 1 / 14 — DETAIL CALLOUT: DETAIL ID, DRAWING SHEET LOCATION

NOTES

1. SEE DRAWING 29 FOR RETURN WATER PIPE DITCH SECTIONS AND DETAILS.
2. RETURN WATER PIPELINE FROM TSF UNDERDRAIN AND RUNOFF COLLECTION POND WILL BE ROUTED INSIDE THE EMBANKMENT TOE BERM AND WILL REQUIRE RELOCATION AT EACH CONSTRUCTION PHASE.
3. RETURN WATER PIPELINE WILL BE RELOCATED TO THE TOE BERM AT EACH PHASE OF BUILDOUT. PHASE 1 AND PHASE 5 LOCATIONS ARE SHOWN ON DRAWING.

0 400 800 1200
SCALE FEET

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
F	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
E	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
D	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	MJG
C	2013-11-15	ISSUED FOR 30,000 TPD M3 USE	DMW	NIL	GM	MJG
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

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FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

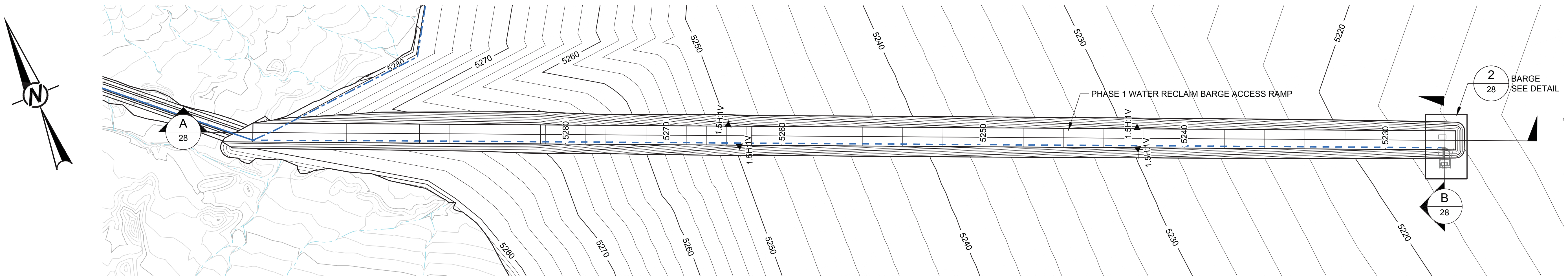
WATER RECLAIM SYSTEM PIPING PLAN

Golder Associates

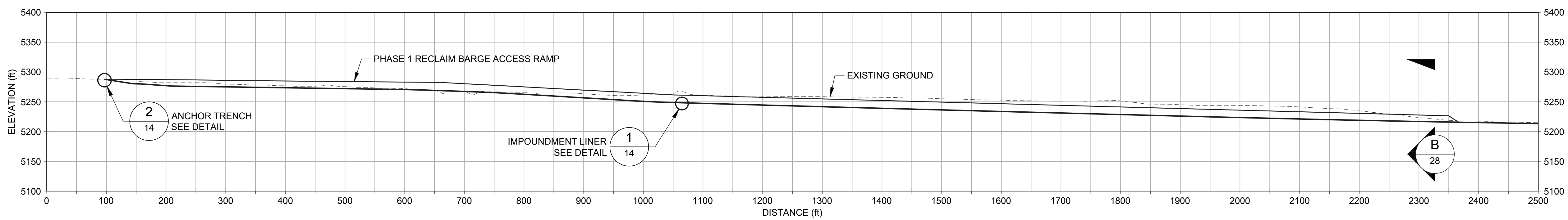
PROJECT No.		103-92557	FILE No. 10392557K018
DESIGN	DW	2013-04-08	SCALE AS SHOWN
CADD	JHR	2013-07-10	DRAWING
CHECK	GM	2013-07-16	27
REVIEW	DAK	2013-07-17	

K:\2010 Projects\103-92557 Copper Flat\K-Feasibility Design\10392557K018.dwg | Layout: 27 WATER RECLAIM SYSTEM PIPING PLAN | Modified: nlocascio 11/11/2015 6:00 PM | Plotted: JRangel 11/13/2015

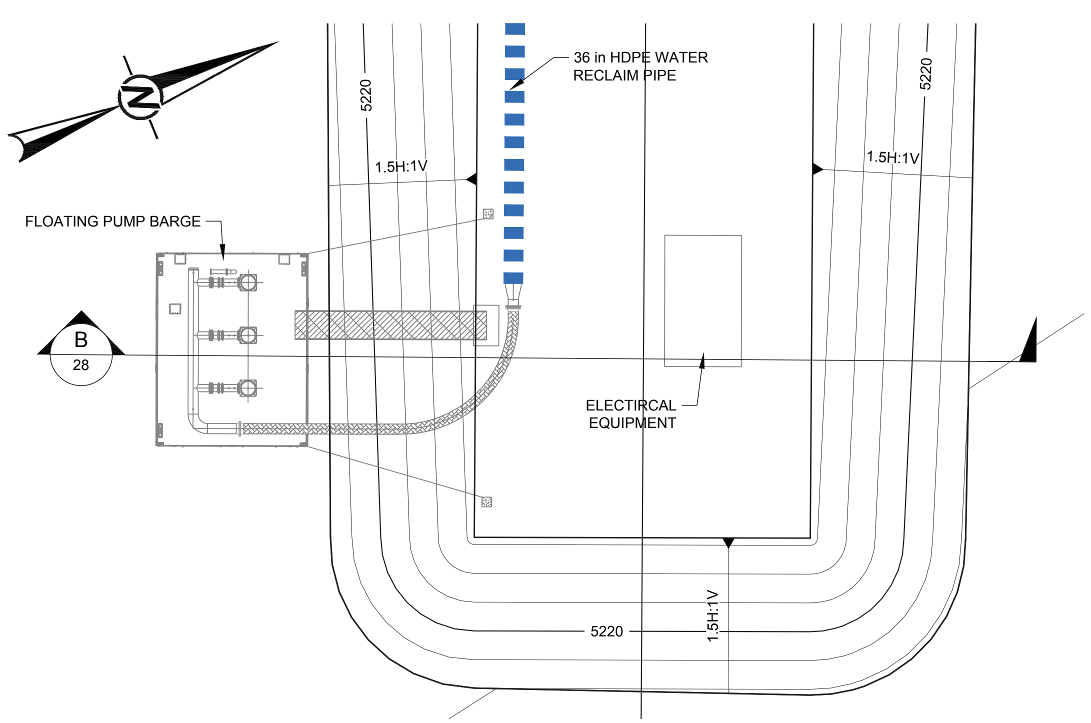
14770



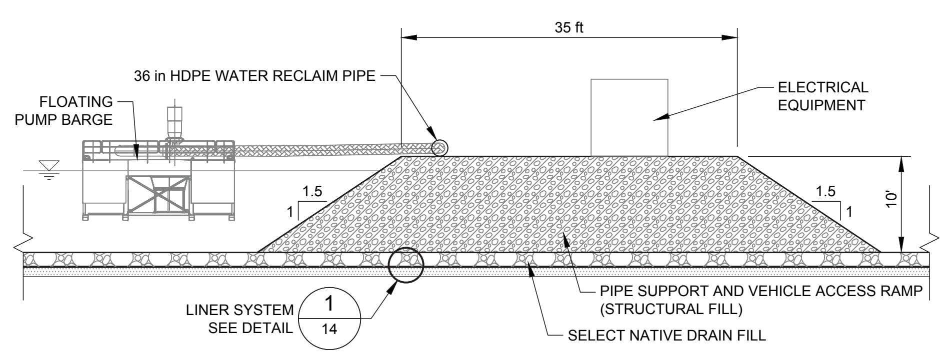
SCALE A 1/28 PIPE RAMP DETAIL



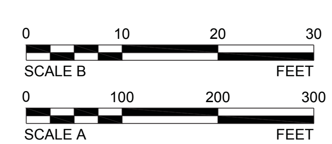
SCALE A A/28 PIPE RAMP SECTION



SCALE B 2/28 RECLAIM BARGE DETAIL



N.T.S. B/28 RECLAIM BARGE SECTION



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D	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
C	2014-01-06	ISSUED FOR FEASIBILITY REPORT (30,000 TPD)	DMW	JHR	GM	DAK
B	2013-07-17	ISSUED FOR FEASIBILITY STUDY	DMW	NIL	GM	DAK
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	DAK

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30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE

WATER RECLAIM SYSTEM DETAILS

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K018
DESIGN	DW	2013-04-08	SCALE	NOT TO SCALE
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		28
REVIEW	DAK	2013-07-17		

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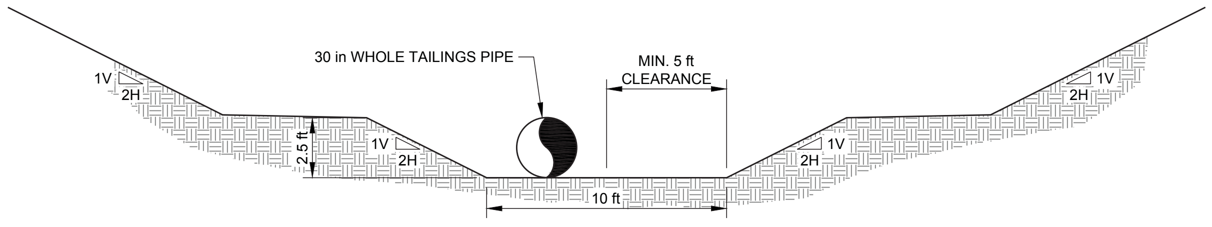
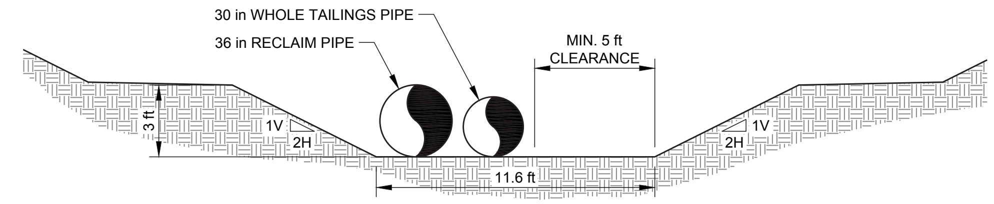
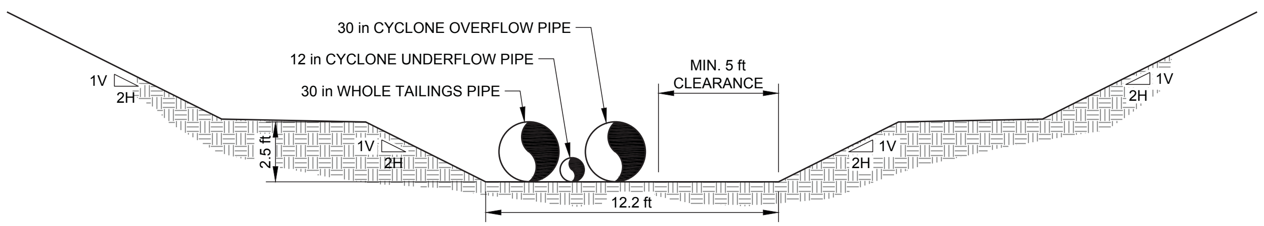


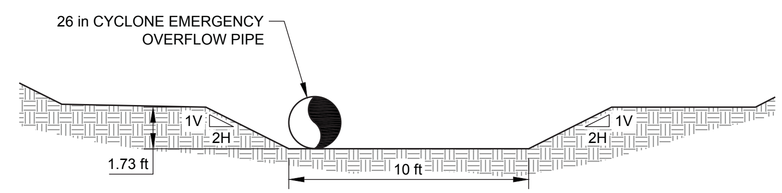
SCALE: N.T.S. A 29 SECONDARY CONTAINMENT MAIN DITCH ABOVE PROCESS WATER RESEVOIR



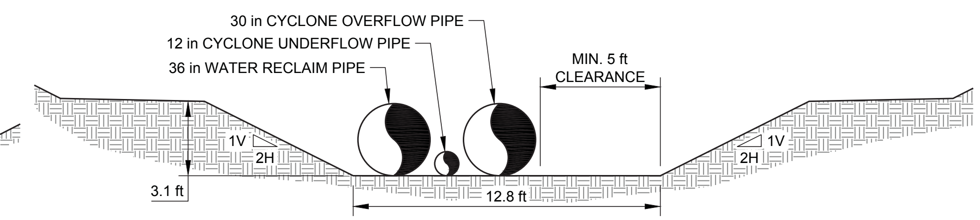
SCALE: N.T.S. B 29 MAIN DITCH BELOW PROCESS WATER RESEVOIR



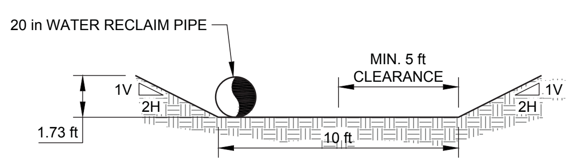
SCALE: N.T.S. C 29 MAIN DITCH TO CYCLONE PLANT



SCALE: N.T.S. D 29 CYCLONE PLANT TO SURGE POND DITCH



SCALE: N.T.S. E 29 MAIN DITCH BELOW CYCLONE PLANT



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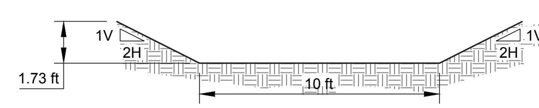
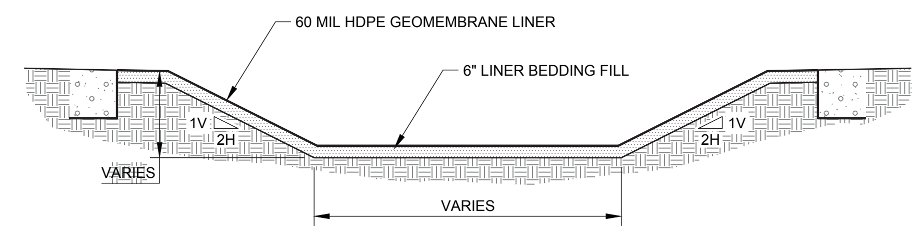


SCALE: N.T.S. G 29 POST YEAR 6 SURGE POND DITCH



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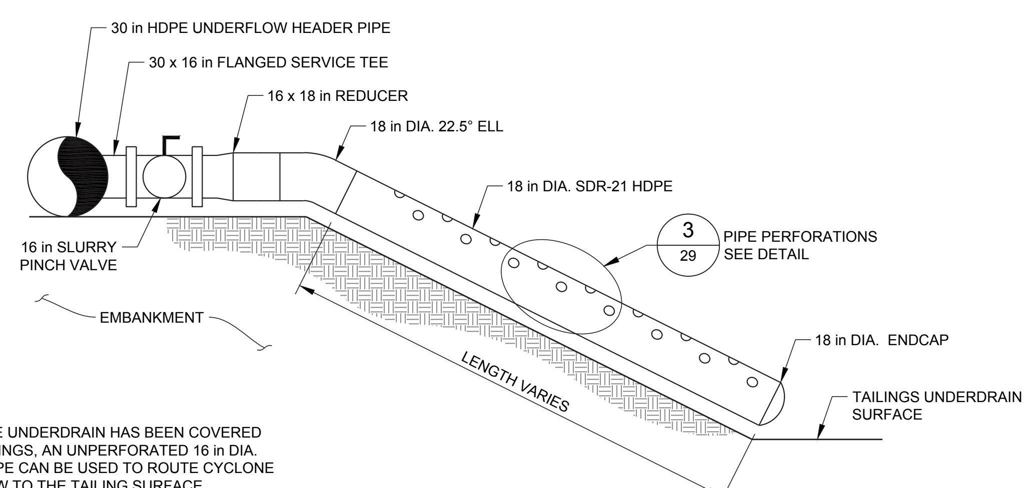
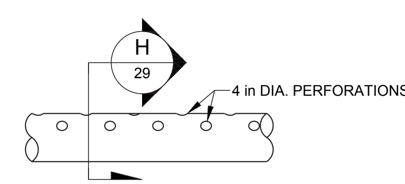


NOTE:
WHEN THE UNDERDRAIN HAS BEEN COVERED WITH TAILINGS, AN UNPERFORATED 16 in DIA. SDR-32 PIPE CAN BE USED TO ROUTE CYCLONE OVERFLOW TO THE TAILING SURFACE

SCALE: N.T.S. 2 29 ENERGY DISSIPATOR/SCOUR PROTECTION CYCLONE OVERFLOW DISTRIBUTION SYSTEM



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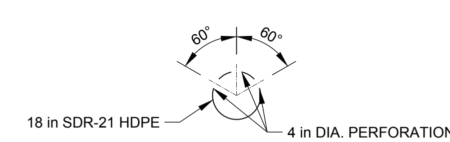

SCALE: N.T.S. H 29 PIPE PERFORATION SECTION

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
C	2015-11-12	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
B	2015-10-27	ISSUED FOR CLIENT AND AGENCY REVIEW	GM	NIL	GM	MJG
A	2013-05-03	ISSUED FOR CLIENT REVIEW	DMW	NIL	GM	MJG

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30K TPD TAILINGS STORAGE FACILITY
FEASIBILITY DESIGN
SIERRA COUNTY, NEW MEXICO

TITLE
TAILINGS DISTRIBUTION AND SECONDARY CONTAINMENT DETAILS AND SECTIONS

Golder Associates

PROJECT No.		103-92557	FILE No.	10392557K022
DESIGN	DMW	2013-04-08	SCALE	AS SHOWN
CADD	JHR	2013-07-10	DRAWING	
CHECK	GM	2013-07-16		29
REVIEW	DAK	2013-07-17		

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Golder Associates

Engineering Earth's Development, Preserving Earth's Integrity

M3-PN120085
Revision 0

Copper Flat Project

Impoundment
Design Report

Prepared For:

THEMAC RESOURCES

14774

Certified Professional Engineer Seal

This report documents work conducted under the oversight of the following Engineer:

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

Harry Lewsley, P.E.

Harry Lewsley

Signature

Date 12/7/2015

IMPOUNDMENT DESIGN REPORT
COPPER FLAT PROJECT

TABLE OF CONTENTS

Harry Lewsley 12/7/2015

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

LIST OF TABLES

LIST OF FIGURES

Harry Lewsley 12/7/2015

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LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

1 INTRODUCTION

The Copper Flat Project is located in South Central New Mexico, near the town of Hillsboro, approximately 150 miles south of Albuquerque, and approximately 20 miles southwest of Truth or Consequences (straight-line distances) (Figure 1). The Project is owned and operated by New Mexico Copper Corporation (NMCC), a wholly owned subsidiary of THEMAC Resources Group Limited.

The State of New Mexico has promulgated regulations pertaining to groundwater protection at copper mining facilities (New Mexico Administrative Code Title 20, Chapter 6, Part 7 [20.6.7 NMAC], the “Copper Rule”), the stated purpose of which is “to control discharges of water contaminants specific to copper mine facilities and their operations to prevent water pollution.”

This report provides the design criteria, location, purpose, operation, and performance of certain elements of the project identified in Section 2 of this report to comply with 20.6.7 NMAC. This report excludes the design considerations for the Tailings Storage Facility (TSF), i.e., the tailings impoundment, underdrain collection pond, surge pond and the secondary containment trench from the processing facility to the TSF, which have been completed by others and are reported separately.

2 SYSTEM DESCRIPTIONS

Impacted Stormwater Impoundments are designed to receive surface drainage that potentially has come in contact with water contaminants on a copper mine facility. These systems consist of a network of diversion channels designed to convey to the impoundment at minimum the peak from a 100-year-return-interval storm with at least 6 inches of freeboard per 20.6.7.17.D.(2).(f). The Impacted Stormwater Impoundments are designed to store impacted stormwater for less than 30 days and include an engineered liner system, as described in Section 3.2.

The Process Water Reservoir is designed to receive reclaimed process water from a variety of sources including the TSF, impacted stormwater impoundments and freshwater supply system conveyed via pipelines. The reservoir also receives direct precipitation to the pond surface and embankment crest area. The Process Water Reservoir is designed with an engineered liner system, leak collection system, and subgrade bedding, as described in Section 3.3.

3 BASIS OF DESIGN

3.1 GENERAL

All impoundments for the Copper Flat Project will be considered “new” impoundments as defined by NMAC 20.6.7.17 (D).

Outside Slopes	20.6.7.17.D.(1).(a) NMAC	Maximum 2:1 (H:V)
Static factor of safety	20.6.7.17.D.(1).(a) NMAC	Minimum 1.3
Liner Sidewall seams	20.6.7.17.D.(1).(e) NMAC	Vertical only
Capacity	20.6.7.17.D.(2) NMAC	Contain 100-year return interval storm event plus minimum 2 ft of freeboard

3.2 IMPACTED STORMWATER IMPOUNDMENTS

Impacted stormwater impoundments are designed to hold impacted stormwater for less than 30 days in accordance with NMAC 20.6.7.17 (D) (4) and (7).

Liner system	20.6.7.17.D.(4).(a) NMAC	Compacted minimum 6-inch subbase overlain by 60 mil HDPE liner system
Wind protection	20.6.7.17.D.(4).(d) NMAC	Weighting system to limit liner damage in high winds
Spillway design	20.6.7.17.D.(7) NMAC	Safely discharge peak flow from 24-hour storm event with 25-year return

3.3 PROCESS WATER RESERVOIR

Process Water Impoundments/Reservoirs are designed to hold process water at design capacity plus impacted stormwater for more than 30 days in accordance with NMAC 20.6.7.17 (D) (3).

Liner system	20.6.7.17.D.(3).(a)and 20.6.7.17.D.(3). (c) NMAC	Primary 60 mil HDPE liner over a secondary 60 mil HDPE liner with drainage layer over a compacted minimum 6-inch subbase
Leakage collection system	20.6.7.17.D.(3).(d) NMAC	Drainage layer between primary and secondary liners with fluid removal system
Drainage layer	20.6.7.17.D.(3).(d) NMAC	Granular soil material or geosynthetic drainage net
Drainage layer slope	20.6.7.17.D.(3).(d) NMAC	At least 2 percent
Drainage layer permeability	20.6.7.17.D.(3).(d) NMAC	At least 1 x 10^{-2} centimeters per second (cm/s)
Collection sump	20.6.7.17.D.(3).(d) NMAC	At confluence drainage layer with dedicated automatic pump system with totalizing flow meter and automated failure alarm system
Spillway design	20.6.7.17.D.(7) NMAC	No discharge to ground surface, safely discharge peak process flows

4 DESIGN AND CONSTRUCTION OF IMPACTED STORMWATER IMPOUNDMENTS AND PROCESS WATER RESERVOIR

The Copper Flat Project permit boundary (Figure 2) incorporates the mine pit, processing plant area, waste rock stockpiles (WRSPs), and the TSF. The TSF and related facilities including the cyclone plant, surge pond, and underdrain collection pond are described by others. The mine and process plant area includes five developed watershed (WS) areas (Figure 3) that are managed as part of this plan. The facilities described below are designed to manage process and impacted stormwater to prevent releases from the site to surface water and groundwater (Figure 4).

4.1 FACILITIES

WS A includes the process plant, maintenance, and administrative areas of the Copper Flat Project. It also includes WS E, which is the Process Water Reservoir as a separate, internal area of stormwater and process water management (Sec. 4.1.5). During precipitation events, sheet flow of stormwater is directed (Figure 5) to open channel conveyances designed to convey the peak flow from a 100-year return interval storm event with at least 6 inches of freeboard to Impacted Stormwater Impoundment A (Figures 6 and 7). The impoundment is designed with a spillway that is capable of safely discharging the peak flow from a 25-year, 24-hour precipitation event with a 90 percent chance of not being exceeded during the design life of the impoundment. Design criteria for Impacted Stormwater Impoundment A are presented in Table 1.

WS B includes runoff from the western flank of Animas Peak and proposed new waste rock stockpiles (WRSP-1) (Figure 3). During precipitation events, sheet flow of stormwater is directed (Figure 3) to open channel conveyances designed to convey the peak flow from a 100-year return interval storm event with at least 6 inches of freeboard to Impacted Stormwater Impoundment B (Figures 8 and 9). The impoundment is designed with a spillway to the mine pit that is capable of safely discharging the peak flow from a 25-year, 24-hour precipitation event with a 90 percent chance of not being exceeded during the design life of the impoundment. Design criteria for Impacted Stormwater Impoundment B are presented in Table 1.

WS C includes runoff from the eastern flank of Animas Peak and proposed new waste rock stockpiles (WRSP-2 and 3) (Figure 3). During precipitation events, sheet flow of stormwater is directed (Figure 3) to open channel conveyances designed to convey the peak flow from a 100-year return interval storm event with at least 6 inches of freeboard to Impacted Stormwater Impoundment C (Figures 10 and 11). The impoundment is designed with a spillway that is capable of safely discharging the peak flow from a 25-year, 24-hour precipitation event with a 90 percent chance of not being exceeded during the design life of the impoundment. Design criteria for Impacted Stormwater Impoundment C are presented in Table 1.

WS D includes runoff from uphill slopes and existing waste rock stockpiles (EWRSP-1 and -2b) to the mine pit (Figure 3). During precipitation events, sheet flow of stormwater is directed by natural drainage channels and open channel conveyances designed to convey the peak flow from a 100-year return interval storm event with at least 6 inches of freeboard to the mine pit.

WS E consists of direct precipitation onto the lined surfaces of the Process Water Reservoir and unlined perimeter road that is directed to the reservoir (Figure 3). The amount of direct precipitation to the pond is small (9.5 cubic feet per second [cfs]) in comparison to the design throughput of process solutions through the pond (100,000 cfs). The design freeboard of 2 ft is more than adequate to handle the additional flux from a precipitation event. The design capacity of the pond is 726,400 cubic feet (ft^3) with 2 ft of freeboard and the ultimate capacity is 938,000 ft^3 (Figures 12 and 13). Overtopping of the reservoir is controlled by an alarm system and emergency shutoff system. Overtopping flows, in the event of system failure, are directed to the lined tailings conveyance trench to the lined tailings impoundment. Design criteria for the Process Water Reservoir are presented in Table 1.

4.2 SURFACE WATER CONTROL

Surface areas draining to the Impacted Stormwater Impoundments (A, B, and C), mine pit, and Process Water Reservoir will be shielded from run-on surface drainage by site diversions as described in a separate report.

4.3 GEOLOGIC HAZARDS

No geologic hazards are known to exist in the vicinities of the Impacted Stormwater Impoundments or Process Water Reservoir. Impacted Stormwater Impoundment B is located on the eastern wall of the ultimate mine pit (Figure 11J-3). In the event of a pit slope failure, any liquids contained in Impacted Stormwater Impoundment B would be contained in the mine pit.

4.4 SOLUTION CHARACTERIZATION

Liquids routinely expected to enter the Impacted Stormwater Impoundments (A, B, and C) are direct precipitation and stormwater runoff from areas impacted by mining activities including mining, hauling, waste rock stockpiling, mineral processing, and shipping and receiving of goods and products. The Impacted Stormwater Impoundments will be typically empty. Impacted stormwater collected in the impoundments will be pumped out and used as process makeup water.

Liquids routinely expected to enter the Process Water Reservoir include direct precipitation, water reclaimed from the Copper-Moly (Cu-Mo) Thickener, fresh make-up water from the water supply wellfield, and reclaimed water from the Tailings Impoundment and Underdrain Collection Pond. The Process Water Reservoir is typically maintained at a nearly full operational level at all times to ensure continuity of the process during short-term interruptions of return or makeup flows. The physical characteristics of these constituents are expected to be neutral to slightly alkaline and completely compatible with the liner materials. Flows from upset conditions in the concentrator do not flow directly to the Process Water Reservoir, but would eventually contribute to the water reclaimed from the Tailings Impoundment and Underdrain Collection Pond.

4.5 CAPACITY AND STORAGE DESIGN

The capacity and storage design of the subject impoundments and reservoir are provided in Table 1. The impacted water impoundments are designed to contain the runoff from a 100-year, 24-hour storm event with a minimum of 2 ft of freeboard.

The Process Water Reservoir is designed to contain the maximum design process flow plus stormwater runoff from the reservoir catchment area with a minimum of 2 ft of freeboard.

4.6 SPILLWAY DESIGN

Spillways for Impacted Stormwater Impoundments A, B, and C are designed to safely discharge the peak runoff of a 25-year, 24-hour precipitation event. The spillways for Impacted Stormwater Impoundments A and C are designed as open channel spillways with slopes that are suitable for vehicle access on the perimeter road. The spillway for Impacted Stormwater Impoundment B is designed as a culvert beneath the haul road. The culvert(s) will have sufficient capacity to safely pass peak runoff from the prescribed precipitation event.

Overflow protection for the process water reservoir is accomplished via a designed solution conveyance to the lined tailings conveyance trench, which conveys any upset flows that exceed the maximum capacity without compromising the integrity of the structure.

4.7 SITE PREPARATION

The pond areas will be cleared and grubbed of vegetation. Any unsuitable foundation materials within the pond footprint will be excavated and replaced. Bedding soil will be placed, moisture conditioned, and compacted pursuant to 20.6.7.17.D.(3) and (4). The bedding soil must be free of sharp rock, vegetation, and stubble to a depth of at least 6 inches. The bedding surface must be smooth to ensure good contact between the liner and the bedding. The liner must be placed on a layer of sand or fine soil. The floor of the bedding surface will be sloped to collection sump at grades of up to 1 percent to facilitate removal of the contents. Side slopes will be less than 2H:1V to permit proper installation of the liner system. The liner bedding shall have an acceptance certificate prior to installation of the liner.

4.8 LINER SYSTEMS

Pursuant to 20.6.7.17.D.(4), the liner system of the Impacted Stormwater Impoundments consists of a single 60 mil HDPE textured geomembrane liner that is certified as UV resistant in accordance with a Construction Quality Assurance and Construction Quality Control (CQA/CQC) Plan, which will be generated and approved prior to construction. Liner panels shall be oriented such that the seams on the sidewall of the impoundments are vertical. Sufficient slack in the liner will be maintained to accommodate expansion and contraction of the liner material due to changes in temperature. These impoundments are typically empty and the liner will be weighted to prevent wind damage. The liner shall be secured in an anchor trench (Figure 14, Detail 3).

Pursuant to 20.6.7.17.D. (3), the liner system for the Process Water Reservoir consists of a secondary liner, drainage layer, and primary liner. The drainage layer connects directly to the fluid collection sump and fluid removal system to alleviate the need for fluid collection pipes. This reservoir typically contains solution and will not require the liner to be weighted unless there is a prolonged period when the reservoir will be empty and susceptible to wind damage. The liner system shall be secured in an anchor trench (Figure 14, Detail 1).

The lower (secondary) liner consists of a single 60 mil HDPE geomembrane AGRU® drainage liner, or equivalent, that is installed in accordance with an approved CQA/CQC Plan. This type of secondary liner, paired with a primary liner, doubles as a drainage layer with a coefficient of permeability of 1×10^{-2} cm/s on a design slope of 2 percent. Liner panels shall be oriented such that the seams on the sidewall of the impoundments are vertical. Sufficient slack in the liner will be maintained to accommodate expansion and contraction of the liner material due to changes in temperature.

The primary liner for the Process Water Reservoir consists of a single 60 mil HDPE textured geomembrane liner that is certified as UV resistant and installed in accordance with an approved CQA/CQC Plan. Liner panels shall be oriented such that the seams on the sidewall of the impoundments are vertical. Sufficient slack in the liner will be maintained to accommodate expansion and contraction of the liner material due to changes in temperature.

A CQA/CQC plan will be developed by the design engineer and the liner installation contractor and for approval by the appropriate agency as part of the final design prior to construction. The plan includes the following elements.

- Identification of persons and entities responsible for overseeing the program.
- Inspection protocols for subgrade, materials, placement, anchoring, welding, testing, and repairing.
- Identification of field and laboratory testing equipment and testing entities.
- Procedures for observing and testing liner, subgrade, bedding, etc.
- Verification protocol for manufacturer's QC testing.
- Procedures for reviewing results of testing and inspection.
- Corrective actions for material repair, subgrade and bedding deficiencies, weld testing failures, or other construction defects.
- Seaming procedures, qualification, testing, and inspection.
- QA/QC reporting procedures, schedules, and certifications.

- Guidelines, schedules, contents, and certifications for submission of a CQA/CQC report.

4.9 LEAK COLLECTION SYSTEM

Pursuant to 20.6.7.17.D.(3).(d), the liner drainage layer of the process water reservoir discharges directly into a leakage collection sump (Figure 14, Detail 6) which is part of the fluid removal system. The sump contains granular fill materials to convey the drainage fluid to the fluid removal pipe and pump system. The fluid removal pipe consists of a 6" Sch. 80 polyvinyl chloride (PVC) pipe with 3 ft of slotted screen at the bottom for water collection. The fluid removal pipe can be cleaned using conventional pipe cleaning equipment. An automated fluid removal pump is installed at the bottom of the pipe to enable removal of leakage. The pump is activated in the presence of drainage fluid in the sump and is turned off when the fluid has been removed. A totalizing flow meter records the volume of fluid removed from the sump. The pump also has an alarm system to notify the operator of system failure.

4.10 PERFORMANCE INSPECTIONS AND OPERATIONAL MONITORING

Routine inspections of the Process Water Reservoir and Impacted Stormwater Impoundments begin at the time of construction and proceed quarterly. Additional inspections are prescribed in the event of a process upset or a significant stormwater flow event. Inspections include visual assessment of integrity and physical assessment of pond capacity. Water levels in the ponds are noted with respect to the freeboard. Totalizing meter readings are recorded from fluid removal pumps from the leakage collection sump and from the impacted stormwater impoundment pumps.

TABLES

Table 1: Impoundment Design Criteria

Impoundment ID	Stormwater Impoundment A	Stormwater Impoundment B	Stormwater Impoundment C	Process Water Reservoir
Catchment Area (ac)	91.06	98.52	198.66	1.80
Peak Flow, Q100 (cfs)[1]	200.25	176.88	315.76	9.54
Pond Size - Approx, Surface area (ac)	1.98	2.12	6.37	1.80
Freeboard Requirement (ft)	2.0	2.0	2.0	2.0
Capacity at Freeboard (ft^3)	976,800	748,400	1,405,500	726,400
Design Capacity at spillway/crest (ft^3)	1,280,500	913,200	1,802,100	938,000
Primary Liner Specifications[2]	60 mil HDPE or equivalent 6" fine soil subgrade Certified UV resistant	60 mil HDPE or equivalent 6" fine soil subgrade Certified UV resistant	60 mil HDPE or equivalent 6" fine soil subgrade Certified UV resistant	60 mil HDPE or equivalent Certified UV resistant
Secondary Liner Specifications[2]	N/A	N/A	N/A	60 mil HDPE or equivalent 6" fine soil subgrade
Drainage Layer Specifications[3]	N/A	N/A	N/A	Geonet drainage layer Slope min. 2% Perm. min. 1 x 10-2 cm/s
Perforated Fluid Collection System[4]	N/A	N/A	N/A	Geonet drainage layer
Fluid Removal System[2]	N/A	N/A	N/A	Automatic pump Totalizing flow meter Automated failure alarm
Design Flow for Conveyance Structures (cfs)	Q100 = 200.25	Q100 = 176.88	Q100 = 315.76	Q100 = 9.54
Design Storm for Pond & Source	100-yr, 24hr rainfall event, WS A	100-yr, 24hr rainfall event, WS B	100-yr, 24hr rainfall event, WS C	100-yr, 24hr rainfall event, WS E
Design Storm for Spillway & Source	200-yr, 24hr rainfall event, WS A	200-yr, 24hr rainfall event, WS B	200-yr, 24hr rainfall event, WS C	N/A
Peak Flow, Q200 for Spillway (cfs)[5]	6.16	6.37	8.80	N/A
Bank Slopes	2:1 (H:V) Max	2:1 (H:V) Max	2:1 (H:V) Max	2:1 (H:V) Max

[1] Precipitation data is per NOAA Atlas 14, Volume 1, Version 5; Hillsboro, NM, Station ID: 29-4009

[2] Specifications are per 20.6.7.17.D.(3) and (4)(c)

[3] Specifications are per 20.6.7.17.D.(3)(d)

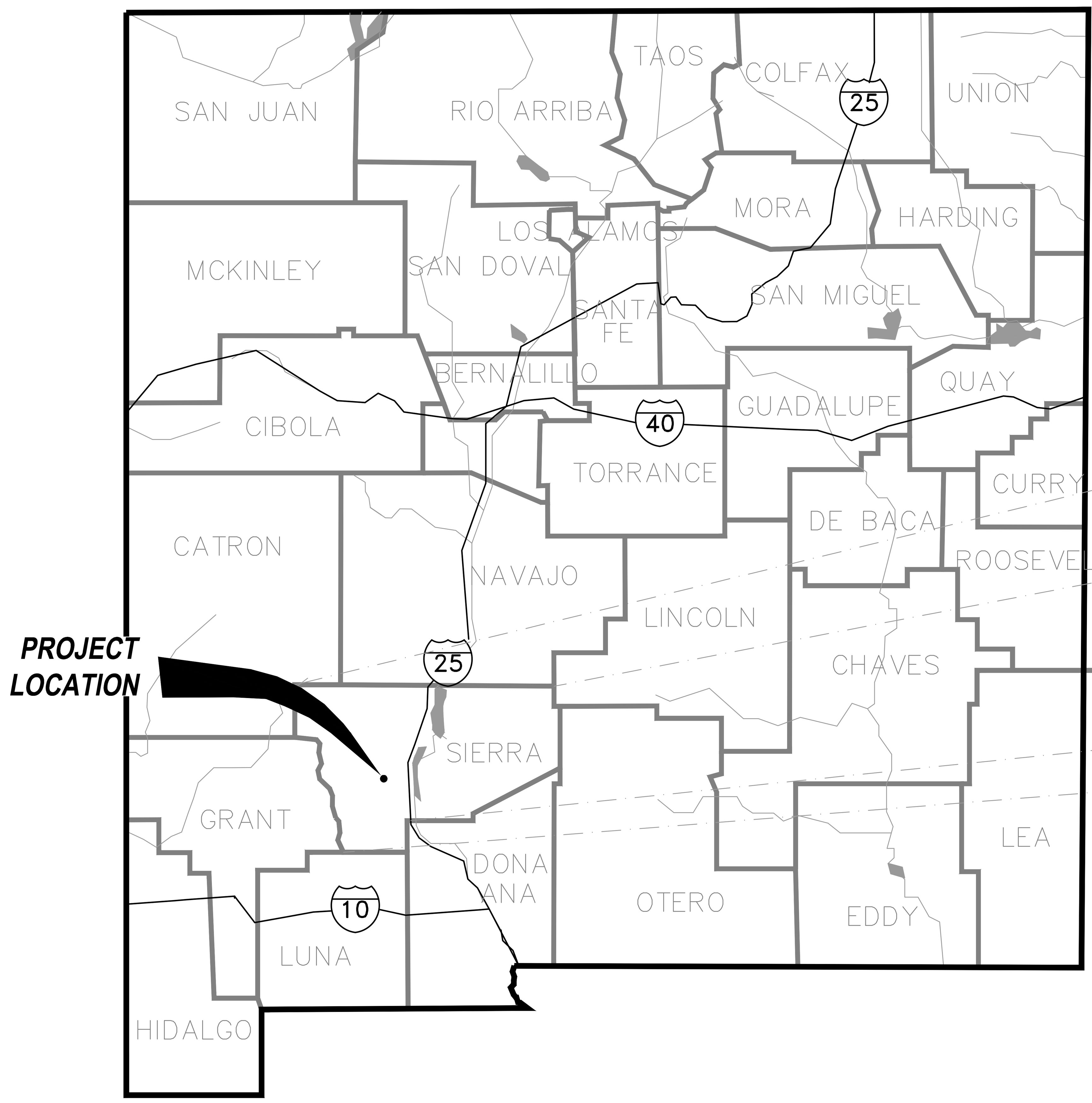
[4] Geonet layer drains directly into collection sump and fluid removal system

[5] Design Flow for spillway is approximate flow from pond to spillway during the 200-yr event assuming the spillway elevation is at the 100-yr WSEL

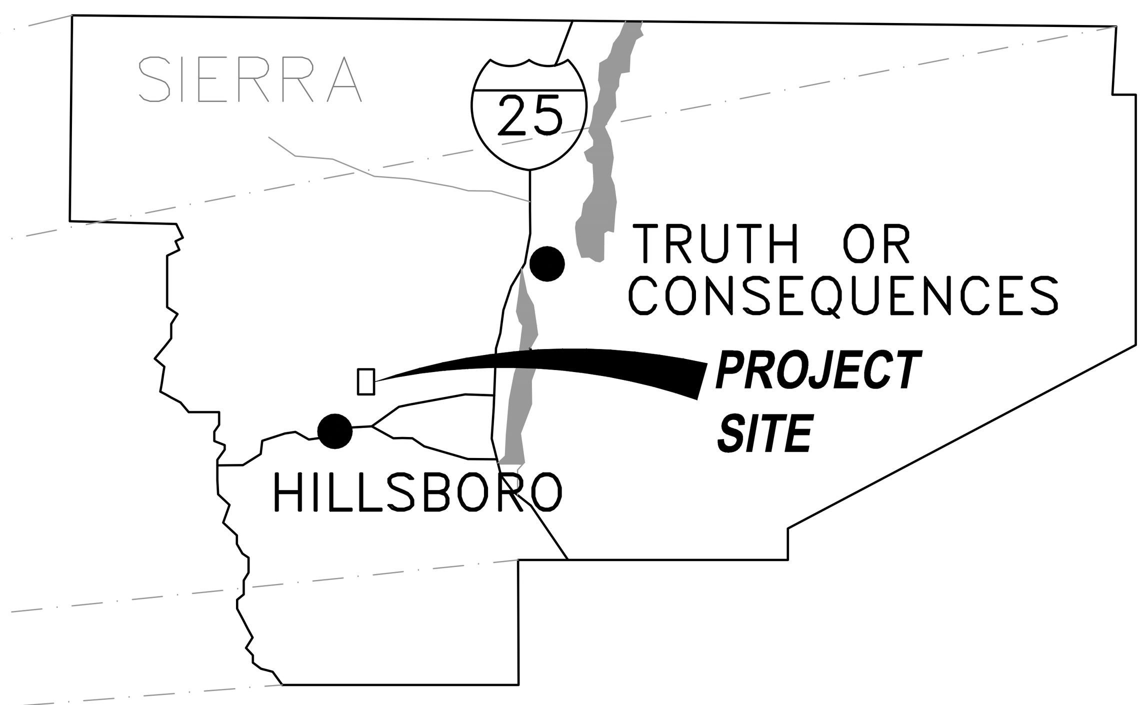
FIGURES

NEW MEXICO COPPER CORPORATION

COPPER FLAT PROJECT
SIERRA COUNTY, NEW MEXICO



STATE OF NEW MEXICO
NOT TO SCALE



PROJECT LOCATION MAP
NOT TO SCALE

FIGURE 1

PRELIMINARY
FOR AGENCY REVIEW

DO NOT SCALE 11x17 DRAWINGS

THEMAC RESOURCES

SCALE:	NONE	DATE
DESIGNED BY	SAM	DEC12
DRAWN BY	SAM	DEC12
CHECKED BY	TDL	JAN13
PROJECT MGR	RKZ	
CLIENT APPR.		

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COPPER FLAT PROJECT
SITE GENERAL
CIVIL
PROJECT AREA
SITE LOCATION PLAN

JOB NO. M3 PN-120085
DWG NO. 0000-CI-001
REV NO. P4
DATE 05 MAR 13

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

14788

FIGURE 2

EWRSP = EXISTING WASTE ROCK STOCKPILE
WRSP = WASTE ROCK STOCKPILE

SITE PLAN
SCALE: 1:500

500' 250' 0' 500' 1000'
1" = 500'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	1" = 500'	DATE
DESIGNED BY	SAM	DEC12
DRAWN BY	SAM	DEC12
CHECKED BY	TDL	JAN13
PROJECT MGR	RKZ	
CLIENT APPR.		

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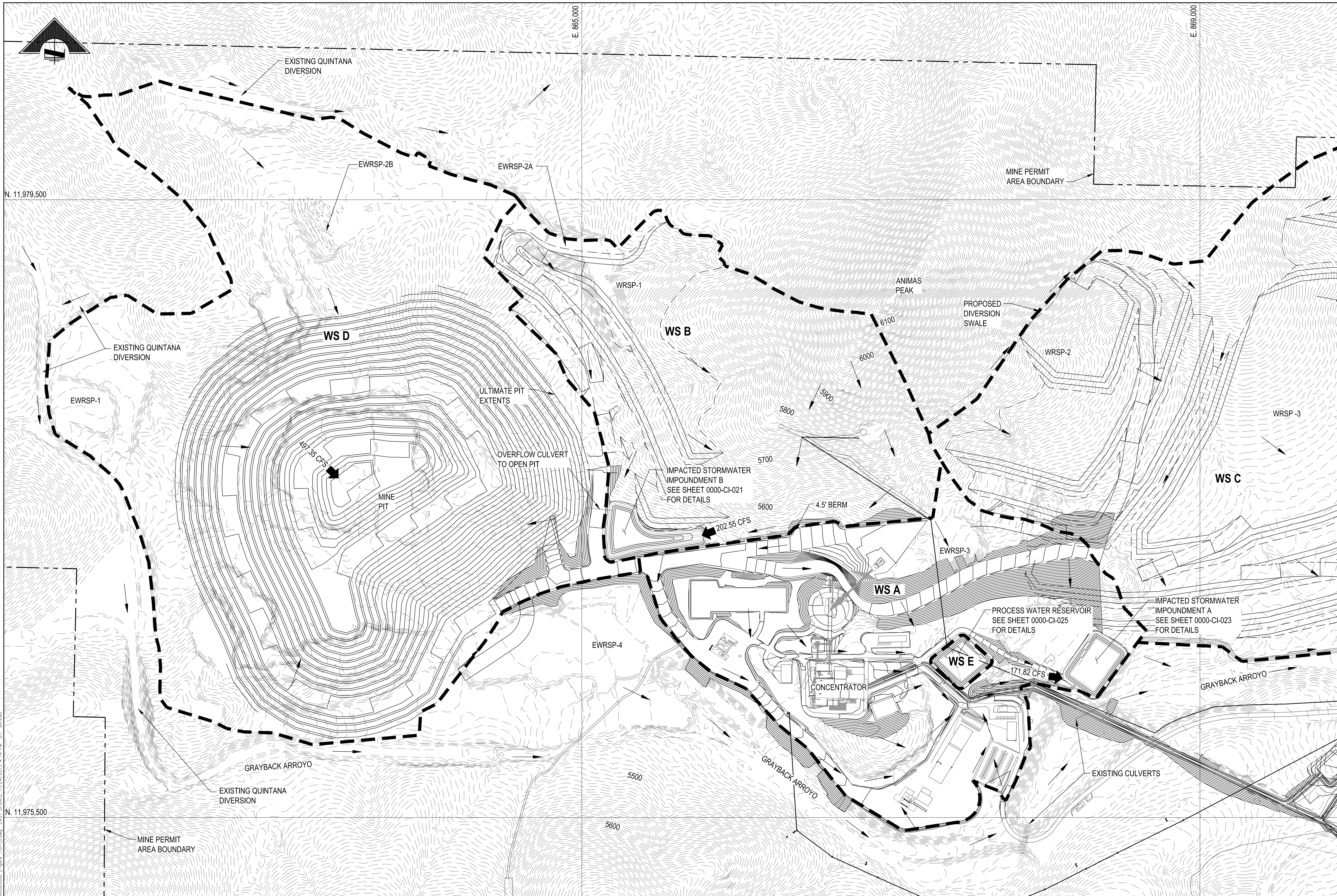
COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PROJECT AREA
PROPOSED SITE PLAN

JOB NO. M3 PN-120085
DWG NO. **FIGURE 11J-1**
REV NO. P18
DATE 16 NOV 15

14789



WATERSHED SUMMARY

WATERSHED ID	AREA (AC)	Q100 (CFS)
WS A	95.71	171.82
WS B	92.12	202.55
WS C	198.66	315.76
WS D	233.81	497.35
WS E	1.80	9.54

LEGEND:

- FLOW ARROW
- WATERSHED BOUNDARY
- RUNOFF CONCENTRATION POINT
- DRAINAGE SWALE

FIGURE 3

PLAN VIEW
SCALE: 1" = 300'

EWRSP = EXISTING WASTE ROCK STOCKPILE
WRSP = WASTE ROCK STOCKPILE

300 150 0 300 600
SCALE IN FEET
CONTOUR INTERVAL = 5FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THE MAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-021	IMPACTED STORMWATER IMPOUNDMENT A PLAN VIEW		
0000-CI-023	IMPACTED STORMWATER IMPOUNDMENT B PLAN VIEW		
0000-CI-025	PROCESS WATER RESERVOIR PLAN VIEW		
0000-CI-027	IMPACTED STORMWATER IMPOUNDMENT D PLAN VIEW		

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 300'		DATE
DESIGNED BY	SAM	NOV 12
DRAWN BY	SAM	NOV 12
CHECKED BY	TDL	NOV 12
PROJECT MGR	RKZ	NOV 12
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
MINE AREA
DEVELOPED WATERSHED AREAS

JOB NO. M3 PN-120085
DWG NO. **FIGURE 11J-3**
REV NO. P10
DATE 29 OCT 15

NOTES

1. POND SIDE SLOPES ARE 2:1 (H:V).
2. ALL CUT SLOPES ARE 1.5:1 (H:V). ALL FILL SLOPES ARE 2:1 (H:V).

SITE PLAN
SCALE: 1:200

FIGURE 4

200 100 0 200 400 600
SCALE IN FEET
CONTOUR INTERVAL = 5.0FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

DWG. NO.	TITLE
0000-CV-021	IMPACTED STORMWATER IMPOUNDMENT B, PLAN VIEW
0000-CV-023	IMPACTED STORMWATER IMPOUNDMENT A, PLAN VIEW
0000-CV-025	PROCESS WATER RESERVOIR PLAN VIEW
0000-CV-027	IMPACTED STORMWATER IMPOUNDMENT C, PLAN VIEW

SCALE:	AS NOTED	DATE
DESIGNED BY	SAM	JUL 15
DRAWN BY	SAM	JUL 15
CHECKED BY	JPN	JUL 15
PROJECT MGR	RKZ	JUL 15
CLIENT APPR.		

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COPPER FLAT PROJECT
JOB NO. M3 PN-120085
SITE GENERAL
CIVIL
STORMWATER & PROCESS WATER PONDS
OVERALL PLAN
DWG NO. 0000-CI-020
REV NO. P3
DATE 09 OCT 15

REFERENCES		REFERENCES		REVISIONS					REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE

SCALE:	1"= 100'	DATE
DESIGNED BY	SAM	FEB 13
DRAWN BY	SAM	FEB 13
CHECKED BY	TDL	FEB 13
PROJECT MGR	RKZ	FEB 13
CLIENT APPR.		

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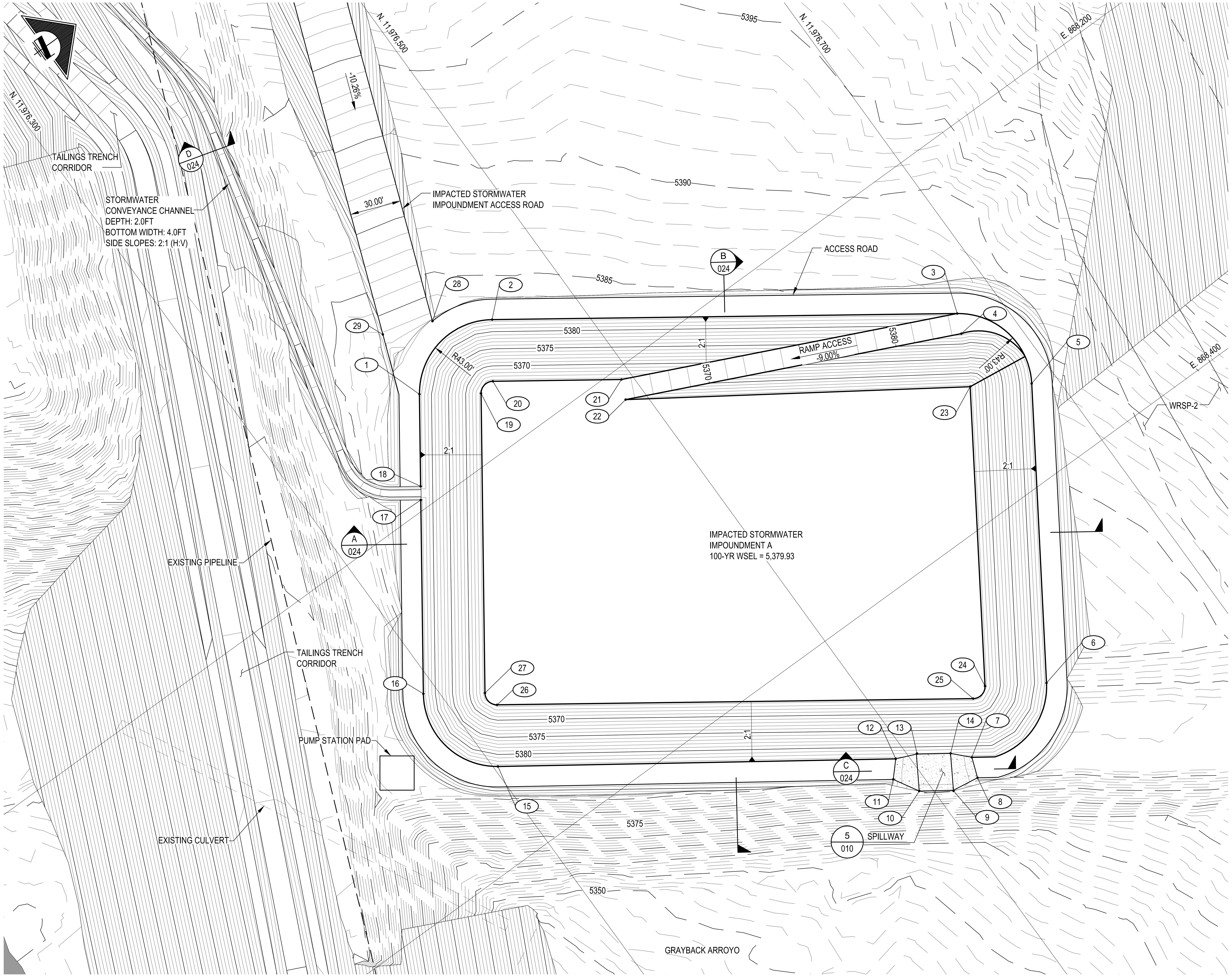
COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PROJECT AREA
PROCESS AREA SITE PLAN

JOB NO. M3 PN-120085
DWG NO. 0000-CI-007
REV NO. P9
DATE 09 OCT 15

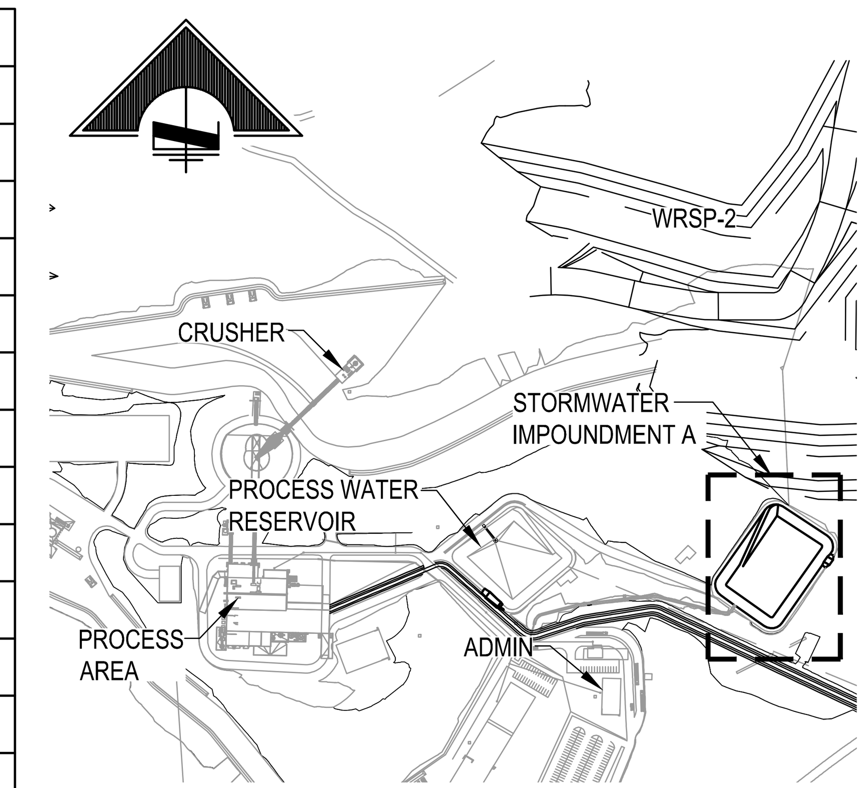
14792



PLAN

SCALE: 1" = 30'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
1	11976393.13	868144.02	5383.50
2	11976453.06	868133.72	5383.50
3	11976675.02	868290.57	5383.50
4	11976670.08	868301.51	5383.50
5	11976686.19	868349.21	5383.50
6	11976590.39	868495.80	5383.50
7	11976529.56	868505.28	5383.50
8	11976525.25	868516.90	5383.50
9	11976509.58	868514.53	5381.96
10	11976493.13	868503.16	5381.96
11	11976484.86	868488.73	5383.50
12	11976493.10	868479.86	5383.50
13	11976504.45	868484.69	5382.18
14	11976520.85	868496.13	5382.18
15	11976302.43	868346.86	5383.50
16	11976292.13	868286.93	5383.50
17	11976357.47	868194.48	5383.50
18	11976362.08	868187.95	5383.50
19	11976422.53	868164.79	5365.50
20	11976432.28	868163.12	5365.50
21	11976493.65	868206.42	5365.50
22	11976488.60	868217.31	5365.50
23	11976656.01	868329.59	5365.50
24	11976560.26	868476.10	5365.50
25	11976550.36	868477.99	5365.50
26	11976323.21	868317.47	5365.50
27	11976321.53	868307.71	5365.50
28	11976424.35	868113.97	5383.50
29	11976396.34	868103.21	5383.50



KEY MAP

SCALE: 1" = 500'

NOTES:

1. STORMWATER IMPOUNDMENT A IS INTENDED TO CAPTURE STORMWATER RUNOFF FROM THE MINE SITE PROCESS AREA.
2. STORMWATER IMPOUNDMENT IS SIZED TO CONTAIN THE 100-YR, 24-HR RAINFALL EVENT WITH A MINIMUM OF 2.0 FEET OF FREEBOARD.
3. STORMWATER IMPOUNDMENT SHALL BE SINGLE LINED WITH 60MIL HDPE LINER, PER DETAIL 4 ON SHEET 0000-CI-010, OR APPROVED EQUAL.
4. STORMWATER SPILLWAY IS DESIGNED FOR THE 25-YR, 24-HR RAINFALL EVENT AT MINIMUM.
5. SPILLWAY IS DESIGNED TO ALLOW FOR VEHICULAR TRAFFIC.

IMPOUNDMENT SUMMARY		
CAPACITY AT 100-YR WSEL	976,772	CU-FT
ULTIMATE CAPACITY	1,280,516	CU-FT

FIGURE 6

30 15 0 30 60

SCALE IN FEET
CONTOUR INTERVAL = 1.0FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-024	IMPACTED STORMWATER IMPOUNDMENT A, SECTIONS		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	AS NOTED	DATE
DESIGNED BY	SAM	JUN 15
DRAWN BY	SAM	JUN 15
CHECKED BY	JPN	AUG 15
PROJECT MGR	RKZ	AUG 15
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT A
PLAN VIEW

JOB NO. M3 PN-120085
DWG NO. 0000-CI-023
REV NO. P3
DATE 09 OCT 15

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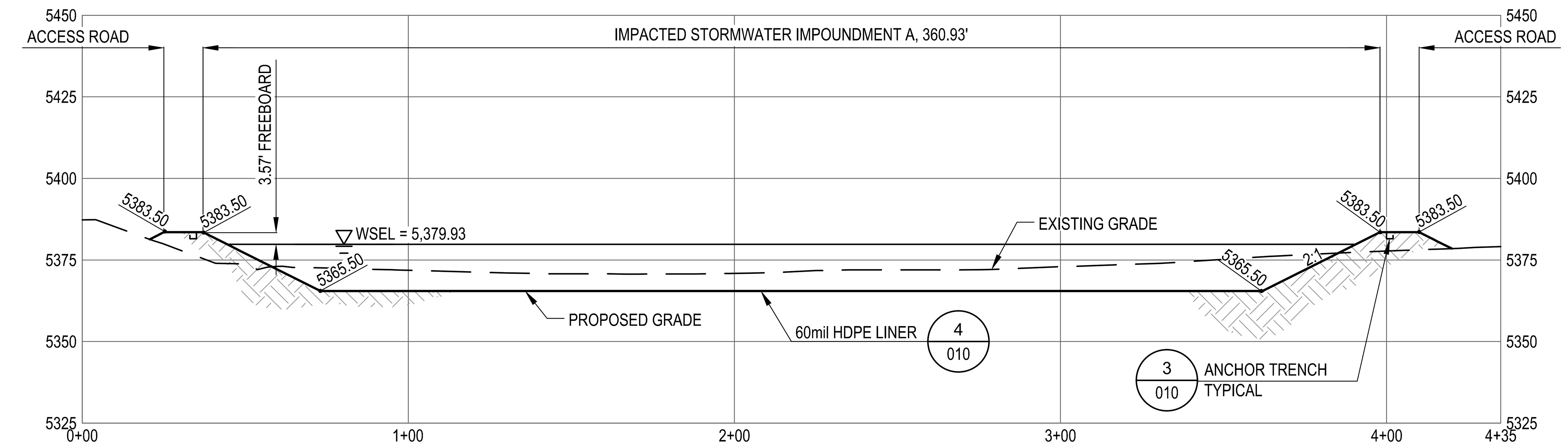
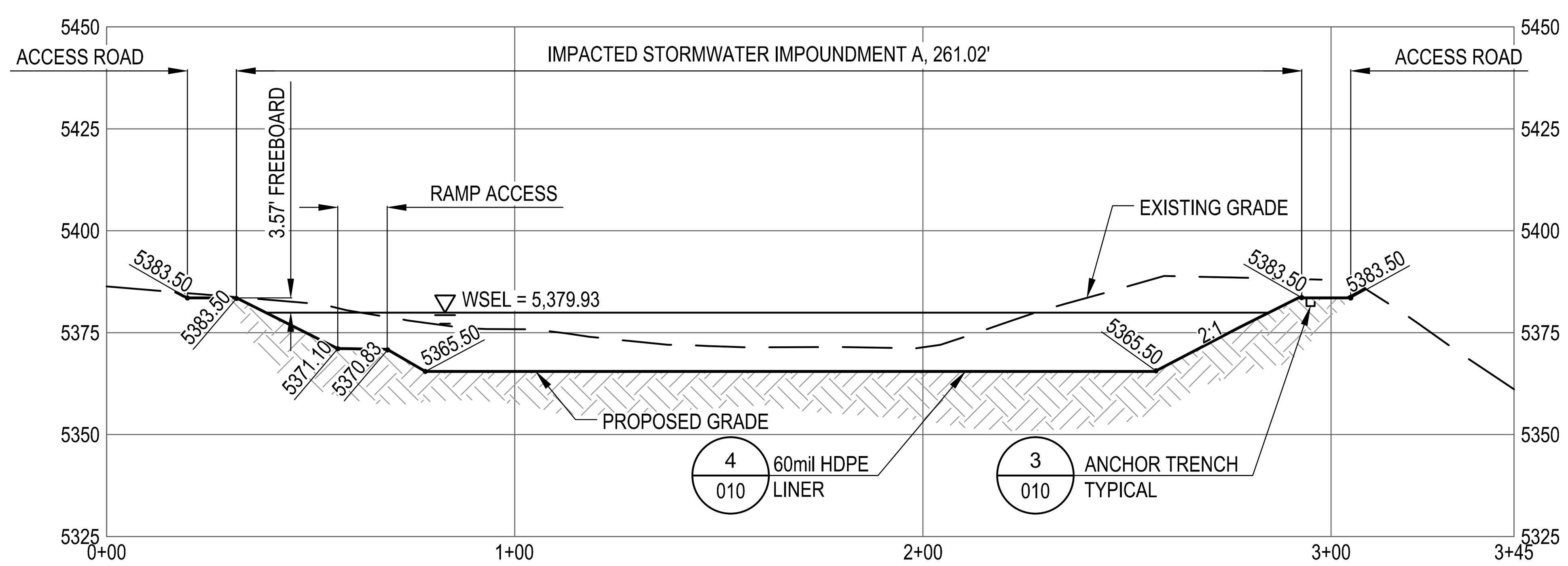


SECTION A 023
SCALE: 1" = 30'



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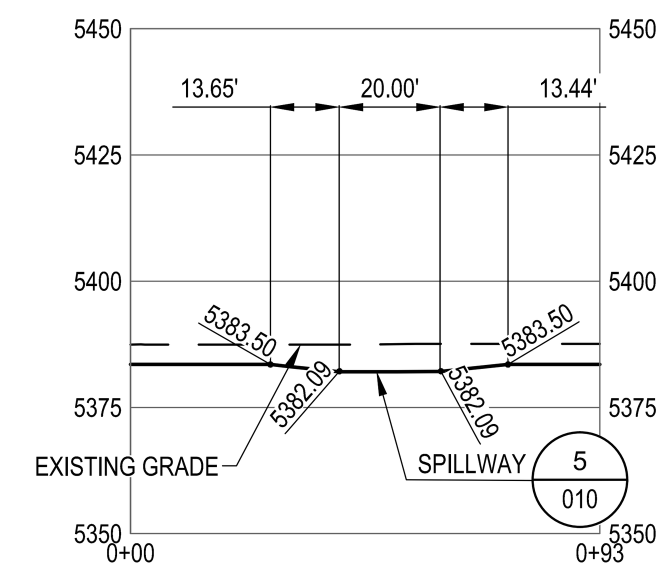
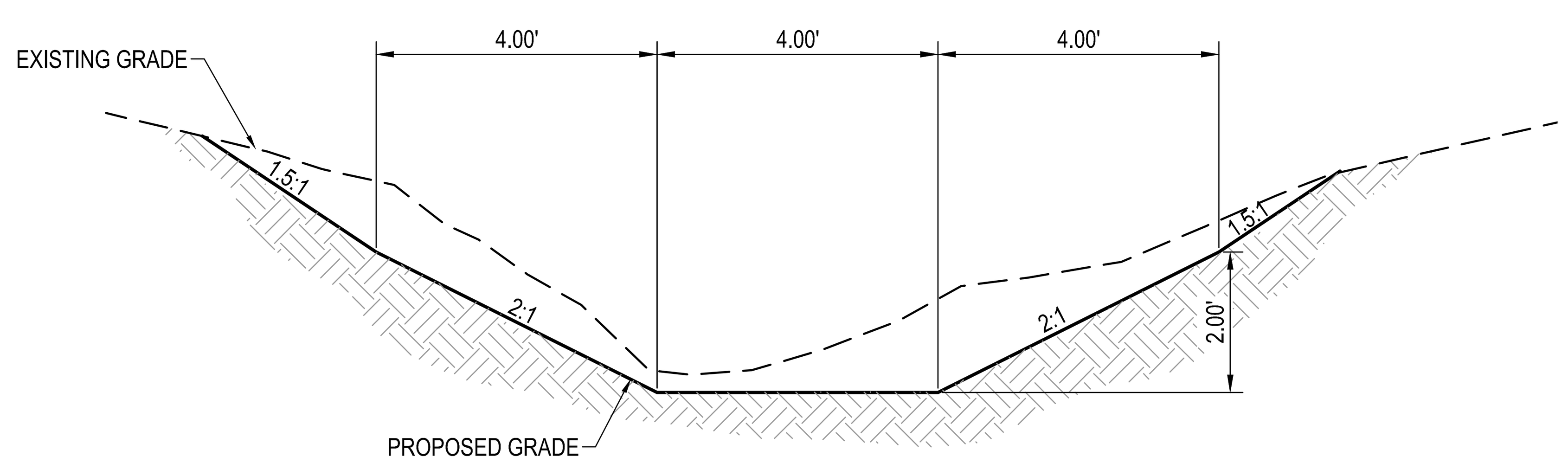


SECTION C 023
SCALE: 1" = 30'



SECTION D 023
SCALE: NTS

NOTES:

1. STORMWATER CONVEYANCE CHANNEL WILL BE DESIGNED TO CONVEY, AT A MINIMUM, THE PEAK FLOW FROM A 100 YEAR RETURN INTERVAL STORM EVENT WHILE PRESERVING NO LESS THAN 6 INCHES OF FREEBOARD.

2. CONVEYANCE STRUCTURE WILL BE DESIGNED TO MINIMIZE PONDING AND INFILTRATION OF STORMWATER.

FIGURE 7

30 15 0 30 60
SCALE IN FEET
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

DWG. NO.	TITLE
0000-CI-023	IMPACTED STORMWATER IMPOUNDMENT A, PLAN VIEW
0000-CI-010	STANDARD DETAILS SHEET 3

REFERENCES | REVISIONS: NO. | DESCRIPTION | BY | APP'D | DATE | CLIENT

SCALE:	AS NOTED	DATE
DESIGNED BY	SAM	JUN 15
DRAWN BY	SAM	JUN 15
CHECKED BY	JPN	AUG 15
PROJECT MGR	RKZ	AUG 15
CLIENT APPR.		

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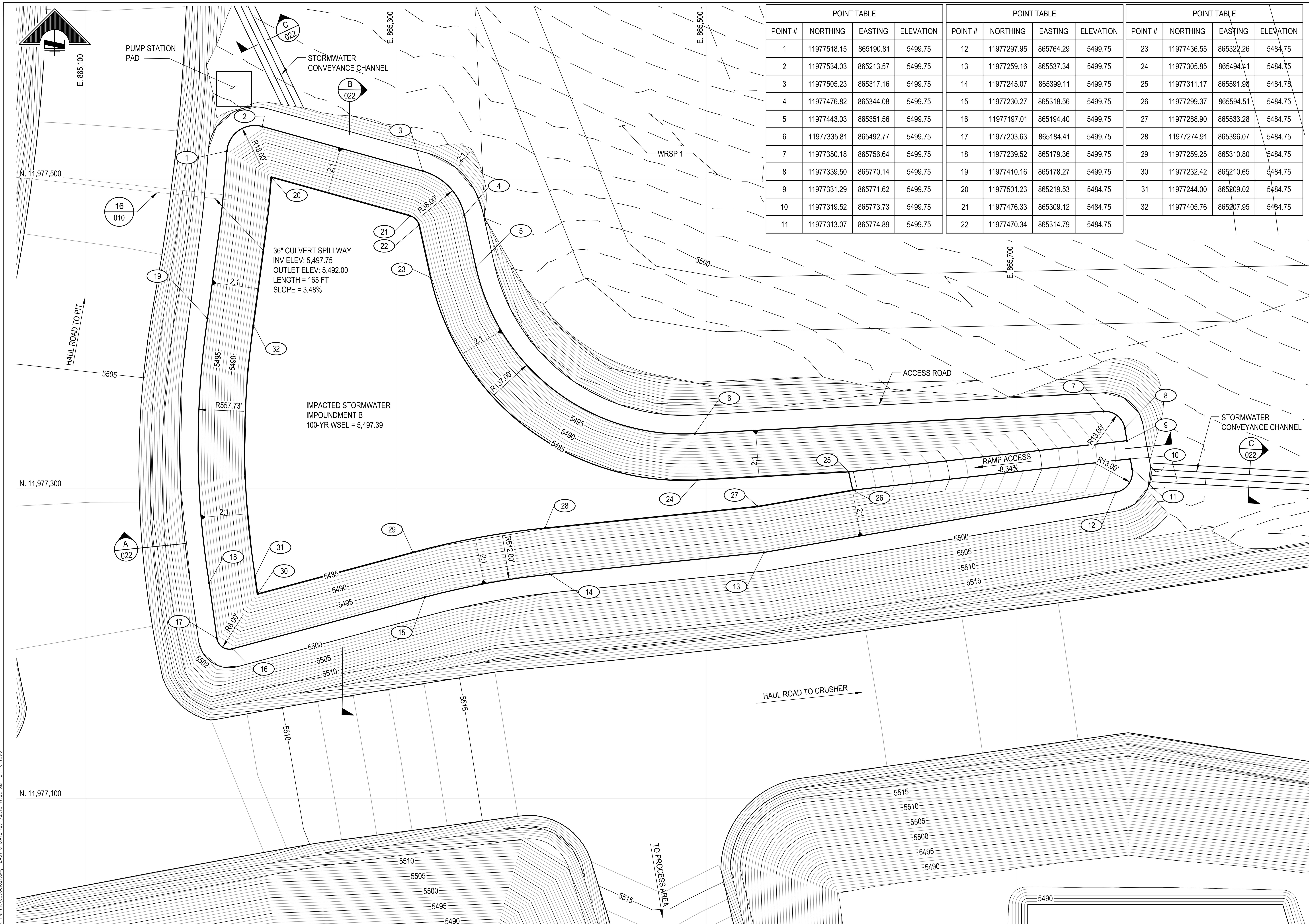
THEMAC RESOURCES

COPPER FLAT PROJECT

GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT A
SECTIONS

JOB NO. M3 PN-120085
DWG NO. 0000-CI-024
REV NO. P3
DATE 09 OCT 15

14794



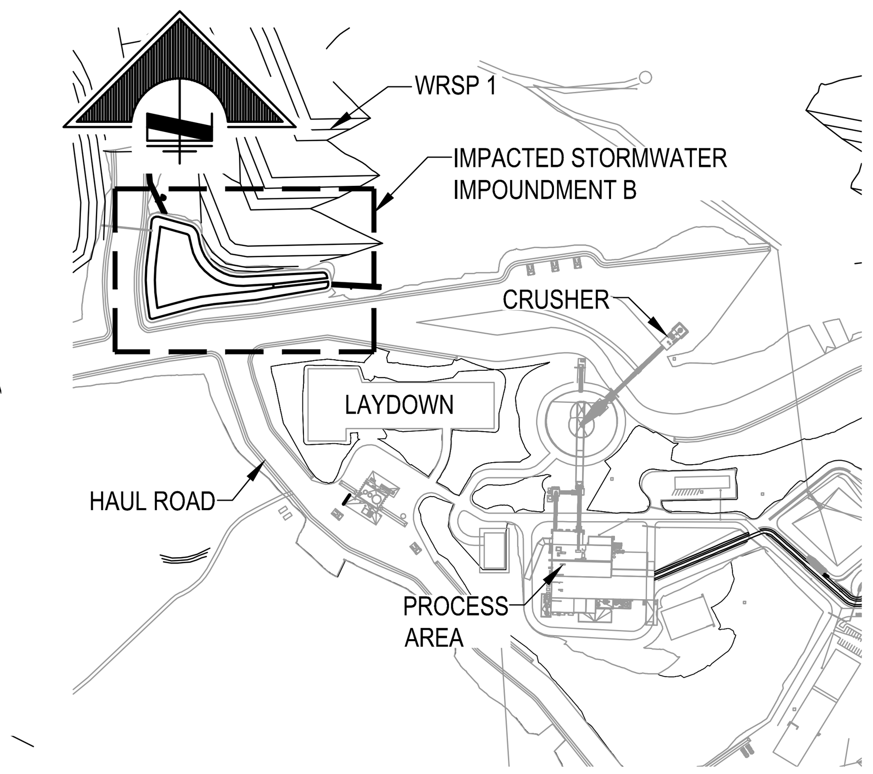
PLAN

SCALE: 1" = 30'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
1	11977518.15	865190.81	5499.75
2	11977534.03	865213.57	5499.75
3	11977505.23	865317.16	5499.75
4	11977476.82	865344.08	5499.75
5	11977443.03	865351.56	5499.75
6	11977335.81	865492.77	5499.75
7	11977350.18	865756.64	5499.75
8	11977339.50	865770.14	5499.75
9	11977331.29	865771.62	5499.75
10	11977319.52	865773.73	5499.75
11	11977313.07	865774.89	5499.75

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
12	11977297.95	865764.29	5499.75
13	11977259.16	865537.34	5499.75
14	11977245.07	865399.11	5499.75
15	11977230.27	865318.56	5499.75
16	11977197.01	865194.40	5499.75
17	11977203.63	865184.41	5499.75
18	11977239.52	865179.36	5499.75
19	11977410.16	865178.27	5499.75
20	11977501.23	865219.53	5484.75
21	11977476.33	865309.12	5484.75
22	11977470.34	865314.79	5484.75

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
23	11977436.55	865322.26	5484.75
24	11977305.85	865494.41	5484.75
25	11977311.17	865591.98	5484.75
26	11977299.37	865594.51	5484.75
27	11977288.90	865533.28	5484.75
28	11977274.91	865396.07	5484.75
29	11977259.25	865310.80	5484.75
30	11977232.42	865210.65	5484.75
31	11977244.00	865209.02	5484.75
32	11977405.76	865207.95	5484.75



KEY MAP

SCALE: 1" = 500'

NOTES:

1. STORMWATER IMPOUNDMENT B IS INTENDED TO CAPTURE STORMWATER RUNOFF FROM THE WASTE ROCK STOCK PILE 1 (WRSP-1).
2. STORMWATER IMPOUNDMENT IS SIZED TO CONTAIN THE 100-YR, 24-HR RAINFALL EVENT WITH A MINIMUM OF 2.0 FEET OF FREEBOARD.
3. STORMWATER CULVERT SPILLWAY IS DESIGNED FOR THE 25-YR, 24HR RAINFALL EVENT AT MINIMUM.
4. STORMWATER IMPOUNDMENT SHALL BE SINGLE LINED WITH 60mil HDPE LINER PER DETAIL 4 ON DWG. 0000-CI-010, OR APPROVED EQUIVALENT.

IMPOUNDMENT SUMMARY		
CAPACITY AT 100-YR WSEL	748,445	CU-FT
ULTIMATE CAPACITY	913,160	CU-FT

FIGURE 8

30 15 0 30 60
SCALE IN FEET
CONTOUR INTERVAL = 1.0FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THE MAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-022	IMPACTED STORMWATER IMPOUNDMENT B SECTIONS		
0000-CI-005	STANDARD DETAILS SHEET 2		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	AS NOTED	DATE
DESIGNED BY	SAM	JUN 15
DRAWN BY	SAM	JUN 15
CHECKED BY	JPN	JUN 15
PROJECT MGR	RKZ	JUN 15
CLIENT APPR.		

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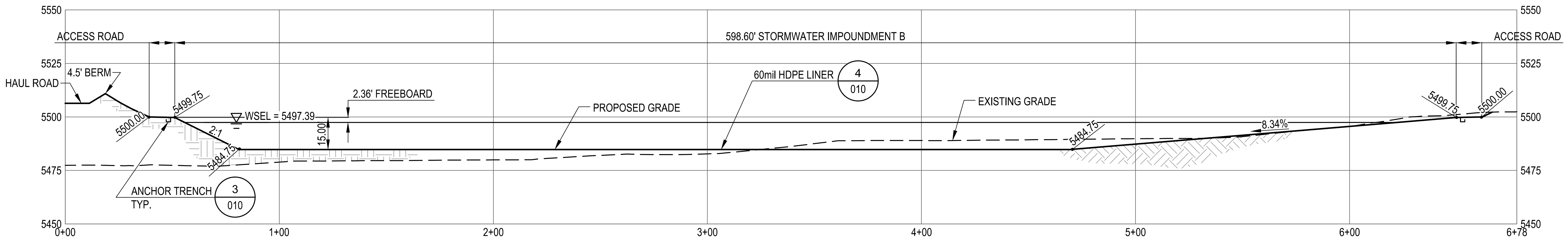
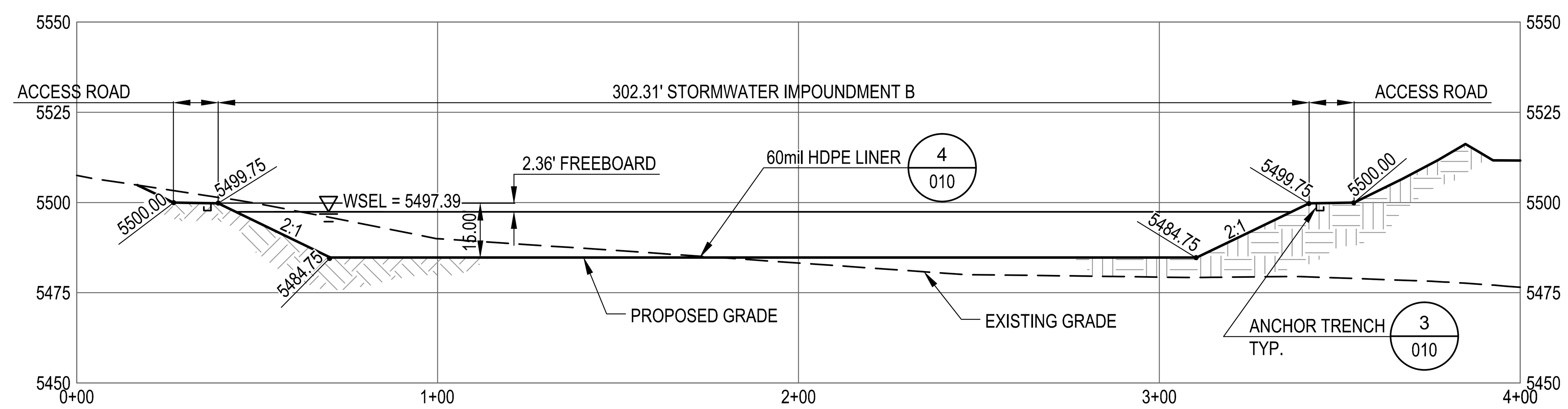
COPPER FLAT PROJECT

GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT B
PLAN VIEW

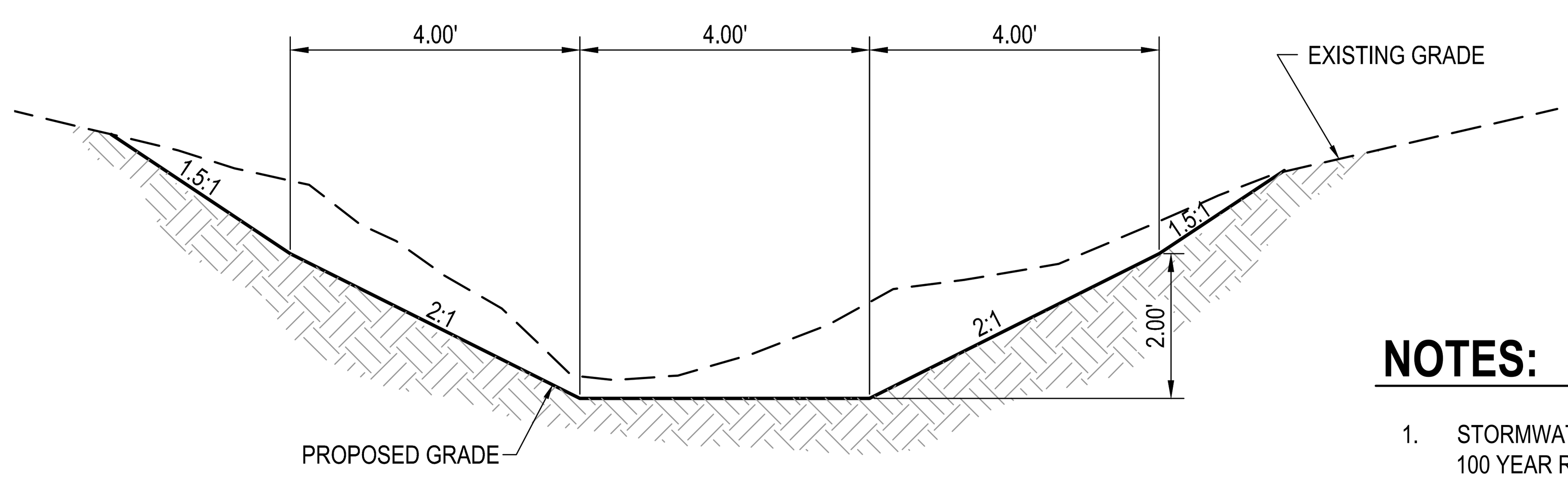
JOB NO. M3 PN-120085
DWG NO. 0000-CI-021
REV NO. P4
DATE 27 OCT 15



SECTION A 021
SCALE: 1" = 30'



SECTION B 021
SCALE: 1" = 30'



SECTION C 021
SCALE: 1" = 30'

NOTES:

1. STORMWATER CONVEYANCE CHANNEL WILL BE DESIGNED TO CONVEY, AT A MINIMUM, THE PEAK FLOW FROM A 100 YEAR RETURN INTERVAL STORM EVENT WHILE PRESERVING NO LESS THAN 6 INCHES OF FREEBOARD.
2. CONVEYANCE STRUCTURE WILL BE DESIGNED TO MINIMIZE PONDING AND INFILTRATION OF STORMWATER.

FIGURE 9

30 15 0 30 60
SCALE IN FEET
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
NOT FOR CONSTRUCTION

THEMAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-021	IMPACTED STORMWATER IMPOUNDMENT B PLAN VIEW		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS											
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: AS NOTED		DATE
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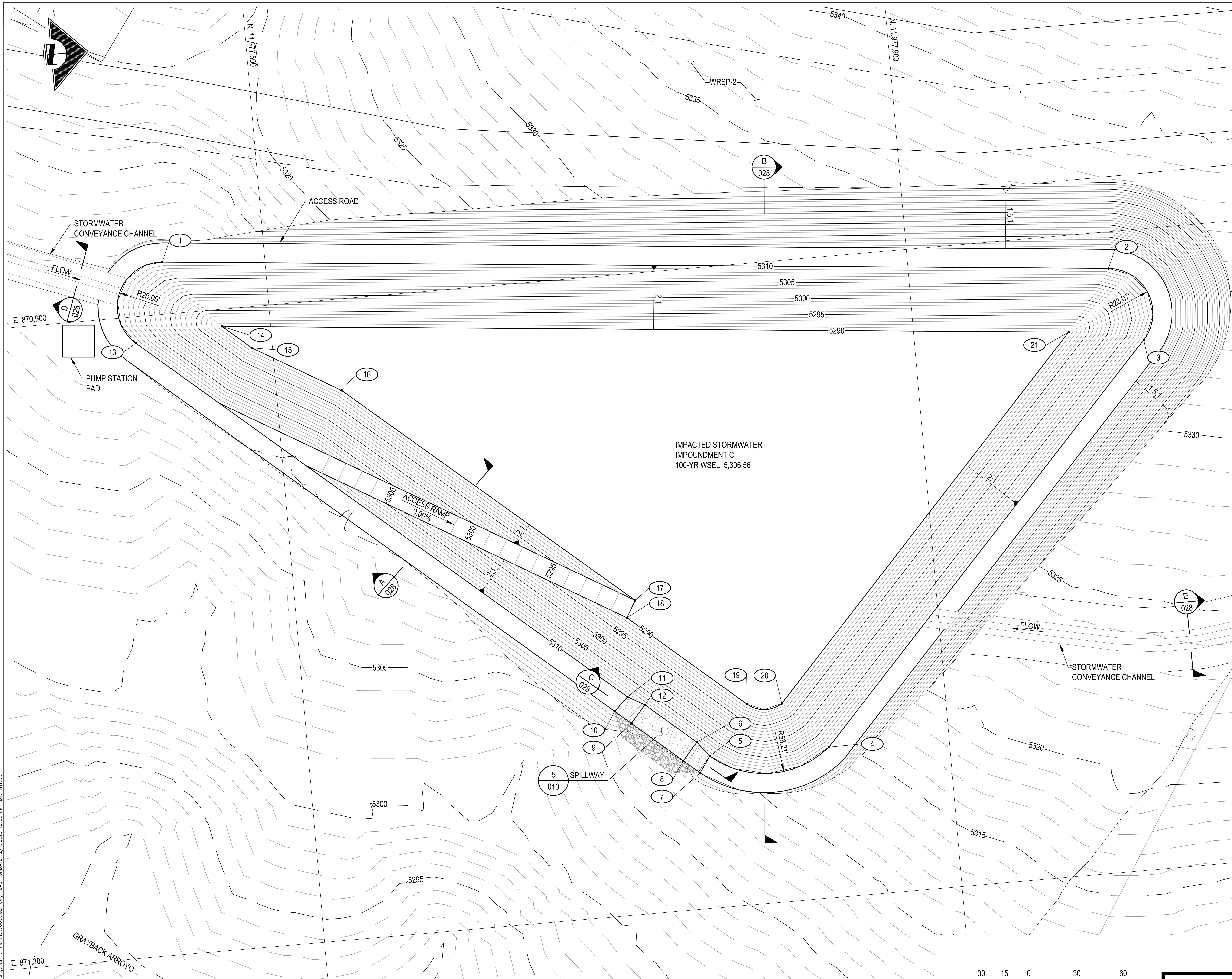
GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT B
SECTIONS

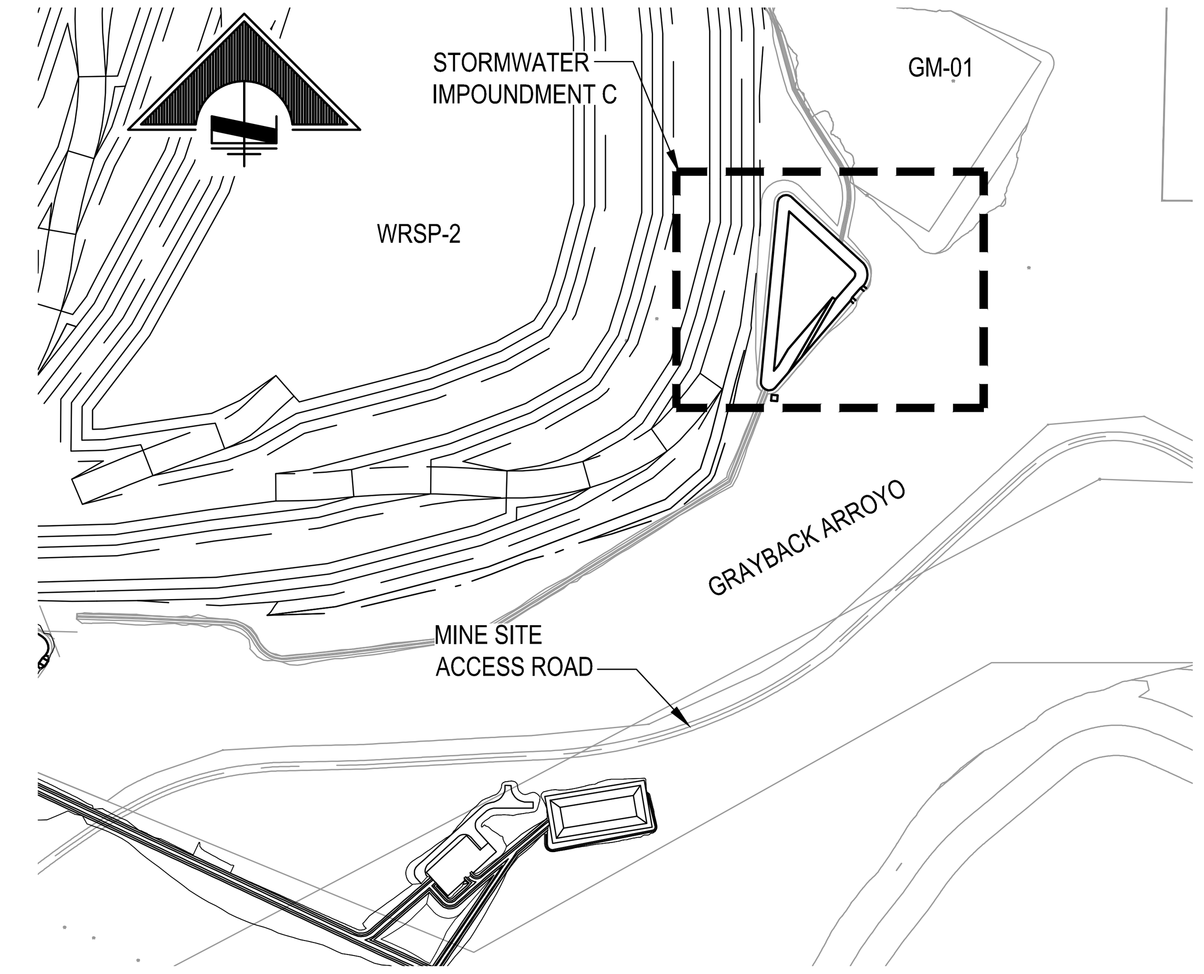
JOB NO. M3 PN-120085
DWG NO. 0000-CI-022
REV NO. P3
DATE 09 OCT 15



PLAN

SCALE: 1" = 30'

SCALE IN FEET
CONTOUR INTERVAL = 1.0FT
DO NOT SCALE 11x17 DRAWINGS



KEY MAP

SCALE: 1" = 500'

NOTES:

1. IMPACTED STORMWATER IMPOUNDMENT C IS INTENDED TO COLLECT AND RETAIN STORMWATER RUNOFF FROM WASTE ROCK STOCKPILE 2 (WRSP-2) AND WASTE ROCK STOCKPILE 3 (WRSP-3).
2. STORMWATER IMPOUNDMENT IS SIZED TO CONTAIN THE 100-YR, 24-HR RAINFALL EVENT WITH A MINIMUM OF 2.0 FEET OF FREEBOARD.
3. STORMWATER IMPOUNDMENT SHALL BE SINGLE LINED WITH 60mil HDPE PER DETAIL 4 ON SHEET 0000-CI-010, OR APPROVED EQUIVALENT.
4. STORMWATER SPILLWAY IS DESIGNED FOR THE 25-YR, 24-HR RAINFALL EVENT AT MINIMUM.
5. SPILLWAY IS DESIGNED TO ALLOW FOR VEHICULAR TRAFFIC.

IMPOUNDMENT SUMMARY

CAPACITY AT 100-YR WSEL	1,405,507	CU-FT
ULTIMATE CAPACITY	1,802,067	CU-FT

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION
1	11977436.02	870867.41	5310.00
2	11978024.85	870922.90	5310.00
3	11978042.98	870969.57	5310.00
4	11977824.76	871205.86	5310.00
5	11977750.03	871205.03	5310.00
6	11977742.72	871195.59	5308.81
7	11977743.12	871214.89	5310.00
8	11977733.33	871206.49	5308.67
9	11977703.03	871180.38	5308.67
10	11977693.25	871171.96	5310.00
11	11977702.00	871163.65	5310.00

POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION
12	11977712.41	871169.49	5308.81
13	11977415.12	870916.50	5310.00
14	11977469.75	870910.76	5290.00
15	11977487.16	870925.76	5290.00
16	11977540.59	870957.08	5290.00
17	11977712.07	871103.95	5290.00
18	11977706.00	871114.30	5290.00
19	11977776.14	871174.73	5290.00
20	11977797.74	871176.15	5290.00
21	11977996.59	870960.41	5290.00

FIGURE 10

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-028	IMPACTED STORMWATER IMPOUNDMENT C SECTIONS		
0000-CI-005	STANDARD DETAILS SHEET 2		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

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PROJECT MGR	RKZ	AUG 15
CLIENT APPR.		

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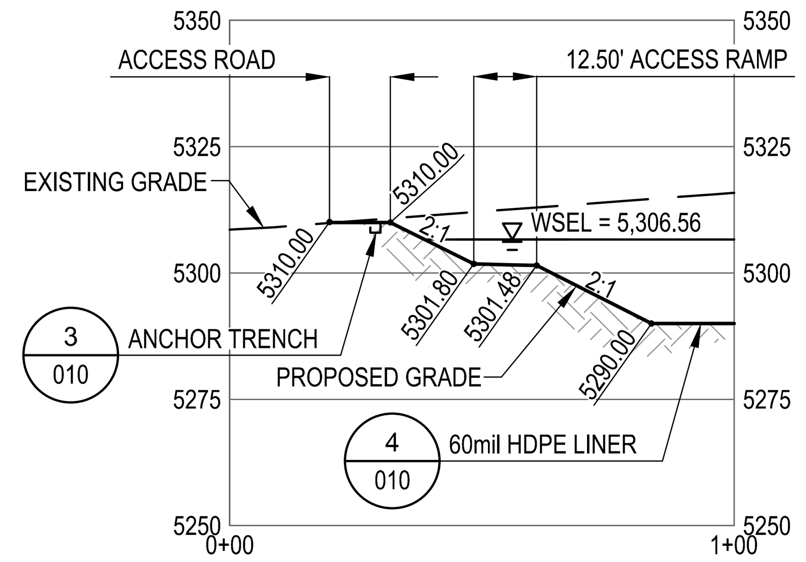
JOB NO. M3 PN-120085

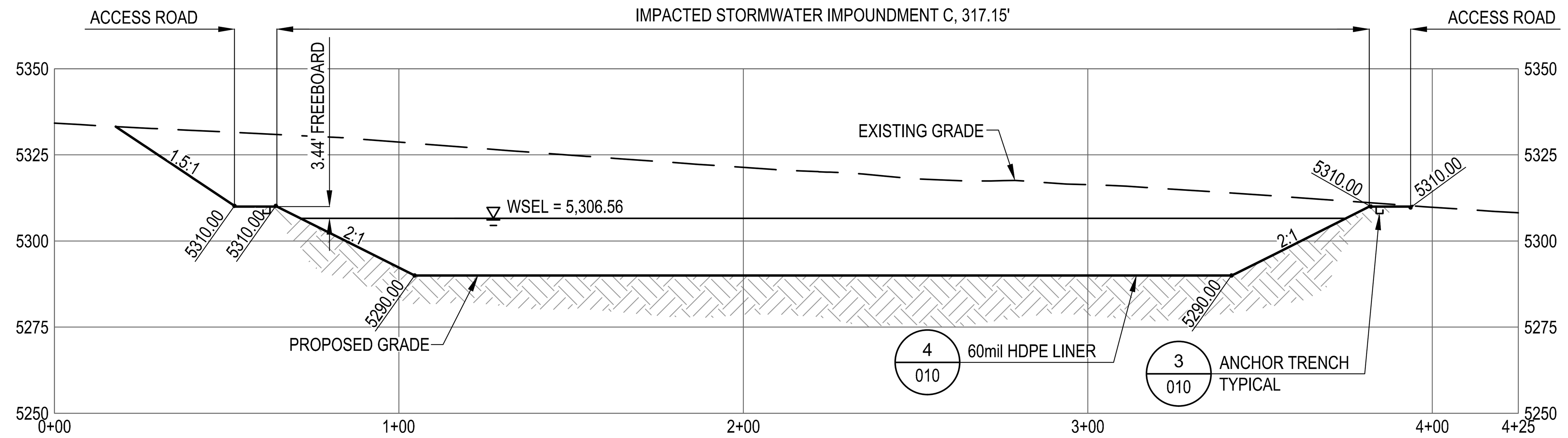
GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT C
PLAN VIEW

DWG NO. **0000-CI-027**
REV NO. P3
DATE 09 OCT 15

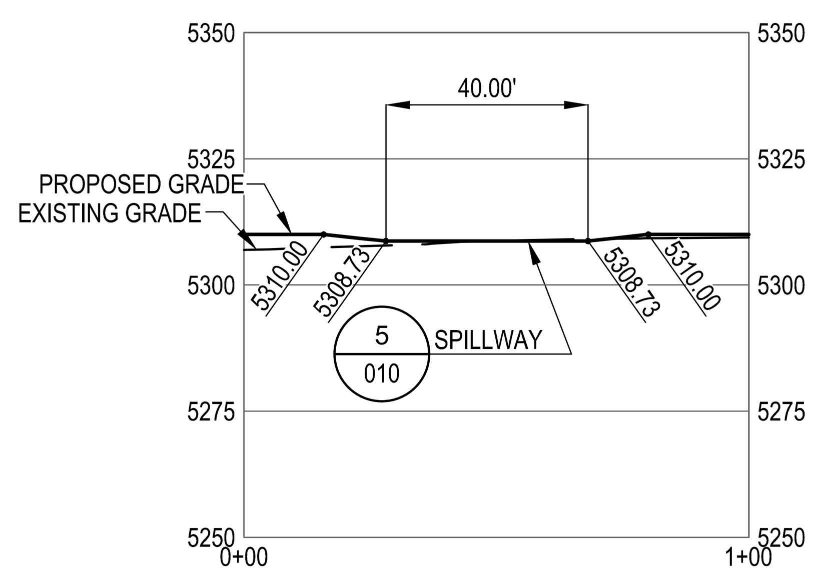
File: P:\2012\120085\CIVIL (544)\544.2 Dwgs\Figures for Permit\0000027.dwg LAST UPDATE:12/1/2015 12:53 PM BY: JN1690



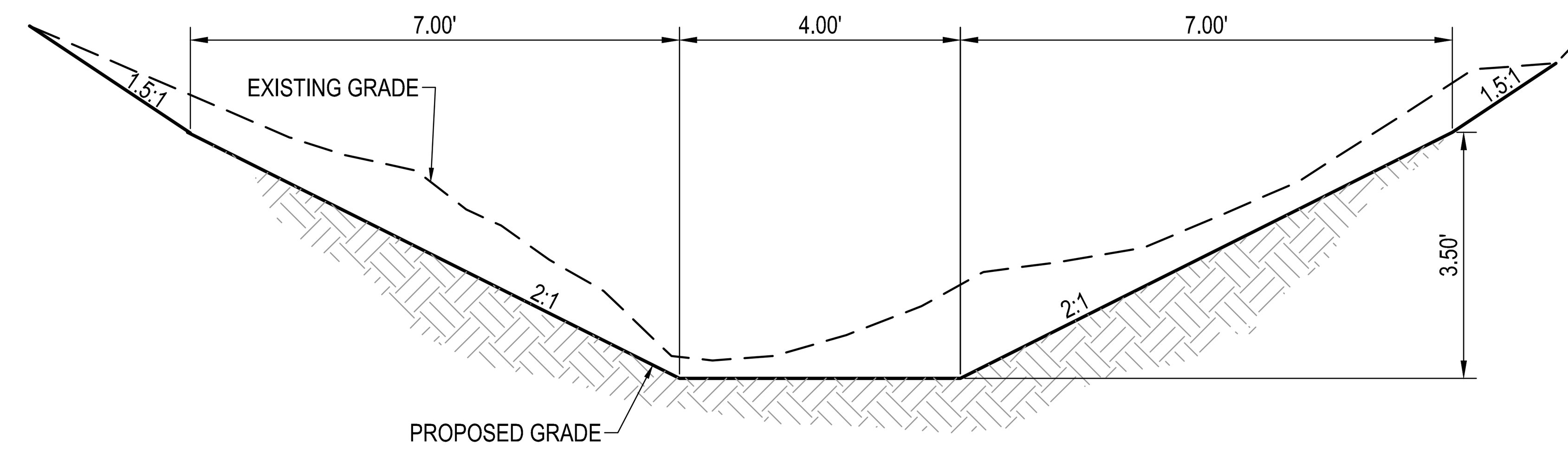
SECTION A 027
SCALE: 1" = 30'



SECTION B 027
SCALE: 1" = 30'



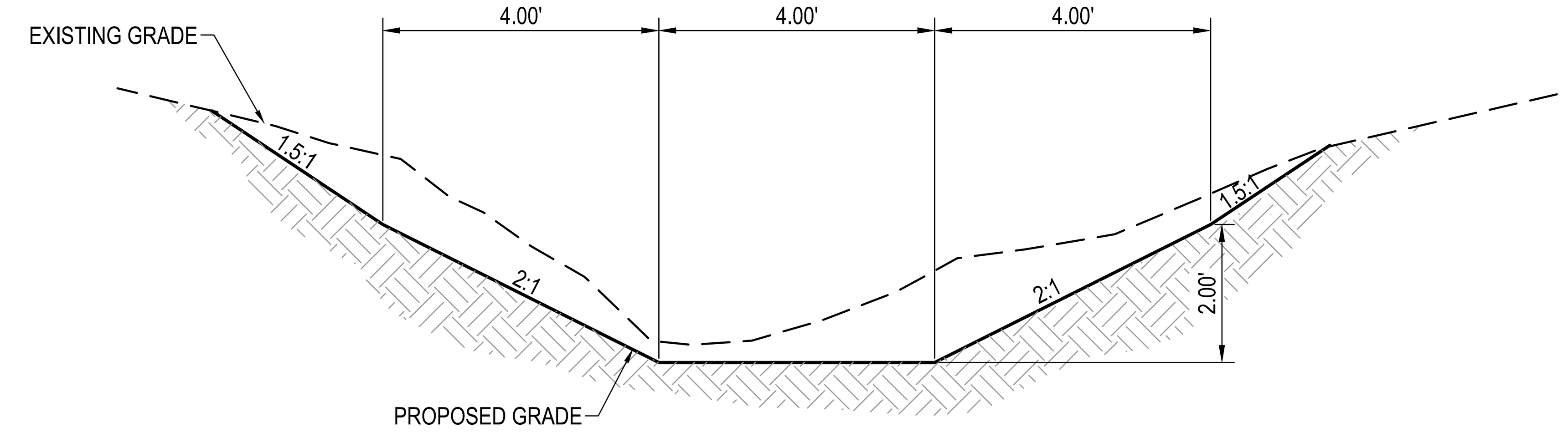
SECTION C 027
SCALE: 1" = 30'



SECTION D 027
SCALE: NTS

NOTES:

1. STORMWATER CONVEYANCE CHANNEL WILL BE DESIGNED TO CONVEY, AT A MINIMUM, THE PEAK FLOW FROM A 100 YEAR RETURN INTERVAL STORM EVENT WHILE PRESERVING NO LESS THAN 6 INCHES OF FREEBOARD.
2. CONVEYANCE STRUCTURE WILL BE DESIGNED TO MINIMIZE PONDING AND INFILTRATION OF STORMWATER.



SECTION E 027
SCALE: NTS

FIGURE 11

30 15 0 30 60
SCALE IN FEET
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-027	IMPACTED STORMWATER IMPOUNDMENT C, PLAN VIEW		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

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PROJECT MGR	RKZ	
CLIENT APPR.		

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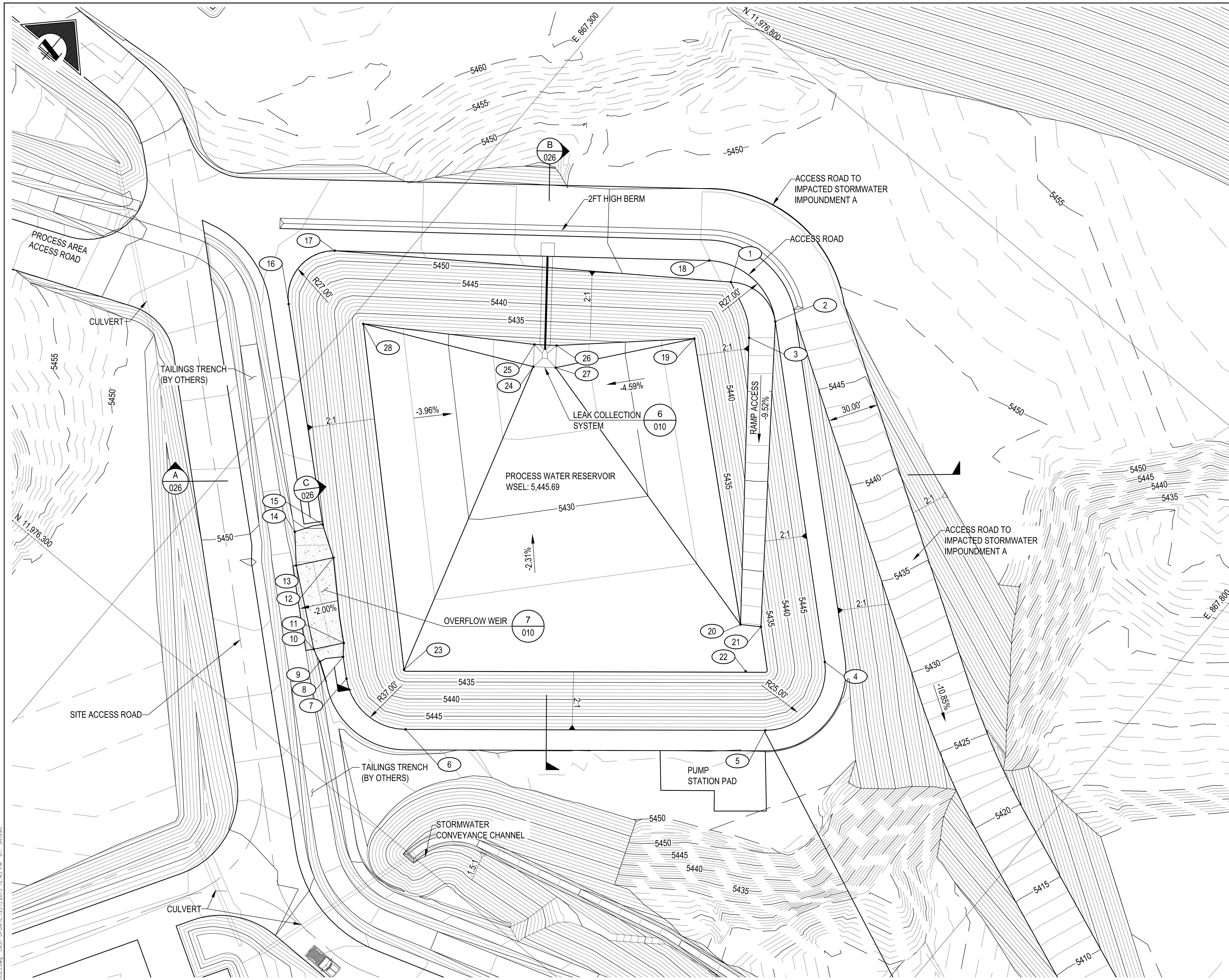
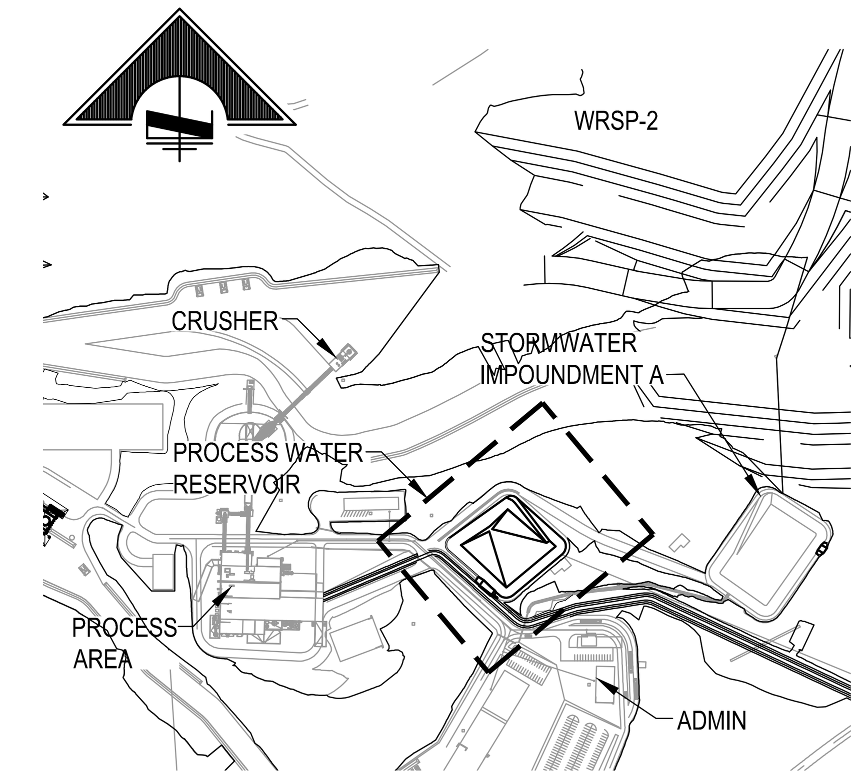
GENERAL SITE
CIVIL
IMPACTED STORMWATER IMPOUNDMENT C
SECTIONS

JOB NO. M3 PN-120085
DWG NO. 0000-CI-028
REV NO. P3
DATE 09 OCT 15



PLAN
SCALE: 1" = 30'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
1	11976677.01	867456.22	5448.90
2	11976676.01	867490.99	5448.90
3	11976658.90	867485.30	5448.00
4	11976525.20	867641.13	5444.30
5	11976488.75	867638.96	5448.61
6	11976354.25	867478.64	5448.90
7	11976354.80	867433.15	5448.90
8	11976363.32	867423.40	5448.90
9	11976352.45	867414.83	5448.90
10	11976355.69	867407.41	5447.80
11	11976369.69	867418.41	5448.16
12	11976404.09	867381.76	5448.24
13	11976386.62	867368.04	5447.80
14	11976401.16	867354.74	5449.81
15	11976414.90	867364.55	5450.22
16	11976500.94	867266.34	5452.92
17	11976542.17	867266.96	5452.92
18	11976678.55	867438.45	5449.02
19	11976637.98	867461.15	5431.90
20	11976519.41	867579.10	5431.84
21	11976526.05	867589.10	5431.90
22	11976508.16	867609.15	5431.90
23	11976380.38	867455.56	5431.90
24	11976564.87	867399.57	5428.10
25	11976575.19	867391.67	5428.10
26	11976583.10	867401.99	5428.10
27	11976572.78	867409.89	5428.10
28	11976520.09	867307.24	5431.90



KEY MAP
SCALE: 1" = 500'

NOTES:

1. THE PROCESS WATER RESERVOIR IS INTENDED TO RETAIN PROCESS WATER, STORMWATER THAT FALLS DIRECTLY ON THE POND SURFACE, AND STORMWATER TRANSFERED FROM OTHER IMPACTED STORMWATER IMPOUNDMENTS.
2. THE PROCESS WATER RESERVOIR IS SIZED TO RETAIN 12 HRS OF 7,200GPM INFLOW AND THE 100-YR, 24-HR RAINFALL EVENT PLUS 2 FEET OF FREEBOARD.
3. THE PROCESS WATER WATER RESERVOIR SHALL BE DOUBLE LINED WITH 60mil HDPE PER DETAIL 2 SHEET 0000-CI-010.
4. THE PROCESS WATER RESERVOIR OVERFLOW WEIR IS DESIGNED FOR THE 25-YR, 24-HR RAINFALL EVENT AT CAPACITY (SEE NOTE 2) AT MINIMUM. THE WEIR CONVEYS PROCESS WATER INTO THE TAILINGS TRENCH AND TO THE TAILINGS IMPOUNDMENT.
5. OVERFLOW WEIR IS DESIGNED TO ALLOW FOR VEHICULAR TRAFFIC.

IMPOUNDMENT SUMMARY		
CAPACITY AT 100-YR WSEL	726,365	CU-FT
ULTIMATE CAPACITY	937,998	CU-FT

FIGURE 12

30 15 0 30 60
SCALE IN FEET
CONTOUR INTERVAL = 1.0FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-026	PROCESS WATER RESERVOIR SECTIONS		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

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PROJECT MGR	RKZ	AUG 15
CLIENT APPR.		

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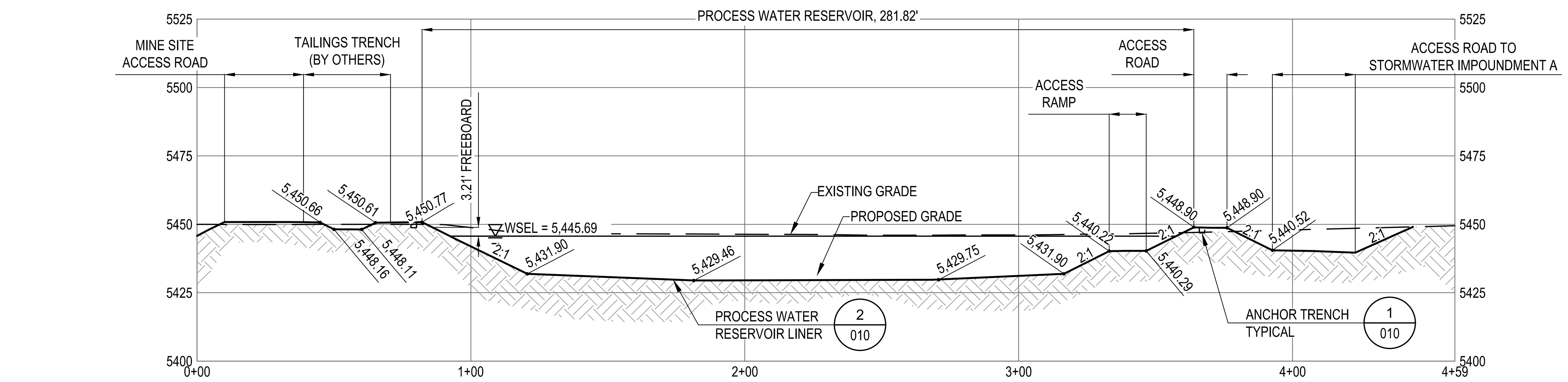
JOB NO. M3 PN-120085
GENERAL SITE CIVIL PROCESS WATER RESERVOIR PLAN VIEW
DWG NO. **0000-CI-025**
REV NO. P3 DATE 09 OCT 15



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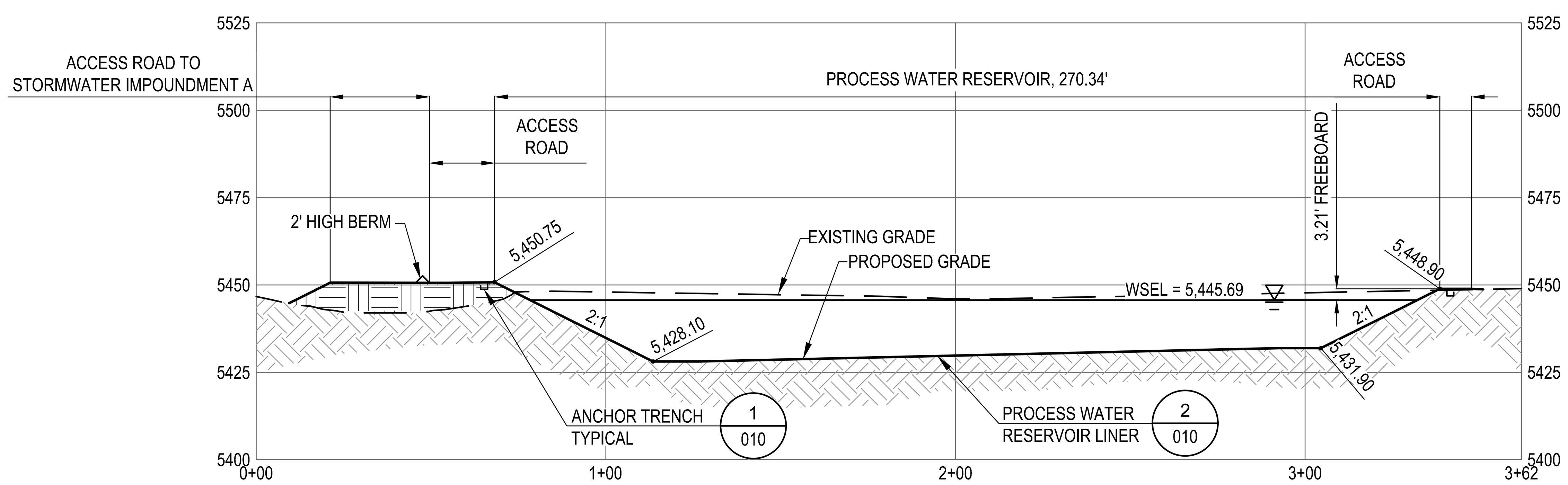
SCALE: 1" = 30'



SECTION B 025
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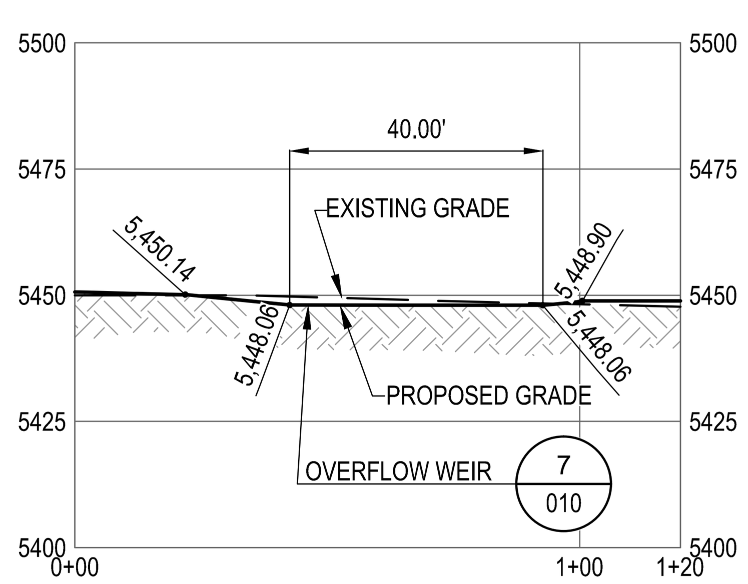

SECTION C 025
SCALE: 1" = 30'

30 15 0 30 60
SCALE IN FEET
DO NOT SCALE 11x17 DRAWINGS

FIGURE 13

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

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DWG. NO.	TITLE	DWG. NO.	TITLE
0000-CI-025	PROCESS WATER RESERVOIR PLAN VIEW		
0000-CI-010	STANDARD DETAILS SHEET 3		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

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GENERAL SITE
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PROCESS WATER RESERVOIR
SECTIONS

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DWG NO. **0000-CI-026**
REV NO. P3
DATE 09 OCT 15

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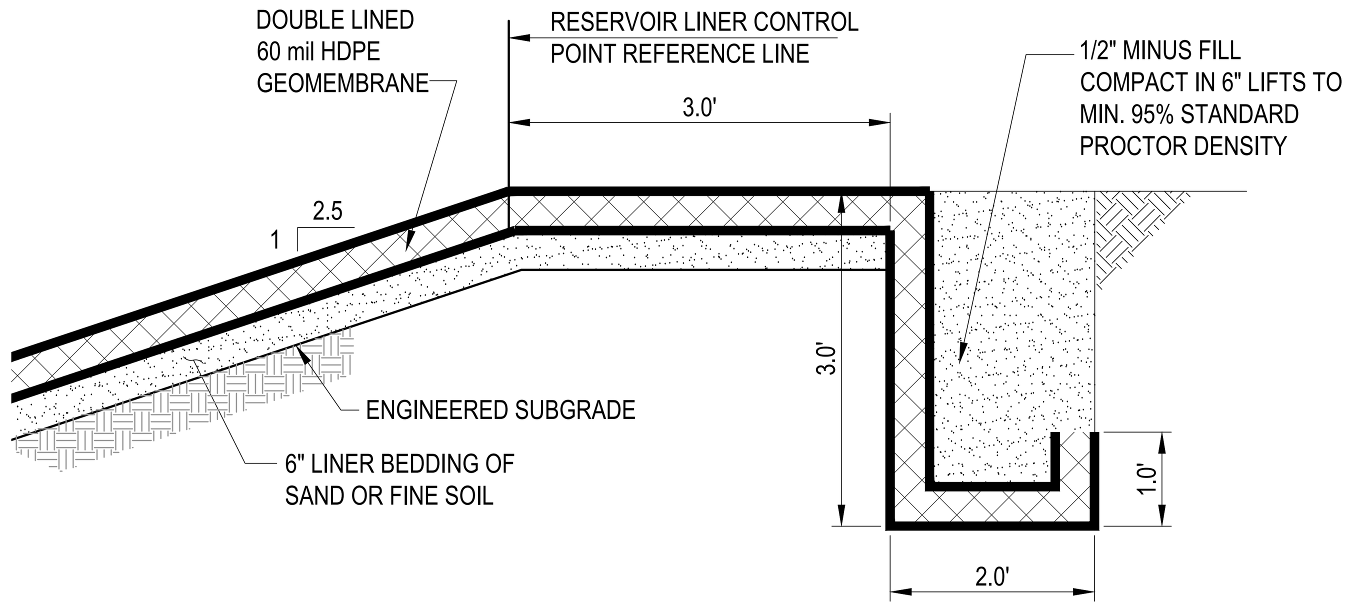
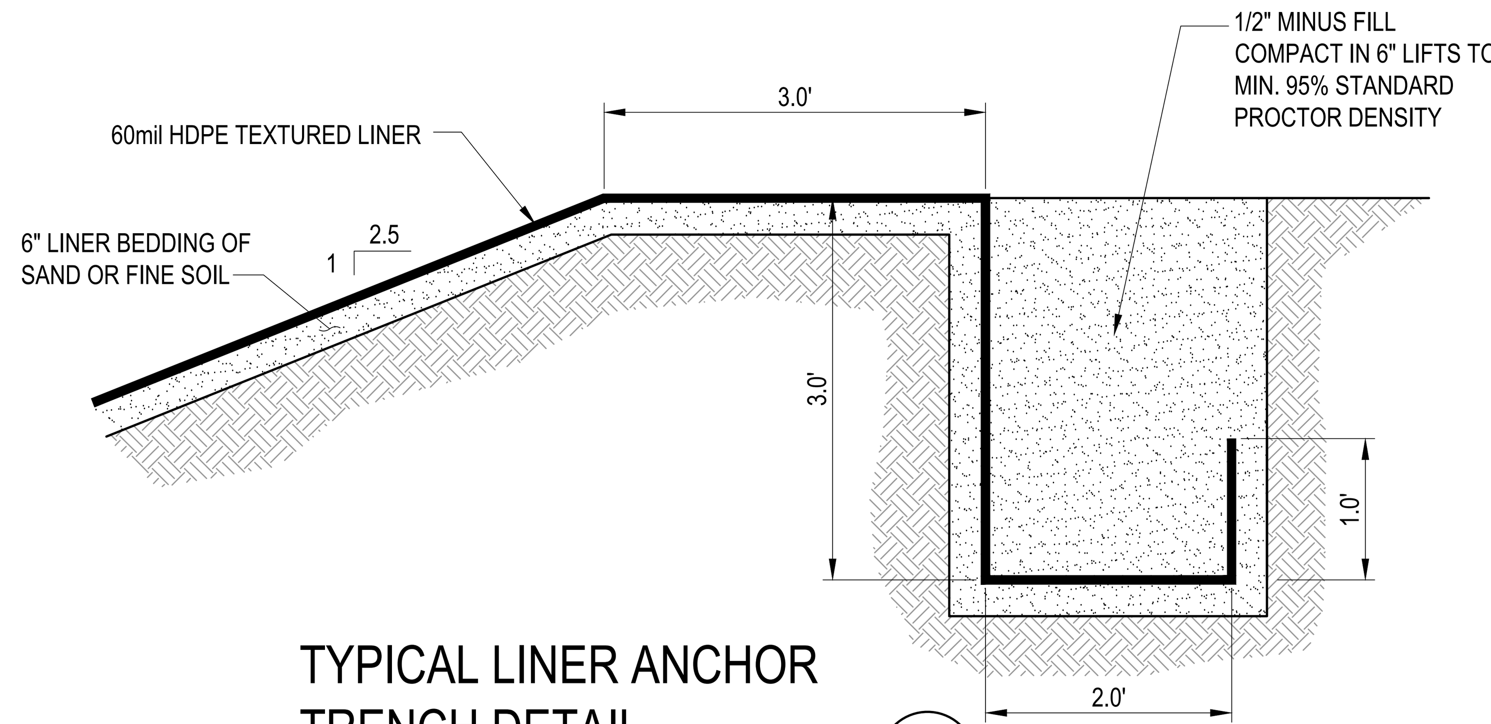
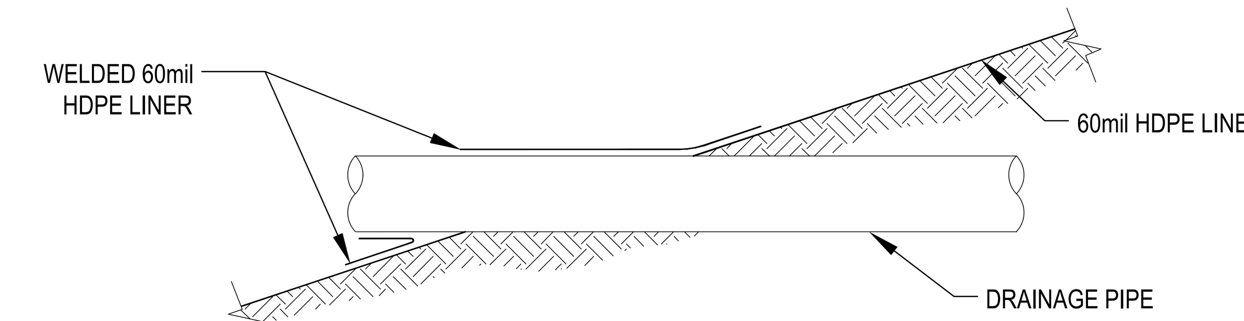
14800



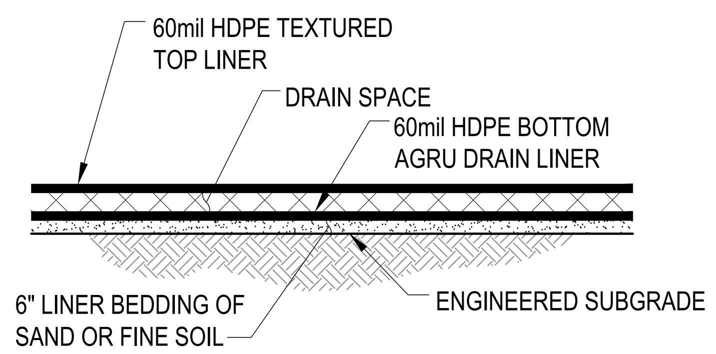
PROCESS WATER RESERVOIR LINER ANCHOR DETAIL (1 / 026)
N.T.S.



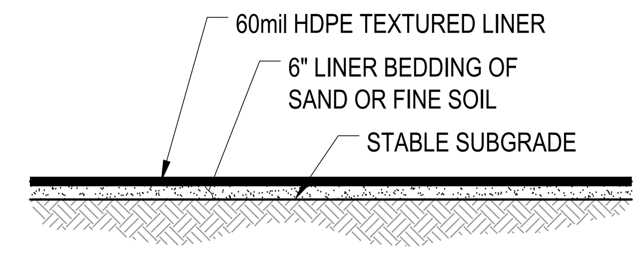
TYPICAL LINER ANCHOR TRENCH DETAIL (3 / 022, 024, 028)
N.T.S.



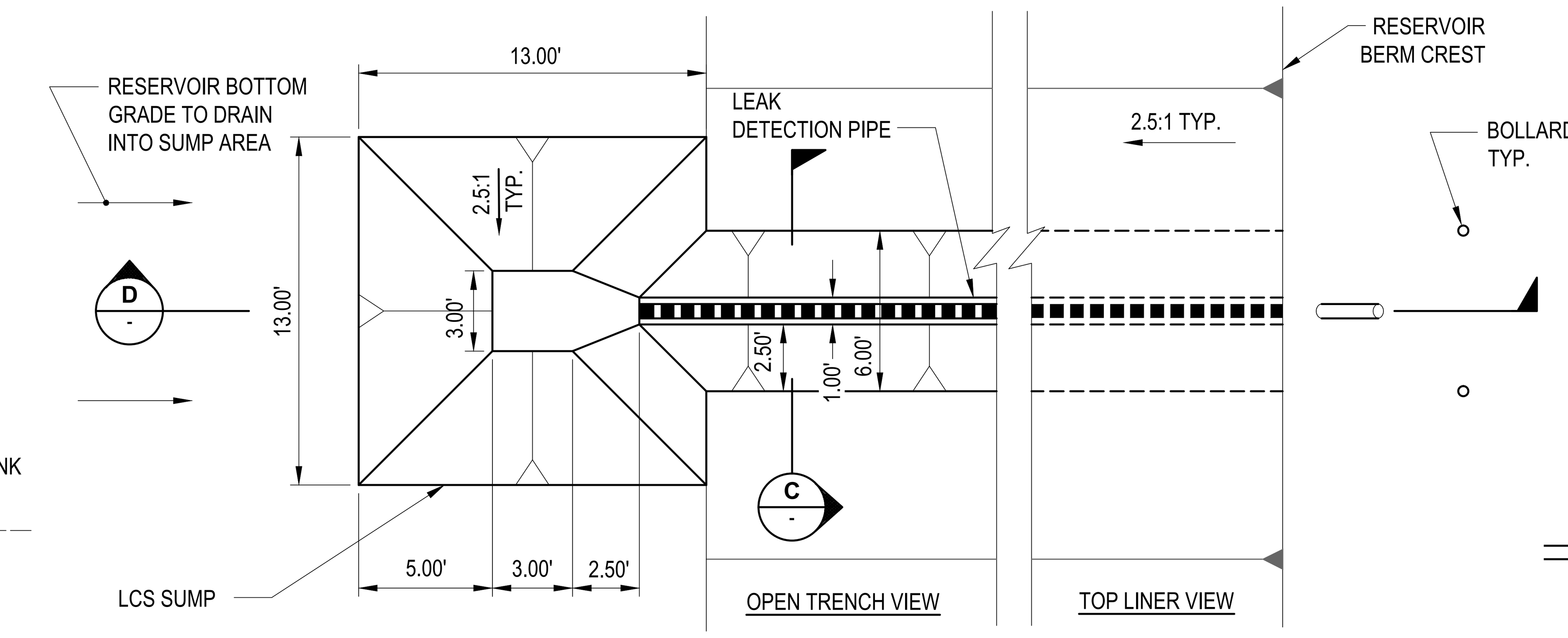
PIPE PENETRATING LINER (16 / -)
N.T.S.



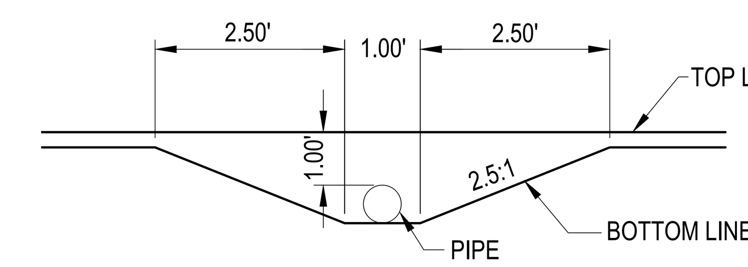
TYPICAL PROCESS WATER RESERVOIR LINER (2 / 026)
N.T.S.



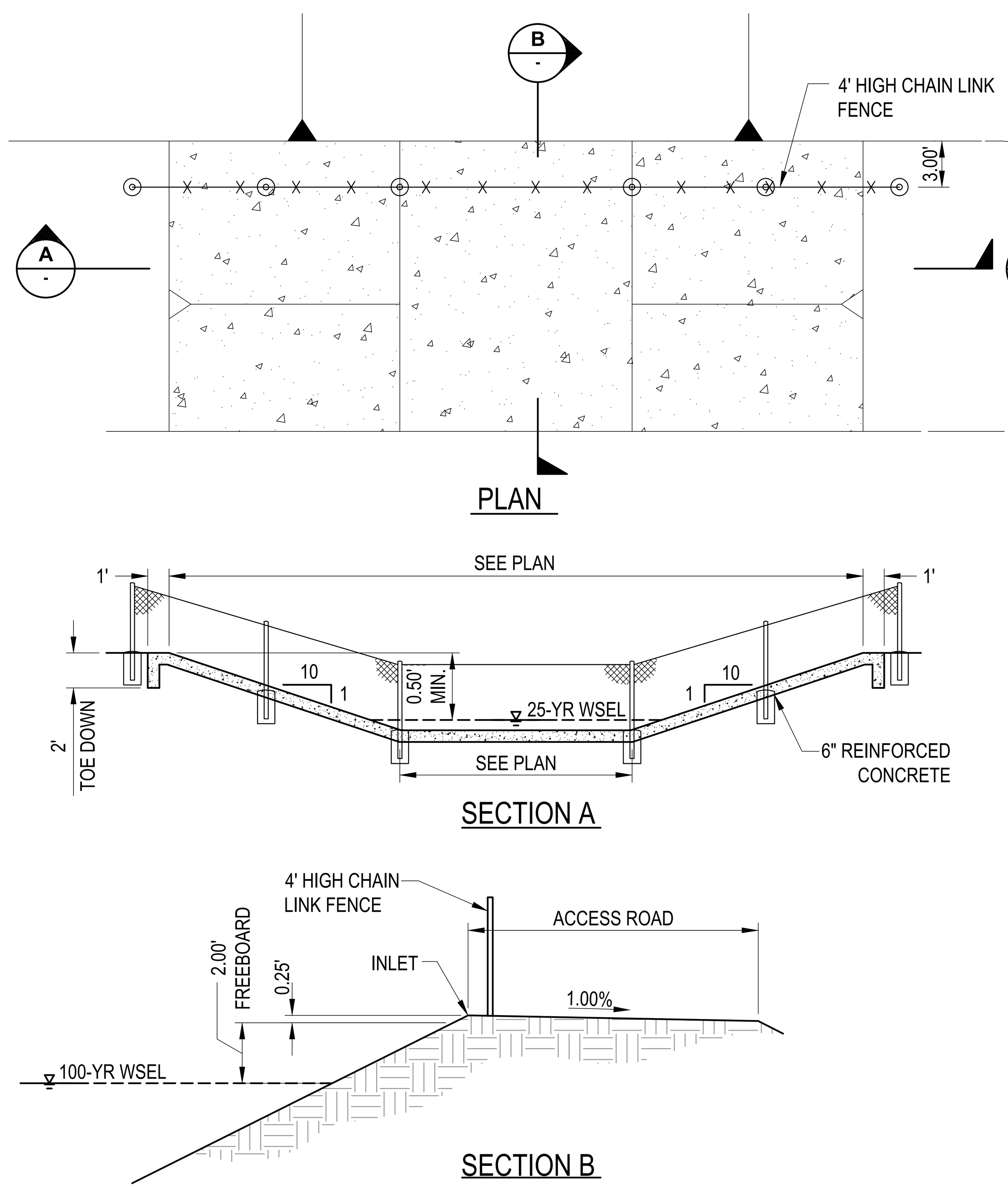
TYPICAL STORMWATER IMPOUNDMENT LINER (4 / 022, 024, 028)
N.T.S.



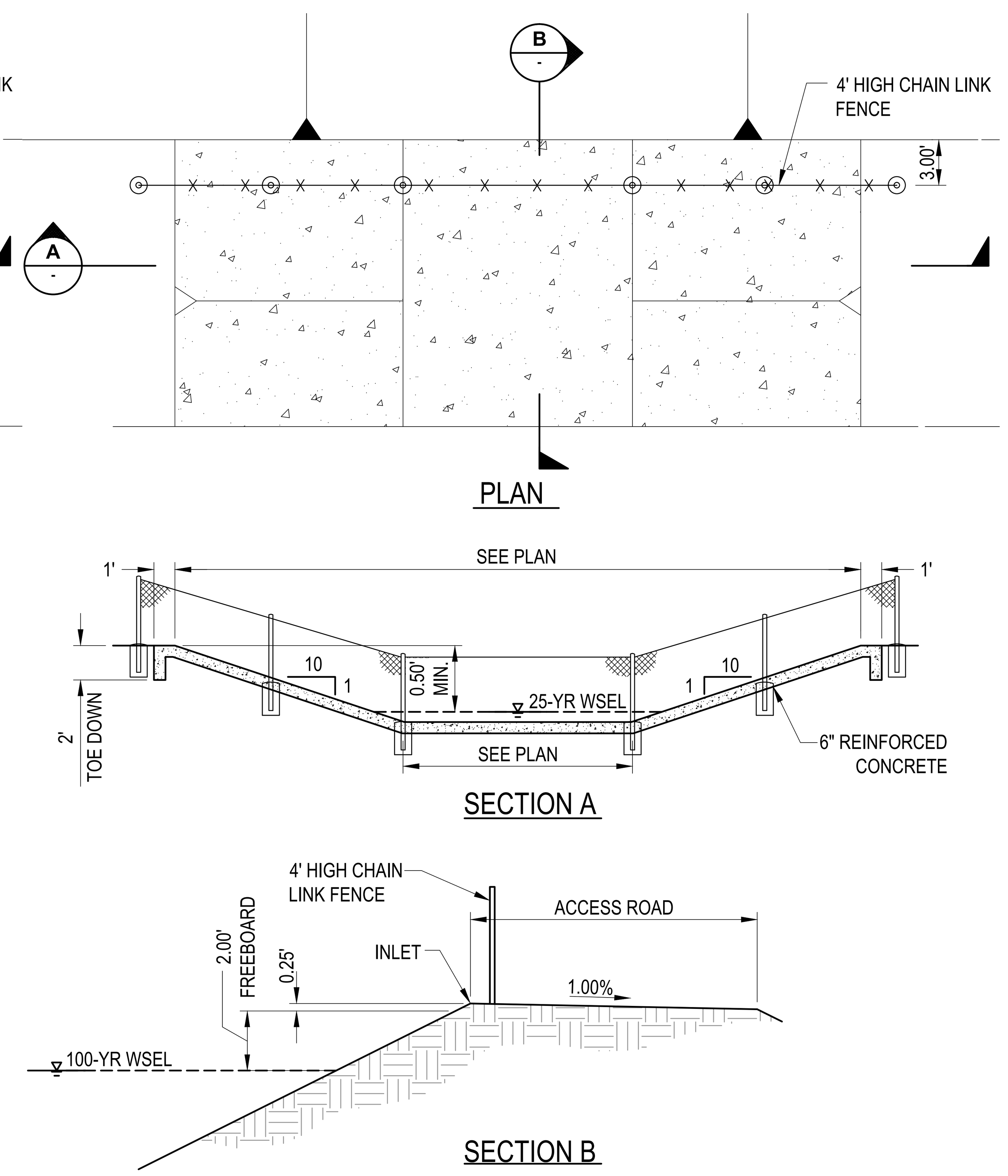
PROCESS WATER RESERVOIR - LCS PLAN (6 / 025)
N.T.S.



SECTION C



SPILLWAY (5 / 021, 023, 027)
N.T.S.



OVERFLOW WEIR (7 / 025)
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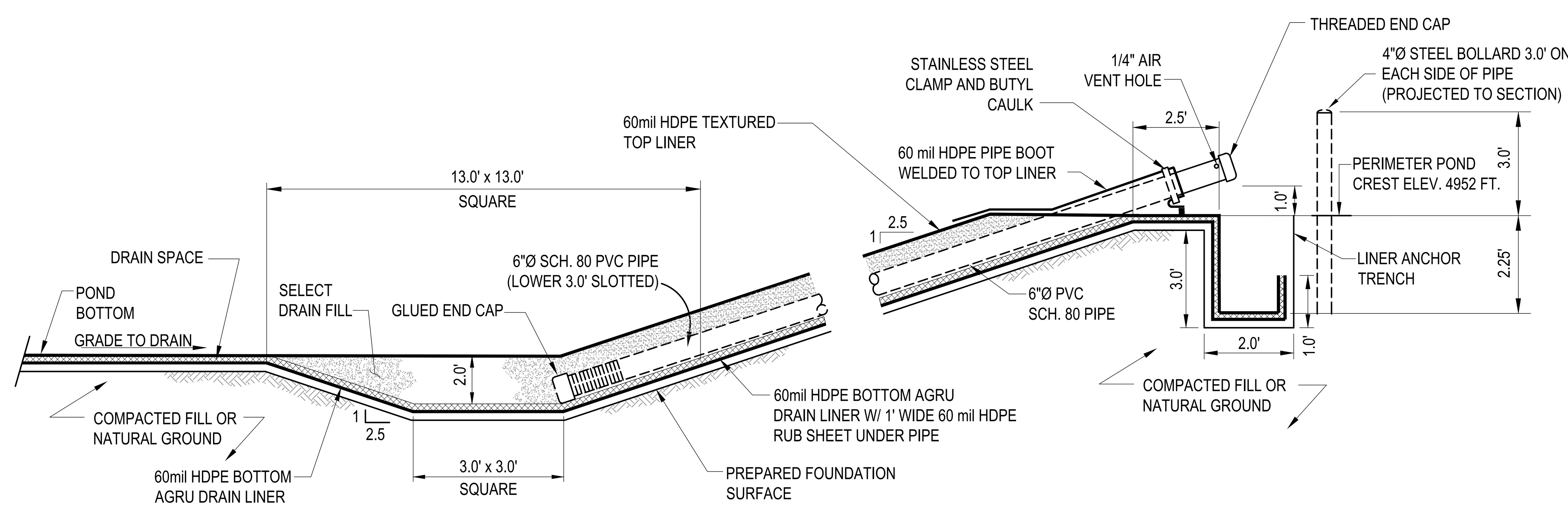

SECTION D

FIGURE 14

PRELIMINARY
FOR AGENCY REVIEW

DO NOT SCALE 11x17 DRAWINGS

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
0000-CI-023	IMPACTED STORMWATER IMPOUNDMENT A, PLAN VIEW														
0000-CI-025	PROCESS WATER RESERVOIR PLAN VIEW														
0000-CI-027	IMPACTED STORMWATER IMPOUNDMENT C, PLAN VIEW														

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DESIGNED BY	SAM	JUN 15
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CHECKED BY	JPN	JAN 13
PROJECT MGR	RKZ	
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL/STANDARDS
CIVIL
STANDARD DETAILS
SHEET 3

JOB NO. M3 PN-120085
DWG NO. 0000-CI-010
REV NO. P3
DATE 09 OCT 15

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M3-PN120085
Revision 0

Copper Flat Project

Process Facility Containment Report

Prepared For:

THEMAC RESOURCES

14802

Certified Professional Engineer Seal

This report documents work conducted under the oversight of the following Engineer:

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER

Harry Lewsley, P.E.

Harry Lewsley

Signature

Exp. 12/31/2017

Date 12/7/2015

PROCESS FACILITY CONTAINMENT REPORT
COPPER FLAT PROJECT

TABLE OF CONTENTS

SECTION PAGE

Harry Lewsley 12/7/2015

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

LIST OF TABLES

LIST OF DRAWINGS

Harry Lewsley 12/7/2015

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

1 INTRODUCTION

The Copper Flat Project is located in South Central New Mexico, near the town of Hillsboro, approximately 150 miles south of Albuquerque, and approximately 20 miles southwest of Truth or Consequences (straight-line distances) as illustrated in Drawing (Dwg.) 000-CI-001. The Project is owned and operated by New Mexico Copper Corporation (NMCC), a wholly owned subsidiary of THEMAC Resources Group Limited.

The State of New Mexico has promulgated regulations pertaining to groundwater protection at copper mining facilities (New Mexico Administrative Code Title 20, Chapter 6, Part 7 [20.6.7 NMAC], the “Copper Rule”), the stated purpose of which is “to control discharges of water contaminants specific to copper mine facilities and their operations to prevent water pollution.”

This report provides the design criteria, location, and capacity of containment systems for the process areas identified in Section 2 of this report to comply with 20.6.7 NMAC, Sections 22, 23, and 26. This report excludes design considerations for the Impacted Stormwater Impoundments, Process Water Reservoir, and Tailings Storage Facility (TSF), i.e., the tailings impoundment, underdrain collection pond, surge pond and the secondary containment trench from the processing facility to the TSF, which have been completed by others and are reported separately.

2 PROCESS AREA IDENTIFICATION

Pursuant to 20.6.17.22 and .23, tanks and pipelines for new construction as proposed for the Copper Flat Project are required to be designed with adequate containment to prevent migration of process solutions to groundwater. Specific areas of the project for which the containment designs are described in this report include the following areas with tanks that require secondary containment.

- Concentrator Area
- Truck Shop
- Fuel Station
- Process Water Storage Tank

This report also describes containment for the following areas that contain process equipment and/or liquids that require containment to prevent release to the environment.

- Crusher
- Coarse Ore Stockpile and Ore Reclaim Tunnel
- Truck and Equipment Washing Unit
- Analytical Laboratory
- Domestic Sewage Treatment Facility

Discussion of containment of facilities related to the tailings storage facility (TSF) (tailings pipelines, tailings storage facility), impacted stormwater impoundments, and the process water reservoir is not included in this report.

The following containment areas will be covered by a roof and therefore will not collect appreciable precipitation.

- Grinding
- Copper Flotation
- Molybdenum Flotation
- Copper Filtration
- Diesel Reagents
- Flotation Reagents
- Sodium Hydrosulfide Reagents
- Truck Shop Tank Farm
- Assay Laboratory
- Wastewater Treatment Facility

The following areas will be uncovered and will therefore collect precipitation. Monthly inspections of these facilities are required by 2.6.7.22 and .23 NMAC. However, after occurrence of a significant precipitation event, the collection sumps will be inspected and collected water will be evacuated within 30 days to maintain required containment capacity. Stormwater evacuated from these areas will be added to the process reservoir or process stream for disposal.

- Copper-Moly Thickening
- Copper Thickening
- Lime Reagents
- Wheel Wash
- Fuel Station
- Truck and Equipment Washing Unit
- Process Water Storage Tank

3 BASIS OF DESIGN

Tanks and pipelines for the Copper Flat Project are designed in accordance with NMAC 20.6.7.23 (A). Most process pipelines are located within buildings with concrete floors sloped to drain to containment sumps. Process pipelines located outside of buildings will have secondary containment for management of leaks and spills. Pipelines are designed in accordance with the following specifications.

Construction Materials	20.6.7.23.A.(1).(a) NMAC	Impermeable materials compatible with contents and resistant to corrosion or degradation
Leak Detection	20.6.7.23.A.(1).(b) NMAC	Mechanism for monitoring integrity
Containment	20.6.7.23.A.(1).(c) NMAC	Secondary containment provided by building floors, double-walled piping, or lined trenches.

Tanks containing process solutions, reagents, chemicals, and petroleum products are located within a building area or on concrete containment pads with curbs or stem walls that are designed to be impermeable to the contents of the contained tanks. Joints between containment curbs and floors will be sealed with approved water stops to seal against leaks. Tanks are designed to contain the stored material, prevent overflows, and are resistant to corrosion or degradation. Tanks for this project (Table 1) are above ground and designed in accordance with the following specifications, except where specifically noted.

Construction Materials	20.6.7.23.A.(2).(a) NMAC	Impermeable materials compatible with contents and resistant to corrosion or degradation
Foundation	20.6.7.23.A.(2).(b) NMAC	Constructed concrete foundation
Containment	20.6.7.23.A.(2).(c) and 20.6.7.23.A.(2).(d) NMAC	Concrete containment to prevent run-on. Containment volume sized to contain 110% of volume of largest tank in the enclosed area while accounting for unusable volume with the containment due to the presence of other tanks, equipment, pedestals, etc.

The majority of process solution pipelines will be placed inside secondary containment for tanks and process buildings. When process pipelines cannot be positioned within secondary containment for tanks or process buildings, the pipe will either be double walled and positioned to drain to an established containment area, or secondary containment specific to the pipeline will be constructed.

Containment sumps will be sealed with water stops at joints and coatings applied where necessary to provide a watertight seal in order to prevent leaking solution to the environment. A list of containment sumps and the destination of liquids collecting in the sumps is provided as Table 2.

4 PROCESS FACILITY CONTAINMENT AREAS

Containment of process solutions, reagents, and other potential groundwater contaminants associated with the Copper Flat Project is delineated below by process area. The areas described include the primary mineral processing circuit and other ancillary areas that are essential to the operation of the project, such as vehicle washing and maintenance, fueling operations, assaying, and sanitary wastewater treatment. The portions of the project area addressed in this report are identified in Dwg. 0000-CI-008. Containment of process solutions is discussed below by process area and by location of ancillary facilities. A list of tanks designed for installation at the Copper Flat Project is presented as Table 1. Table 1 provides location, dimensions, material of construction, and capacity of the tanks in gallons. These tank capacities are compared with the capacities of containments in which they are located to demonstrate adequate containment.

Containment is provided around tanks and in areas with process piping to prevent loss of contents, control leaks and spills, and prevent release of solutions to the surface or ground water. Concrete containment walls are used to contain leaks and spills where tanks are present. The net volume of the containment is designed to contain at least 110 percent of the volume of the largest tank or series of connected tanks in the system. Any leakage, spillage, or wash water within a containment area is directed by sloped concrete floors to a watertight drainage sump. A list of the sumps present in each of the containment areas and the disposition of the captured solutions is presented in Table 2. The sumps listed in Table 2 are containment sumps.

4.1 CONCENTRATOR AREA

Drawing 3000-FS-000 summarizes the Copper Flat ore process flowsheet. Processing of the ore begins with the Crusher. Crushed ore is conveyed to the Coarse Ore Stockpile to be used as mill feed. A concrete tunnel beneath the Coarse Ore Stockpile is used to reclaim the crushed ore and convey it to the Grinding Area. Coarse ore is combined with water in the grinding mills to create a slurry that flows by gravity to Copper Flotation. Concentrate containing copper (Cu) and molybdenum (Moly) is pumped to the Copper-Molybdenum Thickening area and then to the Molybdenum Flotation area for separation of Copper and Moly. Moly Concentrates are filtered, dried, and bagged for shipment in this area. The remaining Copper concentrate is pumped to the Copper Thickening area where excess water is removed. Thickened Copper concentrates are pumped to the Copper Filtration area for dewatering prior to loading onto trucks for offsite shipment. The wheels of trucks and trailers loaded with Copper concentrate are washed In the Wheel Wash area to prevent the loss of concentrate and contamination of roadways.

Chemicals used in the process described above are stored in the Reagents area. Several containment areas are present in the Reagent area to isolate chemicals that may be incompatible or require special handling. Containment areas in the Reagents area include Lime Containment, Diesel Containment, General Reagents Containment, and Sodium Hydrosulfide (NaHS) Containment. The sumps are equipped with a dedicated sump pump to remove the contained liquids and transfer them to an appropriate location in the process.

An overall plan of the Concentrator Area is provided in Dwg. 0000-GA-050. Locations of tanks and sumps are shown on the drawing along with flow arrows depicting the slope of the floor surfaces to demonstrate flows to the collection sumps for the identified areas. A table on the drawing provides the volume of the largest tank in a given area and compares it with the capacity of the containment sump in which it resides.

The concentrator perimeter will be enclosed by curbing to prevent migration of process solutions away from the concentrator building. Unless specified below, general containment curbing at the perimeter of the concentrator will be at least 4 inches tall.

4.1.1 Crushing Area

The Crusher Area (Dwg. 0000-CI-008) does not contain any tanks. The crusher takes large blocks of ore recovered from the mine pit and crushes it to sizes that can be efficiently handled in the grinding area. Crushing is a dry process, but the crusher dump pocket is open to precipitation. Water is used in the crusher to suppress dust during the transfer of crushed ore to the conveying system to feed the Coarse Ore Stockpile. Water is used to wash down areas within the crusher that accumulate dust and dirt. Precipitation and the moisture content of the ore also contribute minor amounts of water that will collect at the bottom of the crusher structure.

A collection sump located in the lowest level of the concrete crusher facility collects water within the primary crusher and pump it to the Coarse Ore Reclaim Tunnel sump using a dedicated sump pump. The sump has a capacity of approximately 560 gallons. The sump pump will be configured for automatic start when solution is detected and the capacity of the crusher sump is appropriate for the potential solution flows.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Crushing Area				
No Storage Tanks	na	na	na	na
		Containment Volume (gallons)	560	

4.1.2 Coarse Ore Stockpile and Ore Reclaim Tunnel Area

The Coarse Ore Stockpile and Reclaim Tunnel Area (Dwg. 0000-CI-008) does not contain any tanks. The Coarse Ore Stockpile accumulates crushed ore for delivery to the grinding area of the concentrator for processing. An existing concrete Reclaim Tunnel lies beneath this area and will be used to recover crushed ore at a controllable rate to supply feed to the grinding circuit. Process water and fresh water piping to the Concentrator pass through the Reclaim Tunnel.

Water used for wash down and dust suppression, as well as the water pumped from Crusher sump, drains to a sump in the bottom of the Reclaim Tunnel. Process water or fresh water solution coming from piping in the tunnel and moisture from precipitation or excess water contained in the crushed ore will drain to the Reclaim Tunnel sump.

A dedicated sump pump will be used to transfer collected water from the Reclaim Tunnel sump to the concentrator through the Primary Cyclone Feed system. The Reclaim Tunnel Sump has a capacity of approximately 6,400 gallons. The sump pump will be configured for automatic start when solution is detected and the capacity of the Reclaim Tunnel sump is appropriate for the potential solution flows. The installed pumping capacity will be sufficient to evacuate the sump at a flow rate equal to the rate that may be generated by a broken water line.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Reclaim Tunnel Area				
No Storage Tanks	na	na	na	na
		Containment Volume (gallons)	6,400	

4.1.3 Grinding Area

A conveyor from the Reclaim Tunnel delivers crushed ore to the semi-autogenous grinding (SAG) mill. Water is added to the SAG mill to begin the grinding process. Discharge from the SAG mill is pumped to the Primary Cyclone classifiers in closed circuit with the Ball Mill. The slurry is circulated through the Ball Mill until the particles are fine enough to flow out of the top of the cyclones and on the Rougher Flotation Conditioning Tank. A portion of the circulating slurry will go through a gravity concentration circuit to recover separable gold prior to fine grinding.

The only tank in the Grinding Area (Dwg. 0000-GA-050) is the Gravity Concentrate Tank. This tank accumulates concentrate from gravity gold separation and will typically be filled with 8,000 gallons of wet solids. The Grinding Area containment volume is 200,000 gallons. The large containment volume in this area is not based on required capacity but rather results from requirements for setup and configuration of the grinding equipment. Therefore, the resulting containment capacity is more than adequate to contain the contents of the gravity concentrate tank and any operating upsets or maintenance conditions that may occur in the grinding circuit or elsewhere in the concentrator area.

All leakage or spillage of liquids or water used to wash down equipment and floors in this area reports to the Grinding Area Containment sump. The sump is equipped with a dedicated pump and automatic start/stop controls. Liquids accumulated in this sump are pumped back into the Primary Cyclone Feed system.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Grinding Area Containment				
Gravity Concentrate Tank	12.00	9.50	8,000	Carbon Steel
		Containment Volume (gallons)	200,000	

4.1.4 Copper Flotation Area

Copper Flotation (Dwg. 0000-GA-050) includes the Rougher Conditioning Tank, rougher flotation cells, and other equipment to recover the sulfide minerals in the process slurry. The floor in the Copper Flotation area is sloped to facilitate gravity flow from one flotation cell to the next.

The floor slopes are directed to the Copper Flotation Area sump. Solutions accumulated in the Copper Flotation Area sump are returned to the Rougher Flotation Conditioning Tank. The sump is equipped with a dedicated pump and automatic start/stop control.

The largest tank the Copper Flotation Area is the Rougher Flotation Conditioning Tank with a capacity of 69,300 gallons, which requires a containment capacity of approximately 76,200 gallons at 110% of capacity. The net containment volume in the Copper Flotation Area is 79,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Copper Flotation Area Containment				
Rougher Flotation Conditioning Tank	22.00	25.00	69,300	Carbon Steel
		Containment Volume (gallons)	79,000	

4.1.5 Copper-Molybdenum Thickening Area

The Copper-molybdenum (Copper-Moly) Thickening Area (Dwg. 0000-GA-050) recovers water from the rougher flotation concentrate in preparation for separating the moly into a saleable product. The area includes the flocculant mixing and distribution system, Copper-Moly thickener, and Copper-Moly thickener overflow tank.

The floor slopes are directed to the Copper-Moly Thickening Area sump. Solutions accumulated in the Copper-Moly Thickening Area sump are returned to the Copper-Moly Separation Conditioning Tank. The sump is equipped with a dedicated pump and automatic start/stop control.

The largest vessel is the Copper-Moly Concentrate Thickener at a capacity of 17,700 gallons., which requires a containment capacity of approximately 19,500 gallons at 110% of capacity. The designed containment volume is 29,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Copper-Moly Thickening Area Containment				
Flocculant Mix Tank	12.00	7.25	6,100	Carbon Steel
Flocculant Distribution Tank	12.00	7.25	6,100	Carbon Steel
Copper-Moly Concentrate Thickener	20.00	7.50	17,700	Carbon Steel
Copper-Moly Concentrate Thickener Overflow Tank	4.00	10.67	1,000	Carbon Steel
		Containment Volume (gallons)	29,000	

4.1.6 Molybdenum Flotation Area

Molybdenum (Moly) Flotation (Dwg. 0000-GA-050) separates the moly from the copper concentrate and refines it through a series of flotation and cleaning steps into a saleable product that is filtered, dried, and bagged for shipment to the buyer. The area includes the copper-moly separation conditioning tank, moly filter feed tank, and moly filter cloth wash tank.

The floor slopes are directed to the Moly Flotation Area sump. Solutions accumulated in the Moly Flotation Area sump are returned to the Copper-Moly Separation Conditioning Tank. The sump is equipped with a dedicated pump and automatic start/stop control.

The largest vessel is the Moly Filter Feed Tank at a capacity of 2,000 gallons., which requires a containment capacity of approximately 2,200 gallons at 110% of capacity. The designed containment volume is 8,300 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Moly Flotation Area Containment				
Copper-Moly Separation Conditioning Tank	4.00	10.67	1,000	Carbon Steel
Moly Filter Cloth Wash Tank	4.00	6.00	560	Carbon Steel
Moly Filter Feed Tank	8.00	6.00	2,000	Carbon Steel

Containment Volume (gallons)	8,300

4.1.7 Copper Thickening Area

The Copper Thickening Area (Dwg. 0000-GA-050) receives the copper concentrate from the moly flotation circuit and dewaters it in preparation for filtration to make a shippable concentrate. The area includes a stock tank for storage of thickened concentrates to act as surge capacity for production. Copper Filtrate tanks receive water recovered from the filters for recycling through the thickener.

The floor slopes are directed to the Copper Thickening Area sump. Solutions accumulated in the Copper Thickening Area sump are returned to the Copper Thickener feed box. The sump is equipped with a dedicated pump and automatic start/stop control.

The largest vessel is the Copper Concentrate Stock Tank at a capacity of 41,760 gallons., which requires a containment capacity of approximately 46,000 gallons at 110% of capacity. The designed containment volume is 50,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Copper Thickening Area Containment				
Copper Concentrate Thickener Overflow Tank	4.00	4.00	375	Carbon Steel
Copper Concentrate Stock Tank	17.00	25.00	41,760	Carbon Steel
Copper Filtrate Tank	4.00	4.00	375	Carbon Steel
Copper Filtrate Tank	4.00	4.00	375	Carbon Steel
Copper Concentrate Filter Cloth Wash Tank	4.00	6.00	560	Carbon Steel
Containment Volume (gallons)			50,000	

4.1.8 Copper Filtration Area

The Copper Filtration Area (Dwg. 0000-GA-050) does not contain any tanks. Thickened copper concentrate from the stock tank is pumped to a pair of plate-and-frame filters that produce a filter cake suitable for bulk shipment. The water recovered from the filters returns to the copper thickener via the Copper Filtrate Tanks that are located with the thickener. The filter cake drops to the floor in the Concentrate Loadout area and is loaded into concentrate trailers for shipment offsite.

The floor slopes are directed to the Copper Loadout Area sump. Solutions accumulated in the Copper Loadout Area sump are returned to the Copper Thickener feed box. The sump is equipped with a dedicated pump and automatic start/stop control.

The designed containment in the Copper Filtration Area is approximately 25,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Copper Filtration and Concentrate Loadout Area Containment				

No Storage Tanks	na	na	na	na
		Containment Volume (gallons)	25,000	

4.1.9 Wheel Wash Area

The Wheel Wash Area (Dwg. 0000-GA-050) consists of the wheel wash tank and pump area and a concrete containment area in which the wheels of the concentrate trucks are washed to remove adhering copper concentrates before driving off onto the site roads.

The floor slopes are directed to the Wheel Wash Area sump. Solutions accumulated in the Wheel Wash Area sump are returned to the Copper Thickener feed box. The sump is equipped with a dedicated pump and automatic start/stop control.

The largest vessel is the Wheel Wash Surge Tank at a capacity of 560 gallons., which requires a containment capacity of approximately 620 gallons at 110% of capacity. The designed containment volume is 15,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Wheel Wash Area Containment				
Wheel Wash Surge Tank	4.00	6.00	560	Carbon Steel
		Containment Volume (gallons)	15,000	

4.1.10 Reagents Area

The Reagents Area (Dwg. 0000-GA-050) includes equipment and storage tanks to contain reagents used in the process. This area is configured into four separate containments to separate and manage Lime Reagent, Diesel Reagent, Flotation Reagent, and Sodium Hydrosulfide (NaHS) Reagent.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Concentrator: Lime Reagent Containment				
Milk of Lime	12.00	23.67	20,000	Carbon Steel
Milk of Lime	12.00	23.67	20,000	Carbon Steel
		Containment Volume (gallons)	30,000	
Concentrator: Diesel Reagent Containment				
No. 2 Diesel Storage Tank	8.00	6.00	2,000	Carbon Steel
		Containment Volume (gallons)	4,800	
Concentrator: Flotation Reagent Containment				

Pax Mix Tank	8.00	10.67	4,000	Carbon Steel
Pax Distribution Tank	8.00	10.67	4,000	Carbon Steel
MIBC Storage Tank	8.00	6.00	2,000	Carbon Steel
AERO 238 Mix Tank	8.00	10.67	4,000	Carbon Steel
AERO 238 Distribution Tank	8.00	10.67	4,000	Carbon Steel
Moly Collector Mix Tank	8.00	6.00	2,300	Carbon Steel
Moly Collector Distribution Tank	8.00	6.00	2,300	Carbon Steel
		Containment Volume (gallons)	10,200	
Concentrator: Sodium Hydrosulfide Reagent Containment				
NaHS Mix Tank	8.00	10.67	4,000	Stainless Steel
NaHS Distribution Tank	8.00	10.67	4,000	Stainless Steel
NaHS Stock Tank	8.00	10.67	4,000	Stainless Steel
		Containment Volume (gallons)	4,900	

4.1.10.1 Lime Reagent Area

The Lime Reagent Area (Dwg. 0000-GA-050) consists of a Lime Silo, Lime Slaker, and Milk of Lime tanks to receive pebble lime from the supplier and convert it to a lime slurry that can be used to raise the pH of process solutions.

The floor slopes are directed to the Lime Reagent Area sump. Solutions accumulated in the Lime Reagent Area sump are returned to the milk of lime distribution box. The containment will be inspected on a regular basis per regulatory requirements and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump.

The largest vessels are the Milk of Lime Tanks at a capacity of 20,000 gallons., which requires a containment capacity of approximately 22,000 gallons at 110% of capacity. The designed containment volume is 30,000 gallons.

4.1.10.2 Diesel Containment Area

Diesel fuel is used as a reagent in the flotation process. It is stored in the Diesel Tank in the Diesel Containment (Dwg. 0000-GA-050) and has its own containment area and sump.

The floor slopes are directed to the Diesel Containment Area sump. Leaked or spilled diesel fuel accumulating in the sump is pumped out using a portable pump and deposited in the Used Oil Storage Tank (Sec. 4.2). The containment will be inspected on a regular basis per regulatory requirements and solutions evacuated as soon as observed, and the source will be investigated and addressed.

The Diesel Containment Tank has a capacity of 2,000 gallons., which requires a containment capacity of approximately 2,200 gallons. The designed containment volume is 4,800 gallons.

4.1.10.3 Flotation Reagent Area

The Flotation (General) Reagents Area contains tanks with compatible aqueous reagents that are used in the process.

The floor slopes are directed to the Flotation Reagent Area sump. Solutions accumulating in the sump are pumped to the tailings box to be combined with tailings and report to the TSF. The containment will be inspected on a regular basis per regulatory requirement and solutions evacuated immediately as observed and the source will be investigated and addressed. The sump is equipped with a dedicated pump and manual start/stop control.

The largest vessels are the Aero 238 Tanks at a capacity of 4,000 gallons., which requires a containment capacity of approximately 4,400 gallons. The designed containment volume is 10,200 gallons.

4.2 TRUCK SHOP

The Truck Shop is located south east of the concentrator (Dwg. 0000-CI-008) and provides maintenance services for the mining and mobile equipment fleet. Tanks will be constructed at the truck shop (Dwg. 1010-AR-012) to store required maintenance fluids such as: motor oil, gear oil, hydraulic oil, engine coolant, and used oil and coolant for recycling.

The floor slopes are directed to the Truck Shop Tank Farm Area sump. Leaked or spilled diesel fuel accumulating in the sump is pumped out using a portable pump and deposited in the Used Oil Storage Tank for recycling. The containment will be inspected on a regular basis per regulatory requirement and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump.

The Used Oil Storage Tank has a capacity of 2,000 gallons., which requires a containment capacity of approximately 2,200 gallons. The designed containment volume is 5,600 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Truck Shop Tank Farm Containment				
Used Oil Storage Tank	8.00	6.00	2,000	Carbon Steel
Used Anti-Freeze Storage Tank	8.00	6.00	2,000	Carbon Steel
ATF Fluid Storage Tank	6.00	6.00	1,000	Carbon Steel
Hydraulic Fluid Storage Tank	6.00	6.00	1,000	Carbon Steel
Engine Oil Storage Tank	6.00	6.00	1,000	Carbon Steel
Gear Oil Storage Tank	6.00	6.00	1,000	Carbon Steel
Anti-Freeze/Coolant Storage Tank	6.00	6.00	1,000	Carbon Steel
		Containment Volume (gallons)	5,600	

4.3 FUEL STATION

A Fuel Station with secondary containment for project vehicles will be constructed on the haulage road west of the concentrator (Dwg. 0000-CI-008). Tanks, pumps, and piping associated with the fuel station will be positioned inside the containment facility (Dwg. 1010-GA-010). During fueling and fuel offloading operations, vehicles and equipment will be parked on concrete pads that are sloped to drain into solution containment sumps. Liquid from the sumps will be evacuated into a portable used oil tank for transfer to the used oil holding facility for recycling.

The floor slopes at the fueling areas and within the tank containment are directed to the Fuel Station Area sumps. Solutions accumulated in the Fuel Station Area sumps are pumped out and transported offsite by a Certified used oil recycler. The containment will be inspected on a regular basis per regulatory requirement and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump.

The largest vessel is the Off Road Diesel Fuel Storage Tank at a capacity of 100,000 gallons., which requires a containment capacity of approximately 110,000 gallons at 110% of capacity. The designed containment volume is 119,000 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Fuel Station Containment				
Off Road Diesel Fuel Storage Tank	28.00	24.00	100,000	Carbon Steel
On Road Diesel Storage Tank	12.00	12.00	10,000	Carbon Steel
Gasoline Storage Tank	12.00	12.00	10,000	Carbon Steel
Urea Tank	4.00	6.00	560	Carbon Steel
Urea Tank	4.00	6.00	560	Carbon Steel
Containment Volume (gallons)			119,000	

4.4 TRUCK AND EQUIPMENT WASHING UNIT

A Truck and Equipment Washing Unit (Truck Wash) will be constructed along the haulage road from the mine to the Truck Shop (Dwg. 0000-CI-008). This facility is designed in accordance with 20.6.7.26 NMAC. The washing unit includes a concrete pad on which equipment will be parked for washing (Dwg. 1010-GA-001). The pad will be sloped to drain into a concrete basin for separating water, solids, oil, and grease. The water from the basin will be recycled and reused for washing equipment. Oil and grease will be skimmed from the settling basin and stored in sealed drums for proper disposal. After draining, sediment will be removed from the basin and either loaded directly into a dump truck for disposal at tailings or stored on a concrete pad adjacent to the facility for re-handling and disposal at the TSF. The settling basin will be designed to provide at least 12 inches of freeboard during operation. During periods of precipitation, excess water will be removed from the settling basin by a water truck and transported to the a process water impoundment for reuse.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Equipment Wash Pad				
Settling Basin	40' W x 50' L x 3' D		50,000	Concrete
Containment Volume (gallons)			50,000	

4.5 ASSAY LABORATORY

The Assay Laboratory (Dwg. 0000-CI-008) uses a variety of reagents for sample process and analytical testing of mine and process samples. Sinks and drains in areas with potential chemical use are piped to a below-ground holding tank (Dwg. 3010-AR-003) so that they are not commingled with sanitary wastes from the building's restrooms and breakroom area. The chemical holding tank will be installed in a concrete, water tight vault as secondary containment.

The floor slopes in the Assay Lab Chemical Waste tank containment are directed to a collection sump. Solutions accumulated in the Assay Lab Chemical Waste sump are pumped out and taken to the TSF or transferred to a portable tank and removed from site by a certified disposal contractor. The containment will be inspected on a regular basis and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump.

The only vessel is the Chemical Waste Tank at a capacity of 1,200 gallons., which requires a containment capacity of approximately 1,300 gallons at 110% of capacity. The designed containment volume is 7,500 gallons.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Assay Laboratory				
Assay Lab Chemical Waste Tank	4.00	14.00	1,200	Polypropylene
		Containment Volume (gallons)	7,700	

4.6 DOMESTIC WASTEWATER TREATMENT FACILITY

A packaged wastewater treatment facility (WWTF) for treatment of domestic sanitary will be installed on an existing concrete slab located near the Guardhouse at the main entrance (Dwg. 0000-CI-008). Concrete, water tight curbing will be installed at the perimeter of the foundation slab to provide a minimum volume of 5,000 gallons of secondary containment for the facility. The containment will be inspected on a regular basis and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Sanitary Wastewater Treatment Facility				
Sewage Treatment Equalization Tank	9.60	8.00	4,300	Carbon Steel
Sewage Treatment Treatment Tank	9.60	8.00	4,300	Carbon Steel
Sewage Treatment Solids Holding Tank	9.60	8.00	4,300	Carbon Steel
		Containment Volume (gallons)	5,000	

4.7 PROCESS WATER STORAGE TANK

Process water from the Process Water Reservoir will be pumped to the Process Water Storage Tank (Dwg. 0000-CI-008) on the slopes of Animas Peak to provide consistent line pressure using gravity head to supply water for use in the process. The tank will be installed within a lined earthen basin with a secondary containment capacity of at least 190,000 gallons, plus 2 feet of freeboard. The containment basin will be lined with 60 mil HDPE liner or equivalent. The containment will be inspected on a regular basis and solutions evacuated immediately as observed and the source will be investigated and addressed. Solutions will be evacuated from the containment using a portable pump. Any water collecting in the basin will be pumped out within 30 days and deposited in the Process Water Reservoir.

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gallons)	TANK MATERIAL
Miscellaneous Site				
Process Water Head Tank	30.00	32.00	170,000	Carbon Steel

TABLES

Table 1: List of Tanks and Process Solution Containment Areas

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gal)	TANK MATERIAL
Concentrator: Grinding Area Containment				
Gravity Concentrator Concentrate Tank	12.00	9.50	8,000	Carbon Steel
		Containment Volume (gal)	200,000	
Concentrator: Copper Flotation Area Containment				
Rougher Flotation Conditioning Tank	22.00	25.00	69,300	Carbon Steel
		Containment Volume (gal)	79,000	
Concentrator: Copper Regrind Area Containment				
Copper 1st Cleaner Conditioning Tank	12.00	7.25	6,000	Carbon Steel
		Containment Volume (gal)	8,900	
Concentrator: Moly Flotation Area Containment				
Cu-Mo Separation Conditioning Tank	4.00	10.67	1,000	Carbon Steel
Moly Filter Cloth Wash Tank	4.00	6.00	560	Carbon Steel
Moly Filter Feed Tank	8.00	6.00	2,000	Carbon Steel
		Containment Volume (gal)	8,300	
Concentrator: Copper-Moly Thickening Area Containment				
Flocculant Mix Tank	12.00	7.25	6,100	Carbon Steel
Flocculant Distribution Tank	12.00	7.25	6,100	Carbon Steel
Cu-Mo Concentrate Thickener	20.00	7.50	17,700	Carbon Steel
Cu-Mo Concentrate Thickener Overflow Tank	4.00	10.67	1,000	Carbon Steel
		Containment Volume (gal)	13,000	
Concentrator: Copper Thickening Area Containment				
Cu-Mo Concentrate Thickener	20.00	7.50	17,700	Carbon Steel
Cu Concentrate Thickener Overflow Tank	4.00	4.00	375	Carbon Steel
Cu Concentrate Stock Tank	17.00	25.00	41,760	Carbon Steel
Copper Filtrate Tank	4.00	4.00	375	Carbon Steel
Copper Filtrate Tank	4.00	4.00	375	Carbon Steel
Cu Concentrate Filter Cloth Wash Tank	4.00	6.00	560	Carbon Steel
		Containment Volume (gal)	50,000	
Concentrator: CopperFiltration and Concentrate Loadout Area Containment				
No Storage Tanks				
		Containment Volume (gal)	25,000	

Table 1: List of Tanks and Process Solution Containment Areas

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gal)	TANK MATERIAL
Concentrator: Copper Filtration Wheel Wash Area Containment				
Wheel Wash Surge Tank	4.00	6.00	560	Carbon Steel
		Containment Volume (gal)	15,000	
Concentrator: Lime Reagent Containment				
Milk of Lime	12.00	23.67	20,000	Carbon Steel
Milk of Lime	12.00	23.67	20,000	Carbon Steel
		Containment Volume (gal)	30,000	
Concentrator: Diesel Reagent Containment				
No. 2 Diesel Storage Tank	8.00	6.00	2,000	Carbon Steel
		Containment Volume (gal)	4,800	
Concentrator: General Reagent Containment				
Pax Mix Tank	8.00	10.67	4,000	Carbon Steel
Pax Distribution Tank	8.00	10.67	4,000	Carbon Steel
MIBC Storage Tank	8.00	6.00	2,000	Carbon Steel
AERO 238 Mix Tank	8.00	10.67	4,000	Carbon Steel
AERO 238 Distribution Tank	8.00	10.67	4,000	Carbon Steel
Moly Collector Mix Tank	8.00	6.00	2,300	Carbon Steel
Moly Collector Distribution Tank	8.00	6.00	2,300	Carbon Steel
		Containment Volume (gal)	10,200	
Concentrator: Sodium Hydrosulfide Reagent Containment				
NaHS Mix Tank	8.00	10.67	4,000	Stainless Steel
NaHS Distribution Tank	8.00	10.67	4,000	Stainless Steel
NaHS Stock Tank	8.00	10.67	4,000	Stainless Steel
		Containment Volume (gal)	4,900	

Table 1: List of Tanks and Process Solution Containment Areas

TANK DESCRIPTION	TANK DIAMETER (ft)	TANK HEIGHT (ft)	TANK VOLUME (gal)	TANK MATERIAL
Truck Shop Tank Farm Containment				
Used Oil Storage Tank	8.00	6.00	2,000	Carbon Steel
Used Anti-Freeze Storage Tank	8.00	6.00	2,000	Carbon Steel
ATF Fluid Storage Tank	6.00	6.00	1,000	Carbon Steel
Hydraulic Fluid Storage Tank	6.00	6.00	1,000	Carbon Steel
Engine Oil Storage Tank	6.00	6.00	1,000	Carbon Steel
Gear Oil Storage Tank	6.00	6.00	1,000	Carbon Steel
Anti-Freeze/Coolant Storage Tank	6.00	6.00	1,000	Carbon Steel
		Containment Volume (gal)	5,600	
Fuel Station Containment				
Off Road Diesel Fuel Storage Tank	28.00	24.00	100,000	Carbon Steel
On Road Diesel Storage Tank	12.00	12.00	10,000	Carbon Steel
Gasoline Storage Tank	12.00	12.00	10,000	Carbon Steel
Urea Tank	4.00	6.00	560	Carbon Steel
Urea Tank	4.00	6.00	560	Carbon Steel
		Containment Volume (gal)	119,000	
Equipment Wash Pad				
Settling Basin	40' W x 50' L x 3' D		50,000	Concrete
		Containment Volume (gal)	50,000	
Miscellaneous Site				
Process Water Head Tank	30.00	32.00	170,000	Carbon Steel
Assay Lab Chemical Waste Tank	4.00	14.00	1,200	Polypropylene
Sewage Treatment Equalization Tank	9.60	8.00	4,300	Carbon Steel
Sewage Treatment Treatment Tank	9.60	8.00	4,300	Carbon Steel
Sewage Treatment Solids Holding Tank	9.60	8.00	4,300	Carbon Steel

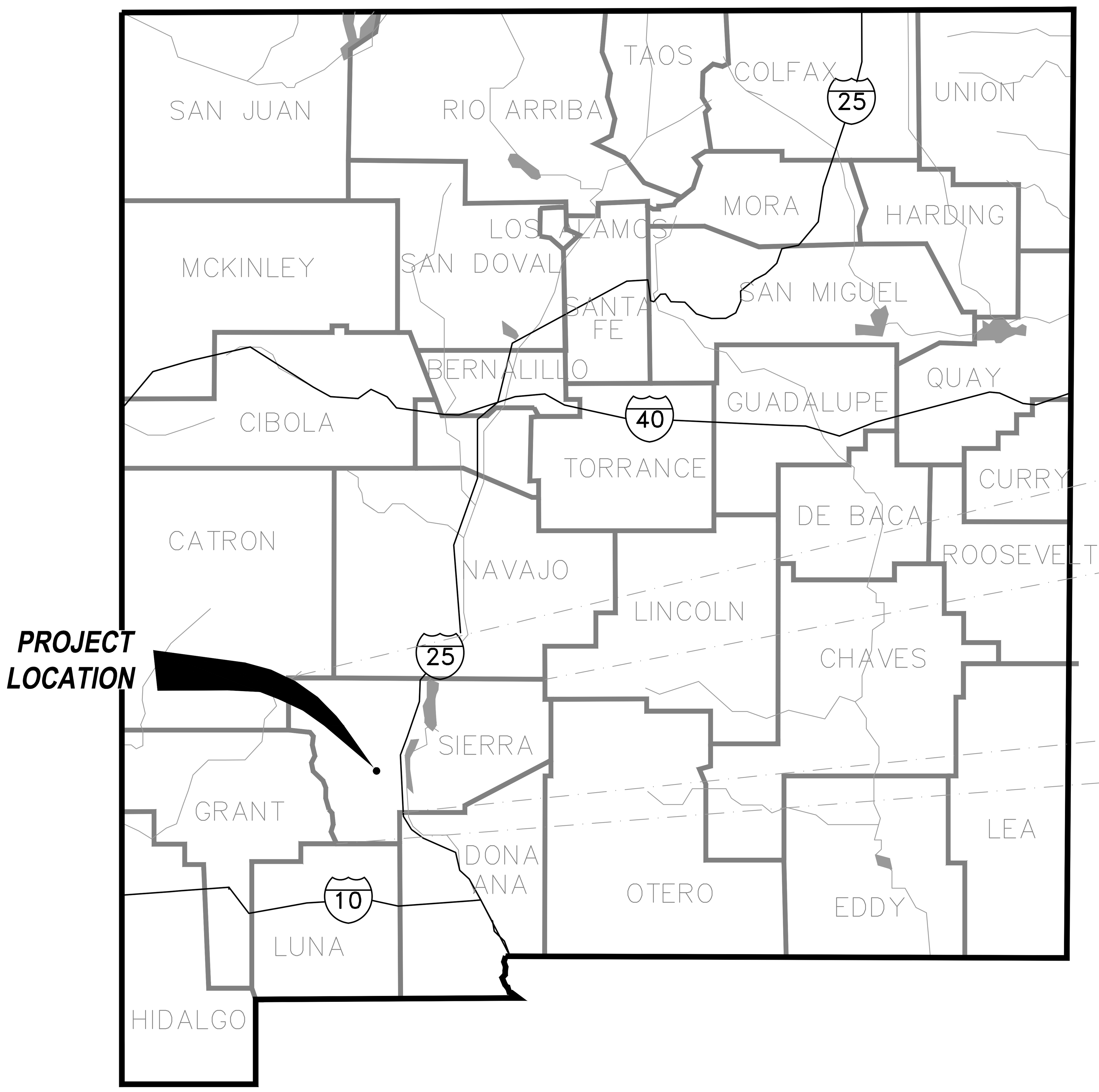
Table 2: Containment and Cleanout Sumps

Location	Reports To
Crusher	Recalim Tunnel Sump
Reclaim Tunnel	Primary Cyclone Feed System
Grinding Area	Primary Cyclone Feed System
Copper Flotation Area	Rougher Flotaiton Conditioning Tank
Copper Regrind Area	Copper Regrind Cyclone Feed Box
Mo Flotation Area	Copper-Molybdenum Separation Conditioning Tank
Copper-Molybdenum Thickening Area	Copper-Molybdenum Thickener
Copper Thickening Area	Copper Concentrate Thickener
Copper Filtration and Concentrate Loadout Area	Copper Concentrate Thickener
Copper Filtration Wheel Wash Area	Copper Concentrate Thickener
Lime Containment Area	Lime Distribution Box
Diesel Reagent Containment Area	Used Oil Tank
General Reagent Containment Area	Tailings Sump
Sodium Hydrosulfide Reagent Containment Area	Copper-Molybdenum Separation Conditioning Tank
Mobile Equipment Shop Containment	Certified Used Oil Recycler
Fuel Station Containment	Certified Used Oil Recycler
Heavy Equipment Fuel Pad	Certified Used Oil Recycler
Light Vehicle Fuel/Fuel Offload Pad	Certified Used Oil Recycler
Equipment Wash Pad Settling Basin	Closed Basin; Zero Discharge
Process Water Head Tank Containment	Process Water Reservoir
Sewage Treatment Plant	Sewage Treatment Plant or Sanitary Waste Disposal Contractor
Chemical Waste Containment	TSF or Certified Contractor Disposal

DRAWINGS

NEW MEXICO COPPER CORPORATION

COPPER FLAT PROJECT
SIERRA COUNTY, NEW MEXICO



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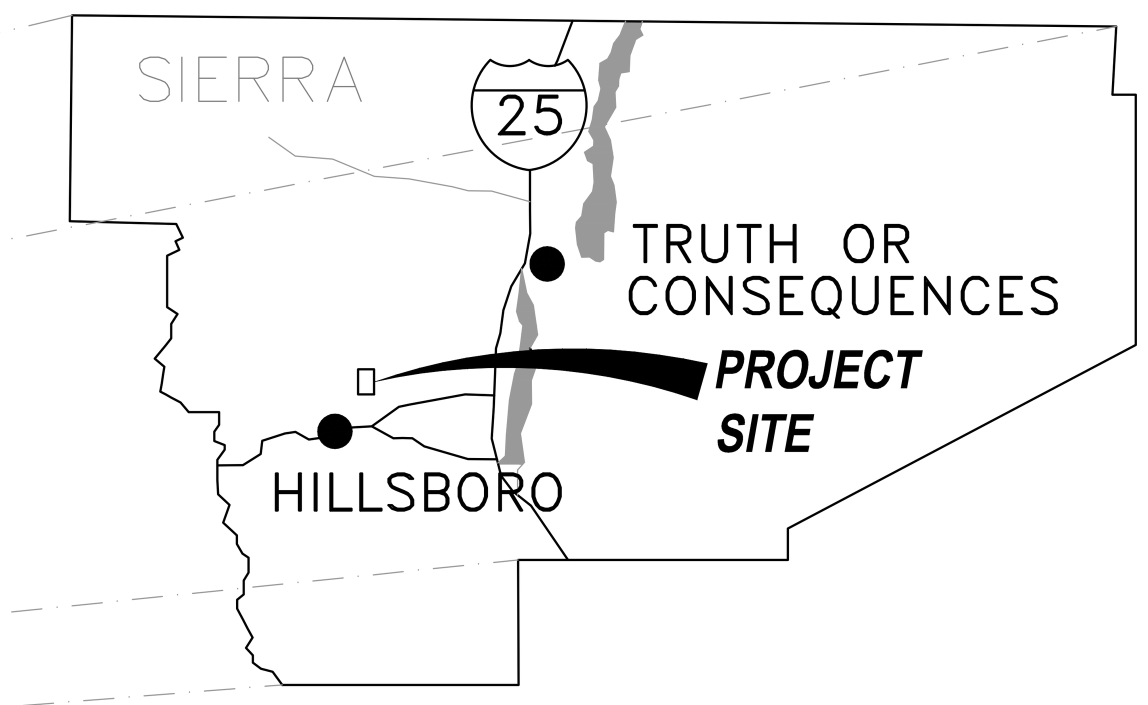

PROJECT LOCATION MAP
NOT TO SCALE

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PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

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DESIGNED BY SAM	DEC12
DRAWN BY SAM	DEC12
CHECKED BY TDL	JAN13
PROJECT MGR RKZ	
CLIENT APPR.	

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PROJECT AREA
SITE LOCATION PLAN

JOB NO. M3 PN-120085
DWG NO. **0000-CI-001**
REV NO. P4
DATE 05 MAR 13

14826

SITE PLAN

SCALE: 1:150

150 75 0 150 300
SCALE IN FEET
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PRELIMINARY
FOR AGENCY REVIEW

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DRAWN BY	SAM	FEB 13
CHECKED BY	TDL	FEB 13
PROJECT MGR	RKZ	FEB 13
CLIENT APPR.		

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
PROJECT AREA
PROCESS FACILITY CONTAINMENT AREAS

JOB NO. M3 PN-120085
DWG NO. **0000-CI-008**
REV NO. p1
DATE 25 NOV 15

THEMAC RESOURCES

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DRAWN BY	FC	JUL 11
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PROJECT MGR		
CLIENT APPR.		

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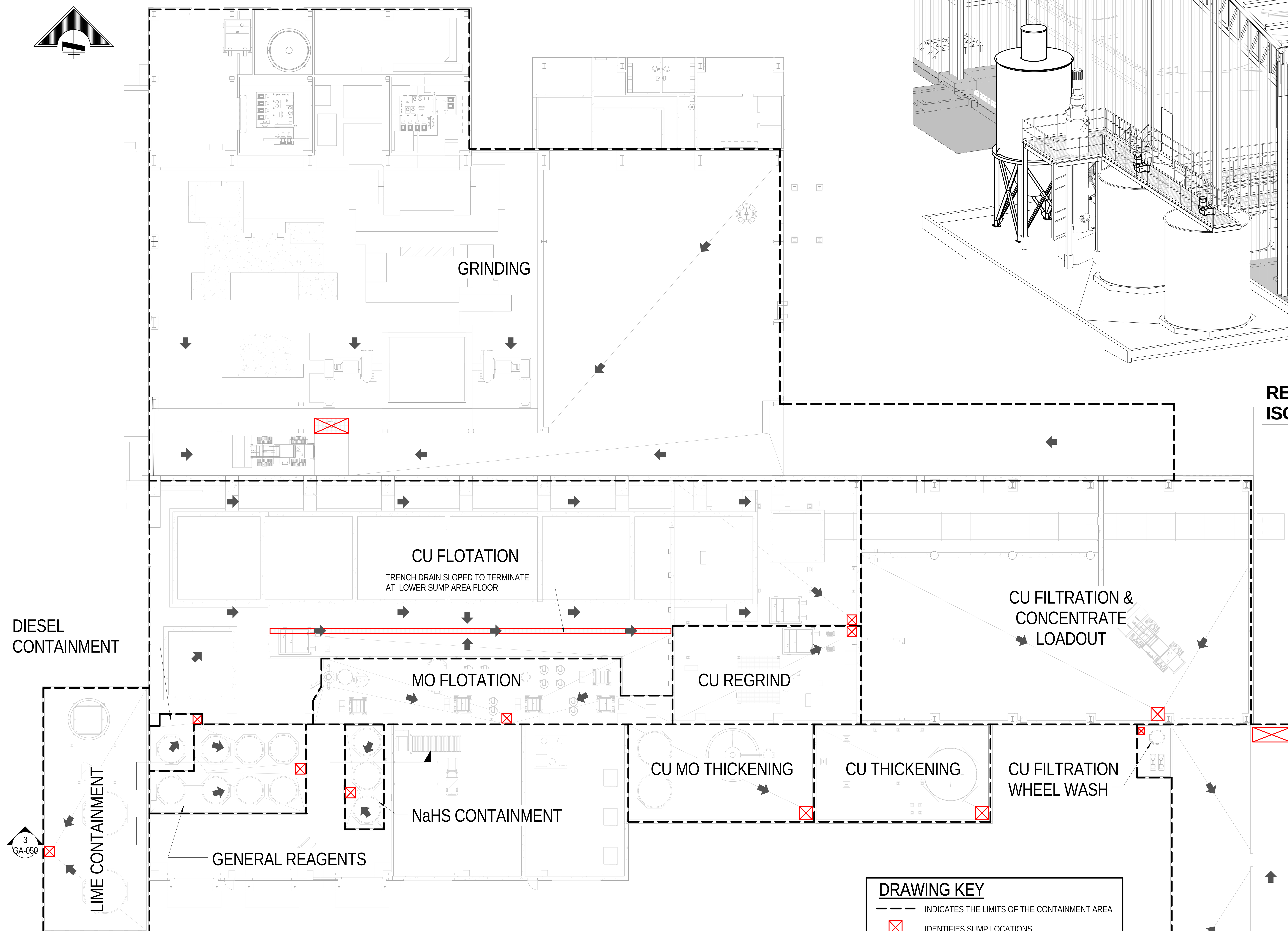
COPPER FLAT PROJECT

PROCESSING PLANT 30,000 TPD CONVENTIONAL TAILINGS OVERALL FLOW SHEET

JOB NO. M3 PN-120085
DWG NO. 3000-FS-000
REV NO. P6
DATE 18 MAR 13

14828

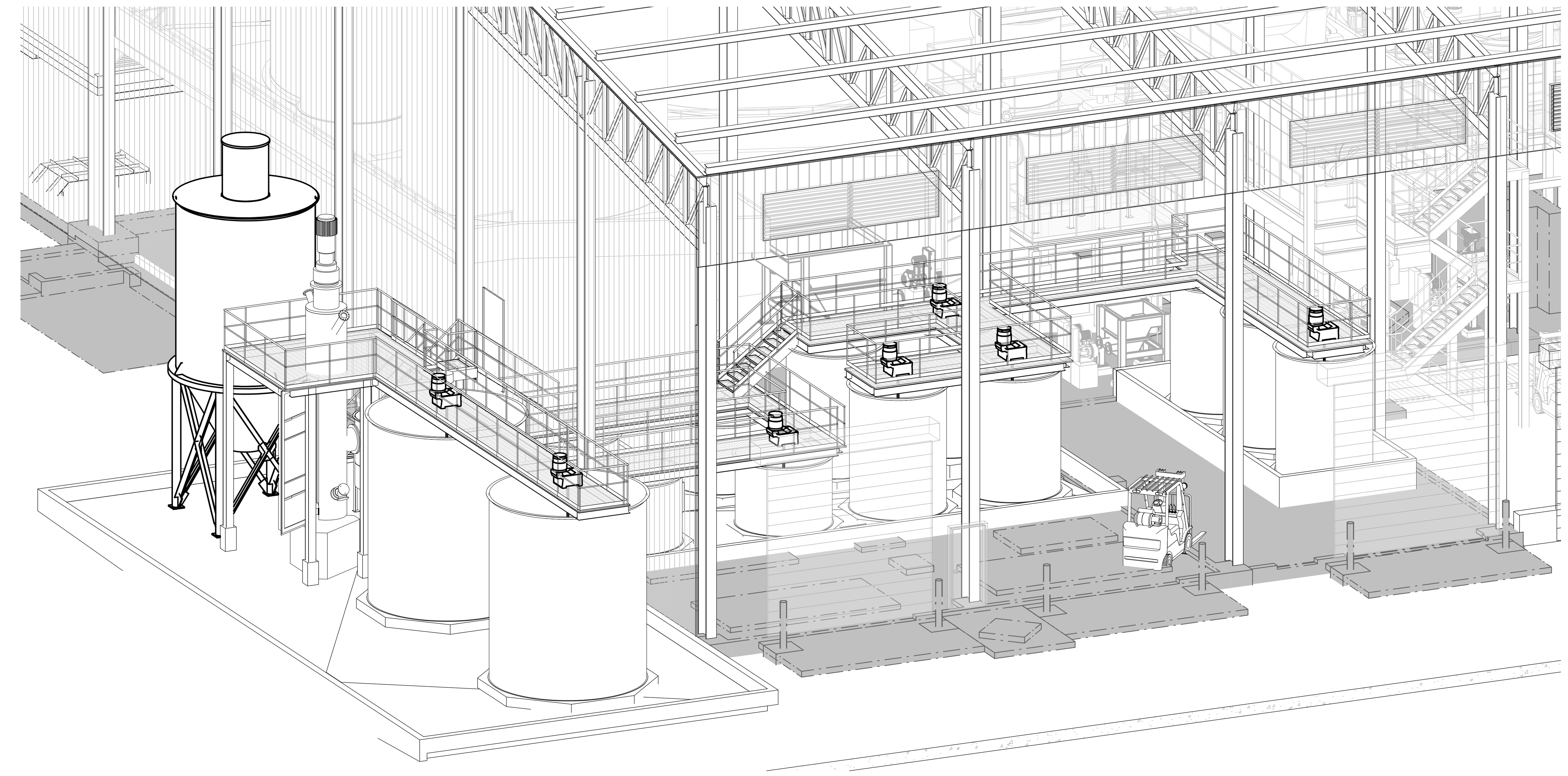


CONCENTRATOR CONTAINMENT PLAN

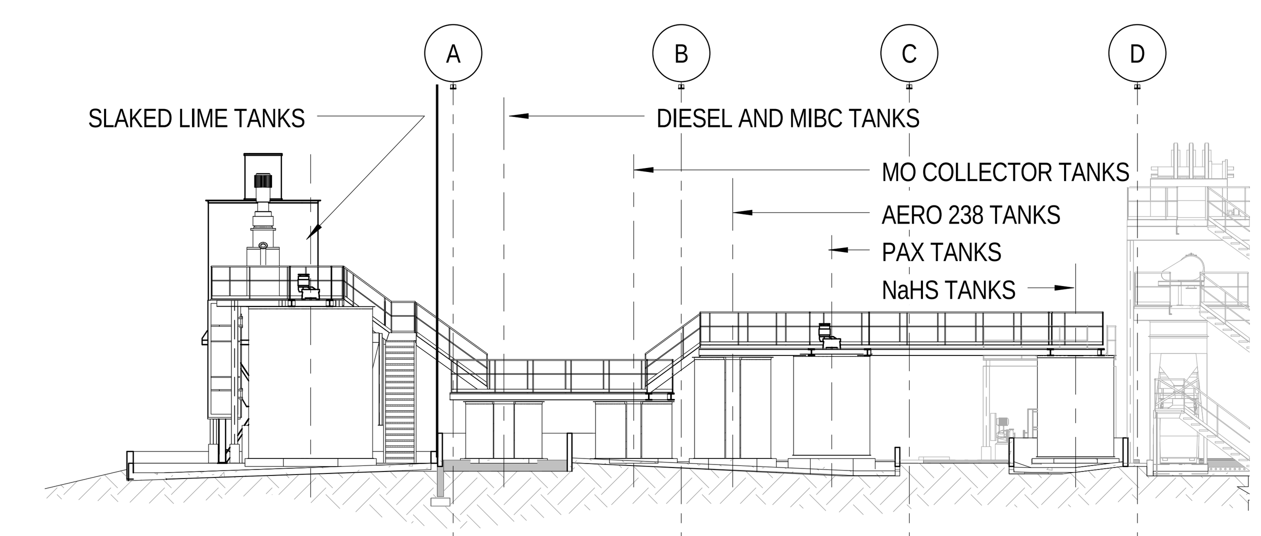
DRAWING KEY

- INDICATES THE LIMITS OF THE CONTAINMENT AREA
- IDENTIFIES SUMP LOCATIONS
- DEMONSTRATES FLOW DIRECTION

16' 8' 0' 16' 32'
1/16" = 1'-0"
DO NOT SCALE 11x17 DRAWINGS



REAGENTS AREA ISOMETRIC



REAGENTS SECTION

SCALE: 1/16" = 1'-0"
3
GA-050

Containment Area	Tank Name	Tank Volume (gal)	Containment Volume Required (gal)	Containment Volume Provided (gal)
General Reagents	PAX Mix Tank*	4,000	4,400	10,200
	PAX DistributionTank	4,000		
	MIBC Storage Tank	2,000		
	Moly Collector Mix Tank	2,300		
	Moly Collector Distribution Tank	2,300		
	AERO 238 Mix Tank	4,000		
	AERO 238 Distribution Tank	4,000		
Diesel Containment	No. 2 Diesel Storage Tank*	2,000	2,200	4,800
Lime Containment	Milk of Lime Storage Tank*	20,000	22,000	30,000
	Milk of Lime Storage Tank	20,000		
NaHS Containment	NaHS Distribution Tank*	4,000	4,400	4,900
	NaHS Mix Tank	4,000		
	NaHS Stock Tank	4,000		
Cu Flotation	Rougher Flotation Tank*	66,000	72,600	79,000
Cu Regrind	Cu 1st Cleaner Conditioning Tank*	1,000	1,100	8,900
Mo Flotation	Filter Feed Tank*	2,000	2,200	8,300
Cu Thickening	Cu Concentrate Stock Tank*	41,800	46,000	50,000
Cu-Mo Thickening	Cu-Mo Concentrate Thickener*	17,700	19,500	29,000
Cu Filtration-Wheel Wash	Wheel Wash Surge Tank*	560	620	750

* - Denotes largest tank in containment area

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CLIENT APPR		

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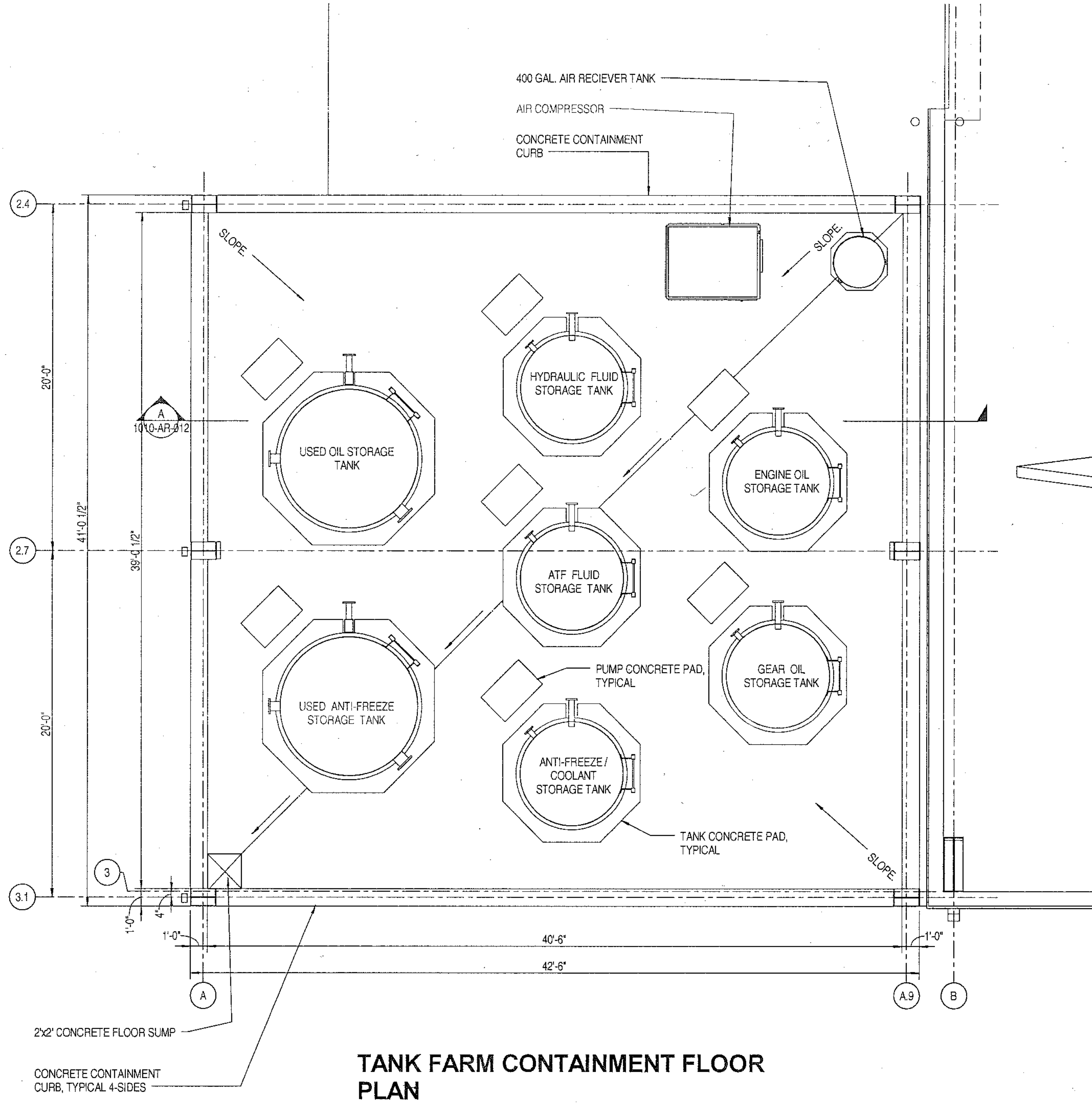
COPPER FLAT PROJECT

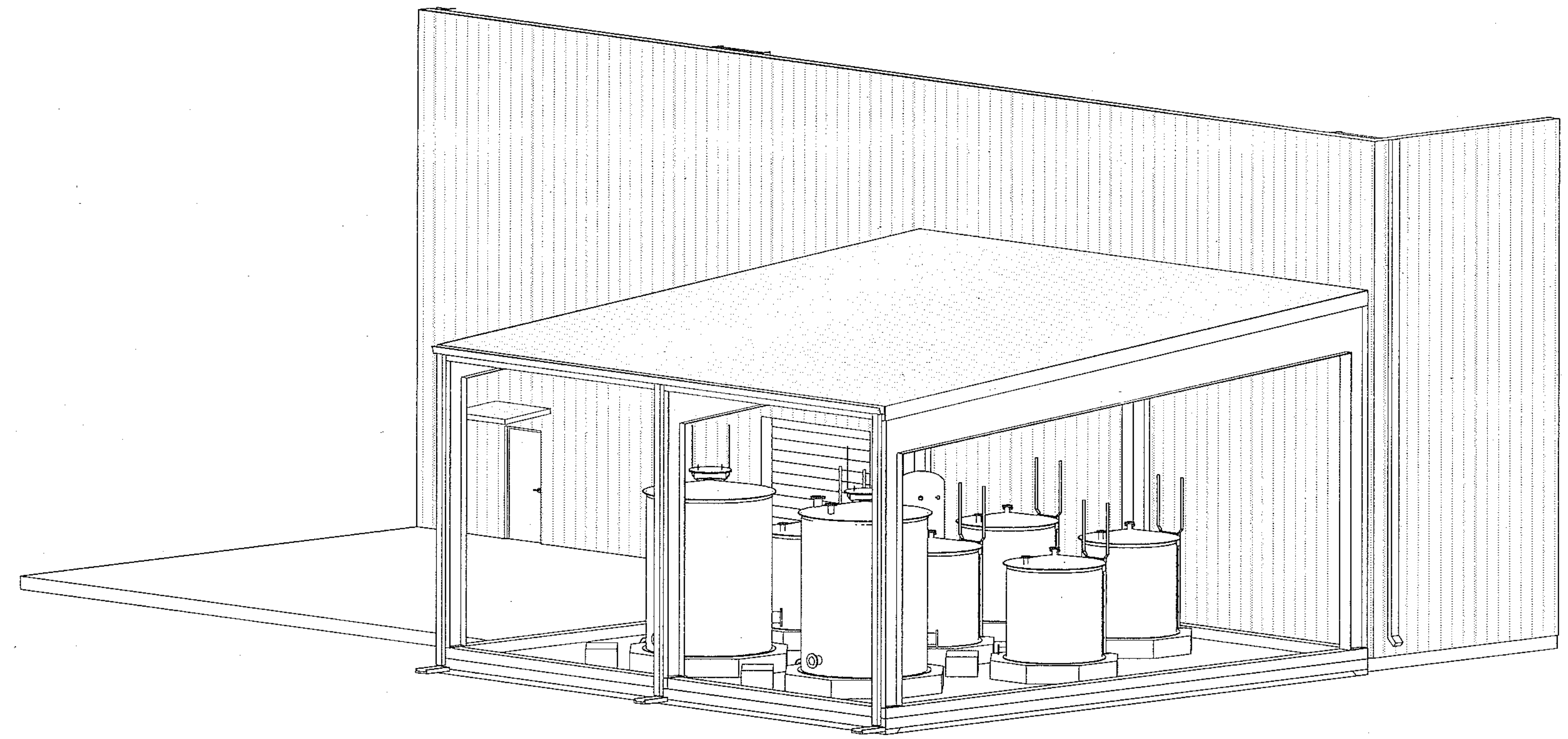
PROJECT PERMITTING GENERAL ARRANGEMENT CONCENTRATOR AREA CONTAINMENT PLAN

PROJECT NO. M3-PN120085
DWG NO. 0000-GA-050
REV NO. P1
DATE 11/30/15



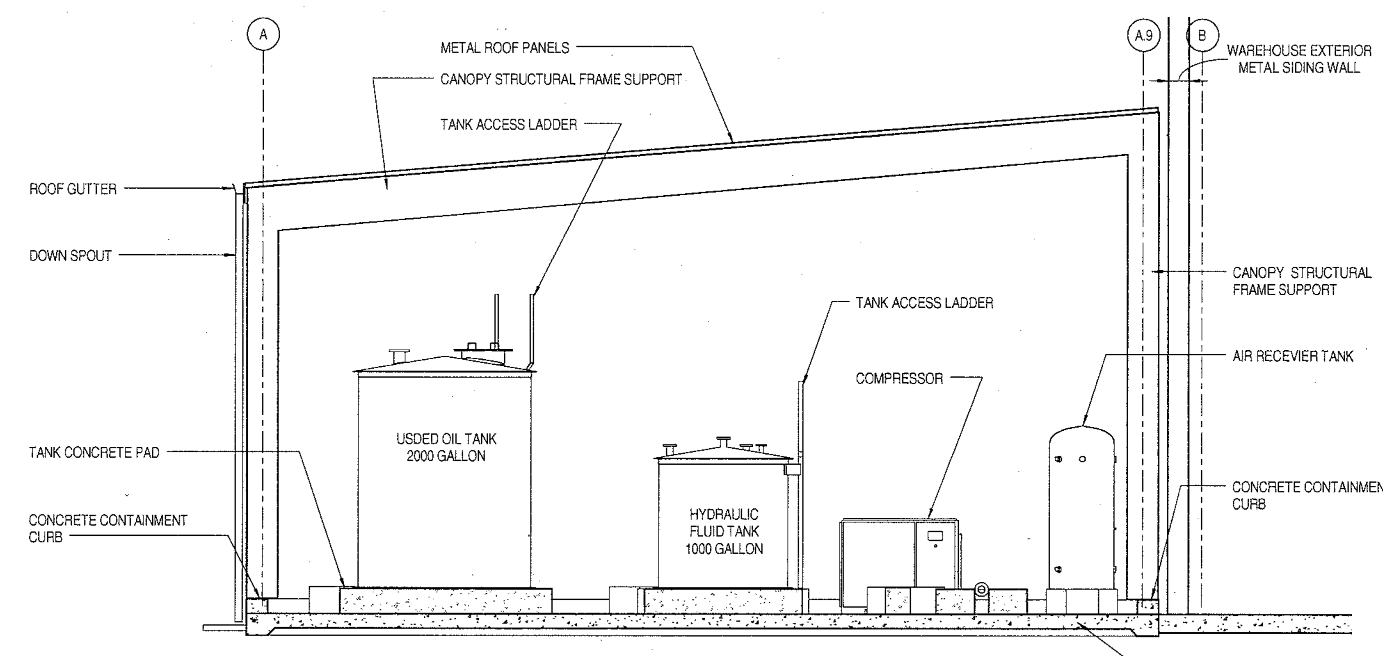
TANK FARM CONTAINMENT FLOOR PLAN

SCALE: 1/4" = 1'-0"



TRUCK SHOP - TANK FARM CONTAINMENT

SCALE:



CROSS SECTION (A)

SCALE: 1/4" = 1'-0"

CONTAINMENT AREA	TANK NAME	TANK VOLUME (GAL.)	CONTAINMENT VOLUME REQUIRED (GAL.)	CONTAINMENT VOLUME PROVIDED (GAL.)
TRUCK SHOP TANK FARM.	USED OIL STORAGE TANK *	2,000	2,200	5,600
	USED ANTI-FREEZE STORAGE TANK	2,000		
	ATF FLUID STORAGE TANK	1,000		
	HYDRAULIC FLUID STORAGE TANK	1,000		
	ENGINE OIL STORAGE TANK	1,000		
	GEAR OIL STORAGE TANK	1,000		
	ANTI-FREEZE / COOLANT STORAGE TANK	1,000		

* DENOTES LARGEST TANK IN CONTAINMENT AREA

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CHECKED BY	RSS	NOV. 15
PROJECT MGR		
CLIENT APPR		

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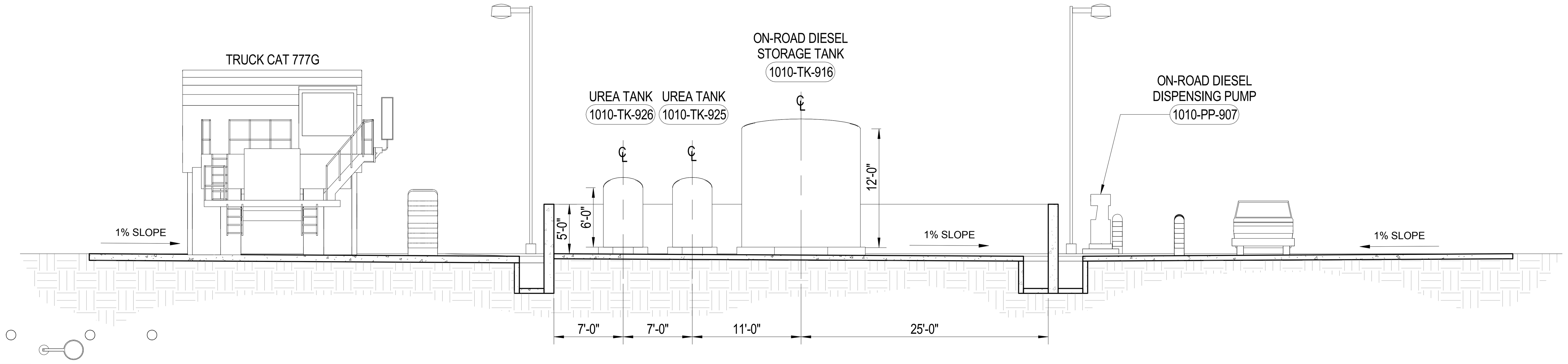
COPPER FLAT PROJECT

ADMINISTRATION AREA
ARCHITECTURAL
TRUCK SHOP
TANK FARM CONTAINMENT

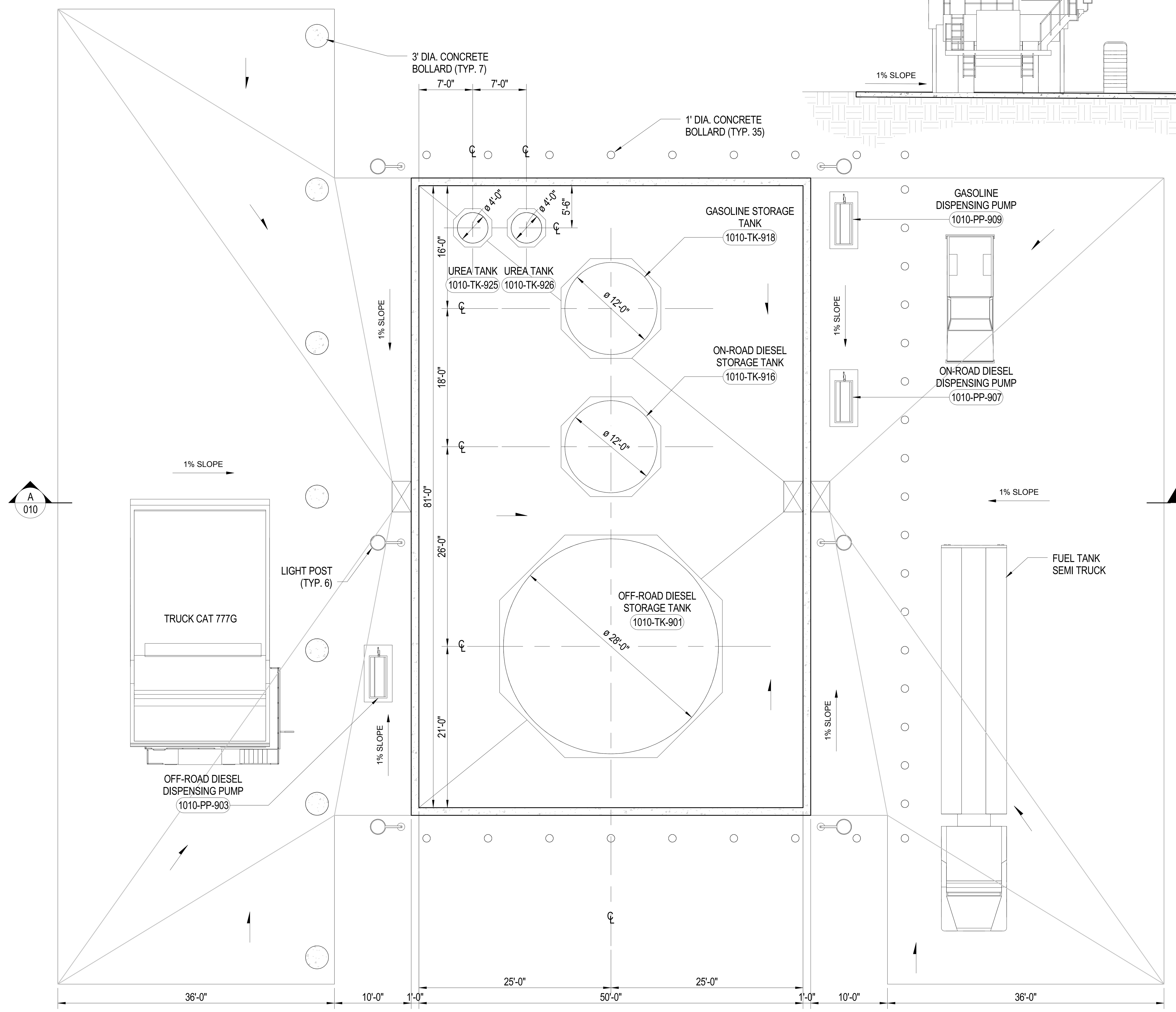
PROJECT NO. M3-PN120085
DWG NO. 1010-AR-012
REV NO. P2
DATE 11/18/15



SECTION

A / 010

SCALE: 1/8" = 1'-0"



FUEL STATION CONTAINMENT PLAN

SCALE: 1/8" = 1'-0"

DRAWING KEY	
☒	CONTAINMENT SUMP
←	DEMONSTRATES FLOW DIRECTION

CONTAINMENT AREA	TANK NAME	TANK VOLUME (GAL.)	CONTAINMENT VOLUME REQUIRED (GAL.)	CONTAINMENT VOLUME PROVIDED (GAL.)
FUEL STATION TANK FARM	OFF-ROAD DIESEL STORAGE TANK *	100,000	110,000	119,000
	ON-ROAD DIESEL STORAGE TANK	10,000		
	GASOLINE STORAGE TANK	10,000		
	UREA TANK	560		
	UREA TANK	560		

* DENOTES LARGEST TANK IN CONTAINMENT AREA

8' 4' 0' 8' 16'
1/8" = 1'-0"
DO NOT SCALE 11x17 DRAWINGS

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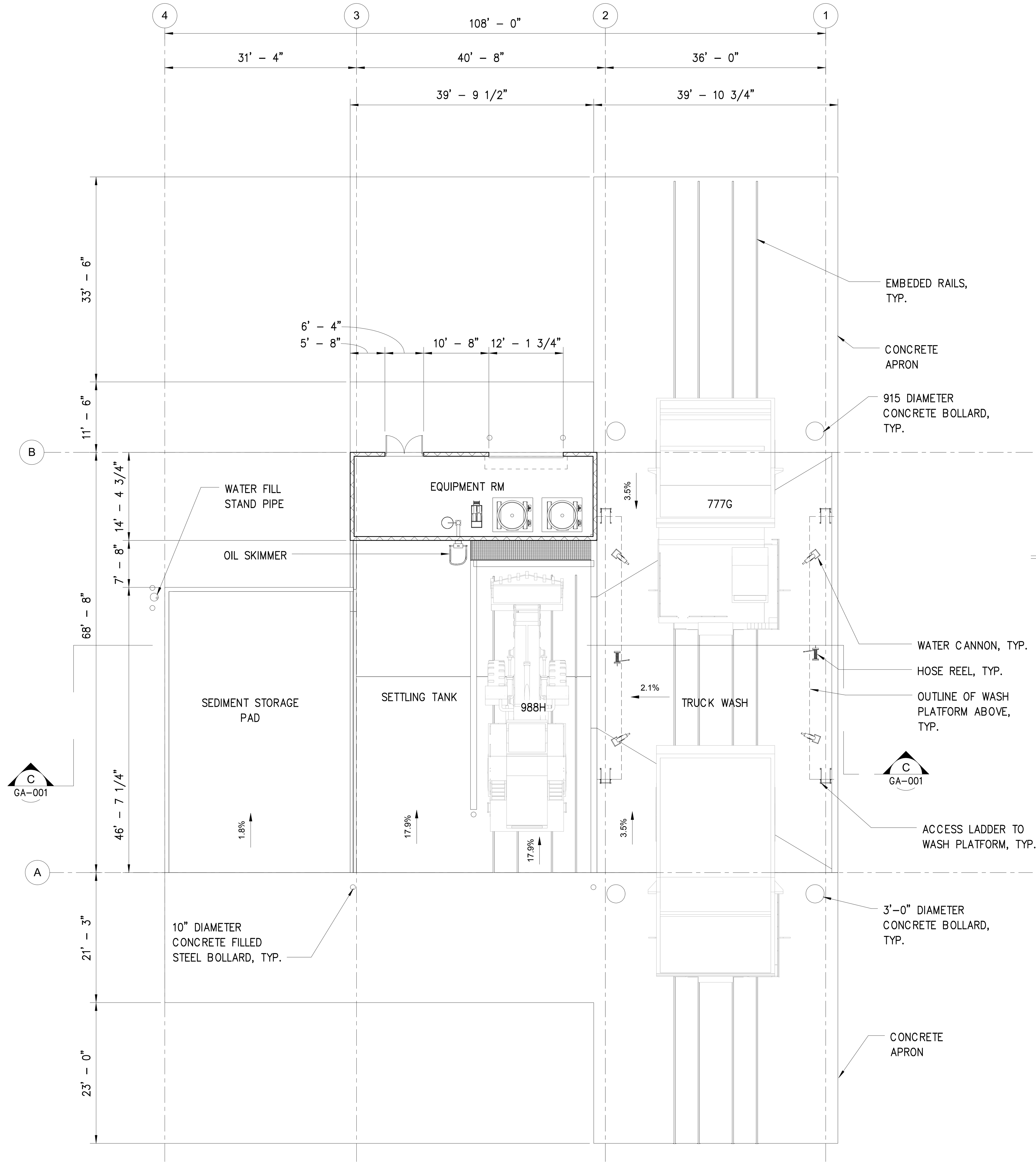
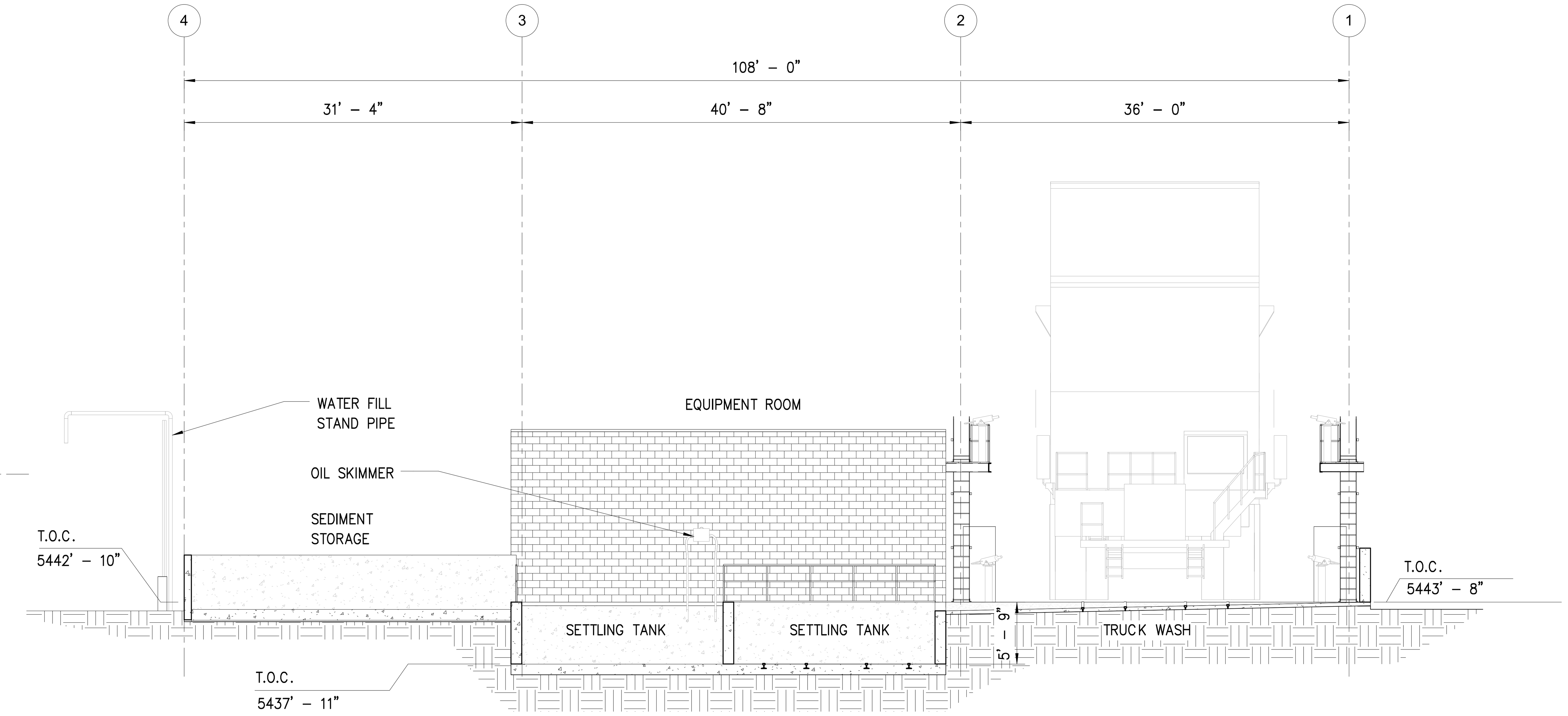
COPPER FLAT PROJECT

ADMINISTRATION AREA
GENERAL ARRANGEMENT
FUEL STATION
CONTAINMENT PLAN

PROJECT NO. M3-PN120085
DWG NO. 1010-GA-010
REV NO. P1
DATE 19 NOV 15



FLOOR PLAN
SCALE: 3/32" = 1'–0"



SECTION C-C
SCALE: 1/8" = 1'–0"

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THEMAC RESOURCES

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CHECKED BY		
PROJECT MGR		
CLIENT APPR		

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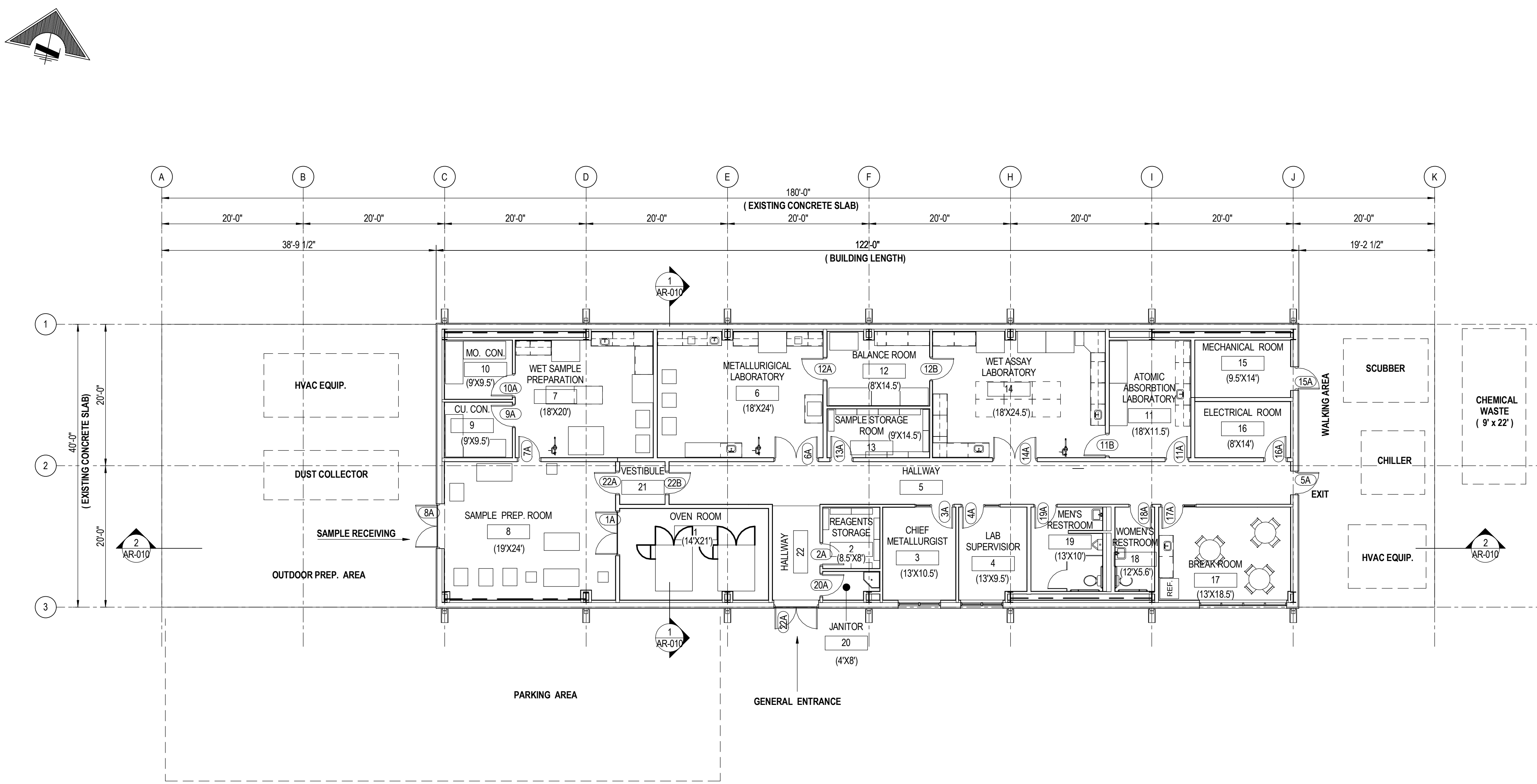
COPPER FLAT PROJECT

ADMINSTRATION AREA
GENERAL ARRANGEMENT
TRUCK WASH
FLOOR PLAN & SECTION

PROJECT NO. M3-PN120085
DWG NO. 1010-GA-001
REV NO. P1
DATE 20 NOV 15

14832



FLOOR PLAN

SCALE: 1/8" = 1'-0"

ANALYSIS:

1. VENDOR ENGINEERED PREFABRICATED METAL BUILDING.
2. NEW BUILDING SIZE: 122'-0" x 40'-0" = 4,880 SQ. FT.
3. EXISTING CONRETE SLAB SQUARE FOOTAGE = 7,200 SQ. FT.
4. COLUMN LINE SPACING SAME AS PRIOR BUILDING, UTILIZING EXISTING FOUNDATIONS.

8' 4' 0' 8' 16'

1/8" = 1'-0"

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DESIGNED BY	R. RAMOS	NOV. 12
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CHECKED BY	R.S.	NOV. 12
PROJECT MGR		
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COPPER FLAT PROJECT

CONCENTRATOR AREA ARCHITECTURAL LABORATORY FLOOR PLAN

PROJECT NO. M3-PN120085

DWG NO. **3010-AR-003**

REV NO. P2

DATE 5 DEC. 12

M3-PN120085
Revision 0

Copper Flat Project

Site Diversion Analysis Report

Prepared For:

THEMAC RESOURCES

14834

Certified Professional Engineer Seal

This report documents work conducted under the oversight of the following Engineer:

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER

Harry Lewsley, P.E.

Exp. 12/31/2017

Signature

Date 12/5/2015

SITE DIVERSION ANALYSIS
COPPER FLAT PROJECT

TABLE OF CONTENTS

12/7/2015

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

LIST OF FIGURES

Harry Lewsley 12/7/2015

HARRY J. LEWSLEY
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LIST OF TABLES

Harry Lewsley
12/7/2015

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

LIST OF APPENDICES

APPENDIX	DESCRIPTION
A	Existing Watershed Summary (Pre and Post-Quintana Watersheds)
B	HydroCAD Results for Pre-Quintana Watersheds
C	HydroCAD Results for Post-Quintana Watersheds
D	HydroCAD Results for Post-Quintana Culvert Analysis
E	HY-8 Culvert Analysis Results

HARRY J. LEWSLEY
NEW MEXICO
18979
LICENSED PROFESSIONAL ENGINEER
Exp. 12/31/2017

12/7/2015

1 PURPOSE AND SCOPE OF ANALYSIS

The Copper Flat Project proposed for mine development by THEMAC Reources, Inc. through its subsidiary, New Mexico Copper Company (NMCC), lies within the Greenhorn Arroyo sub-basin in Sierra County, New Mexico (Dwg. 0000-CI-100).

Previous development of the mining property was conducted by Quintana Minerals Company (Quintana). The natural drainage pattern in the area (Dwg. 0000-CI-101) was modified by Quintana to divert surface drainages away from the proposed mine pit and protect the operations from flooding (Dwg. 0000-CI-102). In addition to the diversions, Quintana placed large diameter culverts beneath two crossings of Grayback Arroyo near the mine entrance. These structures are still in place and will be used by NMCC to limit stormwater run-on and prevent the site impacted areas from interacting with uncontained surface water flows for the planned mining operation (Dwg. 0000-CI-103).

The analysis completed was to evaluate existing diversions and water conveyance features at the Copper Flat Project with regard to their adequacy in conveying flows from storm events and protecting the site from flooding. In order to evaluate the adequacy of the existing diversions it was necessary to identify and evaluate surface water flow prior to the existence of the diversions (Dwg. 000-CI-104). Analytical methods were used to calculate the peak discharges, runoff volumes, and to determine if the existing site diversions and Grayback Arroyo culverts had the adequate capacity to convey the peak discharges and runoff around and away from the proposed site. Peak flows were analyzed for each sub-basin contributing to surface water flows upstream of the project area using the the HydroCAD program which uses both Soil Conservation Service (SCS) TR-20 methods (SCS, 1982) and TR-55 methods (USDA, 1986). An SCS 24-hour Type II storm was selected for simulation due to the project's location. Upstream watersheds were delineated as depicted on Dwg. 0000-CI-104.

The result of this evaluation demonstrates that existing diversions and culverts are adequate to prevent run-on or flooding of the mine site.

2 TYPE OF ANALYSIS

2.1 HYDROLOGY

Peak discharge and volume analysis was performed for drainage areas contributing to the Grayback Arroyo located within the Copper Flat project area. The return periods used were:

- 100-year, 24-hour storm, (Q100)
- 200-year, 24-hour storm, (Q200)
- 500-year, 24-hour storm, (Q500)

2.2 HYDRAULICS

Culvert and channel capacity analysis was conducted for the Grayback Arroyo to determine water surface elevations during the design storm for the two existing culvert crossings.

3 KEY ASSUMPTIONS

- Minimum of 10 percent impervious area assumed for all watersheds.
- Minimum time of concentration set to 5 minutes for developed watersheds and 10 minutes for natural watersheds.
- Soil Class D assumed because fine to medium sand and clay dominate beneath the top layer of soil, which will likely be excavated, in accordance with THEMAC Conceptual Model of Groundwater Flow.
- Surface description used for natural watersheds is "Desert Shrub Range" with a curve number (CN) of 86.
- Existing culverts were modeled assuming that they are in good condition and free of any debris.

4 PROCEDURES AND METHODS USED:

- Peak Discharges:
    - Calculated by the SCS methods using HydroCAD.
    - Calculated the existing discharges for the 100-, 200-, and 500-year, 24-hour storm events.
    - The peak discharges were found using an antecedent moisture condition (AMC) of II to represent normal conditions.
    - Time of concentration was calculated using the SCS Lag time method.
    - The length of longest watercourse, Lc, and mean watershed slope, Sc, were determined by using a combination of site surveys and USGS topographic maps.
- Culvert Capacity Calculations:
    - Calculated the existing culvert capacity for the 100-, 200-, and 500-year, 24-hour storm events.
    - Culvert capacity calculations completed using the Federal Highway Administration (FHWA) HY-8 program for Crossing #1. HY-8 was chosen for the first existing culvert crossing as the culverts will be subject to the peak discharge of the entire watershed reporting to them.
    - Culvert capacity calculations for Crossing #2 were computed utilizing HydroCAD due to the upstream ponding, which will mitigate the peak discharge and thus make the existing culvert at Crossing #2 act as a orifice outlet instead of a standard culvert.
    - Combined peak discharges at each crossing are less than the cumulative respective discharges due to the “routing” effect of Grayback Arroyo.

5 TECHNICAL DATA

- Precipitation depths are per the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Frequency Estimates (NOAA, 2006) near Hillsboro,NM.
- The watershed characteristic summary for the existing watersheds can be found in Appendix A.
- The files for the HydroCAD analysis for Pre-Quintana & Post-Quintana watersheds can be found in Appendices B and C, respectively.
- The HydroCAD analysis for the culvert crossings can be found in Appendix D.
- The HY-8 culvert analysis can be found in Appendix E.

6 RESULTS

Analysis of the pre-mine development topography and drainage pattern identified sixteen watersheds (Dwg. 0000-CI-105) contributing to Grayback Arroyo in the project area. These watersheds were analyzed using HydroCAD and the results are shown in Table 1 in cubic feet per second (cfs) for each watershed. The upstream drainages merged in the central portion of the current Copper Flat Project area and passed through to the eastern boundary via Grayback Arroyo.

Table 1: Pre-Quintana Watershed Characteristics

Watershed ID	Area (ac)	Lc (ft)	Avg. Sc (ft/ft)	Tc (min)	Q100 (cfs)	Q200 (cfs)	Q500 (cfs)
1	352.00	7,396	0.164	30.70	708.72	813.94	952.23
2	117.79	3,175	0.231	13.10	377.27	432.11	504.05
3	100.96	4,242	0.194	18.10	277.70	318.42	371.87
4	85.03	3,389	0.304	12.10	280.90	321.62	375.03
5	107.36	4,088	0.346	13.10	343.86	393.85	459.42
6	377.55	9,338	0.267	29.00	788.24	906.94	1060.97
7	144.47	5,064	0.277	17.40	405.48	464.86	542.79
8	92.01	3,617	0.273	13.40	291.83	334.29	389.99
9	235.91	7,005	0.267	23.00	567.91	651.70	761.76
10	333.62	10,278	0.262	31.50	660.28	758.38	887.32
11	397.83	7,149	0.182	28.30	843.39	968.42	1132.73
12	236.95	6,590	0.292	21.00	600.47	688.82	804.86
13	282.46	7,744	0.258	25.30	641.72	736.61	861.28
14	161.96	5,608	0.160	24.90	371.20	426.07	498.15
15	55.11	2,582	0.184	12.50	179.83	205.93	240.16
16	83.15	3,076	0.078	22.10	204.89	235.08	274.73

Lc = Length of longest waterpath
Tc = Time of concentration
Sc = Slope
Q = Flowrate

Diversion of surface drainages away from the prospective mining area was accomplished by Quintana using a number of diversions shown in Dwg. 0000-CI-105. Diversion 1 is an earthen diversion that re-routed a portion of Watershed 14 (Dwg. 0000 CI 105) to the east into an existing drainage that wraps around the north side of Animas Peak. Diversion 2 consists of earthen diversions routing Watersheds 12 and 13 southward to Diversion 3. Diversion 3 is a composite earthen diversion and bedrock cut that re-routes Watershed 10, 12, and 13 south into Watershed 6, where it joins the ancestral Grayback Arroyo channel south of the mine area (Dwg. 0000-CI-105). Diversion of surface drainages away from the mine area allows for surface water in the mine area to be managed in a manner that prevents impacted stormwater from migrating offsite or impacting groundwater.

Table 2 lists the watersheds that exist after the Quintana diversions, as altered by the NMCC development plan. The Quintana diversions and NMCC development plan alters the drainage pattern in the project area to facilitate control of impacted stormwater. As a result, Watersheds 15 and 16 (Dwg. 0000-CI-104) are completely within the project stormwater control area and are eliminated as tributaries to Grayback Arroyo and portions of Watersheds 1, 2, 3, and 14 are included in the project stormwater control area and isolated from interaction with Grayback Arroyo.

Table 2: Final Watershed Characteristics

Watershed ID	Area (ac)	Lc (ft)	Avg. Sc (ft/ft)	Tc (min)	Q100 (cfs)	Q200 (cfs)	Q500 (cfs)
1	28.21	N/A	0.249	5.00	117.20	133.97	155.94
2	106.56	3,068	0.314	11.00	363.66	415.35	484.31
3	34.99	1,603	0.177	8.70	129.54	148.20	172.66
4	75.02	3,047	0.339	10.50	259.92	297.56	346.92
5	124.19	5,976	0.340	18.00	342.49	392.70	458.61
6	331.22	8,173	0.310	24.20	774.13	888.50	1038.74
7	144.47	5,064	0.296	16.90	411.06	471.20	550.14
8	92.01	3,617	0.274	13.40	291.83	334.29	389.99
9	235.91	7,005	0.268	23.00	567.91	651.70	761.76
10	330.41	10,278	0.276	30.80	663.73	762.30	891.85
11	397.83	7,149	0.182	28.30	843.39	968.42	1132.73
12	227.42	6,590	0.315	20.20	588.30	674.80	789.72
13	275.51	7,744	0.293	23.80	649.87	745.85	871.93
14	79.97	3,545	0.224	14.60	243.90	279.49	326.19

Lc = Length of longest waterpath
Sc = Slope
Tc = Time of concentration
Q = Flowrate

In addition to the Diversions described above, Quintana installed culverts to convey water beneath two earthen crossings over the Grayback Arroyo channel southeast of the process plant area (Dwg. 0000-CI-103). The characteristics of these culverts were evaluated with respect to the calculated flows from the diverted and natural drainages upstream from the proposed mine area. Those characteristics and flows are presented in Tables 3 and 4. The modeled flows through the composite Grayback Arroyo drainage upstream of the culverts were evaluated to ensure that the culverts were adequate to transmit the necessary flows without risk of damage to the structures and flooding of the proposed mine site.

Table 3: Existing Culvert Characteristics and Flows

Crossing No.	Culvert CP Location	Description	End Treatment	Q100 (cfs)	Q200 (cfs)	Q500 (cfs)
1	2	3 – 177" CMPs	Projecting	3,552.39	4,191.95	5,046.09
2	1	1 – 177" CMP	Projecting	3,066.00	3,418.33	3,856.73

Table 4: Existing Culvert Elevations, Lengths, and Slopes

Crossing No.	Inlet Elev. (ft)	Outlet Elev. (ft)	Length (ft)	Slope (ft/ft)	Q100 Headwater Elev. (ft)	Q200 Headwater Elev. (ft)	Q500 Headwater Elev. (ft)	Top of Roadway Elev. (ft)
1	5372.0	5370.0	194.40	0.0103	5391.64	5397.05	5406.01	5419.0
2	5352.0	5344.0	255.4	0.0313	5386.54	5391.04	5396.71	5403.0

7 CONCLUSIONS

The 24-hour storm flows for 100-year, 200-year, and 500-year return periods were evaluated for the watersheds as they exist at present. Analysis of the results of the hydrologic analyses presented in this report demonstrates that the extisting diversions and control structures are adequate to protect the site from flooding during the modeled flow events.

The analyses conducted also determined that both culvert crossings are capable of conveying the Q500 without overtopping the adjacent roadway or pipeline corridor. This conclusion is based on the assumption that the culverts analyzed are in good working condition. Field inspection of the culverts completed by M3 found the body of the existing culverts to be in good condition; repair will be required at the upstream inlets and vegetation removal undertaken at culvert inlets and outlets in order to meet the conditions of this analysis.

8 REFERENCES

Bonin, GM, Martin, D., Lin, B., Parzybok, T., Yekta, M., and Riley, D., 2000. Precipitation Frequency Atlas of the United States, NOAA Atlas 14 Addendum, Volume 1, Version 4.0: Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, Utah) Addendum – Update to Version 3.0. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Silver Spring, Maryland, 2004 revised 2006.

USDA, 1986. Urban Hydrology for Small Watersheds. U.S. Department of Agriculture, National Resources Conservation Service, Conservation Engineering Division. Technical Release (TR) 55. June, SCS, 1986.

SCS, 1982. [Draft] Computer Program Co. Project Formulation – Hydrology. Soil Conservation Service Technical Release 20. Washington, DC.

DRAWINGS

LEGEND

- DRAINAGE BASIN BOUNDARY
- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- FLOWLINE

SITE PLAN

SCALE: 1" = 2500'

2500 1250 0 2500 5000
SCALE IN FEET
CONTOUR INTERVAL = 50'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 2500'	DATE
DESIGNED BY JPN	OCT 15
DRAWN BY JPN	OCT 15
CHECKED BY	
PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
GREENHORN ARROYO
PRE-MINING WATERSHED BASIN

JOB NO. M3 PN-120085
DWG NO. 0000-CI-100
REV NO. P2
DATE 20 NOV 15

LEGEND

- DRAINAGE BASIN BOUNDARY
- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- FLOWLINE

SITE PLAN

SCALE: 1" = 1000'

1000 500 0 1000 2000

SCALE IN FEET
CONTOUR INTERVAL = 20 FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 1000'	DATE
DESIGNED BY JPN	OCT 15
DRAWN BY JPN	OCT 15
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PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

GENERAL SITE
COPPER FLAT SITE
EXISTING HYDROLOGY
PRE-QUINTANA MINING

JOB NO. M3 PN-120085
DWG NO.
0000-CI-101
REV NO. P1
DATE 20 NOV 15

14851

LEGEND

- DRAINAGE BASIN BOUNDARY
- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- FLOWLINE

SITE PLAN

SCALE: 1" = 1000'

1000 500 0 1000 2000
SCALE IN FEET
CONTOUR INTERVAL = 20 FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 1000'		DATE
DESIGNED BY	JPN	OCT 15
DRAWN BY	JPN	OCT 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
COPPER FLAT SITE
EXISTING HYDROLOGY
POST QUINTANA MINING

JOB NO. M3 PN-120085
DWG NO. **0000-CI-102**
REV NO. P1
DATE 20 NOV 15

File: P:\2012\120085\CIVIL (544)\544.2 Dwgs\Figures for Permit\Figures 11j-18_19.dwg LAST UPDATE:11/19/2015 1:47 PM BY: JN1690

SITE PLAN

SCALE: 1:500

500' 250' 0' 500' 1000'
1" = 500'
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THEMAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 500'	DATE
DESIGNED BY JPN	OCT 15
DRAWN BY JPN	OCT 15
CHECKED BY	
PROJECT MGR RKZ	
CLIENT APPR.	

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COPPER FLAT PROJECT

SITE GENERAL
CIVIL
GRAYBACK ARROYO DIVERSION THROUGH NMCC PROJECT SITE

JOB NO. M3 PN-120085
DWG NO. 0000-CI-103
REV NO. P2
DATE 20 NOV 15

WATERSHED SUMMARY

WATERSHED ID	AREA (AC)	Q100 (CFS)
1	352.00	708.72
2	117.79	377.27
3	100.96	277.70
4	85.03	280.90
5	107.36	343.86
6	377.55	788.24
7	144.47	405.48
8	92.01	291.83
9	235.91	567.91
10	333.62	660.28
11	397.83	843.39
12	236.95	600.47
13	282.46	641.72
14	161.96	371.20
15	55.11	179.83
16	83.15	204.89

PLAN VIEW
SCALE: 1" = 600'

600 300 0 600 1200
SCALE IN FEET
CONTOUR INTERVAL = 25FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

THE MAC RESOURCES

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 600'	DATE
DESIGNED BY AJE	OCT 15
DRAWN BY AJE	OCT 15
CHECKED BY	
PROJECT MGR	
CLIENT APPR.	

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COPPER FLAT PROJECT

GENERAL SITE CIVIL PRE QUINTANA EXISTING WATERSHED AREAS

JOB NO. M3 PN-120085
DWG NO. 0000-CI-104
REV NO. P2
DATE 09 JUN 16

WATERSHED SUMMARY

WATERSHED ID	AREA (AC)	Q100 (CFS)
1	28.21	117.20
2	106.56	363.66
3	34.99	129.54
4	75.02	259.92
5	124.19	342.49
6	331.22	774.13
7	144.47	411.06
8	92.01	291.83
9	235.91	567.91
10	330.41	663.73
11	397.83	843.39
12	227.42	588.30
13	275.51	649.87
14	79.97	243.90

LEGEND:

- FLOW ARROW
- WATERSHED BOUNDARY
- RUNOFF CONCENTRATION POINT
- WATERCOURSE PATH
- MINE PROPERTY BOUNDARY

PLAN VIEW

SCALE: 1" = 600'

600 300 0 600 1200
SCALE IN FEET
CONTOUR INTERVAL = 25FT
DO NOT SCALE 11x17 DRAWINGS

PRELIMINARY
FOR AGENCY REVIEW

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1" = 600'		DATE
DESIGNED BY	AJE	OCT 15
DRAWN BY	AJE	OCT 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

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COPPER FLAT PROJECT

GENERAL SITE
CIVIL
POST QUINTANA
EXISTING WATERSHED AREAS

JOB NO. M3 PN-120085
DWG NO. **0000-CI-105**
REV NO. P2
DATE 09 JUN 16

APPENDIX A

WATERSHED SUMMARY - EXISTING

Adam Edwards
11/24/2015

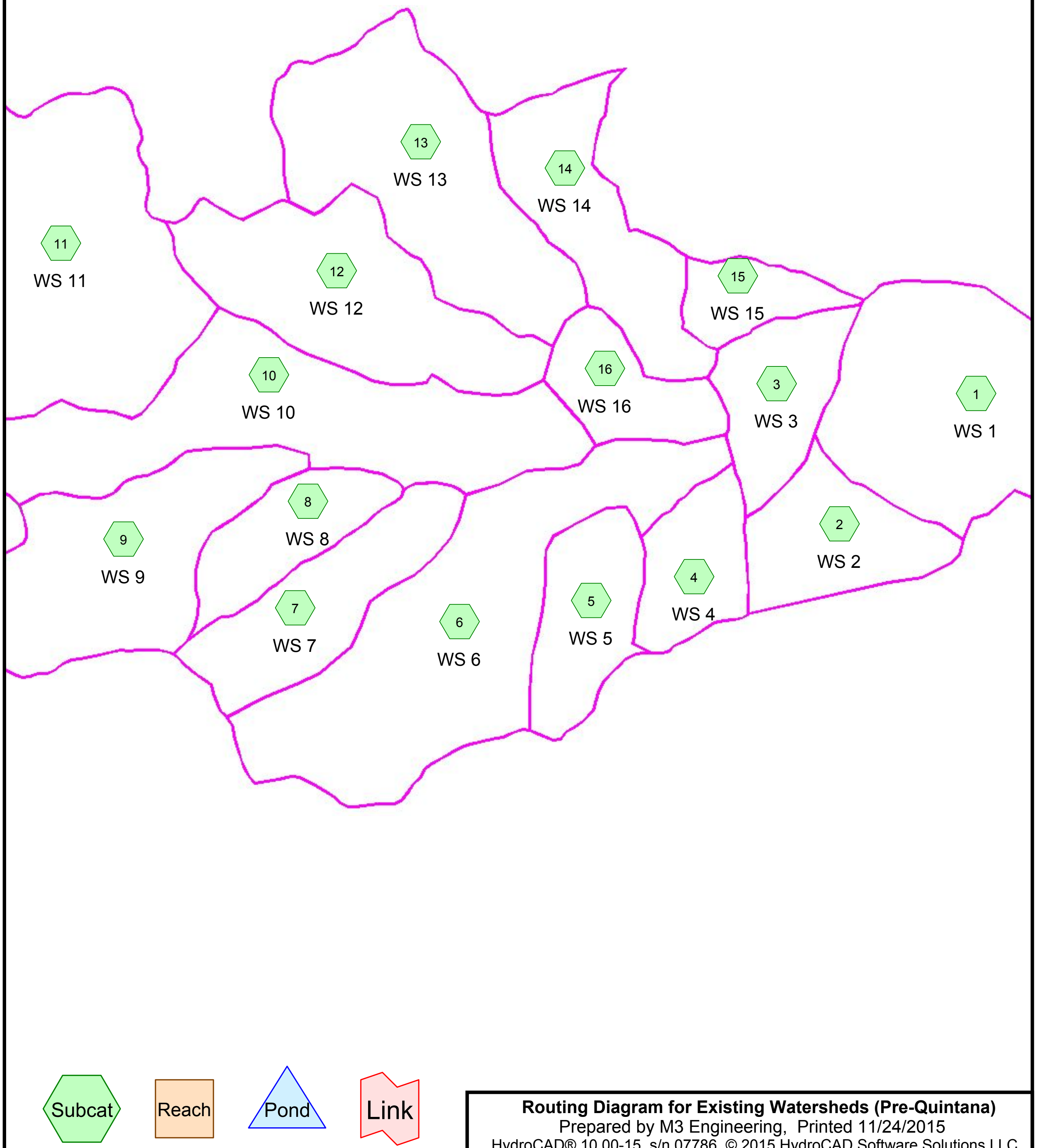
Pre-Quintana Existing

Watershed ID	Area	Total Area	Desert Shrub CN=86	Impervious Area CN=98	Pit Material CN=80	L_c	Avg. S_c	Q_{100} - SCS	Tc Method	Tc	Weighted SCS CN	Soil Type
--	*sq. feet*	*acres*	*acres*	*acres*	*acres*	*ft*	*ft/ft*	*cfs*	--	*min*	--	--
1	15,333,000	352.00	316.80	35.20	0.00	7,396	0.164	708.72	SCS Lag	30.70	87	D
2	5,131,142	117.79	106.01	11.78	0.00	3,175	0.231	377.27	SCS Lag	13.10	87	D
3	4,397,931	100.96	90.87	10.10	0.00	4,242	0.194	277.70	SCS Lag	18.10	87	D
4	3,703,864	85.03	76.53	8.50	0.00	3,389	0.304	280.9	SCS Lag	12.10	87	D
5	4,676,541	107.36	96.62	10.74	0.00	4,088	0.346	343.86	SCS Lag	13.10	87	D
6	16,446,115	377.55	339.79	37.75	0.00	9,338	0.267	788.24	SCS Lag	29.00	87	D
7	6,292,945	144.47	130.02	14.45	0.00	5,064	0.277	405.48	SCS Lag	17.40	87	D
8	4,008,126	92.01	82.81	9.20	0.00	3,617	0.273	291.83	SCS Lag	13.40	87	D
9	10,276,128	235.91	212.32	23.59	0.00	7,005	0.267	567.91	SCS Lag	23.00	87	D
10	14,532,660	333.62	300.26	33.36	0.00	10,278	0.262	660.28	SCS Lag	31.50	87	D
11	17,329,719	397.83	358.05	39.78	0.00	7,149	0.182	843.39	SCS Lag	28.30	87	D
12	10,321,490	236.95	213.25	23.69	0.00	6,590	0.292	600.47	SCS Lag	21.00	87	D
13	12,303,894	282.46	254.21	28.25	0.00	7,744	0.258	641.72	SCS Lag	25.30	87	D
14	7,054,905	161.96	145.76	16.20	0.00	5,608	0.160	371.2	SCS Lag	24.90	87	D
15	2,400,616	55.11	49.60	5.51	0.00	2,582	0.184	179.83	SCS Lag	12.50	87	D
16	3,621,863	83.15	74.83	8.31	0.00	3,076	0.078	204.89	SCS Lag	22.10	87	D

Post-Quintana Existing

Watershed ID	Area	Total Area	Desert Shrub CN=86	Impervious Area CN=98	Pit Material CN=80	L_c	Avg. S_c	Q_{100} - SCS	Tc Method	Tc	Weighted SCS CN	Soil Type
--	*sq. feet*	*acres*	*acres*	*acres*	*acres*	*ft*	*ft/ft*	*cfs*	--	*min*	--	--
1 (pond)	1,228,747	28.21	25.39	2.82	0.00	0	0.249	**117.20**	Minimum	5.00	87	D
2	4,641,978	106.56	95.91	10.66	0.00	3,068	0.314	**363.66**	SCS Lag	11.00	87	D
3	1,523,968	34.99	31.49	3.50	0.00	1,603	0.177	**129.54**	SCS Lag	8.70	87	D
4	3,267,841	75.02	67.52	7.50	0.00	3,047	0.339	**259.92**	SCS Lag	10.50	87	D
5	5,409,568	124.19	111.77	12.42	0.00	5,976	0.340	**342.49**	SCS Lag	18.00	87	D
6	14,427,914	331.22	298.10	33.12	0.00	8,173	0.310	**774.13**	SCS Lag	24.20	87	D
7	6,292,945	144.47	130.02	14.45	0.00	5,064	0.296	**411.06**	SCS Lag	16.90	87	D
8	4,008,126	92.01	82.81	9.20	0.00	3,617	0.274	**291.83**	SCS Lag	13.40	87	D
9	10,276,128	235.91	212.32	23.59	0.00	7,005	0.268	**567.91**	SCS Lag	23.00	87	D
10	14,392,904	330.41	297.37	33.04	0.00	10,278	0.276	**663.73**	SCS Lag	30.80	87	D
11	17,329,719	397.83	358.05	39.78	0.00	7,149	0.182	**843.39**	SCS Lag	28.30	87	D
12	9,906,558	227.42	204.68	22.74	0.00	6,590	0.315	**588.30**	SCS Lag	20.20	87	D
13	12,001,134	275.51	247.96	27.55	0.00	7,744	0.293	**649.87**	SCS Lag	23.80	87	D
14	3,483,496	79.97	71.97	8.00	0.00	3,545	0.224	**243.90**	SCS Lag	14.60	87	D

APPENDIX B



Routing Diagram for Existing Watersheds (Pre-Quintana)
Prepared by M3 Engineering, Printed 11/24/2015
HydroCAD® 10.00-15 s/n 07786 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2,847.730	86	Desert shrub range, Fair, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)
316.410	98	Impervious, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)
3,164.140	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
3,164.140	HSG D	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
0.000	Other	
3,164.140		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2,847.730	0.000	2,847.730	Desert shrub range, Fair	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
0.000	0.000	0.000	316.410	0.000	316.410	Impervious	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
0.000	**0.000**	**0.000**	**3,164.140**	**0.000**	**3,164.140**	**TOTAL AREA**	

Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=352.000 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,396' Slope=0.1640 '/' Tc=30.7 min CN=87 Runoff=708.72 cfs 69.315 af

Subcatchment2: WS 2 Runoff Area=117.790 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,175' Slope=0.2310 '/' Tc=13.1 min CN=87 Runoff=377.27 cfs 23.195 af

Subcatchment3: WS 3 Runoff Area=100.970 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=4,242' Slope=0.1940 '/' Tc=18.1 min CN=87 Runoff=277.70 cfs 19.883 af

Subcatchment4: WS 4 Runoff Area=85.030 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,389' Slope=0.3050 '/' Tc=12.1 min CN=87 Runoff=280.90 cfs 16.744 af

Subcatchment5: WS 5 Runoff Area=107.360 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=4,088' Slope=0.3460 '/' Tc=13.1 min CN=87 Runoff=343.86 cfs 21.141 af

Subcatchment6: WS 6 Runoff Area=377.540 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=9,338' Slope=0.2670 '/' Tc=29.0 min CN=87 Runoff=788.24 cfs 74.344 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,064' Slope=0.2780 '/' Tc=17.4 min CN=87 Runoff=405.48 cfs 28.449 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=291.83 cfs 18.118 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=567.91 cfs 46.455 af

Subcatchment10: WS 10 Runoff Area=333.620 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=10,278' Slope=0.2630 '/' Tc=31.5 min CN=87 Runoff=660.28 cfs 65.695 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=843.39 cfs 78.339 af

Subcatchment12: WS 12 Runoff Area=236.940 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=6,590' Slope=0.2920 '/' Tc=21.0 min CN=87 Runoff=600.47 cfs 46.657 af

Subcatchment13: WS 13 Runoff Area=282.460 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,744' Slope=0.2590 '/' Tc=25.3 min CN=87 Runoff=641.72 cfs 55.621 af

Subcatchment14: WS 14 Runoff Area=161.960 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,608' Slope=0.1600 '/' Tc=24.9 min CN=87 Runoff=371.20 cfs 31.893 af

Subcatchment15: WS 15 Runoff Area=55.110 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=2,582' Slope=0.1840 '/' Tc=12.5 min CN=87 Runoff=179.83 cfs 10.852 af

Subcatchment16: WS 16 Runoff Area=83.140 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,076' Slope=0.0780 '/' Tc=22.1 min CN=87 Runoff=204.89 cfs 16.372 af

Total Runoff Area = 3,164.140 ac Runoff Volume = 623.071 af Average Runoff Depth = 2.36"
90.00% Pervious = 2,847.730 ac 10.00% Impervious = 316.410 ac

Summary for Subcatchment 1: WS 1

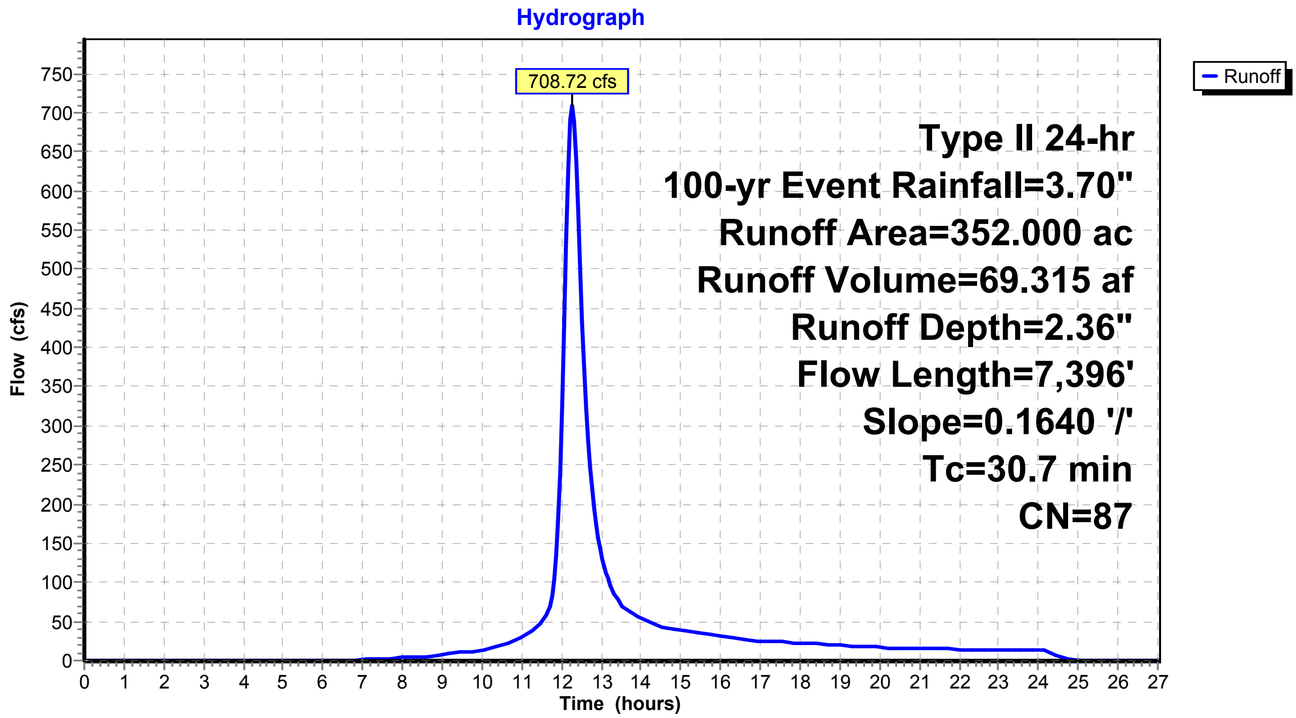
Runoff = 708.72 cfs @ 12.25 hrs, Volume= 69.315 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	316.800	86	Desert shrub range, Fair, HSG D
*	35.200	98	Impervious, HSG D
	352.000	87	Weighted Average
	316.800		90.00% Pervious Area
	35.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	7,396	0.1640	4.02		**Lag/CN Method,**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

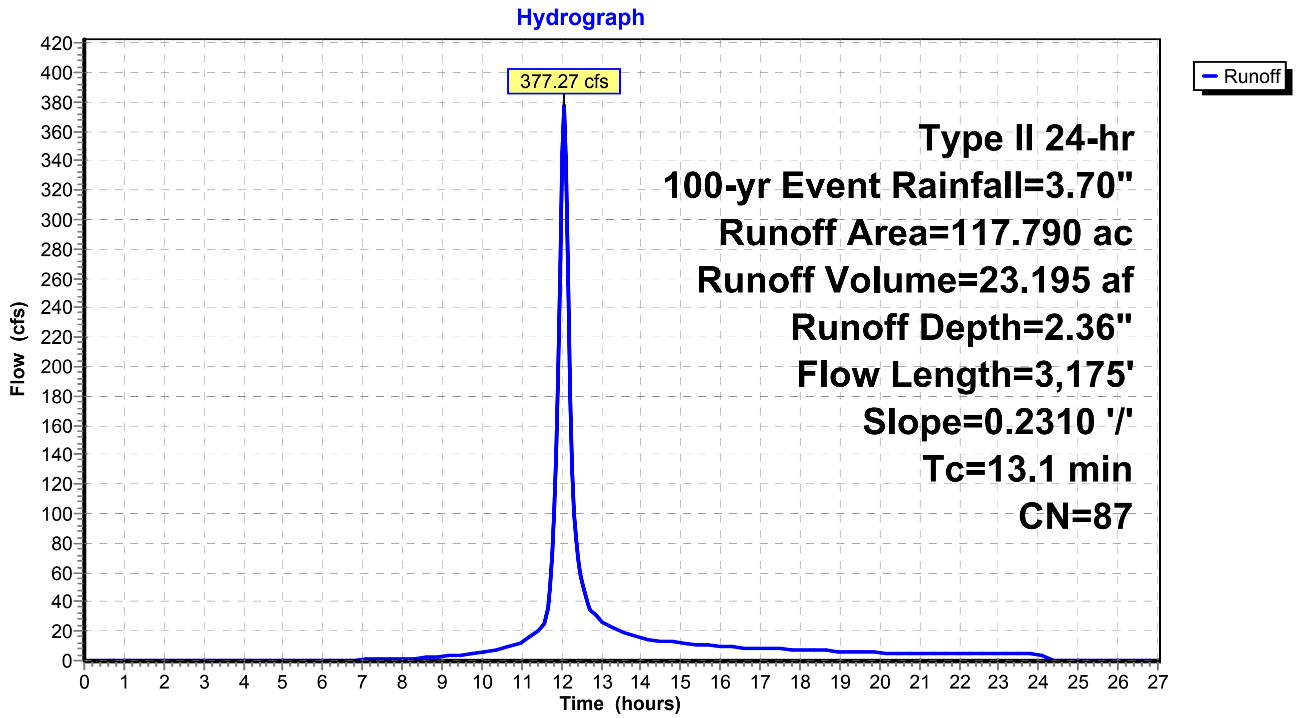
Runoff = 377.27 cfs @ 12.05 hrs, Volume= 23.195 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	106.010	86	Desert shrub range, Fair, HSG D
*	11.780	98	Impervious, HSG D
	117.790	87	Weighted Average
	106.010		90.00% Pervious Area
	11.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	3,175	0.2310	4.03		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

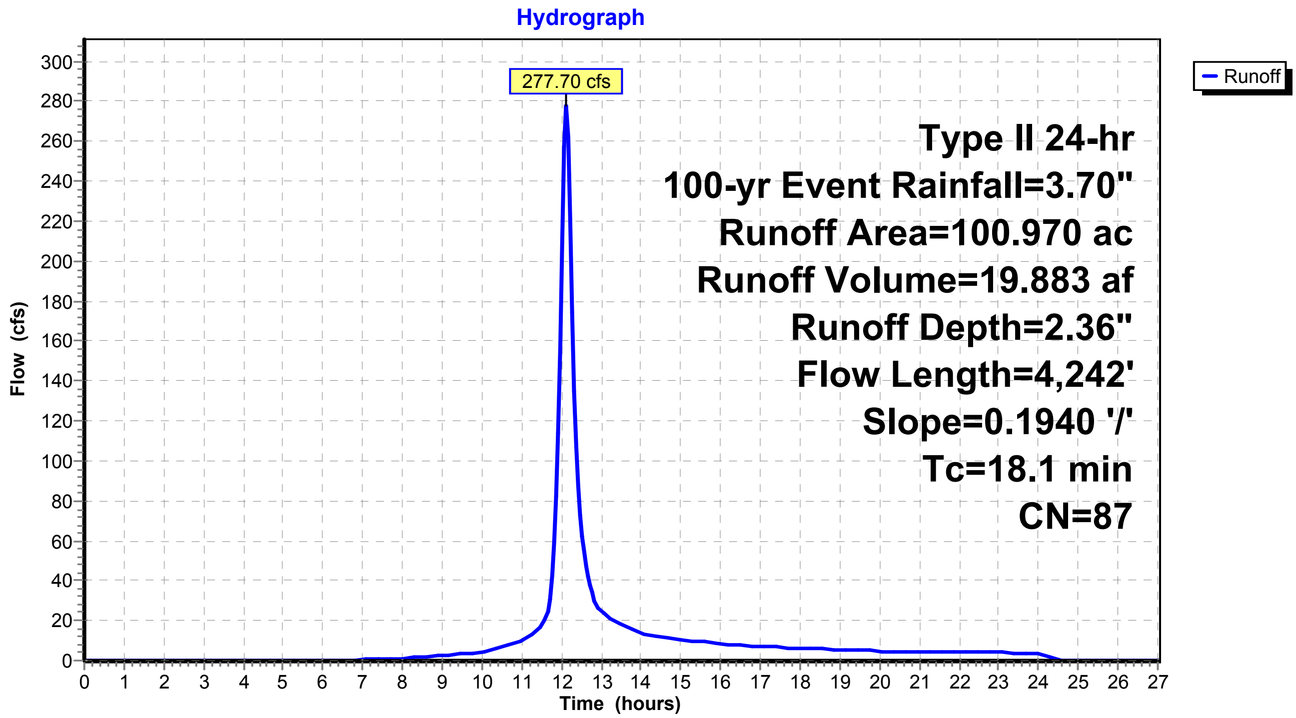
Runoff = 277.70 cfs @ 12.10 hrs, Volume= 19.883 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	90.870	86	Desert shrub range, Fair, HSG D
*	10.100	98	Impervious, HSG D
	100.970	87	Weighted Average
	90.870		90.00% Pervious Area
	10.100		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	4,242	0.1940	3.91		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

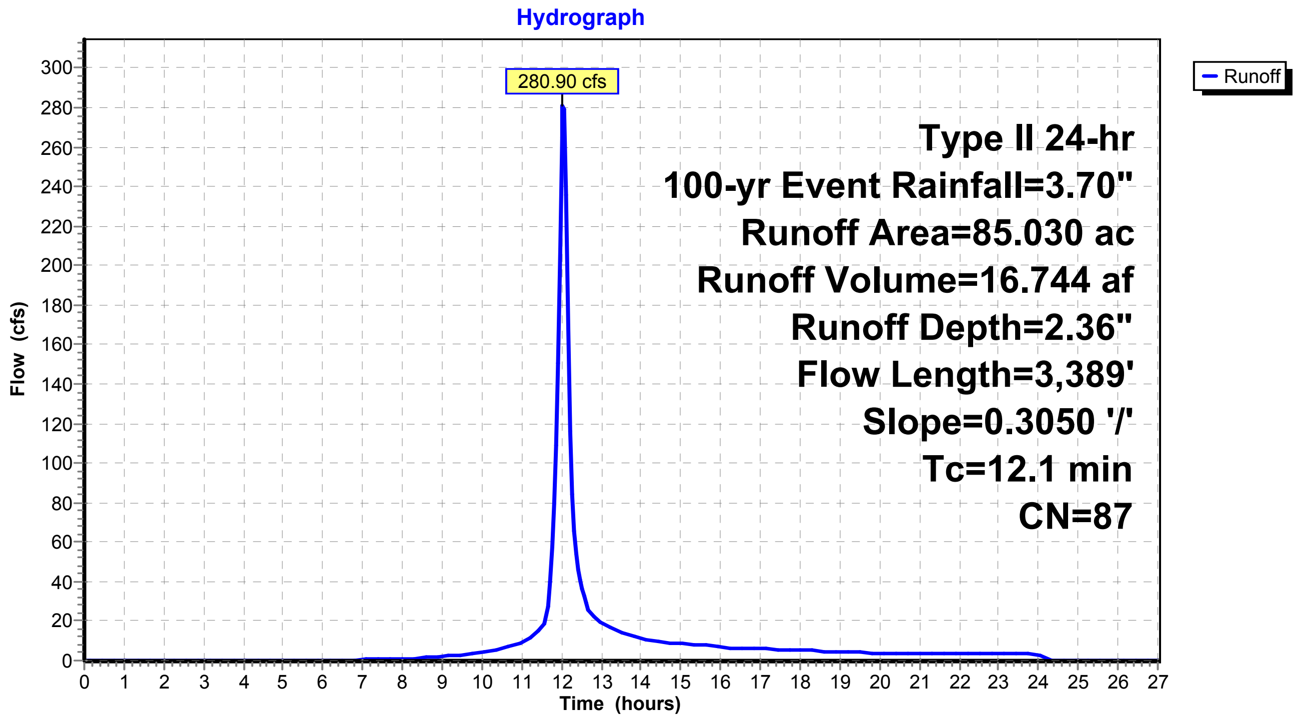
Runoff = 280.90 cfs @ 12.04 hrs, Volume= 16.744 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	76.530	86	Desert shrub range, Fair, HSG D
*	8.500	98	Impervious, HSG D
	85.030	87	Weighted Average
	76.530		90.00% Pervious Area
	8.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	3,389	0.3050	4.69		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

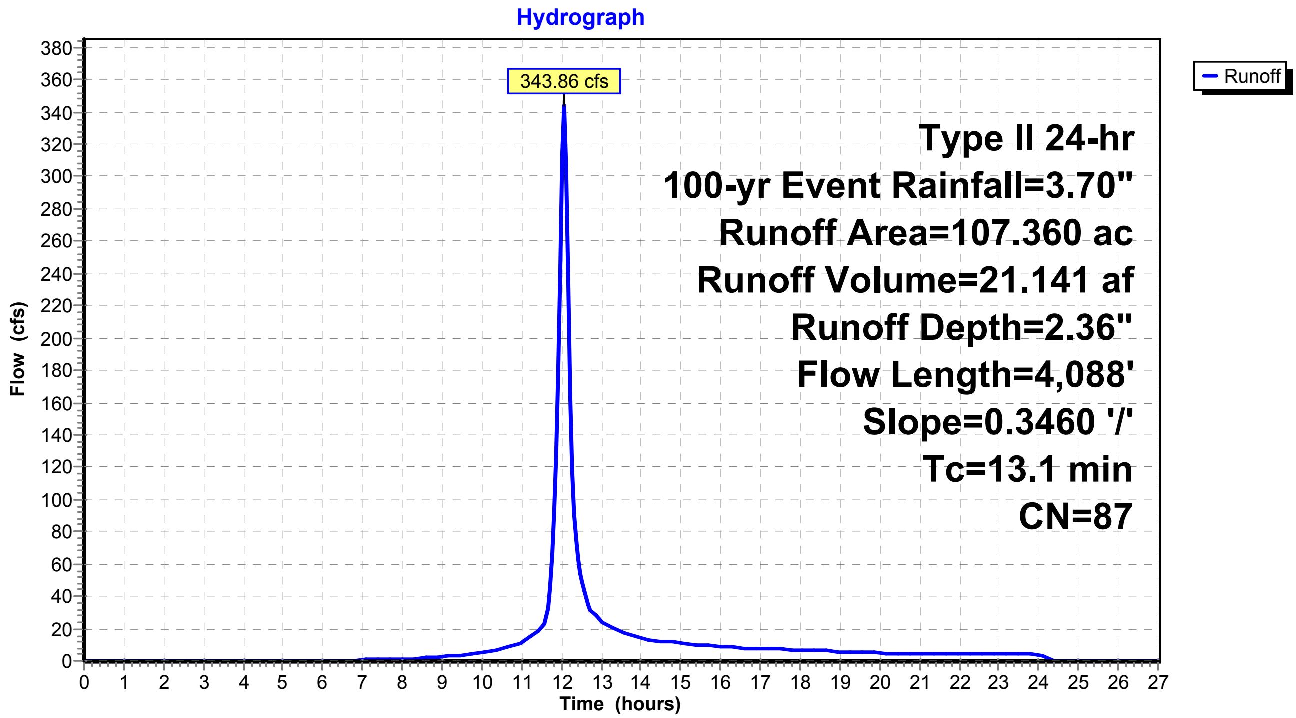
Runoff = 343.86 cfs @ 12.05 hrs, Volume= 21.141 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	96.620	86	Desert shrub range, Fair, HSG D
*	10.740	98	Impervious, HSG D
	107.360	87	Weighted Average
	96.620		90.00% Pervious Area
	10.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	4,088	0.3460	5.18		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

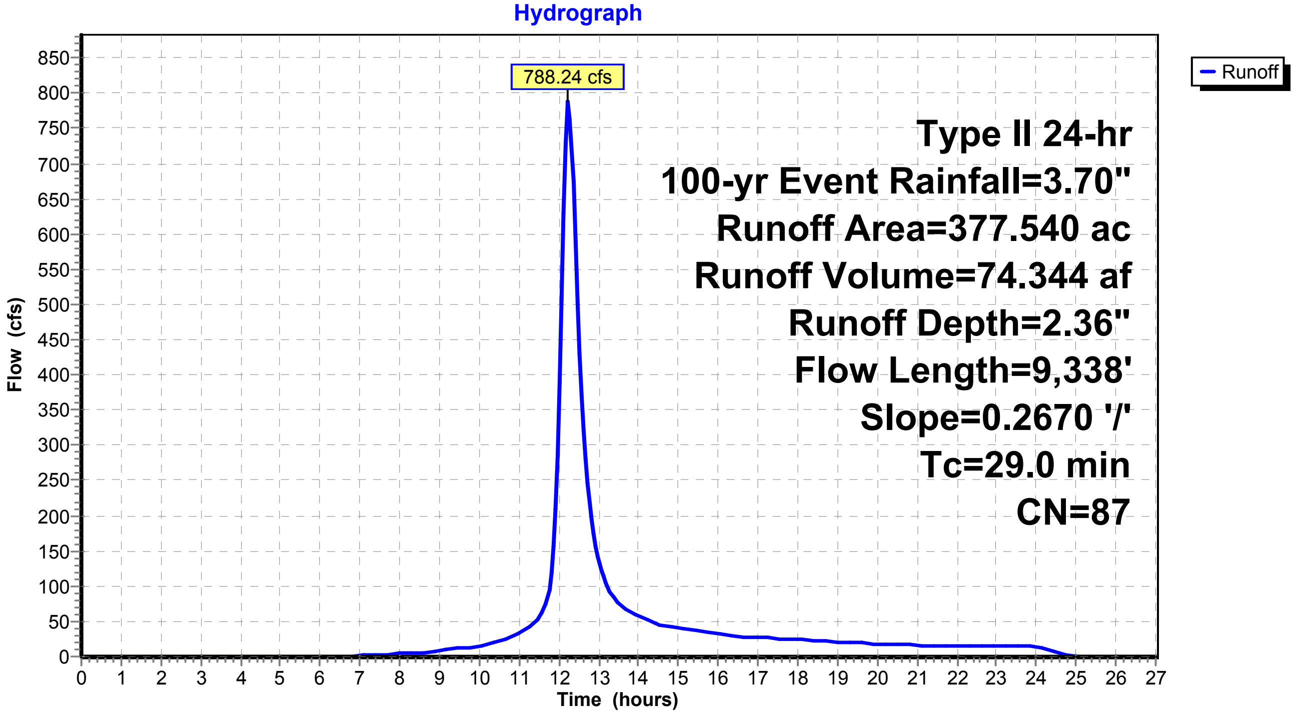
Runoff = 788.24 cfs @ 12.23 hrs, Volume= 74.344 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	339.790	86	Desert shrub range, Fair, HSG D
*	37.750	98	Impervious, HSG D
	377.540	87	Weighted Average
	339.790		90.00% Pervious Area
	37.750		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	9,338	0.2670	5.37		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

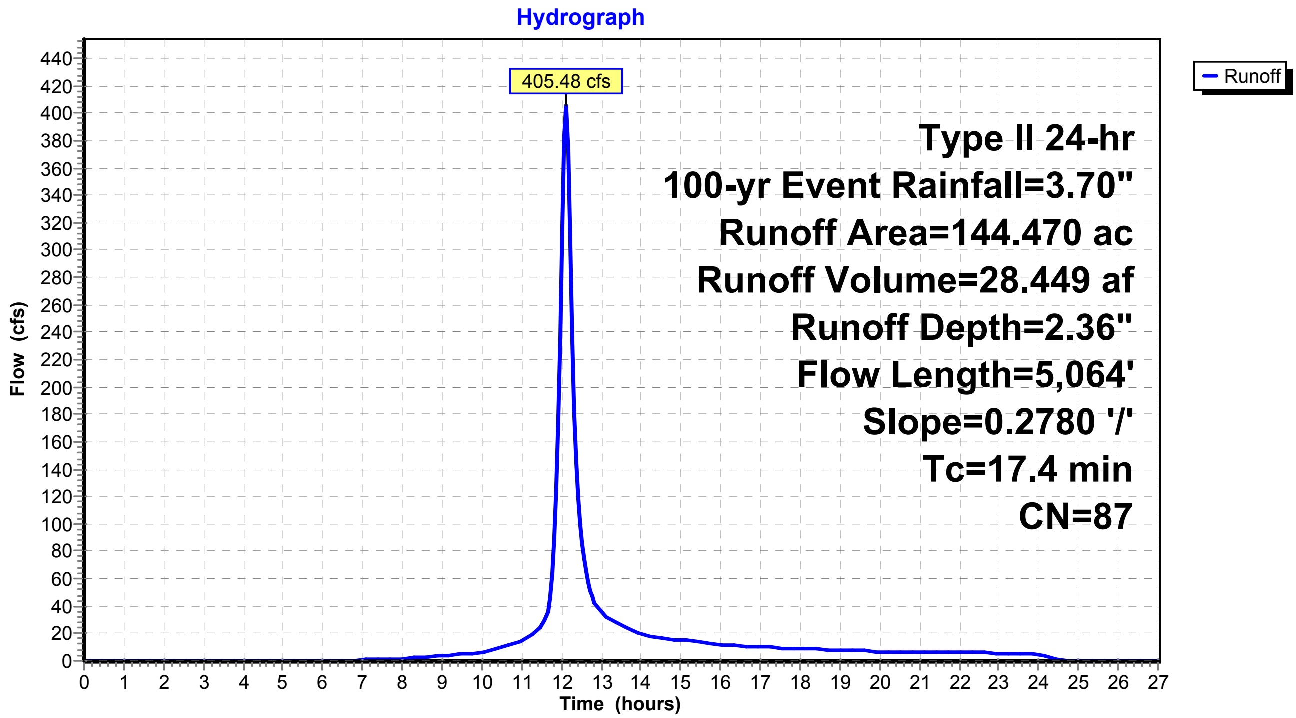
Runoff = 405.48 cfs @ 12.10 hrs, Volume= 28.449 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	5,064	0.2780	4.85		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

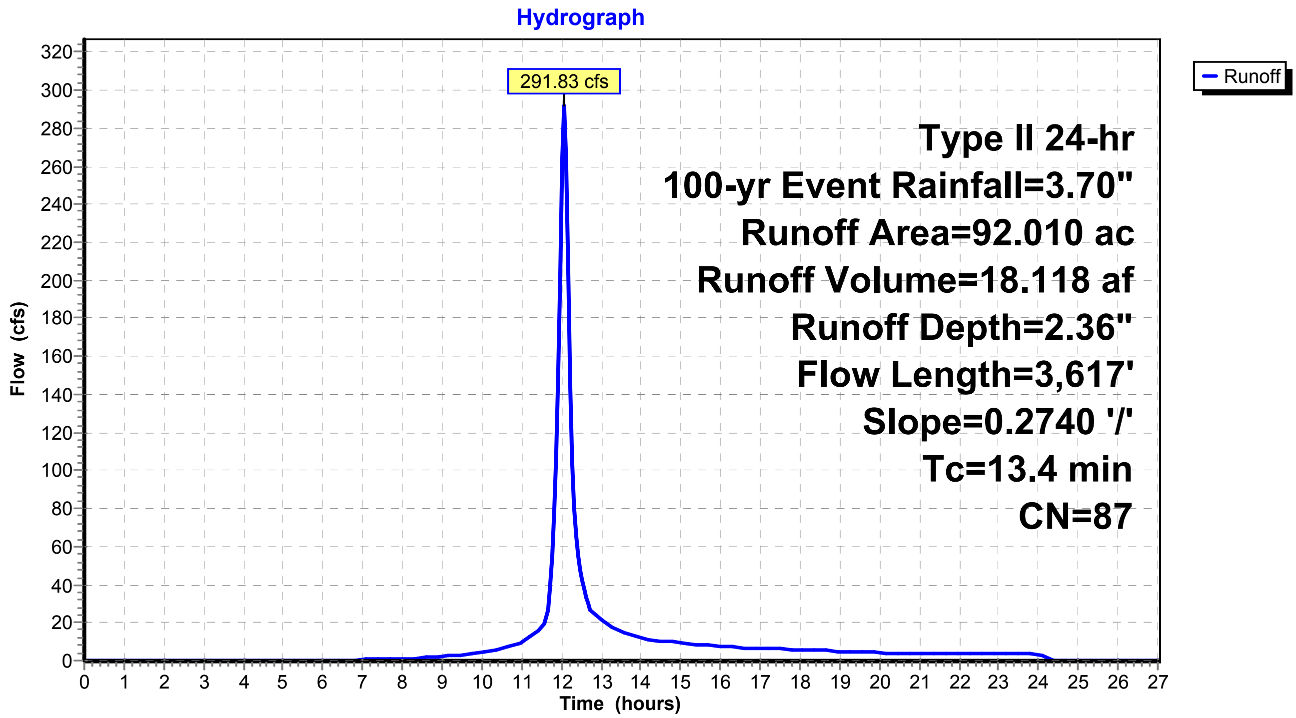
Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

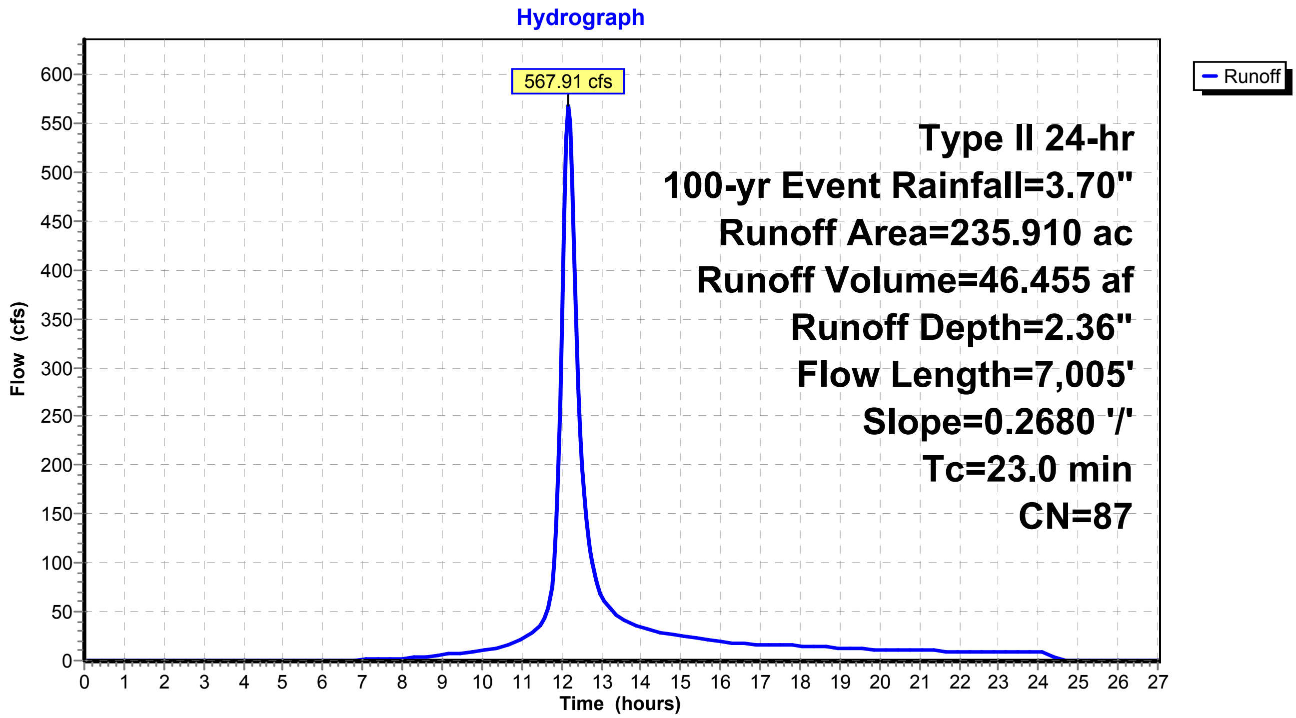
Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

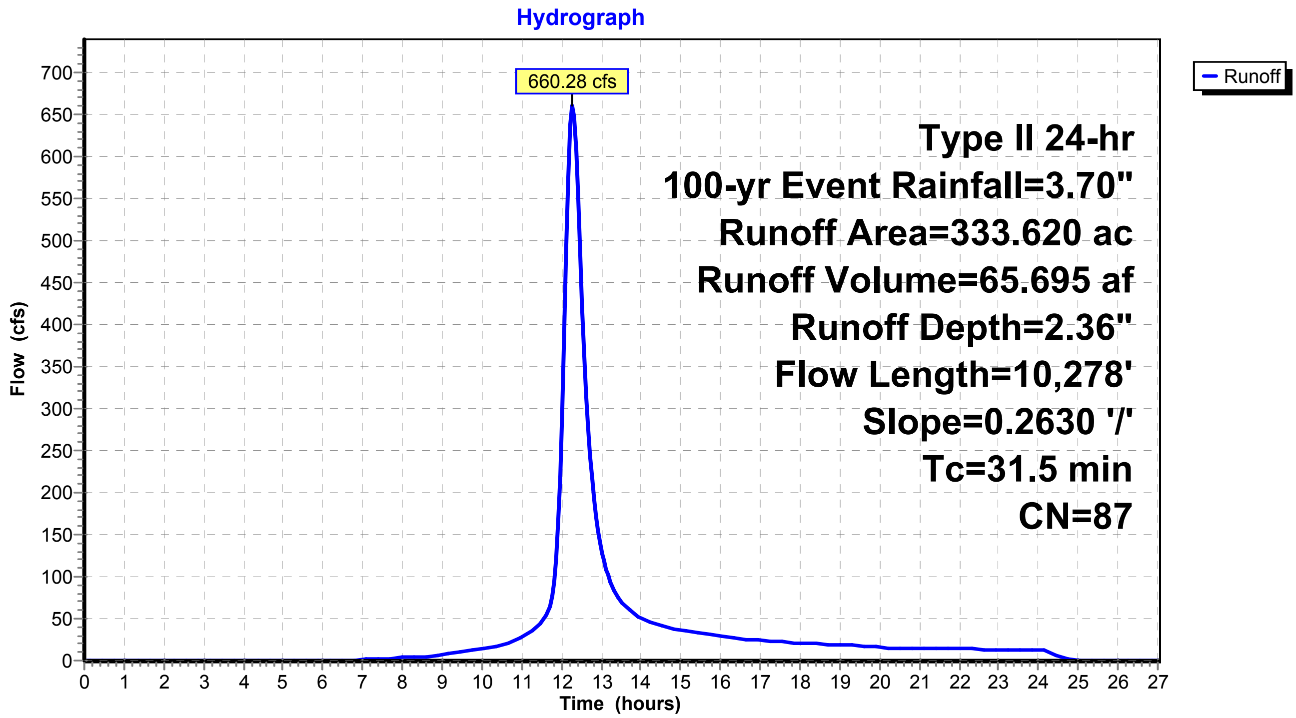
Runoff = 660.28 cfs @ 12.26 hrs, Volume= 65.695 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	300.260	86	Desert shrub range, Fair, HSG D
*	33.360	98	Impervious, HSG D
	333.620	87	Weighted Average
	300.260		90.00% Pervious Area
	33.360		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	10,278	0.2630	5.43		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

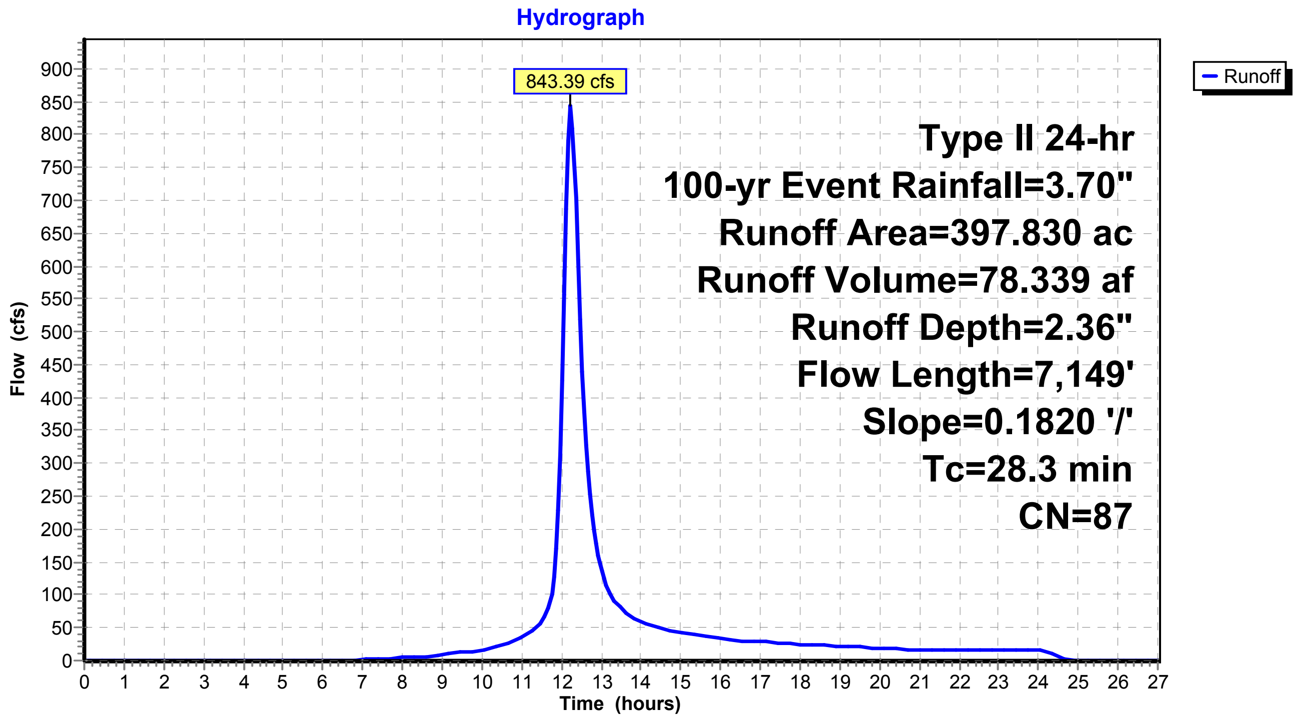
Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

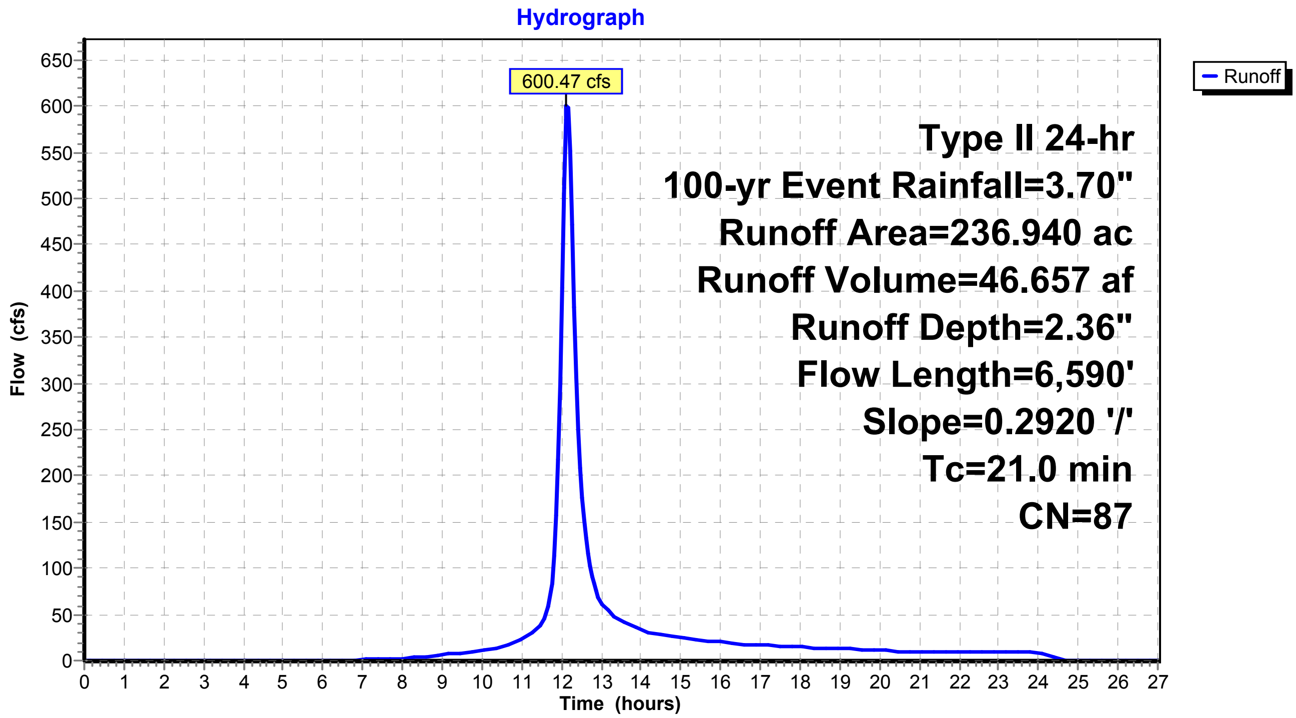
Runoff = 600.47 cfs @ 12.14 hrs, Volume= 46.657 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	213.250	86	Desert shrub range, Fair, HSG D
*	23.690	98	Impervious, HSG D
	236.940	87	Weighted Average
	213.250		90.00% Pervious Area
	23.690		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	6,590	0.2920	5.24		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

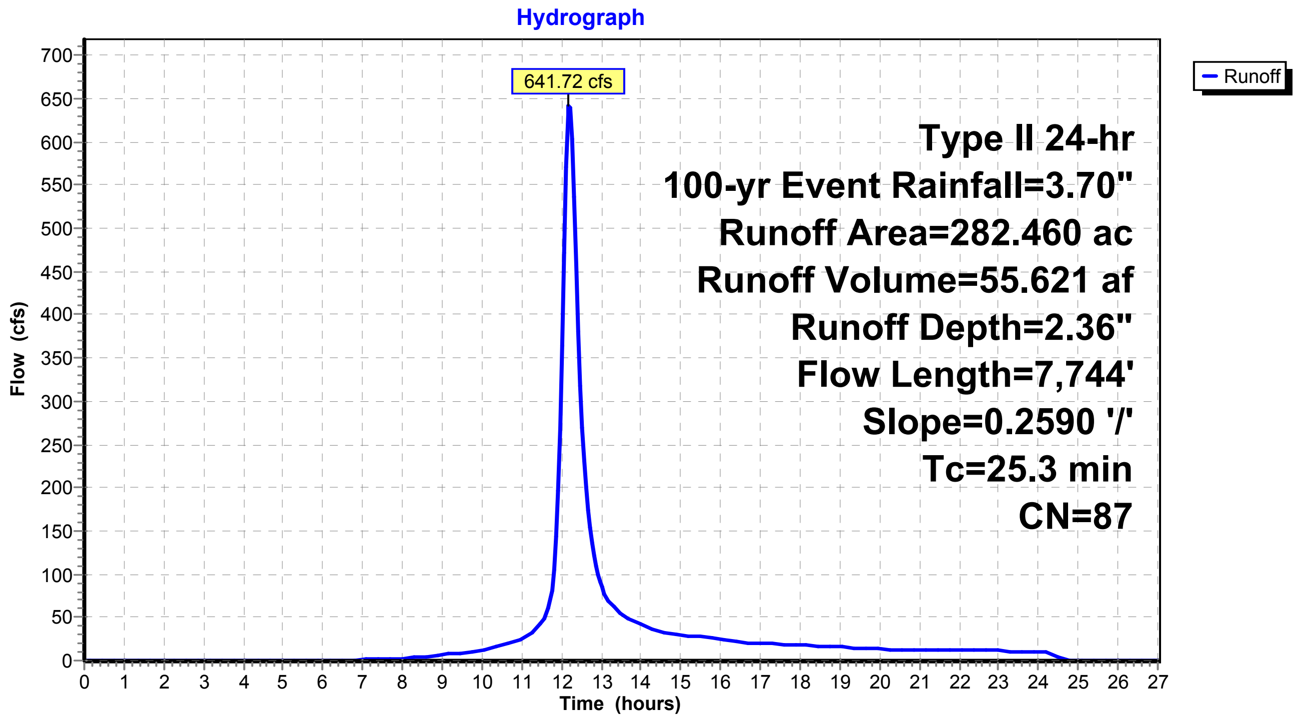
Runoff = 641.72 cfs @ 12.18 hrs, Volume= 55.621 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	254.210	86	Desert shrub range, Fair, HSG D
*	28.250	98	Impervious, HSG D
	282.460	87	Weighted Average
	254.210		90.00% Pervious Area
	28.250		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.3	7,744	0.2590	5.10		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

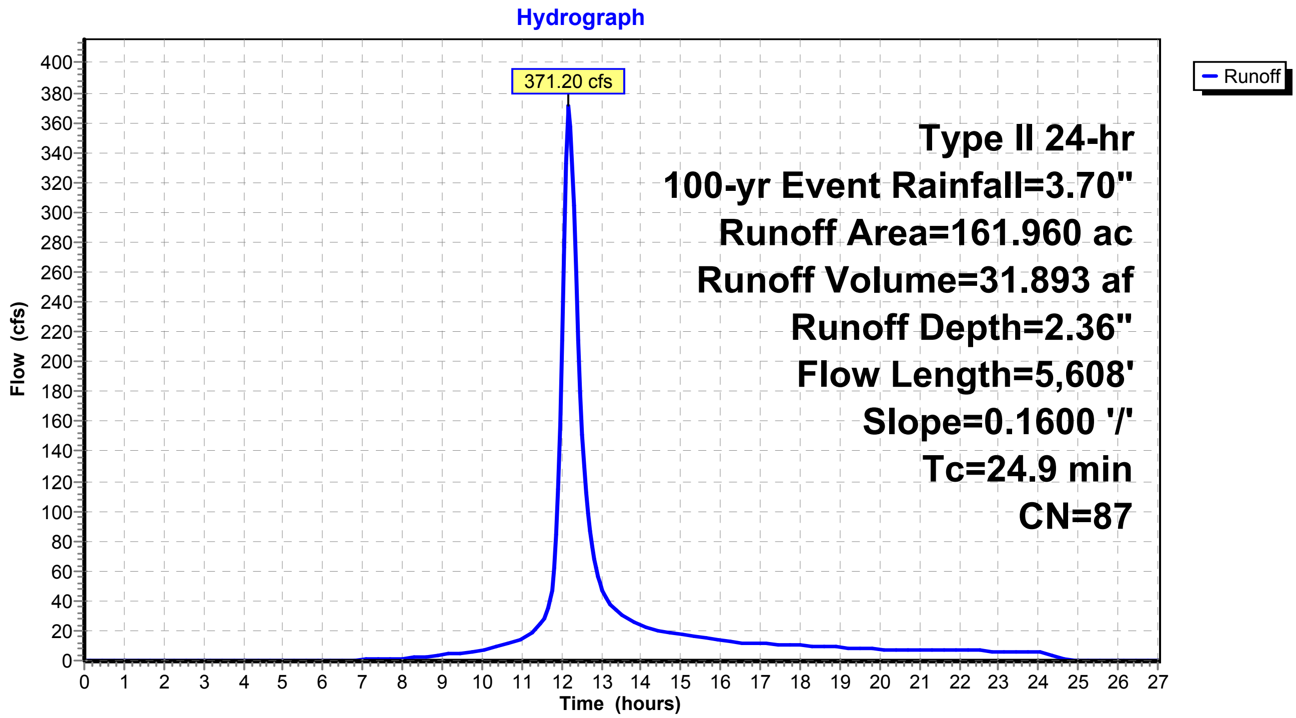
Runoff = 371.20 cfs @ 12.18 hrs, Volume= 31.893 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	145.760	86	Desert shrub range, Fair, HSG D
*	16.200	98	Impervious, HSG D
	161.960	87	Weighted Average
	145.760		90.00% Pervious Area
	16.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	5,608	0.1600	3.75		**Lag/CN Method,**

Subcatchment 14: WS 14



Summary for Subcatchment 15: WS 15

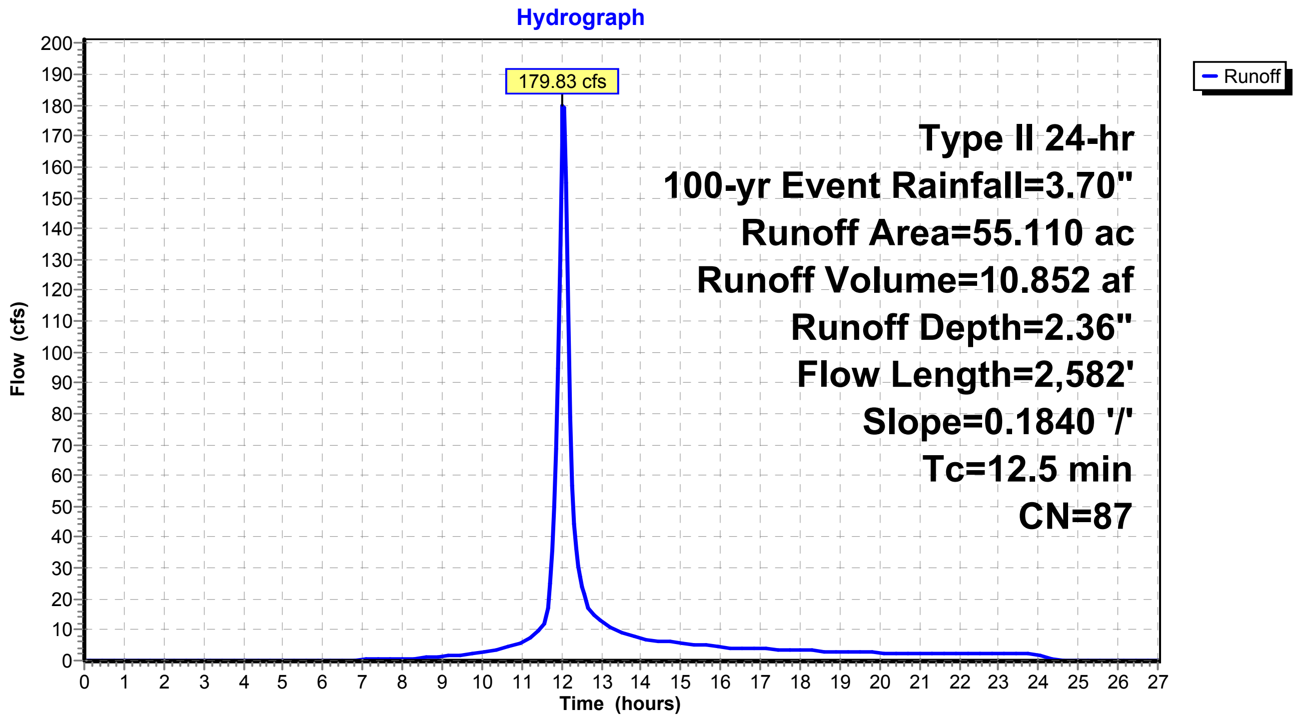
Runoff = 179.83 cfs @ 12.04 hrs, Volume= 10.852 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	49.600	86	Desert shrub range, Fair, HSG D
*	5.510	98	Impervious, HSG D
	55.110	87	Weighted Average
	49.600		90.00% Pervious Area
	5.510		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	2,582	0.1840	3.45		**Lag/CN Method,**

Subcatchment 15: WS 15



Summary for Subcatchment 16: WS 16

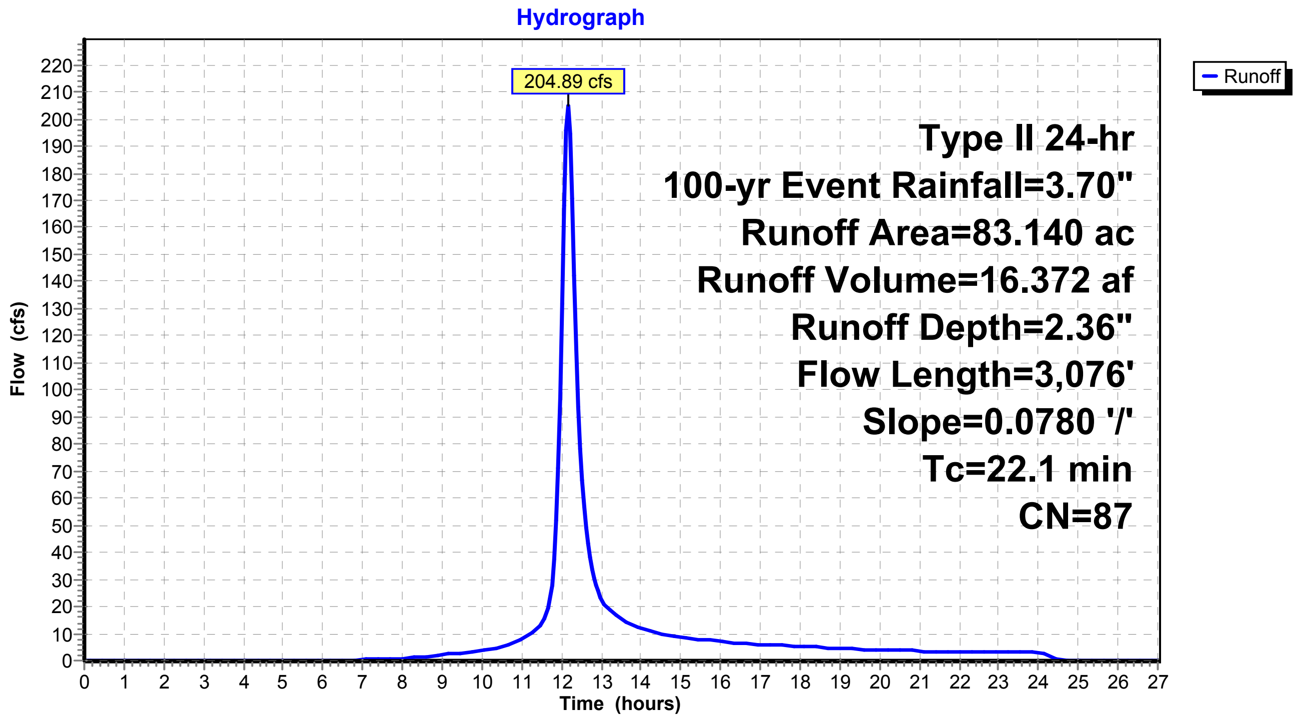
Runoff = 204.89 cfs @ 12.15 hrs, Volume= 16.372 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	74.830	86	Desert shrub range, Fair, HSG D
*	8.310	98	Impervious, HSG D
	83.140	87	Weighted Average
	74.830		90.00% Pervious Area
	8.310		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	3,076	0.0780	2.32		**Lag/CN Method,**

Subcatchment 16: WS 16



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=352.000 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,396' Slope=0.1640 '/' Tc=30.7 min CN=87 Runoff=813.94 cfs 79.767 af

Subcatchment2: WS 2 Runoff Area=117.790 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,175' Slope=0.2310 '/' Tc=13.1 min CN=87 Runoff=432.11 cfs 26.693 af

Subcatchment3: WS 3 Runoff Area=100.970 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=4,242' Slope=0.1940 '/' Tc=18.1 min CN=87 Runoff=318.42 cfs 22.881 af

Subcatchment4: WS 4 Runoff Area=85.030 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,389' Slope=0.3050 '/' Tc=12.1 min CN=87 Runoff=321.62 cfs 19.269 af

Subcatchment5: WS 5 Runoff Area=107.360 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=4,088' Slope=0.3460 '/' Tc=13.1 min CN=87 Runoff=393.85 cfs 24.329 af

Subcatchment6: WS 6 Runoff Area=377.540 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=9,338' Slope=0.2670 '/' Tc=29.0 min CN=87 Runoff=906.94 cfs 85.555 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,064' Slope=0.2780 '/' Tc=17.4 min CN=87 Runoff=464.86 cfs 32.739 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=334.29 cfs 20.851 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=651.70 cfs 53.460 af

Subcatchment10: WS 10 Runoff Area=333.620 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=10,278' Slope=0.2630 '/' Tc=31.5 min CN=87 Runoff=758.38 cfs 75.602 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=968.42 cfs 90.153 af

Subcatchment12: WS 12 Runoff Area=236.940 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=6,590' Slope=0.2920 '/' Tc=21.0 min CN=87 Runoff=688.82 cfs 53.693 af

Subcatchment13: WS 13 Runoff Area=282.460 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,744' Slope=0.2590 '/' Tc=25.3 min CN=87 Runoff=736.61 cfs 64.009 af

Subcatchment14: WS 14 Runoff Area=161.960 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,608' Slope=0.1600 '/' Tc=24.9 min CN=87 Runoff=426.07 cfs 36.702 af

Subcatchment15: WS 15 Runoff Area=55.110 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=2,582' Slope=0.1840 '/' Tc=12.5 min CN=87 Runoff=205.93 cfs 12.489 af

Subcatchment16: WS 16 Runoff Area=83.140 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,076' Slope=0.0780 '/' Tc=22.1 min CN=87 Runoff=235.08 cfs 18.841 af

Total Runoff Area = 3,164.140 ac Runoff Volume = 717.031 af Average Runoff Depth = 2.72"
90.00% Pervious = 2,847.730 ac 10.00% Impervious = 316.410 ac

Summary for Subcatchment 1: WS 1

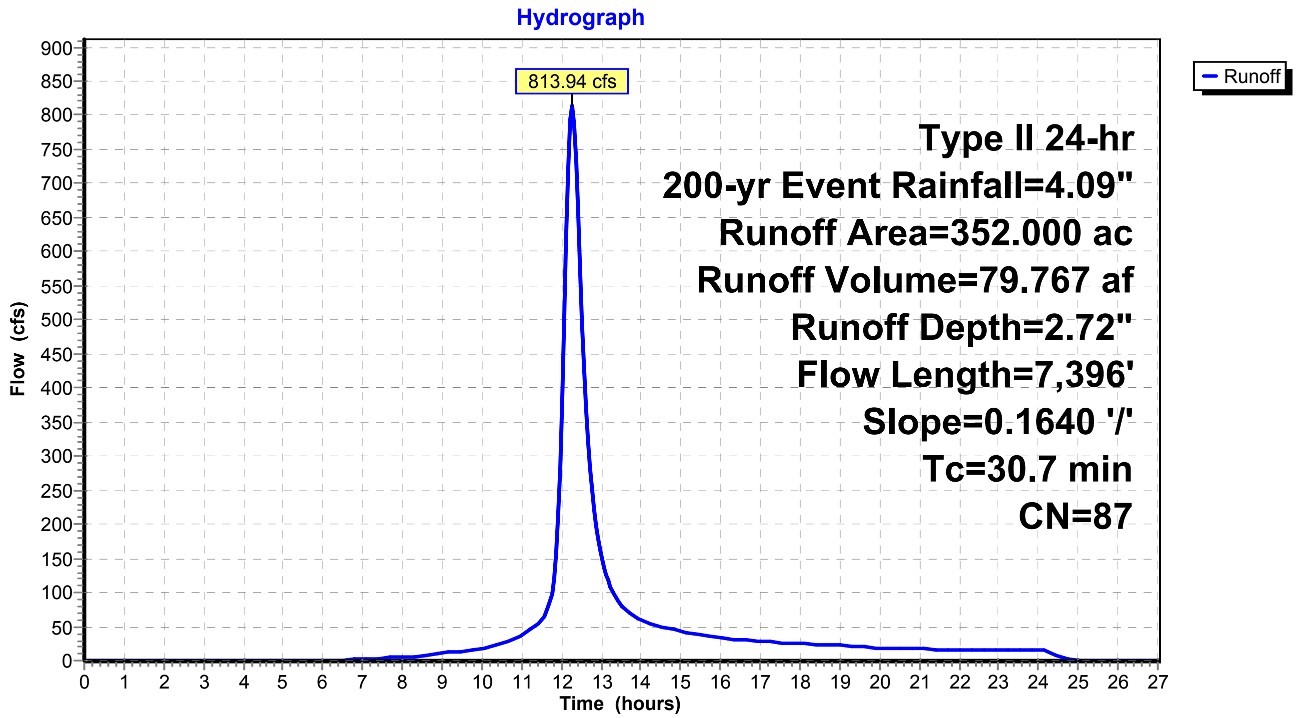
Runoff = 813.94 cfs @ 12.25 hrs, Volume= 79.767 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	316.800	86	Desert shrub range, Fair, HSG D
*	35.200	98	Impervious, HSG D
	352.000	87	Weighted Average
	316.800		90.00% Pervious Area
	35.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	7,396	0.1640	4.02		**Lag/CN Method,**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

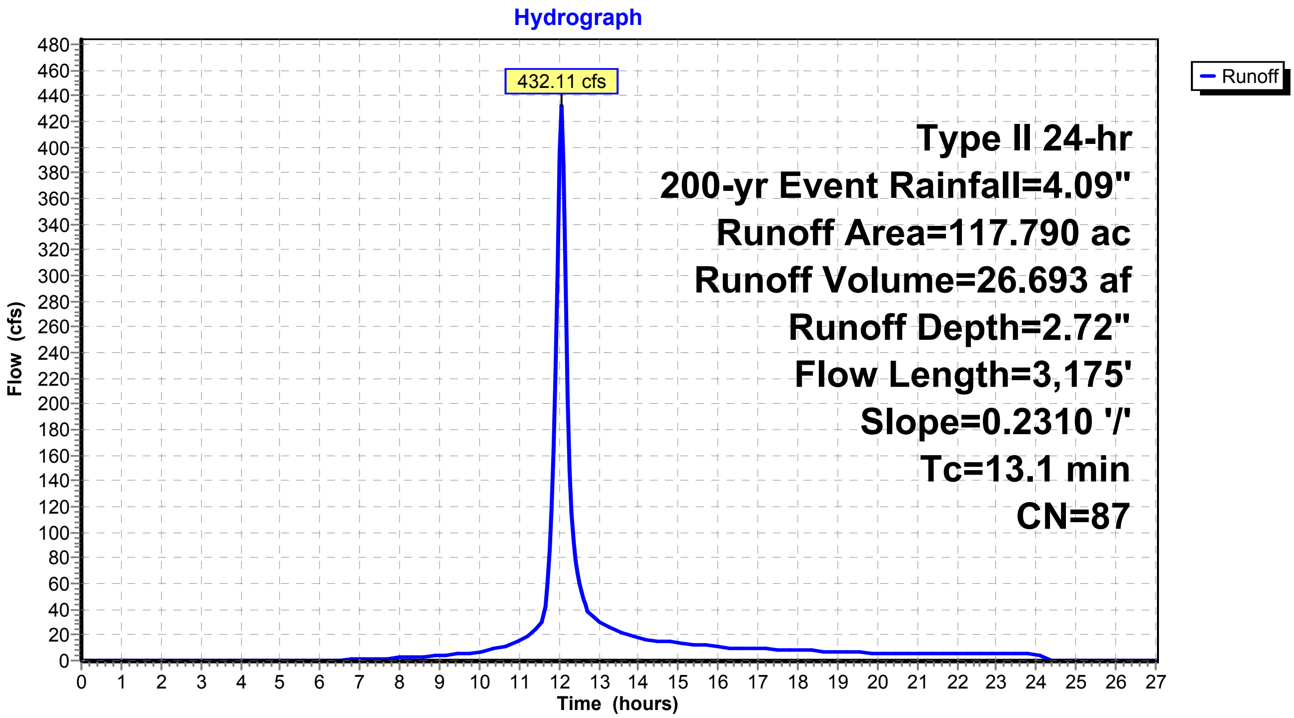
Runoff = 432.11 cfs @ 12.05 hrs, Volume= 26.693 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	106.010	86	Desert shrub range, Fair, HSG D
*	11.780	98	Impervious, HSG D
	117.790	87	Weighted Average
	106.010		90.00% Pervious Area
	11.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	3,175	0.2310	4.03		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

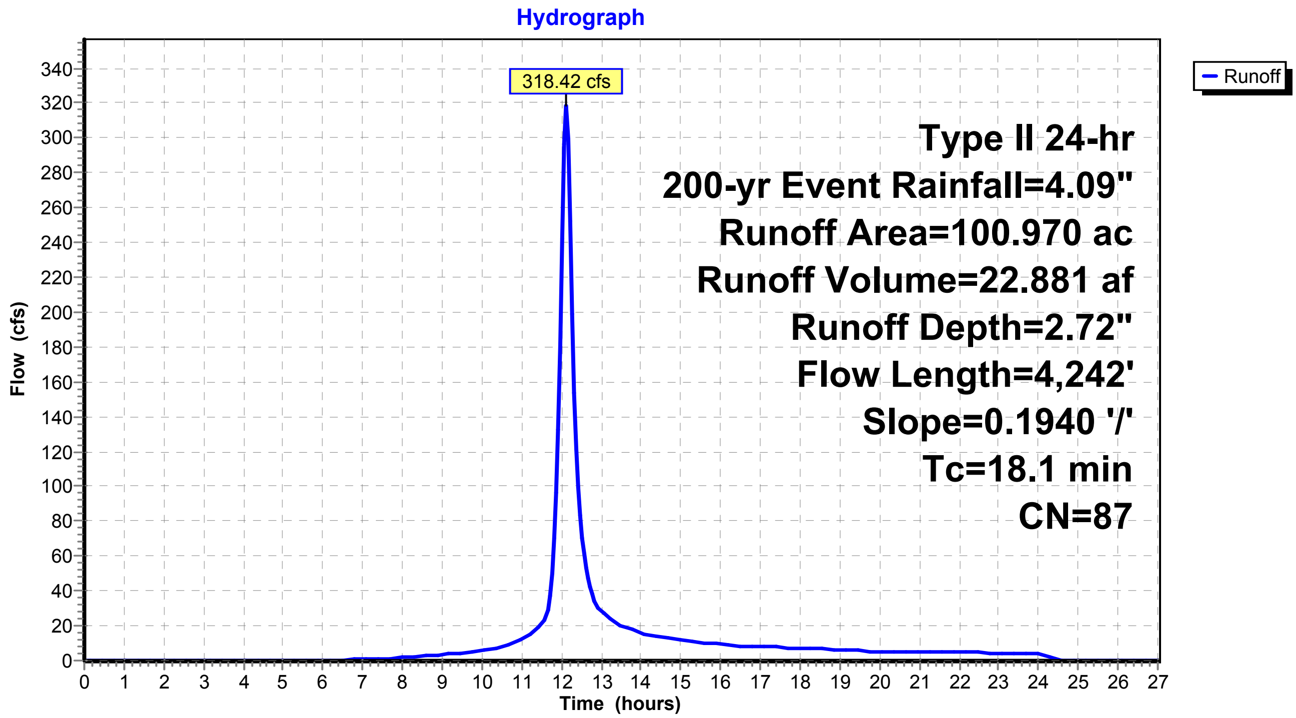
Runoff = 318.42 cfs @ 12.10 hrs, Volume= 22.881 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	90.870	86	Desert shrub range, Fair, HSG D
*	10.100	98	Impervious, HSG D
	100.970	87	Weighted Average
	90.870		90.00% Pervious Area
	10.100		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	4,242	0.1940	3.91		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

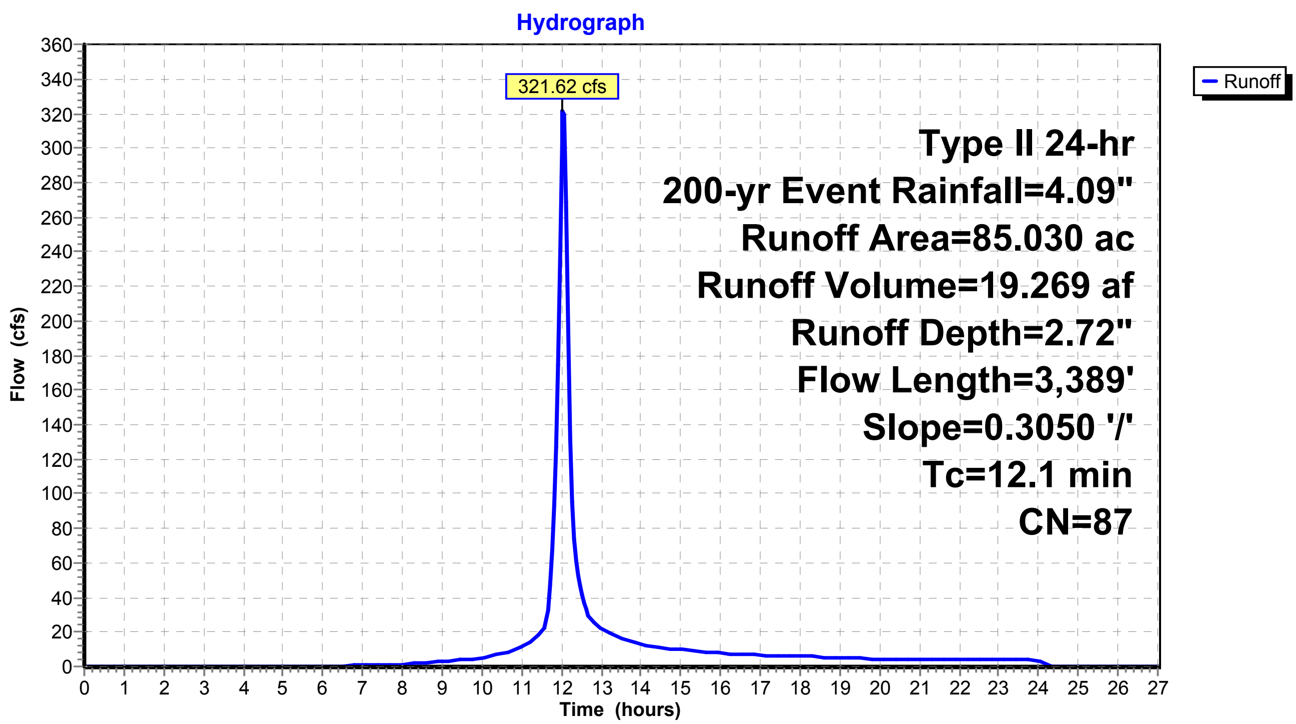
Runoff = 321.62 cfs @ 12.04 hrs, Volume= 19.269 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	76.530	86	Desert shrub range, Fair, HSG D
*	8.500	98	Impervious, HSG D
	85.030	87	Weighted Average
	76.530		90.00% Pervious Area
	8.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	3,389	0.3050	4.69		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

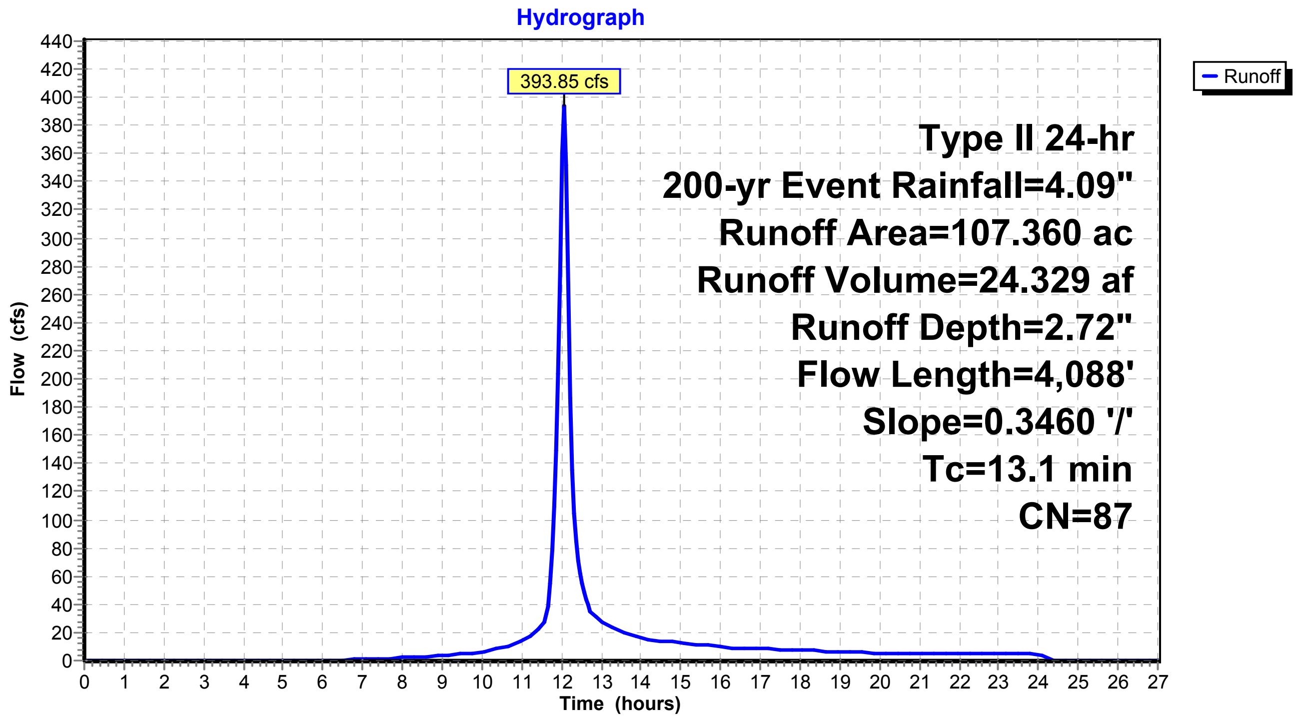
Runoff = 393.85 cfs @ 12.05 hrs, Volume= 24.329 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	96.620	86	Desert shrub range, Fair, HSG D
*	10.740	98	Impervious, HSG D
	107.360	87	Weighted Average
	96.620		90.00% Pervious Area
	10.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	4,088	0.3460	5.18		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

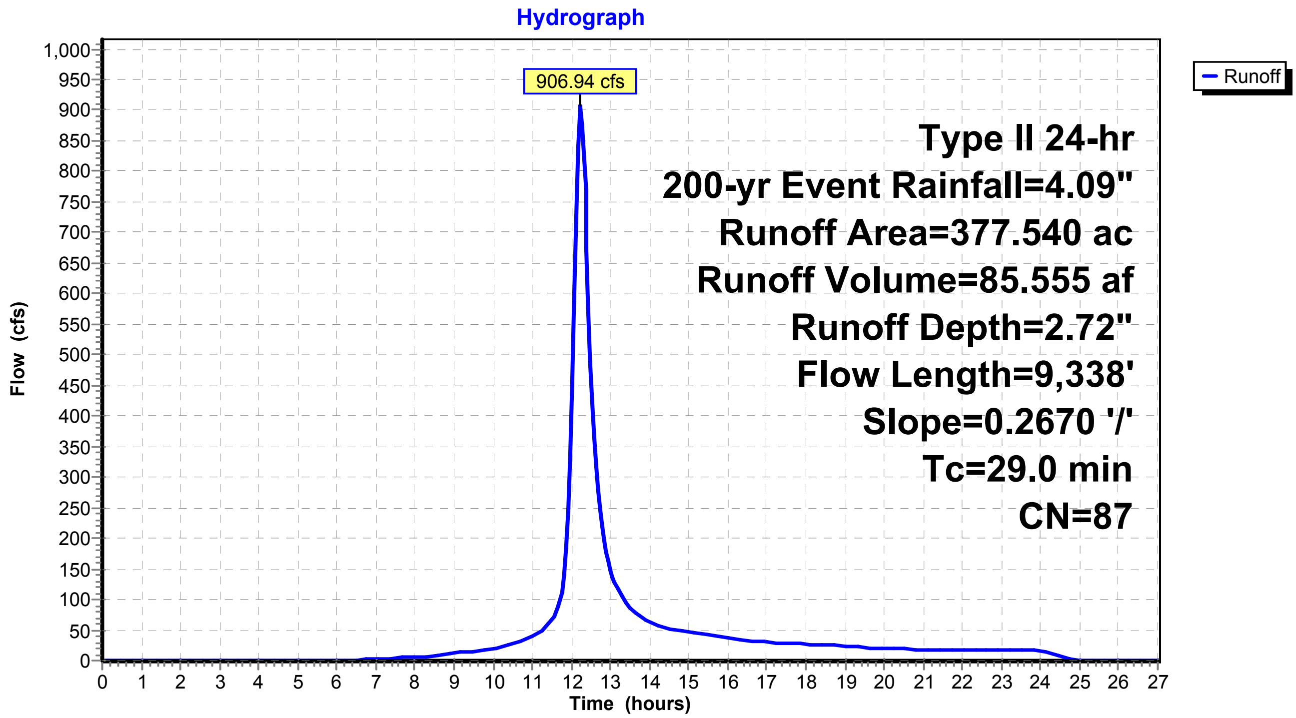
Runoff = 906.94 cfs @ 12.22 hrs, Volume= 85.555 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	339.790	86	Desert shrub range, Fair, HSG D
*	37.750	98	Impervious, HSG D
	377.540	87	Weighted Average
	339.790		90.00% Pervious Area
	37.750		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	9,338	0.2670	5.37		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

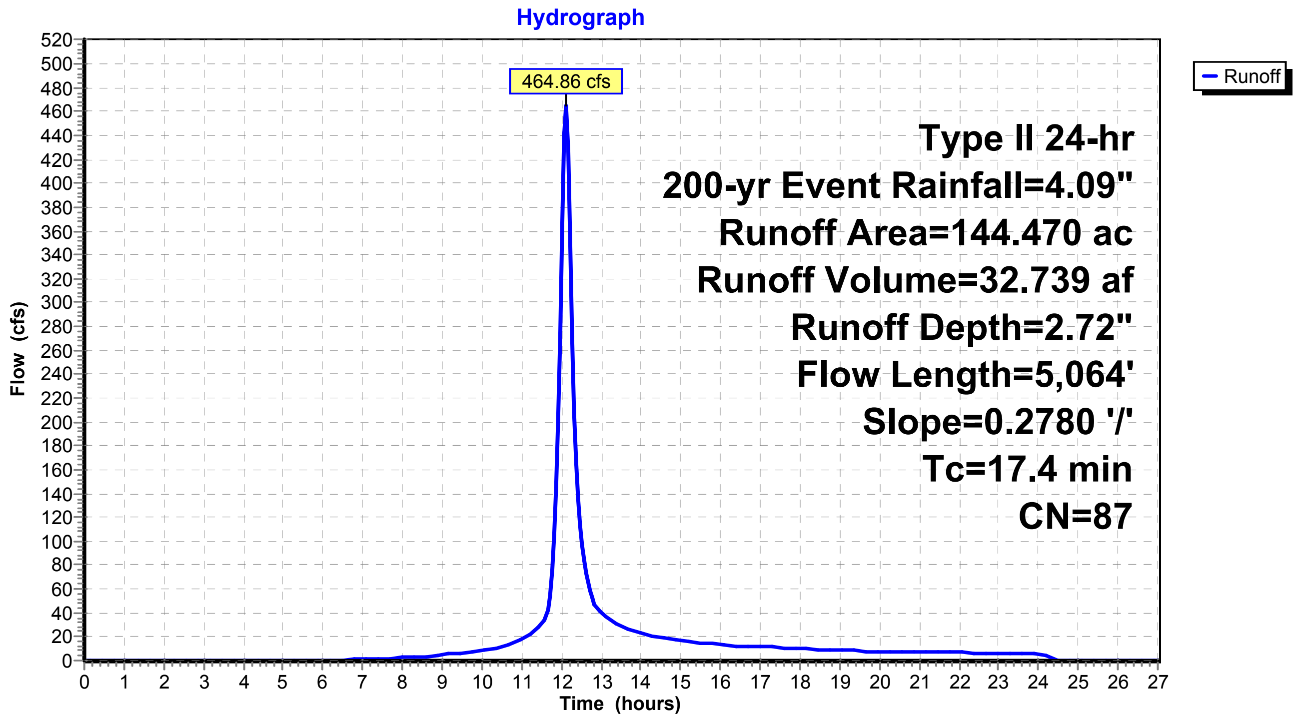
Runoff = 464.86 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	5,064	0.2780	4.85		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

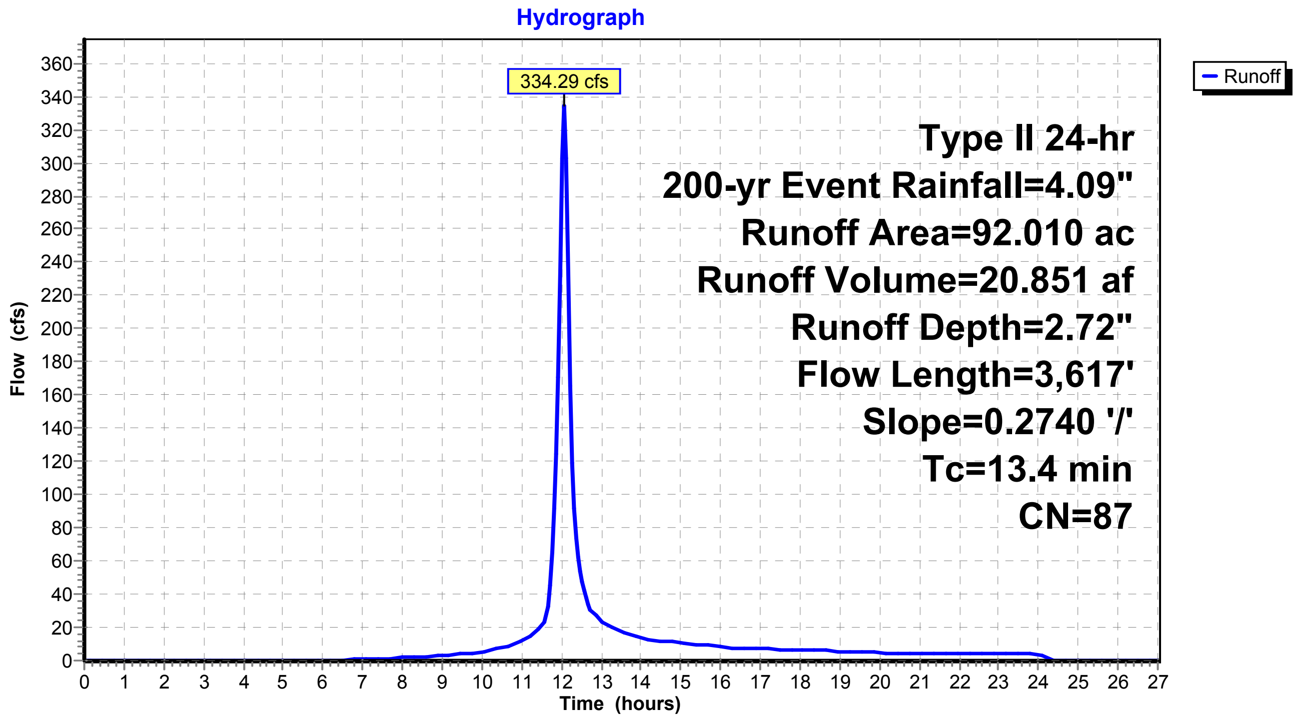
Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

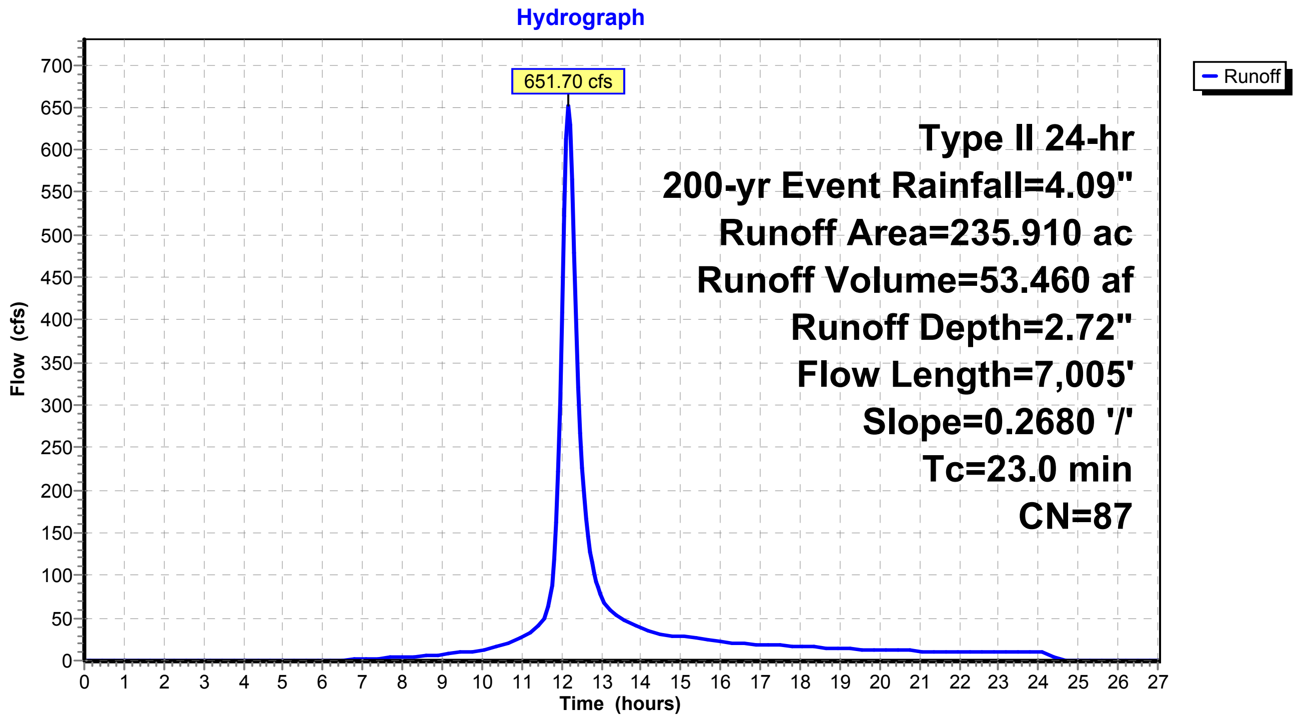
Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

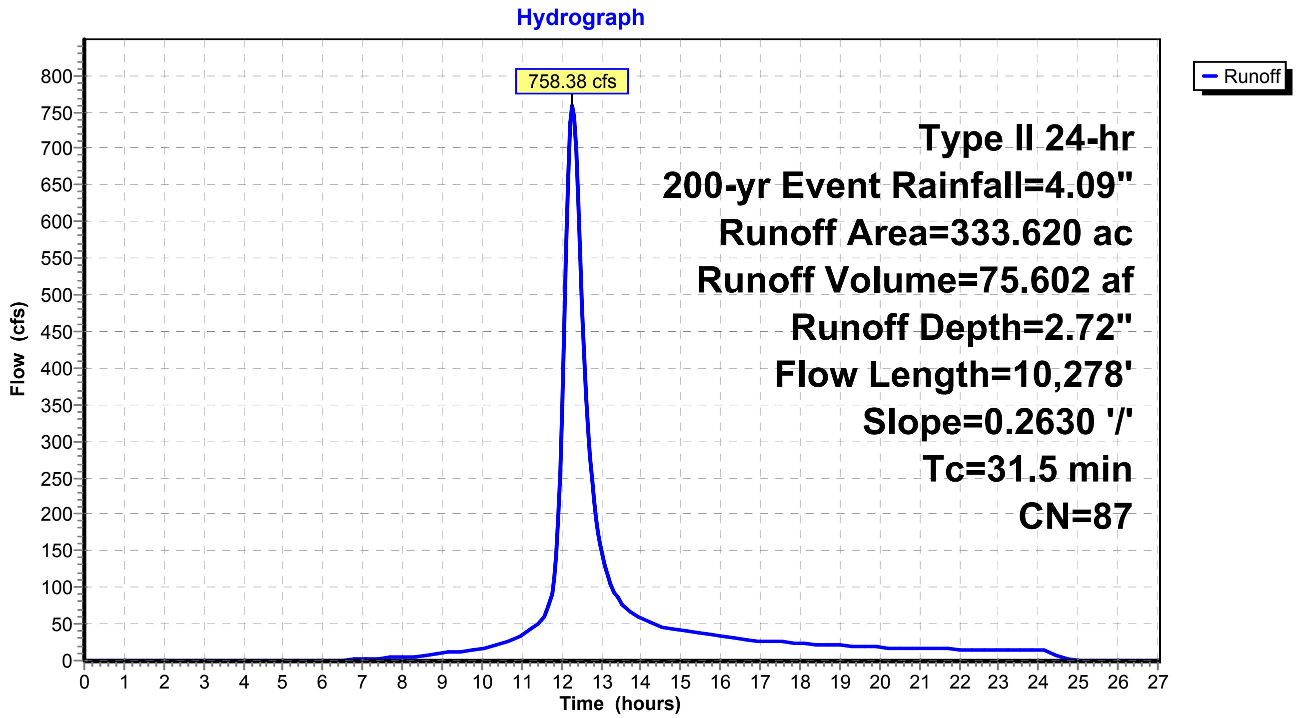
Runoff = 758.38 cfs @ 12.26 hrs, Volume= 75.602 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	300.260	86	Desert shrub range, Fair, HSG D
*	33.360	98	Impervious, HSG D
	333.620	87	Weighted Average
	300.260		90.00% Pervious Area
	33.360		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	10,278	0.2630	5.43		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

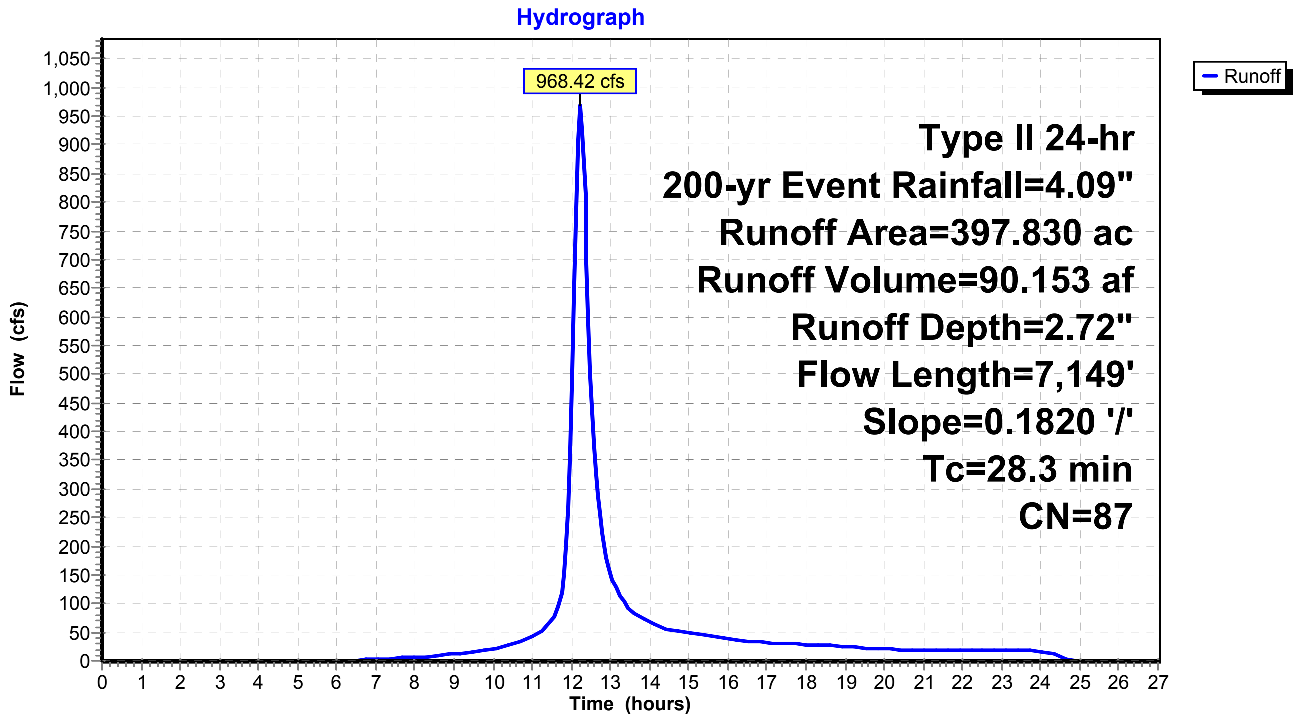
Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

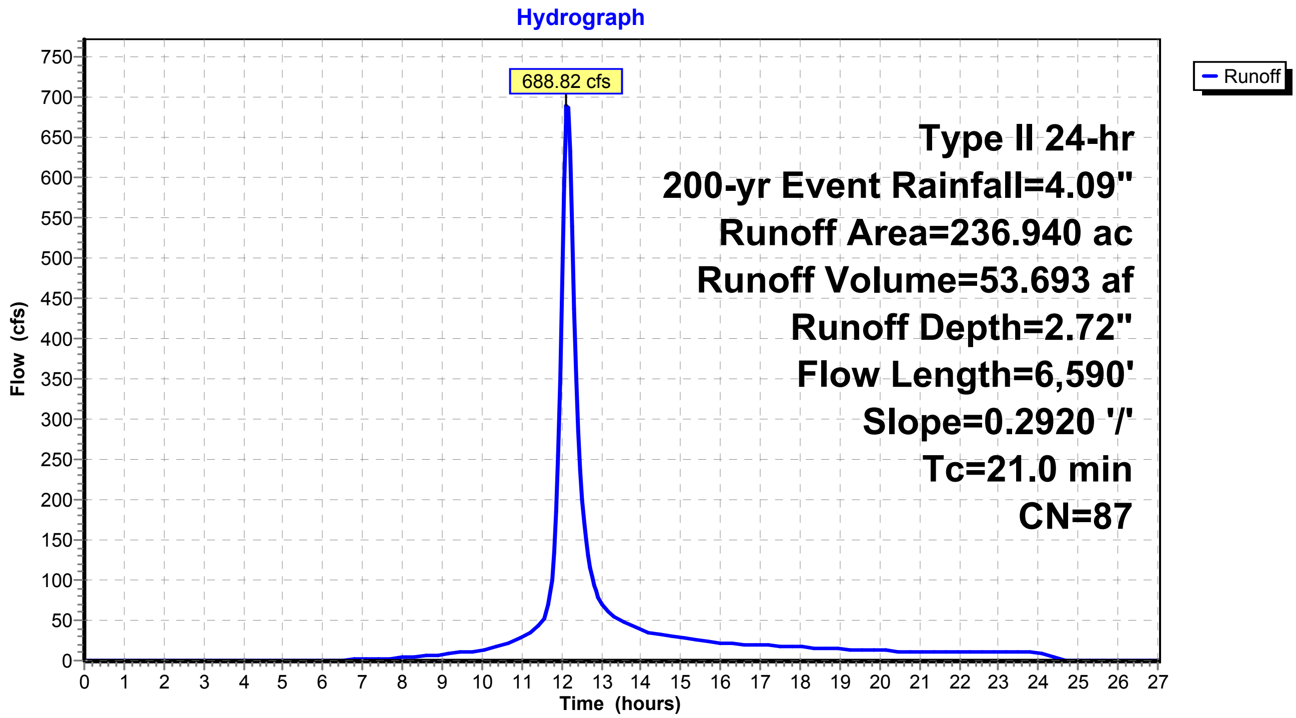
Runoff = 688.82 cfs @ 12.13 hrs, Volume= 53.693 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	213.250	86	Desert shrub range, Fair, HSG D
*	23.690	98	Impervious, HSG D
	236.940	87	Weighted Average
	213.250		90.00% Pervious Area
	23.690		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	6,590	0.2920	5.24		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

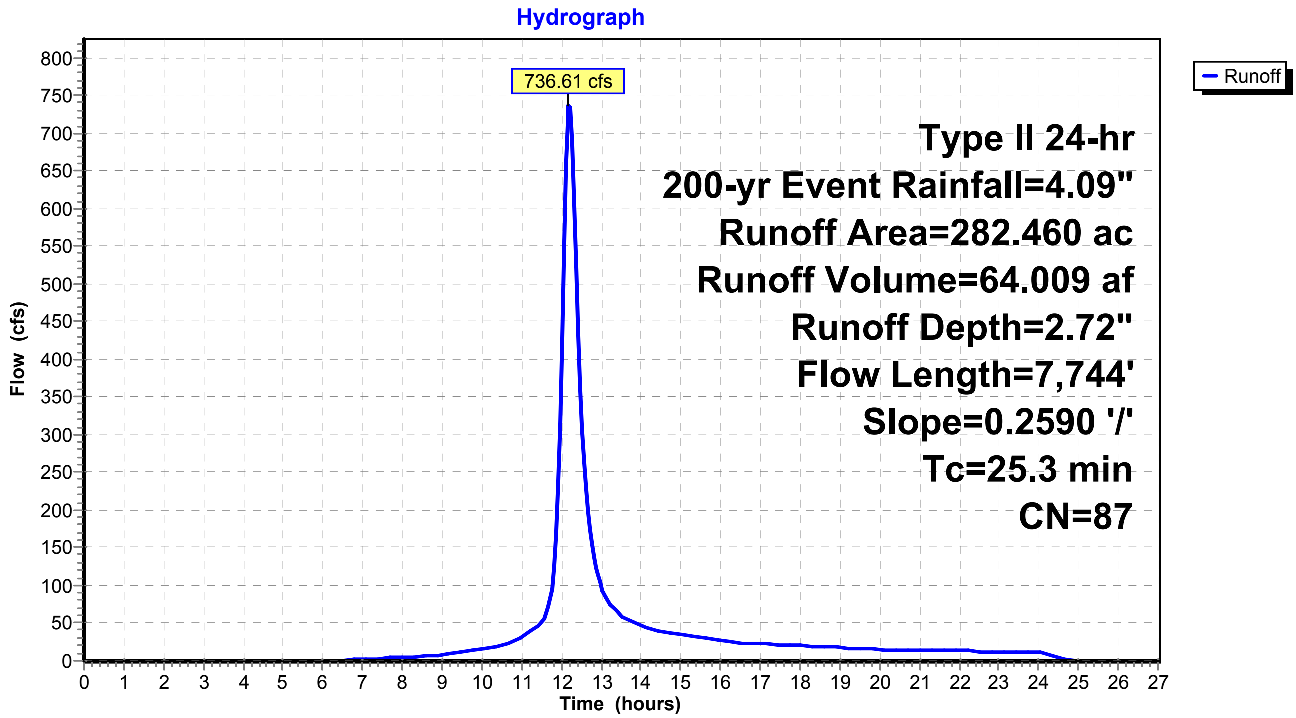
Runoff = 736.61 cfs @ 12.18 hrs, Volume= 64.009 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	254.210	86	Desert shrub range, Fair, HSG D
*	28.250	98	Impervious, HSG D
	282.460	87	Weighted Average
	254.210		90.00% Pervious Area
	28.250		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.3	7,744	0.2590	5.10		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

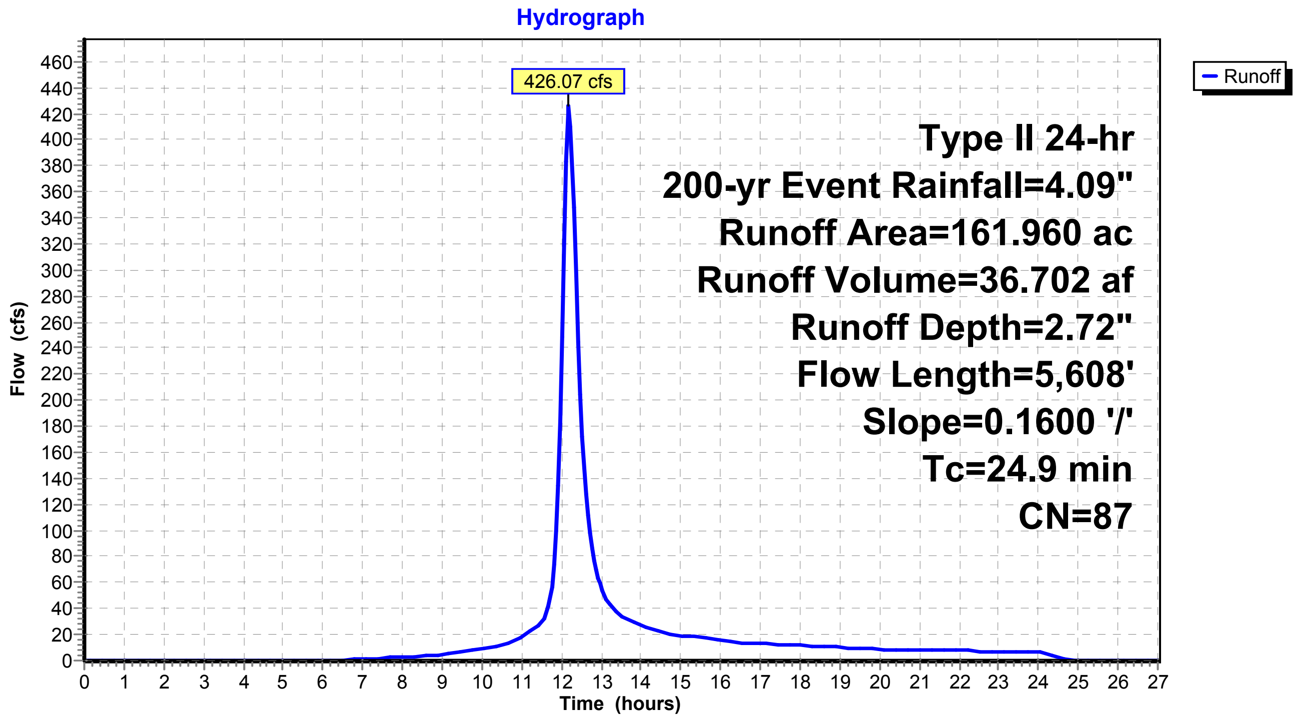
Runoff = 426.07 cfs @ 12.18 hrs, Volume= 36.702 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	145.760	86	Desert shrub range, Fair, HSG D
*	16.200	98	Impervious, HSG D
	161.960	87	Weighted Average
	145.760		90.00% Pervious Area
	16.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	5,608	0.1600	3.75		**Lag/CN Method,**

Subcatchment 14: WS 14



Summary for Subcatchment 15: WS 15

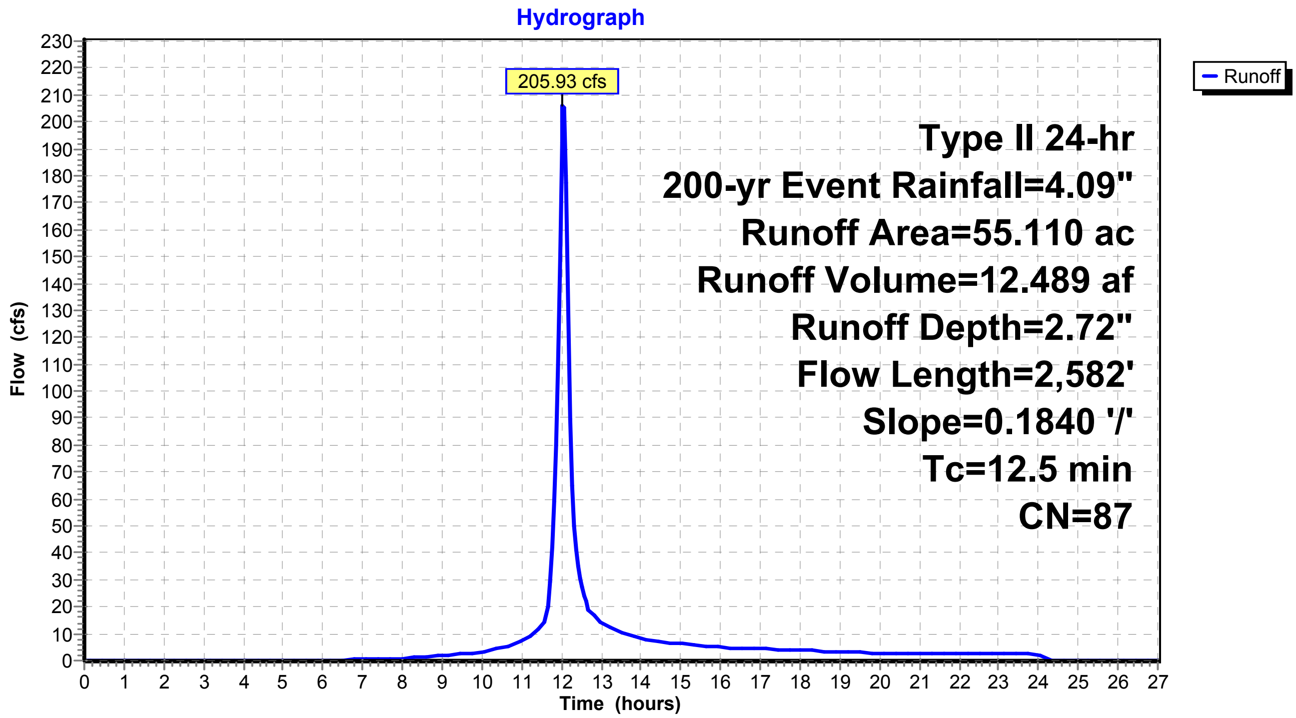
Runoff = 205.93 cfs @ 12.04 hrs, Volume= 12.489 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	49.600	86	Desert shrub range, Fair, HSG D
*	5.510	98	Impervious, HSG D
	55.110	87	Weighted Average
	49.600		90.00% Pervious Area
	5.510		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	2,582	0.1840	3.45		**Lag/CN Method,**

Subcatchment 15: WS 15



Summary for Subcatchment 16: WS 16

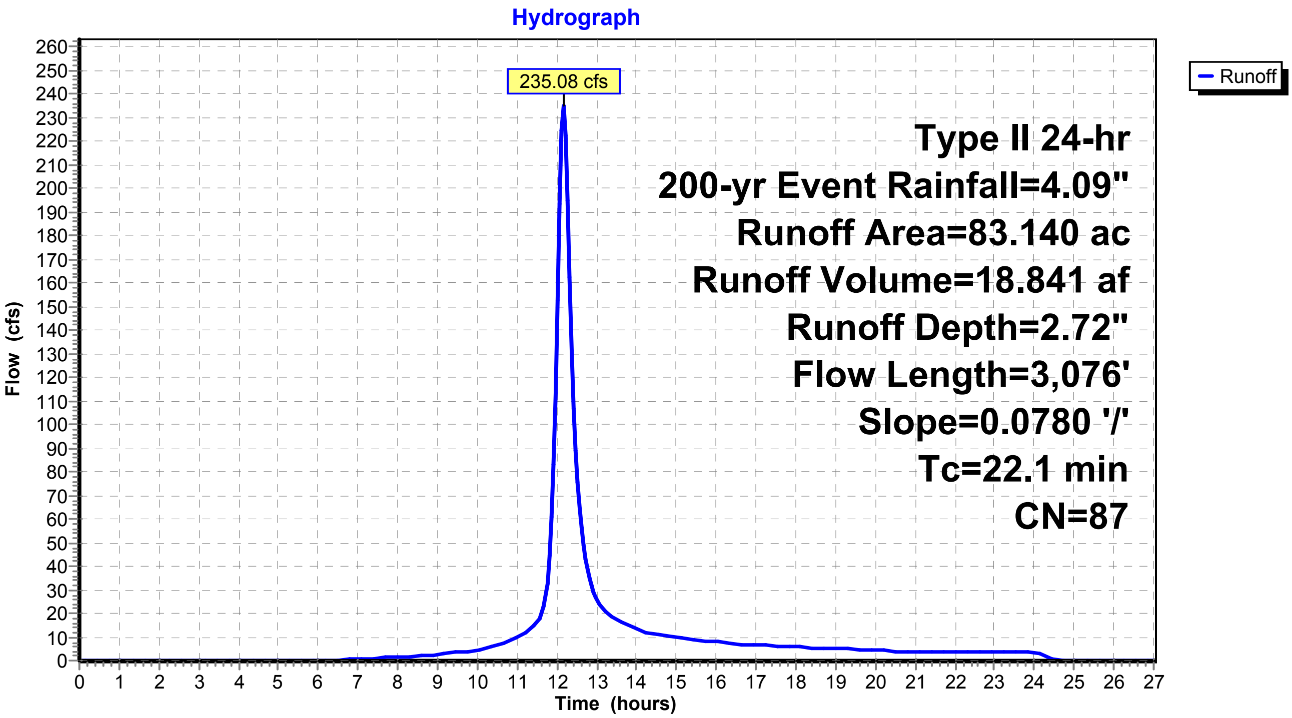
Runoff = 235.08 cfs @ 12.15 hrs, Volume= 18.841 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	74.830	86	Desert shrub range, Fair, HSG D
*	8.310	98	Impervious, HSG D
	83.140	87	Weighted Average
	74.830		90.00% Pervious Area
	8.310		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	3,076	0.0780	2.32		**Lag/CN Method,**

Subcatchment 16: WS 16



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=352.000 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,396' Slope=0.1640 '/' Tc=30.7 min CN=87 Runoff=952.23 cfs 93.637 af

Subcatchment2: WS 2 Runoff Area=117.790 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,175' Slope=0.2310 '/' Tc=13.1 min CN=87 Runoff=504.05 cfs 31.334 af

Subcatchment3: WS 3 Runoff Area=100.970 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=4,242' Slope=0.1940 '/' Tc=18.1 min CN=87 Runoff=371.87 cfs 26.859 af

Subcatchment4: WS 4 Runoff Area=85.030 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,389' Slope=0.3050 '/' Tc=12.1 min CN=87 Runoff=375.03 cfs 22.619 af

Subcatchment5: WS 5 Runoff Area=107.360 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=4,088' Slope=0.3460 '/' Tc=13.1 min CN=87 Runoff=459.42 cfs 28.559 af

Subcatchment6: WS 6 Runoff Area=377.540 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=9,338' Slope=0.2670 '/' Tc=29.0 min CN=87 Runoff=1,060.97 cfs 100.431 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,064' Slope=0.2780 '/' Tc=17.4 min CN=87 Runoff=542.79 cfs 38.431 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=389.99 cfs 24.476 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=761.76 cfs 62.755 af

Subcatchment10: WS 10 Runoff Area=333.620 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=10,278' Slope=0.2630 '/' Tc=31.5 min CN=87 Runoff=887.32 cfs 88.748 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=1,132.73 cfs 105.828 af

Subcatchment12: WS 12 Runoff Area=236.940 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=6,590' Slope=0.2920 '/' Tc=21.0 min CN=87 Runoff=804.86 cfs 63.029 af

Subcatchment13: WS 13 Runoff Area=282.460 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,744' Slope=0.2590 '/' Tc=25.3 min CN=87 Runoff=861.28 cfs 75.138 af

Subcatchment14: WS 14 Runoff Area=161.960 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,608' Slope=0.1600 '/' Tc=24.9 min CN=87 Runoff=498.15 cfs 43.084 af

Subcatchment15: WS 15 Runoff Area=55.110 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=2,582' Slope=0.1840 '/' Tc=12.5 min CN=87 Runoff=240.16 cfs 14.660 af

Subcatchment16: WS 16 Runoff Area=83.140 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,076' Slope=0.0780 '/' Tc=22.1 min CN=87 Runoff=274.73 cfs 22.116 af

Total Runoff Area = 3,164.140 ac Runoff Volume = 841.705 af Average Runoff Depth = 3.19"
90.00% Pervious = 2,847.730 ac 10.00% Impervious = 316.410 ac

Summary for Subcatchment 1: WS 1

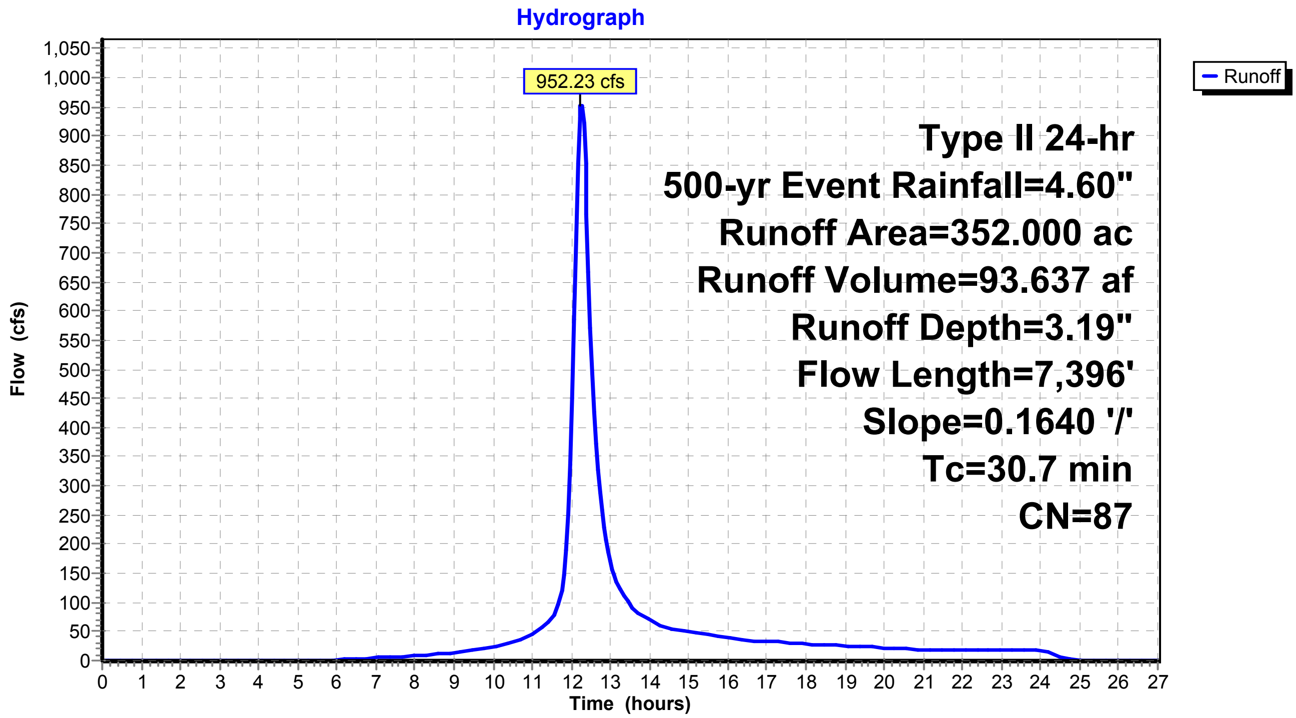
Runoff = 952.23 cfs @ 12.25 hrs, Volume= 93.637 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	316.800	86	Desert shrub range, Fair, HSG D
*	35.200	98	Impervious, HSG D
	352.000	87	Weighted Average
	316.800		90.00% Pervious Area
	35.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	7,396	0.1640	4.02		**Lag/CN Method,**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

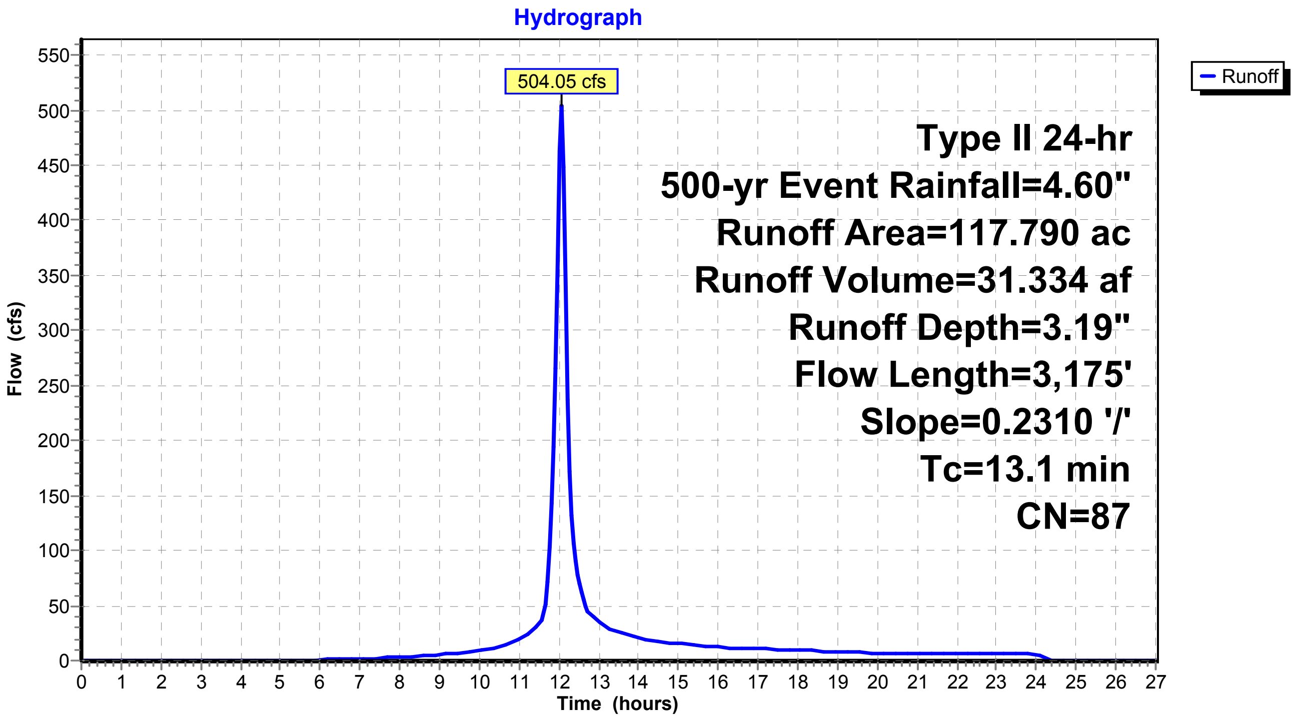
Runoff = 504.05 cfs @ 12.05 hrs, Volume= 31.334 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	106.010	86	Desert shrub range, Fair, HSG D
*	11.780	98	Impervious, HSG D
	117.790	87	Weighted Average
	106.010		90.00% Pervious Area
	11.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	3,175	0.2310	4.03		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

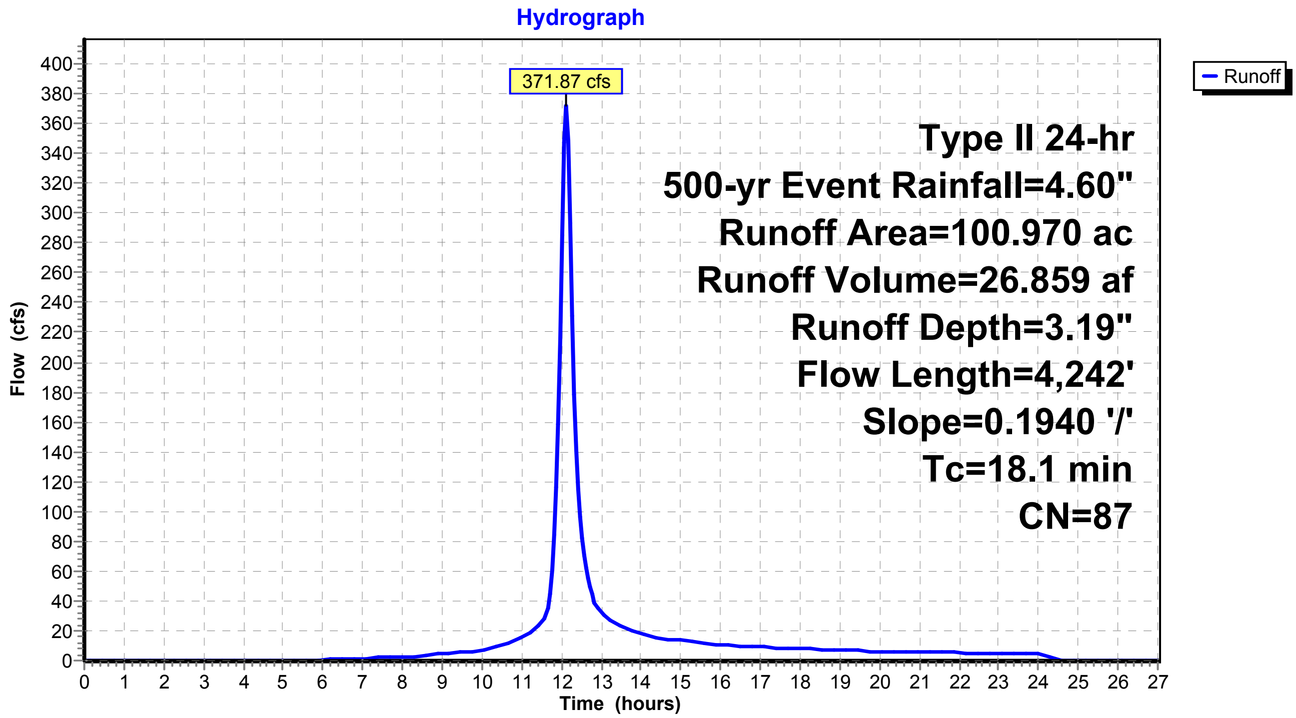
Runoff = 371.87 cfs @ 12.10 hrs, Volume= 26.859 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	90.870	86	Desert shrub range, Fair, HSG D
*	10.100	98	Impervious, HSG D
	100.970	87	Weighted Average
	90.870		90.00% Pervious Area
	10.100		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	4,242	0.1940	3.91		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

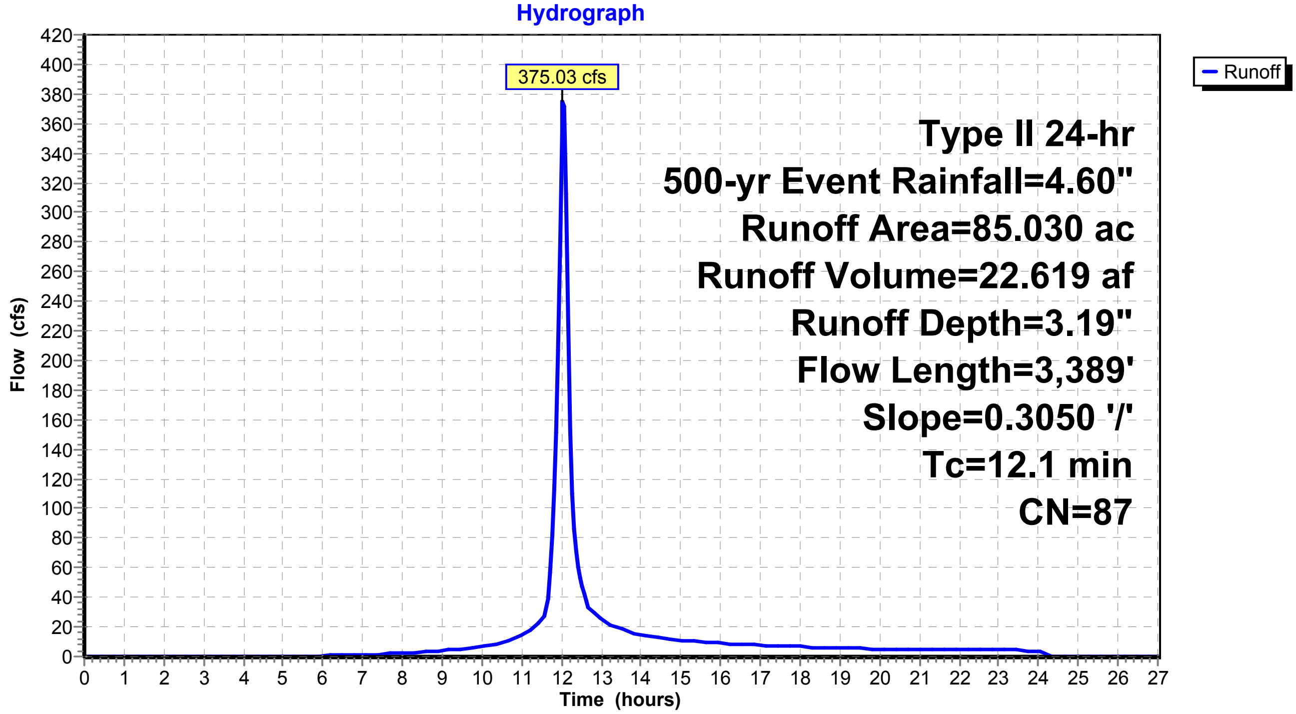
Runoff = 375.03 cfs @ 12.04 hrs, Volume= 22.619 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	76.530	86	Desert shrub range, Fair, HSG D
*	8.500	98	Impervious, HSG D
	85.030	87	Weighted Average
	76.530		90.00% Pervious Area
	8.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	3,389	0.3050	4.69		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

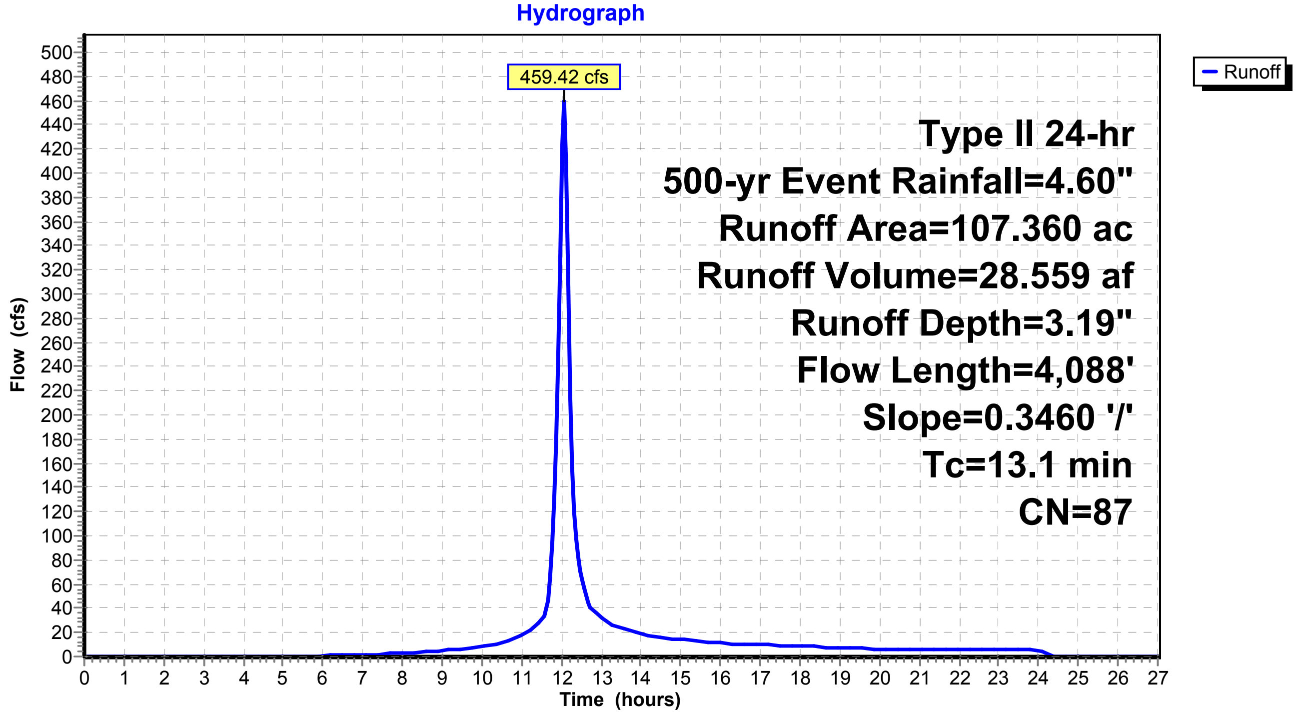
Runoff = 459.42 cfs @ 12.05 hrs, Volume= 28.559 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	96.620	86	Desert shrub range, Fair, HSG D
*	10.740	98	Impervious, HSG D
	107.360	87	Weighted Average
	96.620		90.00% Pervious Area
	10.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	4,088	0.3460	5.18		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

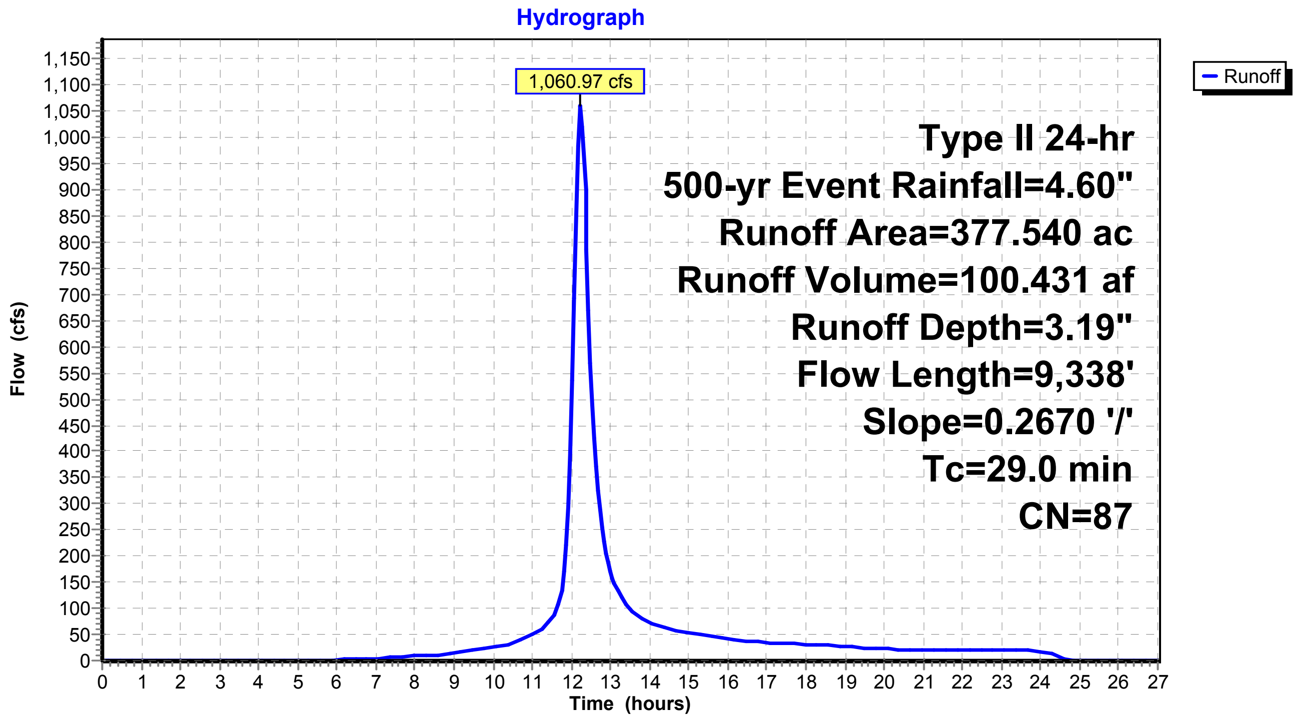
Runoff = 1,060.97 cfs @ 12.22 hrs, Volume= 100.431 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	339.790	86	Desert shrub range, Fair, HSG D
*	37.750	98	Impervious, HSG D
	377.540	87	Weighted Average
	339.790		90.00% Pervious Area
	37.750		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	9,338	0.2670	5.37		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

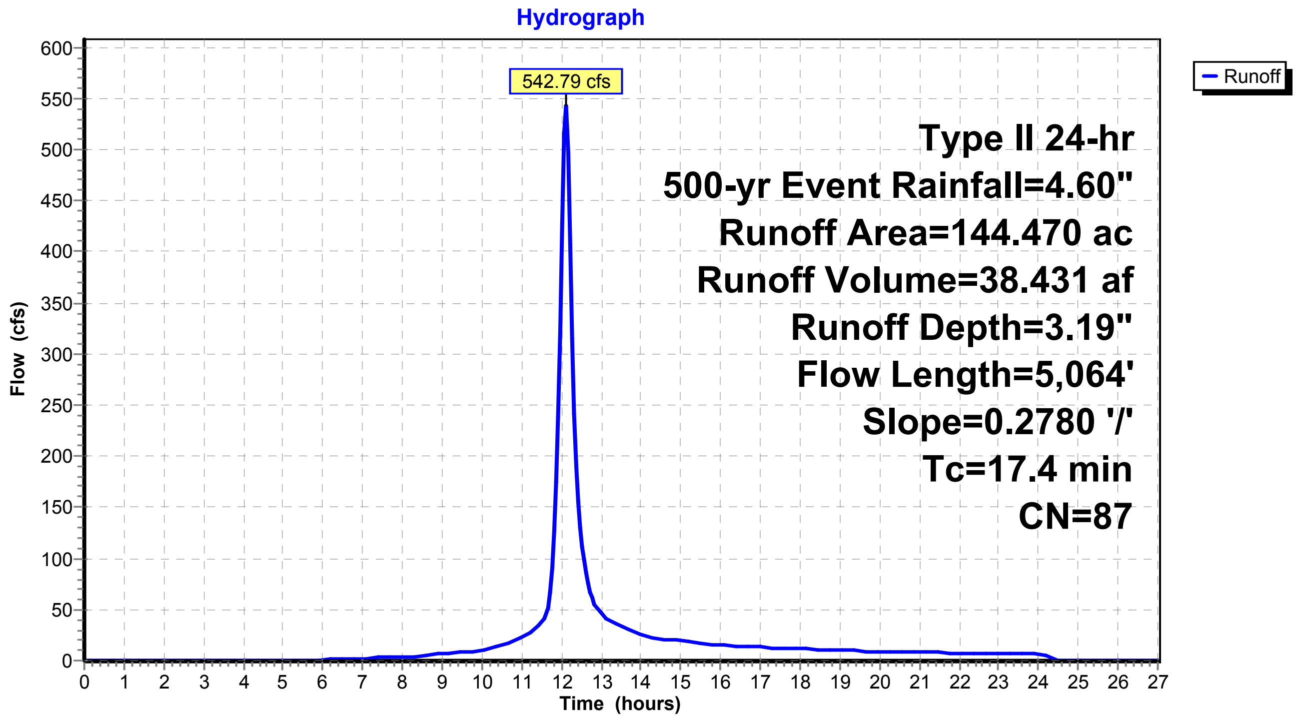
Runoff = 542.79 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	5,064	0.2780	4.85		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

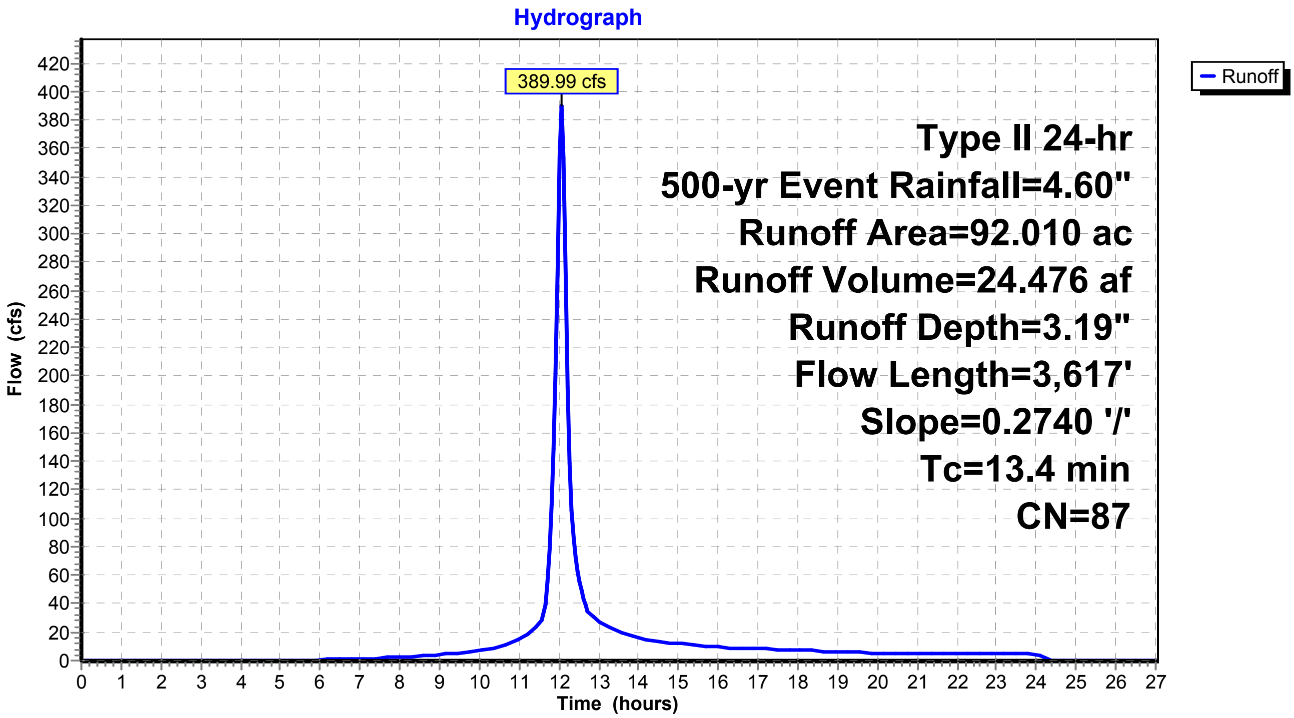
Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

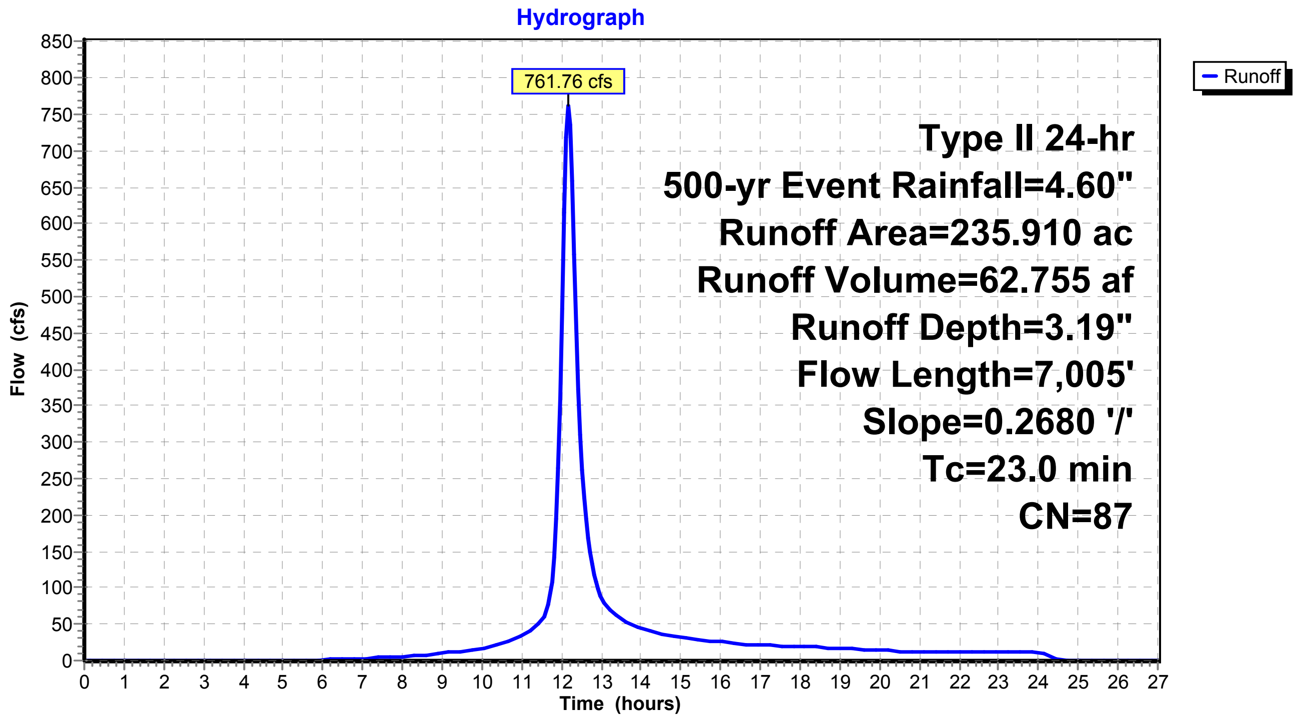
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

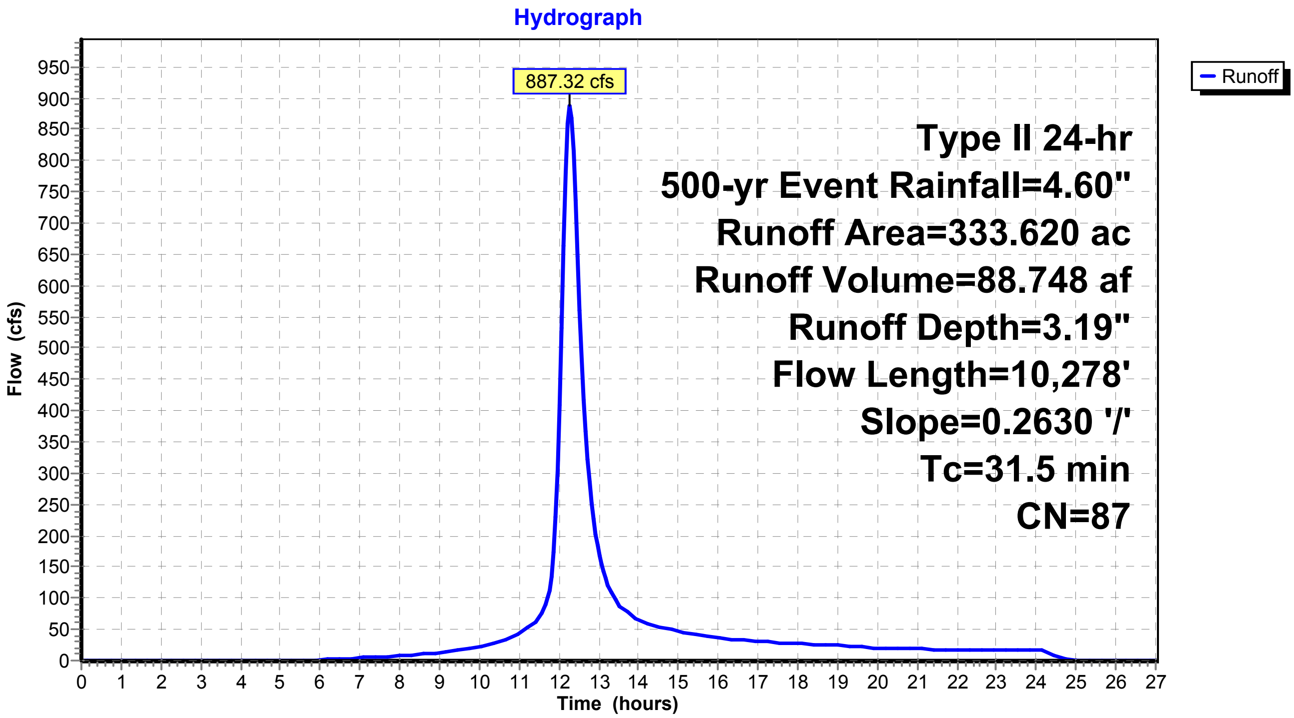
Runoff = 887.32 cfs @ 12.26 hrs, Volume= 88.748 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	300.260	86	Desert shrub range, Fair, HSG D
*	33.360	98	Impervious, HSG D
	333.620	87	Weighted Average
	300.260		90.00% Pervious Area
	33.360		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	10,278	0.2630	5.43		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

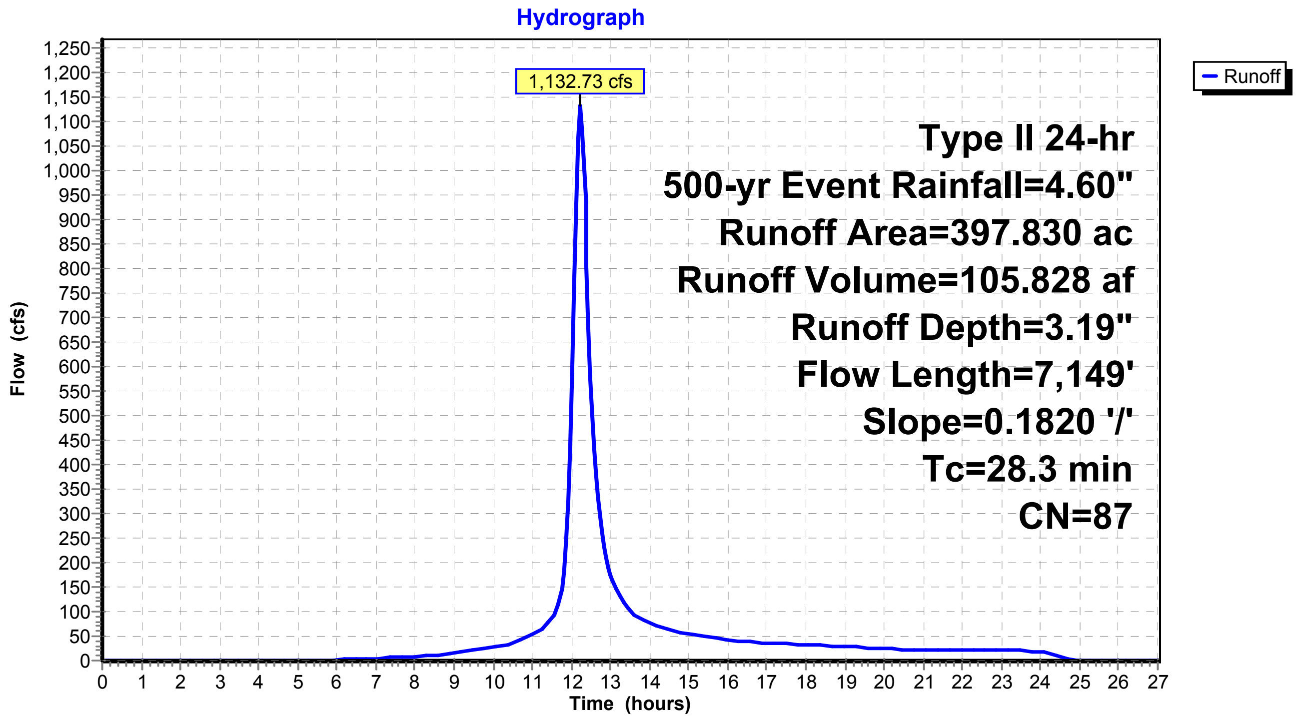
Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

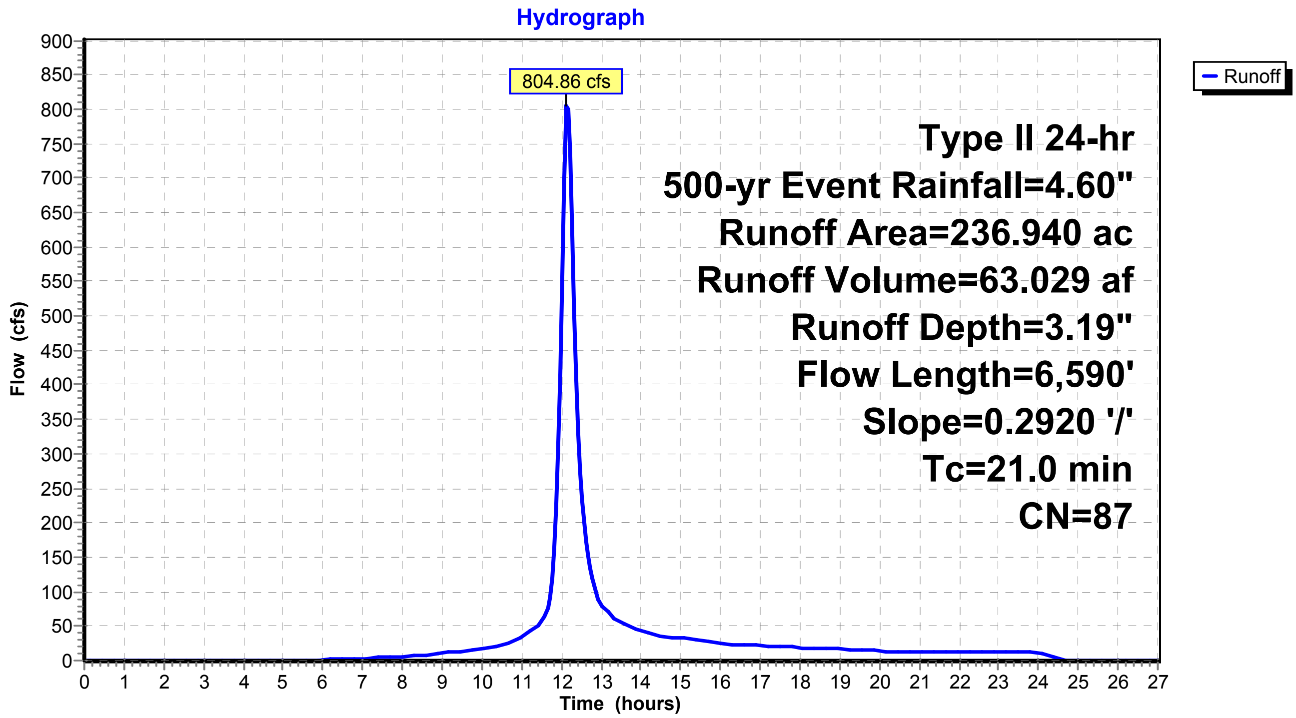
Runoff = 804.86 cfs @ 12.13 hrs, Volume= 63.029 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	213.250	86	Desert shrub range, Fair, HSG D
*	23.690	98	Impervious, HSG D
	236.940	87	Weighted Average
	213.250		90.00% Pervious Area
	23.690		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	6,590	0.2920	5.24		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

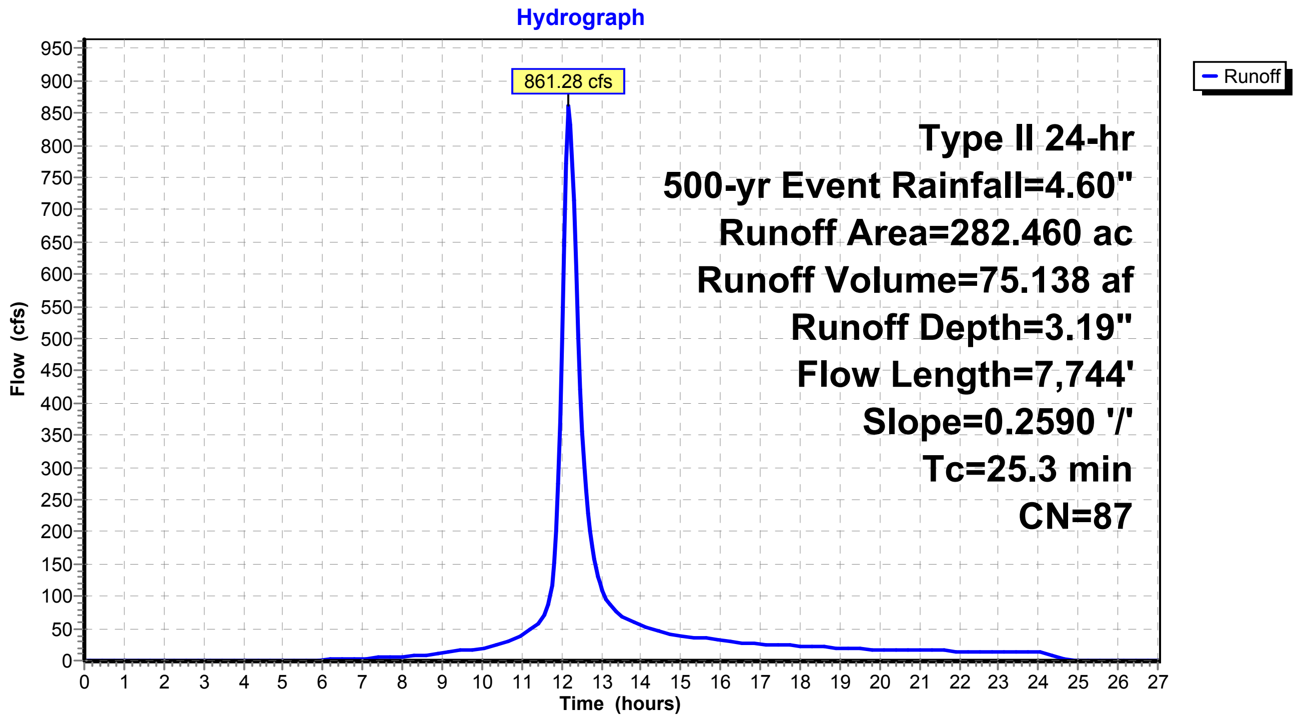
Runoff = 861.28 cfs @ 12.18 hrs, Volume= 75.138 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	254.210	86	Desert shrub range, Fair, HSG D
*	28.250	98	Impervious, HSG D
	282.460	87	Weighted Average
	254.210		90.00% Pervious Area
	28.250		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.3	7,744	0.2590	5.10		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

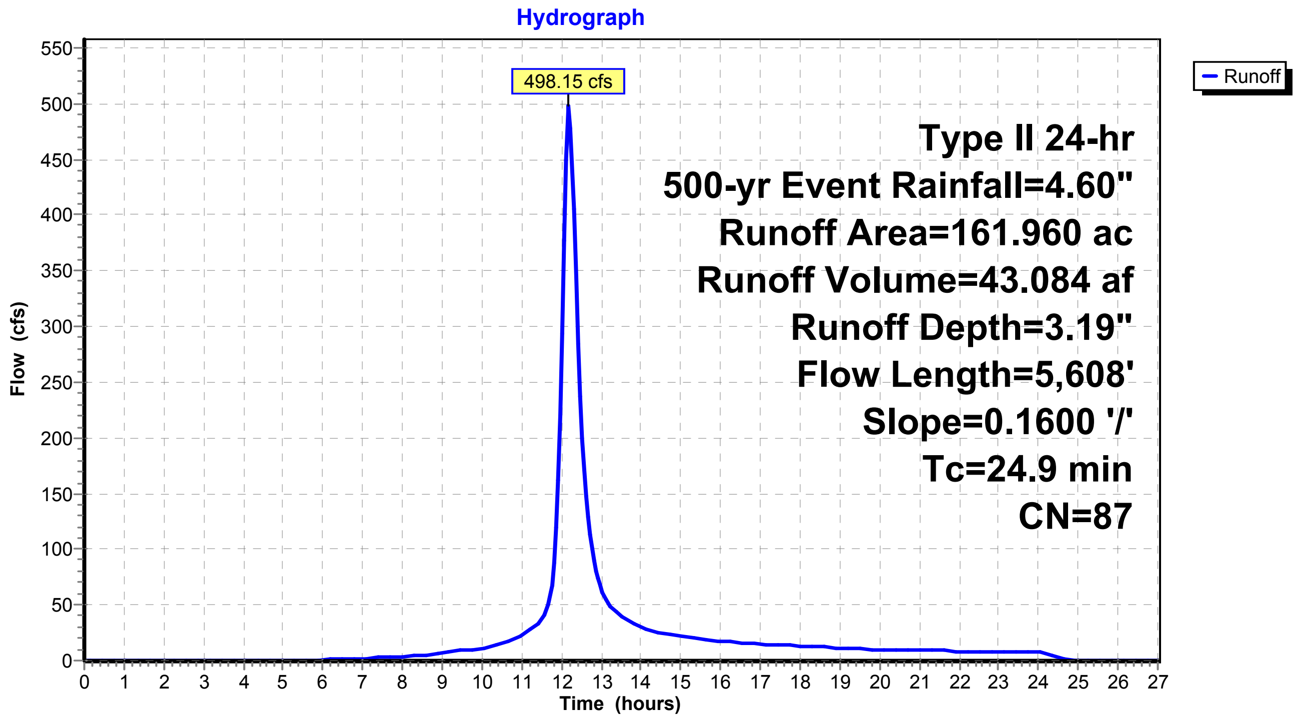
Runoff = 498.15 cfs @ 12.18 hrs, Volume= 43.084 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	145.760	86	Desert shrub range, Fair, HSG D
*	16.200	98	Impervious, HSG D
	161.960	87	Weighted Average
	145.760		90.00% Pervious Area
	16.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	5,608	0.1600	3.75		**Lag/CN Method,**

Subcatchment 14: WS 14



Summary for Subcatchment 15: WS 15

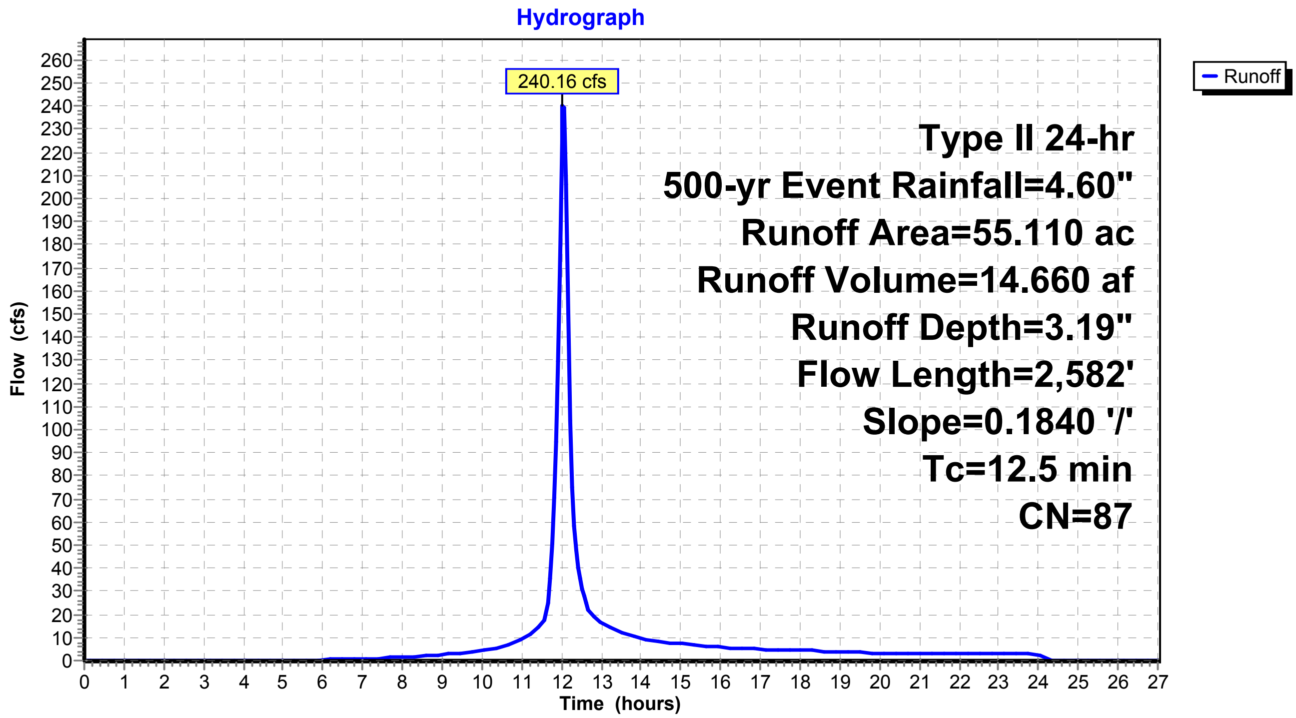
Runoff = 240.16 cfs @ 12.04 hrs, Volume= 14.660 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	49.600	86	Desert shrub range, Fair, HSG D
*	5.510	98	Impervious, HSG D
	55.110	87	Weighted Average
	49.600		90.00% Pervious Area
	5.510		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	2,582	0.1840	3.45		**Lag/CN Method,**

Subcatchment 15: WS 15



Summary for Subcatchment 16: WS 16

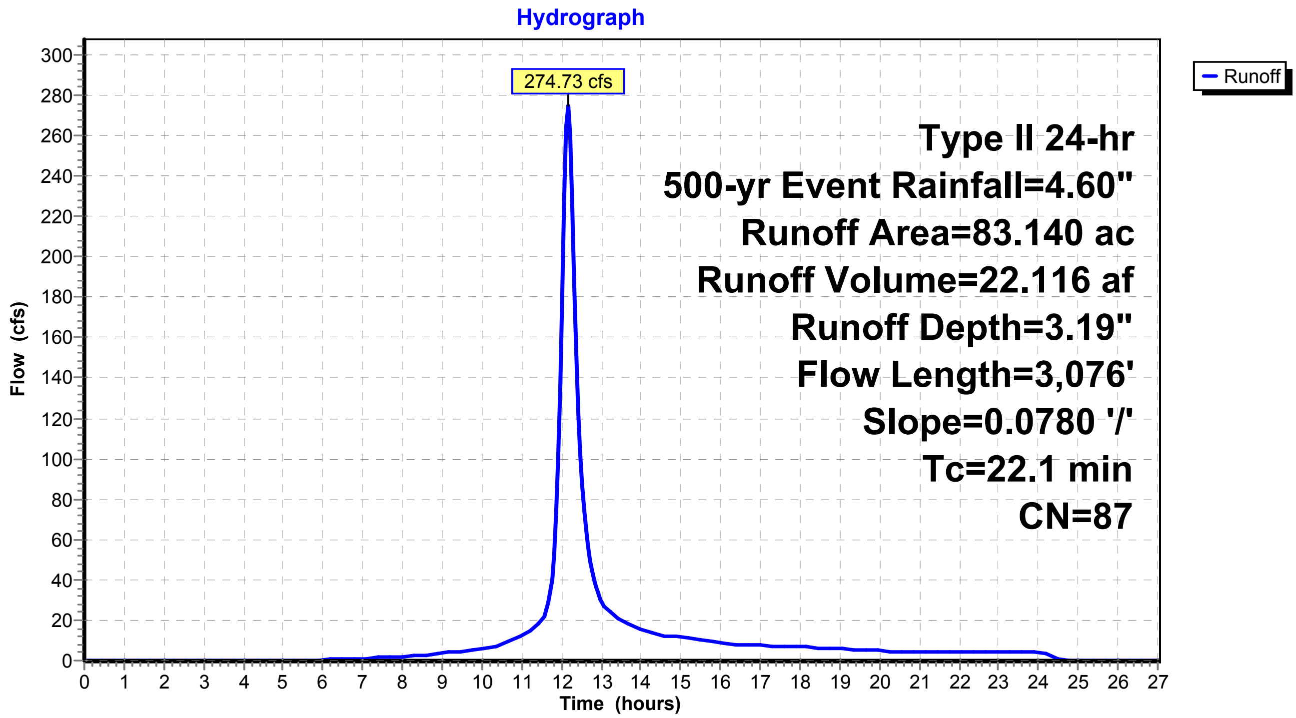
Runoff = 274.73 cfs @ 12.15 hrs, Volume= 22.116 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

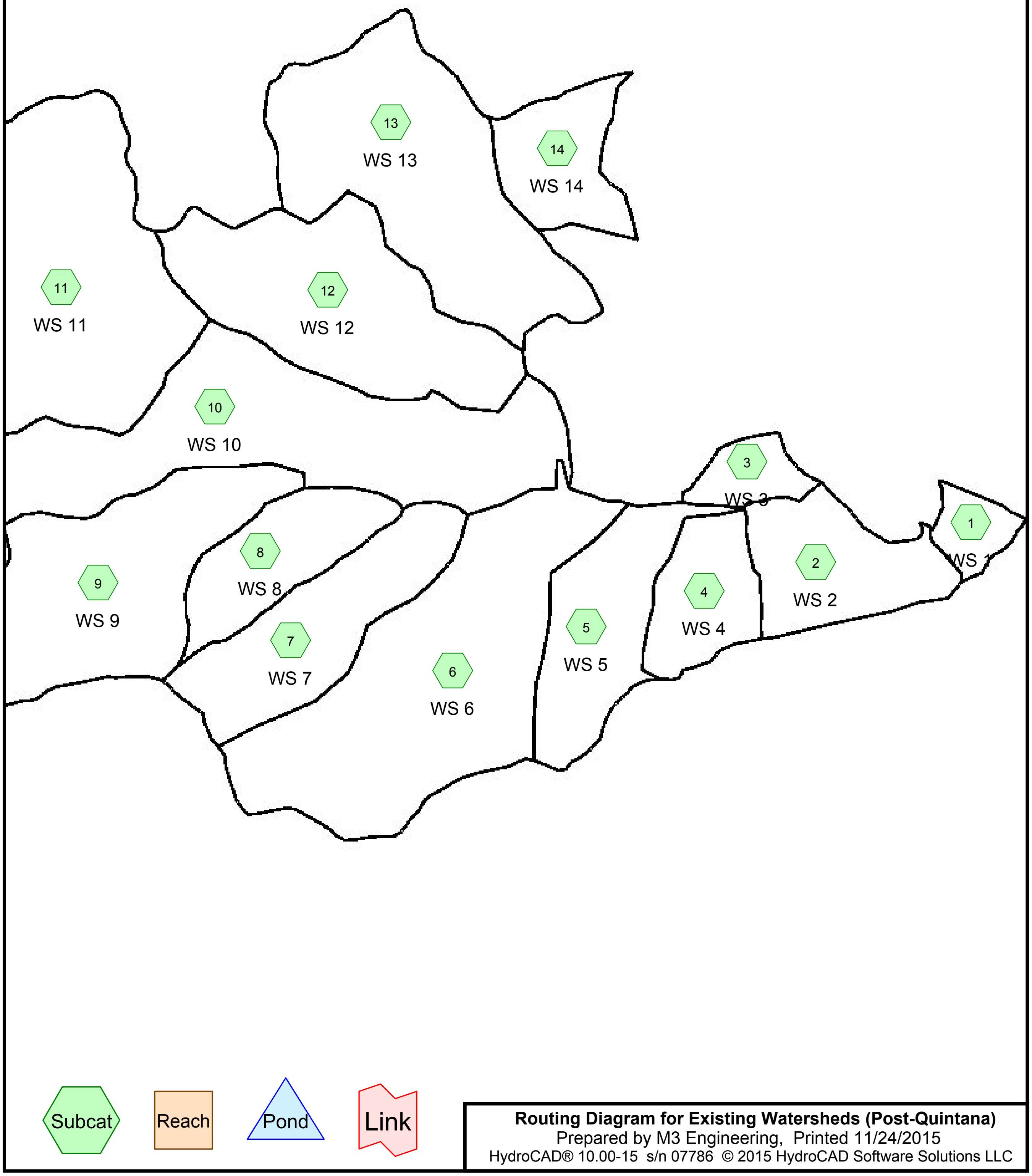
	Area (ac)	CN	Description
	74.830	86	Desert shrub range, Fair, HSG D
*	8.310	98	Impervious, HSG D
	83.140	87	Weighted Average
	74.830		90.00% Pervious Area
	8.310		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	3,076	0.0780	2.32		**Lag/CN Method,**

Subcatchment 16: WS 16



APPENDIX C



Routing Diagram for Existing Watersheds (Post-Quintana)
Prepared by M3 Engineering, Printed 11/24/2015
HydroCAD® 10.00-15 s/n 07786 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2,235.360	86	Desert shrub range, Fair, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)
248.370	98	Impervious, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)
2,483.730	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2,483.730	HSG D	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
0.000	Other	
2,483.730		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2,235.360	0.000	2,235.360	Desert shrub range, Fair	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
0.000	0.000	0.000	248.370	0.000	248.370	Impervious	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
0.000	**0.000**	**0.000**	**2,483.730**	**0.000**	**2,483.730**	**TOTAL AREA**	

Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=2.36"
Tc=5.0 min CN=87 Runoff=117.20 cfs 5.555 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=363.66 cfs 20.985 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=129.54 cfs 6.890 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=259.92 cfs 14.773 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=342.49 cfs 24.455 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=774.13 cfs 65.223 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=411.06 cfs 28.449 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=291.83 cfs 18.118 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=567.91 cfs 46.455 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=663.73 cfs 65.063 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=843.39 cfs 78.339 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=588.30 cfs 44.783 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=649.87 cfs 54.252 af

Subcatchment14: WS 14 Runoff Area=79.970 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,545' Slope=0.2240 '/' Tc=14.6 min CN=87 Runoff=243.90 cfs 15.747 af

Total Runoff Area = 2,483.730 ac Runoff Volume = 489.087 af Average Runoff Depth = 2.36"
90.00% Pervious = 2,235.360 ac 10.00% Impervious = 248.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

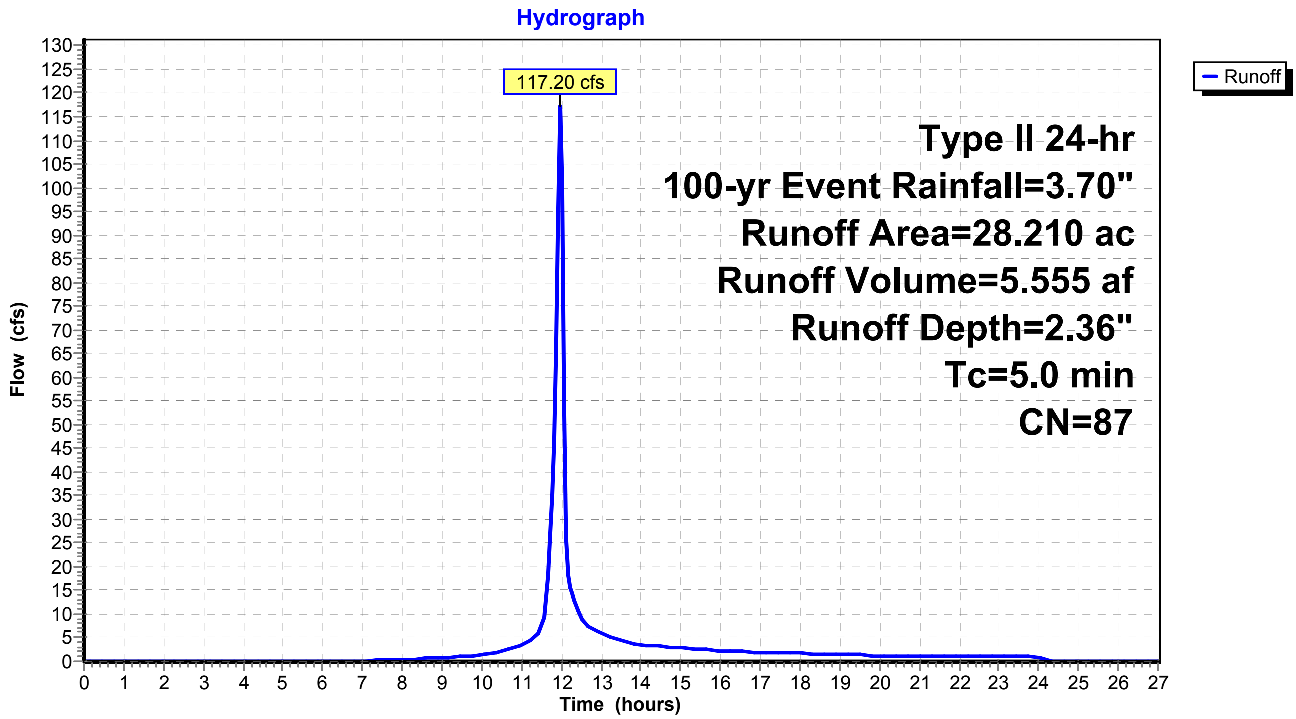
Runoff = 117.20 cfs @ 11.95 hrs, Volume= 5.555 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

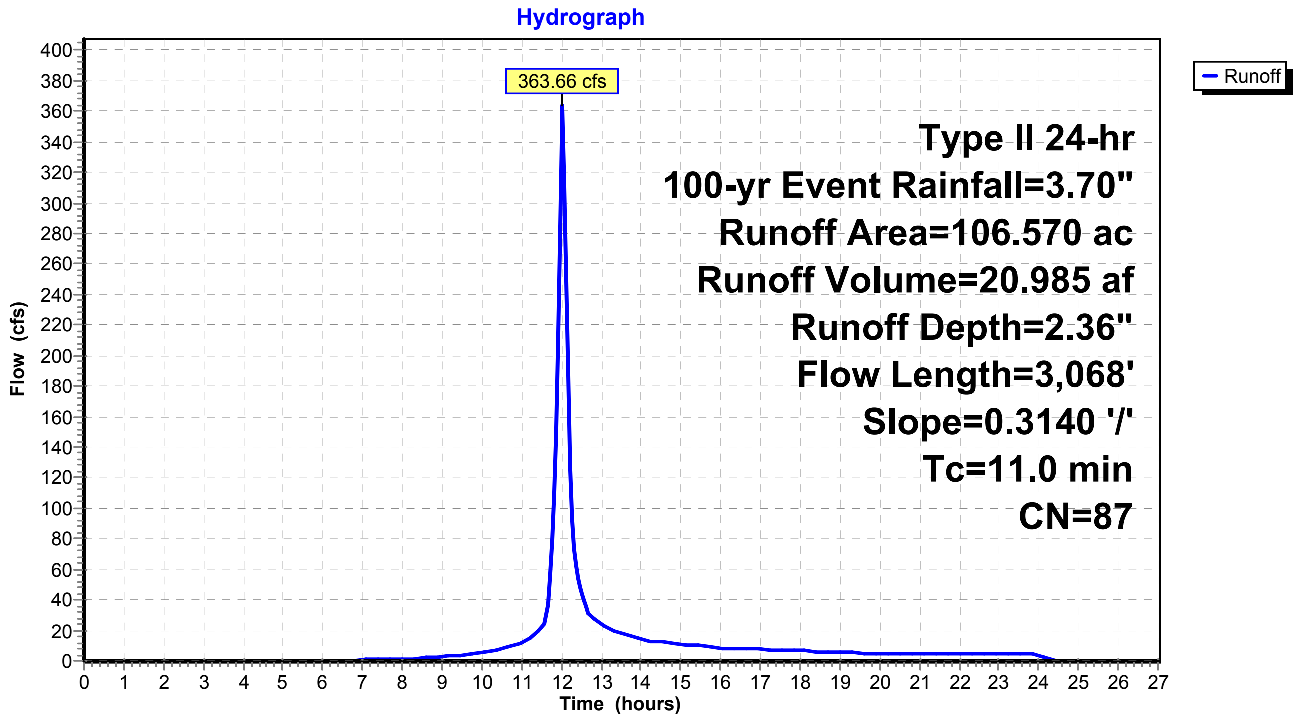
Runoff = 363.66 cfs @ 12.03 hrs, Volume= 20.985 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

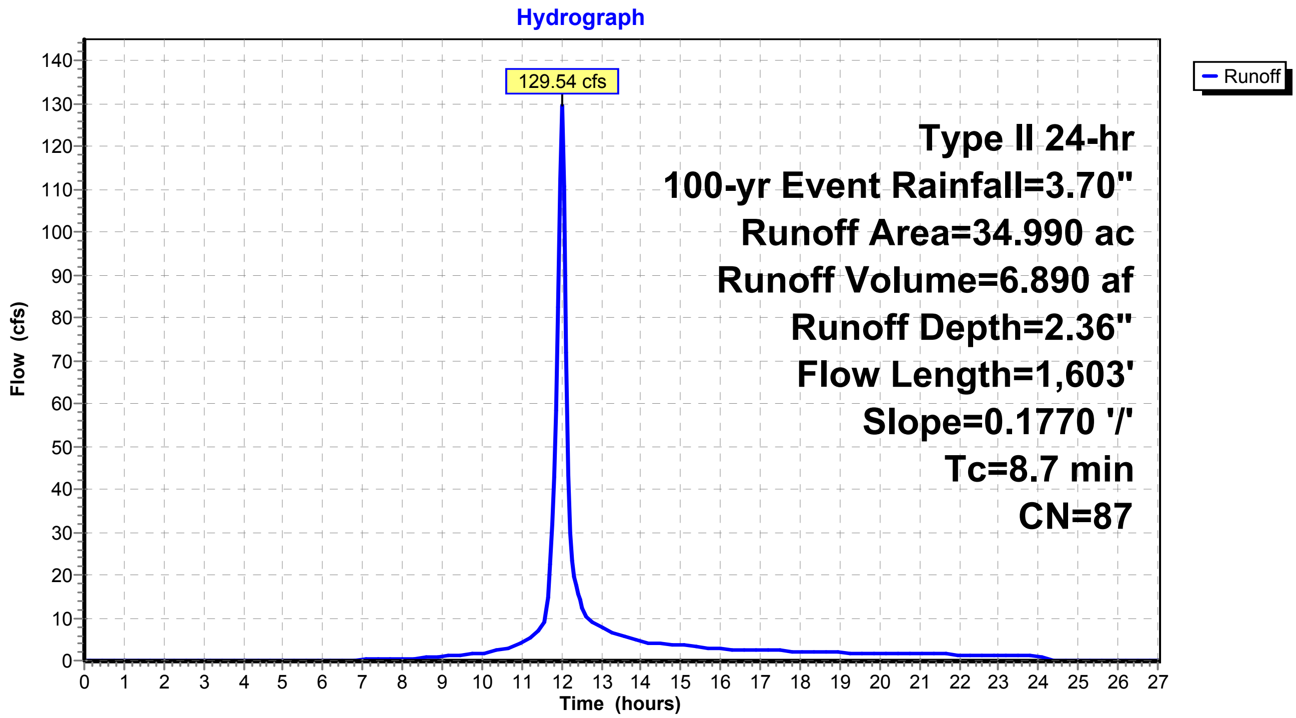
Runoff = 129.54 cfs @ 12.00 hrs, Volume= 6.890 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

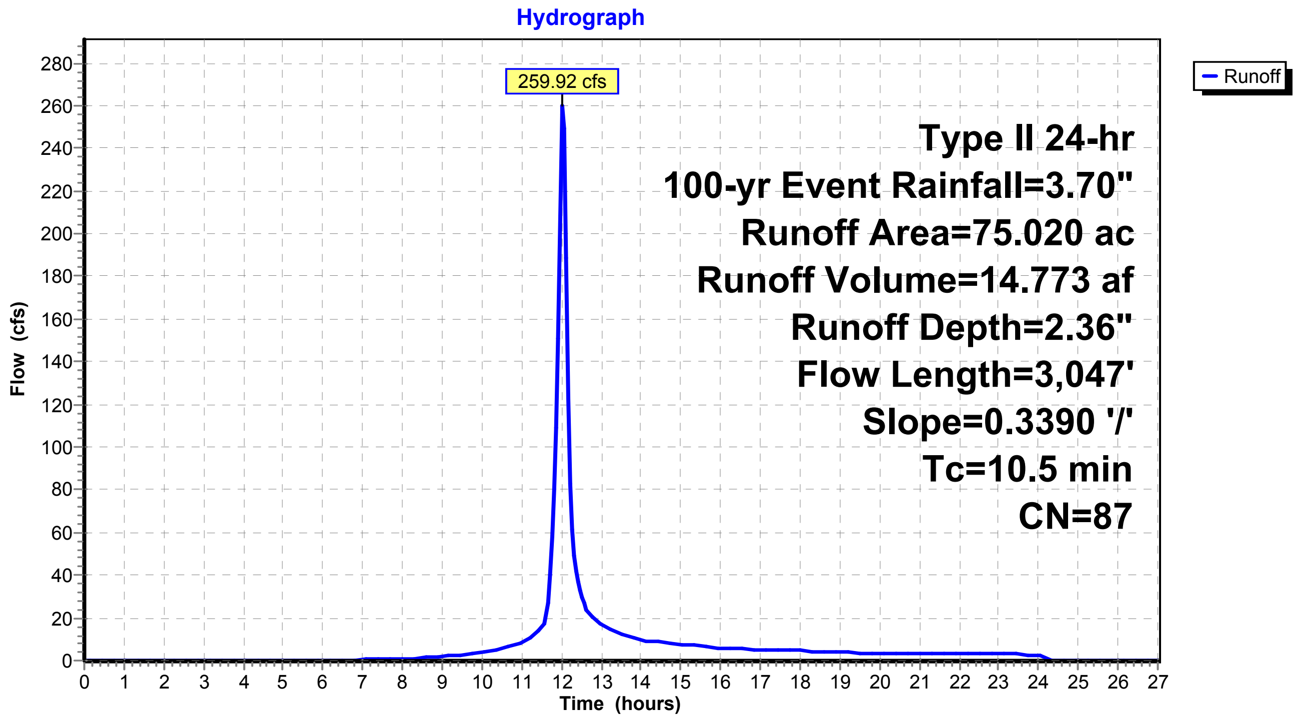
Runoff = 259.92 cfs @ 12.02 hrs, Volume= 14.773 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

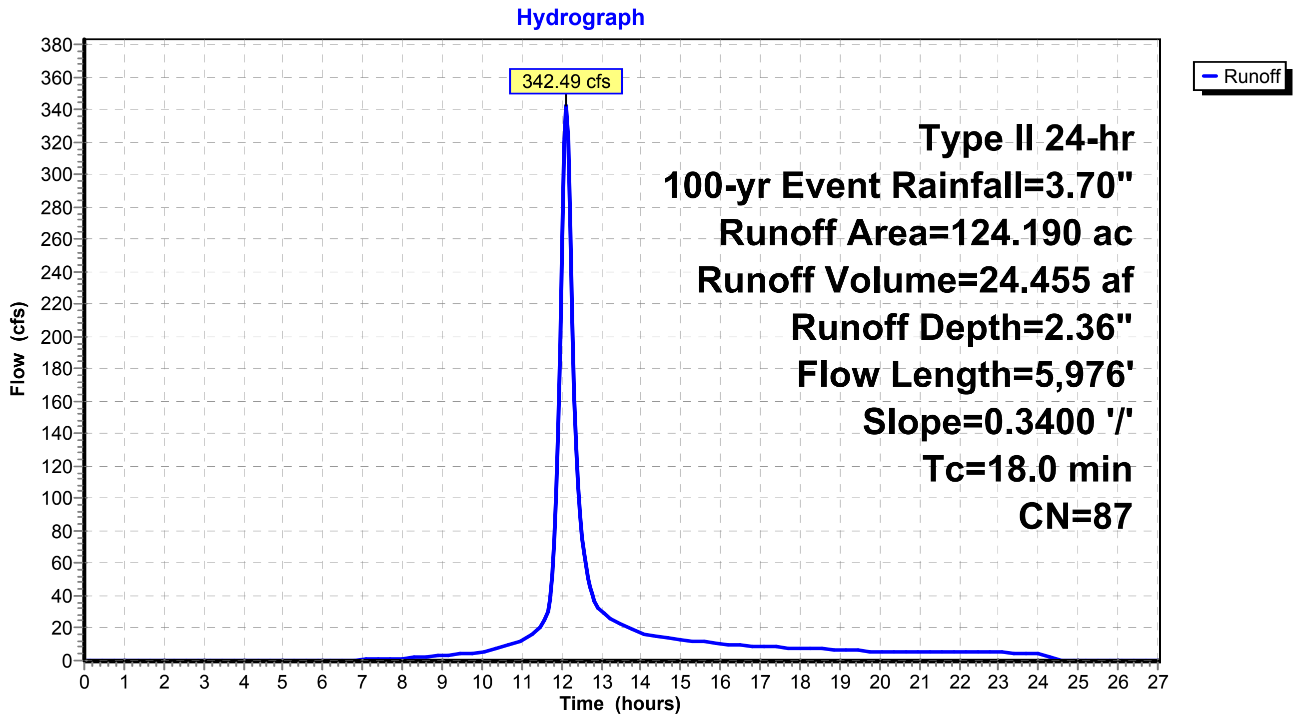
Runoff = 342.49 cfs @ 12.10 hrs, Volume= 24.455 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

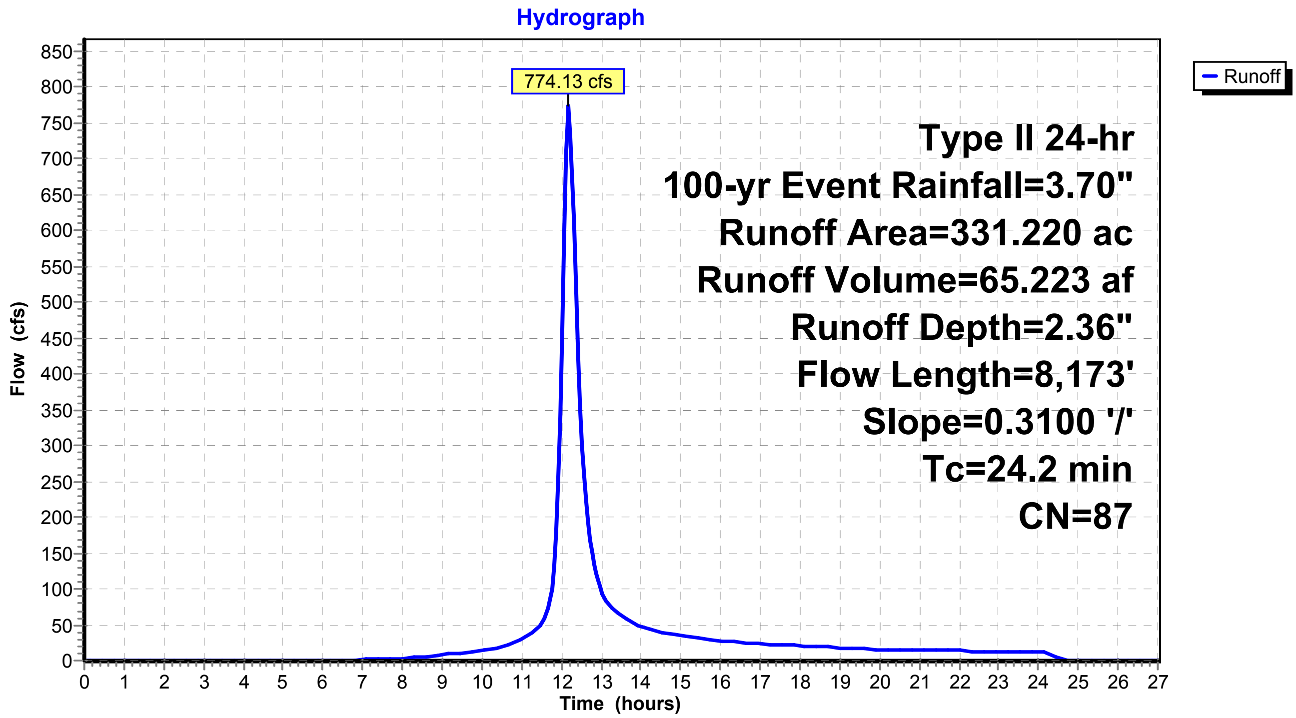
Runoff = 774.13 cfs @ 12.17 hrs, Volume= 65.223 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

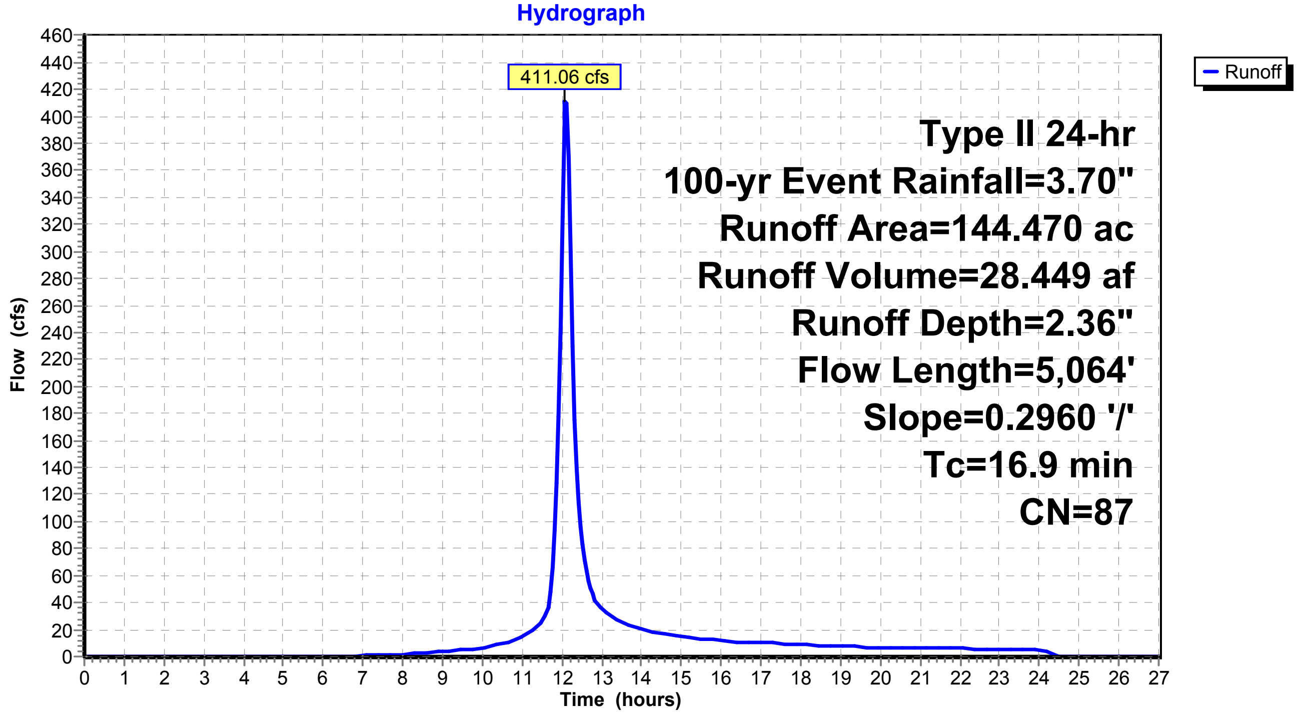
Runoff = 411.06 cfs @ 12.09 hrs, Volume= 28.449 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

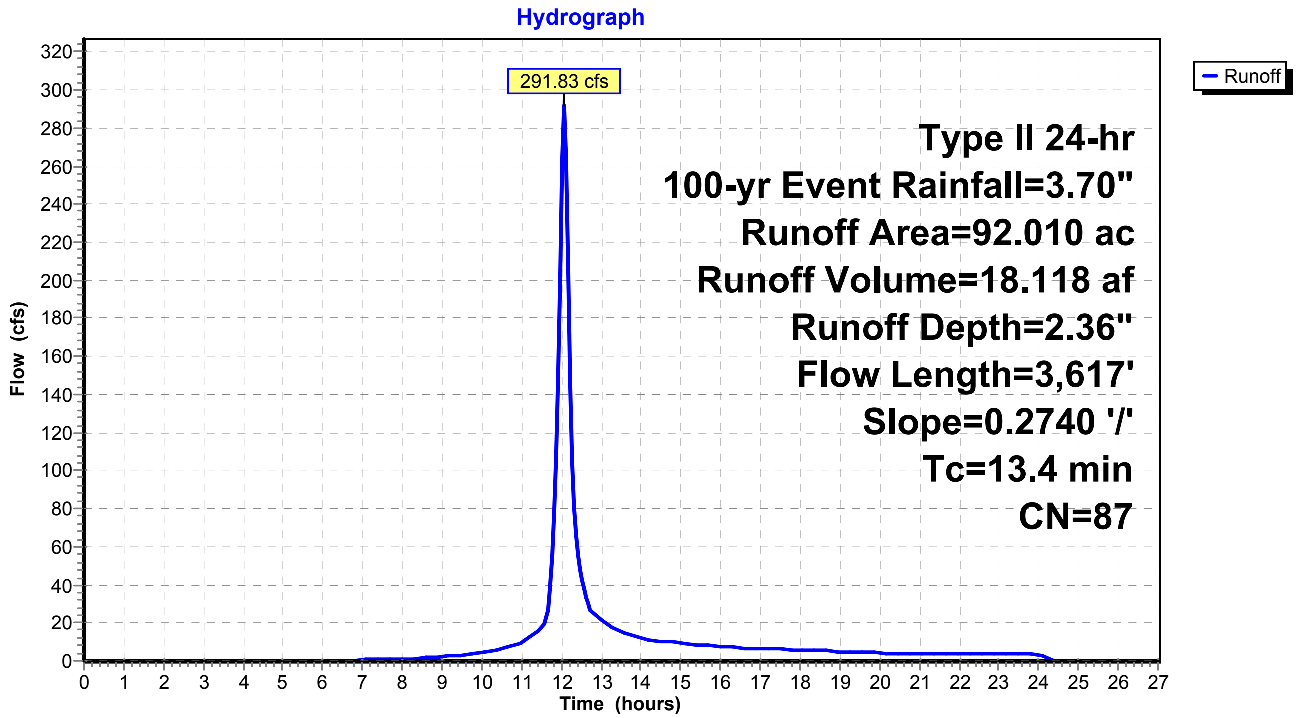
Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

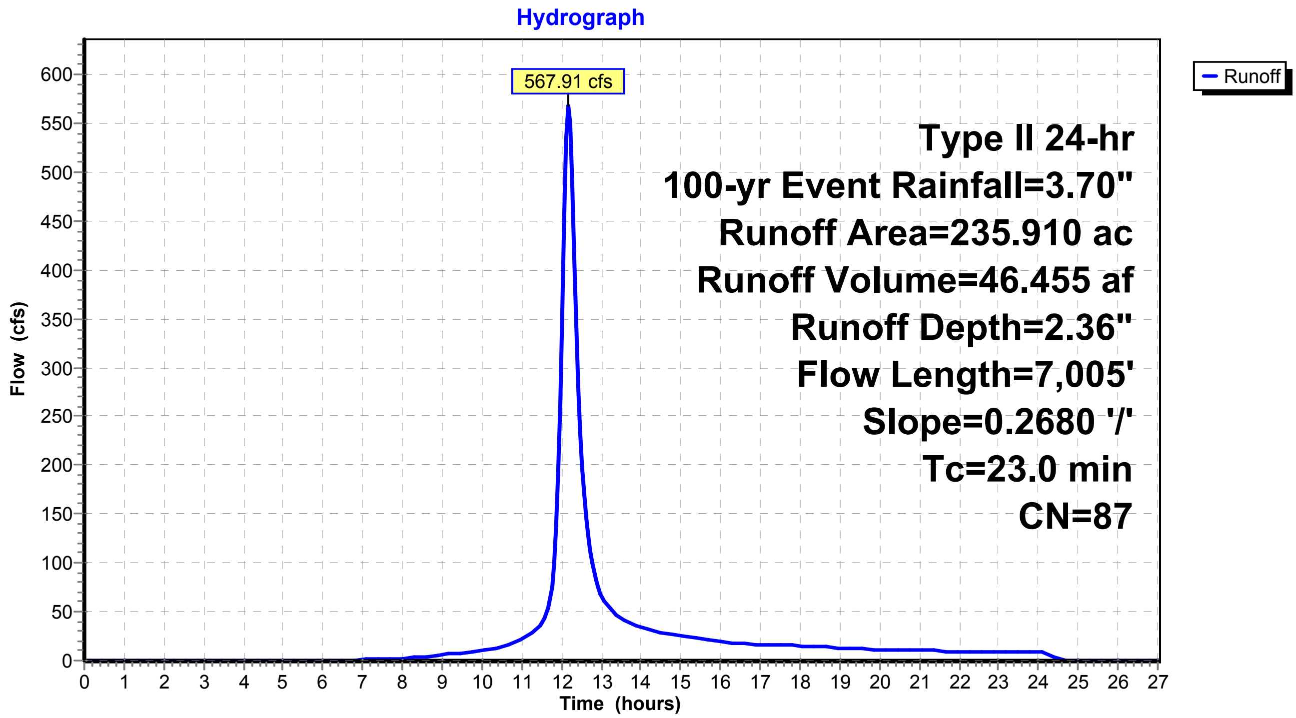
Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

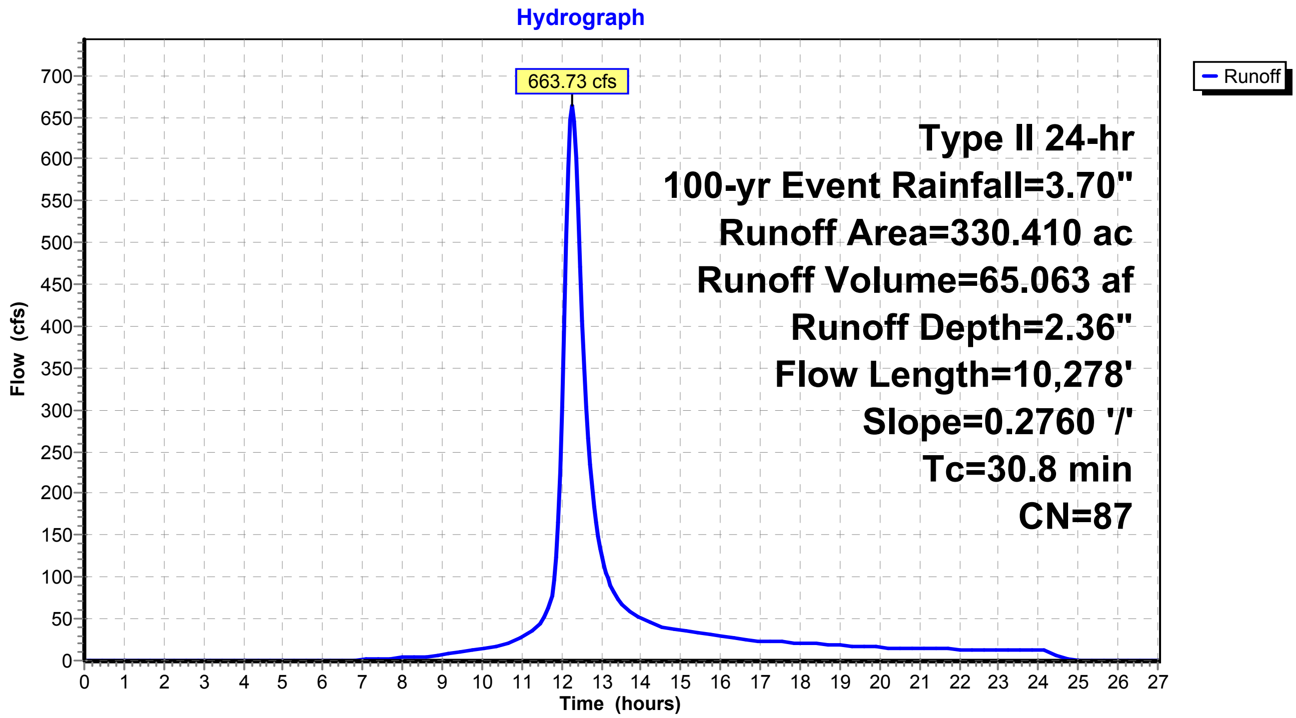
Runoff = 663.73 cfs @ 12.25 hrs, Volume= 65.063 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

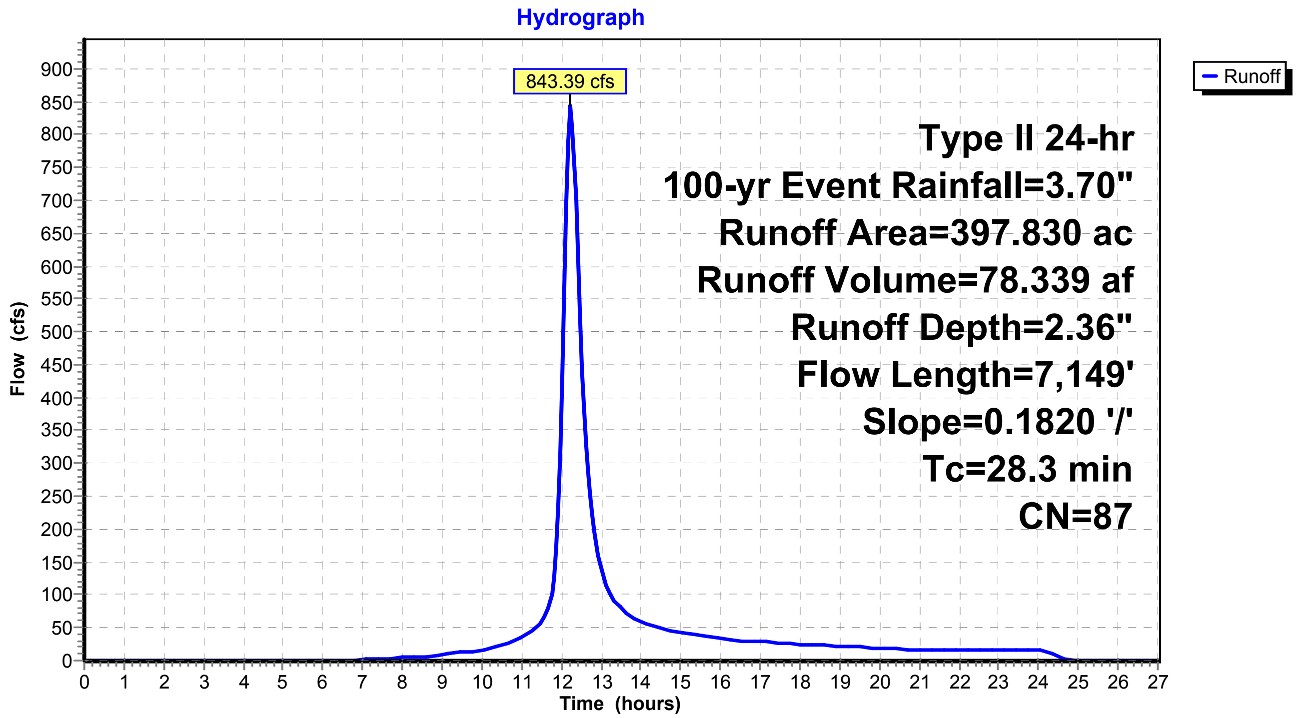
Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

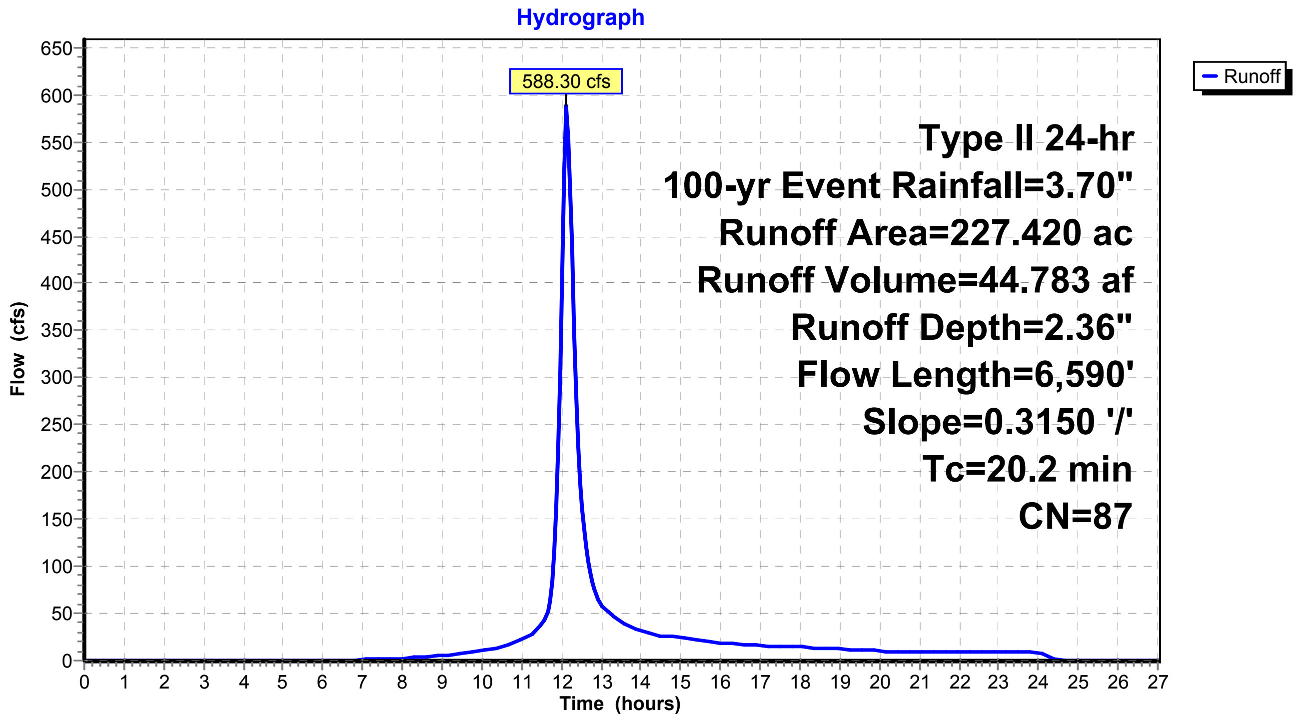
Runoff = 588.30 cfs @ 12.13 hrs, Volume= 44.783 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

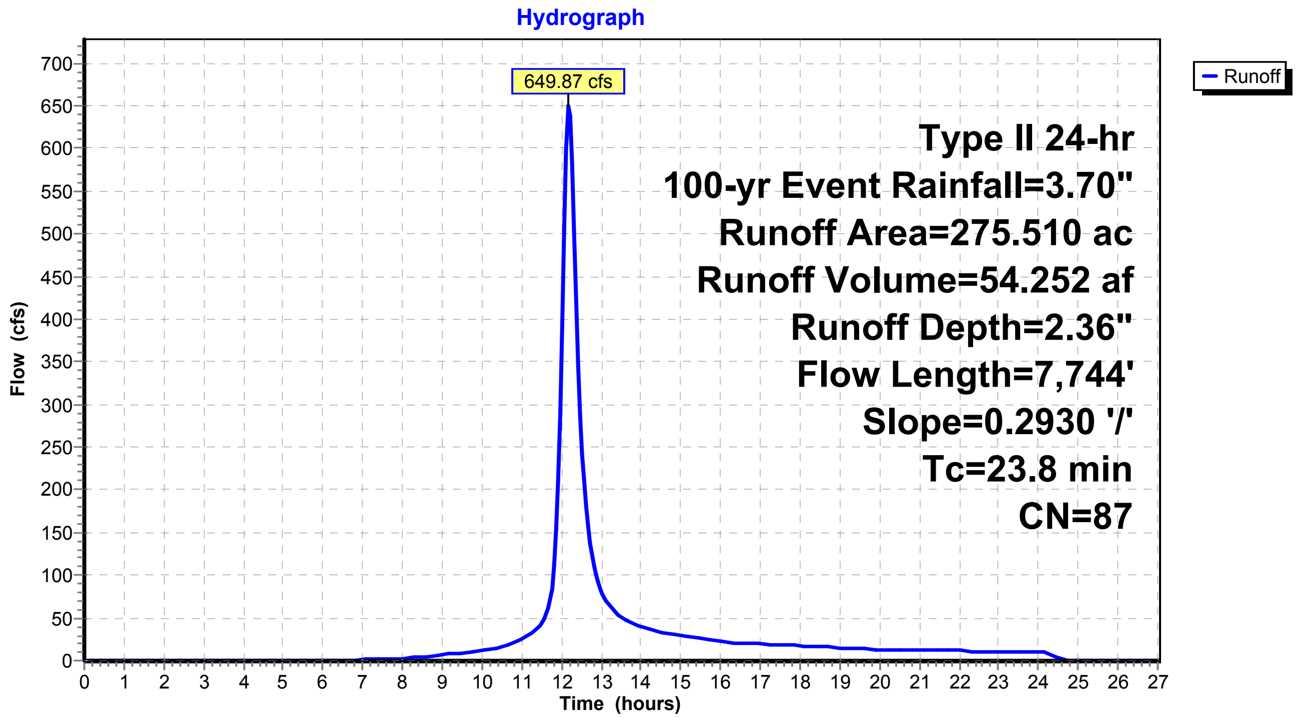
Runoff = 649.87 cfs @ 12.17 hrs, Volume= 54.252 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

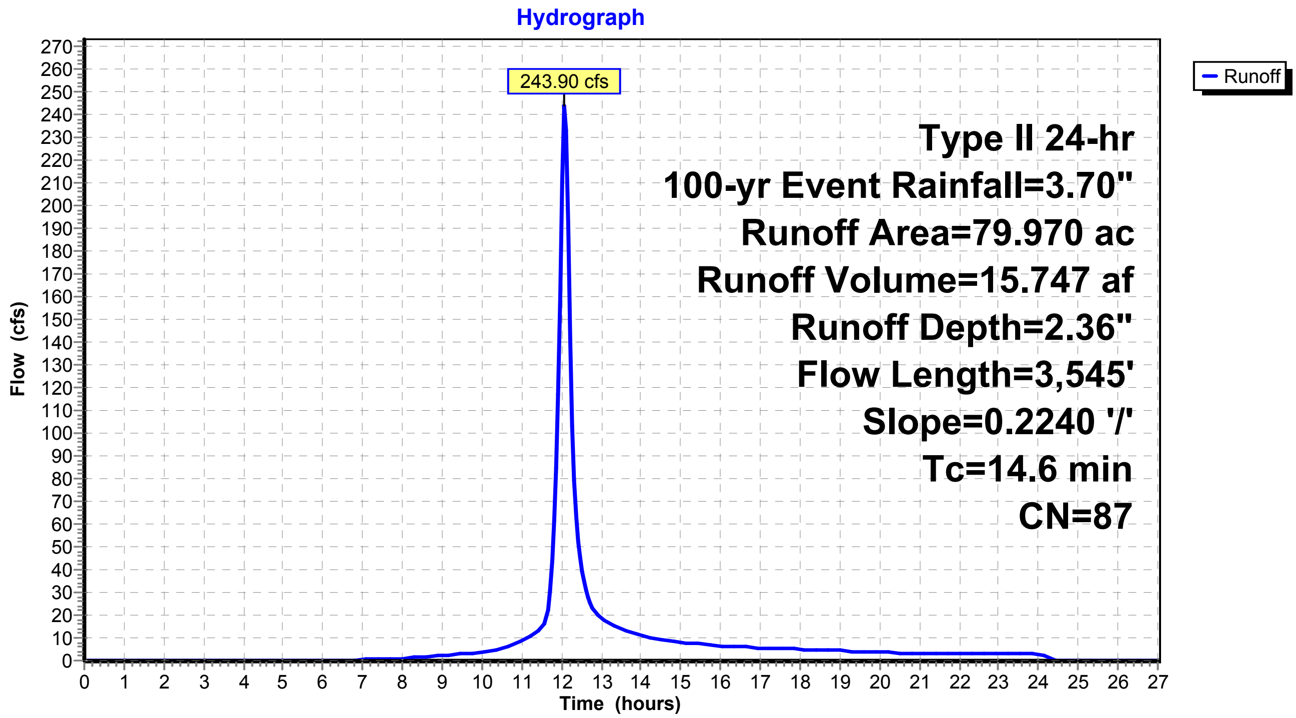
Runoff = 243.90 cfs @ 12.06 hrs, Volume= 15.747 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	71.970	86	Desert shrub range, Fair, HSG D
*	8.000	98	Impervious, HSG D
	79.970	87	Weighted Average
	71.970		90.00% Pervious Area
	8.000		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	3,545	0.2240	4.05		**Lag/CN Method,**

Subcatchment 14: WS 14



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=2.72"
Tc=5.0 min CN=87 Runoff=133.97 cfs 6.393 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=415.35 cfs 24.150 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=148.20 cfs 7.929 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=297.56 cfs 17.000 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=392.70 cfs 28.143 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=888.50 cfs 75.058 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=471.20 cfs 32.739 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=334.29 cfs 20.851 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=651.70 cfs 53.460 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=762.30 cfs 74.875 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=968.42 cfs 90.153 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=674.80 cfs 51.536 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=745.85 cfs 62.434 af

Subcatchment14: WS 14 Runoff Area=79.970 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,545' Slope=0.2240 '/' Tc=14.6 min CN=87 Runoff=279.49 cfs 18.122 af

Total Runoff Area = 2,483.730 ac Runoff Volume = 562.843 af Average Runoff Depth = 2.72"
90.00% Pervious = 2,235.360 ac 10.00% Impervious = 248.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

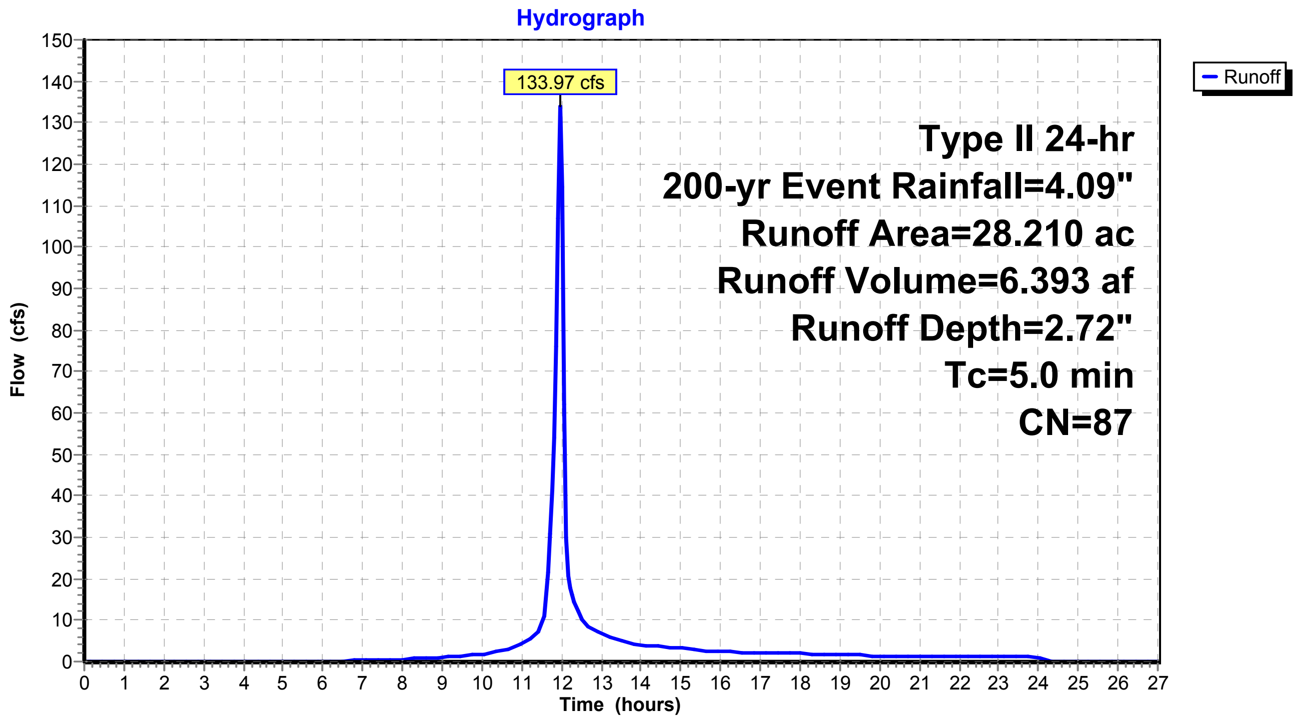
Runoff = 133.97 cfs @ 11.95 hrs, Volume= 6.393 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

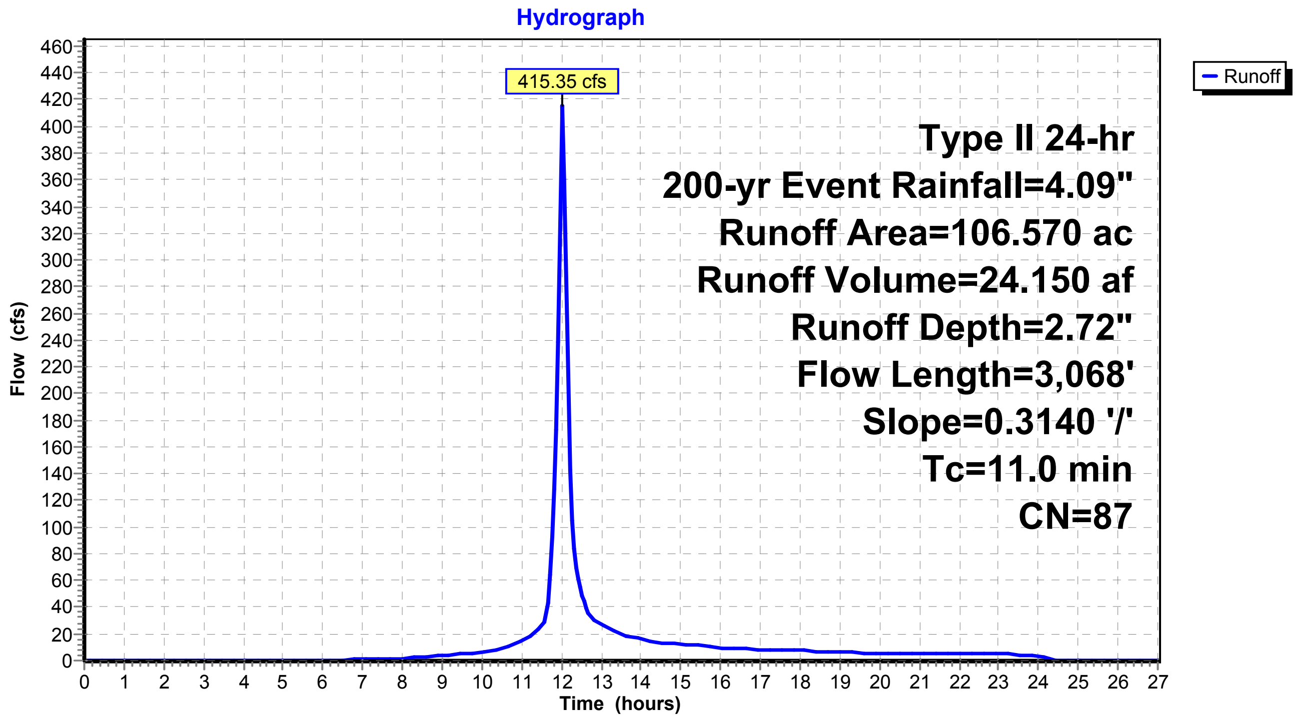
Runoff = 415.35 cfs @ 12.02 hrs, Volume= 24.150 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

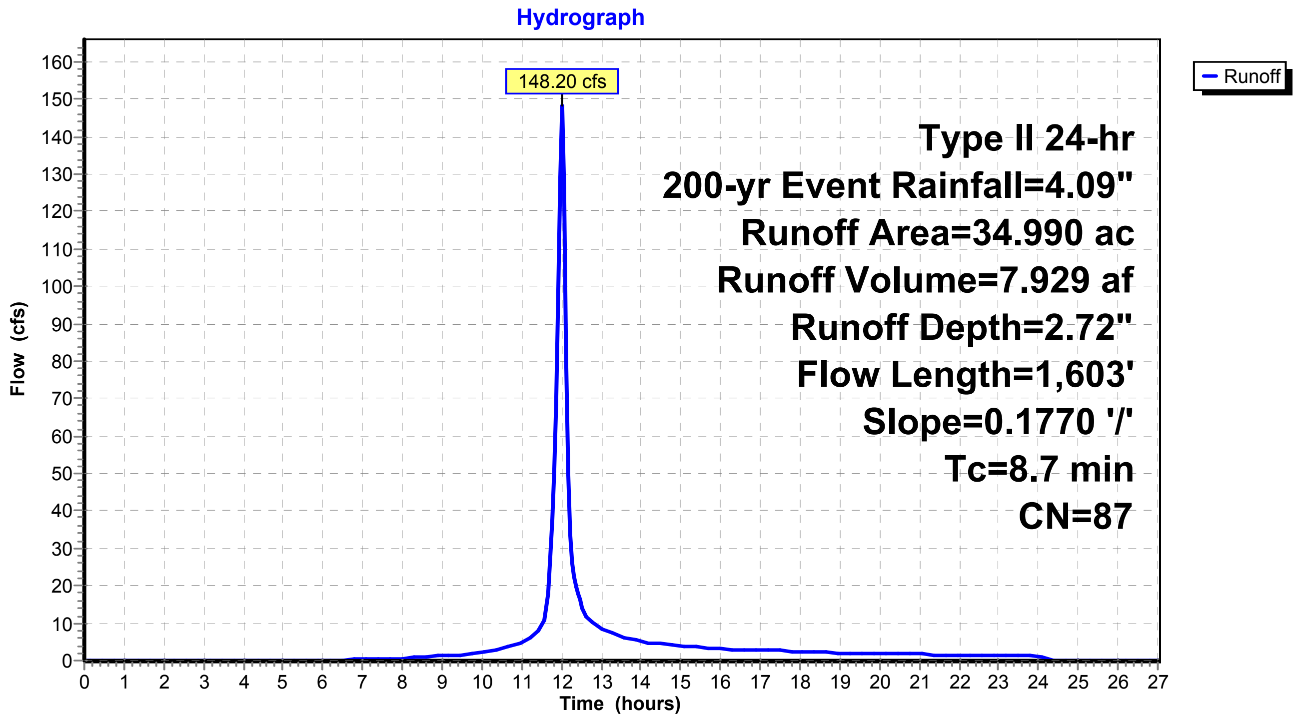
Runoff = 148.20 cfs @ 12.00 hrs, Volume= 7.929 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

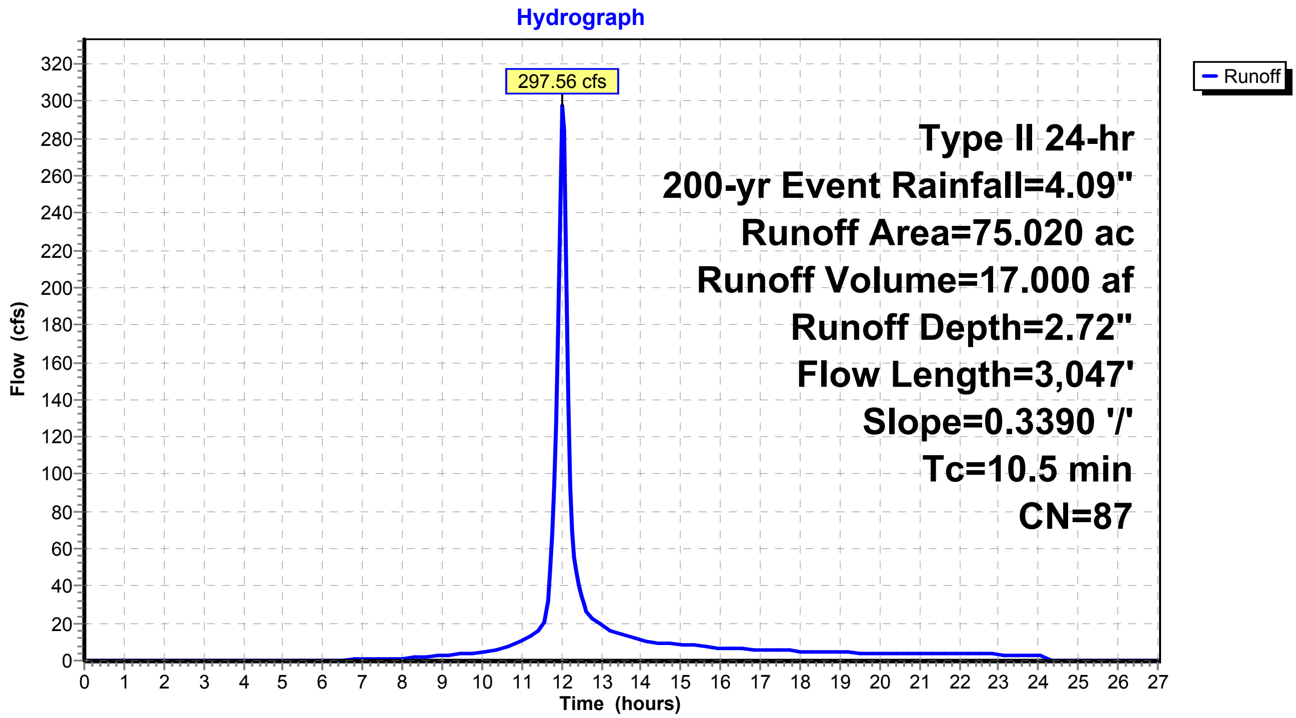
Runoff = 297.56 cfs @ 12.02 hrs, Volume= 17.000 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

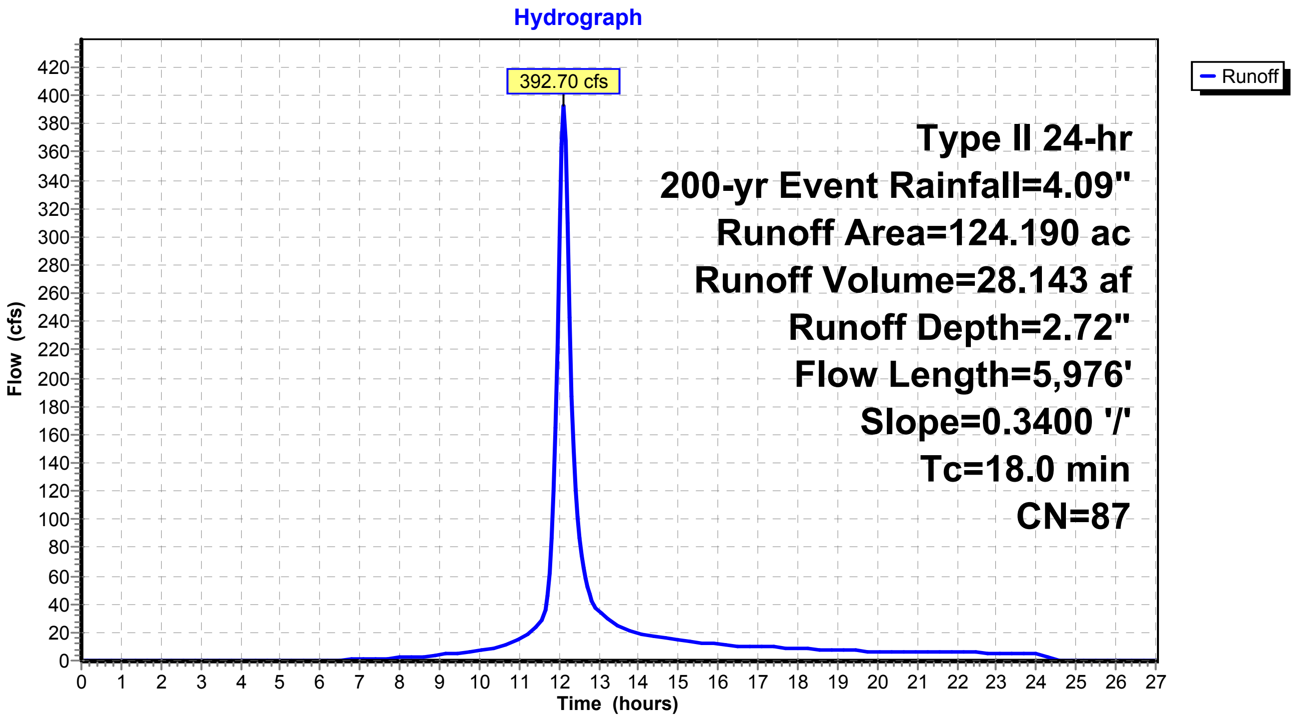
Runoff = 392.70 cfs @ 12.10 hrs, Volume= 28.143 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

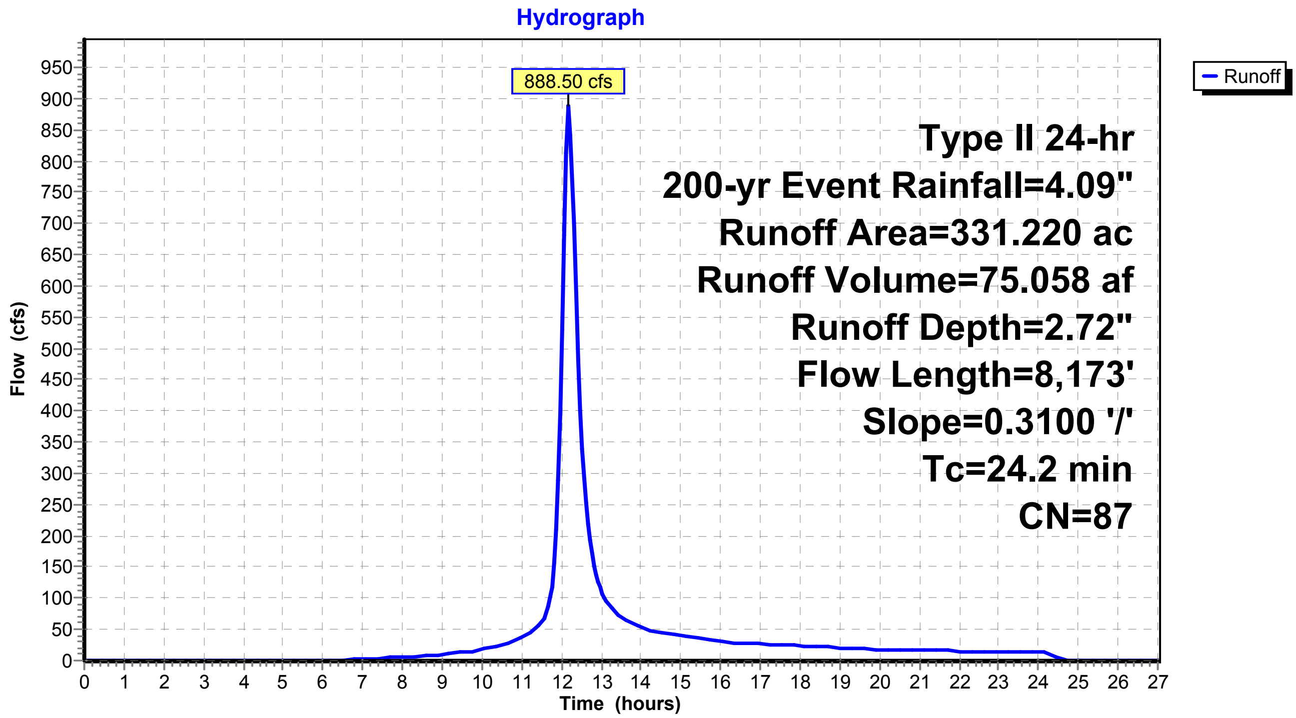
Runoff = 888.50 cfs @ 12.17 hrs, Volume= 75.058 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

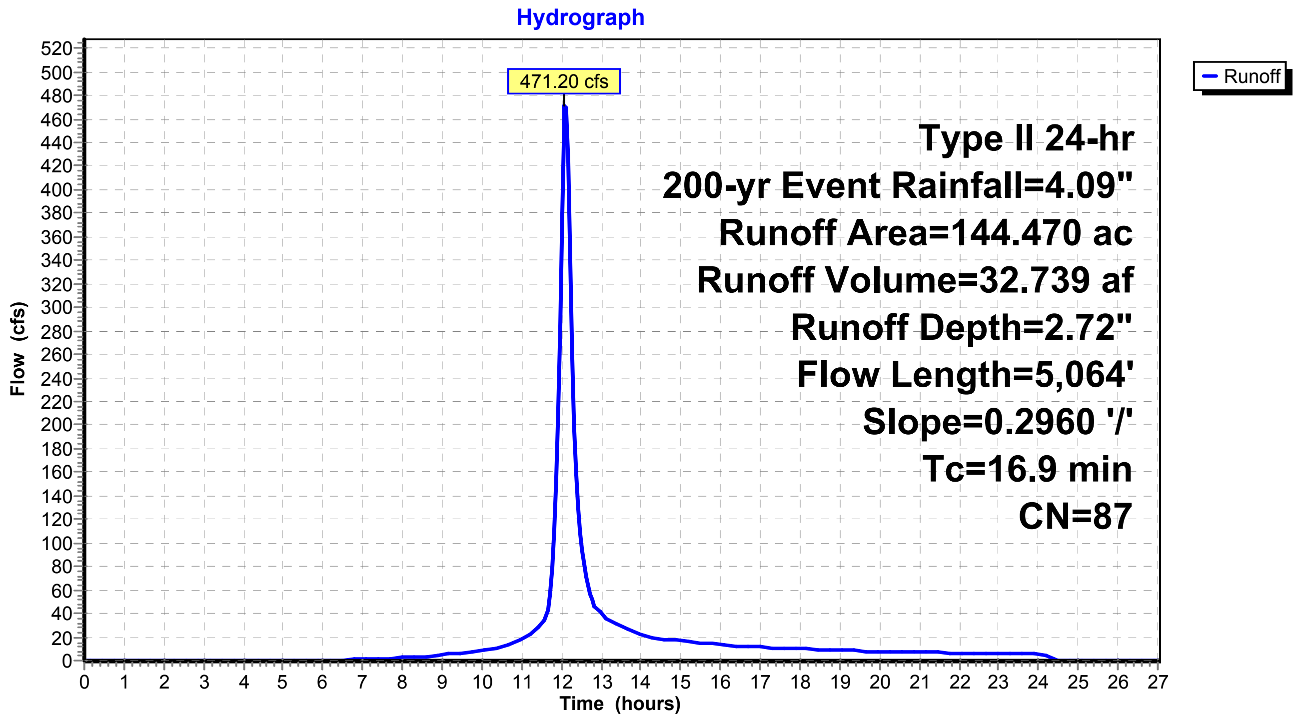
Runoff = 471.20 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

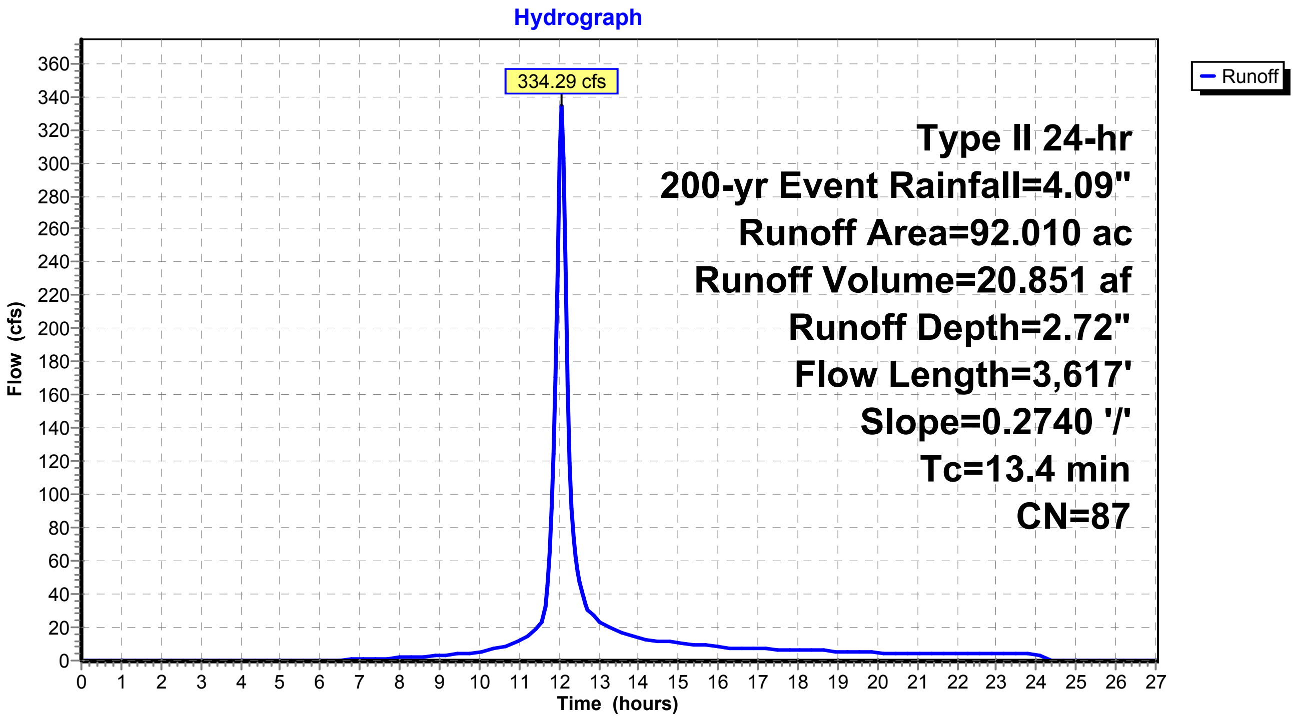
Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

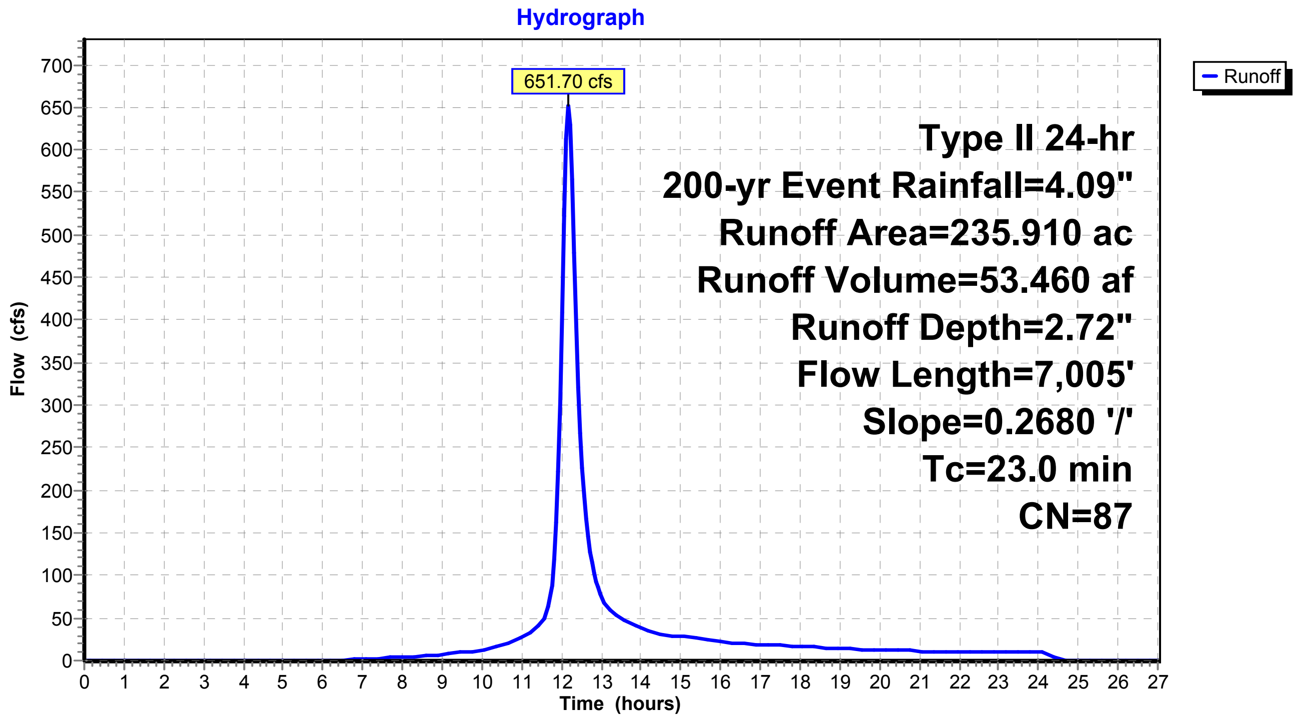
Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

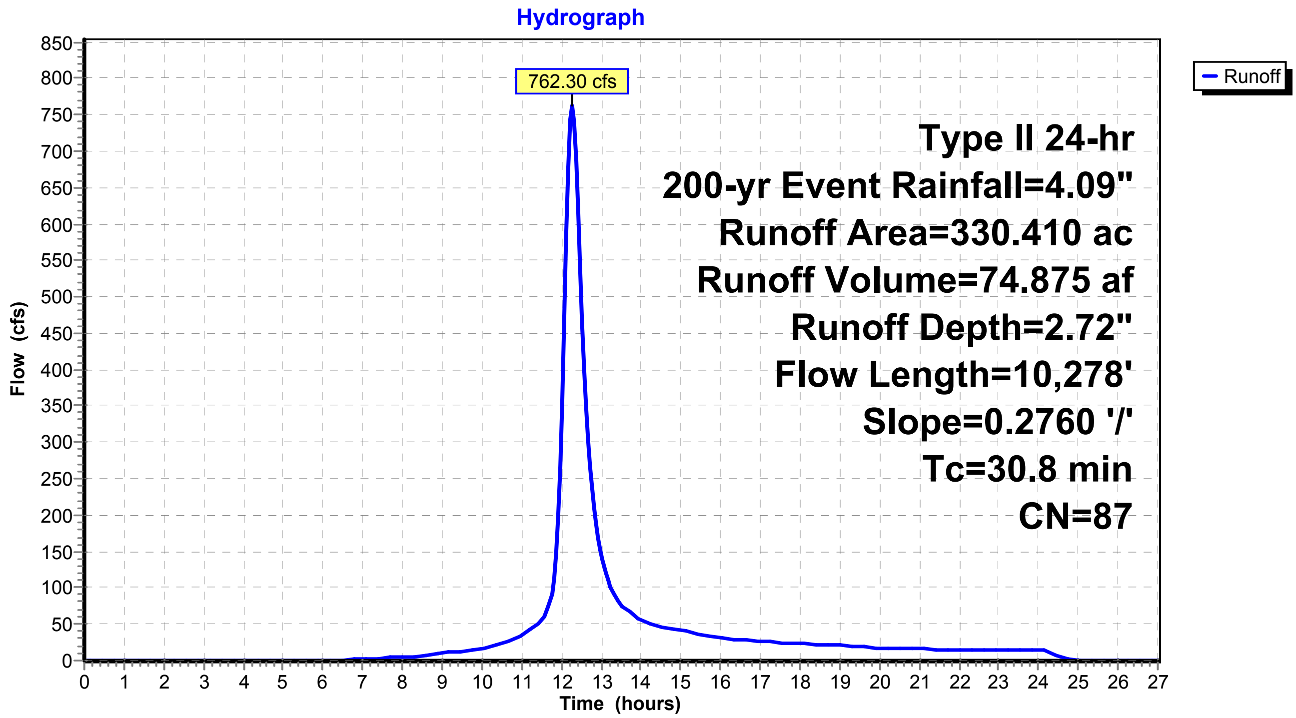
Runoff = 762.30 cfs @ 12.25 hrs, Volume= 74.875 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

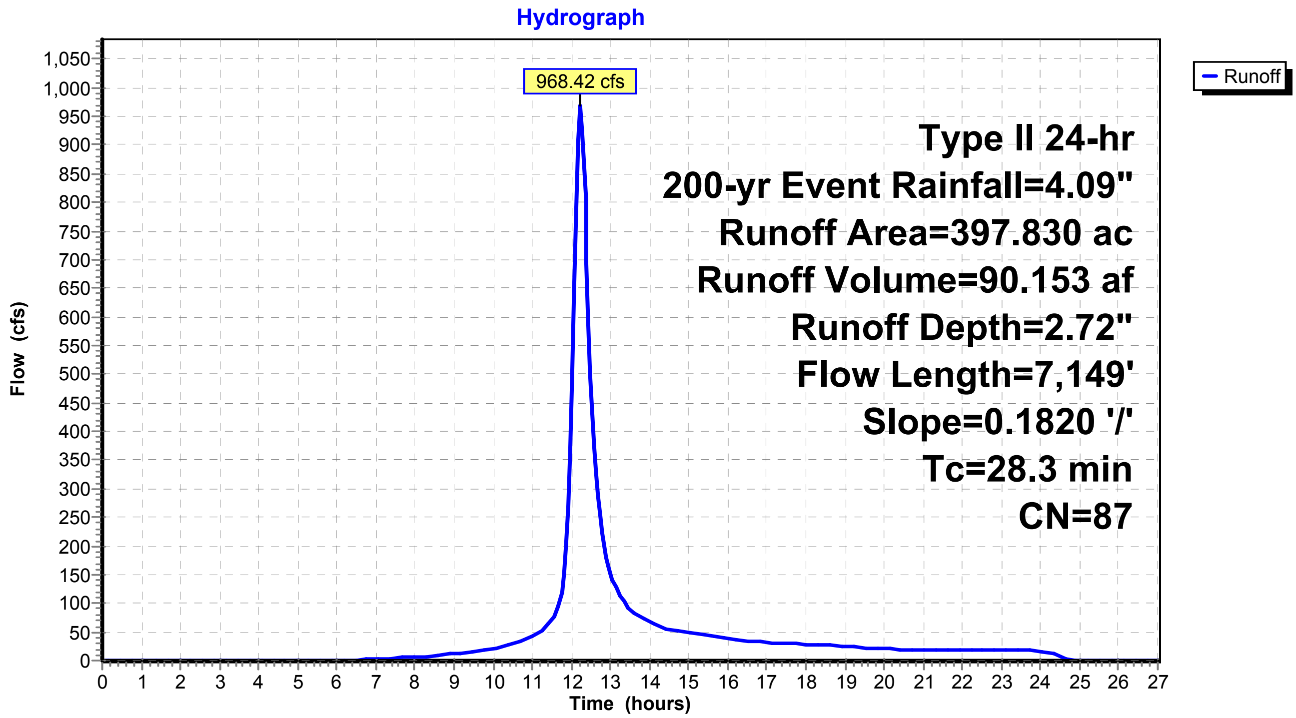
Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

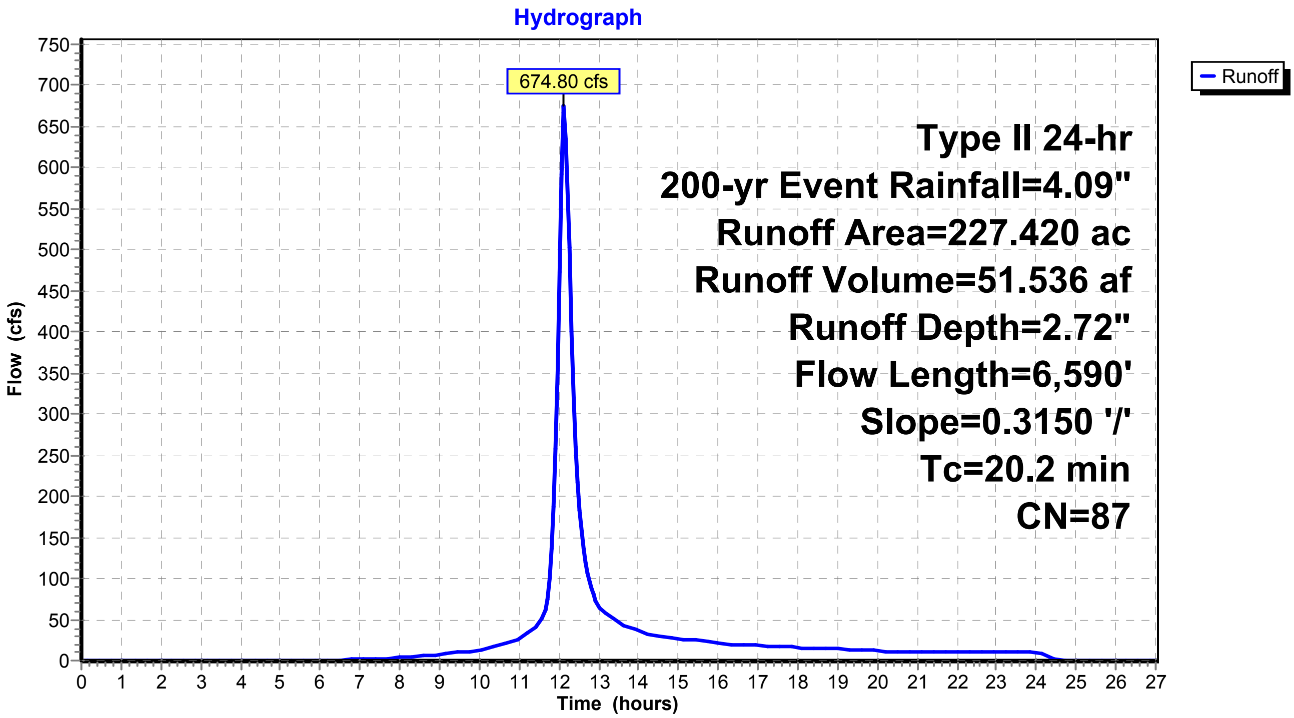
Runoff = 674.80 cfs @ 12.13 hrs, Volume= 51.536 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

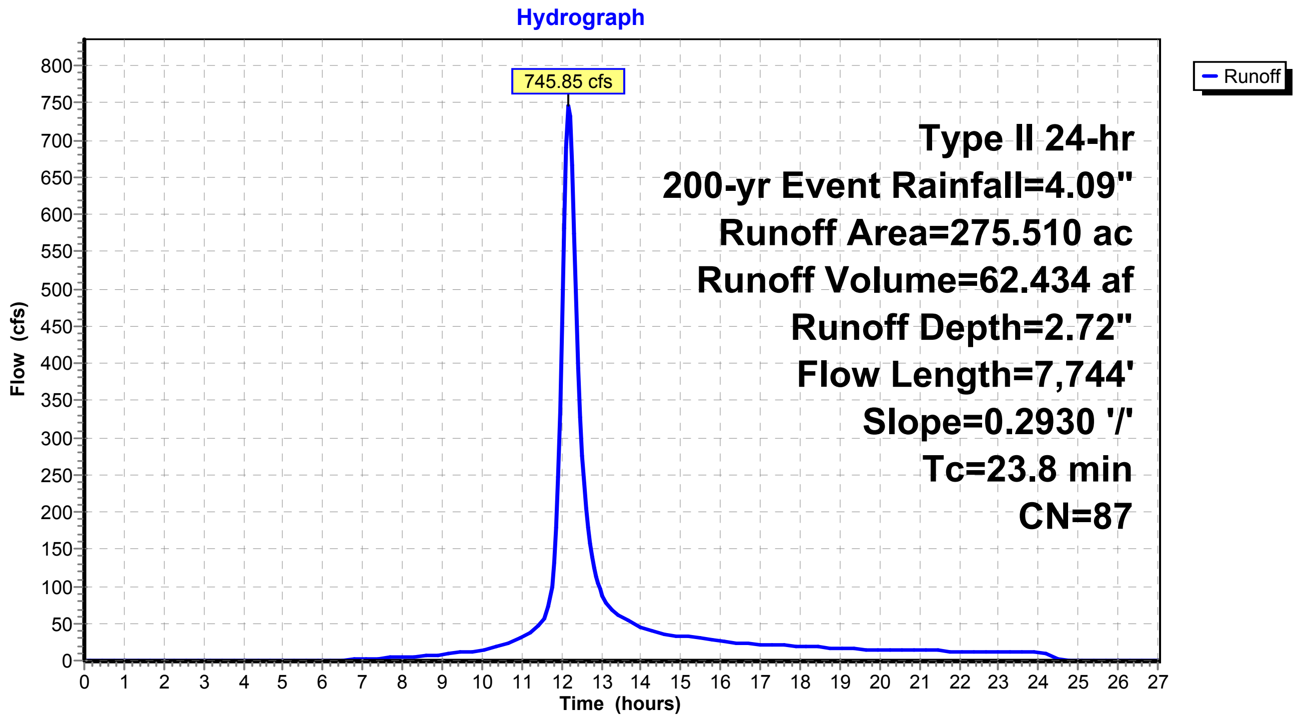
Runoff = 745.85 cfs @ 12.17 hrs, Volume= 62.434 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

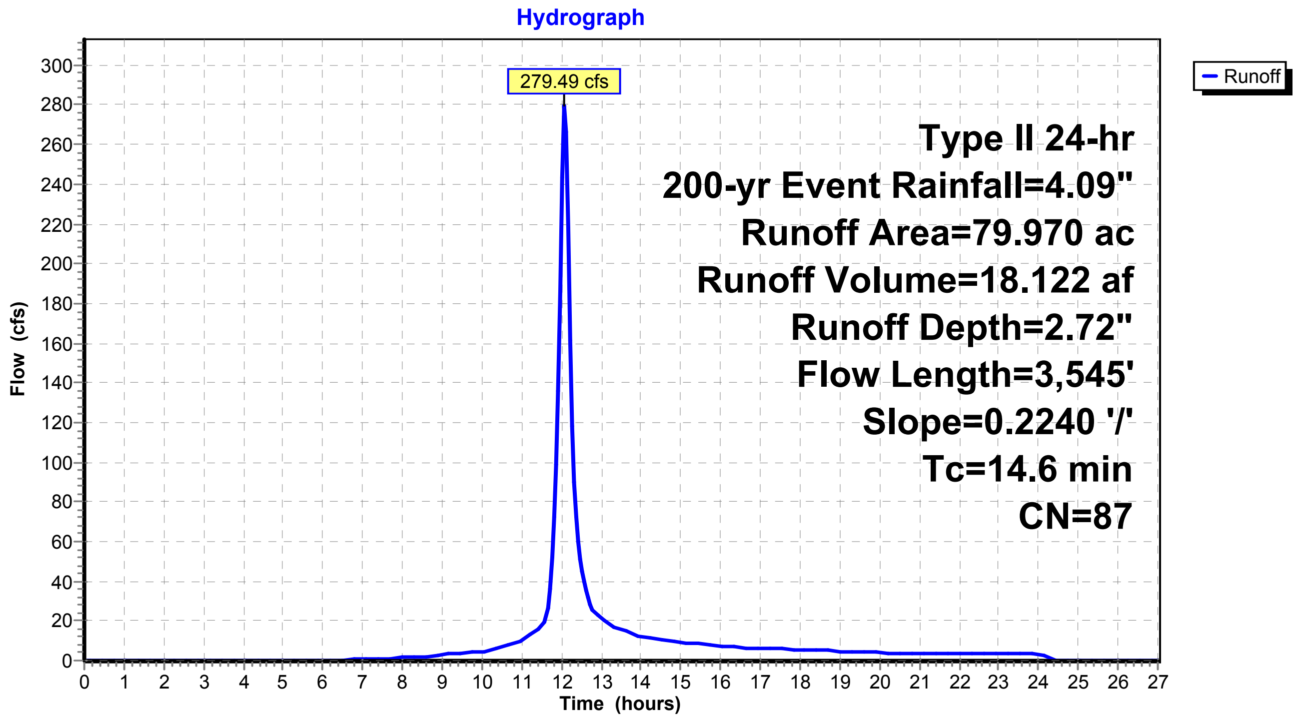
Runoff = 279.49 cfs @ 12.06 hrs, Volume= 18.122 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	71.970	86	Desert shrub range, Fair, HSG D
*	8.000	98	Impervious, HSG D
	79.970	87	Weighted Average
	71.970		90.00% Pervious Area
	8.000		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	3,545	0.2240	4.05		**Lag/CN Method,**

Subcatchment 14: WS 14



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=3.19"
Tc=5.0 min CN=87 Runoff=155.94 cfs 7.504 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=484.31 cfs 28.349 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=172.66 cfs 9.308 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=346.92 cfs 19.956 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=458.61 cfs 33.036 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=1,038.74 cfs 88.109 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=550.14 cfs 38.431 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=389.99 cfs 24.476 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=761.76 cfs 62.755 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=891.85 cfs 87.894 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=1,132.73 cfs 105.828 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=789.72 cfs 60.497 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=871.93 cfs 73.289 af

Subcatchment14: WS 14 Runoff Area=79.970 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,545' Slope=0.2240 '/' Tc=14.6 min CN=87 Runoff=326.19 cfs 21.273 af

Total Runoff Area = 2,483.730 ac Runoff Volume = 660.707 af Average Runoff Depth = 3.19"
90.00% Pervious = 2,235.360 ac 10.00% Impervious = 248.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

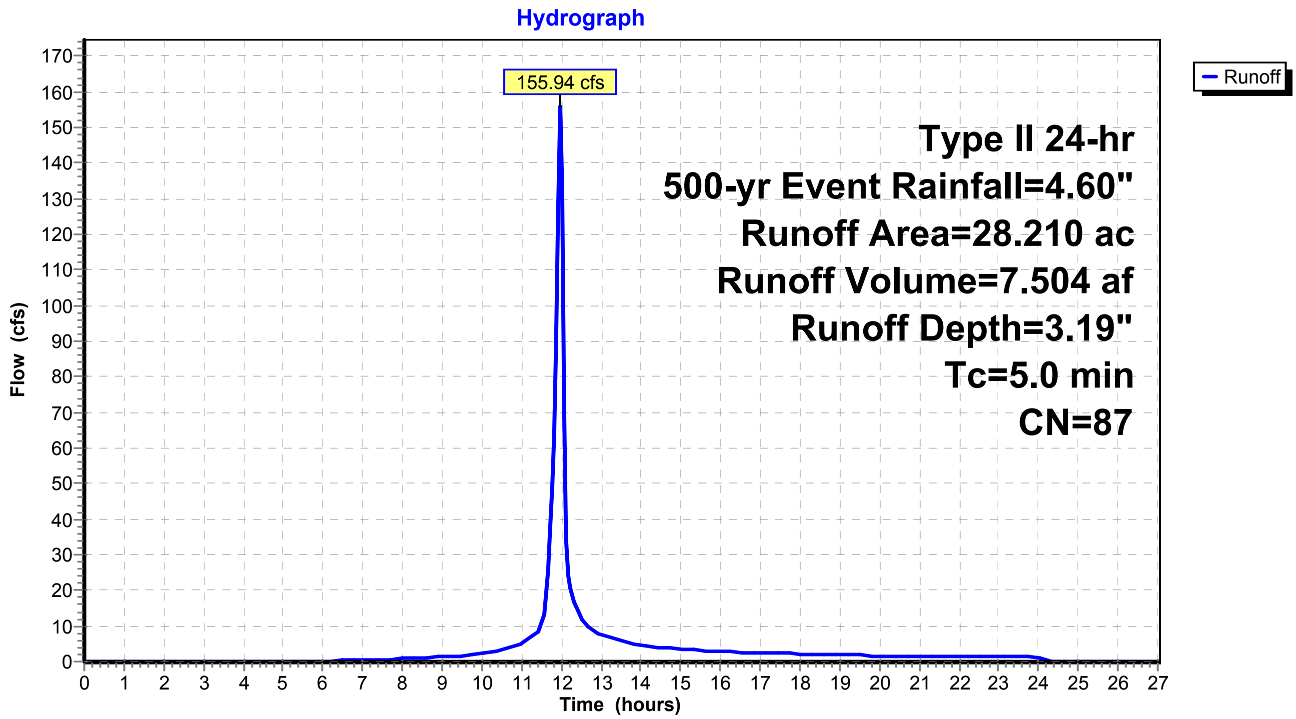
Runoff = 155.94 cfs @ 11.95 hrs, Volume= 7.504 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

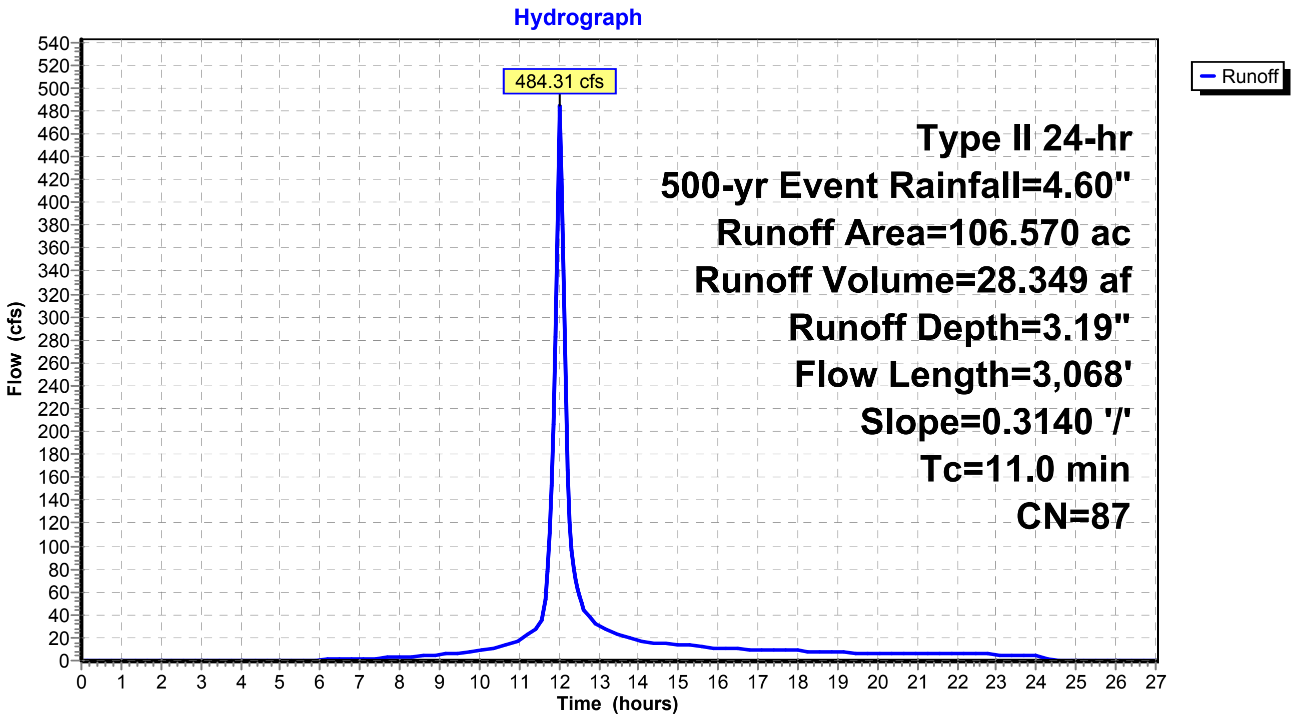
Runoff = 484.31 cfs @ 12.02 hrs, Volume= 28.349 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

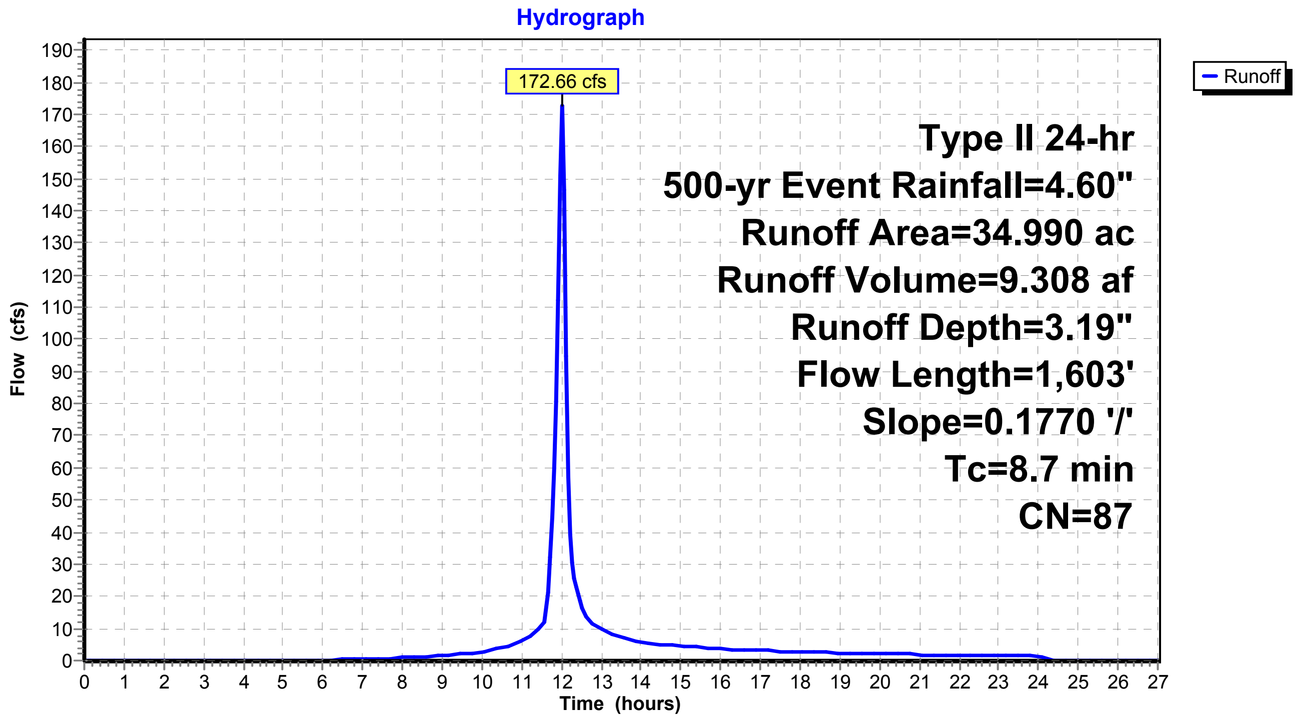
Runoff = 172.66 cfs @ 12.00 hrs, Volume= 9.308 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

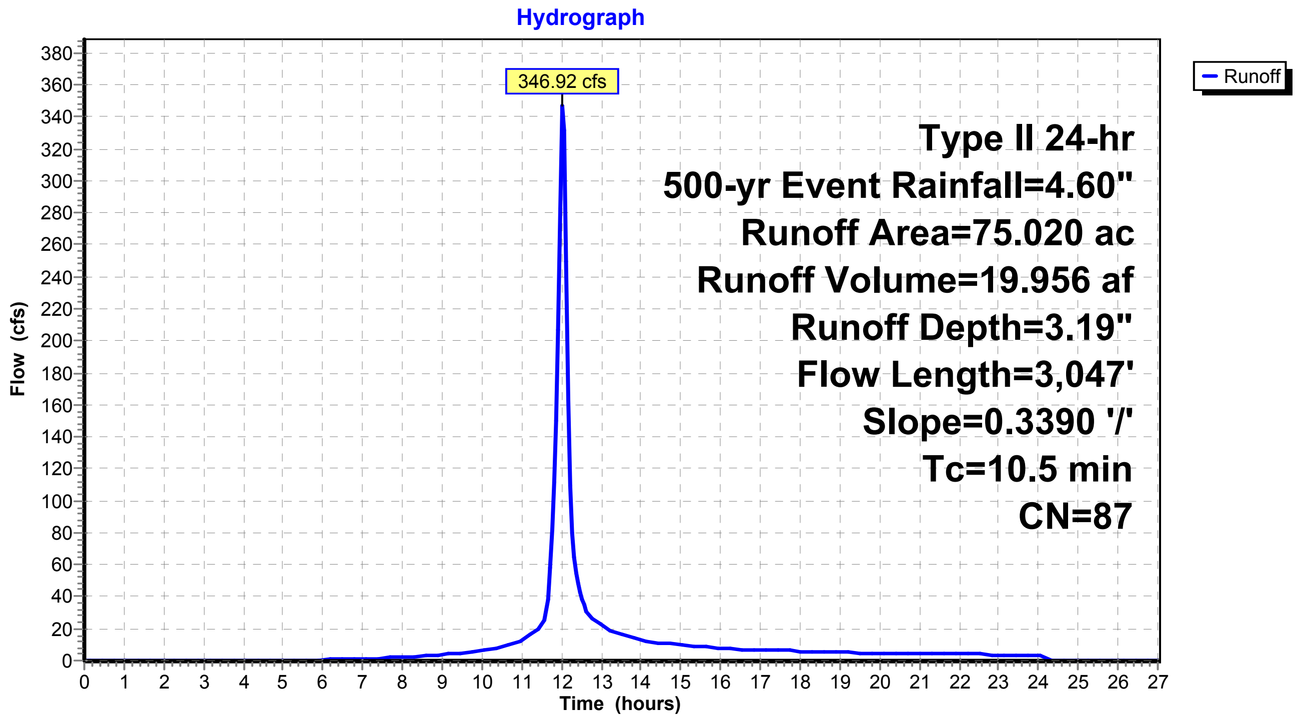
Runoff = 346.92 cfs @ 12.02 hrs, Volume= 19.956 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

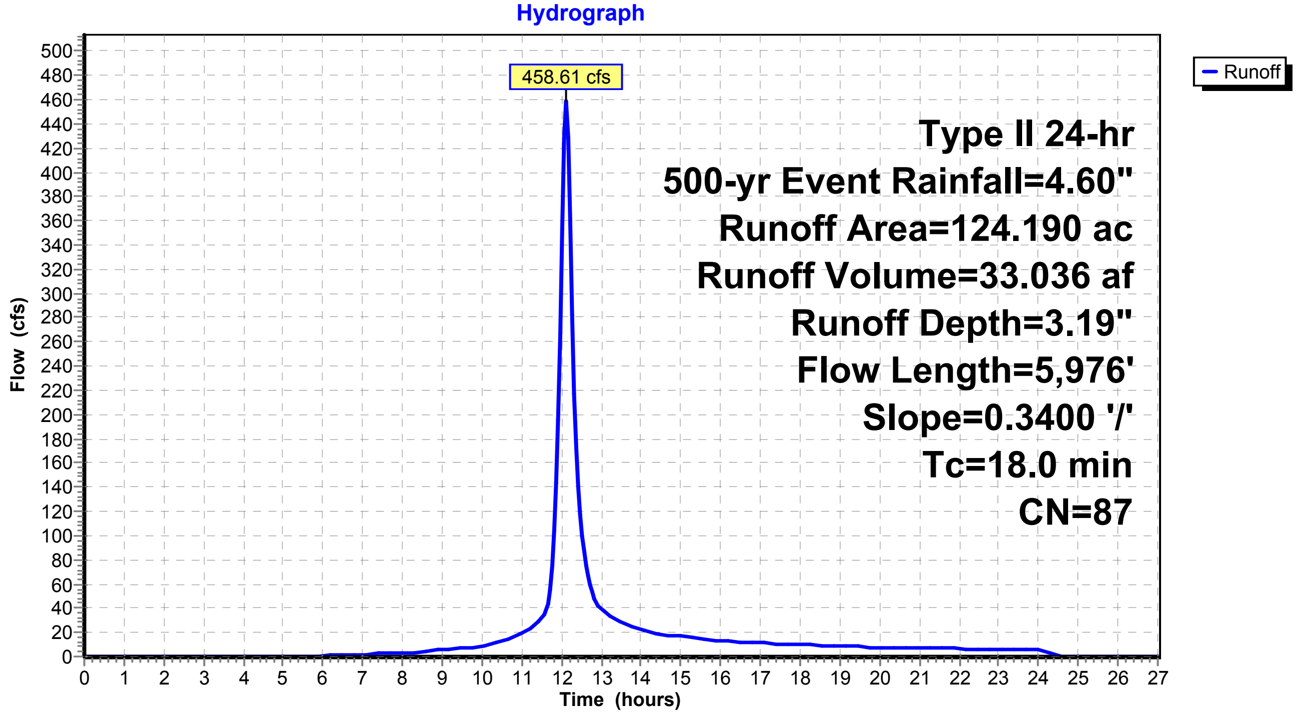
Runoff = 458.61 cfs @ 12.10 hrs, Volume= 33.036 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

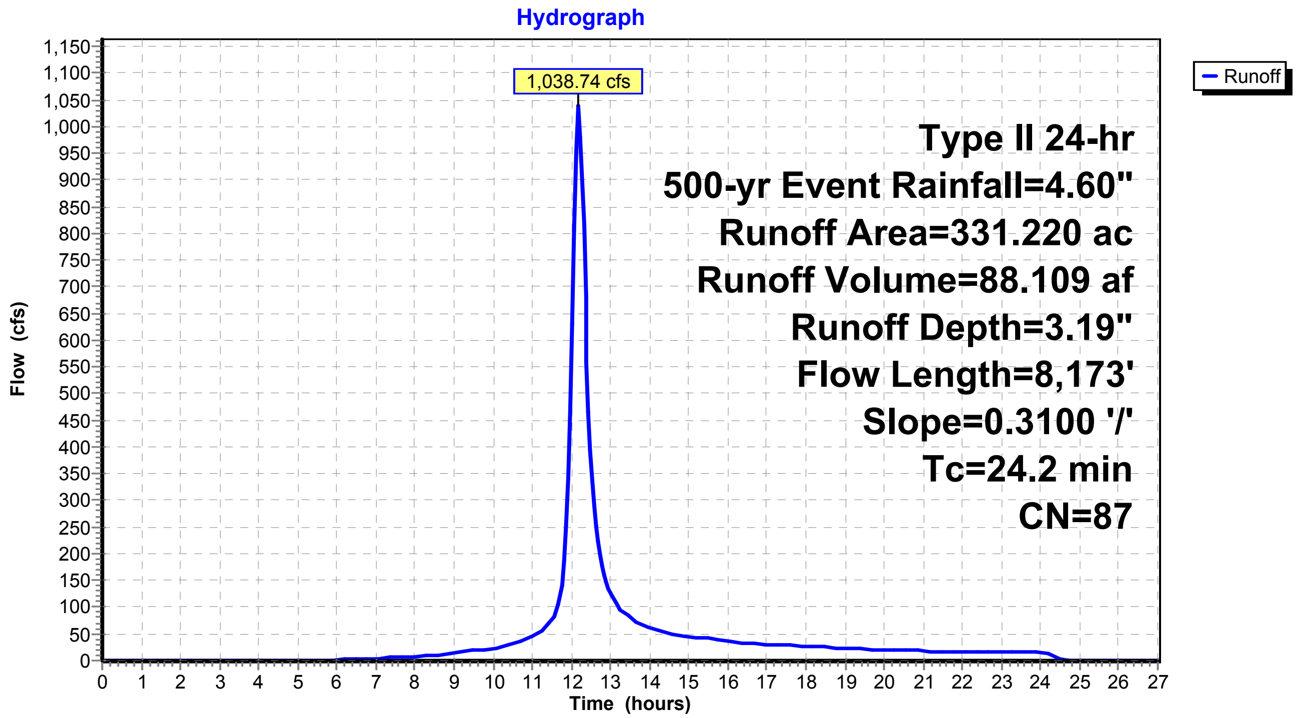
Runoff = 1,038.74 cfs @ 12.17 hrs, Volume= 88.109 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

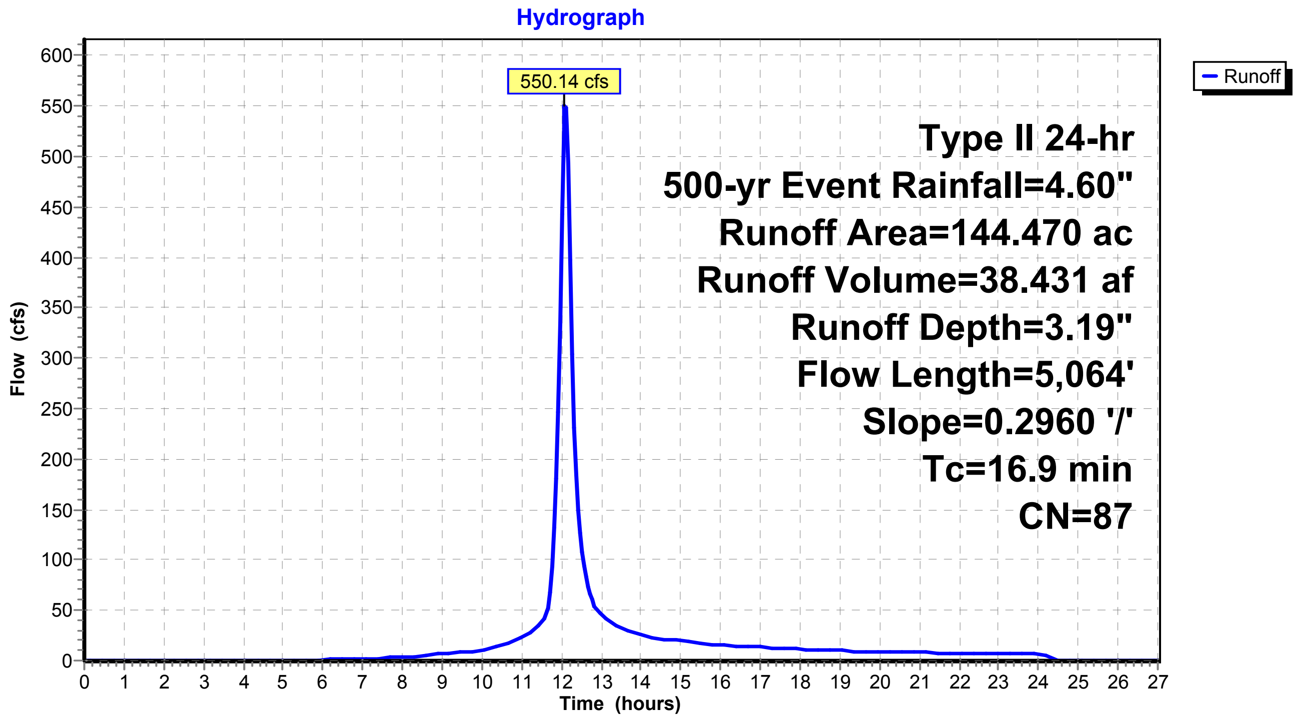
Runoff = 550.14 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

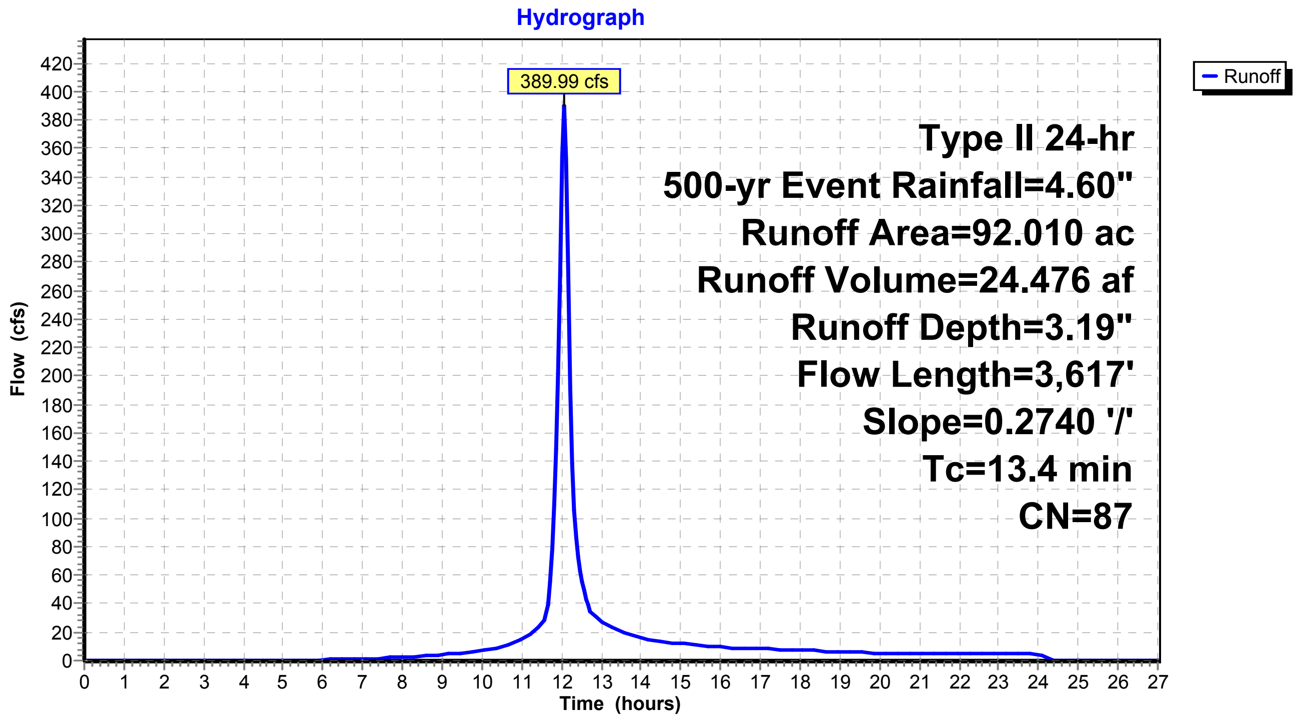
Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

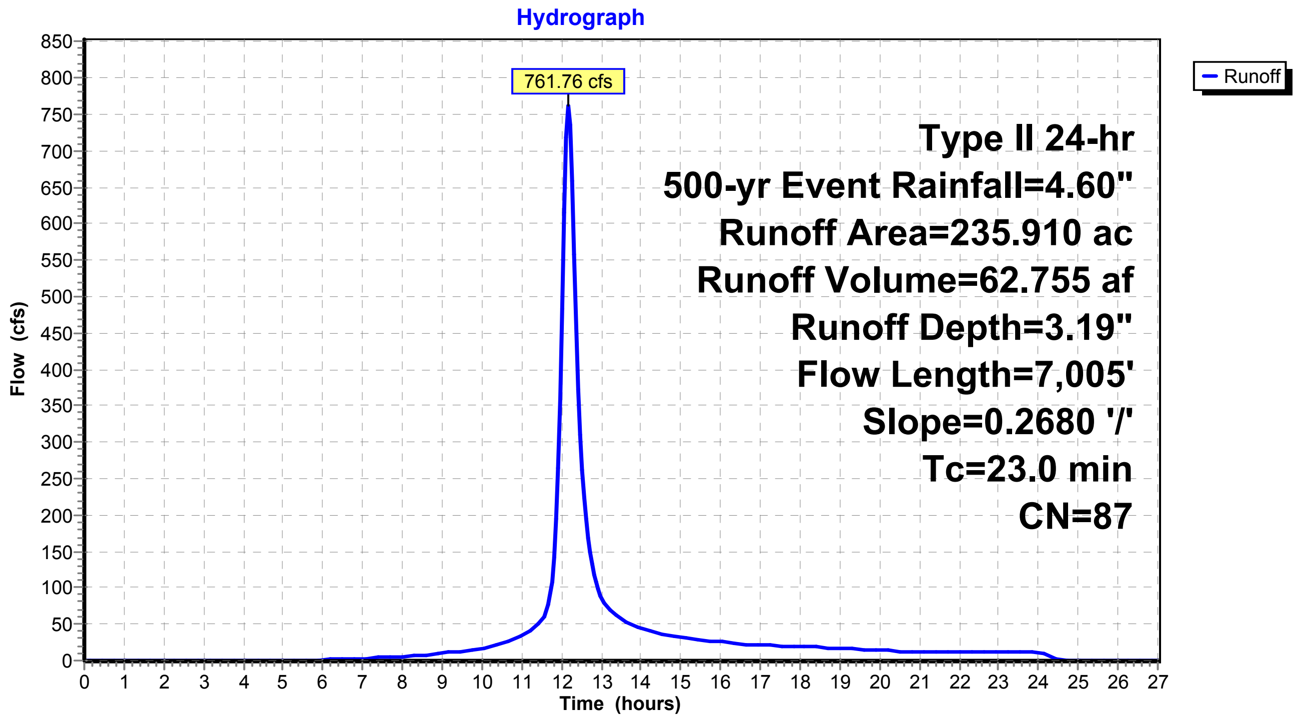
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

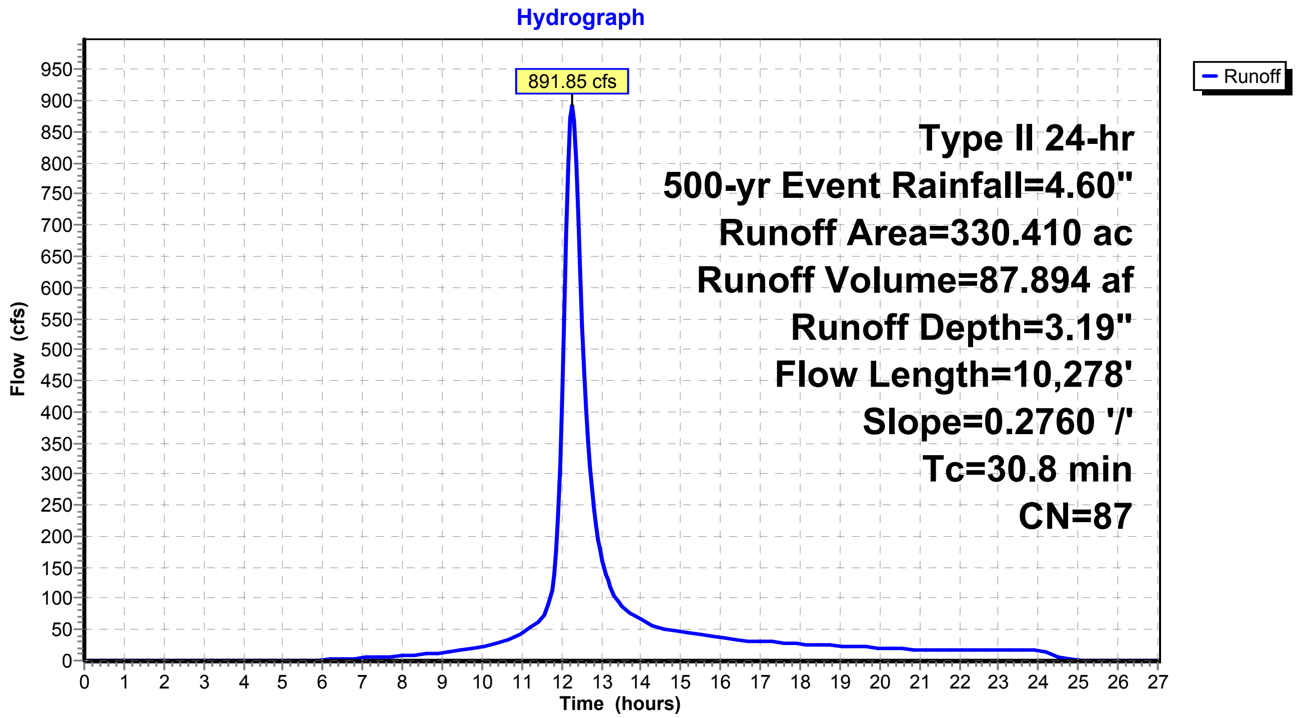
Runoff = 891.85 cfs @ 12.25 hrs, Volume= 87.894 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

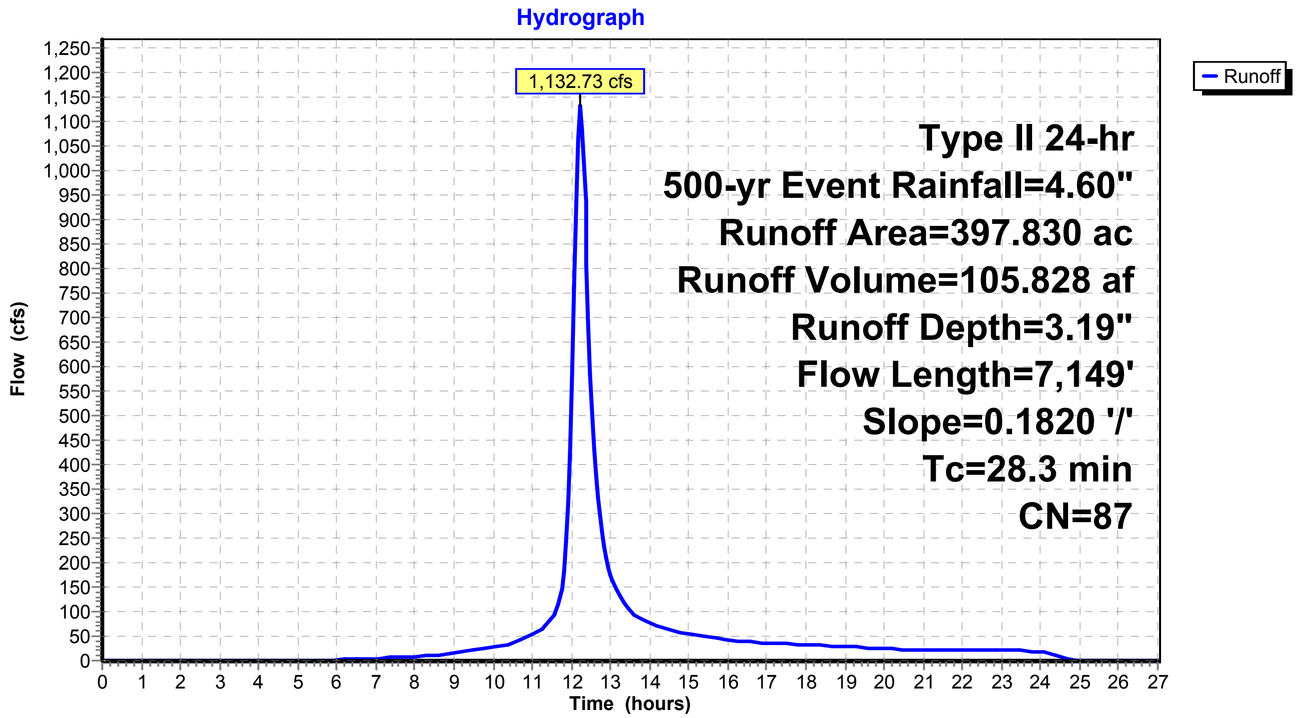
Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

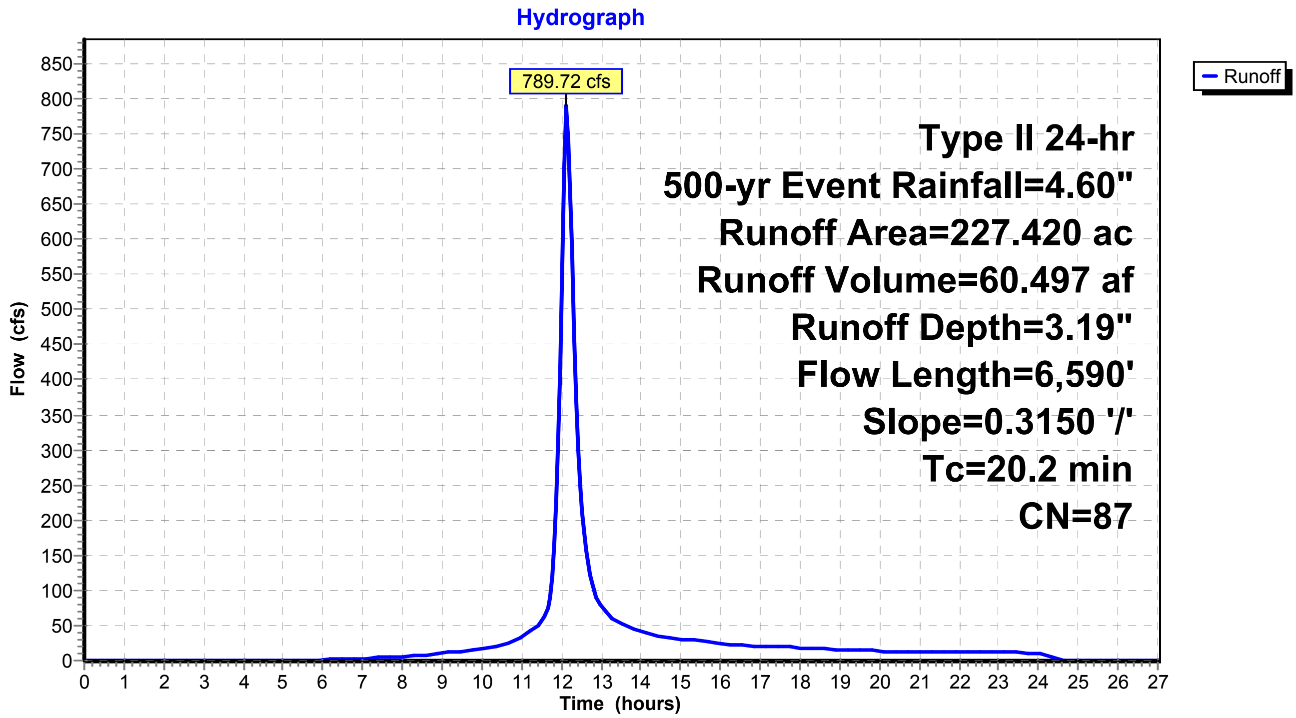
Runoff = 789.72 cfs @ 12.12 hrs, Volume= 60.497 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

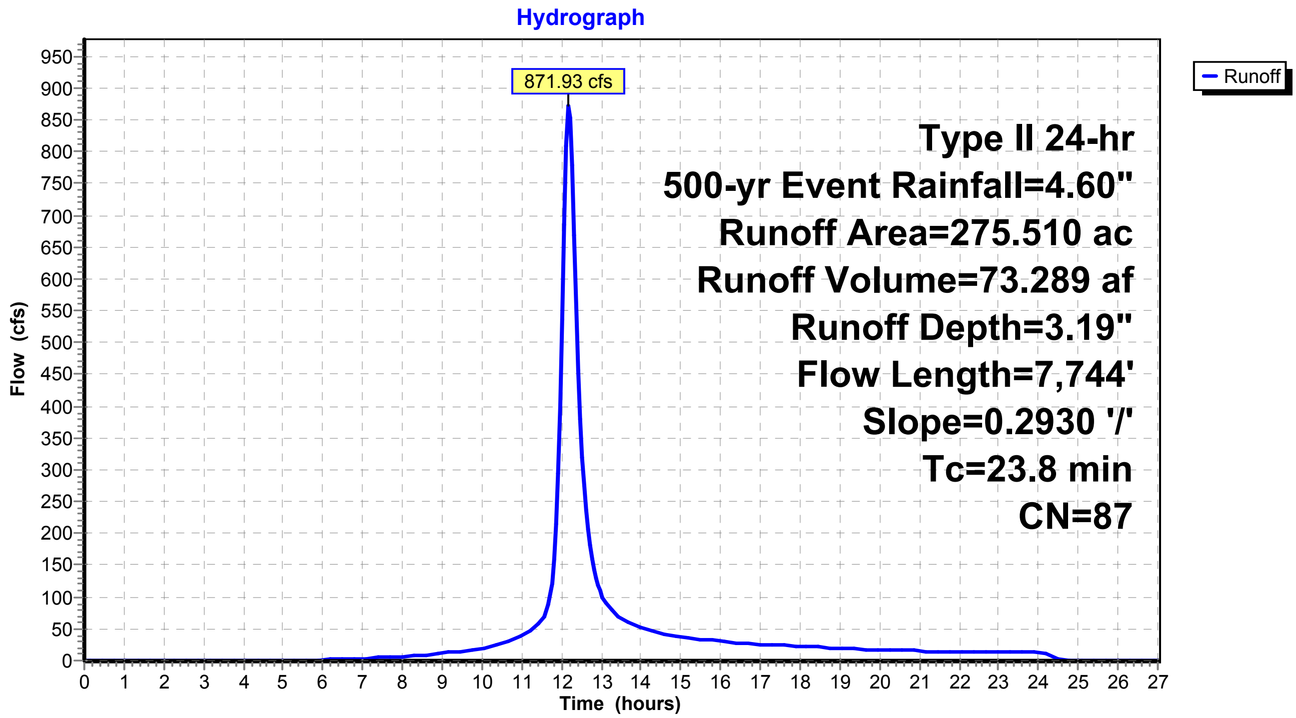
Runoff = 871.93 cfs @ 12.16 hrs, Volume= 73.289 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Subcatchment 14: WS 14

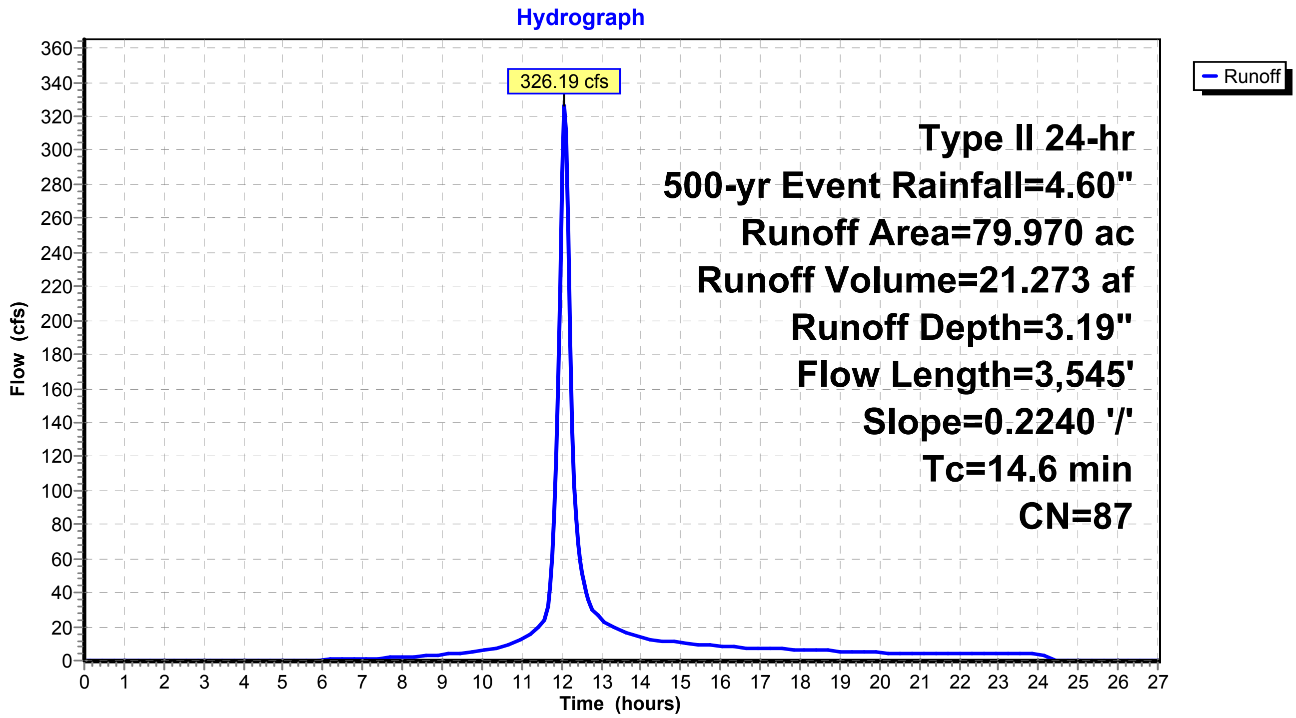
Runoff = 326.19 cfs @ 12.06 hrs, Volume= 21.273 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

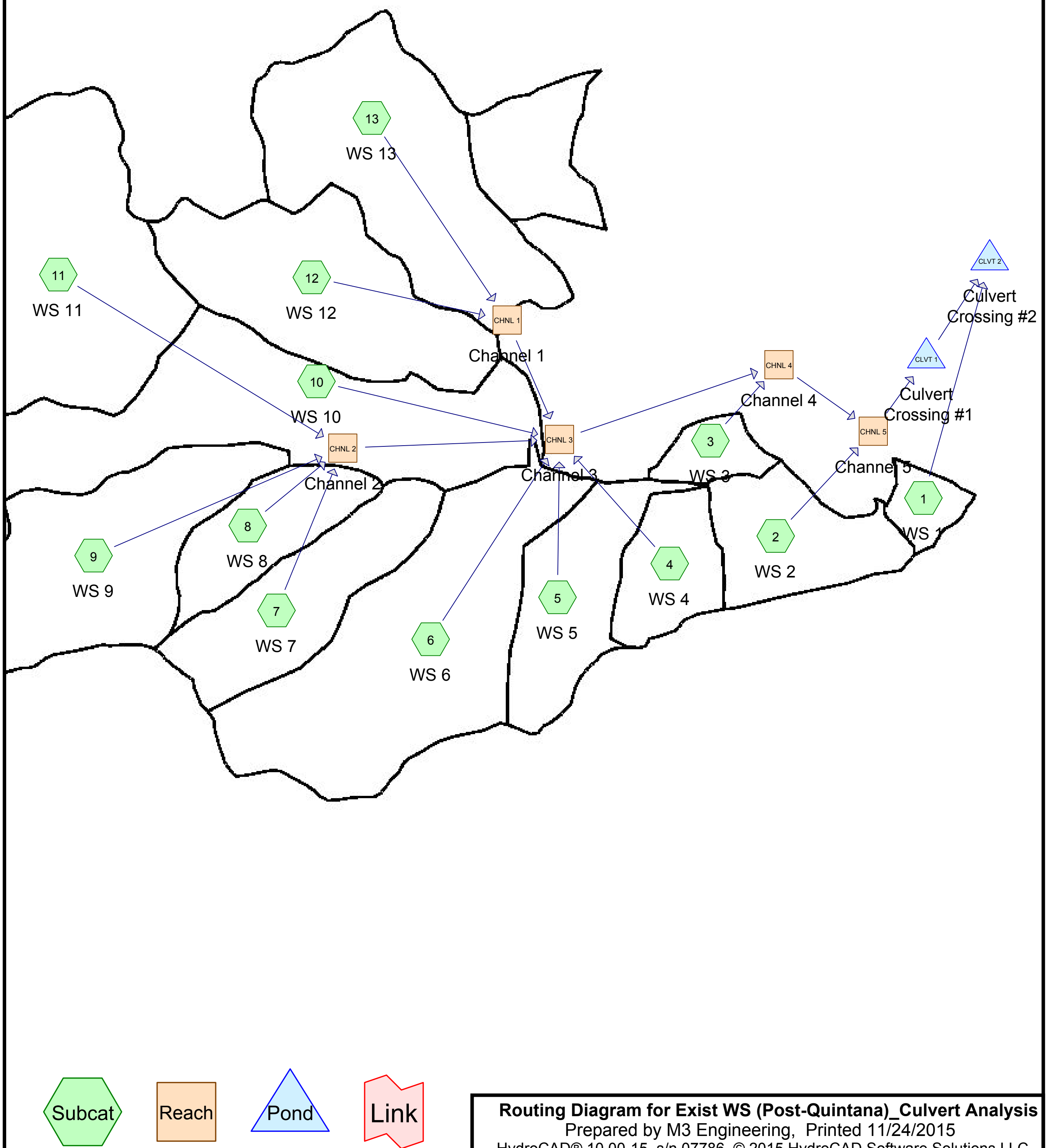
	Area (ac)	CN	Description
	71.970	86	Desert shrub range, Fair, HSG D
*	8.000	98	Impervious, HSG D
	79.970	87	Weighted Average
	71.970		90.00% Pervious Area
	8.000		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	3,545	0.2240	4.05		**Lag/CN Method,**

Subcatchment 14: WS 14



APPENDIX D



Routing Diagram for Exist WS (Post-Quintana)_Culvert Analysis
Prepared by M3 Engineering, Printed 11/24/2015
HydroCAD® 10.00-15 s/n 07786 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2,163.390	86	Desert shrub range, Fair, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13)
240.370	98	Impervious, HSG D (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13)
2,403.760	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2,403.760	HSG D	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
0.000	Other	
2,403.760		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2,163.390	0.000	2,163.390	Desert shrub range, Fair	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
0.000	0.000	0.000	240.370	0.000	240.370	Impervious	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
0.000	**0.000**	**0.000**	**2,403.760**	**0.000**	**2,403.760**	**TOTAL AREA**	

Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=2.36"
Tc=5.0 min CN=87 Runoff=117.20 cfs 5.555 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=363.66 cfs 20.985 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=129.54 cfs 6.890 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=259.92 cfs 14.773 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=342.49 cfs 24.455 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=774.13 cfs 65.223 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=411.06 cfs 28.449 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=291.83 cfs 18.118 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=567.91 cfs 46.455 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=663.73 cfs 65.063 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=843.39 cfs 78.339 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=588.30 cfs 44.783 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=2.36"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=649.87 cfs 54.252 af

Reach CHNL 1: Channel 1 Avg. Flow Depth=2.49' Max Vel=8.88 fps Inflow=1,228.49 cfs 99.035 af
n=0.036 L=1,919.0' S=0.0155 '/' Capacity=12,871.33 cfs Outflow=1,184.09 cfs 99.033 af

Reach CHNL 2: Channel 2 Avg. Flow Depth=1.68' Max Vel=9.03 fps Inflow=1,933.74 cfs 171.361 af
n=0.036 L=7,061.5' S=0.0255 '/' Capacity=32,870.94 cfs Outflow=1,565.27 cfs 170.940 af

Reach CHNL 3: Channel 3 Avg. Flow Depth=5.30' Max Vel=13.90 fps Inflow=3,580.90 cfs 439.487 af
n=0.036 L=3,680.5' S=0.0162 '/' Capacity=10,812.70 cfs Outflow=3,520.63 cfs 439.082 af

Reach CHNL 4: Channel 4 Avg. Flow Depth=3.72' Max Vel=20.81 fps Inflow=3,535.74 cfs 445.972 af
n=0.036 L=1,100.0' S=0.0545 '/' Capacity=19,828.03 cfs Outflow=3,523.29 cfs 445.885 af

Reach CHNL 5: Channel 5 Avg. Flow Depth=6.13' Max Vel=16.97 fps Inflow=3,572.05 cfs 466.870 af
n=0.036 L=2,163.7' S=0.0231 '/' Capacity=10,541.66 cfs Outflow=3,552.39 cfs 466.654 af

Pond CLVT 1: Culvert Crossing Peak Elev=5,389.78' Storage=1,214,495 cf Inflow=3,552.39 cfs 466.654 af
117.0" Round Culvert x 3.00 n=0.024 L=194.4' S=0.0103 '/' Outflow=3,058.70 cfs 466.511 af

Pond CLVT 2: Culvert Crossing Peak Elev=5,386.54' Storage=5,175,763 cf Inflow=3,066.00 cfs 472.066 af
117.0" Round Culvert n=0.024 L=255.4' S=0.0313 '/' Outflow=1,545.71 cfs 472.015 af

Total Runoff Area = 2,403.760 ac Runoff Volume = 473.340 af Average Runoff Depth = 2.36"
90.00% Pervious = 2,163.390 ac 10.00% Impervious = 240.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

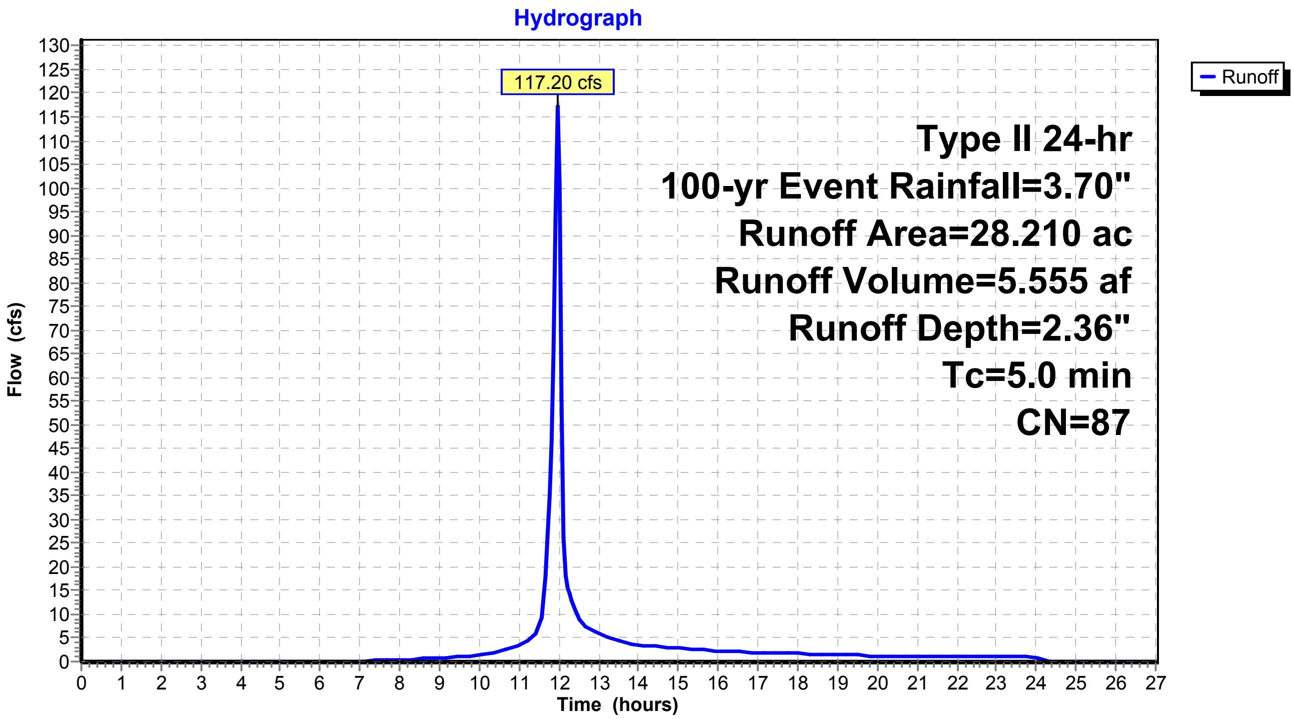
Runoff = 117.20 cfs @ 11.95 hrs, Volume= 5.555 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

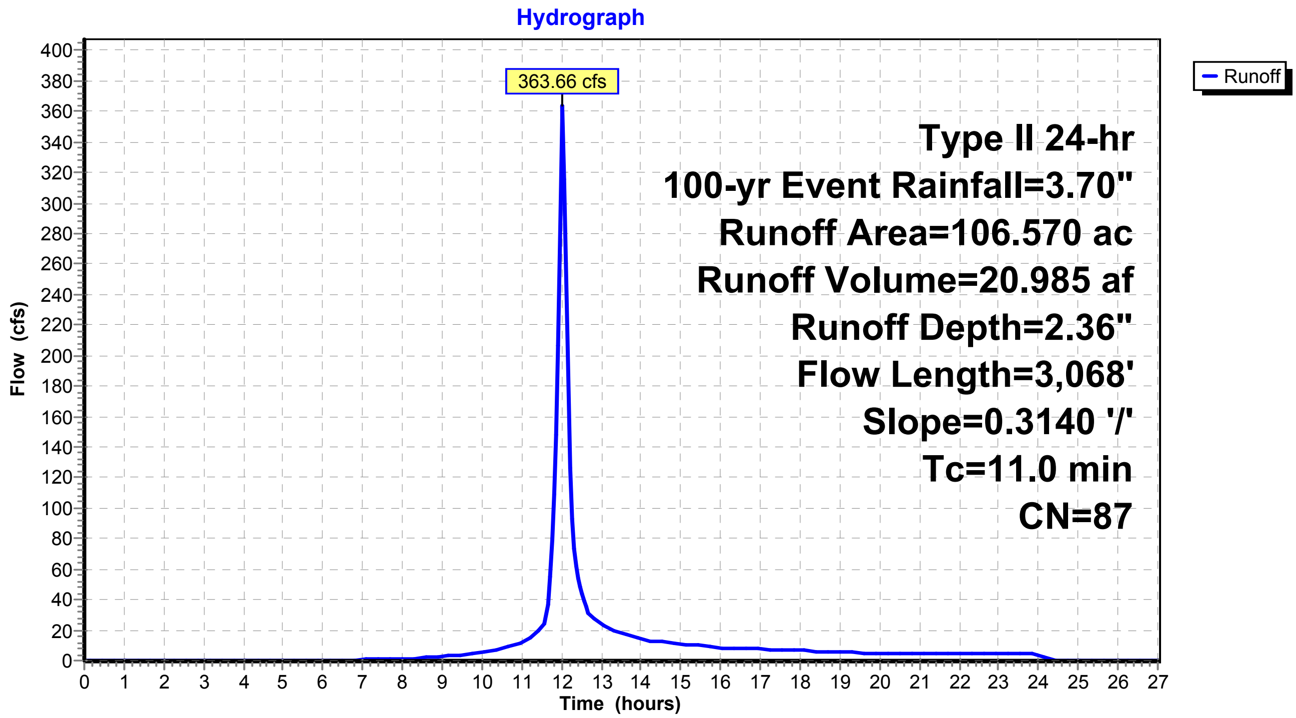
Runoff = 363.66 cfs @ 12.03 hrs, Volume= 20.985 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

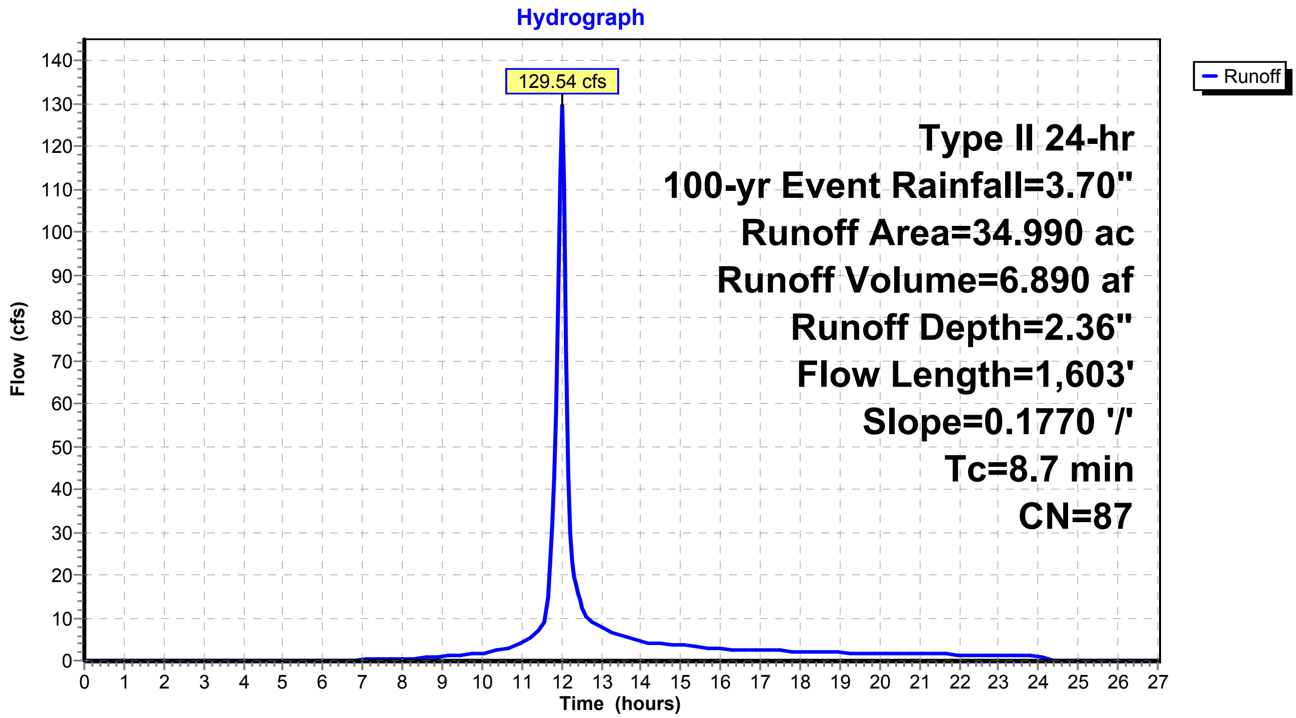
Runoff = 129.54 cfs @ 12.00 hrs, Volume= 6.890 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

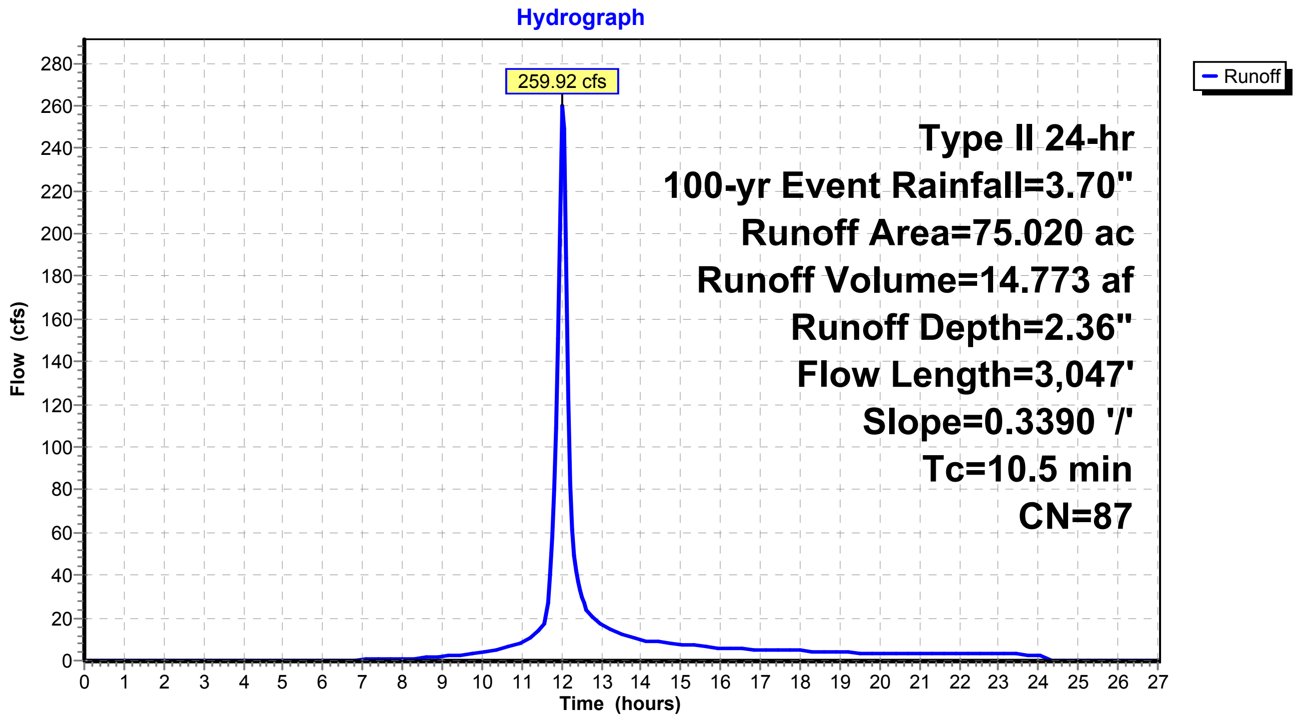
Runoff = 259.92 cfs @ 12.02 hrs, Volume= 14.773 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

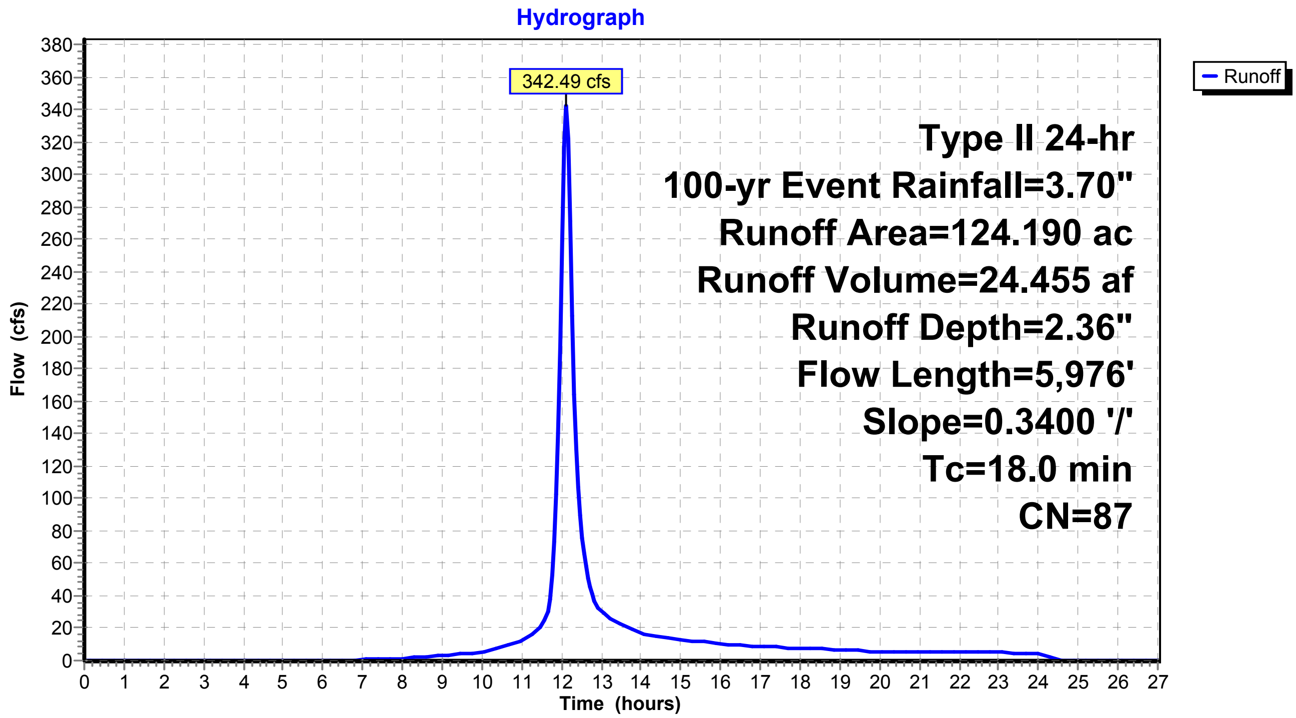
Runoff = 342.49 cfs @ 12.10 hrs, Volume= 24.455 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

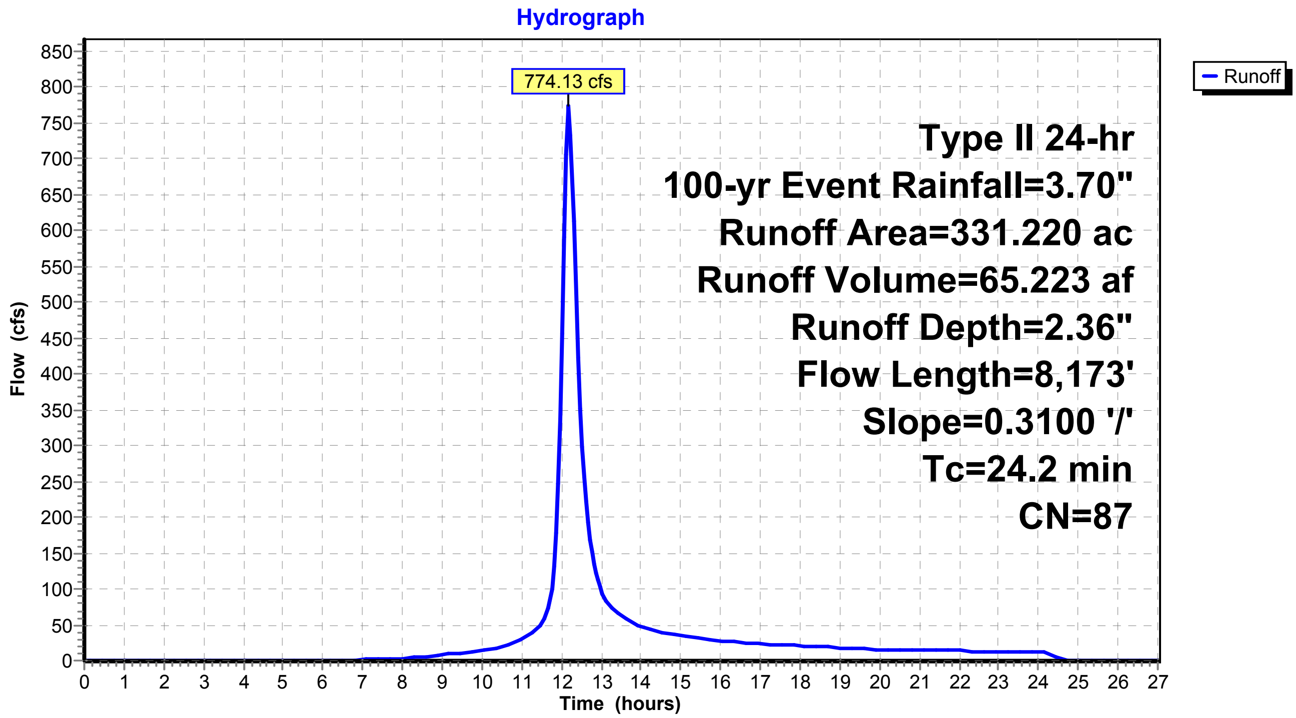
Runoff = 774.13 cfs @ 12.17 hrs, Volume= 65.223 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

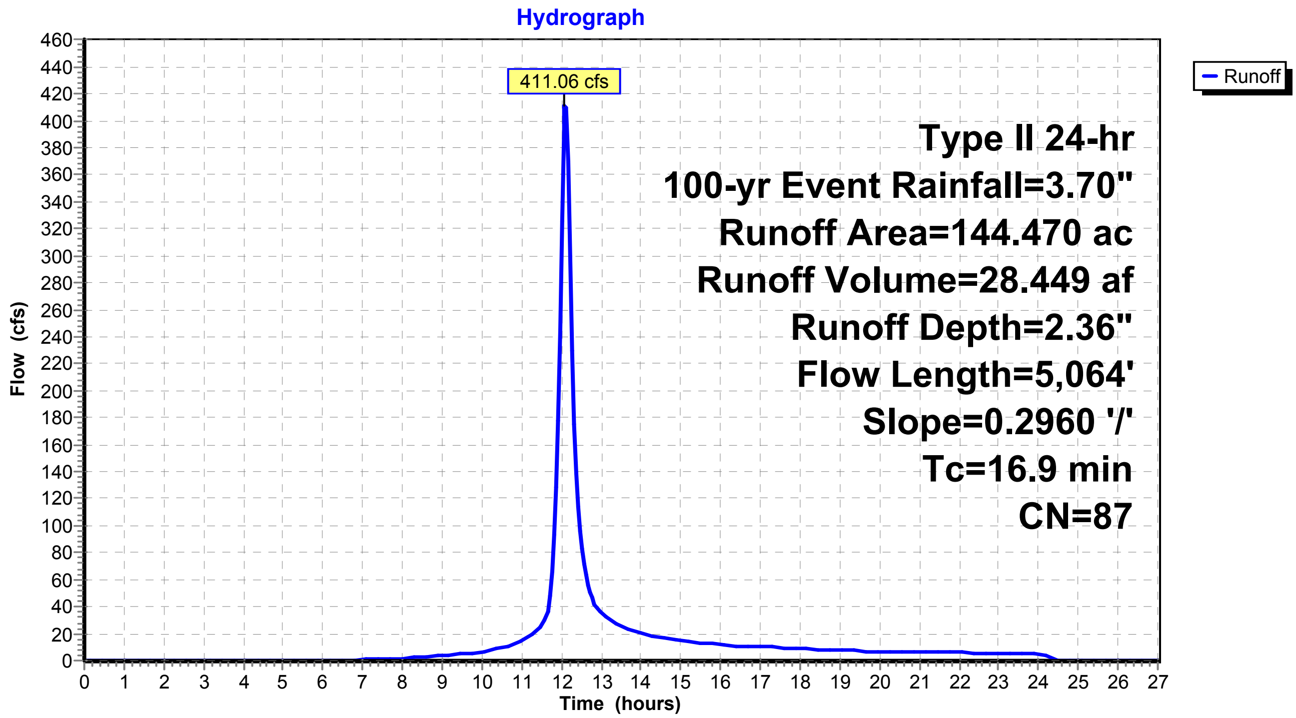
Runoff = 411.06 cfs @ 12.09 hrs, Volume= 28.449 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

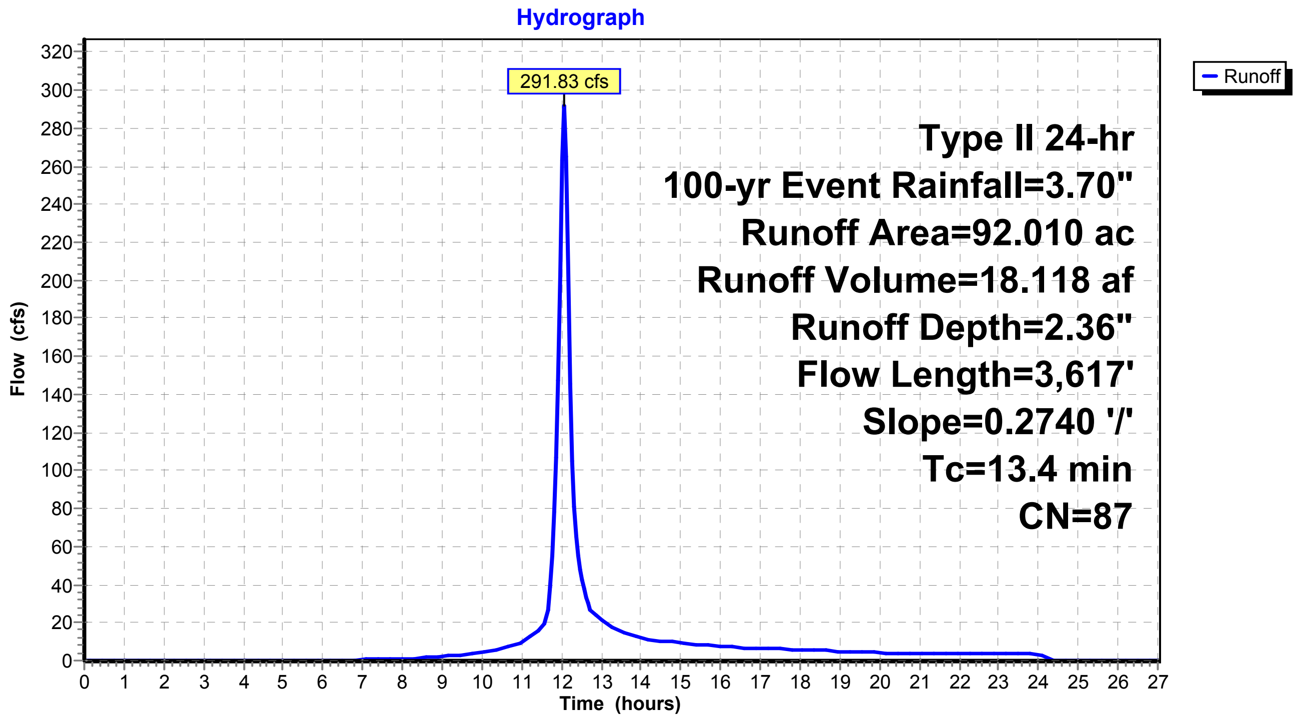
Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

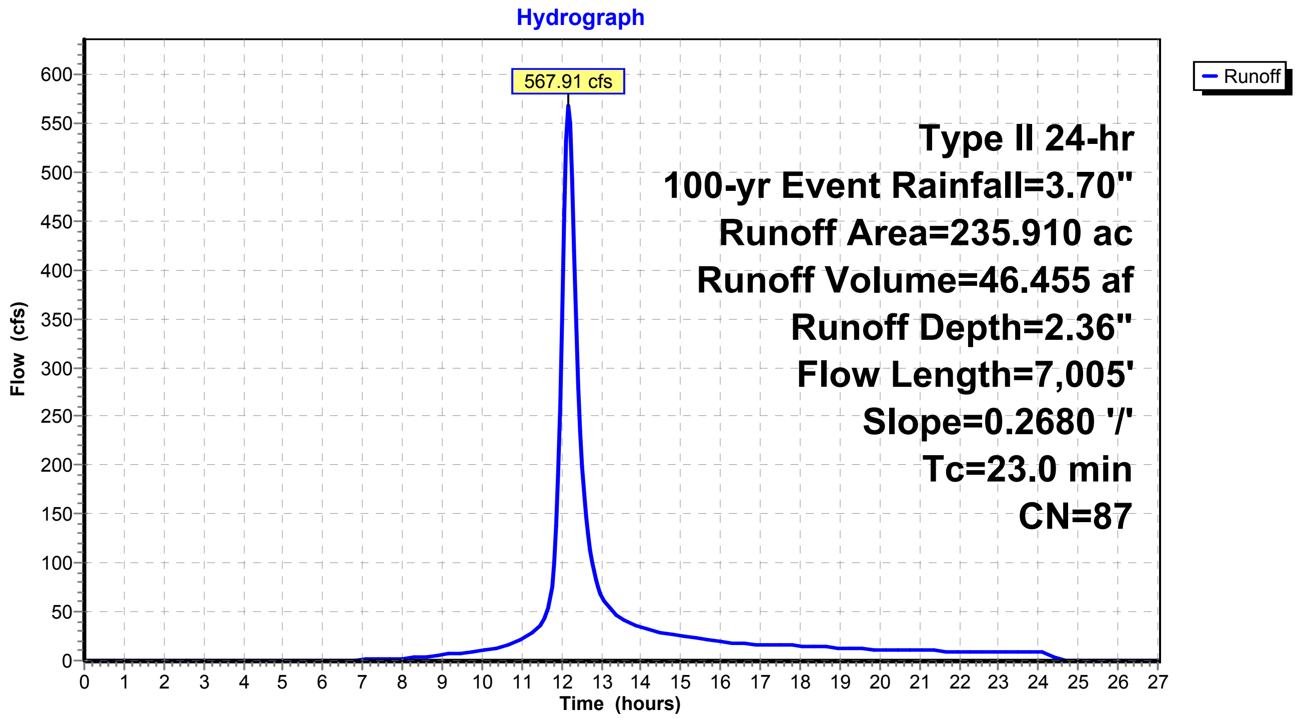
Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

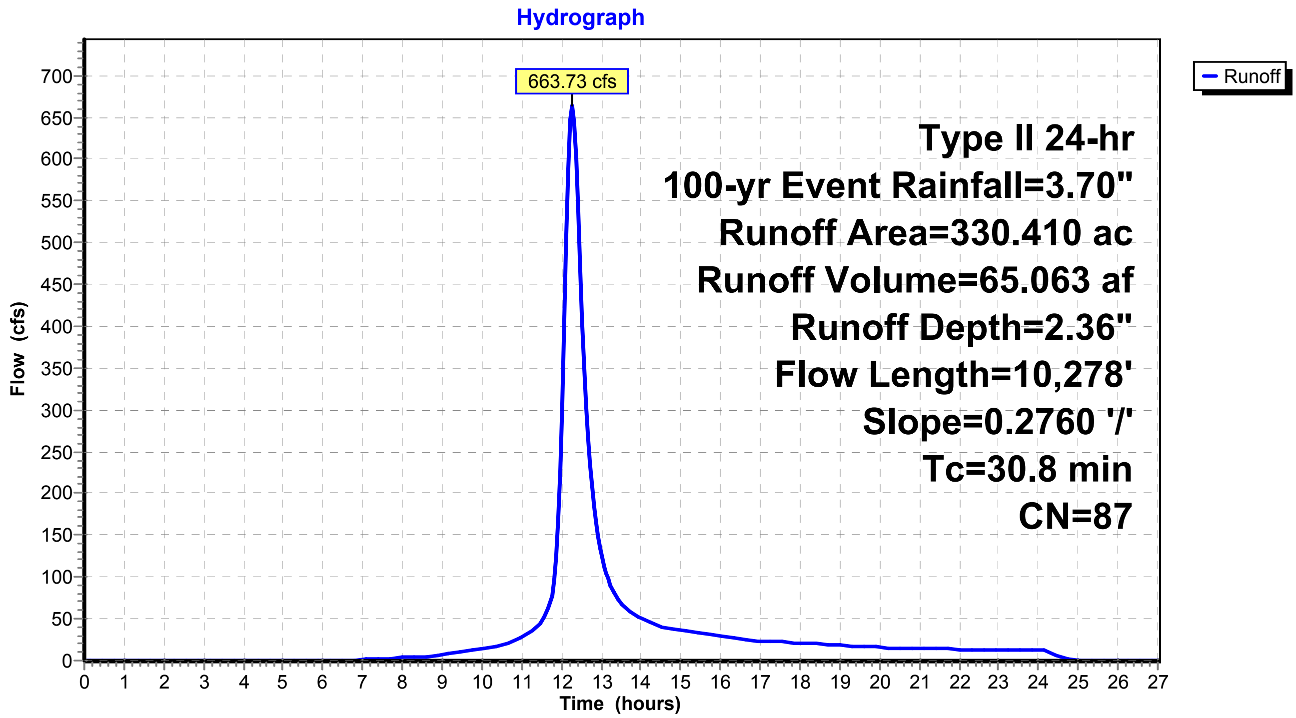
Runoff = 663.73 cfs @ 12.25 hrs, Volume= 65.063 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

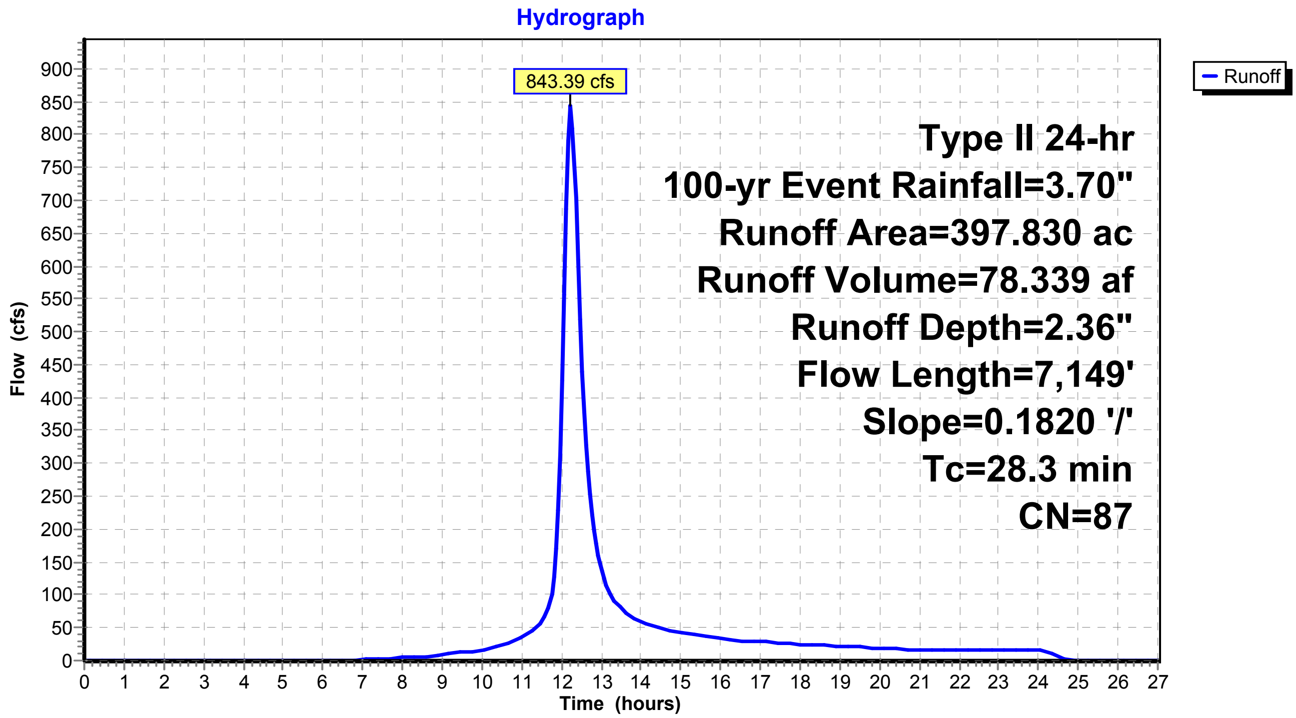
Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

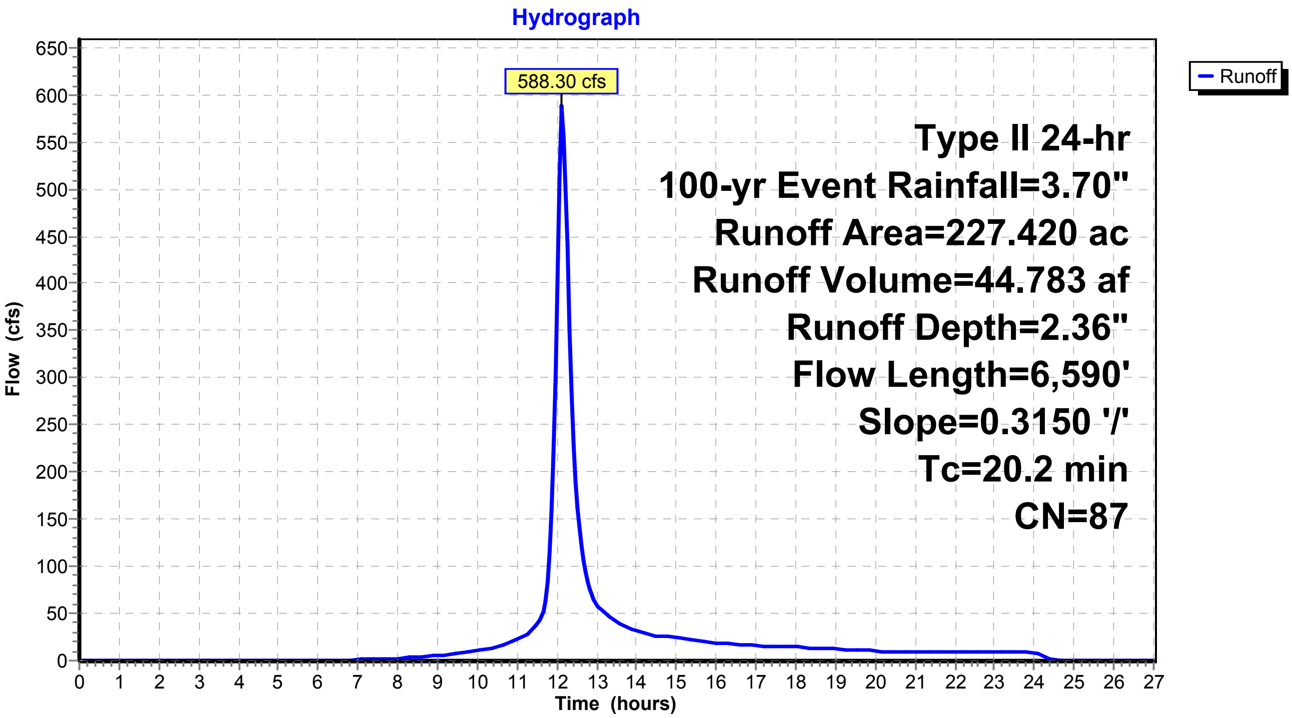
Runoff = 588.30 cfs @ 12.13 hrs, Volume= 44.783 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

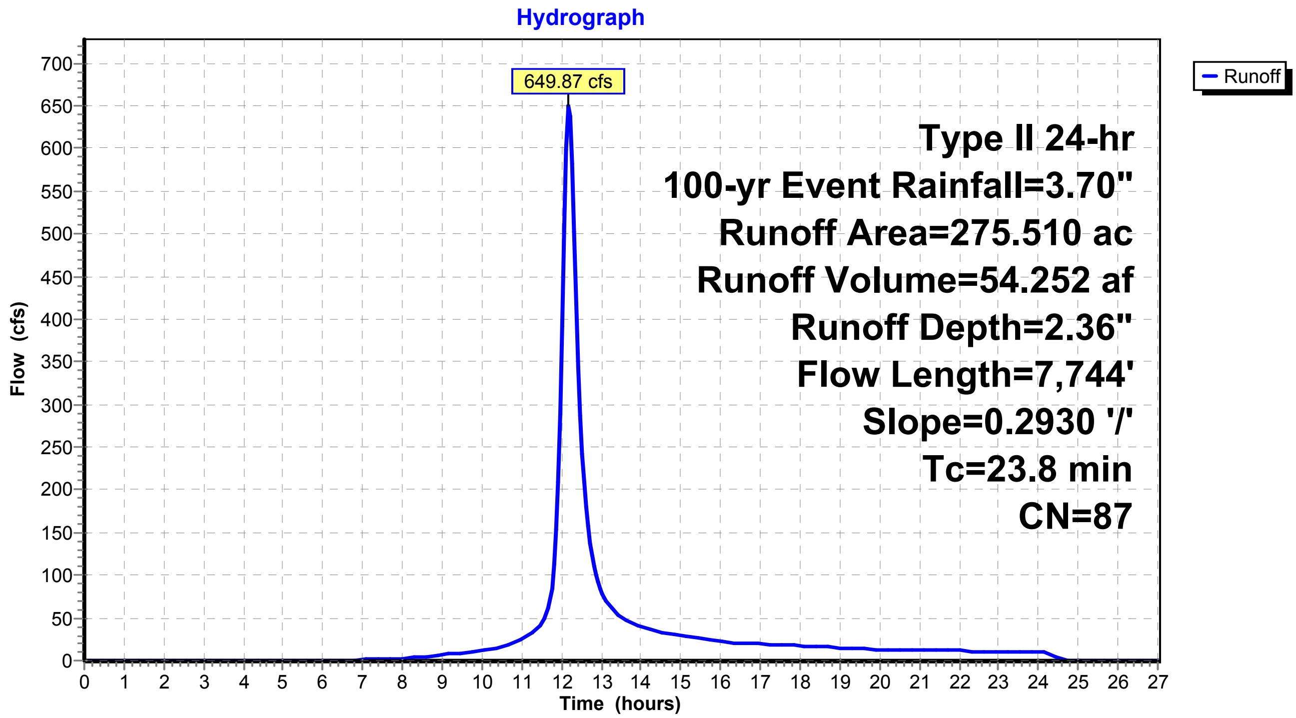
Runoff = 649.87 cfs @ 12.17 hrs, Volume= 54.252 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Event Rainfall=3.70"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Reach CHNL 1: Channel 1

Inflow Area = 502.930 ac, 10.00% Impervious, Inflow Depth = 2.36" for 100-yr Event event
Inflow = 1,228.49 cfs @ 12.15 hrs, Volume= 99.035 af
Outflow = 1,184.09 cfs @ 12.25 hrs, Volume= 99.033 af, Atten= 4%, Lag= 6.1 min

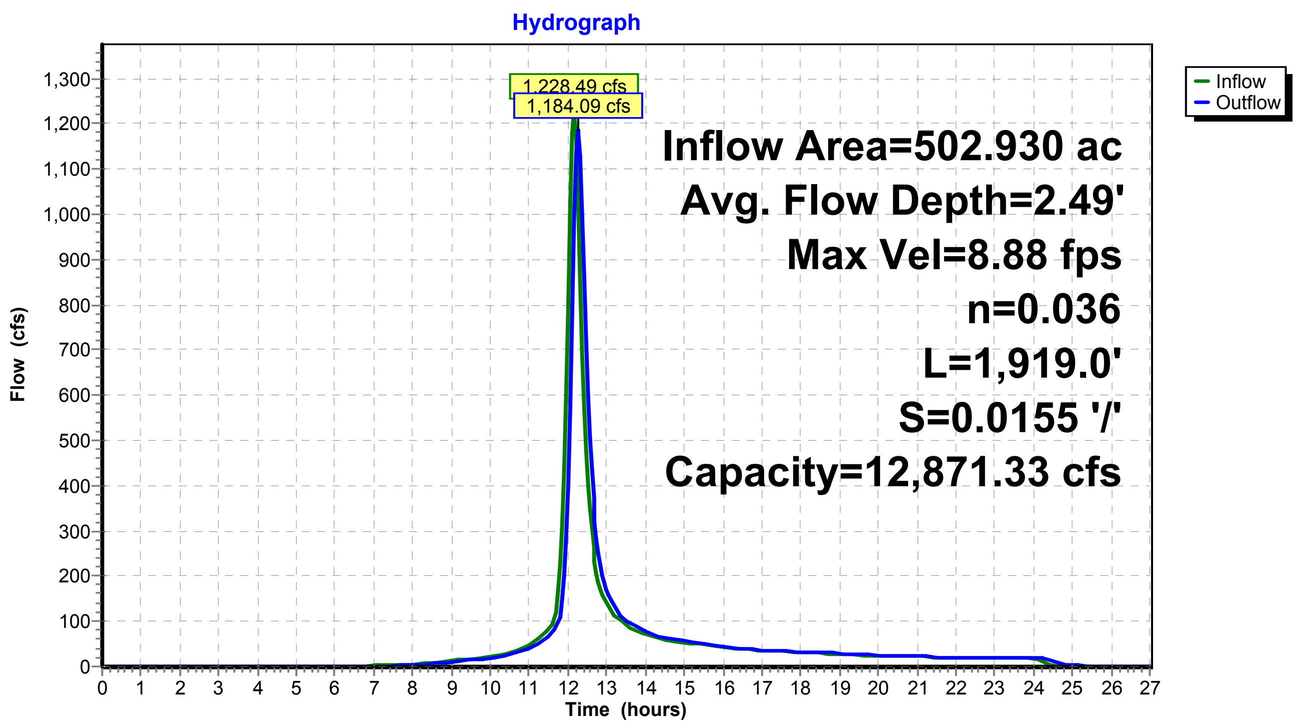
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.88 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 2.21 fps, Avg. Travel Time= 14.4 min

Peak Storage= 257,291 cf @ 12.19 hrs
Average Depth at Peak Storage= 2.49'
Bank-Full Depth= 10.00' Flow Area= 650.0 sf, Capacity= 12,871.33 cfs

50.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 80.00'
Length= 1,919.0' Slope= 0.0155 '/'
Inlet Invert= 5,569.50', Outlet Invert= 5,539.70'

‡

Reach CHNL 1: Channel 1



Summary for Reach CHNL 2: Channel 2

Inflow Area = 870.220 ac, 10.00% Impervious, Inflow Depth = 2.36" for 100-yr Event event
Inflow = 1,933.74 cfs @ 12.14 hrs, Volume= 171.361 af
Outflow = 1,565.27 cfs @ 12.49 hrs, Volume= 170.940 af, Atten= 19%, Lag= 21.3 min

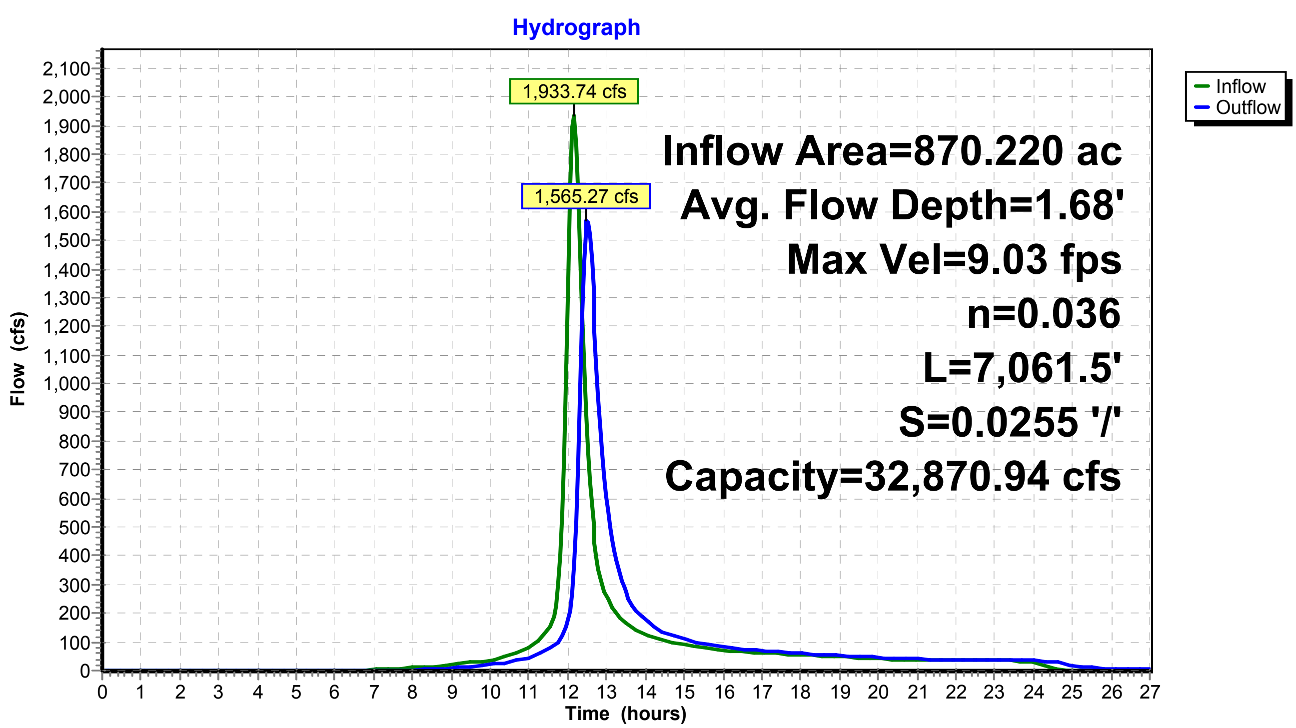
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.03 fps, Min. Travel Time= 13.0 min
Avg. Velocity = 2.51 fps, Avg. Travel Time= 46.9 min

Peak Storage= 1,228,925 cf @ 12.27 hrs
Average Depth at Peak Storage= 1.68'
Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

100.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 2.5 2.0 '/' Top Width= 145.00'
Length= 7,061.5' Slope= 0.0255 '/'
Inlet Invert= 5,720.00', Outlet Invert= 5,539.70'

‡

Reach CHNL 2: Channel 2



Summary for Reach CHNL 3: Channel 3

[62] Hint: Exceeded Reach CHNL 1 OUTLET depth by 3.53' @ 12.45 hrs
[62] Hint: Exceeded Reach CHNL 2 OUTLET depth by 3.70' @ 12.40 hrs

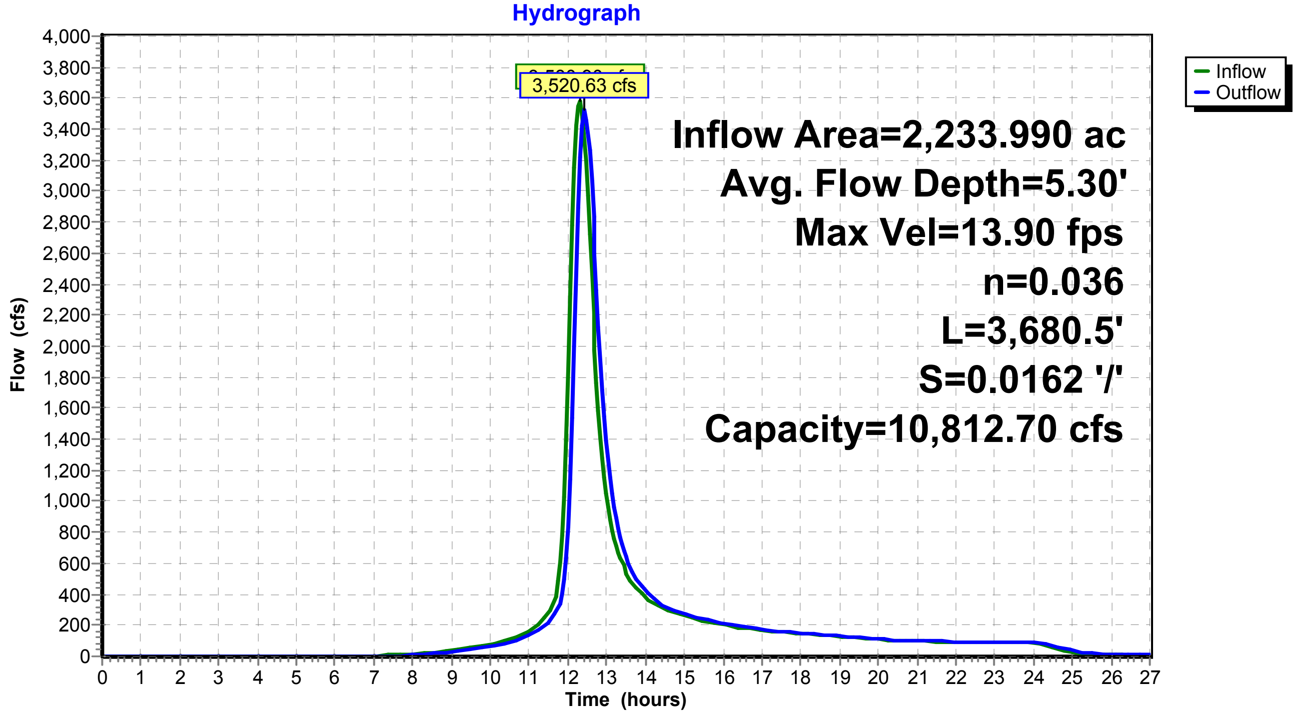
Inflow Area = 2,233.990 ac, 10.00% Impervious, Inflow Depth > 2.36" for 100-yr Event event
Inflow = 3,580.90 cfs @ 12.29 hrs, Volume= 439.487 af
Outflow = 3,520.63 cfs @ 12.42 hrs, Volume= 439.082 af, Atten= 2%, Lag= 7.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 13.90 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 4.18 fps, Avg. Travel Time= 14.7 min

Peak Storage= 935,003 cf @ 12.35 hrs
Average Depth at Peak Storage= 5.30'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 10,812.70 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 3,680.5' Slope= 0.0162 '/'
Inlet Invert= 5,539.70', Outlet Invert= 5,480.00'

Reach CHNL 3: Channel 3



Summary for Reach CHNL 4: Channel 4

[61] Hint: Exceeded Reach CHNL 3 outlet invert by 3.72' @ 12.45 hrs

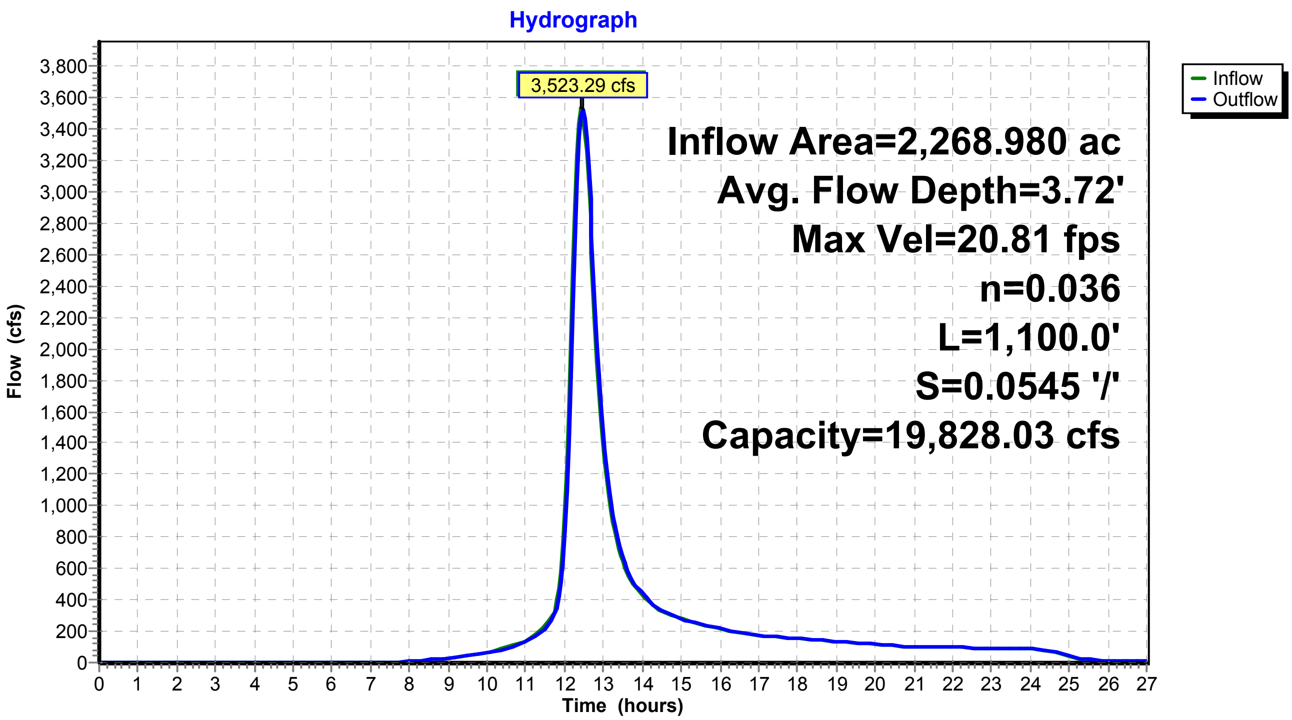
Inflow Area = 2,268.980 ac, 10.00% Impervious, Inflow Depth > 2.36" for 100-yr Event event
Inflow = 3,535.74 cfs @ 12.42 hrs, Volume= 445.972 af
Outflow = 3,523.29 cfs @ 12.45 hrs, Volume= 445.885 af, Atten= 0%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 20.81 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 6.18 fps, Avg. Travel Time= 3.0 min

Peak Storage= 186,563 cf @ 12.43 hrs
Average Depth at Peak Storage= 3.72'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 1,100.0' Slope= 0.0545 '/'
Inlet Invert= 5,480.00', Outlet Invert= 5,420.00'

Reach CHNL 4: Channel 4



Summary for Reach CHNL 5: Channel 5

[62] Hint: Exceeded Reach CHNL 4 OUTLET depth by 2.45' @ 12.55 hrs

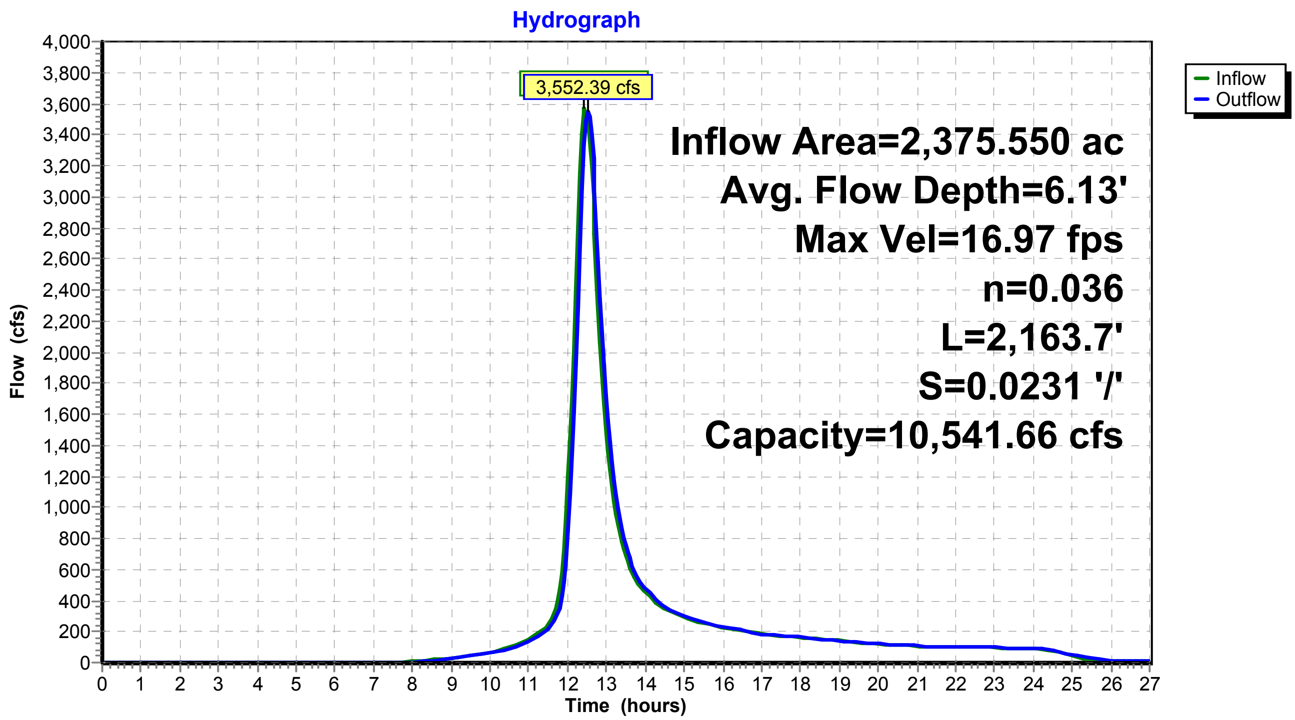
Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 2.36" for 100-yr Event event
Inflow = 3,572.05 cfs @ 12.44 hrs, Volume= 466.870 af
Outflow = 3,552.39 cfs @ 12.51 hrs, Volume= 466.654 af, Atten= 1%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 16.97 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 5.55 fps, Avg. Travel Time= 6.5 min

Peak Storage= 453,859 cf @ 12.47 hrs
Average Depth at Peak Storage= 6.13'
Bank-Full Depth= 11.00' Flow Area= 456.5 sf, Capacity= 10,541.66 cfs

25.00' x 11.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 58.00'
Length= 2,163.7' Slope= 0.0231 '/'
Inlet Invert= 5,420.00', Outlet Invert= 5,370.00'

Reach CHNL 5: Channel 5



Summary for Pond CLVT 1: Culvert Crossing #1

[62] Hint: Exceeded Reach CHNL 5 OUTLET depth by 14.44' @ 12.75 hrs

Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 2.36" for 100-yr Event event
Inflow = 3,552.39 cfs @ 12.51 hrs, Volume= 466.654 af
Outflow = 3,058.70 cfs @ 12.70 hrs, Volume= 466.511 af, Atten= 14%, Lag= 11.4 min
Primary = 3,058.70 cfs @ 12.70 hrs, Volume= 466.511 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,389.78' @ 12.70 hrs Surf.Area= 0 sf Storage= 1,214,495 cf
Flood Elev= 5,419.00' Surf.Area= 0 sf Storage= 12,108,960 cf

Plug-Flow detention time= 3.5 min calculated for 465.649 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (865.7 - 862.5)

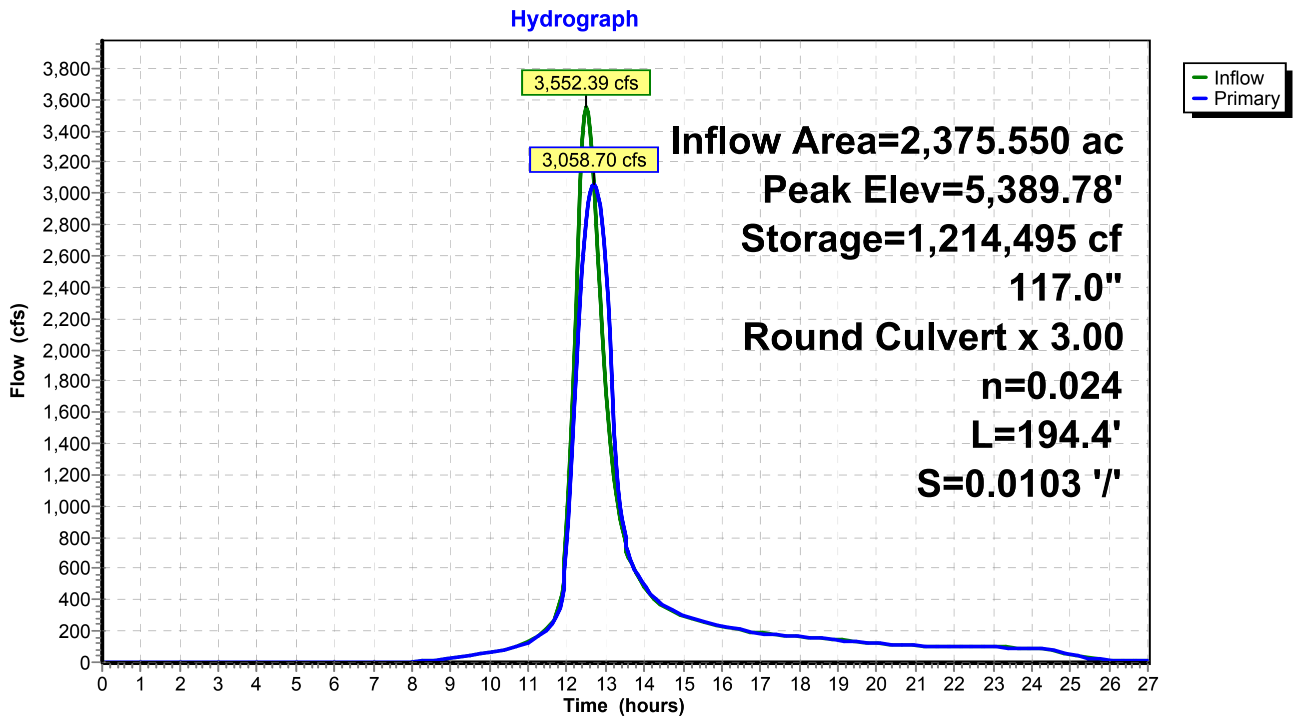
Volume	Invert	Avail.Storage	Storage Description
#1	5,370.00'	12,108,960 cf	**Culvert Crossing #1** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
5,370.00	0
5,371.00	1,264
5,372.00	4,909
5,373.00	7,513
5,374.00	16,645
5,375.00	29,237
5,376.00	46,725
5,377.00	71,156
5,378.00	103,816
5,379.00	144,375
5,380.00	193,809
5,381.00	252,611
5,382.00	321,098
5,383.00	399,998
5,384.00	488,627
5,385.00	587,544
5,386.00	697,578
5,387.00	818,723
5,388.00	950,841
5,389.00	1,094,170
5,390.00	1,248,216
5,391.00	1,412,011
5,392.00	1,587,481
5,393.00	1,774,410
5,394.00	1,971,598
5,395.00	2,046,356
5,396.00	2,266,171
5,397.00	2,498,604
5,398.00	2,742,207
5,399.00	2,998,577
5,400.00	3,272,610
5,401.00	3,564,605
5,402.00	3,875,249
5,403.00	4,205,411
5,404.00	4,554,001
5,405.00	4,921,330
5,406.00	5,306,733
5,407.00	5,710,058
5,408.00	6,132,117
5,409.00	6,572,849
5,410.00	7,032,579
5,411.00	7,512,479
5,412.00	8,012,116
5,413.00	8,533,107
5,414.00	9,078,172
5,415.00	9,647,155
5,416.00	10,235,642
5,417.00	10,841,380
5,418.00	11,465,162
5,419.00	12,108,960

Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	**117.0" Round Culvert X 3.00** L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=3,057.57 cfs @ 12.70 hrs HW=5,389.77' (Free Discharge)
└─**1=Culvert** (Inlet Controls 3,057.57 cfs @ 13.65 fps)

Pond CLVT 1: Culvert Crossing #1



Summary for Pond CLVT 2: Culvert Crossing #2

[81] Warning: Exceeded Pond CLVT 1 by 7.40' @ 13.35 hrs

Inflow Area = 2,403.760 ac, 10.00% Impervious, Inflow Depth > 2.36" for 100-yr Event event
Inflow = 3,066.00 cfs @ 12.70 hrs, Volume= 472.066 af
Outflow = 1,545.71 cfs @ 13.19 hrs, Volume= 472.015 af, Atten= 50%, Lag= 29.9 min
Primary = 1,545.71 cfs @ 13.19 hrs, Volume= 472.015 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,386.54' @ 13.19 hrs Surf.Area= 0 sf Storage= 5,175,763 cf
Flood Elev= 5,403.00' Surf.Area= 0 sf Storage= 10,142,539 cf

Plug-Flow detention time= 26.2 min calculated for 471.143 af (100% of inflow)
Center-of-Mass det. time= 26.0 min (891.1 - 865.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,352.00'	10,142,539 cf	**Existing Pond** Listed below

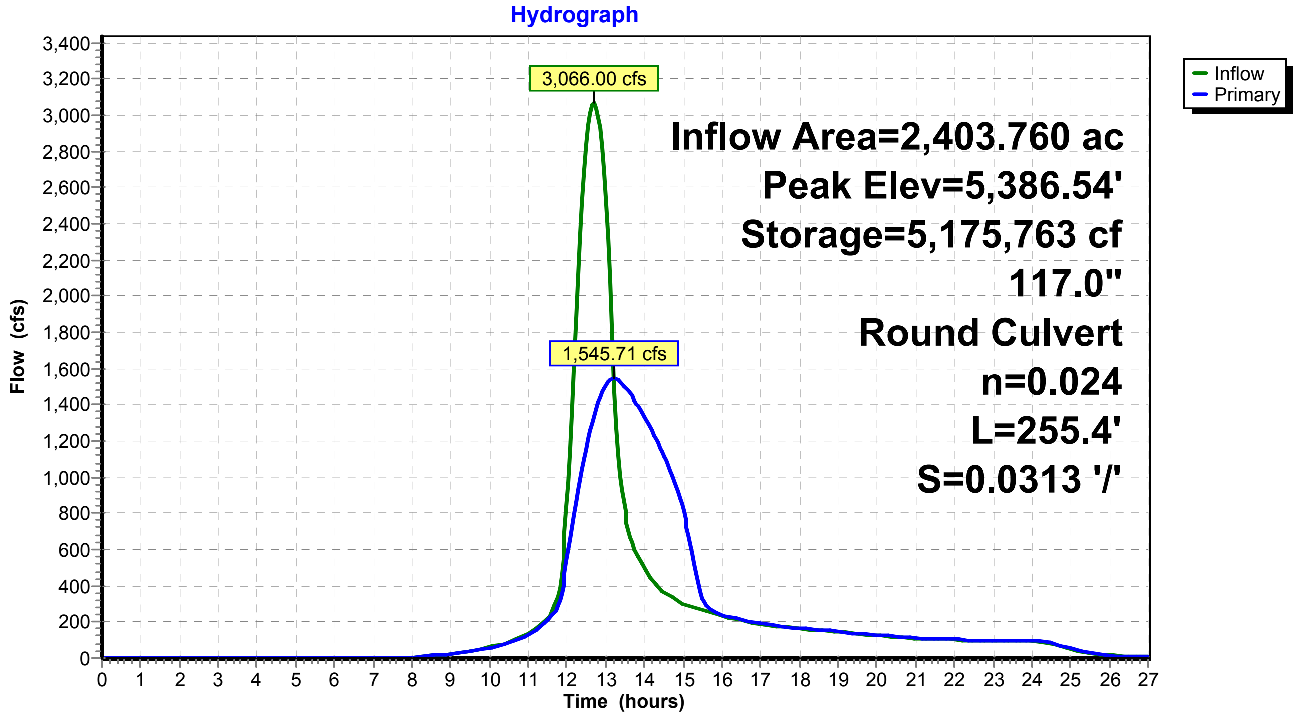
Elevation (feet)	Cum.Store (cubic-feet)
5,352.00	0
5,353.00	2,681
5,354.00	7,382
5,355.00	15,397
5,356.00	28,286
5,357.00	47,224
5,358.00	75,773
5,359.00	117,133
5,360.00	170,345
5,361.00	235,331
5,362.00	312,331
5,363.00	399,765
5,364.00	497,494
5,365.00	605,663
5,366.00	724,610
5,367.00	855,928
5,368.00	1,000,315
5,369.00	1,157,122
5,370.00	1,325,832
5,371.00	1,505,243
5,372.00	1,693,878
5,373.00	1,890,808
5,374.00	2,095,234
5,375.00	2,306,959
5,376.00	2,525,755
5,377.00	2,751,367
5,378.00	2,983,426
5,379.00	3,221,478
5,380.00	3,465,168
5,381.00	3,714,247
5,382.00	3,968,434
5,383.00	4,227,291
5,384.00	4,490,405
5,385.00	4,757,518
5,386.00	5,028,418
5,387.00	5,302,894
5,388.00	5,580,732
5,389.00	5,861,867
5,390.00	6,146,219
5,391.00	6,433,776
5,392.00	6,724,543
5,393.00	7,018,534
5,394.00	7,315,762
5,395.00	7,616,273
5,396.00	7,920,106
5,397.00	8,227,290
5,398.00	8,537,855
5,399.00	8,851,826
5,400.00	9,169,229
5,401.00	9,490,117

5,402.00	9,814,540
5,403.00	10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	**117.0" Round Culvert** L= 255.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,352.00' / 5,344.00' S= 0.0313 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=1,545.45 cfs @ 13.19 hrs HW=5,386.53' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1,545.45 cfs @ 20.70 fps)

Pond CLVT 2: Culvert Crossing #2



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=2.72"
Tc=5.0 min CN=87 Runoff=133.97 cfs 6.393 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=415.35 cfs 24.150 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=148.20 cfs 7.929 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=297.56 cfs 17.000 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=392.70 cfs 28.143 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=888.50 cfs 75.058 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=471.20 cfs 32.739 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=334.29 cfs 20.851 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=651.70 cfs 53.460 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=762.30 cfs 74.875 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=968.42 cfs 90.153 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=674.80 cfs 51.536 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=2.72"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=745.85 cfs 62.434 af

Reach CHNL 1: Channel 1 Avg. Flow Depth=2.71' Max Vel=9.34 fps Inflow=1,409.59 cfs 113.970 af
n=0.036 L=1,919.0' S=0.0155 '/' Capacity=12,871.33 cfs Outflow=1,364.28 cfs 113.968 af

Reach CHNL 2: Channel 2 Avg. Flow Depth=1.84' Max Vel=9.59 fps Inflow=2,220.40 cfs 197.202 af
n=0.036 L=7,061.5' S=0.0255 '/' Capacity=32,870.94 cfs Outflow=1,835.68 cfs 196.763 af

Reach CHNL 3: Channel 3 Avg. Flow Depth=5.83' Max Vel=14.67 fps Inflow=4,230.35 cfs 505.807 af
n=0.036 L=3,680.5' S=0.0162 '/' Capacity=10,812.70 cfs Outflow=4,159.08 cfs 505.394 af

Reach CHNL 4: Channel 4 Avg. Flow Depth=4.10' Max Vel=22.02 fps Inflow=4,176.49 cfs 513.323 af
n=0.036 L=1,100.0' S=0.0545 '/' Capacity=19,828.03 cfs Outflow=4,160.94 cfs 513.234 af

Reach CHNL 5: Channel 5 Avg. Flow Depth=6.72' Max Vel=17.83 fps Inflow=4,217.67 cfs 537.384 af
n=0.036 L=2,163.7' S=0.0231 '/' Capacity=10,541.66 cfs Outflow=4,191.95 cfs 537.163 af

Pond CLVT 1: Culvert Crossing Peak Elev=5,392.92' Storage=1,758,861 cf Inflow=4,191.95 cfs 537.163 af
117.0" Round Culvert x 3.00 n=0.024 L=194.4' S=0.0103 '/' Outflow=3,410.14 cfs 537.020 af

Pond CLVT 2: Culvert Crossing Peak Elev=5,391.04' Storage=6,444,314 cf Inflow=3,418.33 cfs 543.413 af
117.0" Round Culvert n=0.024 L=255.4' S=0.0313 '/' Outflow=1,658.81 cfs 543.361 af

Total Runoff Area = 2,403.760 ac Runoff Volume = 544.720 af Average Runoff Depth = 2.72"
90.00% Pervious = 2,163.390 ac 10.00% Impervious = 240.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

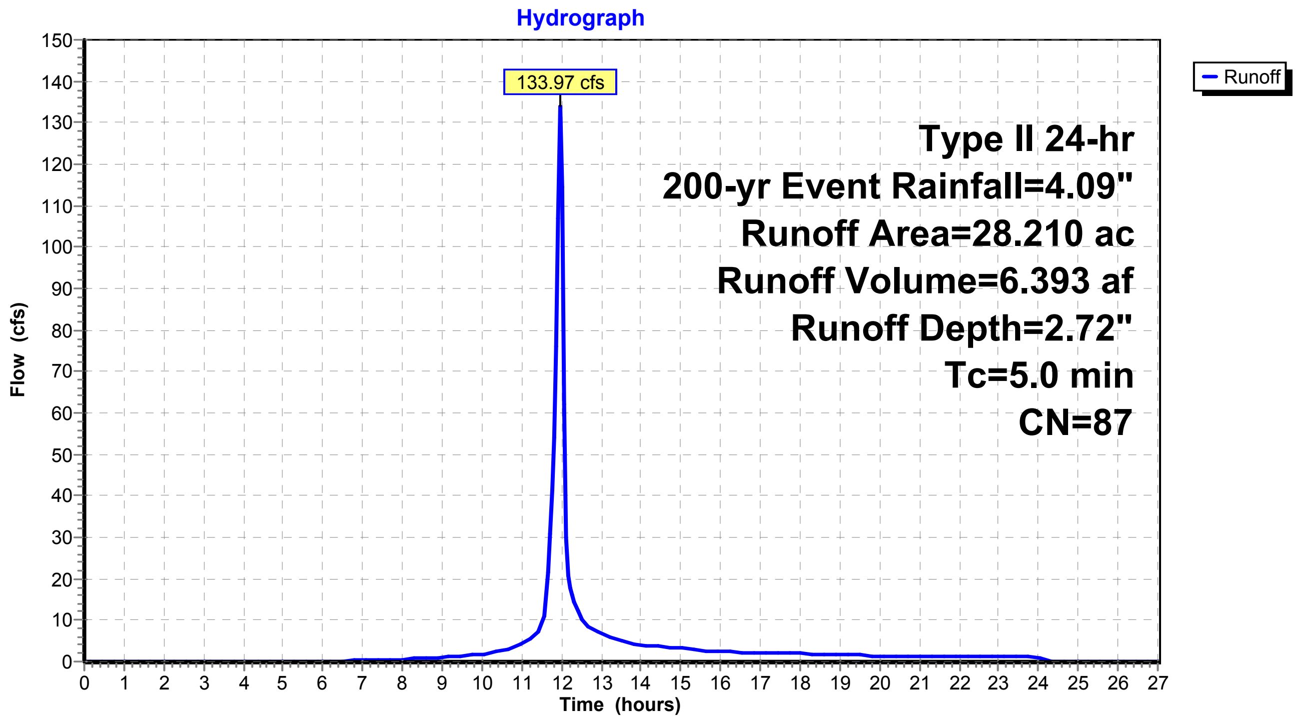
Runoff = 133.97 cfs @ 11.95 hrs, Volume= 6.393 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

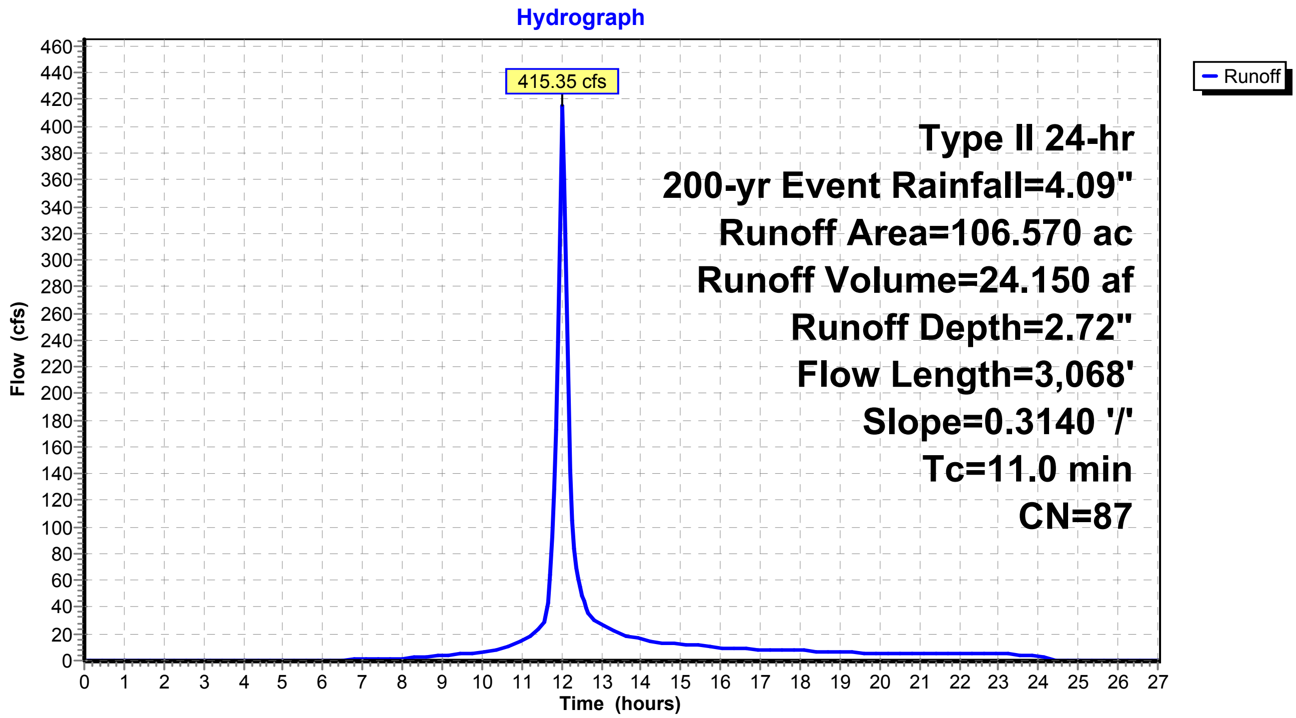
Runoff = 415.35 cfs @ 12.02 hrs, Volume= 24.150 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

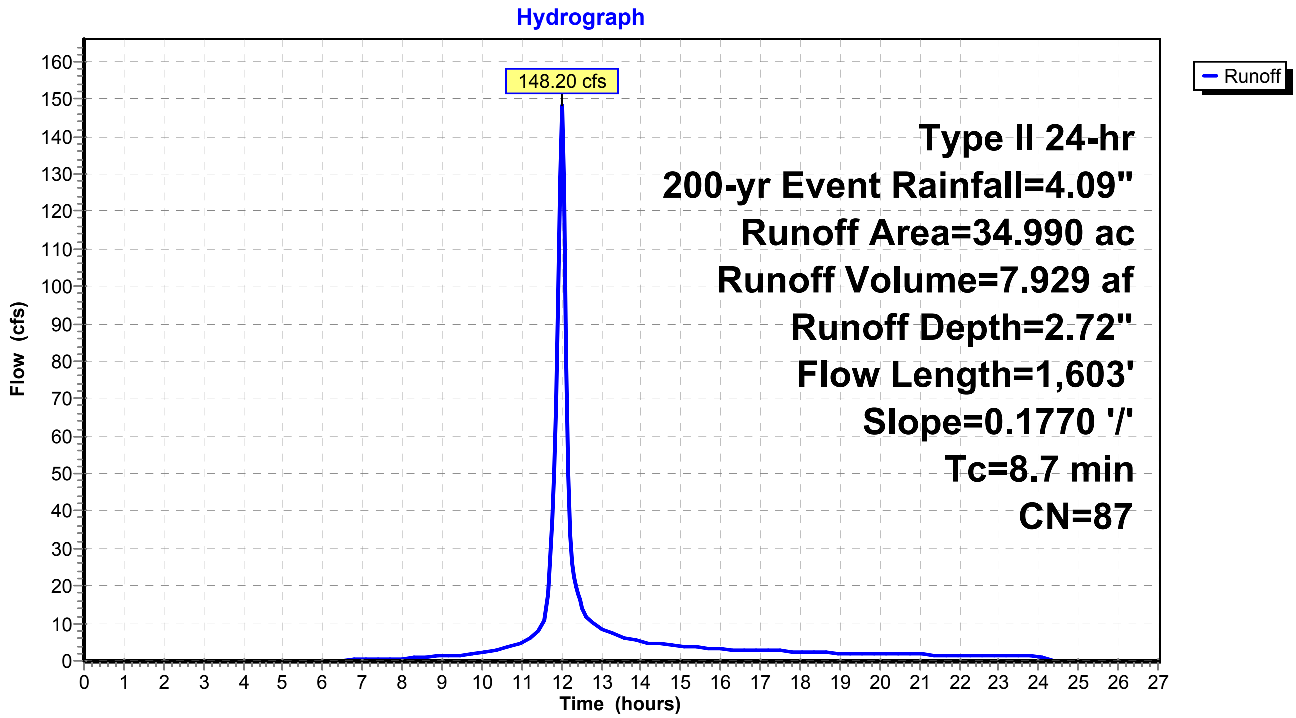
Runoff = 148.20 cfs @ 12.00 hrs, Volume= 7.929 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

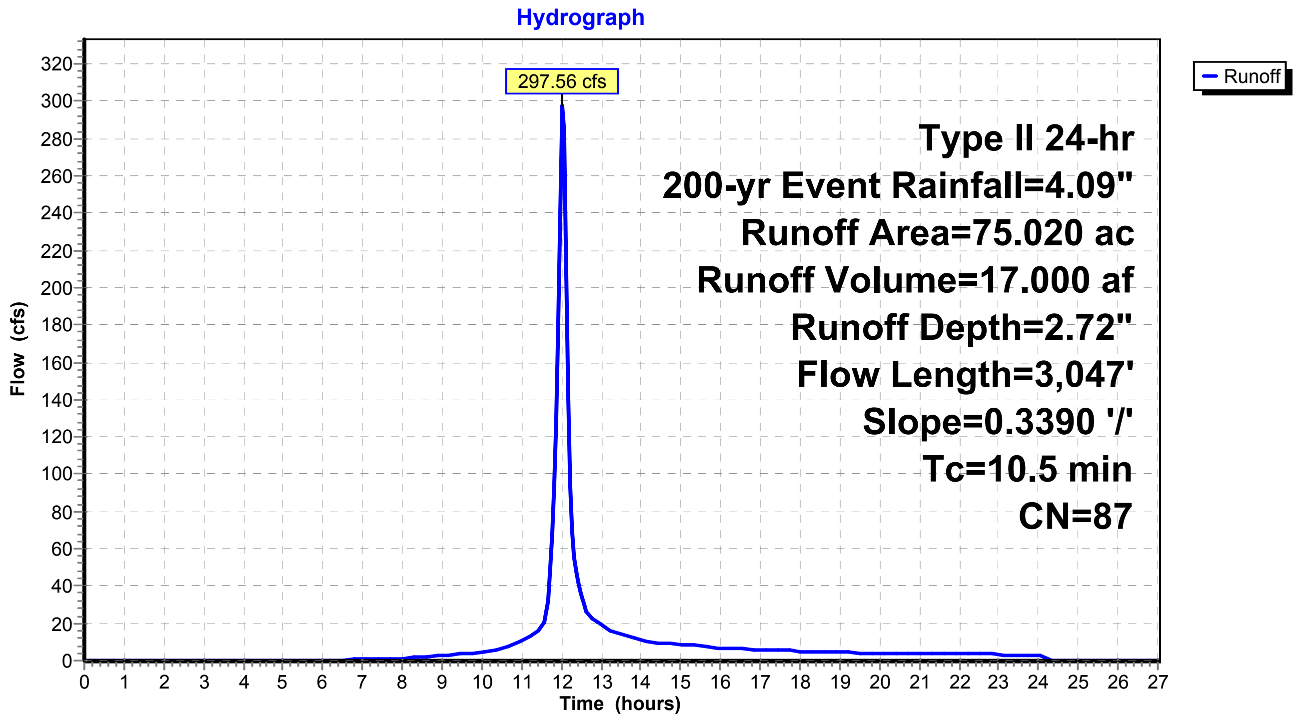
Runoff = 297.56 cfs @ 12.02 hrs, Volume= 17.000 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

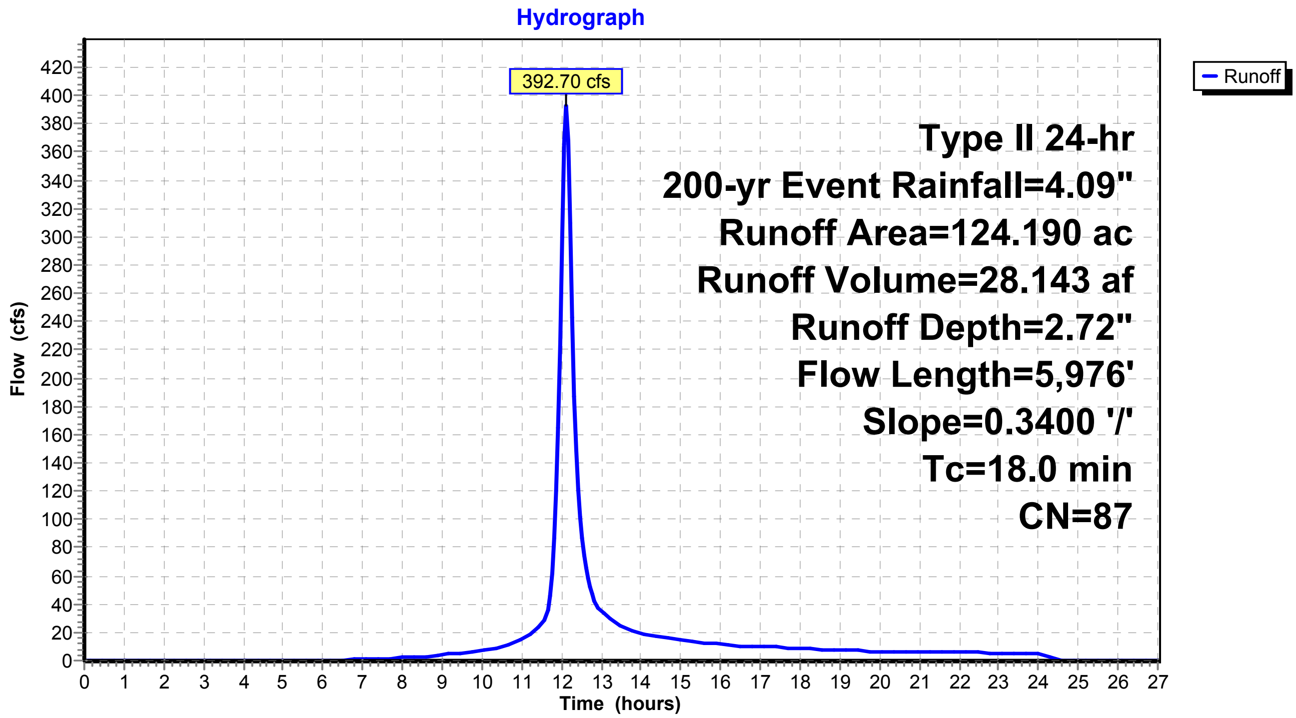
Runoff = 392.70 cfs @ 12.10 hrs, Volume= 28.143 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

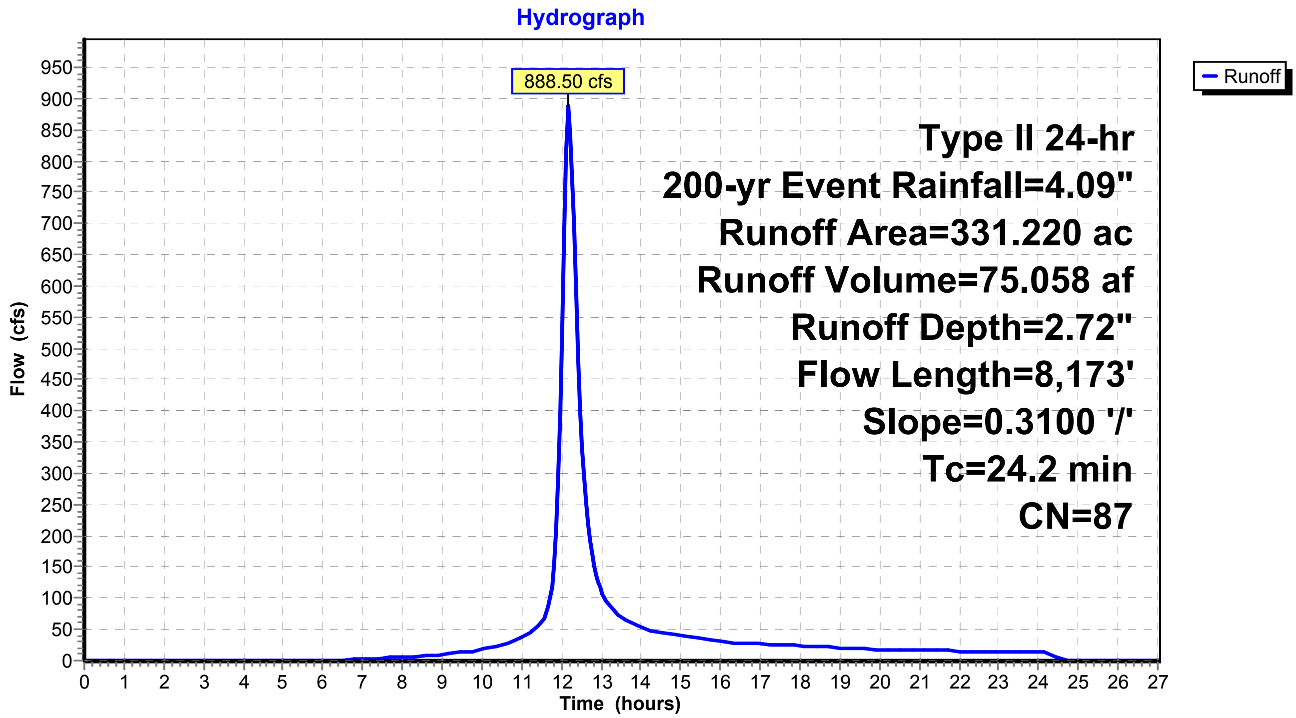
Runoff = 888.50 cfs @ 12.17 hrs, Volume= 75.058 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

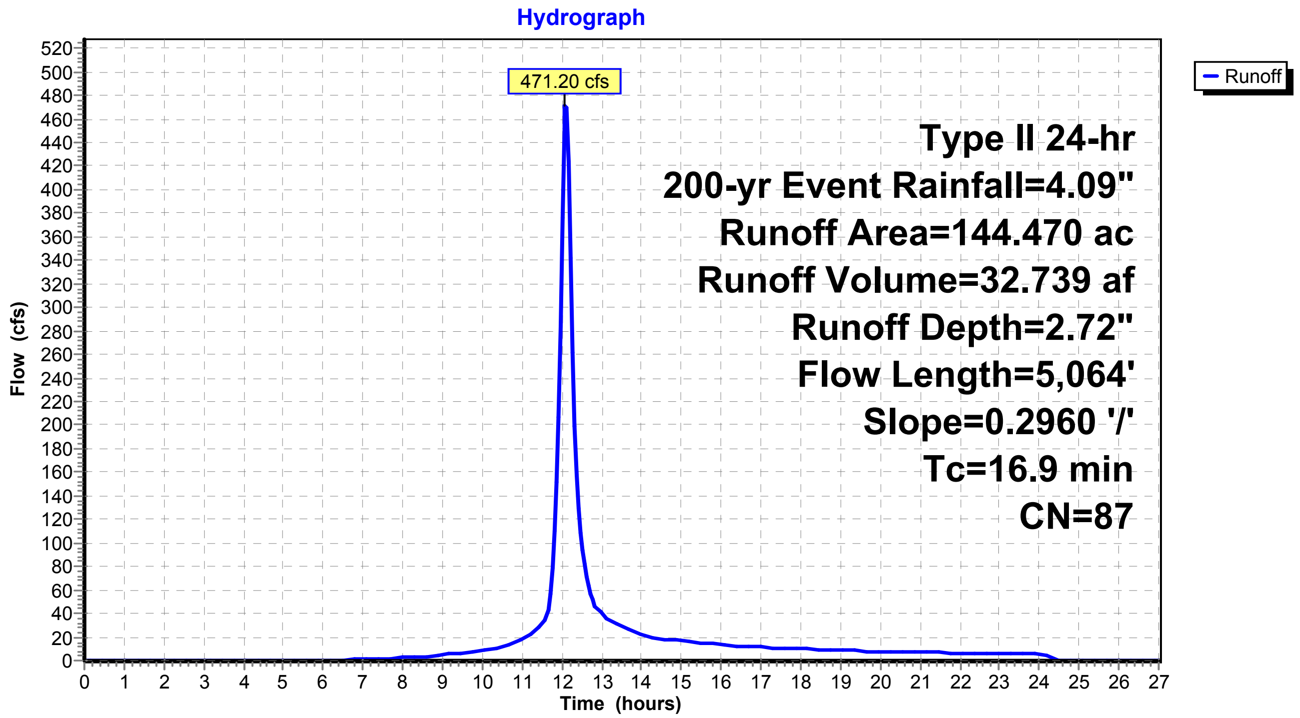
Runoff = 471.20 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

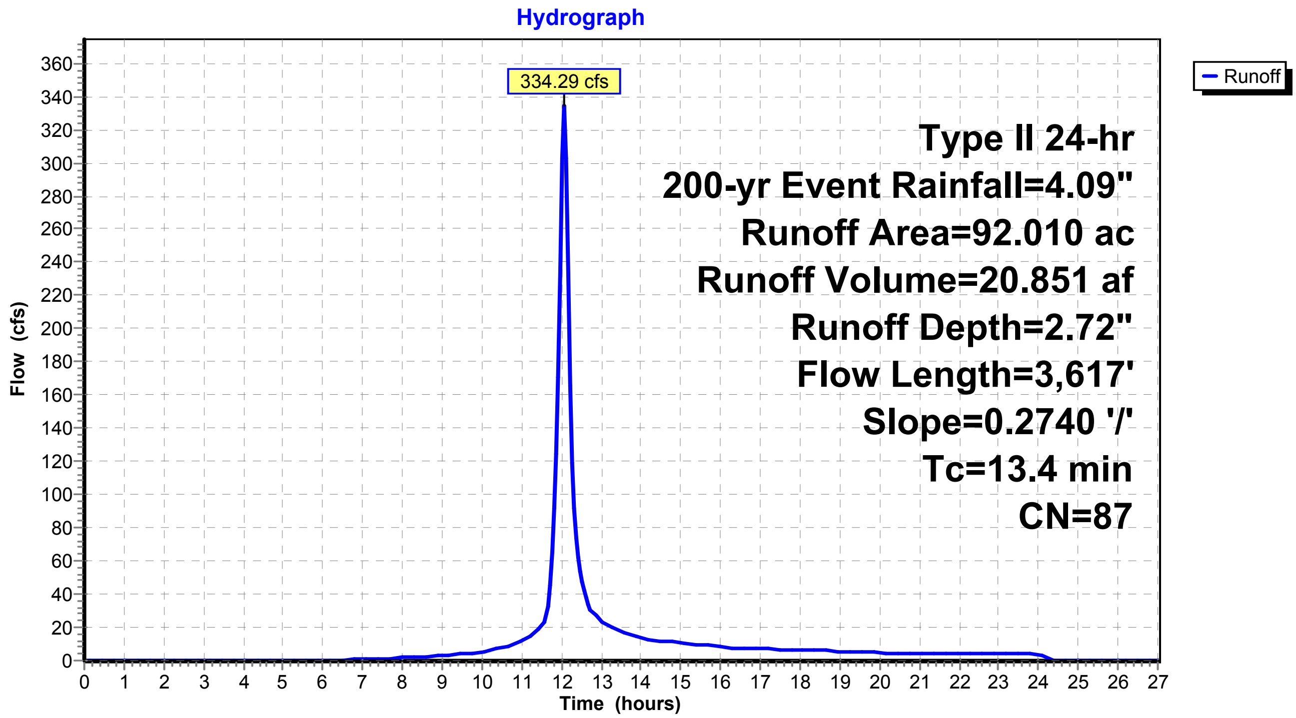
Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

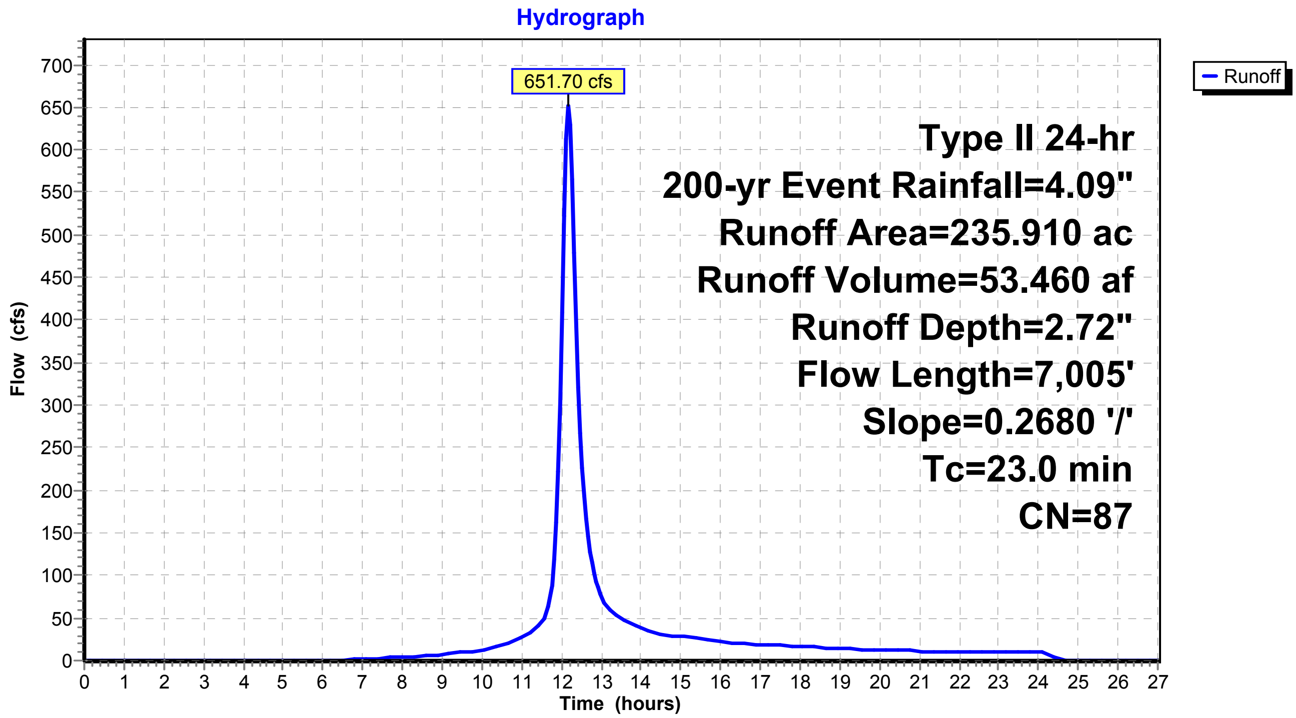
Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

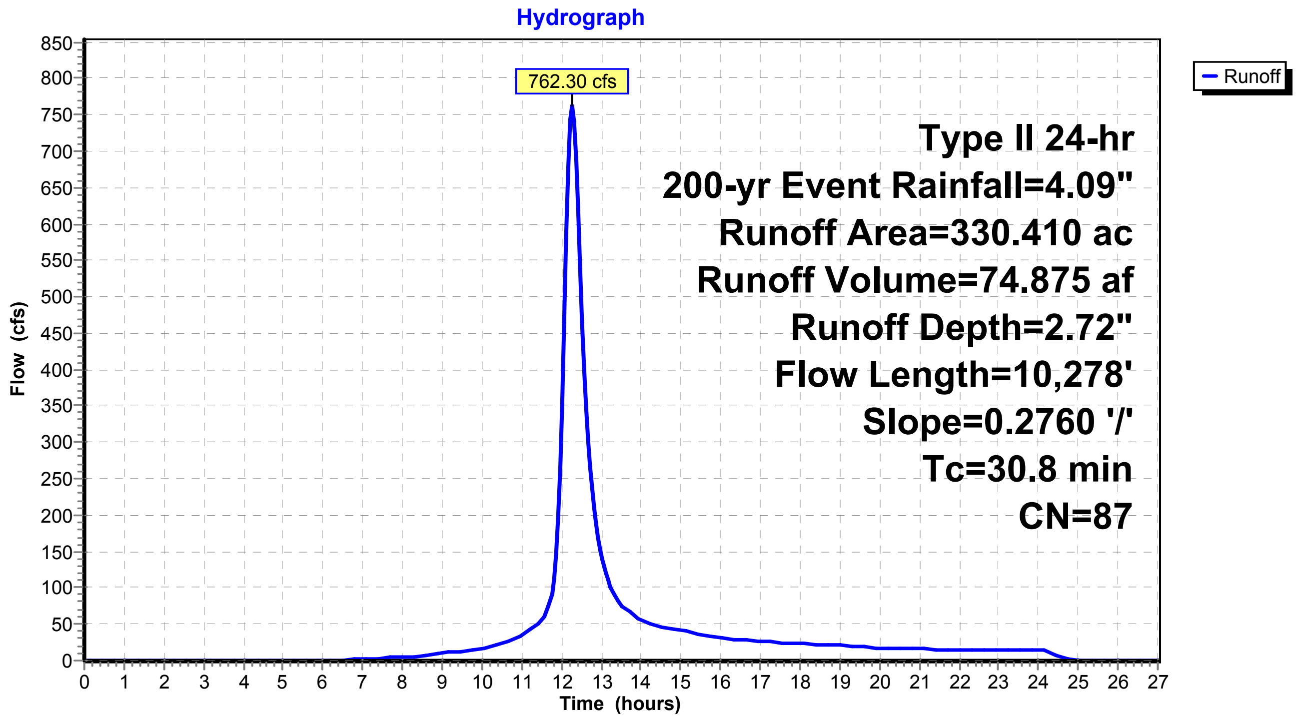
Runoff = 762.30 cfs @ 12.25 hrs, Volume= 74.875 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

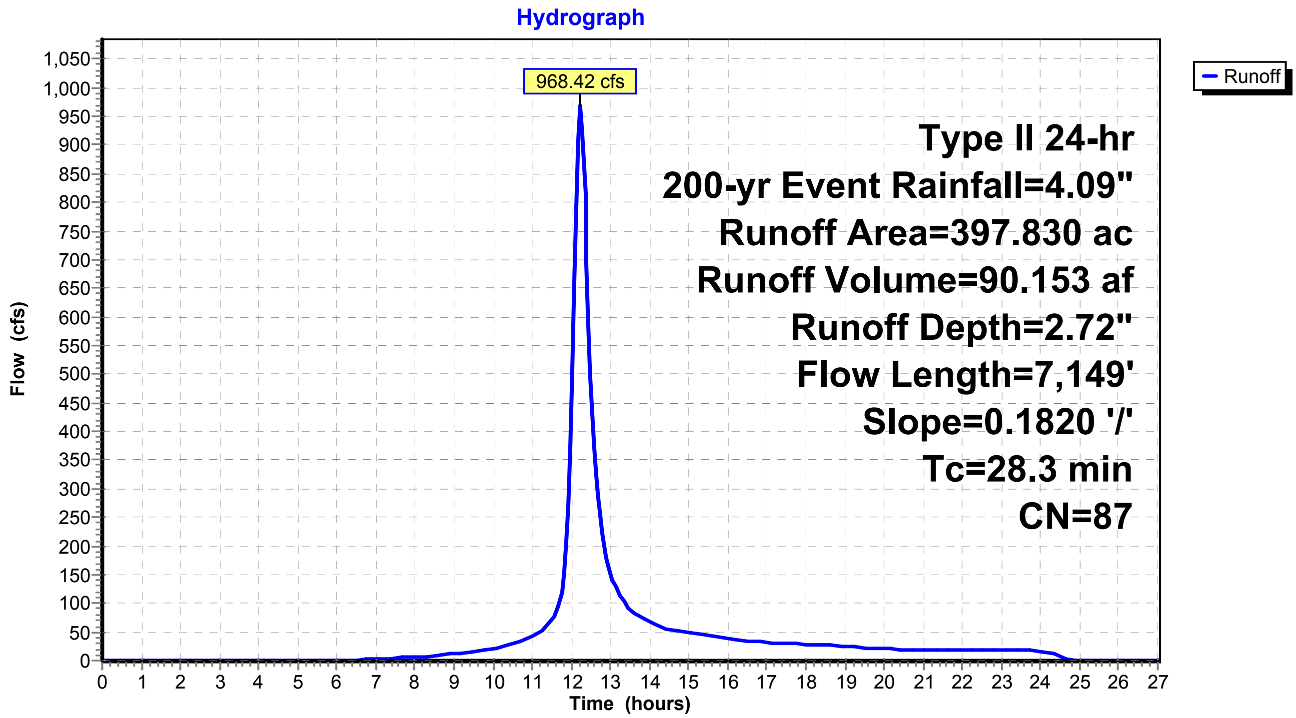
Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

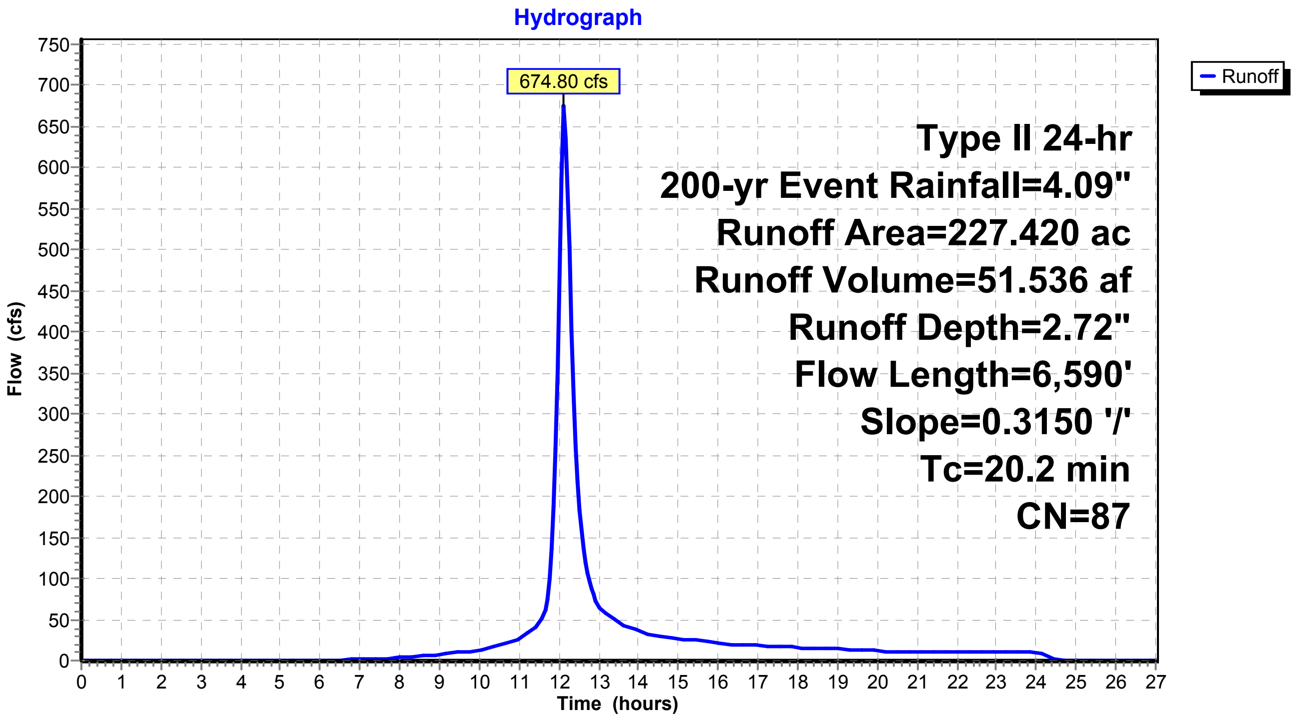
Runoff = 674.80 cfs @ 12.13 hrs, Volume= 51.536 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

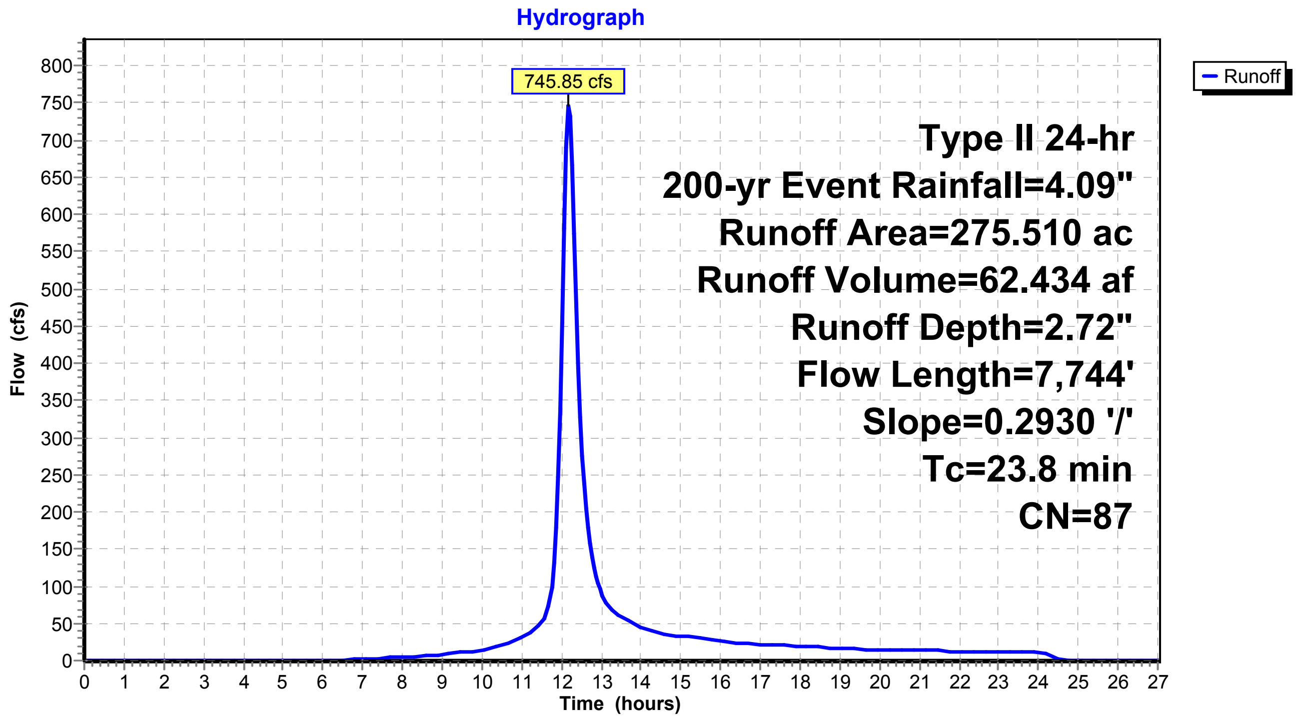
Runoff = 745.85 cfs @ 12.17 hrs, Volume= 62.434 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-yr Event Rainfall=4.09"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Reach CHNL 1: Channel 1

Inflow Area = 502.930 ac, 10.00% Impervious, Inflow Depth = 2.72" for 200-yr Event event
Inflow = 1,409.59 cfs @ 12.15 hrs, Volume= 113.970 af
Outflow = 1,364.28 cfs @ 12.24 hrs, Volume= 113.968 af, Atten= 3%, Lag= 5.8 min

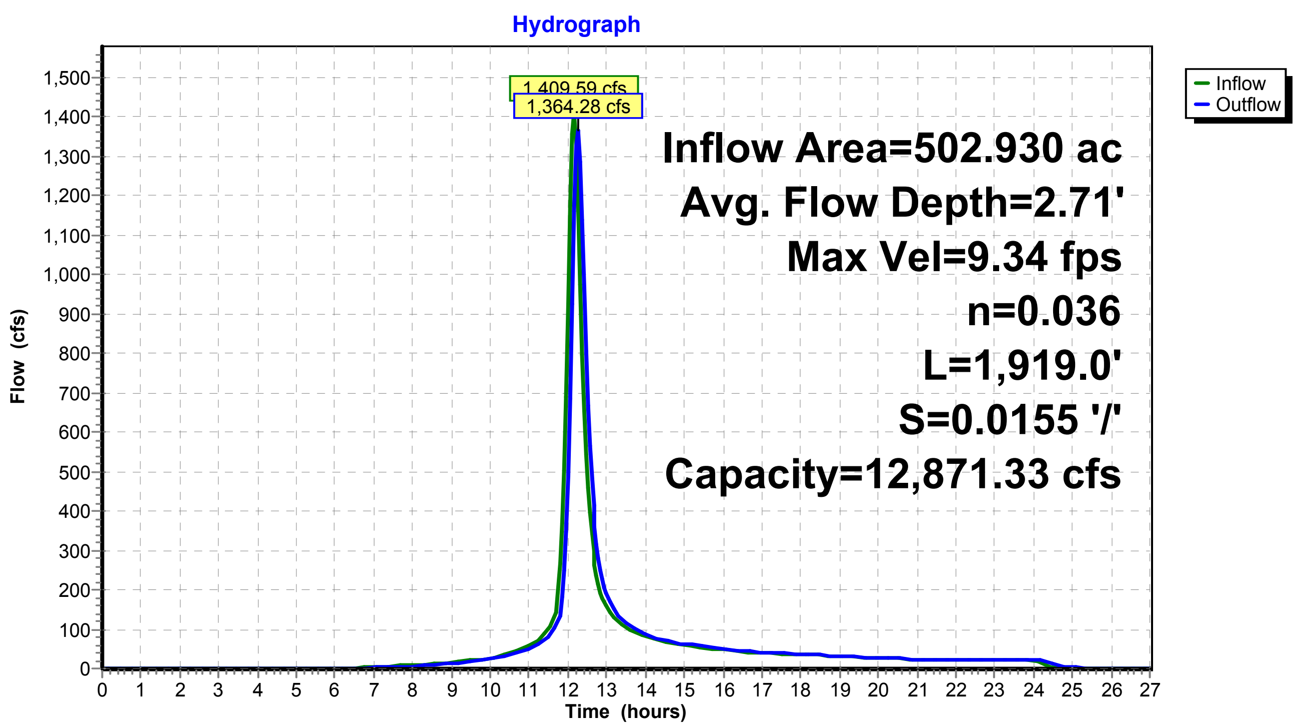
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.34 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 2.31 fps, Avg. Travel Time= 13.9 min

Peak Storage= 281,335 cf @ 12.18 hrs
Average Depth at Peak Storage= 2.71'
Bank-Full Depth= 10.00' Flow Area= 650.0 sf, Capacity= 12,871.33 cfs

50.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 80.00'
Length= 1,919.0' Slope= 0.0155 '/'
Inlet Invert= 5,569.50', Outlet Invert= 5,539.70'

‡

Reach CHNL 1: Channel 1



Summary for Reach CHNL 2: Channel 2

Inflow Area = 870.220 ac, 10.00% Impervious, Inflow Depth = 2.72" for 200-yr Event event
Inflow = 2,220.40 cfs @ 12.14 hrs, Volume= 197.202 af
Outflow = 1,835.68 cfs @ 12.47 hrs, Volume= 196.763 af, Atten= 17%, Lag= 20.0 min

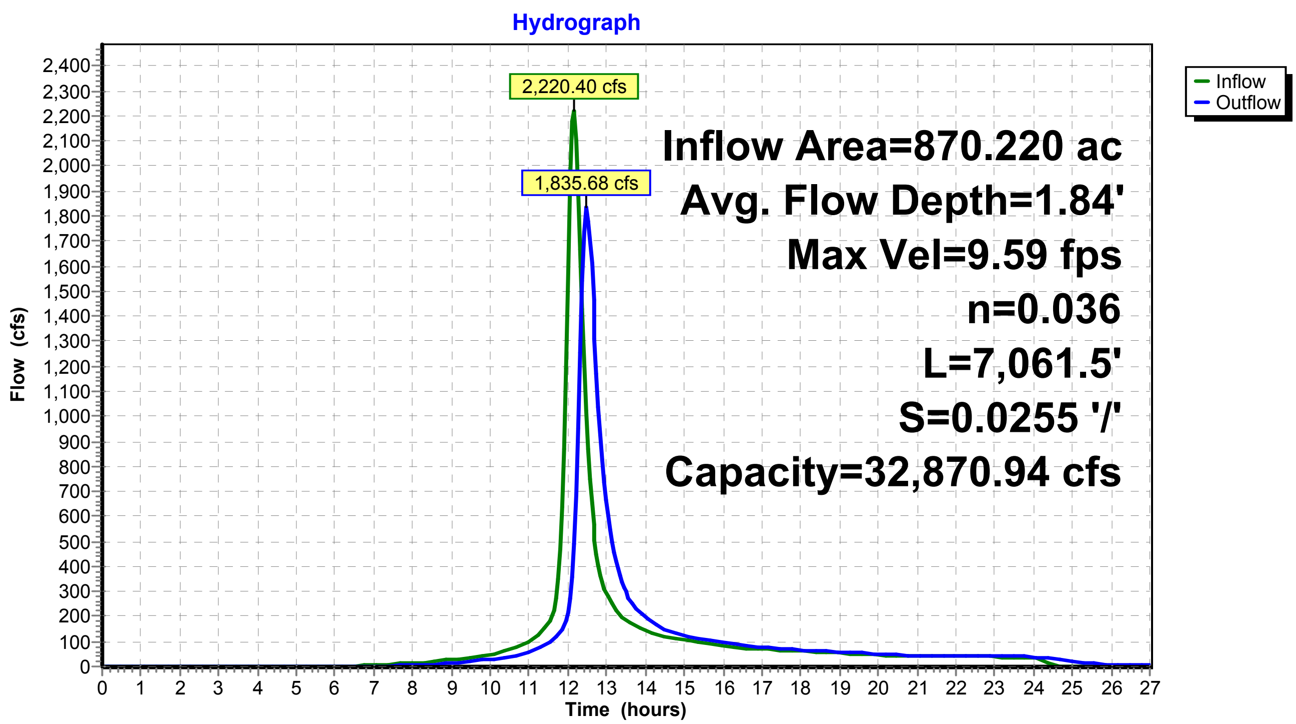
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.59 fps, Min. Travel Time= 12.3 min
Avg. Velocity = 2.61 fps, Avg. Travel Time= 45.2 min

Peak Storage= 1,352,568 cf @ 12.27 hrs
Average Depth at Peak Storage= 1.84'
Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

100.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 2.5 2.0 '/' Top Width= 145.00'
Length= 7,061.5' Slope= 0.0255 '/'
Inlet Invert= 5,720.00', Outlet Invert= 5,539.70'

‡

Reach CHNL 2: Channel 2



Summary for Reach CHNL 3: Channel 3

[62] Hint: Exceeded Reach CHNL 1 OUTLET depth by 3.89' @ 12.45 hrs
[62] Hint: Exceeded Reach CHNL 2 OUTLET depth by 4.08' @ 12.40 hrs

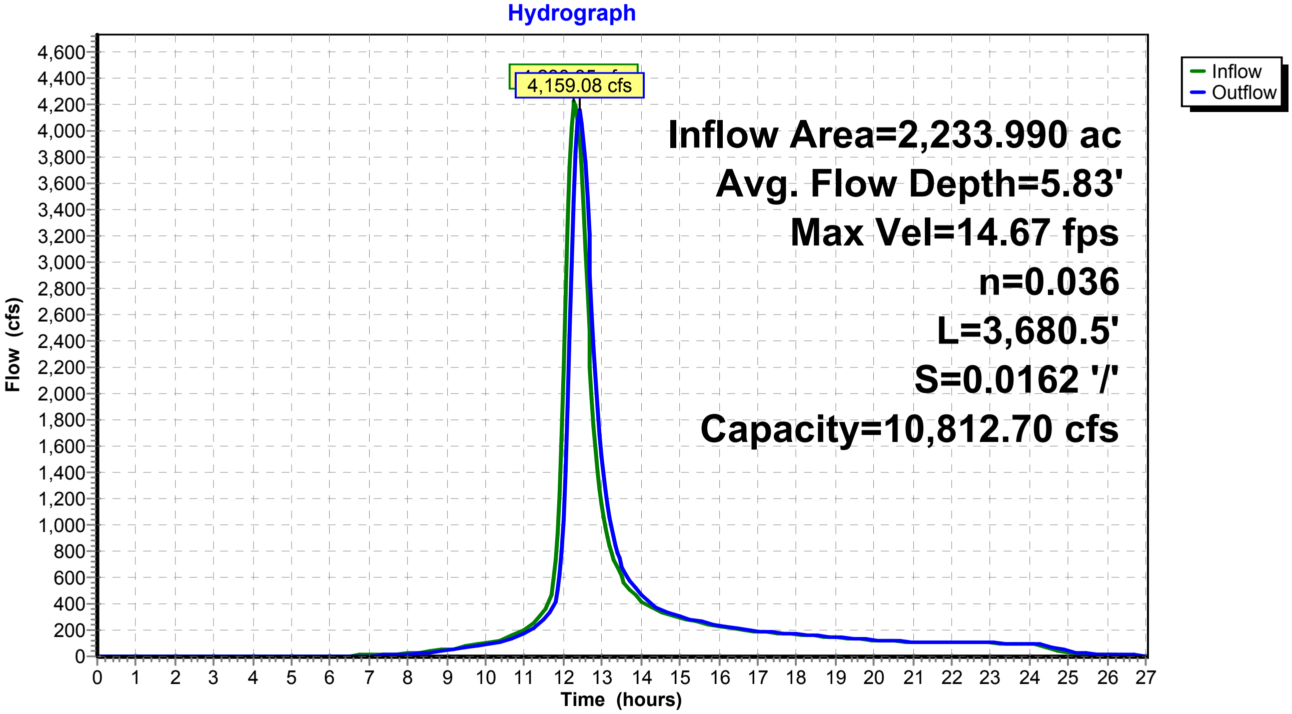
Inflow Area = 2,233.990 ac, 10.00% Impervious, Inflow Depth > 2.72" for 200-yr Event event
Inflow = 4,230.35 cfs @ 12.29 hrs, Volume= 505.807 af
Outflow = 4,159.08 cfs @ 12.41 hrs, Volume= 505.394 af, Atten= 2%, Lag= 7.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.67 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 4.37 fps, Avg. Travel Time= 14.1 min

Peak Storage= 1,046,926 cf @ 12.34 hrs
Average Depth at Peak Storage= 5.83'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 10,812.70 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 3,680.5' Slope= 0.0162 '/'
Inlet Invert= 5,539.70', Outlet Invert= 5,480.00'

Reach CHNL 3: Channel 3



Summary for Reach CHNL 4: Channel 4

[61] Hint: Exceeded Reach CHNL 3 outlet invert by 4.10' @ 12.40 hrs

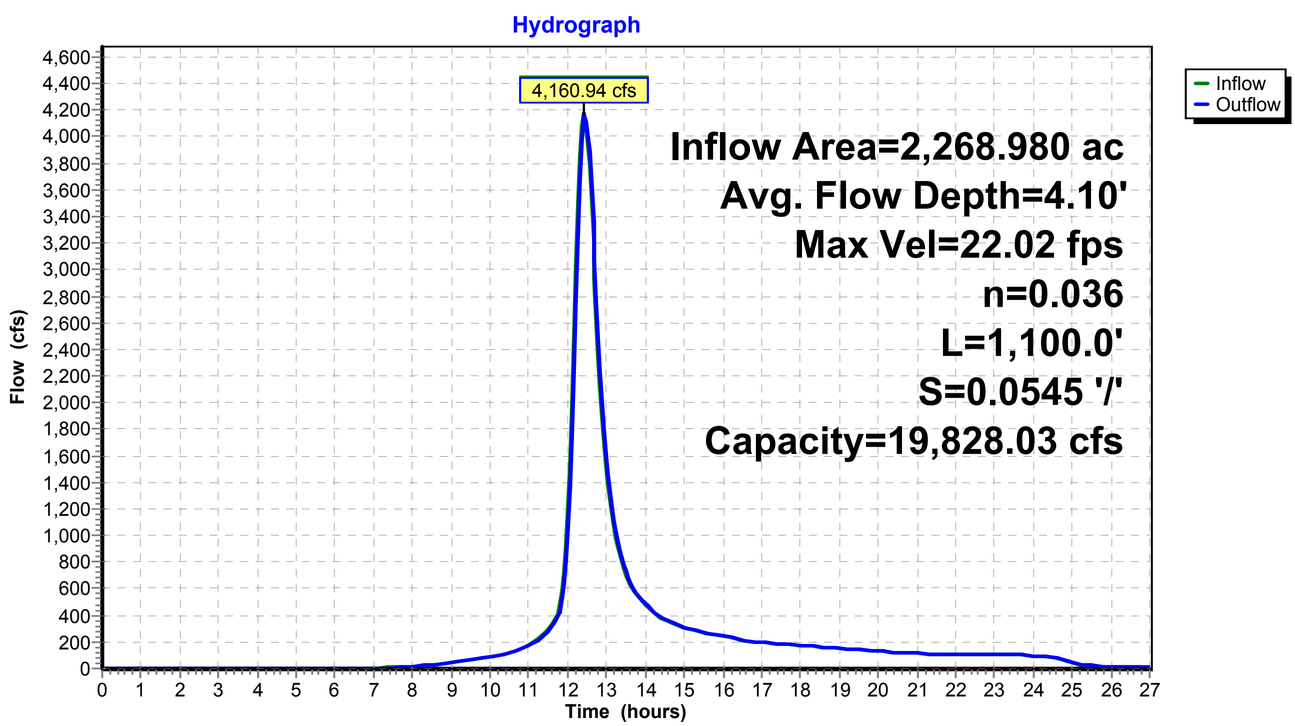
Inflow Area = 2,268.980 ac, 10.00% Impervious, Inflow Depth > 2.71" for 200-yr Event event
Inflow = 4,176.49 cfs @ 12.41 hrs, Volume= 513.323 af
Outflow = 4,160.94 cfs @ 12.43 hrs, Volume= 513.234 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 22.02 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 6.44 fps, Avg. Travel Time= 2.8 min

Peak Storage= 208,374 cf @ 12.42 hrs
Average Depth at Peak Storage= 4.10'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 1,100.0' Slope= 0.0545 '/'
Inlet Invert= 5,480.00', Outlet Invert= 5,420.00'

Reach CHNL 4: Channel 4



Summary for Reach CHNL 5: Channel 5

[62] Hint: Exceeded Reach CHNL 4 OUTLET depth by 2.66' @ 12.50 hrs

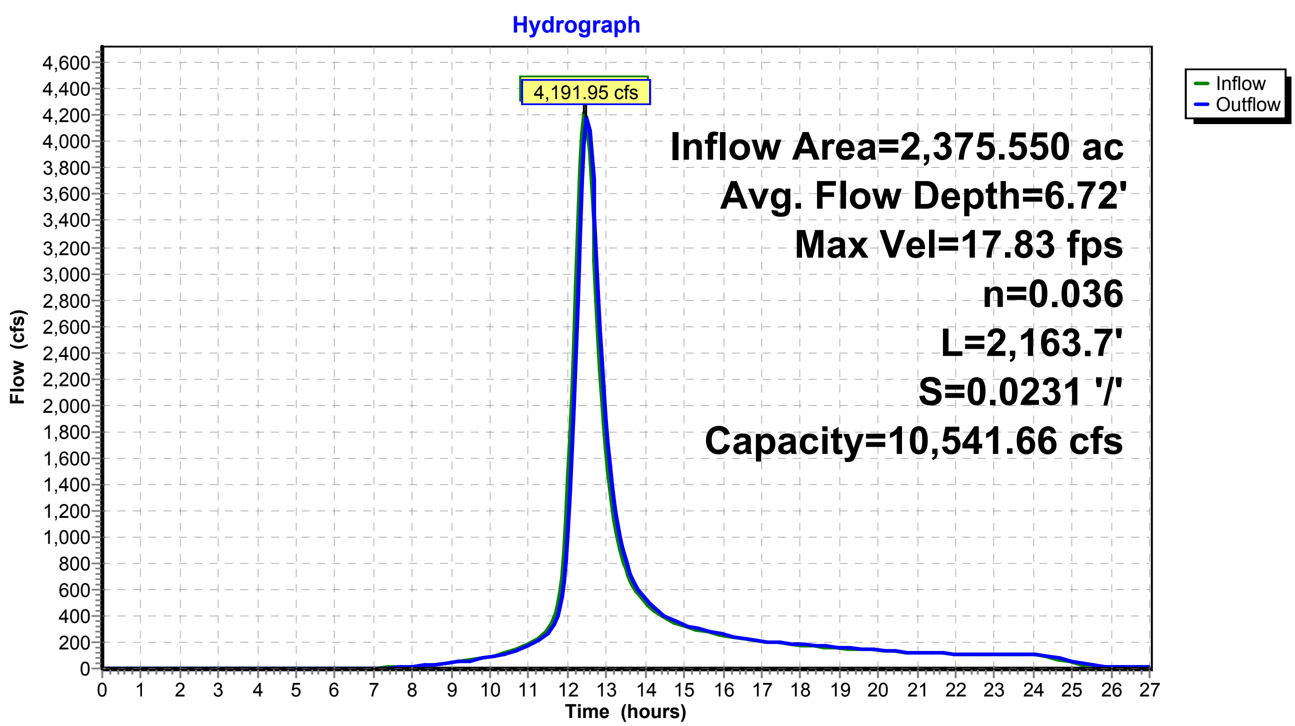
Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 2.71" for 200-yr Event event
Inflow = 4,217.67 cfs @ 12.43 hrs, Volume= 537.384 af
Outflow = 4,191.95 cfs @ 12.49 hrs, Volume= 537.163 af, Atten= 1%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 17.83 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 5.77 fps, Avg. Travel Time= 6.2 min

Peak Storage= 510,334 cf @ 12.46 hrs
Average Depth at Peak Storage= 6.72'
Bank-Full Depth= 11.00' Flow Area= 456.5 sf, Capacity= 10,541.66 cfs

25.00' x 11.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 58.00'
Length= 2,163.7' Slope= 0.0231 '/'
Inlet Invert= 5,420.00', Outlet Invert= 5,370.00'

Reach CHNL 5: Channel 5



Summary for Pond CLVT 1: Culvert Crossing #1

[62] Hint: Exceeded Reach CHNL 5 OUTLET depth by 17.28' @ 12.75 hrs

Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 2.71" for 200-yr Event event
Inflow = 4,191.95 cfs @ 12.49 hrs, Volume= 537.163 af
Outflow = 3,410.14 cfs @ 12.71 hrs, Volume= 537.020 af, Atten= 19%, Lag= 12.9 min
Primary = 3,410.14 cfs @ 12.71 hrs, Volume= 537.020 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,392.92' @ 12.71 hrs Surf.Area= 0 sf Storage= 1,758,861 cf
Flood Elev= 5,419.00' Surf.Area= 0 sf Storage= 12,108,960 cf

Plug-Flow detention time= 4.1 min calculated for 537.020 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (860.7 - 856.8)

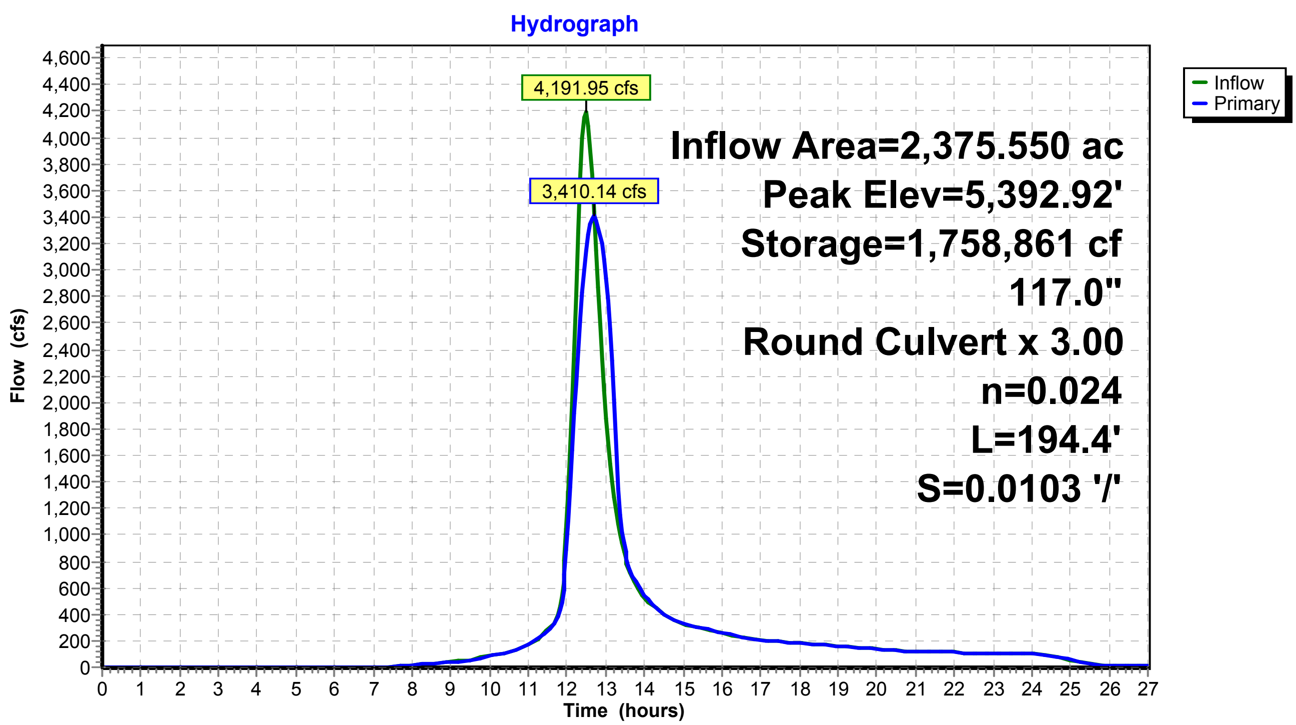
Volume	Invert	Avail.Storage	Storage Description
#1	5,370.00'	12,108,960 cf	**Culvert Crossing #1**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
5,370.00	0
5,371.00	1,264
5,372.00	4,909
5,373.00	7,513
5,374.00	16,645
5,375.00	29,237
5,376.00	46,725
5,377.00	71,156
5,378.00	103,816
5,379.00	144,375
5,380.00	193,809
5,381.00	252,611
5,382.00	321,098
5,383.00	399,998
5,384.00	488,627
5,385.00	587,544
5,386.00	697,578
5,387.00	818,723
5,388.00	950,841
5,389.00	1,094,170
5,390.00	1,248,216
5,391.00	1,412,011
5,392.00	1,587,481
5,393.00	1,774,410
5,394.00	1,971,598
5,395.00	2,046,356
5,396.00	2,266,171
5,397.00	2,498,604
5,398.00	2,742,207
5,399.00	2,998,577
5,400.00	3,272,610
5,401.00	3,564,605
5,402.00	3,875,249
5,403.00	4,205,411
5,404.00	4,554,001
5,405.00	4,921,330
5,406.00	5,306,733
5,407.00	5,710,058
5,408.00	6,132,117
5,409.00	6,572,849
5,410.00	7,032,579
5,411.00	7,512,479
5,412.00	8,012,116
5,413.00	8,533,107
5,414.00	9,078,172
5,415.00	9,647,155
5,416.00	10,235,642
5,417.00	10,841,380
5,418.00	11,465,162
5,419.00	12,108,960

Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	**117.0" Round Culvert X 3.00** L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=3,408.57 cfs @ 12.71 hrs HW=5,392.90' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 3,408.57 cfs @ 15.22 fps)

Pond CLVT 1: Culvert Crossing #1



Summary for Pond CLVT 2: Culvert Crossing #2

[81] Warning: Exceeded Pond CLVT 1 by 11.78' @ 13.40 hrs

Inflow Area = 2,403.760 ac, 10.00% Impervious, Inflow Depth > 2.71" for 200-yr Event event
Inflow = 3,418.33 cfs @ 12.71 hrs, Volume= 543.413 af
Outflow = 1,658.81 cfs @ 13.25 hrs, Volume= 543.361 af, Atten= 51%, Lag= 32.8 min
Primary = 1,658.81 cfs @ 13.25 hrs, Volume= 543.361 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,391.04' @ 13.25 hrs Surf.Area= 0 sf Storage= 6,444,314 cf
Flood Elev= 5,403.00' Surf.Area= 0 sf Storage= 10,142,539 cf

Plug-Flow detention time= 30.6 min calculated for 543.361 af (100% of inflow)
Center-of-Mass det. time= 30.5 min (890.6 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,352.00'	10,142,539 cf	**Existing Pond** Listed below

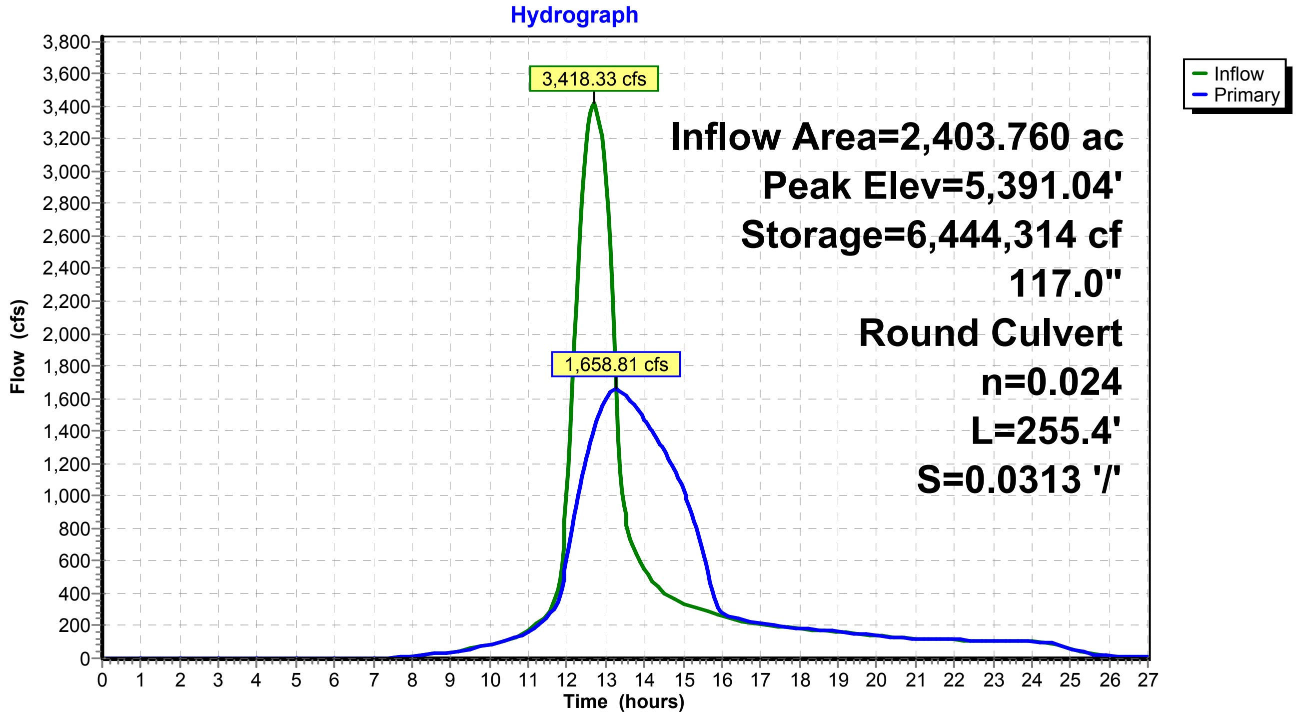
Elevation (feet)	Cum.Store (cubic-feet)
5,352.00	0
5,353.00	2,681
5,354.00	7,382
5,355.00	15,397
5,356.00	28,286
5,357.00	47,224
5,358.00	75,773
5,359.00	117,133
5,360.00	170,345
5,361.00	235,331
5,362.00	312,331
5,363.00	399,765
5,364.00	497,494
5,365.00	605,663
5,366.00	724,610
5,367.00	855,928
5,368.00	1,000,315
5,369.00	1,157,122
5,370.00	1,325,832
5,371.00	1,505,243
5,372.00	1,693,878
5,373.00	1,890,808
5,374.00	2,095,234
5,375.00	2,306,959
5,376.00	2,525,755
5,377.00	2,751,367
5,378.00	2,983,426
5,379.00	3,221,478
5,380.00	3,465,168
5,381.00	3,714,247
5,382.00	3,968,434
5,383.00	4,227,291
5,384.00	4,490,405
5,385.00	4,757,518
5,386.00	5,028,418
5,387.00	5,302,894
5,388.00	5,580,732
5,389.00	5,861,867
5,390.00	6,146,219
5,391.00	6,433,776
5,392.00	6,724,543
5,393.00	7,018,534
5,394.00	7,315,762
5,395.00	7,616,273
5,396.00	7,920,106
5,397.00	8,227,290
5,398.00	8,537,855
5,399.00	8,851,826
5,400.00	9,169,229
5,401.00	9,490,117

5,402.00	9,814,540
5,403.00	10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	**117.0" Round Culvert** L= 255.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,352.00' / 5,344.00' S= 0.0313 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=1,658.65 cfs @ 13.25 hrs HW=5,391.03' (Free Discharge)
└─**1=Culvert** (Inlet Controls 1,658.65 cfs @ 22.22 fps)

Pond CLVT 2: Culvert Crossing #2



Time span=0.00-27.00 hrs, dt=0.05 hrs, 541 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: WS 1 Runoff Area=28.210 ac 10.00% Impervious Runoff Depth=3.19"
Tc=5.0 min CN=87 Runoff=155.94 cfs 7.504 af

Subcatchment2: WS 2 Runoff Area=106.570 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,068' Slope=0.3140 '/' Tc=11.0 min CN=87 Runoff=484.31 cfs 28.349 af

Subcatchment3: WS 3 Runoff Area=34.990 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=1,603' Slope=0.1770 '/' Tc=8.7 min CN=87 Runoff=172.66 cfs 9.308 af

Subcatchment4: WS 4 Runoff Area=75.020 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,047' Slope=0.3390 '/' Tc=10.5 min CN=87 Runoff=346.92 cfs 19.956 af

Subcatchment5: WS 5 Runoff Area=124.190 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,976' Slope=0.3400 '/' Tc=18.0 min CN=87 Runoff=458.61 cfs 33.036 af

Subcatchment6: WS 6 Runoff Area=331.220 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=8,173' Slope=0.3100 '/' Tc=24.2 min CN=87 Runoff=1,038.74 cfs 88.109 af

Subcatchment7: WS 7 Runoff Area=144.470 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=5,064' Slope=0.2960 '/' Tc=16.9 min CN=87 Runoff=550.14 cfs 38.431 af

Subcatchment8: WS 8 Runoff Area=92.010 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=3,617' Slope=0.2740 '/' Tc=13.4 min CN=87 Runoff=389.99 cfs 24.476 af

Subcatchment9: WS 9 Runoff Area=235.910 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,005' Slope=0.2680 '/' Tc=23.0 min CN=87 Runoff=761.76 cfs 62.755 af

Subcatchment10: WS 10 Runoff Area=330.410 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=10,278' Slope=0.2760 '/' Tc=30.8 min CN=87 Runoff=891.85 cfs 87.894 af

Subcatchment11: WS 11 Runoff Area=397.830 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,149' Slope=0.1820 '/' Tc=28.3 min CN=87 Runoff=1,132.73 cfs 105.828 af

Subcatchment12: WS 12 Runoff Area=227.420 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=6,590' Slope=0.3150 '/' Tc=20.2 min CN=87 Runoff=789.72 cfs 60.497 af

Subcatchment13: WS 13 Runoff Area=275.510 ac 10.00% Impervious Runoff Depth=3.19"
Flow Length=7,744' Slope=0.2930 '/' Tc=23.8 min CN=87 Runoff=871.93 cfs 73.289 af

Reach CHNL 1: Channel 1 Avg. Flow Depth=2.98' Max Vel=9.88 fps Inflow=1,647.46 cfs 133.786 af
n=0.036 L=1,919.0' S=0.0155 '/' Capacity=12,871.33 cfs Outflow=1,601.86 cfs 133.784 af

Reach CHNL 2: Channel 2 Avg. Flow Depth=2.04' Max Vel=10.26 fps Inflow=2,597.10 cfs 231.491 af
n=0.036 L=7,061.5' S=0.0255 '/' Capacity=32,870.94 cfs Outflow=2,180.53 cfs 231.028 af

Reach CHNL 3: Channel 3 Avg. Flow Depth=6.49' Max Vel=15.55 fps Inflow=5,094.93 cfs 593.807 af
n=0.036 L=3,680.5' S=0.0162 '/' Capacity=10,812.70 cfs Outflow=5,008.23 cfs 593.385 af

Reach CHNL 4: Channel 4 Avg. Flow Depth=4.57' Max Vel=23.45 fps Inflow=5,028.84 cfs 602.692 af
n=0.036 L=1,100.0' S=0.0545 '/' Capacity=19,828.03 cfs Outflow=5,012.38 cfs 602.599 af

Reach CHNL 5: Channel 5 Avg. Flow Depth=7.44' Max Vel=18.81 fps Inflow=5,080.00 cfs 630.949 af
n=0.036 L=2,163.7' S=0.0231 '/' Capacity=10,541.66 cfs Outflow=5,046.09 cfs 630.724 af

Pond CLVT 1: Culvert Crossing Peak Elev=5,397.29' Storage=2,570,184 cf Inflow=5,046.09 cfs 630.724 af
117.0" Round Culvert x 3.00 n=0.024 L=194.4' S=0.0103 '/' Outflow=3,847.35 cfs 630.580 af

Pond CLVT 2: Culvert Crossing Peak Elev=5,396.71' Storage=8,137,086 cf Inflow=3,856.73 cfs 638.084 af
117.0" Round Culvert n=0.024 L=255.4' S=0.0313 '/' Outflow=1,791.19 cfs 638.031 af

Total Runoff Area = 2,403.760 ac Runoff Volume = 639.433 af Average Runoff Depth = 3.19"
90.00% Pervious = 2,163.390 ac 10.00% Impervious = 240.370 ac

Summary for Subcatchment 1: WS 1

[49] Hint: Tc<2dt may require smaller dt

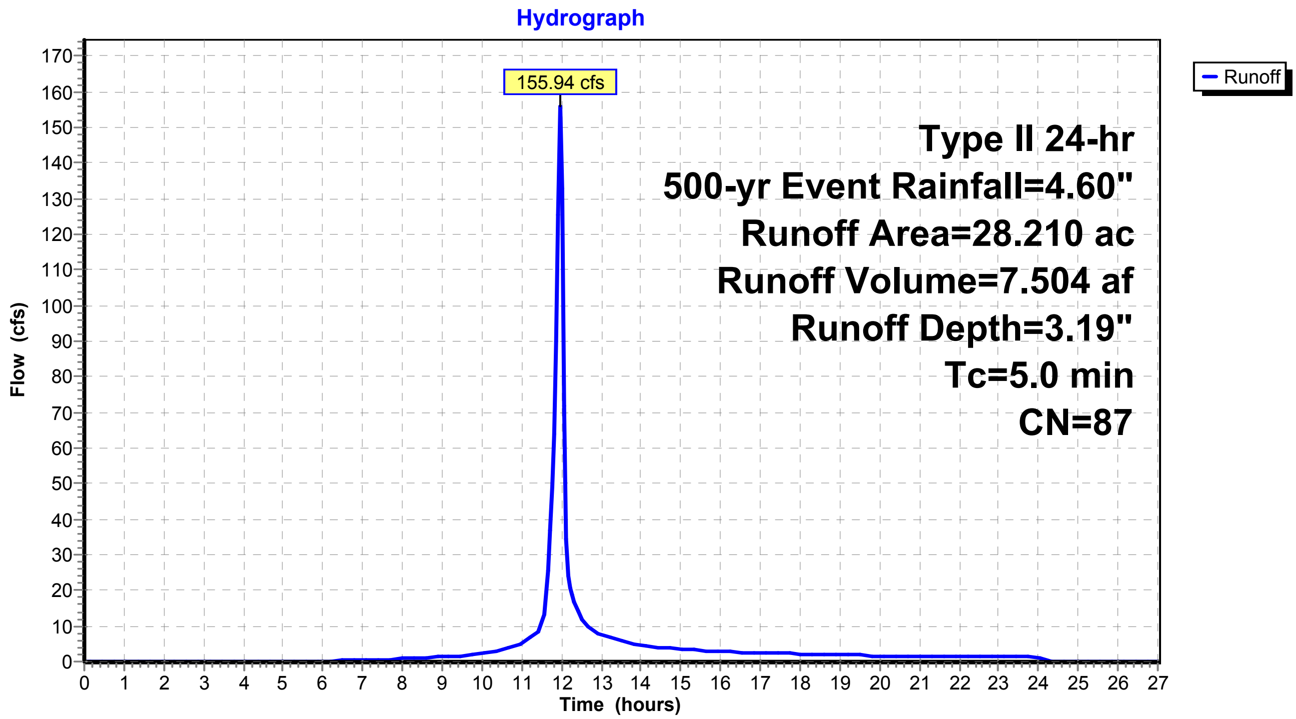
Runoff = 155.94 cfs @ 11.95 hrs, Volume= 7.504 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	25.390	86	Desert shrub range, Fair, HSG D
*	2.820	98	Impervious, HSG D
	28.210	87	Weighted Average
	25.390		90.00% Pervious Area
	2.820		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 1: WS 1



Summary for Subcatchment 2: WS 2

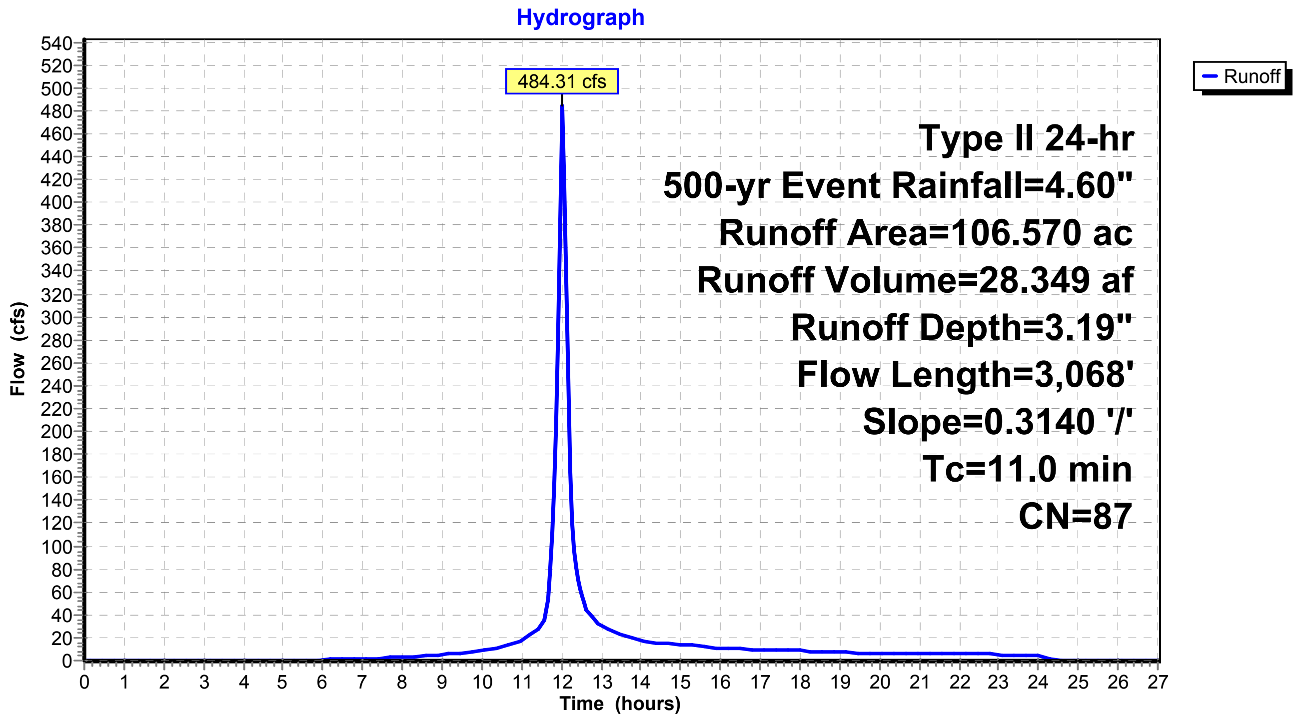
Runoff = 484.31 cfs @ 12.02 hrs, Volume= 28.349 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	95.910	86	Desert shrub range, Fair, HSG D
*	10.660	98	Impervious, HSG D
	106.570	87	Weighted Average
	95.910		90.00% Pervious Area
	10.660		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	3,068	0.3140	4.66		**Lag/CN Method,**

Subcatchment 2: WS 2



Summary for Subcatchment 3: WS 3

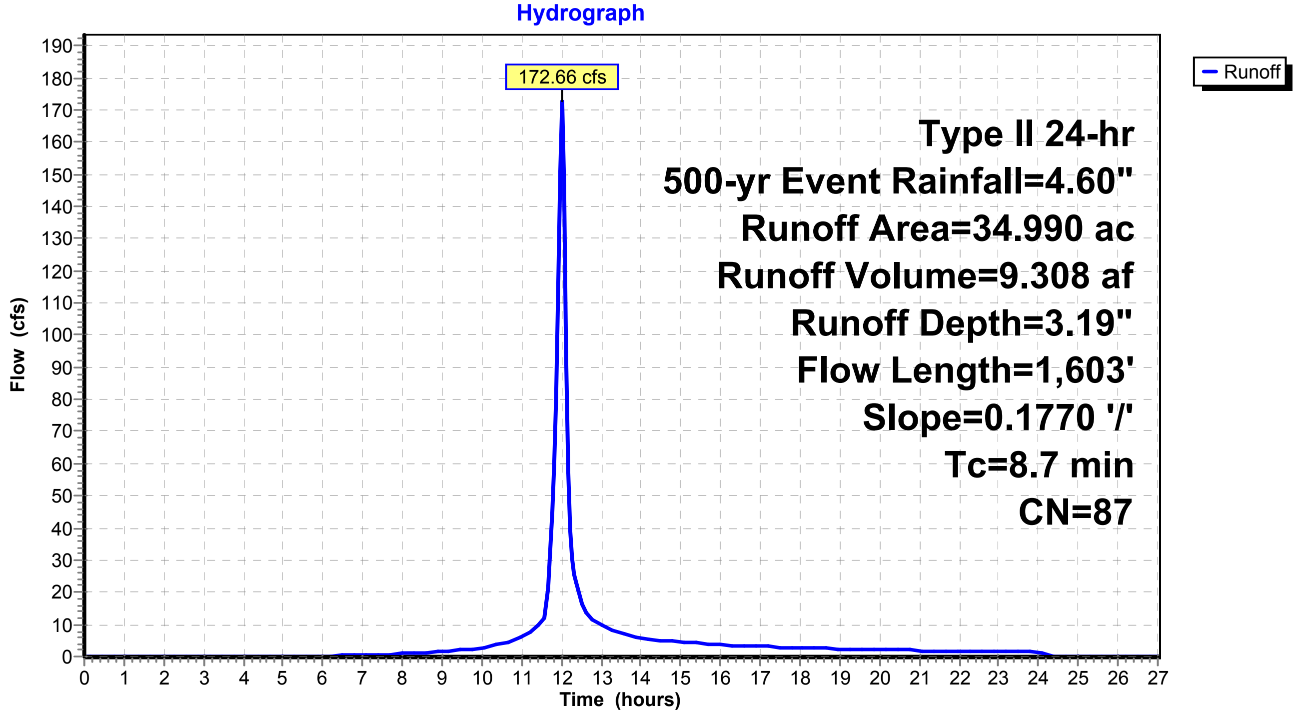
Runoff = 172.66 cfs @ 12.00 hrs, Volume= 9.308 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	31.490	86	Desert shrub range, Fair, HSG D
*	3.500	98	Impervious, HSG D
	34.990	87	Weighted Average
	31.490		90.00% Pervious Area
	3.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	1,603	0.1770	3.07		**Lag/CN Method,**

Subcatchment 3: WS 3



Summary for Subcatchment 4: WS 4

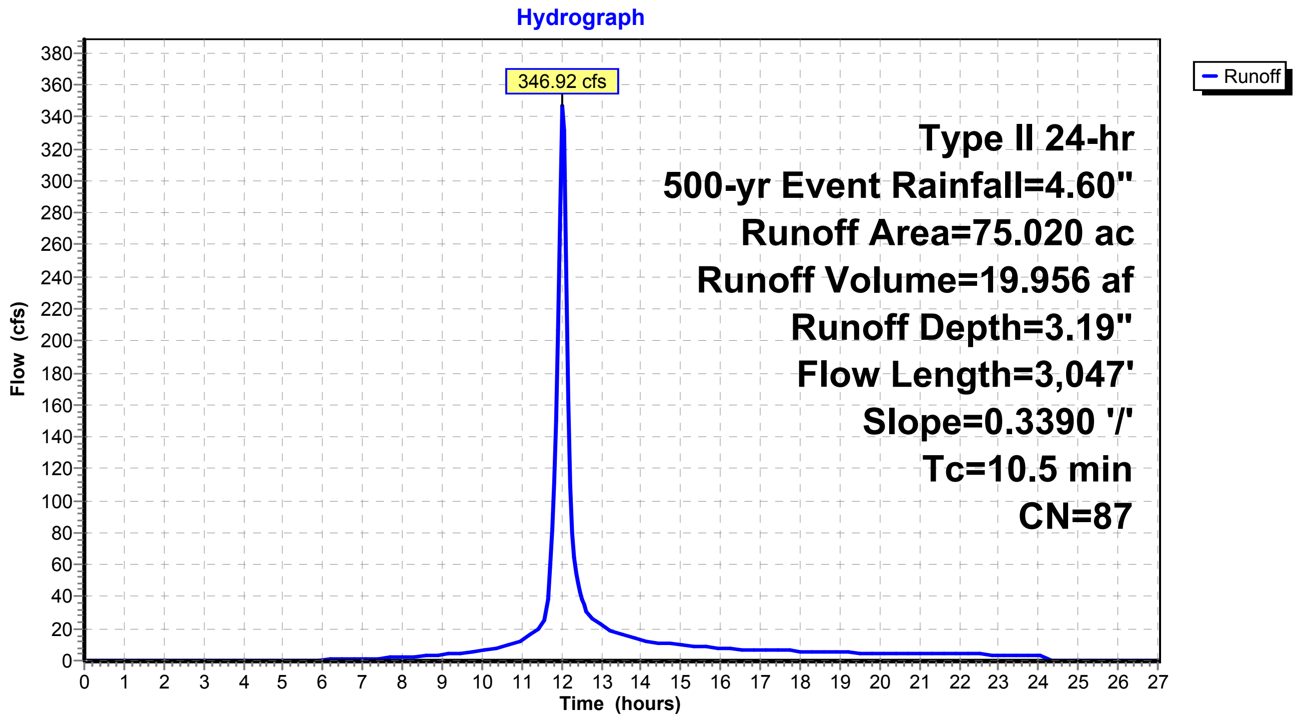
Runoff = 346.92 cfs @ 12.02 hrs, Volume= 19.956 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	67.520	86	Desert shrub range, Fair, HSG D
*	7.500	98	Impervious, HSG D
	75.020	87	Weighted Average
	67.520		90.00% Pervious Area
	7.500		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	3,047	0.3390	4.84		**Lag/CN Method,**

Subcatchment 4: WS 4



Summary for Subcatchment 5: WS 5

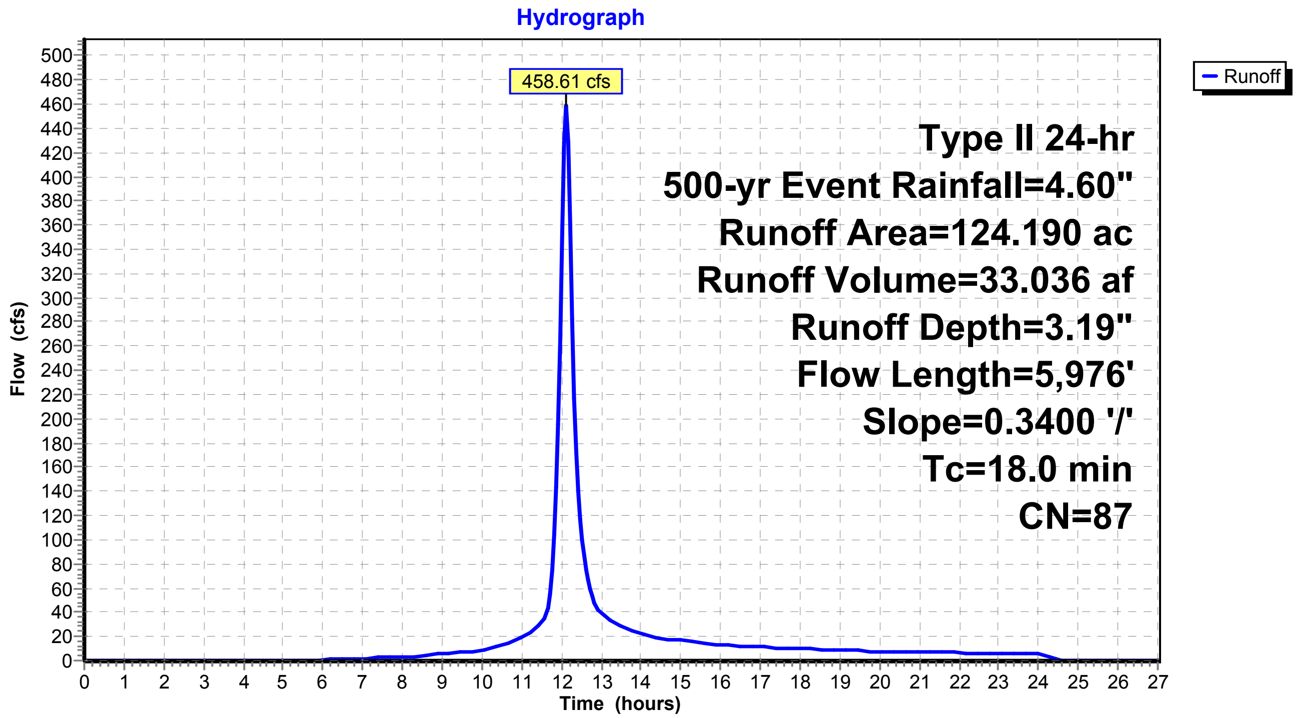
Runoff = 458.61 cfs @ 12.10 hrs, Volume= 33.036 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	111.770	86	Desert shrub range, Fair, HSG D
*	12.420	98	Impervious, HSG D
	124.190	87	Weighted Average
	111.770		90.00% Pervious Area
	12.420		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	5,976	0.3400	5.54		**Lag/CN Method,**

Subcatchment 5: WS 5



Summary for Subcatchment 6: WS 6

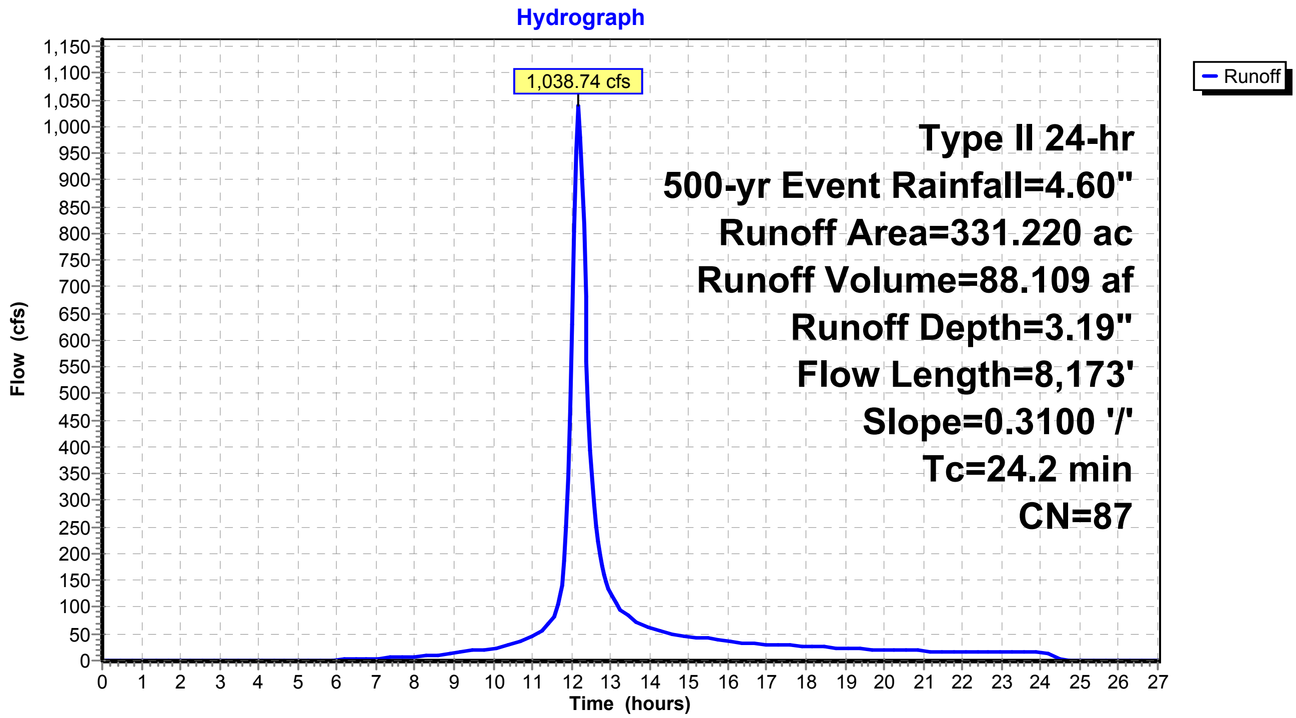
Runoff = 1,038.74 cfs @ 12.17 hrs, Volume= 88.109 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	298.100	86	Desert shrub range, Fair, HSG D
*	33.120	98	Impervious, HSG D
	331.220	87	Weighted Average
	298.100		90.00% Pervious Area
	33.120		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.2	8,173	0.3100	5.64		**Lag/CN Method,**

Subcatchment 6: WS 6



Summary for Subcatchment 7: WS 7

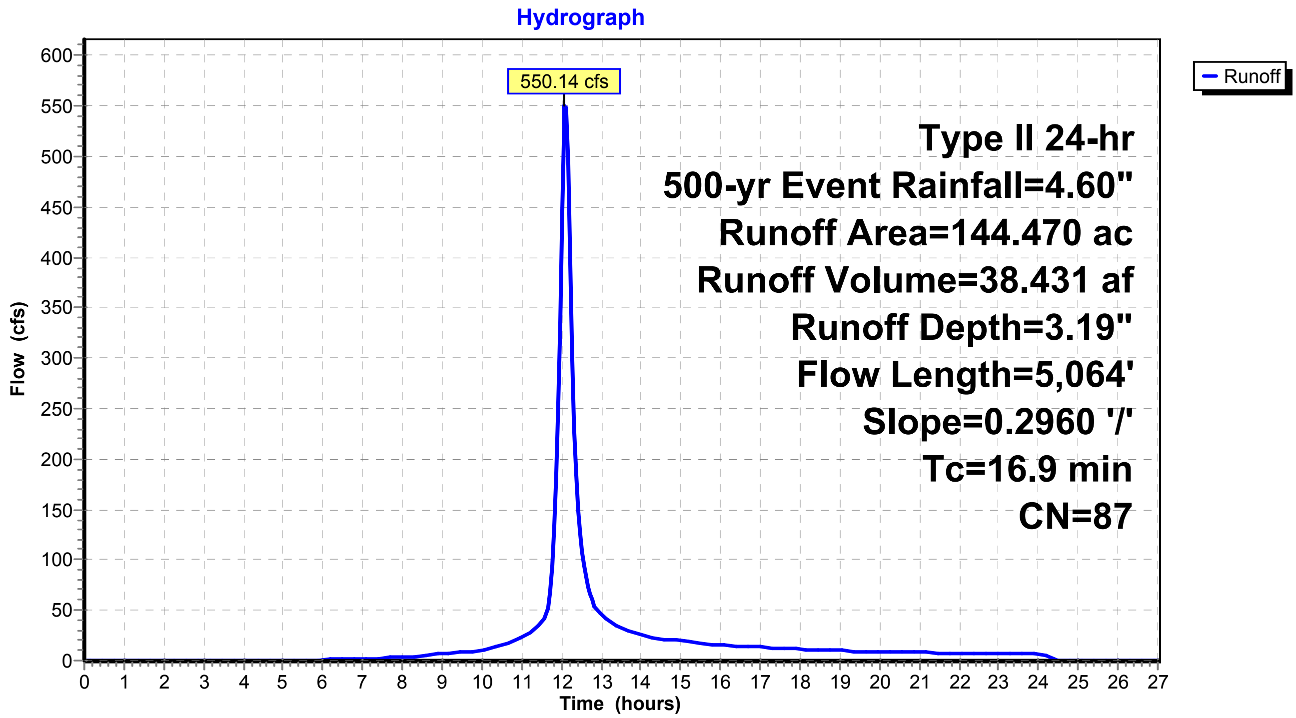
Runoff = 550.14 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	130.020	86	Desert shrub range, Fair, HSG D
*	14.450	98	Impervious, HSG D
	144.470	87	Weighted Average
	130.020		90.00% Pervious Area
	14.450		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	5,064	0.2960	5.00		**Lag/CN Method,**

Subcatchment 7: WS 7



Summary for Subcatchment 8: WS 8

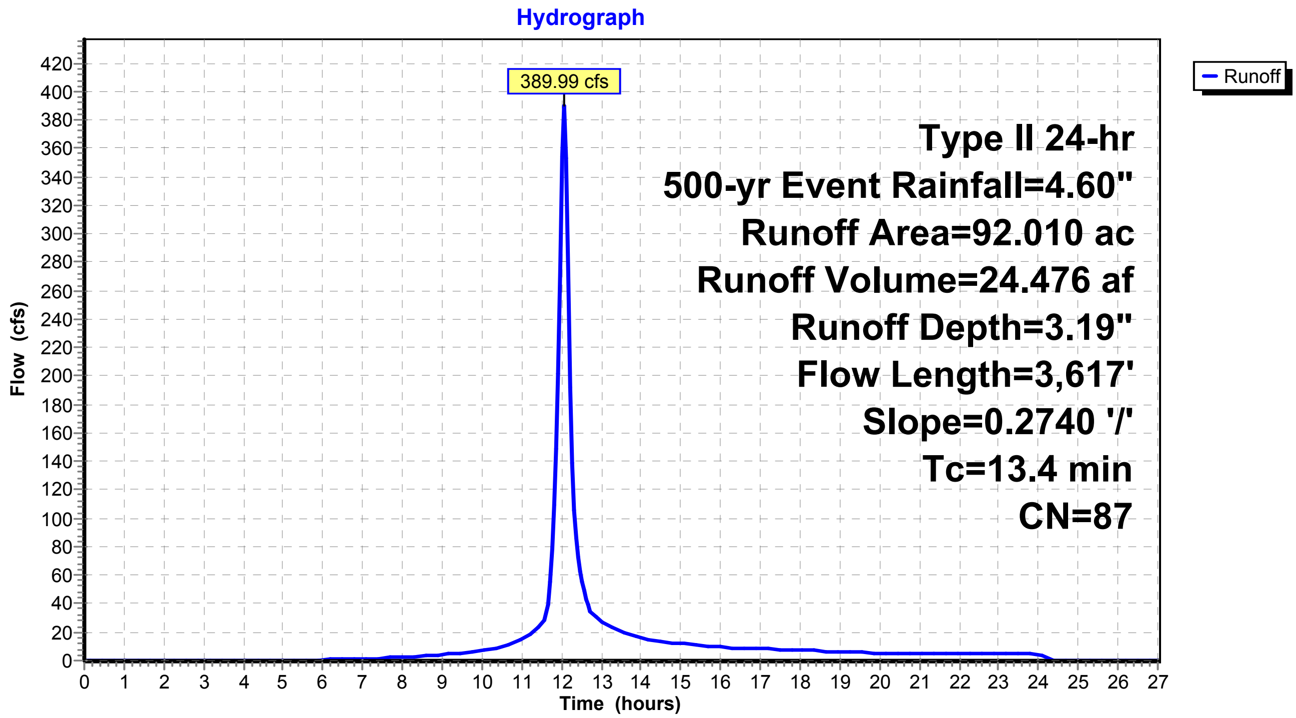
Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	82.810	86	Desert shrub range, Fair, HSG D
*	9.200	98	Impervious, HSG D
	92.010	87	Weighted Average
	82.810		90.00% Pervious Area
	9.200		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.4	3,617	0.2740	4.50		**Lag/CN Method,**

Subcatchment 8: WS 8



Summary for Subcatchment 9: WS 9

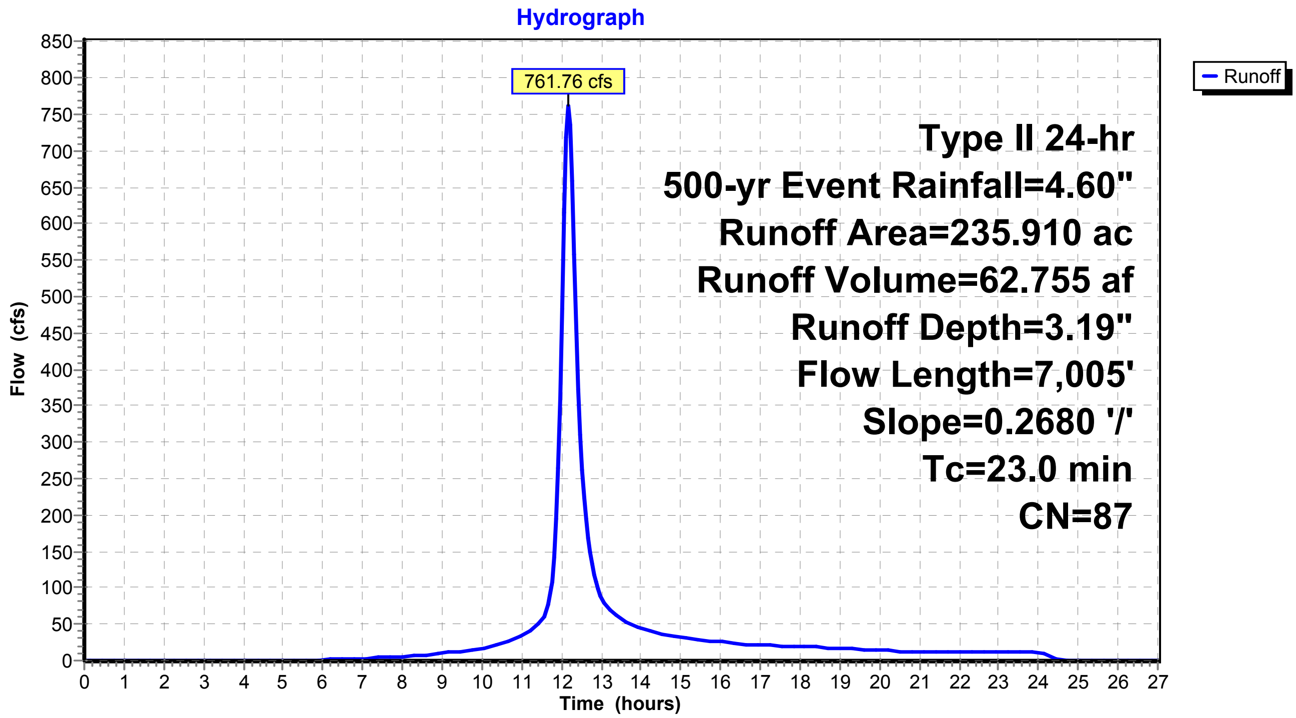
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	212.320	86	Desert shrub range, Fair, HSG D
*	23.590	98	Impervious, HSG D
	235.910	87	Weighted Average
	212.320		90.00% Pervious Area
	23.590		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	7,005	0.2680	5.08		**Lag/CN Method,**

Subcatchment 9: WS 9



Summary for Subcatchment 10: WS 10

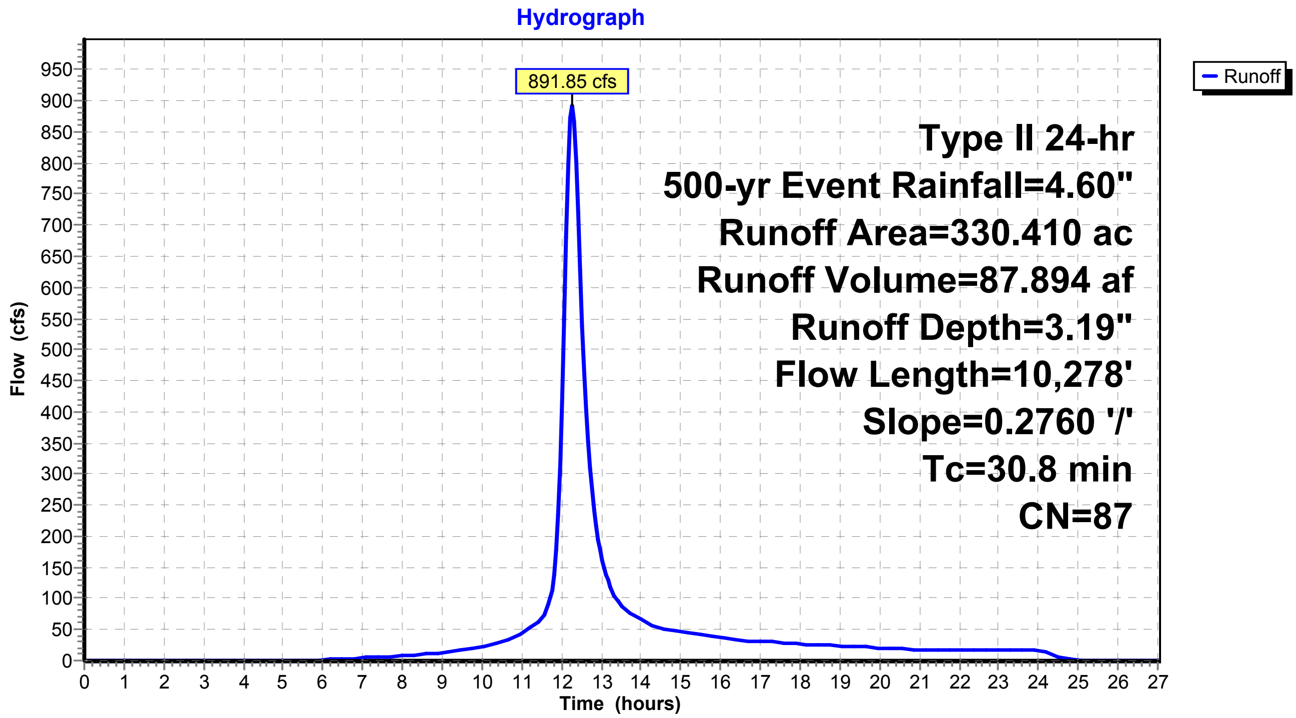
Runoff = 891.85 cfs @ 12.25 hrs, Volume= 87.894 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	297.370	86	Desert shrub range, Fair, HSG D
*	33.040	98	Impervious, HSG D
	330.410	87	Weighted Average
	297.370		90.00% Pervious Area
	33.040		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	10,278	0.2760	5.57		**Lag/CN Method,**

Subcatchment 10: WS 10



Summary for Subcatchment 11: WS 11

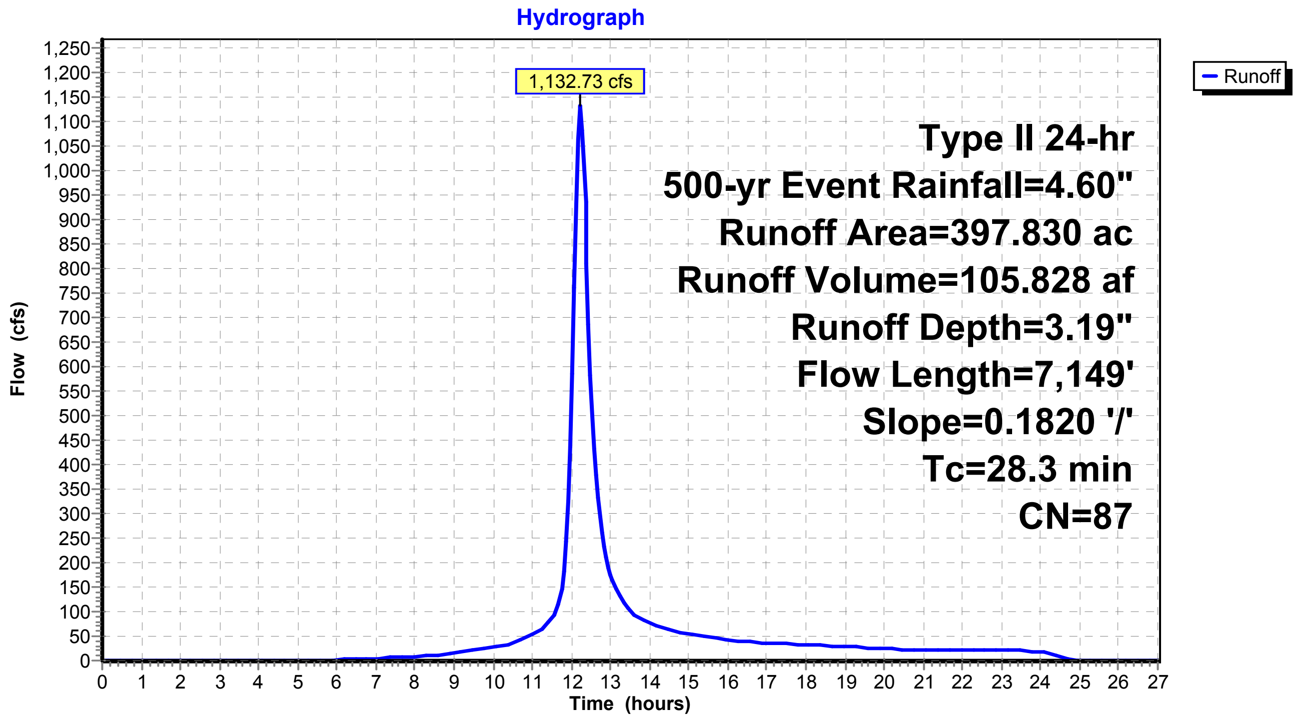
Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	358.050	86	Desert shrub range, Fair, HSG D
*	39.780	98	Impervious, HSG D
	397.830	87	Weighted Average
	358.050		90.00% Pervious Area
	39.780		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	7,149	0.1820	4.20		**Lag/CN Method,**

Subcatchment 11: WS 11



Summary for Subcatchment 12: WS 12

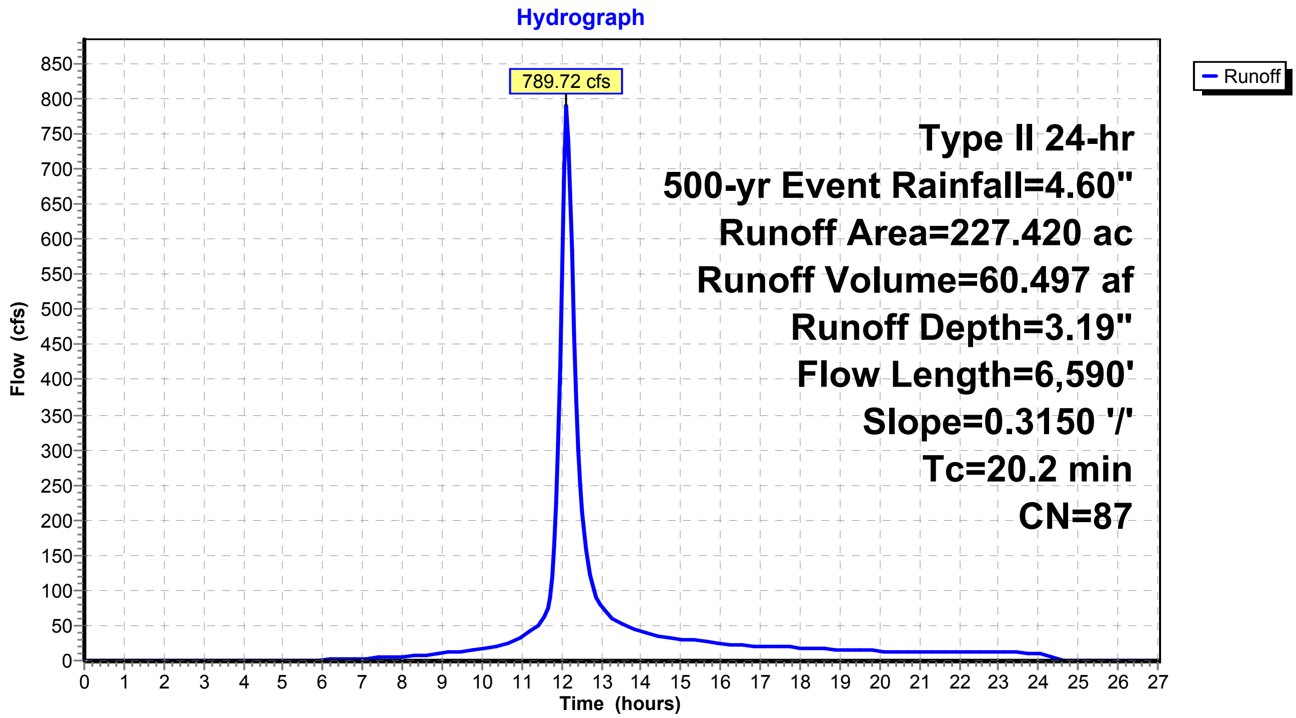
Runoff = 789.72 cfs @ 12.12 hrs, Volume= 60.497 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	204.680	86	Desert shrub range, Fair, HSG D
*	22.740	98	Impervious, HSG D
	227.420	87	Weighted Average
	204.680		90.00% Pervious Area
	22.740		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	6,590	0.3150	5.44		**Lag/CN Method,**

Subcatchment 12: WS 12



Summary for Subcatchment 13: WS 13

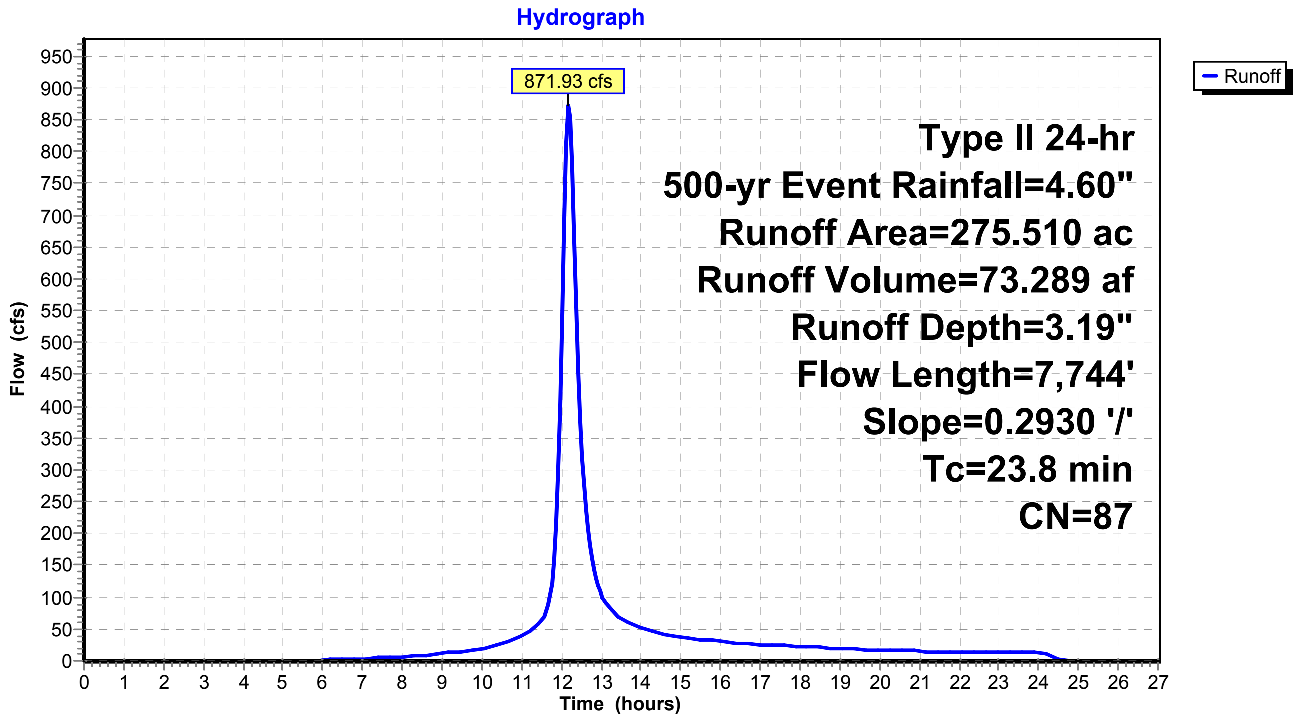
Runoff = 871.93 cfs @ 12.16 hrs, Volume= 73.289 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-yr Event Rainfall=4.60"

	Area (ac)	CN	Description
	247.960	86	Desert shrub range, Fair, HSG D
*	27.550	98	Impervious, HSG D
	275.510	87	Weighted Average
	247.960		90.00% Pervious Area
	27.550		10.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.8	7,744	0.2930	5.42		**Lag/CN Method,**

Subcatchment 13: WS 13



Summary for Reach CHNL 1: Channel 1

Inflow Area = 502.930 ac, 10.00% Impervious, Inflow Depth = 3.19" for 500-yr Event event
Inflow = 1,647.46 cfs @ 12.14 hrs, Volume= 133.786 af
Outflow = 1,601.86 cfs @ 12.23 hrs, Volume= 133.784 af, Atten= 3%, Lag= 5.4 min

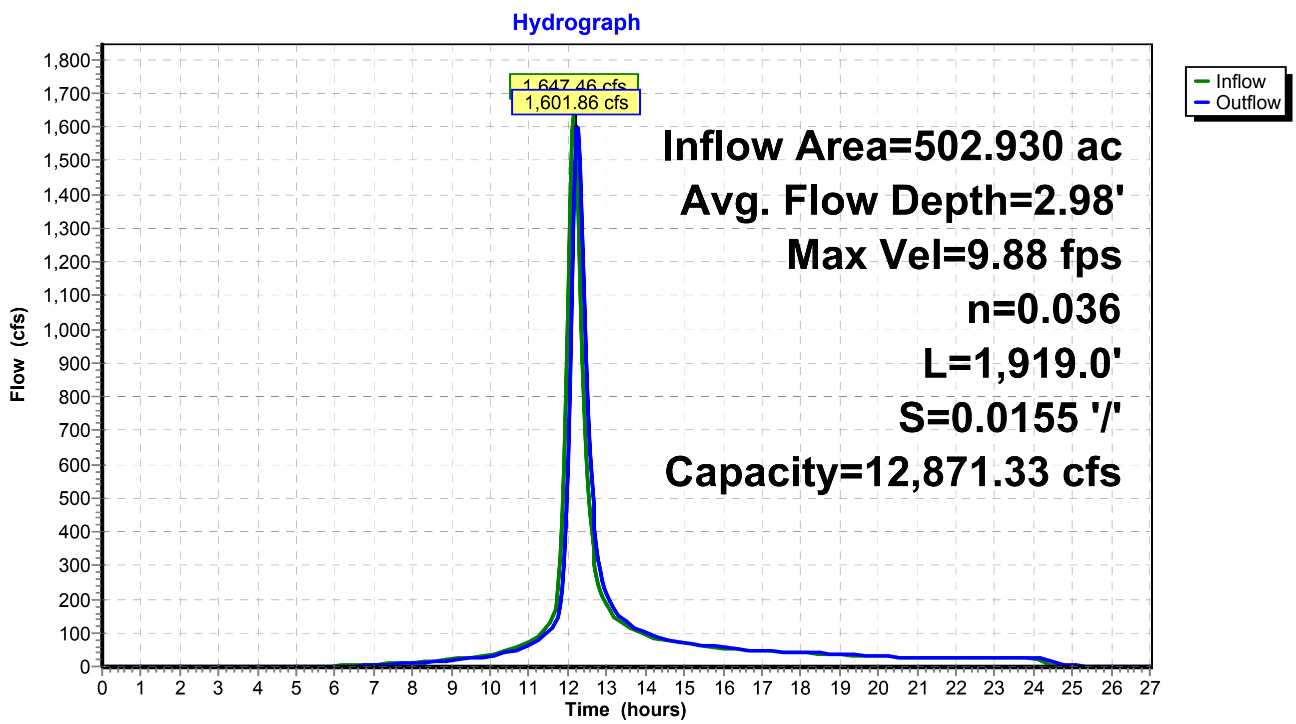
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.88 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 2.42 fps, Avg. Travel Time= 13.2 min

Peak Storage= 311,381 cf @ 12.18 hrs
Average Depth at Peak Storage= 2.98'
Bank-Full Depth= 10.00' Flow Area= 650.0 sf, Capacity= 12,871.33 cfs

50.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 80.00'
Length= 1,919.0' Slope= 0.0155 '/'
Inlet Invert= 5,569.50', Outlet Invert= 5,539.70'

‡

Reach CHNL 1: Channel 1



Summary for Reach CHNL 2: Channel 2

Inflow Area = 870.220 ac, 10.00% Impervious, Inflow Depth = 3.19" for 500-yr Event event
Inflow = 2,597.10 cfs @ 12.14 hrs, Volume= 231.491 af
Outflow = 2,180.53 cfs @ 12.45 hrs, Volume= 231.028 af, Atten= 16%, Lag= 18.9 min

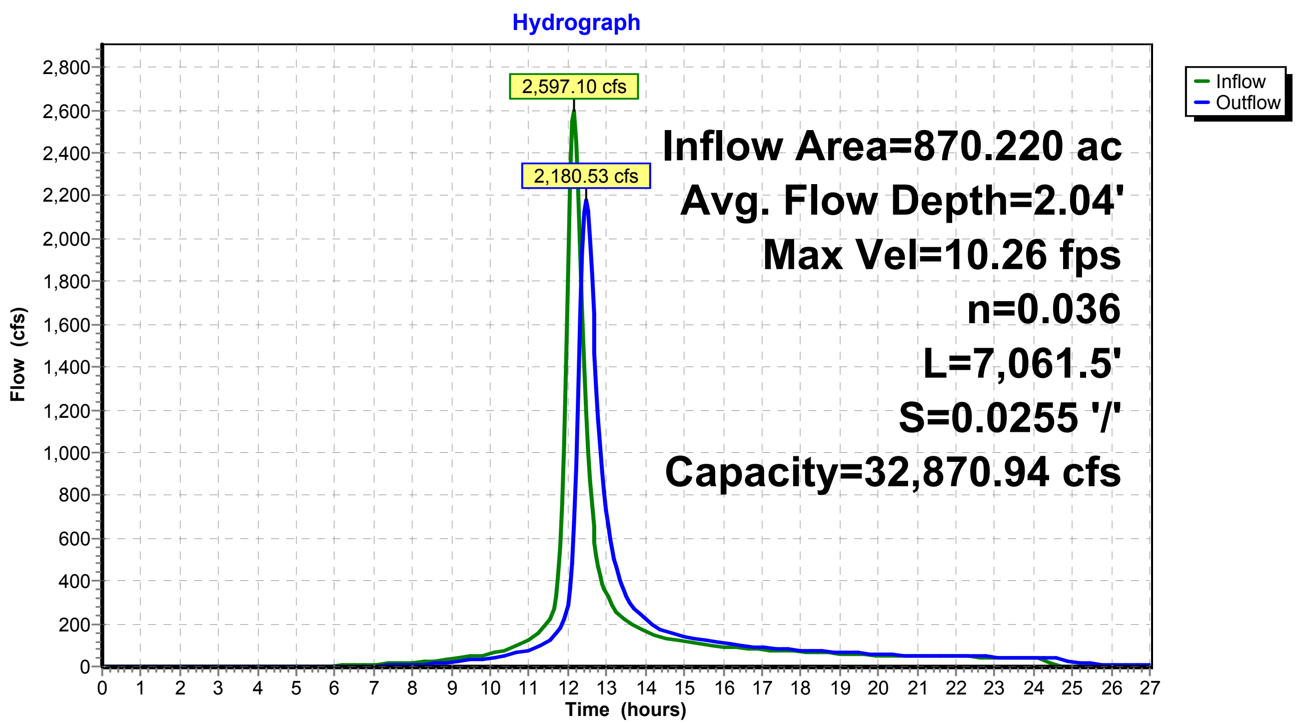
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.26 fps, Min. Travel Time= 11.5 min
Avg. Velocity = 2.72 fps, Avg. Travel Time= 43.2 min

Peak Storage= 1,506,746 cf @ 12.26 hrs
Average Depth at Peak Storage= 2.04'
Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

100.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 2.5 2.0 '/' Top Width= 145.00'
Length= 7,061.5' Slope= 0.0255 '/'
Inlet Invert= 5,720.00', Outlet Invert= 5,539.70'

‡

Reach CHNL 2: Channel 2



Summary for Reach CHNL 3: Channel 3

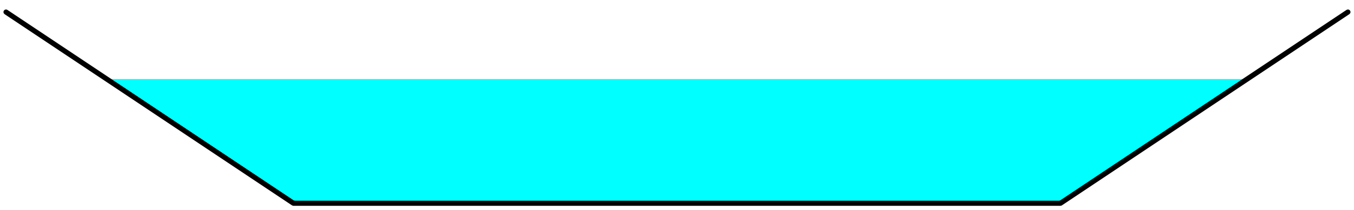
[62] Hint: Exceeded Reach CHNL 1 OUTLET depth by 4.30' @ 12.45 hrs
[62] Hint: Exceeded Reach CHNL 2 OUTLET depth by 4.53' @ 12.35 hrs

Inflow Area = 2,233.990 ac, 10.00% Impervious, Inflow Depth > 3.19" for 500-yr Event event
Inflow = 5,094.93 cfs @ 12.28 hrs, Volume= 593.807 af
Outflow = 5,008.23 cfs @ 12.40 hrs, Volume= 593.385 af, Atten= 2%, Lag= 6.9 min

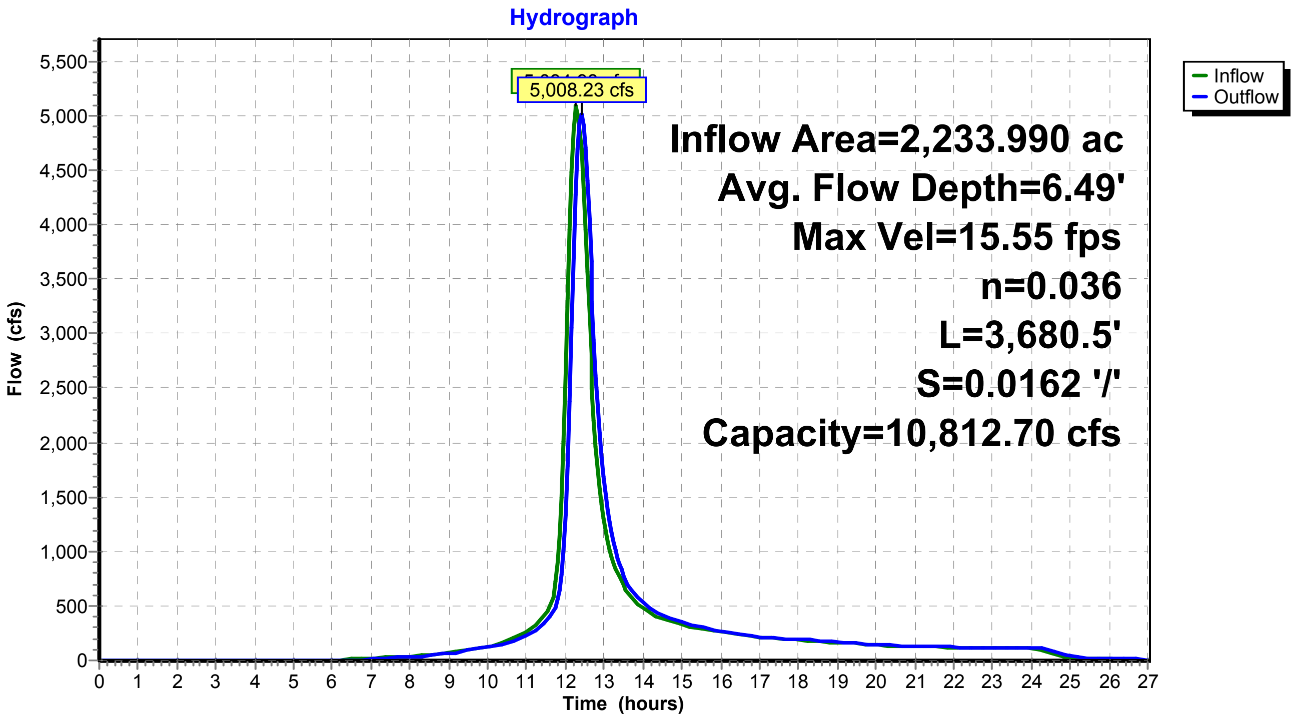
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 15.55 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 4.58 fps, Avg. Travel Time= 13.4 min

Peak Storage= 1,188,451 cf @ 12.33 hrs
Average Depth at Peak Storage= 6.49'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 10,812.70 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 3,680.5' Slope= 0.0162 '/'
Inlet Invert= 5,539.70', Outlet Invert= 5,480.00'



Reach CHNL 3: Channel 3



Summary for Reach CHNL 4: Channel 4

[61] Hint: Exceeded Reach CHNL 3 outlet invert by 4.57' @ 12.40 hrs

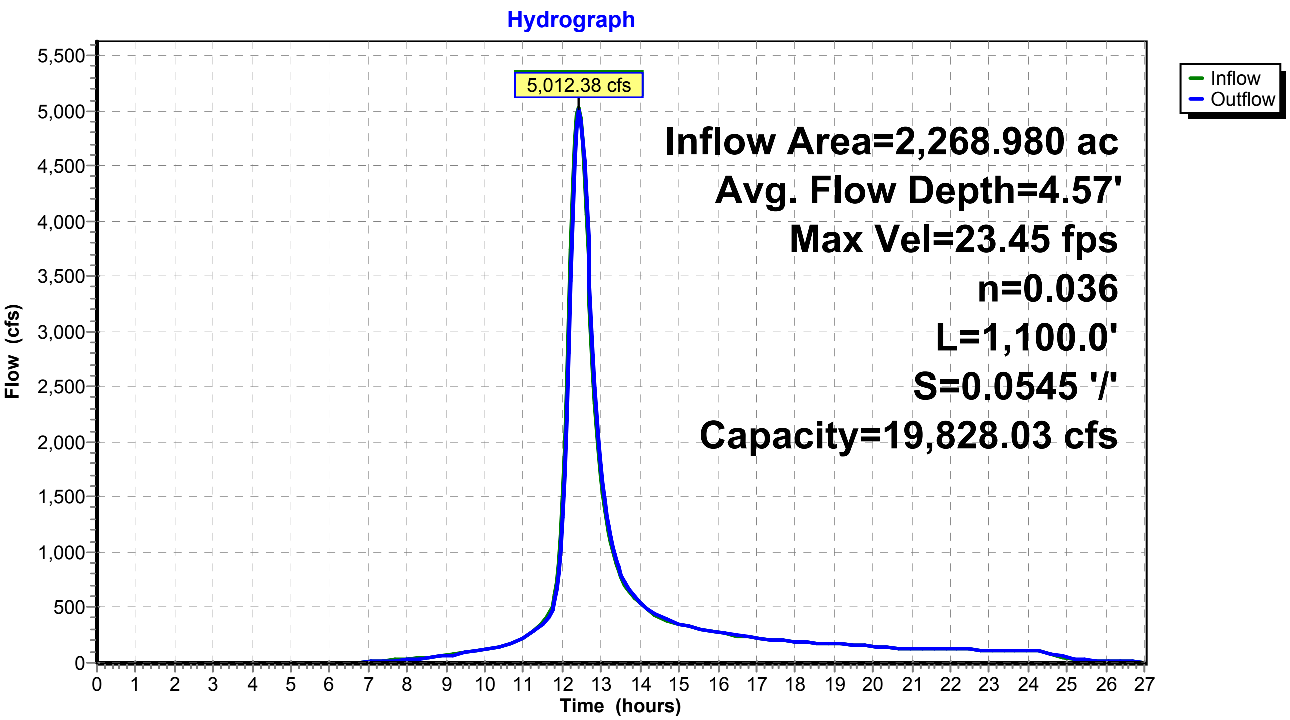
Inflow Area = 2,268.980 ac, 10.00% Impervious, Inflow Depth > 3.19" for 500-yr Event event
Inflow = 5,028.84 cfs @ 12.40 hrs, Volume= 602.692 af
Outflow = 5,012.38 cfs @ 12.42 hrs, Volume= 602.599 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 23.45 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 6.76 fps, Avg. Travel Time= 2.7 min

Peak Storage= 235,792 cf @ 12.41 hrs
Average Depth at Peak Storage= 4.57'
Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

40.00' x 10.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 70.00'
Length= 1,100.0' Slope= 0.0545 '/'
Inlet Invert= 5,480.00', Outlet Invert= 5,420.00'

Reach CHNL 4: Channel 4



Summary for Reach CHNL 5: Channel 5

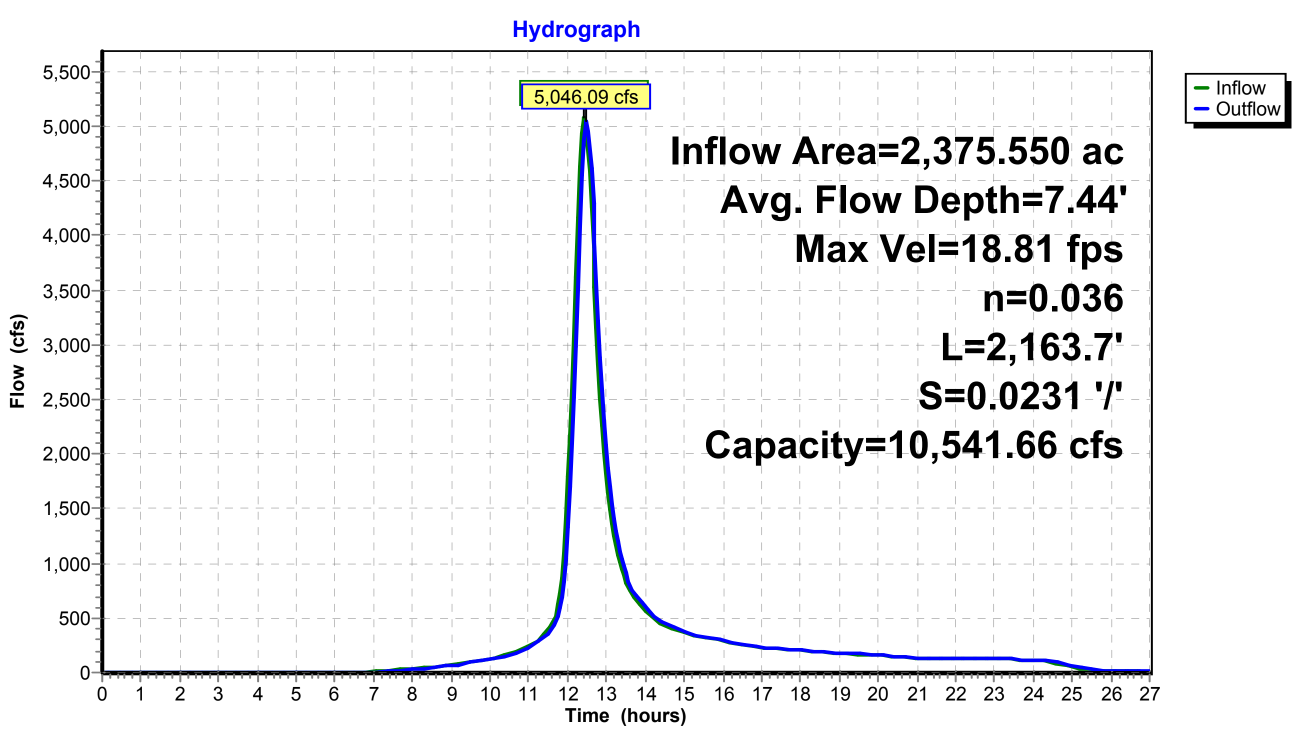
[62] Hint: Exceeded Reach CHNL 4 OUTLET depth by 2.92' @ 12.50 hrs

Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 3.19" for 500-yr Event event
Inflow = 5,080.00 cfs @ 12.42 hrs, Volume= 630.949 af
Outflow = 5,046.09 cfs @ 12.47 hrs, Volume= 630.724 af, Atten= 1%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Max. Velocity= 18.81 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 6.05 fps, Avg. Travel Time= 6.0 min

Peak Storage= 582,162 cf @ 12.44 hrs
Average Depth at Peak Storage= 7.44'
Bank-Full Depth= 11.00' Flow Area= 456.5 sf, Capacity= 10,541.66 cfs

25.00' x 11.00' deep channel, n= 0.036
Side Slope Z-value= 1.5 '/' Top Width= 58.00'
Length= 2,163.7' Slope= 0.0231 '/'
Inlet Invert= 5,420.00', Outlet Invert= 5,370.00'



Summary for Pond CLVT 1: Culvert Crossing #1

[62] Hint: Exceeded Reach CHNL 5 OUTLET depth by 21.32' @ 12.80 hrs

Inflow Area = 2,375.550 ac, 10.00% Impervious, Inflow Depth > 3.19" for 500-yr Event event
Inflow = 5,046.09 cfs @ 12.47 hrs, Volume= 630.724 af
Outflow = 3,847.35 cfs @ 12.71 hrs, Volume= 630.580 af, Atten= 24%, Lag= 14.4 min
Primary = 3,847.35 cfs @ 12.71 hrs, Volume= 630.580 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,397.29' @ 12.71 hrs Surf.Area= 0 sf Storage= 2,570,184 cf
Flood Elev= 5,419.00' Surf.Area= 0 sf Storage= 12,108,960 cf

Plug-Flow detention time= 5.1 min calculated for 629.414 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (855.3 - 850.4)

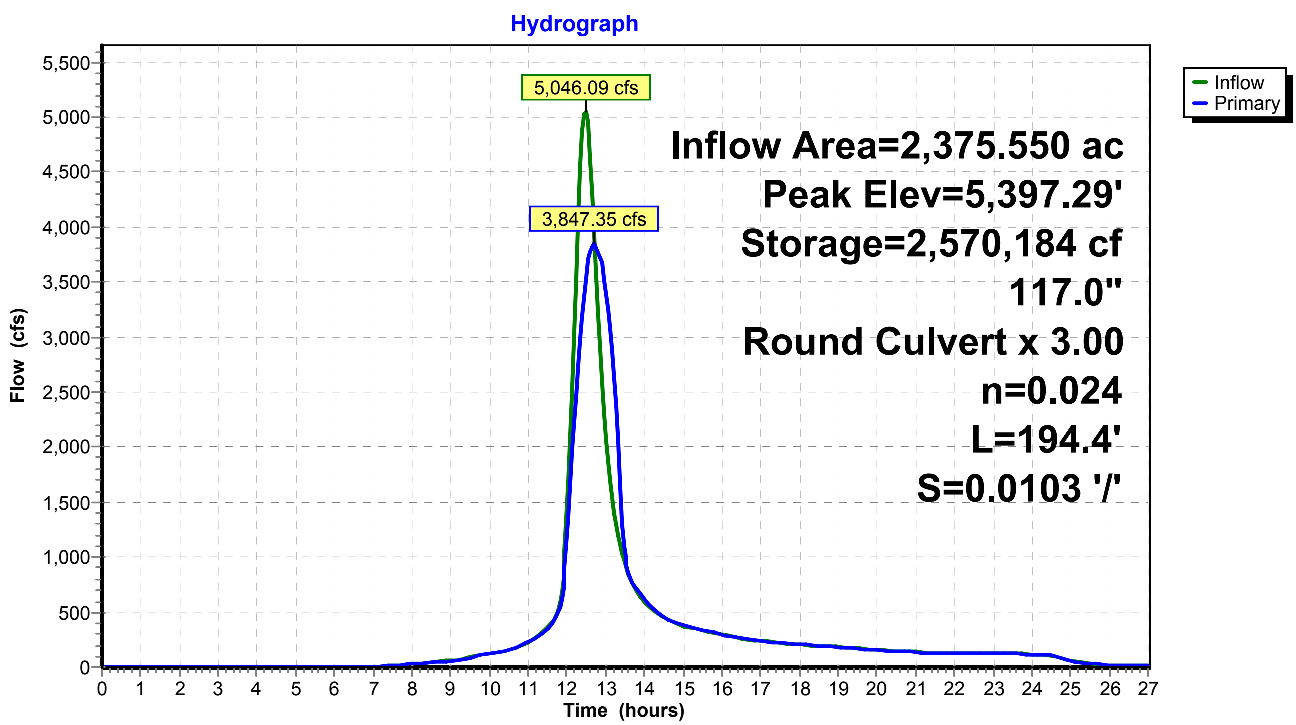
Volume	Invert	Avail.Storage	Storage Description
#1	5,370.00'	12,108,960 cf	**Culvert Crossing #1** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
5,370.00	0
5,371.00	1,264
5,372.00	4,909
5,373.00	7,513
5,374.00	16,645
5,375.00	29,237
5,376.00	46,725
5,377.00	71,156
5,378.00	103,816
5,379.00	144,375
5,380.00	193,809
5,381.00	252,611
5,382.00	321,098
5,383.00	399,998
5,384.00	488,627
5,385.00	587,544
5,386.00	697,578
5,387.00	818,723
5,388.00	950,841
5,389.00	1,094,170
5,390.00	1,248,216
5,391.00	1,412,011
5,392.00	1,587,481
5,393.00	1,774,410
5,394.00	1,971,598
5,395.00	2,046,356
5,396.00	2,266,171
5,397.00	2,498,604
5,398.00	2,742,207
5,399.00	2,998,577
5,400.00	3,272,610
5,401.00	3,564,605
5,402.00	3,875,249
5,403.00	4,205,411
5,404.00	4,554,001
5,405.00	4,921,330
5,406.00	5,306,733
5,407.00	5,710,058
5,408.00	6,132,117
5,409.00	6,572,849
5,410.00	7,032,579
5,411.00	7,512,479
5,412.00	8,012,116
5,413.00	8,533,107
5,414.00	9,078,172
5,415.00	9,647,155
5,416.00	10,235,642
5,417.00	10,841,380
5,418.00	11,465,162
5,419.00	12,108,960

Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	**117.0" Round Culvert X 3.00** L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=3,844.98 cfs @ 12.71 hrs HW=5,397.27' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 3,844.98 cfs @ 17.17 fps)

Pond CLVT 1: Culvert Crossing #1



Summary for Pond CLVT 2: Culvert Crossing #2

[81] Warning: Exceeded Pond CLVT 1 by 17.33' @ 13.50 hrs

Inflow Area = 2,403.760 ac, 10.00% Impervious, Inflow Depth > 3.19" for 500-yr Event event
Inflow = 3,856.73 cfs @ 12.71 hrs, Volume= 638.084 af
Outflow = 1,791.19 cfs @ 13.33 hrs, Volume= 638.031 af, Atten= 54%, Lag= 37.4 min
Primary = 1,791.19 cfs @ 13.33 hrs, Volume= 638.031 af

Routing by Stor-Ind method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs
Peak Elev= 5,396.71' @ 13.33 hrs Surf.Area= 0 sf Storage= 8,137,086 cf
Flood Elev= 5,403.00' Surf.Area= 0 sf Storage= 10,142,539 cf

Plug-Flow detention time= 36.3 min calculated for 636.852 af (100% of inflow)
Center-of-Mass det. time= 36.2 min (890.9 - 854.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,352.00'	10,142,539 cf	**Existing Pond** Listed below

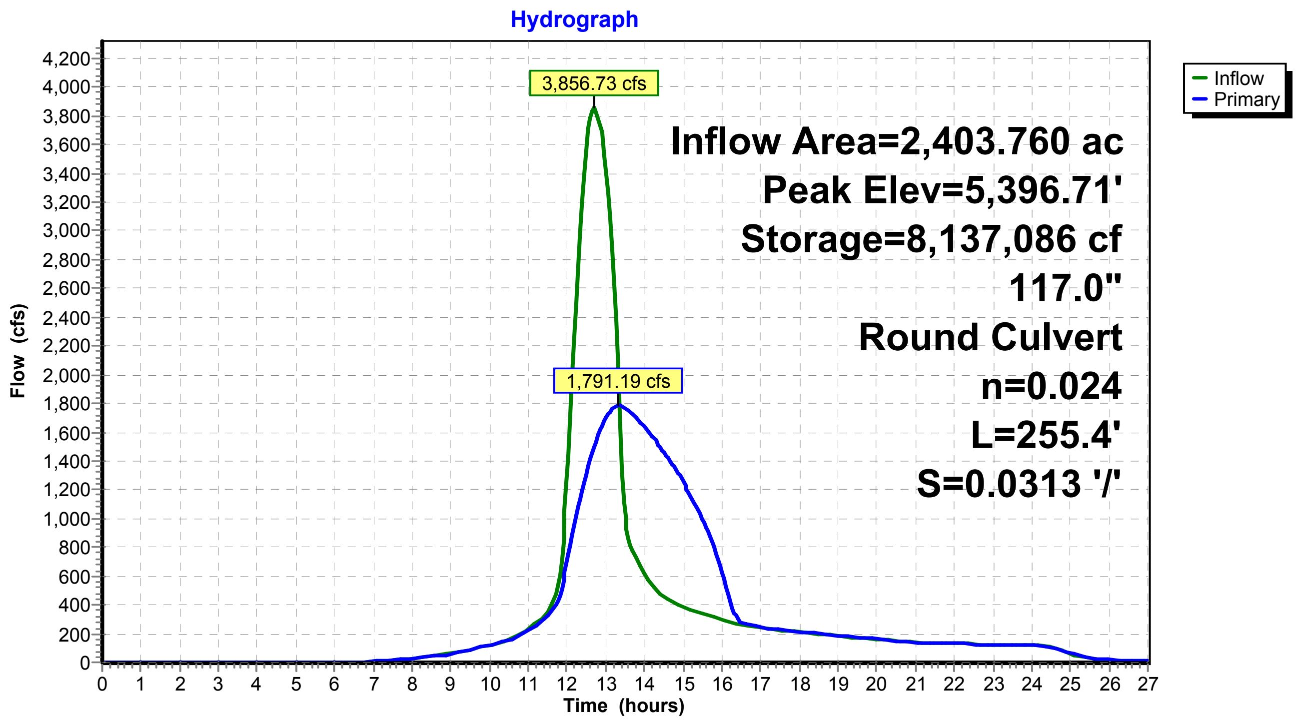
Elevation (feet)	Cum.Store (cubic-feet)
5,352.00	0
5,353.00	2,681
5,354.00	7,382
5,355.00	15,397
5,356.00	28,286
5,357.00	47,224
5,358.00	75,773
5,359.00	117,133
5,360.00	170,345
5,361.00	235,331
5,362.00	312,331
5,363.00	399,765
5,364.00	497,494
5,365.00	605,663
5,366.00	724,610
5,367.00	855,928
5,368.00	1,000,315
5,369.00	1,157,122
5,370.00	1,325,832
5,371.00	1,505,243
5,372.00	1,693,878
5,373.00	1,890,808
5,374.00	2,095,234
5,375.00	2,306,959
5,376.00	2,525,755
5,377.00	2,751,367
5,378.00	2,983,426
5,379.00	3,221,478
5,380.00	3,465,168
5,381.00	3,714,247
5,382.00	3,968,434
5,383.00	4,227,291
5,384.00	4,490,405
5,385.00	4,757,518
5,386.00	5,028,418
5,387.00	5,302,894
5,388.00	5,580,732
5,389.00	5,861,867
5,390.00	6,146,219
5,391.00	6,433,776
5,392.00	6,724,543
5,393.00	7,018,534
5,394.00	7,315,762
5,395.00	7,616,273
5,396.00	7,920,106
5,397.00	8,227,290
5,398.00	8,537,855
5,399.00	8,851,826
5,400.00	9,169,229
5,401.00	9,490,117

5,402.00	9,814,540
5,403.00	10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	**117.0" Round Culvert** L= 255.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,352.00' / 5,344.00' S= 0.0313 '/' Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

Primary OutFlow Max=1,790.68 cfs @ 13.33 hrs HW=5,396.68' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1,790.68 cfs @ 23.98 fps)

Pond CLVT 2: Culvert Crossing #2



APPENDIX E

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 3552.39 cfs

Maximum Flow: 3552.39 cfs

Table 1 - Summary of Culvert Flows at Crossing: Crossing #1 (Q100)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5379.00	0.00	0.00	0.00	1
5379.14	355.24	355.24	0.00	1
5379.56	710.48	710.48	0.00	1
5380.24	1065.72	1065.72	0.00	1
5381.15	1420.96	1420.96	0.00	1
5382.25	1776.19	1776.19	0.00	1
5383.46	2131.43	2131.43	0.00	1
5384.93	2486.67	2486.67	0.00	1
5386.88	2841.91	2841.91	0.00	1
5389.10	3197.15	3197.15	0.00	1
5391.64	3552.39	3552.39	0.00	1
5419.00	6067.40	6067.40	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	0.00	0.00	5379.00	0.000	7.000	0-NF	0.000	0.000	9.000	9.000	0.000
	355.24	355.24	5379.14	3.732	7.141	1-S1t	2.429	2.542	9.000	9.000	1.661
	710.48	710.48	5379.56	5.429	7.560	1-S1t	3.514	3.636	9.000	9.000	3.322
	1065.72	1065.72	5380.24	6.895	8.241	1-S1t	4.391	4.498	9.000	9.000	4.983
	1420.96	1420.96	5381.15	8.285	9.153	1-S1t	5.196	5.224	9.000	9.000	6.645
	1776.19	1776.19	5382.25	9.701	10.246	7-M1t	5.989	5.872	9.000	9.000	8.221
	2131.43	2131.43	5383.46	11.227	11.459	7-M1t	6.823	6.452	9.000	9.000	9.865
	2486.67	2486.67	5384.93	12.934	12.754	7-M1t	7.797	6.982	9.000	9.000	11.509
	2841.91	2841.91	5386.88	14.878	14.187	3-M2t	9.750	7.458	9.000	9.000	13.153
	3197.15	3197.15	5389.10	17.102	16.162	7-M2t	9.750	7.882	9.000	9.000	14.797
	3552.39	3552.39	5391.64	19.638	18.453	7-M2t	9.750	8.252	9.000	9.000	16.441

****

Straight Culvert

Inlet Elevation (invert): 5372.00 ft, Outlet Elevation (invert): 5370.00 ft

Culvert Length: 194.41 ft, Culvert Slope: 0.0103

****

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 5372.00 ft

Outlet Station: 194.40 ft

Outlet Elevation: 5370.00 ft

Number of Barrels: 3

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 9.75 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing #1 (Q100))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	5379.00	9.00
355.24	5379.00	9.00
710.48	5379.00	9.00
1065.72	5379.00	9.00
1420.96	5379.00	9.00
1776.19	5379.00	9.00
2131.43	5379.00	9.00
2486.67	5379.00	9.00
2841.91	5379.00	9.00
3197.15	5379.00	9.00
3552.39	5379.00	9.00

Tailwater Channel Data - Crossing #1 (Q100)

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 5379.00 ft

Roadway Data for Crossing: Crossing #1 (Q100)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 5419.00 ft

Roadway Surface: Paved

Roadway Top Width: 57.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 4191.95 cfs

Maximum Flow: 4191.95 cfs

Table 4 - Summary of Culvert Flows at Crossing: Crossing #1 (Q200)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5379.00	0.00	0.00	0.00	1
5379.20	419.19	419.19	0.00	1
5379.78	838.39	838.39	0.00	1
5380.71	1257.59	1257.59	0.00	1
5381.93	1676.78	1676.78	0.00	1
5383.33	2095.97	2095.97	0.00	1
5385.08	2515.17	2515.17	0.00	1
5387.43	2934.36	2934.36	0.00	1
5390.18	3353.56	3353.56	0.00	1
5393.38	3772.76	3772.76	0.00	1
5397.05	4191.95	4191.95	0.00	1
5419.00	6067.40	6067.40	0.00	Overtopping

Table 5 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	0.00	0.00	5379.00	0.000	7.000	0-NF	0.000	0.000	9.000	9.000	0.000
	419.19	419.19	5379.20	4.077	7.197	1-S1t	2.671	2.769	9.000	9.000	1.960
	838.39	838.39	5379.78	5.973	7.777	1-S1t	3.833	3.962	9.000	9.000	3.920
	1257.59	1257.59	5380.71	7.648	8.708	1-S1t	4.827	4.903	9.000	9.000	5.881
	1676.78	1676.78	5381.93	9.297	9.926	7-M1t	5.767	5.696	9.000	9.000	7.761
	2095.97	2095.97	5383.33	11.067	11.334	7-M1t	6.738	6.397	9.000	9.000	9.701
	2515.17	2515.17	5385.08	13.080	12.862	7-M1t	7.879	7.022	9.000	9.000	11.641
	2934.36	2934.36	5387.43	15.428	14.613	3-M2t	9.750	7.573	9.000	9.000	13.581
	3353.56	3353.56	5390.18	18.179	17.154	7-M2t	9.750	8.052	9.000	9.000	15.521
	3772.76	3772.76	5393.38	21.377	19.962	7-M2t	9.750	8.453	9.000	9.000	17.461
	4191.95	4191.95	5397.05	25.048	23.060	7-M2t	9.750	8.776	9.000	9.000	19.402

****

Straight Culvert

Inlet Elevation (invert): 5372.00 ft,   Outlet Elevation (invert): 5370.00 ft

Culvert Length: 194.41 ft,   Culvert Slope: 0.0103

****

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 5372.00 ft

Outlet Station: 194.40 ft

Outlet Elevation: 5370.00 ft

Number of Barrels: 3

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 9.75 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 6 - Downstream Channel Rating Curve (Crossing: Crossing #1 (Q200))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	5379.00	9.00
419.19	5379.00	9.00
838.39	5379.00	9.00
1257.59	5379.00	9.00
1676.78	5379.00	9.00
2095.97	5379.00	9.00
2515.17	5379.00	9.00
2934.36	5379.00	9.00
3353.56	5379.00	9.00
3772.76	5379.00	9.00
4191.95	5379.00	9.00

Tailwater Channel Data - Crossing #1 (Q200)

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 5379.00 ft

Roadway Data for Crossing: Crossing #1 (Q200)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 5419.00 ft

Roadway Surface: Paved

Roadway Top Width: 57.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 5046.09 cfs

Maximum Flow: 5046.09 cfs

Table 7 - Summary of Culvert Flows at Crossing: Crossing #1 (Q500)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5379.00	0.00	0.00	0.00	1
5379.28	504.61	504.61	0.00	1
5380.12	1009.22	1009.22	0.00	1
5381.42	1513.83	1513.83	0.00	1
5383.06	2018.44	2018.44	0.00	1
5385.12	2523.05	2523.05	0.00	1
5388.00	3027.65	3027.65	0.00	1
5391.49	3532.26	3532.26	0.00	1
5395.63	4036.87	4036.87	0.00	1
5400.48	4541.48	4541.48	0.00	1
5406.01	5046.09	5046.09	0.00	1
5419.00	6067.41	6067.41	0.00	Overtopping

Table 8 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	0.00	0.00	5379.00	0.000	7.000	0-NF	0.000	0.000	9.000	9.000	0.000
	504.61	504.61	5379.28	4.496	7.284	1-S1t	2.918	3.045	9.000	9.000	2.360
	1009.22	1009.22	5380.12	6.670	8.116	1-S1t	4.252	4.370	9.000	9.000	4.719
	1513.83	1513.83	5381.42	8.649	9.424	3-M1t	5.404	5.401	9.000	9.000	7.006
	2018.44	2018.44	5383.06	10.725	11.064	7-M1t	6.552	6.274	9.000	9.000	9.342
	2523.05	2523.05	5385.12	13.121	12.892	7-M1t	7.902	7.033	9.000	9.000	11.677
	3027.65	3027.65	5388.00	16.003	15.097	3-M2t	9.750	7.686	9.000	9.000	14.013
	3532.26	3532.26	5391.49	19.485	18.319	7-M2t	9.750	8.233	9.000	9.000	16.348
	4036.87	4036.87	5395.63	23.634	21.878	7-M2t	9.750	8.665	9.000	9.000	18.684
	4541.48	4541.48	5400.48	28.477	25.882	7-M2t	9.750	8.986	9.000	9.000	21.019
	5046.09	5046.09	5406.01	34.012	30.317	7-M2c	9.750	9.218	9.218	9.000	23.018

****

Straight Culvert

Inlet Elevation (invert): 5372.00 ft, Outlet Elevation (invert): 5370.00 ft

Culvert Length: 194.41 ft, Culvert Slope: 0.0103

****

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 5372.00 ft

Outlet Station: 194.40 ft

Outlet Elevation: 5370.00 ft

Number of Barrels: 3

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 9.75 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 9 - Downstream Channel Rating Curve (Crossing: Crossing #1 (Q500))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	5379.00	9.00
504.61	5379.00	9.00
1009.22	5379.00	9.00
1513.83	5379.00	9.00
2018.44	5379.00	9.00
2523.05	5379.00	9.00
3027.65	5379.00	9.00
3532.26	5379.00	9.00
4036.87	5379.00	9.00
4541.48	5379.00	9.00
5046.09	5379.00	9.00

Tailwater Channel Data - Crossing #1 (Q500)

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 5379.00 ft

Roadway Data for Crossing: Crossing #1 (Q500)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 60.00 ft

Crest Elevation: 5419.00 ft

Roadway Surface: Paved

Roadway Top Width: 57.00 ft

DRAFT REPORT

APPENDIX E
MINE RECLAMATION AND CLOSURE PLAN

COPPER FLAT MINE

Submitted To: Mr. Jeffrey Smith, PE
Chief Operating Officer
THEMAC Resources Group Ltd.
Copper Flat Mine Project
4253 Montgomery Blvd. NE, Suite 130
Albuquerque, NM 87109

Submitted By: Golder Associates Inc.
5200 Pasadena Avenue N.E., Suite C
Albuquerque, NM 87113 USA

Distribution:

2 Copies – Mining and Minerals Division
2 Copies – New Mexico Environment Department
3 Copies – THEMAC Resources Group Ltd.
2 Copies – Golder Associates Inc.

October 7, 2016

1531453

Golder Associates

This report documents the Reclamation and Closure Plan for all of the mine facilities and disturbed areas associated with New Mexico Copper Corporation's Copper Flat project located near Hillsboro, New Mexico in Sierra County. The designs included herein were developed at a level consistent with preliminary designs for agency review. Development of this report and associated preliminary reclamation and closure designs was conducted under the oversight of the following Golder staff:

JEFFREY A. CLARK NEW MEXICO 19041 PROFESSIONAL ENGINEER

10-14-16

Jeffrey Clark, PE — Date

(Senior Level Review of Preliminary Mine Reclamation and Closure Design Drawings)

10/14/16

Heather Lammers, Project Engineer — Date

(Preparation of Preliminary Mine Reclamation and Closure Design Drawings and Associated Engineering Calculations)

STATE OF TEXAS TODD L. STEIN GEOLOGY #3820 LICENSED PROFESSIONAL GEOSCIENTIST

10/14/16

Todd Stein, PG — Date

(Preparation of Copper Flat Mine Reclamation and Closure Plan Document)

Table of Contents

List of Tables

List of Figures

List of Attachments

1.0 INTRODUCTION

Golder Associates has been contracted by New Mexico Copper Corporation (NMCC) to prepare a Mine Reclamation and Closure Plan for its Copper Flat project located near Hillsboro, New Mexico in Sierra County (**Figure E1**). This reclamation and closure plan describes the approach for reclamation of all of the disturbed areas described in NMCC's Mine Operations and Reclamation Plan document to which this document is attached as Appendix E. The reclamation and closure plan and associated design criteria conform to; (1) the closure requirements in the Copper Mine Rules (*Subsection A of 20.6.7.18 NMAC, 20.6.7.33 NMAC, 20.6.7.34 NMAC and 20.6.7.35 NMAC*); (2) reclamation requirements described 19.10.6.602.D(15) NMAC and 19.10.6.603 NMAC; and (3) applicable mine reclamation regulations set forth by the Bureau of Land Management (BLM) (3809.401(b)(3) and 3809.420(b)(3)). The goal for reclamation of the site is to re-establish the post-mining land uses consistent with the pre-mining land uses of the site and the surrounding area, i.e., wildlife habitat, grazing, mining, watershed and recreation as identified by the BLM in its approved Land Use Management Plan (BLM, 1986).

The Reclamation and Closure Plan and associated design criteria for the individual Copper Flat facilities are described in Section 2. Section 3 details how the plan will be implemented with regards to regrading operations, growth media placement and the revegetation plan. Section 4 describes the projected reclamation schedule and sequence of reclamation activities. Section 5 details the performance and reclamation standards and requirements. Section 6 provides the references associated with the citations included within the report.

2.0 RECLAMATION AND CLOSURE PLAN DESIGN CRITERIA

This Reclamation and Closure Plan was developed with consideration of the site-specific conditions that will exist at the Copper Flat Mine as a result of previous mine operations at the site by Quintana Minerals, and at the cessation of NMCC's proposed mining operations (end of mine life). The general setting of the Copper Flat Mine area is shown on **Figure E2** (existing features) and **Figure E3** (end of mine life features). The designs are depicted in the drawing set provided in **Attachment E1** of this Plan and have been developed to provide sufficient detail to calculate the financial assurance cost estimate when the Plans are deemed approvable.

The Reclamation and Closure Plan is subdivided into five major facility areas and several ancillary facilities, including:

Major Facility Areas:

- Existing Waste Rock Stockpiles (EWRSPs)
- Proposed Waste Rock Stockpiles (WRSPs)
- Tailings Storage Facility (TSF)
- Open Pit
- Plant Area

Ancillary Facilities:

- Surface Impoundments and Reservoirs
- Growth Media (i.e., Topdressing) Stockpiles
- Other Ancillary Facilities

Each of the major facility areas are discussed in Sections 2.1 through 2.5, and the ancillary facilities are discussed in Sections 2.6 through 2.8. The plans and methods developed herein represent detailed designs for reclamation of the facilities sufficient for agency review and approval. Construction design documents and construction quality assurance/construction quality control (CQA/CQC) plans will be prepared by NMCC for submittal to and approval by the State of New Mexico within 180 days of submission of a notice of intent to implement the closure plan per the Copper Rule (20.6.7.34.B, NMAC). The CQA/CQC plan will provide a detailed description of the work proposed to be performed and the final reclamation designs for the facilities to be closed. Post-closure monitoring activities will be conducted in accordance with Section 20.6.7.35 NMAC, and post-closure monitoring and maintenance any requirements that may be contained in the Copper Flat Mine Permit.

This Reclamation and Closure Plan describes: (1) contemporaneous reclamation that will be conducted, to the extent practicable, during mine operations; (2) facilities to be closed following cessation of mining operations; and (3) components that will be retained following closure of the site. A summary of the key design criteria for reclamation of the facilities to be closed is presented in **Table E1**.

Table E1. Proposed Copper Flat Reclamation Design Criteria

Facilities to be Reclaimed	Outslope Angle (Interbench)[1,2]	Cover Thickness[3,4]	Bench Width[2,5]	Interbench Slope Length[2,6]	Top Surface Slope[7,8]	Bench Cross Slope[5]	Bench Longitudinal Slope[5]	Surface Water Conveyances[2,9]	Comments
Existing Waste Rock Stockpiles (EWRSPs)									
EWRSP-1	3.0H:1.0V max.	36" min.	NA	200' max.	Between 1.0% and 5.0%	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Requires a pullback from Grayback Diversion to maintain 25-foot setback from diversion. Top surfaces and outslopes to be graded to drain back to Grayback Diversion. Two small detention basins to be constructed to capture and evaporate minimal surface water runoff and provide riparian habitat. Will also regrade and cover safety/containment berm located south of EWRSP-1. There are no slopes greater than 200 feet in length so no benches are required.
EWRSP-2A	NA	0" to 6"		NA	NA			NA	Stockpile will get partially consumed by proposed WRSP-1. Portion that does not get consumed and located outside the OPSDA will get moved to EWRSP-2B or reclaimed as part of WRSP-1 reclamation. Disturbed surfaces will be graded, ripped and covered with 6-inches of suitable cover material where unsuitable growth media exists.
EWRSP-2B	3.0H:1.0V max.	36" min.		200' max.	Between 1.0% and 5.0%			Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Waste material to the north of EWRSP-2B also gets graded and covered. Disturbed areas get graded, ripped, and seeded. There are no slopes greater than 200 feet in length so no benches are required.
EWRSP-3	3.0H:1.0V max.	36" min.		200' max.	Between 1.0% and 5.0%			Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Will be reclaimed as part of the Plant Area reclamation program. There are no slopes greater than 200 feet in length so no benches are required.
EWRSP-4	3.0H:1.0V max.	36" min.		200' max.	Between 1.0% and 5.0%			Armored channels designed to convey peak flows from 100-year, 24-hour storm event	The area between the two lobes of EWRSP-4 will be filled in with clean mine waste during the pre-production years. For reclamation design purposes it is assumed that the area is filled in prior to reclamation. Top surface to be graded to drain back toward the open pit, and the top surface will be used as an equipment and laydown area during operations. There are no slopes greater than 200 feet in length so no benches are required.

Table E1. Proposed Copper Flat Reclamation Design Criteria (continued)

Facilities to be Reclaimed	Outslope Angle (Interbench)[1,2]	Cover Thickness[3,4]	Bench Width[2,5]	Interbench Slope Length[2,6]	Top Surface Slope[7,8]	Bench Cross Slope[5]	Bench Longitudinal Slope[5]	Surface Water Conveyances[2,9]	Comments
New Proposed Waste Rock Stockpiles (WRSPs)									
WRSP-1	2.75H:1.0V max.	36" min.	25'	200' max.	Between 1.0% and 5.0%	1%	1%	Armored channels designed convey peak flows from 100-year, 24-hour storm event	This stockpile is located within the OPSDA and the outslopes will be graded to 2.75H:1V. Portion of EWRSP-2A located along northern perimeter of WRSP-1 will get consumed by this stockpile and reclaimed as part of WRSP-1.
WRSP-2	3.0H:1.0V max.			200' max.					WRSP's 2 and 3 will be reclaimed as one single facility. Southeastern toe needs to be set back a minimum of 50' from Grayback Arroyo.
WRSP-3									
Surface Impoundments	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	HDPE liners will be ripped, folded over and buried in place, and impoundments backfilled with clean fill, surface to graded to drain and blend into the natural topography. Surface area to be covered with 6-inches of suitable cover material where unsuitable growth media exists after grading.
Growth Media Stockpiles (GMSPs)									
GMSP-1	NA	0"	NA	NA	Blended to natural topography	NA	NA	NA	The footprint areas of the growth media stockpiles will be graded to drain and recontoured to blend into the natural topography. It is anticipated that the only area that may require cover is GMSP-3 which is underlain by andesitic bedrock. The other two stockpile areas are underlain by alluvial materials (suitable growth media).
GMSP-2		0"							
GMSP-3		Up to 6"							
Tailing Storage Facility (TSF)									
Tailing Storage Facility	Between 3.0H:1.0V and 3.5H:1.0V	36" min.	25'	Between 200 feet (3H:1V) and 250 feet (3.5H:1V)	Between 1.0% and 5.0%	1%	1%	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	The toe of the TSF needs to stay where its at due to the underlying HDPE liner and associated HDPE lined toe berm.

Table E1. Proposed Copper Flat Reclamation Design Criteria (continued)

Facilities to be Reclaimed	Outslope Angle (Interbench)[1,2]	Cover Thickness[3,4]	Bench Width[2,5]	Interbench Slope Length[2,6]	Top Surface Slope[7,8]	Bench Cross Slope[5]	Bench Longitudinal Slope[5]	Surface Water Conveyances[2,9]	Comments
Tailing Storage Facility (TSF)									
Surface Impoundments	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	See above description in WRSPs.
Cyclone Plant Area	NA	6" to 36"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	All structures and equipment at the cyclone plant will be removed from the site and disposed of in an approved manner according to applicable federal and state laws; concrete foundations will be broken and covered with 36" of growth media; remaining disturbed areas will be graded and covered with 6" of growth media.
Open Pit									
Open Pit	NA	NA	NA	NA	NA	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Earthen berm will be constructed around the perimeter of the open pit to limit public access and reduce the physical safety hazard. Surface water conveyance channels will be constructed around the perimeter of the pit (immediately upstream of the perimeter berm/security fence) and along the existing haul road to direct surface water around and into the pit. Two small detention basins will be constructed on the western perimeter of the pit to capture and evaporate minimal surface runoff from the west perimeter of the pit. It is assumed there will be an approximate 100-foot-wide disturbance area around the pit that will be ripped and revegetated.
Plant Area									
Buildings and Structures	NA	6" to 36"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	All fuel tanks, reagent storage facilities, and equipment will be removed from the site and disposed of in an approved manner according to applicable federal and state laws; concrete foundations will be broken, walls toppled, backfilled, and covered with 36" of growth media; remaining disturbed areas will be graded and covered with 6" of growth media.

Table E1. Proposed Copper Flat Reclamation Design Criteria (continued)

Facilities to be Reclaimed	Outslope Angle (Interbench)[1,2]	Cover Thickness[3,4]	Bench Width[2,5]	Interbench Slope Length[2,6]	Top Surface Slope[7,8]	Bench Cross Slope[5]	Bench Longitudinal Slope[5]	Surface Water Conveyances[2,9]	Comments
Plant Area									
Surface Impoundments	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	See above description in WRSPs.
Pipelines, Pipeline Corridors	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Residual sediments and fluids will be flushed from the pipelines and placed in the TSF prior to reclamation of this facility, or at an approved location. Above-ground pipelines will be disposed of in the TSF prior to reclamation of this facility, or at a nearby approved construction and debris landfill. Buried pipelines will be capped at both ends. Surfaces will be graded, ripped and covered with 6-inches of suitable cover material where unsuitable growth media exists.
Electrical Infrastructure	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	Armored channels designed to convey peak flows from 100-year, 24-hour storm event	Removal of on-site overhead lines and power poles and disconnect from the 115kV line owned by Tri-State Generation and Transmission. The electrical substation and associated transmission lines will be closed once they are no longer needed. Disturbed surfaces along corridor will be graded, ripped and covered with 6-inches of suitable cover material where unsuitable growth media exists.
Ancillary Facilities									
Pipelines, Pipeline Corridors	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	See above description in Plant Area.

Table E1. Proposed Copper Flat Reclamation Design Criteria (continued)

Facilities to be Reclaimed	Outslope Angle (Interbench)[1,2]	Cover Thickness[3,4]	Bench Width[2,5]	Interbench Slope Length[2,6]	Top Surface Slope[7,8]	Bench Cross Slope[5]	Bench Longitudinal Slope[5]	Surface Water Conveyances[2,9]	Comments
Ancillary Facilities									
Surface Impoundments	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	See above description in WRSPs.
Mine Access Roads									Access roads not needed for closure and post-closure access will be reclaimed by ripping and revegetating the surfaces. Roads will be covered with 6-inches of suitable cover material where unsuitable growth media exists. Culverts will be removed if they are not needed for post-closure storm water management and disposed of in an approved manner.
Substation and Electrical Transmission Infrastructure	NA	0" to 6"	NA	NA	Blended to natural topography with a min. 1.0%	NA	NA	NA	See above description in Plant Area.
Other Disturbed Areas									Surfaces will be graded, ripped and covered with 6-inches of suitable cover material where unsuitable growth media exists.

Notes:
NA – Not Applicable

OPSDA – Open Pit Surface Drainage Area

[1] – Outslopes will be graded in accordance to 20.6.7.33.C(3) NMAC which states: "The outslopes of all tailing impoundments, waste rock and leach stockpiles at a copper mine facility shall be constructed to an interbench slope no steeper than three horizontal to one vertical (3H:1V). Alternative slope gradients may be allowed within an open pit surface drainage area, or if the permittee provides information showing that the cover performance objectives in Subsection F of this Section are met and the exception is approved by the department."

[2] – For the growth media stockpiles, it is assumed that the majority of the growth media will be used for cover on the reclaimed facilities and that there will be little to no growth media remaining following closure of these facilities (no outslopes, benches, or surface water conveyances).

[3] – Cover systems for the EWRSPs, WRSPs, and TSF will be in accordance to 20.6.7.33.F NMAC which states: "Any cover system installed at an existing copper mine facility after the effective date of the copper mine rule shall be a store and release earthen cover system with a thickness of thirty-six inches…"

[4] – The growth media stockpile areas, disturbed areas, and other ancillary facilities will not require additional cover unless sufficient native growth media is not present in the area (such as area underlain by bedrock). In areas with insufficient residual growth media, an additional six inches of cover material will be added to promote vegetative growth as part of the reclamation plan. The surfaces will be graded to drain and recontoured to blend into the natural topography, the graded area will then be ripped to a depth of between 12 and 18 inches and then seeded.

[5] – In accordance with 19.10.5.507 NMAC "final surface configuration of the disturbed area shall be suitable for achieving a self-sustaining ecosystem or approved post-mining land use".

[6] – Slopes lengths will be in accordance with 20.6.7.33.C(4) NMAC which states: "The maximum uninterrupted slope lengths shall be no greater than 300 feet for 4.0:1, 200 feet for 3:1 slopes and 175 feet for 2.5:1 slopes."

[7] – The top surfaces of the EWRSPs and WRSPs will be graded in accordance to 20.6.7.33C(2) NMAC which states: "The top surfaces of all waste rock and leach stockpiles at a copper mine facility shall be constructed to a minimum final grade of 1%."

[8] – The top surface of the TSF will be graded in accordance to 20.6.7.33. C(1) NMAC which states: "The top surfaces of all tailing impoundments at a copper mine facility shall be constructed to a minimum final grade of 0.5% after accounting for the estimated magnitude and location of large scale settlement due to totaling consolidation or differential settlement."

[9] – Surface water conveyances will be constructed in accordance to 20.6.7.33. A NMAC which states: "Permanent storm water conveyances, ditches, channels, and diversions required for closure of a discharging facility at a copper mine facility shall be designed to convey the peak flow generated by the 100 year return interval storm event."

2.1 Existing Waste Rock Stockpiles

There are four existing waste rock stockpiles at the site, EWRSP-1, EWRSP-2A and 2B, EWRSP-3 and EWRSP-4 (**Figure E2**). The size and volume of the four EWRSPs are listed in **Table E2**.

Table E2. EWRSP Details

Facility	Size[1] (Acres)	Volume[2] (tons)
EWRSP 1	15.34	486,000
EWRSP 2A & 2B	21.06	760,050
EWRSP 3	19.54	333,300
EWRSP 4	22.62	1,000,050

Notes:
[1] – Includes stockpile areas and associated disturbance areas.
[2] – Provided by NMCC

NMCC will conduct contemporaneous reclamation of these EWRSP's to the extent practicable. EWRSP-1 is located at the western edge of the site within the open pit surface drainage area (OPSDA) and contains approximately 324,000 cy of waste rock. EWRSP-2, consists of two waste rock disposal areas and associated disturbed areas (EWRSP-2A and EWRSP-2B) located northeast of the open pit. Combined, these two disposal areas are estimated to contain approximately 506,700 cy of waste rock. EWRSP-3, located immediately east of the QMC crusher foundation and approximately 3,000 feet east of the pit, is estimated to contain approximately 222,200 cy of waste rock and unprocessed ore remaining on-site at the end of Quintana's operations. EWRSP-4 is located southeast of the open pit and contains approximately 666,700 cy of waste rock. NMCC will use a portion of the top surface of EWRSP-4 for an equipment/supply laydown yard during the future mining operations.

EWRSP-1, EWRSP-2B, and a portion of EWRSP-2A will be reclaimed during the pre-production phase of mine operations. EWRSP-3 will be reclaimed at the end of mine life as part of the plant area reclamation. The outslope of EWRSP-4 will also be reclaimed during the pre-production phase of mine operations. The top surface of EWRSP-4 will be regraded to drain toward the open pit to capture and route surface runoff during operations to the mine pit. EWRSP-4 will be reclaimed at the end of mine life after the area is no longer needed for an equipment/supply laydown yard. An earthen berm of growth media will be installed around the perimeter of the EWRSP-4 top surface during mining operations as safety measure for mining equipment operating in the area. It will also prevent surface water run-on onto the top surface from the outer edges of the stockpile and prevent runoff from impacting the reclaimed outslope.

Reclamation designs for the EWRSPs are based on an overall slope of 3H:1V with maximum 200-foot slope lengths. Final reclamation designs for the EWRSPs will be prepared and submitted to the agencies along with CQA/CQC plans within 180 days of submission of a notice of intent to implement the reclamation plan and may adjust the designs presented herein. The reclamation design criteria for the EWRSPs are summarized in **Table E1** and the design strategy for closure of these facilities are described below. Reclamation design drawings for the facilities are presented in **Attachment E1**.

2.1.1 Components To Remain At Closure

There are certain components and related engineering controls associated with the EWRSPs and associated disturbance areas that will be used for post-closure purposes, including:

- The existing Grayback Diversion Channel;
- The clean water diversion channel located at the north perimeter of EWRSP-2B;
- Access for small vehicles for future monitoring of the reclaimed areas; and
- Groundwater monitoring wells and surface water samplers that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.1.2 EWRSP Reclamation and Closure Plan

The approach for reclamation and closure of the EWRSPs is summarized below and the associated reclamation schedule and sequence is summarized in Section 4.0. The reclamation designs for the EWRSPs are detailed in sheets C-001 through C-006, C-015 and C-016 in **Attachment E1**. The approach for reclamation and closure of the EWRSPs include the following:

- Waste rock adjacent to the Grayback Diversion pulled back from EWRSP-1 or moved to provide clear separation between the final toe of the reclaimed stockpile and the bank of the Grayback Diversion channel;
- The portion of the EWRSP-2A that lies within the footprint of proposed WRSP-1 incorporated into this new stockpile;
- The portion of EWRSP-2A located outside of the OPSDA boundary relocated to the top of EWRSP-2B located inside the OPSDA boundary;
- Grading of the EWRSP top surfaces to a final grade of between 1 and 5% to direct storm water to slope drainage channels;
- Grading of the EWRSP outslopes down to an overall slope of 3.0H:1V with maximum uninterrupted slope lengths of 200 feet;
- Covering of the top surfaces and outslopes of the EWRSPs with 36 inches of growth media;
- Construction of two small detention basins on the eastern perimeter of EWRSP-1 to capture and evaporate minimal surface runoff from the western perimeter of the pit to protect surface water runoff from eroding the pit wall. The soils at the bottom of the basin will be compacted to inhibit water from percolating into the underlying rock formation and potentially creating an acid-generating pathway into the pit lake;
- Construction of an earthen protective safety/containment berm around the outer edge of the equipment/supply laydown yard on top of EWRSP-4 to prevent surface water run-on onto the top surface and to provide a safety berm for mining equipment operating in the area;
- Construction of surface water conveyance channels on the top surfaces (where required) to direct surface water off the covered stockpile surfaces. Surface water directed to the OPSDA for the top surfaces and interior slopes of EWRSPs 2B, 3, and 4 and to the exterior for the exterior slopes. Surface water directed to the exterior to Grayback Diversion for the top surfaces and slopes of EWRSP-1;
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary. Where possible channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock to promote long-term integrity of the structures;

- Construction of diversion swales and/or surface water conveyance channels to prevent storm water run on onto the EWRSPs;
- Grading and ripping of the disturbed areas associated with the EWRSPs to provide positive drainage. Where adequate growth media does not exist, areas will be covered with 6-inches of growth media;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD, seeding of the equipment and material storage area on top of EWRSP-4 will be completed as part of the plant area reclamation; and
- Installation, operation, and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.2 Proposed Waste Rock Stockpiles

Waste rock will be hauled from the mine pit and placed in three proposed new waste rock stockpile (WRSP) areas shown on **Figure E3**. The planned sizes and capacities of the three WRSPs at the end of mine life are listed in **Table E3**.

Table E3. Proposed WRSP Details

Facility	Size[1] (Acres)	Storage Volume[2] (MT)
WRSP 1	39.71	3.16
WRSP 2	48.78	8.64
WRSP 3	121.35	32.89

Notes:
1 – Includes stockpile areas and associated disturbance areas.
2 – Provided by NMCC
MT – Million tons

Proposed waste rock stockpiles WRSP-1, WRSP-2 and WRSP-3 will be constructed in areas of the site that are completely underlain by andesite bedrock, a geologic formation that has a transmissivity of less than 10^{-6} centimeters per second (SRK, 2013). The proposed WRSPs will cover approximately 210 acres at final built-out, and will be constructed by end dumping in lifts approximately 75 feet high. The outslopes of the stockpiles will be built at angle of repose with benches sufficiently wide enough on each lift to allow grading the final slope and allow sufficient space for cross slope ditches.

Reclamation of the WRSP areas will be completed after the cessation of mining operations. However, select areas may be reclaimed contemporaneous during mine operations. NMCC is committed to maximizing contemporaneous reclamation activities, to the extent practicable, at the Copper Flat Project that will reduce erosion, provide early impact mitigation, limit costs and reduce final reclamation work. For example, portions of WRSP-3 may begin to be reclaimed by regrading and contouring of the WRSP beginning on the north side and proceeding south after the area is filled to capacity at the end of mining. Also, some roads that are no longer required for operations may be decommissioned and reclaimed contemporaneously during the active mining operation. Reclamation efforts will be implemented as soon as practicable in areas where activities are discontinued. This includes recontouring, scarifying, placement of topdressing or other approved growth media, followed by revegetation.

Reclamation designs for the proposed WRSP-2 and WRSP-3 are based on an inter-bench slope of 3.0H:1V, 25-foot wide terrace benches, and maximum 200-foot inter-bench slope lengths to allow for flexibility in the final design of the terrace benches. With these designs, the overall outslope gradient from the crest to toe is generally 3.5H:1V. For WRSP-1, which is located within the OPSDA, reclamation designs are based on an inter-bench slope of 2.75H:1V, 25-foot wide terrace benches, and maximum 200-foot inter-bench slope lengths. With these designs, the overall outslope gradient from the crest to toe for WRSP-1 ranges between 3.0H:1V and 3.5H:1V. Final reclamation designs for the WRSPs will be prepared and submitted to the agencies along with CQA/CQC plans within 180 days of submission of a notice of intent to implement the reclamation plan and may adjust the overall slopes presented herein. The reclamation design criteria for the proposed WRSPs are summarized in **Table E1** and the design strategy for closure of these facilities are described below. Reclamation design drawings for the facilities are presented in **Attachment E1**.

2.2.1 Components To Remain At Closure

The closure components and related engineering controls associated with the proposed WRSPs and stockpile areas that will be used for post-closure purposes include:

- Access for small vehicles maintained for future monitoring of the reclaimed areas; and
- Groundwater monitoring wells and surface water samplers that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.2.2 WRSP Reclamation and Closure Plan

The approach for reclamation and closure of the WRSPs is summarized below and the associated reclamation schedule and sequence is summarized in Section 4.0. The reclamation designs for the WRSPs are detailed in sheets C-007 through C-010 in **Attachment E1**. The approach for reclamation and closure of the WRSPs include the following:

- Grading of the proposed WRSP top surfaces to a final grade of between 1 and 5% to direct storm water to slope drainage channels;
- Grading of proposed WRSP-2 and WRSP-3 outslopes down to interbench slopes of 3.0H:1V;
- Construction of 25 foot wide terrace benches on the outslopes of proposed WRSP-2 and WRSP-3 at maximum slope lengths of 200 feet;
- Grading of proposed WRSP-1 outslopes down to interbench slopes of 2.75H:1V;
- Construction of 25 foot wide terrace benches on the outslopes of proposed WRSP-1 at maximum slope lengths of 200 feet;
- Covering of the top surfaces and outslopes of the proposed WRSPs with 36 inches of growth media;
- Construction of surface water conveyance channels on the top surfaces (as needed), terrace benches, and downslope channels to direct surface water off the covered stockpile surfaces. Surface water will be directed to the OPSDA for the top surfaces and interior slopes of WRSP-1 and WRSP-2, and to the exterior of the mine for WRSP-3;

- Construction of diversion swales and/or surface water conveyance channels to prevent storm water run on onto the stockpiles;
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary. Where possible channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock to promote long-term integrity of the structures;
- Grading of the disturbed areas associated with the stockpiles to provide positive drainage;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD; and
- Installation, operation, and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.3 Tailings Storage Facility

The proposed TSF will include an HDPE-lined tailings impoundment with an associated underdrain collection system and underdrain collection pond for the impoundment and the dam, and a water reclaim system to maximize water reuse. The TSF will also include a cyclone plant to separate the tailings coarse and fine fractions and a surge pond to handle potential upset conditions at the Copper Flat Project. The proposed TSF and associated ancillary facilities will cover approximately 564 acres at full capacity (**Figure E3**) and will be constructed using the centerline construction method. The proposed TSF design will comply with the design and dam-safety guidelines of the New Mexico Office of the State Engineer (OSE) Dam Safety Bureau. The tailings impoundment is designed to store 113 million tons of tailings produced over approximately 11 years, with tailings deposition occurring at an average rate of approximately 27,900 tons per day over the life of the mine. Additional details on the TSF design are provided in the Feasibility Level Design Report for the TSF (Golder, 2015).

The Feasibility Level Design Report for the TSF indicates that the maximum down-drain flow rate at final buildout of the dam is anticipated to be approximately 448 gallons per minute (gpm) from the dam underdrain and 66 gpm from the impoundment underdrain. The TSF embankment (dam) will be constructed of cyclone underflow sand fill which is coarser and has a higher permeability than the cyclone overflow material that is deposited within the TSF impoundment. This means that the TSF embankment will drain quickly in comparison to the impoundment and is, therefore, anticipated to undergo reclamation sooner than the impoundment surface. It is currently estimated that it will take approximately 2 to 3 years for the TSF embankment to drain sufficiently to begin reclamation. It is also anticipated that some reclamation of the impoundment can begin within 5 years of cessation of operations as the impoundment continues to drain and dry, allowing construction equipment to be utilized to commence cover placement. The underdrain systems will continue to operate after cessation of operations. An “active” underdrain water management program will commence thereafter, including pumping captured water from underdrain collection pond back to the impoundment surface of the TSF and use of forced or enhanced evaporation equipment to reduce the volume of the water. The duration of continued operation of the “active” water management system will, be driven by the volume of water that continues to drain from the impoundment.

For planning purposes NMCC has assumed that there will be 5 years of operation of the active program followed by 20 years of “passive” drain-down water management. After decommissioning of the active program and full reclamation of the TSF, any water that may continue to drain from the TSF (at ever decreasing rates for an estimated 20 years) will be captured in an evaporation pond that will be constructed below the toe of the TSF within the mine permit area. The underdrain collection pond will be incorporated into this evaporation pond. Details of the TSF drain-down water management program, including the design of the evaporation ponds, are included in **Attachment E2**.

Reclamation designs for the proposed TSF are based on an inter-bench slopes ranging between of 3H:1V and 3.5H:1V, 25-foot wide terrace benches, and inter-bench slope lengths of between 200 feet (3H:1V) and 250 feet (3.5H:1V). With these designs, the overall outslope gradient from the crest to toe ranges between approximately 3.0H:1V and 3.6:1V. Final reclamation designs for the TSF will be prepared and submitted to the agencies along with CQA/CQC plans within 180 days of submission of a notice of intent to implement the reclamation plan and may adjust the overall slopes presented herein. The reclamation design criteria for the proposed TSF are summarized in **Table E1** and the approaches for closure of this facility are described below. Reclamation design drawings for the TSF are presented in **Attachment E1**.

2.3.1 Components To Remain At Closure

The closure components and related engineering controls associated with the TSF area that will be used for post-closure purposes include:

- Access for small vehicles maintained for future monitoring of the reclaimed areas; and
- Groundwater monitoring wells and surface water samplers that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.3.2 TSF Reclamation and Closure Plan

The approach for closure of the proposed TSF is summarized below and the associated reclamation schedule and sequence is summarized in Section 4.0. The reclamation designs for the TSF are detailed in sheets C-011 and C-012 in **Attachment E1**. The approach for closure of the TSF is outlined below. The approach contains two fundamental components to successful completion of reclamation, i.e., a short-term active or forced water evaporation component and a long-term passive operation component. Utilization of active evaporation will allow the cover to begin to be placed on those areas of the top of the impoundment that become sufficiently “dry” to accept machinery. The goal of the active phase of evaporation is to dry the top of the impoundment as soon as possible to allow as much of the cover to be placed as possible, and eventually placing all of the cover on the impoundment. The active evaporation phase includes the following:

- Maintain the HDPE-lined runoff collection trench constructed at the toe of the dam to capture surface water runoff from the outer slopes of the dam and route it to the TSF underdrain collection pond prior to cover placement on the TSF embankment. Following cover placement on the embankment, surface water runoff will be routed to the nearest natural drainage;

- The storm water diversion ditches will be maintained to limit surface water run on onto the TSF;
- The TSF underdrain collection system will be maintained to collect drain down water from the TSF and direct it to the TSF underdrain collection pond during the active evaporation period;
- Maintenance of the HDPE-lined runoff collection trench at the toe of the dam to capture surface water runoff from the outer slopes of the TSF and route it to the TSF underdrain collection pond prior to cover placement, and to an offsite drainage after cover placement on the outslope;
- Maintenance of the HDPE-lined TSF underdrain collection pond and associated pumps and piping to collect drain down and storm water runoff from the TSF (prior to cover placement) and direct it to the top of the TSF for active evaporation, or for direct passive evaporation within the pond;
- Grading of the TSF embankment outslope down to interbench slopes of between 3.0H:1V and 3.5H:1V (estimated to begin 2-3 years after cessation of operations);
- Construction of 25 foot wide terrace benches on the outslope of the TSF embankment at maximum slope lengths of between 200 feet (3H:1V) and 250 feet (3.5:1V);
- Covering of the embankment outslopes of the TSF with 36 inches of growth media and seeding;
- Begin grading of TSF impoundment as conditions allow (estimated to begin within 5 years of cessation of operations). Placement of growth media cover to the extent possible as conditions allow;
- Closure of surge pond at the cyclone plant as described in Section 2.6;
- All structures, tanks, storage facilities, buildings and equipment will be removed from the cyclone plant and TSF areas and disposed of in an approved manner according to applicable federal and state laws;
- Concrete foundations will be broken and covered with 36 inches of growth media;
- Pipelines will be removed or capped as described below in Section 2.8.
- The electrical power systems and associated transmission lines will be removed once they are no longer needed as described below in Section 2.8.
- Grading and ripping of the disturbed areas associated with the cyclone plant area to provide positive drainage. Where adequate growth media does not exist, areas will be covered with 6-inches of growth media;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD;
- Construction of HDPE–lined evaporation pond for management of long term drain down water from the TSF through passive evaporation at end of active evaporation phase. (This includes consolidation of the underdrain collection pond into the evaporation pond system).

Upon completion of placement of the cover on the impoundment, active evaporation will no longer be necessary. However, the impoundment will continue to drain at an ever-decreasing rate, requiring that it continue to be captured and treated. A passive evaporation phase will be implemented so that captured drain-down water can continue to be managed through evaporation and the water not be placed on the clean impoundment cover. For planning purposes it is assumed that the passive evaporation phase may last as long as 20 years after cessation of operations. NMCC, in coordination with the MMD, NMED and BLM, will determine when sufficient drain down has occurred to allow closure and reclamation of the passive evaporation system. The passive evaporation phase includes the following;

- The TSF underdrain collection system maintained to collect continued drain down water long-term, from the TSF and direct it to the evaporation pond during the passive evaporation period;
- Continue grading of the TSF top surface to a final grade of between 1 and 5% to direct storm water to the back side of the TSF;
- Complete covering of the top surfaces of the TSF with 36 inches of growth media and seeding, as conditions allow;
- Construction of surface water conveyance channels on the top surface of the TSF and outlet structure from the top of the TSF to Grayback Arroyo to direct surface water off the covered TSF surfaces. Surface water will be directed to Grayback Arroyo and other natural drainages upon completion of cover placement;
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary. Where possible channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock, which will promote long-term integrity of the structures;
- Grading of the disturbed areas associated with the TSF to provide positive drainage;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD;
- Installation, operation and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC;
- The TSF evaporation pond will remain in place until drain down from the facility is reduced to a point to where it is no longer required for passive evaporation of these waters. This point in time will be determined in collaboration with the Agencies; and
- The evaporation pond will be reclaimed once it is no longer needed as described below in Section 2.6.2.

2.4 Open Pit

The open pit will be mined with pit benches ranging between 16 and 28 feet wide, creating a terraced/benched pit wall. Over the 11-year life of the proposed project, approximately 113 million tons of copper ore and 45 million tons of waste rock will be mined and removed from the open pit. The proposed mining activities will enlarge the open pit over time to a diameter of approximately 2,800 feet and an area of approximately 165 acres (including pit perimeter disturbed area). The floor of the proposed open pit will be mined to an elevation of approximately 4,650 feet above mean sea level (AMSL), which will be approximately 900 feet beneath the original surface of the Copper Flat Basin in this area.

The open pit will remain a hydrologic sink capturing groundwater flowing from all directions during operations and post-closure (JSAI, 2012; JSAI, 2013; JSAI, 2014; JSAI, 2014b; JSAI, 2014c; JSAI, 2015). NMCC will conduct rapid filling of the mine pit with water provided from the off-site well field as the initial step in commencing reclamation/closure. The purpose of rapid filling of the pit is to provide a source of good quality water and provide a mechanism by which the mineralized rock walls of the pit will be more quickly submerged under water, thus limiting the potential for mineral oxidation. Approximately 2,800 acre-feet of water will be required for the rapid fill, pumping into the pit over approximately 7 months. Thereafter, pumping water for rapid fill will be discontinued and the elevation of the pit lake will reach an average steady-state condition of 4,900 feet above MSL over the long-term. Surface water runoff from the reclaimed facilities located within the OPSDA will be routed into the pit. Surface water conveyance channels will be constructed around the northern and eastern pit perimeter to direct surface runoff water into the pit. Two small surface water detention basins will be constructed along the western perimeter of the pit to capture and evaporate minimal surface runoff from the west perimeter of the pit. These features will limit the potential for erosion into and around the pit, provide stability to the pit walls, and provide riparian habitat to replace that lost in the mining operation.

The reclamation design criteria for the open pit are summarized in **Table E1** and the design strategy for closure of this facility are described below. Reclamation design drawings for the open pit are presented in **Attachment E1**.

2.4.1 Components To Remain At Closure

The closure components and related engineering controls associated with the open pit area that will be used for post-closure purposes include:

- Maintenance of existing storm water diversion structures to limit surface water run on into the open pit;
- Access for small vehicles maintained on the portion of the haul road remaining following construction of the open pit conveyance channel for future monitoring within of the open pit; and
- Groundwater monitoring wells in the vicinity of the open pit that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.4.2 Mine Pit Reclamation and Closure Plan

The approach for closure of the open pit is summarized below and the associated reclamation schedule and sequence is summarized in Section 4.0. The reclamation designs for the open pit area are detailed in sheets C-013 and C-014 in **Attachment E1**. The approaches for closure of the open pit area include the following:

- Rapid filling of the pit with 2,800 acre-feet of water from the off-site well field over a period of approximately 7 months;
- Construction of an earthen berm around the perimeter of the open pit to limit public access and ensure that the pit area does not pose a current or future hazard to public health or safety. The berm will be constructed from local rock and soils and will be 15 to 20-foot wide and 5- to 6-feet high with side slopes angled at 1.5H:1V;

- Construction of surface water conveyance channels around the perimeter of the pit (immediately upstream of the perimeter berm/security fence) to direct surface water around the pit and to the newly constructed open pit conveyance channel;
- Construction of the open pit conveyance channel along the existing haul road to direct surface water flows from around the perimeter of the pit to the pit lake;
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary. Where possible the channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock, which will promote long-term integrity of the structures;
- Grading of the disturbed areas associated with the pit perimeter, perimeter channels, and safety berm construction. It is assumed there will be an approximate 100-foot-wide disturbance area around the pit;
- Removal of aboveground electrical systems and infrastructure, including pumps, lighting and transmission lines not necessary for post-closure site operations and maintenance;
- Installation of a security gate at the haul road entrance into the pit to allow access for operation, maintenance, and monitoring activities to authorized personnel;
- Installation of a barbed wire fence around the outside perimeter of the pit to exclude livestock and other large mammals;
- Signs will be posted at 500-ft intervals along the security fence/earthen berm and at all access points, warning of potential hazards present;
- Seeding of disturbed areas around the pit perimeter to reestablish vegetation using a seed mix approved by the BLM and MMD; and
- Installation, operation, and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.5 Plant Area

The Copper Flat plant area will cover an area of approximately 82 acres located southeast of the existing open pit (**Figure E3**). The plant area includes the process area, primary crusher, concentrator area, laydown yard, administration/warehouse/mine shop, water tanks, process water reservoir, impacted stormwater impoundment A, tailings and process water conveyances, ancillary roadways, haul roads on the northern and southern/southwestern portion of the area, parking lot, wastewater treatment facility, fuel station, truck wash, and facilities supporting the process area. Additionally, due to its physical location within the plant area, an additional 23 acres which include EWRSP-3 will be incorporated into grading and drainage reclamation plan for the plant area.

At closure, all surface facilities, equipment and buildings will be removed from the area. The foundations associated with these structures will be buried in place. The slopes of the land bridge will be stabilized and the top revegetated during reclamation. The land bridge currently supports a wetland area, estimated to be 1.5 acres in size, and will be maintained as part of the closure plan. The reclamation design criteria for the plant area are summarized in **Table E1** and the approach for closure of this facility area is described below. Reclamation design drawings for the plant area are presented in **Attachment E1**.

2.5.1 Components To Remain At Closure

The closure components and related engineering controls associated with the plant area that will be used for post-closure purposes include:

- The Grayback Diversion Channel located along the southern perimeter of the plant area;
- The land bridge which conveys the tailings pipeline along the southeast corner of the area;
- Access for vehicles maintained following regrading EWRSP-3 and the access road on the western portion of the plant area for future monitoring and maintenance activities. Access through the plant area to the open pit and WRSPs north and west of the plant area, and for access to public and private lands north and west of the mine property; and
- Groundwater monitoring wells in the vicinity of the plant area that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.5.2 Plant Process Area Reclamation and Closure Plan

The approach for closure of the plant area summarized below and the associated reclamation schedule and sequence is summarized in Section 4.0. The reclamation designs for the plant area are detailed in sheets C-015 and C-016 in **Attachment E1**. The approach for closure of the plant area includes the following:

- All fuel tanks, reagent storage facilities, buildings and equipment will be removed from the site and disposed of in an approved manner according to applicable federal and state laws;
- Concrete foundations will be broken, walls toppled, backfilled, and covered with 36 inches of growth media;
- Closure of the process water reservoir and impacted storm water impoundment A as described below in Section 2.6.
- Pipelines will be removed or capped as described below in Section 2.8.
- The electrical substation and associated transmission lines will be removed once they are no longer needed as described below in Section 2.8.
- Ripping and grading of the disturbed areas associated with the plant area following burial of concrete foundations, slabs, and footings to provide positive drainage;
- Grading of EWRSP-3 top surface to a final grade of between 1 and 5% to direct storm water to slope drainage channels;
- Grading of the EWRSP-3 outslope down to a slope of 3.0H:1V;
- Covering of the top surface and outslope of the EWRSP-3 with 36 inches of growth media;
- Covering of ripped and graded disturbed areas with 6-inches of growth media;
- Construction of surface water conveyance channels to direct surface water off the covered surfaces. Surface water runoff will be directed to Grayback Arroyo;
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary. Where possible channels will be constructed to incorporate existing topography, grade controls and exposed inert bedrock, which will promote long-term integrity of the structures;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD; and

- Installation, operation, and maintenance of any additional groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.6 Surface Impoundments

Table E4 presents a summary of the surface impoundment list for the Copper Flat Project. There will be 6 surface impoundments present at Copper Flat at the end of mine life; 3 impacted storm water impoundments, one process water reservoir, one surge pond and one underdrain collection pond. The seventh impoundment will be a passive evaporation pond constructed after mine closure to provide long-term passive evaporation of residual fluid drainage from the TSF.

Table E4. Summary of Copper Flat Surface Impoundments

Impoundment	Size[1] (Acres)	Storage Volume[2] (Gallons)
Impacted Storm Water Impoundment A	2.90	7,306,971
Impacted Storm Water Impoundment B	2.69	5,598,421
Impacted Storm Water Impoundment C	4.44	10,513,870
Process Water Reservoir	2.12	5,433,849
Surge Pond	1.86	1,610,000
TSF Underdrain Collection Pond	7.90	12,240,000
TSF Evaporation Pond	21.60	21,934,379

Notes:
[1] –Surface impoundment areas also include disturbed areas (embankment, access road, etc) associated with each impoundment.
[2] – Surface impoundment storage volumes account for 2-feet of freeboard.

Typically the surface impoundments will be the last features to be closed at their respective locations after grading and cover placement of the adjacent facilities (e.g., WRSPs, TSF, plant area, mine pit).

2.6.1 Components To Remain At Closure

The closure components and related engineering controls associated with the surface impoundments that will be used for post-closure purposes include:

- Groundwater monitoring wells in the vicinity of the plant area that are required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.6.2 Surface Impoundment Reclamation and Closure Plan

All of the surface impoundments will be reclaimed after the facilities they services are reclaimed. The TSF underdrain collection pond will continue to collect water that drains from the TSF during the active evaporation phase discussed above and will be incorporated into a single evaporation pond constructed for the management of water collected during the passive evaporation phase. The evaporation pond will be constructed below the toe of the TSF to allow for passive evaporation of any residual drain down water from the TSF. The evaporation pond will remain in place until drain down from the TSF facility is reduced to a point to where it is no longer required. This point in time will be determined in collaboration with the

Agencies and the pond will be reclaimed thereafter. The reclamation and closure activities for the surface impoundments consist of the following:

- Flushing of all process water pipelines to remove residual solutions and disposing of the solutions in the TSF to evaporate;
- Removing and disposing of the above-ground process pipelines in the TSF or at a nearby approved construction and debris landfill;
- Pumping of remaining water in the impoundments into the TSF to evaporate;
- Removal of all above ground impoundment electrical systems, pumps, and infrastructure, including outdoor lighting and transmission lines;
- Capping all buried process water, tailings delivery, and water delivery pipelines;
- Ripping surface impoundment HDPE liners and folding over prior to backfilling;
- Grading impoundment berms into and backfilling the impoundments with clean fill, as necessary, in lifts and compacting each lift;
- Grading the backfilled areas to drain and recontour surfaces to blend into the natural topography;
- Covering of impoundments with 6-inches of suitable cover material where unsuitable growth media exists after grading;
- Seeding of covered and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD; and
- Installation, operation, and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

2.7 Growth Media Stockpiles

The term "growth media" as referred to within this Plan is equivalent to topdressing as defined in 19.10.1.7.T(1) NMAC. **Figure E3** identifies the location of three growth media stockpiles (GMSP-1, GMSP-2, and GMSP-3) established as part of the site development and construction phases of operation. GMSP-1 will be located at the southwest corner of the proposed TSF, GMSP-2 will be located north of the proposed TSF and north of Grayback Arroyo, and GMSP-3 will be located east of WRSP-3. Combined these stockpiles will contain an estimated 4.5 million cy of suitable growth media/cover material (**Table E5**).

Table E5. Proposed Growth Media Stockpile Details

Facility	Size[1] (Acres)	Storage Volume[2] (cy)
Growth Media Stockpile 1	29.33	2,180,000
Growth Media Stockpile 2	31.55	1,813,000
Growth Media Stockpile 3	14.10	508,000

Notes:
[1] – Includes stockpile areas and associated disturbance areas.
[2] – Provided by NMCC
cy – Cubic yards

The growth media stockpile material will be consumed as part of the cover systems associated with reclamation of the site. After moving this material from the stockpiles to its location of use in reclamation, there will be a need to also reclaim the area disturbed at the stockpile location. There may be a need to leave a minimum of 6 inches of growth media material in place to provide for seeding the disturbed stockpile area. The design criteria associated with reclamation of any remaining growth media stockpile material that may be present following closure of these facilities, and the disturbed areas associated with the growth media stockpiles are summarized in **Table E1**, and the planned approach for closure of these facilities is described below.

2.7.1 Growth Media Stockpile Reclamation and Closure Plan

The approach for closure of any residual growth media stockpile material that may be present following closure of the facilities described in Sections 2.1 through 2.6 above, and the disturbed areas associated with the growth media stockpiles includes the following:

- Grading remaining growth media material and disturbed areas to drain and re-contour surfaces to blend into the natural topography;
- Ripping of the remaining growth media and disturbed areas to a depth of between 18 and 24 inches;
- Leave a minimum of six inches of growth media material in place, as needed, within the stockpile footprints. The only area that may require a minimum of six inches of residual stockpiled growth media to remain within the stockpile footprint is GMSP-3 which is underlain by andesitic bedrock. The other two stockpile areas (GMSP-1 and GMSP-2) are underlain by alluvial materials (suitable growth media); and
- Seeding of remaining growth media and disturbed areas to reestablish vegetation using a seed mix approved by the BLM and MMD.

2.8 Ancillary Facilities and Structures

A miscellaneous group of ancillary facilities and structures will be present within the Copper Flat mine permit area including: access roads utilized during operations; HDPE pipelines and trenches; electrical power distribution system and components; storm water structures for drainage, diversion, and sediment control; equipment storage areas; and fencing. The Copper Flat project also includes several off-site facilities that are integral to the project, including an electrical substation located on 30 acres of land owned by the State of New Mexico, nine separate 5-acre mill-site claim sites associated with the well field and an approximate 8-mile long fresh water buried pipeline contained in approximately 53 acres, 45 of which are off the site boundary.

Reclamation of the disturbed areas associated with the ancillary facilities and structures will be accomplished by burying utility and structure foundations, removing and disposing of above-ground pipelines and power lines on-site, and removing all buildings erected by NMCC. Erosion and drainage control and revegetation of these areas will be provided as necessary. Surface disturbance at the five acre mill sites will be reclaimed. The buried fresh water pipeline will be left in place. No reclamation will be required as the pipeline corridor contains natural vegetation consistent with the surrounding environs. The electrical substation will be the property of the service provider. It is assumed that the substation will continue to provide local infrastructure power supply to the area well beyond the time of cessation of operation of the mine. As such, no reclamation requirement is contemplated. The closure components and the closure activities for the ancillary facilities and structures are described below.

2.8.1 Components to Remain At Closure

The closure components and related engineering controls associated with the ancillary facilities and structures that will be used for post-closure purposes include:

- On-site power poles may be left in place to the extent possible as bird perching sites;
- Continued utilization of access roads for post closure access to the pit bottom and reclaimed facilities for reclamation monitoring and long-term access to public and private lands;
- Continued utilization of storm water control structures located along post-closure haul roads and access roads;
- The existing 115-kV transmission line and the electrical substation constructed on State land will be left in place. The local power utility owns these facilities and will be responsible for their continued operation and maintenance; and
- Preservation of existing water supply pipeline from four production wells located off-site on BLM land. The wells will remain in a condition suitable for other uses. All roads, power lines and foundations for the production wells are in place. No additional disturbance will occur during mining operations, with the exception of occasional minor disturbance that may occur during inspection and maintenance. Such disturbances will be repaired and reclaimed as they may be needed during operations. Surface structures and equipment will be removed and the well area will be left as it currently exists after closure of the mine.

2.8.2 Ancillary Facilities and Structures Reclamation and Closure Plan

The design criteria for the ancillary facilities and structures are summarized in **Table E1** and the approach for closure includes:

- Haul roads and access roads not needed for closure and post-closure access will be reclaimed. The compacted road material will be loosened by ripping to a depth of between 18 and 24 inches and revegetated using a seed mix approved by the BLM and MMD. Covering of haul roads with 6-inches of suitable cover material where unsuitable growth media exists after ripping and revegetated using a seed mix approved by the BLM and MMD;
- Removal of culverts not needed for post-closure storm water management and disposal of them in an approved manner;
- Removal of overhead lines and power poles and disconnect from the 115kV line owned by Tri-State Generation and Transmission;
- Removal of pumping stations and on-site electrical substation once they are no longer needed for post-closure water management;
- Removal of residual sediments and fluids from pipelines and disposal of materials in the TSF prior to reclamation of this facility, or at an approved location;
- Removal and disposal of the above-ground pipelines in the TSF prior to reclamation of this facility, or at a nearby approved construction and debris landfill;
- Capping all buried pipelines;
- Ripping HDPE liners within corridors;

- Backfilling of pipeline corridor trenches with clean fill, as necessary, in lifts and compacting each lift;
- Grading the backfilled areas to drain and recontour surfaces to blend into the natural topography;
- Covering of pipeline corridors with 6-inches of suitable cover material where unsuitable growth media exists after grading;
- Ripping of non-impacted disturbed areas to a depth of 18 to 24 inches; and
- Seeding of ripped and covered areas to reestablish vegetation using a seed mix approved by the BLM and MMD;

2.9 Post-Mining Land Use

The NMMA Rules (MMD 1996) defines Post-Mining Land Use (PMLU) as:

> “a beneficial use or multiple uses which will be established on a permit area after completion of a mining project. The PMLU may involve active management of the land. The use shall be selected by the owner of the land and approved by the Director [of MMD]. The uses, which may be approved as PMLUs, may include agriculture, commercial or ecological uses that would ensure compliance with Federal, State or local laws, regulations and standards and which are feasible.” 19.10.1.7. P (5) NMAC

The major land uses in the vicinity of the project area are mining, grazing, wildlife, watershed and recreation, particularly on federal lands. This multiple land management strategy concurs with the BLM administrative directives and resource management plans. Land use in the project area will not change from pre-mining approved purposes and the project area will continue to support these approved uses following closure. Post-closure land uses at Copper Flat will conform to the previously defined BLM Caballo Planning Unit, the 1986 White Sands Resource Management Plan (BLM, 1986) and the Sierra County Comprehensive Land Use Plan.

Grazing land, wildlife habitat, recreation, and mining are the PMLUs most consistent with the surrounding land uses of the Copper Flat site. NMCC will reclaim all disturbed areas in the permit boundary to support the multiple uses of grazing, wildlife habitat, and mining consistent with current BLM land uses. At completion of mining activities, the site will be reclaimed to a native plant community similar to surrounding undisturbed areas. Reclamation will result in the development of an early-stage grass/shrub community that will provide a locally-important increase in landscape-level (plant community) diversity. Native vegetation established on reclaimed areas at Copper Flat will result in increased erosion protection, habitat improvement, forage production, and reduced net infiltration of water into the underlying materials relative to current conditions.

The open pit area will be reclaimed to the extent practicable to a wildlife habitat. A water conveyance channel will be constructed along the existing pit haul road to direct surface water flows to the pit lake. As a rule, catch benches left in pit walls and/or inaccessible benches will not be revegetated after mining for safety reasons. Safety protocols do not permit personnel or equipment to operate below a highwall, in areas with no safe access, or at the rim of the open pit. These areas will be allowed to revegetate themselves through natural processes. The open pit walls and benches will become wildlife habitat providing abundant rock outcroppings and cliff habitat suitable for small mammals, reptiles and birds.

3.0 IMPLEMENTATION OF RECLAMATION AND CLOSURE PLAN

At completion of mining activities, Copper Flat will be reclaimed according to the reclamation and closure plan described in Section 2.0 and the site will be restored to conditions to meet post-mining land uses of wildlife habitat, grazing land, recreation, and mining consistent with the BLM land management plan (BLM, 1986). The focus of this section is to detail regrading operations, growth media placement and the revegetation plan including planting techniques and proposed seed mixes.

3.1 Growth Media Placement

The use of the term "growth media" herein is synonymous with the term 'topdressing" as defined in the Mining Act regulations. The major guiding elements in developing the grading plans for the major facility areas and ancillary facilities at Copper Flat are to achieve positive drainage, facilitate constructability and the efficient conveyance of water and limit slope length and gradient, soil erosion and eliminate long-term maintenance requirements. Prior to cover placement, top surfaces and disturbed areas will require minor grading to fill rills, enable the construction of surface water control features and ensure that the final grade is between 1 and 5 percent for reclaimed waste storage units, and graded to blend into the natural topography for other disturbed areas. More extensive grading will be required on the slopes to achieve the desired slope configuration, smooth the bed materials and accommodate surface water control features.

Once facilities are regraded, cover materials will be hauled from growth media stockpiles and placed on the top surface and slopes using a variety of equipment including scrapers or haul trucks. Bulldozers and motor graders will be used to smooth the surfaces and facilitate access for cover placement and revegetation activities. Reclamation of EWRSP-1, EWRSP-2B, a portion of EWRSP-2A and the outslope of EWRSP-4 will occur during the pre-production phase of mine operations. Suitable growth media for these existing facilities will be excavated from TSF and/or WRSP-2 and -3 borrow areas and hauled directly as part of the plans to reclamation contemporaneously during the pre-production phase of mine operations (Section 2.1).

The cover system will be designed to provide erosion control, sustain vegetation and reduce net infiltration of stormwater through the underlying materials. The soil cover will be a monolithic store and release/evapotranspiration system. Where mine wastes are present (EWRSPs, WRSPs, and TSF) soil covers will be 36 inches thick, and other disturbed areas that do not have adequate growth media already in place will covered with 6-inches of soil. The covers will be designed to be protective of groundwater, resist erosion and support vegetation. Growth media to construct the cover will be spread and graded with care taken to prevent compaction by limiting the number of passes.

NMCC will construct the soil covers in single lift. However, there may be occasions during cover construction when the subsurface and surface cover materials may be placed in separate operations. In these instances, NMCC will place coarser textured growth media materials in the surface lift, particularly on outslopes. Coarser textured soils materials are expected to have better performance related to their ability to resist erosion and capture water (high infiltration capacity) during high intensity precipitation events that occur during the summer monsoons (Golder, 2013).

Growth media will be placed at a depth of at least 6 inches in all other disturbance areas. GMSP-1 and -2 are underlain by alluvial deposits that are suitable growth media. As such, the existing deposits underlying these stockpiles will simply be graded, scarified, and reseeded. Removal of growth media from GMSP-3 may expose bedrock that will require a minimum of 6 inches of stockpiled growth media to remain within the stockpile footprint prior to reseeding. **Table E6** provides an estimate of the volume of growth media required for reclamation.

Table E6: Estimated Reclamation Cover Requirements

Facility	Regraded Surface Area[1] (acres)	Cover Thickness (ft)	Growth Media Requirement (cy)
EWRSP-1[2]	17.5	3	84,700
EWRSP-2A[2,3]	8.3	0	0
EWRSP-2B[2,3]	5.1	3	24,684
EWRSP-3	19.5	3	94,574
EWRSP-4[2]	22.6	3	109,481
WRSP-1	41.9	3	202,796
WRSP-2 and WRSP-3	171.8	3	831,512
TSF	564.4	3	2,731,696
Plant Area (excluding EWRSP-3)	78.9	0.5	63,646
Surface Impoundments[4]	36.2	0.5	25,168
Open Pit[5]	165.3	0	0
GMSP-1	29.3	0	0
GMSP-2	31.6	0	0
GMSP-3	14.1	0.5	11,374
Ancillary Facility Areas[6]	19.7	0.5	15,891
Total	**1,226.2**	**-**	**4,195,522**

Notes:

1 - Regraded areas based on reclamation and closure designs presented in Attachment E1.

2 - EWRSP-1, EWRSP-2B, and a portion of EWRSP-2A will be reclaimed during the pre-production phase of mine operations. The outslope of EWRSP-4 will also be reclaimed during the pre-production phase of mine operations. The top surface of EWRSP-4 will be reclaimed following cessation of mining.

3 - The portion of the EWRSP-2A that lies within the footprint of proposed WRSP-1 and will be incorporated into this new stockpile. The portion of EWRSP-2A located outside of the OPSDA boundary will be relocated to the top of EWRSP-2B and the disturbed area will be ripped and seeded. EWRSP-2B includes 5.1 acres of waste rock stockpile that will get covered and 7.6 acres of disturbed area that will get ripped and seeded.

4 - Impacted Stormwater Impoundment A and the Process Water Reservoir cover requirements are already covered within the Plant Area and are excluded in the cover volume calculation.

5 - Open pit area (132.1 acres) and associated disturbed area around the pit perimeter (33.2 acres) that will get ripped and seeded.

6 - Includes ancillary facilities and structures not already included in one of the specific facilities listed within this table. Includes haul and access roads, electrical power distribution system; storm water and sediment control structures; equipment storage areas; pipeline corridors; pump stations; tanks; explosives magazine and associated access road; and fencing.

3.2 Revegetation Plan

The revegetation plan for the Copper Flat Project is designed to create a stable, self-sustaining plant community and will conform to the planned grazing and wildlife habitat PMLU for areas outside the open pit. Revegetation of the site will consist mainly of the establishment of grass, forb and shrub species characteristic of the desert grassland community. Plant species were chosen based on their ability to provide satisfactory cover, on their nutritional value and ability to support livestock production and wildlife habitat. General planting techniques and proposed seed mixtures are provided below.

3.2.1 Planting Techniques

In general, revegetation operations will follow immediately after cover material placement, or after grading and ripping for disturbed areas that don't require additional cover, and will be timed to take advantage of summer moisture to encourage the establishment of warm season grasses. Thus, to the extent practicable, soil placement and reclamation seeding will occur prior to the monsoon season of July, August and September.

Revegetation will be performed in a manner consistent with industry standards to promote erosional stability and support the post-mining land use. The general order agronomic practices for revegetation seeding are ripping or scarification, disking, seeding (drill, broadcast or hydroseed), mulching and crimping or tackifying. These practices are discussed in more detail below.

After placement, the cover will be scarified (ripped 8 to 12 inches) to break up compaction and roughen the surface. The ripping operation will be implemented on the contour for sloping areas to reduce the potential for early-stage soil erosion during vegetation establishment. The roughened surface is a transient condition that provides micro-sites for seedling establishment and to reduce concentrated overland flow and erosion. Prior to seeding, the seed bed will be prepared by disking or harrowing to a depth of approximately 6 inches. If soil amendments are required, disking to prepare the seedbed will take place after applying the amendments. Ripping and other seedbed preparation procedures will be conducted when surface and subsurface soil moisture conditions are dry to avoid compaction.

Specific seeding methods to be utilized at the site are dependent on many factors including the topography, surface conditions, seed mixture and equipment availability. Specialized rangeland drills are available for seeding native seed mixes. They are equipped with an agitator and depth bands to mix seed and ensure proper seeding depths. Alternatively, seed may be broadcast and covered using a drag or hydro-seeding may be used on steep, small areas where larger equipment cannot easily operate. In most cases, seed will be planted using a rangeland drill or similar equipment. Wherever possible, seeding will be done along the contour. When drill seeding is not practical due to steep slopes or wet soil conditions, broadcast seeding will be employed. For broadcast seeding, the drill seeding rate will be doubled and areas will be raked with a chain- or tire-harrow to lightly cover the seed and achieve good soil-seed contact.

Following seeding, certified weed-free mulch will be uniformly spread at a rate of about 2 tons/acre. Mulch will contain a minimum of viable seeds associated with the source (i.e., barley or wheat). Long-stem mulch will be given preference over shorter materials. The mulch will be then be crimped with a straight-disc harrow or similar equipment to fix it in place. On steep slopes, tackifier emulsion may be used to secure the mulch rather than crimping.

Weed control will be implemented only if necessary. Methods of weed control will be determined upon recommendations from the BLM and/or MMD.

3.2.2 Seed Mixtures

Table E7 provides the proposed interim seed mix (primarily associated with the seeding of the growth media stockpiles) and final seed mixes for the Copper Flat Project for the grazing and wildlife PMLUs. The seed mixtures include native warm and cool season grasses, perennial shrubs and forbs. **Table E8** provides the primary functions and attributes of each proposed plant species. The species selected for the reclamation seed mixtures have been successfully used in mine reclamation and range improvement projects in many parts of New Mexico and are readily available from seed suppliers. The seed mix is selected to provide early establishment of ground cover, erosion control and productivity while providing diversity in growth forms.

The seed mixes are designed for application prior to the summer rains and the seeding will be completed in early- to mid-June. The ratio of cool season to warm season grasses may be adjusted if the seeding is conducted after the summer rains. The overall target seed rate for final seeding is expected to vary, but will range from about 40 to 60 seeds per square foot. Interim seedings for growth media stockpiles and other temporary stabilization seedings target a seed density of 30 seeds per square foot. All seed mixes shall be certified as weed free.

NMCC may propose to adjust the seeding rates or species listed in **Table E7** based on seed availability or to accommodate variations in seeding methods (e.g., broadcast, drill, hydraulic) and field conditions. A list of alternate or substitute species is included in **Table E9**. Based on the performance on the interim seed mix and seeding associated with the contemporaneous reclamation of the existing stockpiles, the final seed mix may be modified with approval of the MMD.

Table E7: Interim and Final Reclamation Seed Mixes

Scientific Name	Common Name	PLS/ac[1]	
		Interim	**Final**
Grasses – Warm Season			
Bothriochloa barbinodis	Cane bluestem	0.15	0.20
Bouteloua curtipendula	Sideoats grama	1.00	1.10
Bouteloua gracilis	Blue grama	0.20	0.25
Pleuraphis jamesii	Galleta	0.75	1.10
Leptochloa dubia	Green sprangletop	0.15	0.20
Seteria vulpiseta	Plains bristlegrass	0.20	0.30
Sporobolus cryptandrus	Sand dropseed	0.03	0.04
Grasses – Cool, Intermediate Season			
Achnatherum hymenoides	Indian ricegrass	0.60	1.30
Eragrostis intermedia	Plains lovegrass	0.05	0.04
Hesperostipa newmexicana	NM feathergrass	0.70	0.50
Shrubs			
Atriplex canescens	Four-wing saltbush	0.30	1.75
Ericamerica nauseosus	Rubber rabbitbrush	0.10	0.35
Fallugia paradoxa	Apache plume	--	0.10
Krascheninnikovia lanata	Winterfat	0.15	0.70
Forbs			
Dalea candida	White prairie clover	0.10	0.40
Linum lewisii	Blue flax	0.15	0.35
Ratibida colomnifera	Prairie coneflower	--	0.10
Sphaeralcea ambigua	Desert globemallow	0.10	0.40
	Total	**4.73**	**9.18**

Notes:
[1] - Rate is in pounds of pure live seed (PLS) per acre; Substitutions may change seeding rates.

Table E8: Functions and Attributes of the Primary Plant Species

Species	Character[1]	Attributes and Function
Cane beardgrass (*Bothriochloa barbinodis)*	N,P,W,G	Bunch grass providing ground cover and forage
Blue grama (*Bouteloua gracilis*)	N,P,W,G	Drought resistant sod grass providing ground cover and forage
Side-oats grama (*Bouteloua curtipendula*)	N,P,W,G	Drought tolerant bunchgrass providing ground cover and forage
Galleta (*Pleuraphis jamesii*)	N,P,W,G	Bunchgrass providing erosion control and early spring/late fall forage
Green sprangletop (*Leptochloa dubia*)	N,P,W,G	Erect bunchgrass; aggressive short-lived nurse plant with forage value
Plains lovegrass (*Eragrostis intermedia*)	N,P,I,G	Bunchgrass providing ground cover and early spring forage
Plains bristlegrass (*Setaria vulpiseta)*	N,P,W,G	Palatable bunchgrass with valuable seed for upland birds and small mammals
NM needlegrass (*Hesperostipa neomexicana*)	N,P,C,G	Persistent bunch grass providing ground cover and forage
Sand dropseed (*Sporobolus cryptandrus*)	N,P,W,G	Drought tolerant bunchgrass adapted to sandy sites
Indian ricegrass (*Achnatherum hymenoides*)	N,P,C,G	Tufted grass providing forage/seed to birds and small mammals
Apache plume (*Fallugia pardoxa*)	N,P,S	Mid-height shrub providing browse, cover and erosion control
Four-wing saltbush (*Atriplex canescens*)	N,P,S	Slightly evergreen shrub providing cover/forage for wildlife and livestock
Winterfat (*Krascheninnikovia lanata*)	N,P,HS	Low shrub providing nutritious winter browse
Rubber rabbitbush (*Ericamerica nauseosus*)	N,P,S	Mid-height shrub providing cover and erosion control
Desert globemallow (*Sphaeralcea ambigua*)	N,P,F	Persistent mid-height forb providing browse for deer and antelope
Prairie coneflower (*Ratibida colomnifera*)	N,P,F	Red and yellow flowered forb attracting pollinators
White prairie clover (*Dalea candida*)	N,P,F	Nitrogen-fixing forb with low water requirements providing forage and ground cover
Blue flax (*Linum lewisii*)	N,P,F	Persistent blue-flowered forb, nutritious seed for ground birds

Notes:
[1] - N = Native; P = Perennial; W = Warm season; C = Cool season; I = Intermediate season; G = Grass; S = Shrub; HS = Half shrub; F = Forb

Table E9: Alternative or Substitute Plant Species for Seed Mixtures

Scientific Name	Common Name
Grasses	
Andropogon saccharoides	Silver bluestem
Aristida purpurea	Purple three-awn
Bouteloua eriopoda	Black grama
Eragrositis curvula	Weeping lovegrass
Digitaria californica	Arizona cottontop
Hesperostipa comata	Needle and thread
Heterotheca contortus	Tanglehead
Panicum obtusum	Vine mesquite
Pleuraphis mutica	Tabosa
Sporobolus contractus	Spike dropseed
Shrubs	
Calliandra eriophylla	Fairyduster
Isocoma tenuisecta	Burroweed
Lycium pallidum	Wolfberry
Nolina microcarpa	Beargrass
Forbs	
Baileya multiradiata	Desert marigold
Coreopsis lanceolata	Lanceleaf tickseed
Machaeranthera tanacetifolia	Prairie aster
Penstemon parryii	Parry's penstemon

4.0 RECLAMATION SCHEDULE AND SEQUENCE

Table E10 presents the anticipated reclamation schedule and sequence for the Copper Flat Mine based on best available information and mine planning forecasts. The proposed schedule summarizes NMCC's understanding of the near-term mine operation and longer-term mine plan projections. More specifically, the schedule is based on the following considerations:

- Practical phasing of the reclamation projects to account for the anticipated labor, equipment and other resources that will be necessary to complete these projects based on current conditions;
- Sequential closure of facilities in a phased cost efficient manner; and
- Total annual acreages that will be reclaimed over this period.

The anticipated duration for reclamation presented in **Table E10** include earthwork and reseeding, but do not include vegetation success/O&M/monitoring that will be conducted throughout the post-closure monitoring period as described in Section 5. The reclamation schedule is based on the number of years from the time NMCC obtains the required Mine permits and approvals to begin operations. Contemporaneous reclamation of EWRSP-1, EWRSP-2, and portions of EWRSP-4 will begin during the initial mine pre-production period.

Table E10. Copper Flat Reclamation Schedule and Sequence

Reclamation Facility Area	Reclamation Schedule, Year Following Mine Permit Approval[1]	
	Start	Finish
Existing Waste Rock Stockpiles		
EWRSP-1, EWRSP-2A, and EWRSP-2B (Placement of EWRSP-2A Stockpile Material Outside OPSDA onto the top of EWRSP-2B, Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 2	Year 2
EWRSP-4 (Regrading, Cover Placement on Outslopes, Revegetation Outslopes, Revegetation of Top Surface,	Year 2	Year 2
EWRSP-4 (Cover Placement on Top Surface, Conveyance Channel Construction,	Year 14	Year 14
EWRSP-3 [2] (Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 15	Year 16
Proposed Waste Rock Stockpiles		
WRSP-1 (Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 13	Year 16
WRSP-2 (Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 14	Year 16
WRSP-3 [3] (Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 10	Year 16
Proposed Tailing Storage Facility		
Tailings Storage Facility (Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 15	Year 21
Active Evaporation of Drain Down Waters	Year 12	Year 18
Construction of Evaporation Pond	Year 17	Year 18
Passive Evaporation of Drain Down Waters	Year 18	Year 38
Evaporation Pond Closure (Ripping Liner and Backfilling Pond, Regrading and Cover Placement, Revegetation)	Year 39	Year 39
Proposed Plant Area Facility[2]		
Plant Area (Building/Structure Demolition & Removal, Regrading and Cover Placement, Conveyance Channel Construction, Revegetation)	Year 15	Year 16

Table E10. Copper Flat Reclamation Schedule and Sequence (Continued)

Reclamation Facility Area	Reclamation Schedule, Year Following Mine Permit Approval(1)	
	Start	Finish
Proposed Open Pit		
Rapid Fill of Pit Lake	Year 13	Year 14
Pit Perimeter (Construction of Pit Perimeter Conveyance Channels Perimeter Berm/Fencing and Cover Placement, Construction of Haul Road Conveyance Channel, Revegetation)	Year 15	Year 15
Ancillary Facilities[4]		
Building/Structure/Pipeline Demolition, Removal, and Burial, Regrading and Cover Placement, Facility Revegetation	Year 16	Year 20

Notes:

[1] - The reclamation schedule is based on the number of years from the time NMCC obtains all of the required Mine permits and approvals to begin operations.

[2] – Reclamation of the plant area will also include reclamation of EWRSP-3 and the haul roads running through the plant area.

[3] – Reclamation of the WRSP-3 may begin contemporaneous with mining operations.

[4] - Includes ancillary facilities and structures not already included in one of the specific facilities listed within this table. Includes haul and access roads, electrical power distribution system; storm water and sediment control structures; equipment storage areas; pipeline corridors; pump stations; tanks; explosives magazine and associated access road; and fencing.

5.0 PERFORMANCE AND RECLAMATION STANDARDS AND REQUIREMENTS

5.1 Most Appropriate Technology and Best Management Practices

The reclamation and closure plan has been designed to protect human health and safety, the environment, wildlife and domestic animals using Most Appropriate Technology (MAT) and BMPs. MAT in mine operations is understood as the selection and application of the most suitable techniques, practices, or methods of operation that have been proven effective in achieving the intended purpose or performance standard while reducing impacts to the environment (prevent, reduce or control pollution). The selection of a MAT is typically accomplished in mine feasibility studies that evaluate mining technologies, processes and operating methods relative to site-specific conditions. The Copper Flat Project will be designed and operated using both MAT and BMPs based on site-specific technical and economic feasibility. Mining technologies, processes and operating methods proposed by NMCC are provided in Section 2.0 of Updated Mine Operations and Reclamation Plan.

BMPs are defined as any program, technology, process, siting criteria, operating method, measure or device, which controls, prevents, removes or reduces impacts to the environment. BMPs are currently accepted, effective and practical methods including structural or engineered control devices, systems and materials as well as operational or procedural practices used to prevent or reduce environmental impacts of ground disturbing activities.

NMCC will meet or exceed applicable state and federal reclamation requirements through application of MAT and BMPs. NMCC has designed its reclamation and closure plan to use the most appropriate technology for an open pit mine operation. Structural and operational BMPs will be used to stabilize the site, limit erosion, reduce sediment control fugitive dust, and prevent noxious weeds from existing and proposed facilities and disturbed areas during reclamation. These BMPs include:

- Surface stabilization measures – dust control, regrading, mulching, riprap, temporary and permanent revegetation/reclamation and placing growth media;
- Run-on and runoff control and conveyance measures – clean water diversions and swales, armored drainage channels, runoff diversions and berms;
- Sediment traps and barriers – check dams, grade stabilization structures, sediment detention, sediment/silt fence and straw bale barriers and sediment traps;
- Air quality – apply water to control dust on haul roads and other disturbance areas, interim seeding of growth media stockpiles and other surface disturbance areas
- Revegetation and noxious weeds – use of certified weed-free seed and mulch, cleaning heavy equipment before entering the mine area, noxious weed monitoring and treatment.

BMPs will be employed in appropriate sites during the reclamation phase of the Project and structures will be inspected periodically, with repairs performed as needed. NMCC will limit disturbance and preserve existing vegetation to the maximum extent possible. Additional details regarding structural and operational BMPs are included in Section 4.0 of the Updated Mine Operations and Reclamation Plan.

5.2 Contemporaneous Reclamation

Contemporaneous reclamation, mining-for-closure, or “designing for closure” will reduce erosion, provide early impact mitigation, limit costs and reduce final reclamation work. NMCC is committed to maximize this type of reclamation at the Copper Flat Mine Project and has designed mine facilities to employ contemporaneous reclamation, to the extent appropriate and practicable. Specific details regarding contemporaneous reclamation of the EWRSP-1, -2B and -4 and some outslopes of the proposed WRSP-3 are provided in Section 2.1 and 2.2 respectively. Other examples include, designing the waste rock stockpiles in such a way to facilitate their reclamation, building final lifts to accommodate the required reclamation slopes, and managing tails deposition while constructing the embankment to achieve the desired outslope grade.

5.3 Protection Assurance

NMCC has designed a reclamation plan to assure protection of human health and safety, the environment, wildlife and domestic animals. Mine development and operation activities will also be implemented to assure protection of human health and safety, the environment, wildlife and domestic animals. Specific details of the protection assurances associated with signs, markers, and safeguarding [603.C (1)]; wildlife protection [603.C (2)]; cultural resources [603.C (3)]; hydrologic balance [603.C (4)]; stream diversions [603.C (5)]; impoundments [603.C (6)]; mass movement minimization [603.C (7)]; riparian and wetland areas [603.C (8)]; roads [603.C (9)]; subsidence control [603.C (10)]; and explosives [603.C (11)] are provided in Section 4.3 of NMCC’s Updated Mine Operations and Reclamation Plan.

5.4 Site Stabilization and Configuration

The permit area will be stabilized, to the extent practicable, to prevent future impact to the environment and protect air and water resources. The final surface configurations for the Project are presented in **Figure E4** and will be suitable to achieve the grazing, wildlife habitat, and mining PMLUs. All facilities, slopes, embankments and roads will be designed, constructed, maintained and reclaimed to achieve stable configurations within the industry’s and engineering “standard of care” design process. Specific details on the steps to be taken to stabilize and configure to minimize future impact to the environment and protect air and water resources are provided in Section 4.4 of NMCC’s Updated Mine Operations and Reclamation Plan.

5.5 Topdressing and Cover Materials

Topdressing, for the purposes of reclamation, refers to any suitable soil or geological material used as growth media or soil cover for establishing native vegetation on sites disturbed by mining activities. Reclamation suitability is based on the material’s ability to provide erosion control, sustain vegetation, and reduce net infiltration into the underlying materials.

As previously described, growth media as referred to within this Mine Reclamation and Closure Plan is equivalent to topdressing as defined in 19.10.1.7.T(1) NMAC. Growth media removal quantities have been estimated on the basis of the Supplemental Soils Investigation (Golder, 2013) and are discussed below. The majority of the cover materials required to support revegetation and reclamation efforts will be obtained from within the footprints of the proposed TSF, WRSP-2 and WRSP-3.

The proposed soil cover system for the Copper Flat Project is a monolithic store-and-release or evapotranspiration (ET) cover. A store-and-release cover system stores precipitation during wet periods and releases the moisture back to the atmosphere via evapotranspiration during dry periods, reducing net infiltration. Where mine wastes are present, soil covers will be 36 inches thick unless NMCC can demonstrate a thinner cover can be protective of groundwater (per NMAC 20.6.7.33.F), resist erosion and support vegetation. Other reclamation units including the plant site, roads, other ancillary facilities, and disturbed areas that do not contain adequate growth media will require a minimum of 6 inches of cover. GMSP-1 and 2 which are underlain by unconsolidated alluvial materials will not require additional cover. Additional information regarding cover material requirements for reclamation are provided in Section 3.1.

5.5.1 Suitability

The suitability of topdressing/cover materials is based on the material's ability to provide erosion control, sustain vegetation, and reduce net infiltration. The ability of the materials to meet these performance objectives is primarily related to their physical properties, specifically the texture and rock fragment content of the final cover system (Golder, 2013). Cover materials identified within the limits of the TSF and WRSP-2 and -3 were found to be generally suitable from a physical perspective, though many surficial soils are fine-textured (high clay and silt content) that could be present challenges with respect to revegetation and soil erodibility. In general, soils and underlying colluvial and alluvial materials in the permit area are considered suitable and have no chemical limitations (salinity, pH, macro and micronutrients, lime, or specific ion toxicity) for growth of native and adapted reclamation species.

Pursuant to Paragraph (2) of Subsection F of 20.6.7.33 NMAC, the proposed soil cover system must be designed to limit net-percolation by having the capacity to store at least 95 percent of the long-term average winter (December, January and February) precipitation or at least 35% of the long-term average summer (June, July and August) precipitation, whichever is greater as determined by utilizing field or laboratory test results or published estimates of available water capacity. Long-term average annual summer precipitation totals for the Hillsboro area are 5.43 inches (35% equals 1.90 inches), and winter precipitation totals 1.96 inches (95% equals 1.86 inches) (WRCC, 2016). Therefore in order to comply with the Copper Rule, the proposed 3-foot thick soil cover system must be able to store at least 1.90 inches of water.

The available water capacity (AWC) for the salvageable growth media within the limits of the TSF and WRSP-2 and -3 were estimated as part of the Supplemental Soils Investigation at Copper Flat (see Subsection 3.3.1 and Table 3, Golder, 2013). The AWC estimates were based on general relationships between water retention and soil texture (Brady and Weil 2002, USDA NRCS 2005). These estimates show an average AWC of approximately 0.9 inches of water per 1 foot of soil for the salvageable growth media within the footprint of WRSP-2 and -3, with a range of between 0.6 and 1.3 inches of water per 1 foot of soil. The AWC estimates for the salvageable growth media within the footprint of the TSF show an average AWC of approximately 1.2 inches of water per 1 foot of soil, with a range of between 0.4 and 2.2 inches of water per 1 foot of soil.

The actual water retention of the salvaged soils will vary based on the types of soil materials that are placed in the growth media stockpiles. Cover materials with varying physical properties (e.g. texture and rock fragment content) will be blended during soil salvage. Given the range of materials identified as suitable cover, the proposed cover system at Copper Flat is expected to meet the storage requirements of the Copper Rule.

Additional sources of alternative sources and types of materials for use as reclamation cover may be identified as part of a growth media management plan to be developed as part of the CQA/CQC plan that will be submitted to the agencies within 180 days of submission of a notice of intent to implement the reclamation plan and in consideration of performance objectives for the soil cover system.

5.5.2 Salvage

Where salvageable soil and alluvial materials exists, either on undisturbed or reclaimed areas, NMCC will salvage as much material as can be safely and practicably recovered. Additional suitable soils and other suitable cover materials including unconsolidated subgrade materials, colluvium and overburden will be salvaged to meet the volumetric requirements for final cover construction at closure (Section 3.1). Suitable soil materials available for reclamation from the previously mined and disturbed areas are very limited. Efforts will be made to carefully recover and stockpile these materials during the pre-production phase of the Project.

As part of the proposed operations, NMCC will salvage suitable soils and near-surface alluvial materials from within the TSF, WRSP-2 and WRSP-3 footprints. These materials are part of the Santa Fe formation gravels and alluvial basin fill. NMCC will bulk salvage suitable topdressing materials. The deep coarse-textured alluvial materials will be mixed with the more fine-textured surficial soils as part of the bulk salvaging, loading and hauling operations and will create a suitable growth media for final reclamation (Golder, 2013).

Large diameter trees and shrubs will be grubbed prior to soil salvage. To the extent that it doesn't interfere with soil salvage operations, small diameter woody plants and herbaceous vegetation will be salvaged and incorporated in with the stockpiled growth media to maintain organic matter content of the cover materials. However, vegetation residues from creosote-dominated vegetation will not be salvaged and incorporated in the growth media stockpiles due to creosote's allelopathic properties that may prevent seedling germination during revegetation.

The estimated volumes of salvageable cover material available are shown in **Table E11**. These estimates are based on the test pit data collected during the Supplemental Soils Investigation by Golder (2013). The area with existing tailing deposits (about 60 acres) will not get salvaged and that approximately 87% of the materials with in the remaining TSF footprint area contains suitable growth media (Golder 2013). Assuming a 20-foot excavation, there is approximately 13,755,280 cy of suitable cover materials within the proposed TSF footprint.

The WRSP-2 and WRSP-3 footprint occurs on the back- and footslopes of Animas Peak and the soils and unconsolidated materials are shallower than those found within the TSF footprint. Test pit excavations in these locations encountered andesite bedrock and were restricted to 10 feet. Additionally, soils on the steep slopes of Animas Peak are expected to be thin and salvage may not be practical. Thus, cover estimates assume that only 50% of the proposed WRSP-2 and WRSP-3 disturbance footprints will be salvageable. Assuming a 10 foot excavation depth, there is approximately 1,385,853 cy of suitable cover materials available within the footprints of WRSP-2 and WRSP-3.

Surficial soil materials will salvaged in association with the construction of the plant, pipeline corridor, access roads and ancillary facilities. The salvaged growth media in these locations will be windrowed for local redistribution during final reclamation of the site.

Total available topdressing materials for the project are estimated at over 15 million cy (**Table E11**). These estimates surpass the required 4.2 million cy of cover required for the Copper Flat Reclamation and Closure Plan (**Table E6**). To obtain the necessary cover volume, a single 134-acre excavation to 20 feet will salvage sufficient materials. Additional sources of alternative sources of growth media for reclamation may be identified prior to construction activities and in consideration of performance objectives for the soil cover system.

Table E11: Estimated Available Topdressing Materials

Facility	Growth Media Salvage Area (acres)	Estimated Available Topdressing Materials (cy)
Tailings Storage Facility Area[1]	490	13,755,280
WRSP-2 and WRSP-3 Areas[2]	86	1,385,853
Total	**576**	**15,141,133**

Note:
[1] - Surface area excludes 60 acres of existing tailing deposits and assumes that 87% of the salvage area has suitable material.
[2] - Surface area excludes steep slopes and existing waste rock pile, it is assumed that 50% of the WRSP footprint areas will be salvageable.

Oversight and coordination will be required to handle suitable growth media during salvage operations. Specific borrow areas will be developed within the TSF and WRSP footprints for growth media and engineering materials. Depending on the construction sequence, both engineering and growth media materials may come from a single borrow area. The procedures to segregate topdressing from engineering materials will be further defined in a materials handling plan once final engineering specifications are determined.

5.5.3 Stockpiling

Salvaged growth media will be stored in the three GMSPs shown in **Figure E4**. The design capacity of GMSPs is estimated at 4.5 million cy (Section 2.7). Approximately 4.2 million cy of growth media are required for reclamation (**Table E6**). This includes nearly 204,000 cy of topdressing required to reclaim the EWRSPs during the pre-production phase (Section 2.1) and 80,000 cy of topdressing to be stored in wind-rows around the perimeter of surface disturbances for the plant area and ancillary facilities (Section 3.1). For final reclamation of the TSF and WRSPs, it is estimated that the GMSPs need to contain a total of 3.92 million cy. Thus, the GMSPs at their design capacity will contain an additional 584,000 cy of growth media to offset any losses associated with the storage and redistribution of growth media.

GMSPs are located so as not to be disturbed or impacted by mining operations. The surfaces of the stockpile will be shaped after construction with overall slopes of 3H:1V or shallower to minimize soil loss. To further minimize erosion and the establishment of undesirable weeds, growth media stockpiles will be seeded with the interim seed mix listed in **Table E7**. Interim seeding will be conducted prior to growing season. Diversion ditches will be constructed upgradient of the stockpiles, where necessary, to prevent run-on erosion. Additionally, berms will be constructed around the crest of stockpiles, as needed, to prevent outslope erosion from overland flow. BMPs such as silt fences or staked straw bales will be used as necessary to capture sediment and reduce soil loss.

5.5.4 Re-Distribution

Details regarding growth media's redistribution and application on regraded areas ready for reclamation are discussed in the Reclamation Plan (Section 3).

5.5.5 Stabilization

Cover materials will be stabilized after redistribution with seedbed preparation including scarification and disking along the contour and by seeding and mulching operations as described in the Reclamation Plan (Section 3).

5.5.6 Soil Fertility

Native soils in the project area, like most semi-arid soils in the region, have inherently low fertility in the upper horizons. In particular, site soils have relatively thin and poorly developed A horizons with low nitrogen and phosphorus levels and low to moderate organic matter content (Section 6, BDR; Golder, 2013). Further, most semi-arid native plants have adapted to low to moderate soil fertility conditions and are relatively unresponsive to increased soil fertility compared to crop plants (Chapin 1980). Fertilizer additions have been shown to also have negative impacts in reclamation including increases in weedy annuals, shifts in species composition and decreases in drought, disease and pest resistance. Based on the performance of interim seeding and concurrent reclamation efforts, NMCC will evaluate potential soil amendment requirements for redistributed topdressing materials through soil testing relative to native plant nutrient requirements.

5.6 Erosion Control

Reclamation activities described in Section 2.0 will stabilize disturbed areas to a condition that protects against erosion. All disturbed areas will be regraded and shaped to a final contour that achieves positive drainage, reconstructs slopes with lengths and gradients that will provide long-term stability and seeded and mulched to establish a vegetative cover. Stormwater will be diverted away from facilities. Drainage channels will be designed to regulate the velocity of water and minimize the potential for channel erosion. BMPs for stormwater diversions, drainage and other water conveyance channels may include lining the channel with rock, riprap, vegetation or other geotechnical materials.

NMCC will routinely inspect and maintain all reclaimed areas, drainage channels, diversion structures, retention impoundments and auxiliary erosion control features in accordance with professionally recognized standards such as Natural Resources Conservation Service. Post-construction/reclamation inspection schedules will be developed to include provisions for periodic (annual or semi-annual) and extreme event monitoring as appropriate for individual facilities.

5.7 Revegetation Success

The MMD rules require reclamation to a self-sustaining ecosystem (SSE) appropriate for the life zone of the surrounding area following closure. Revegetation success will be determined in conformance with Section 19.10.603.G of the Mining Act rules.

To summarize the revegetation success standards specified in Section 603.G, to obtain the release of financial assurance, revegetated lands under the grazing and wildlife habitat PMLU will meet the following:

- Total herbaceous cover and productivity shall be equal to 90 percent of the reference area within a 90 percent statistical confidence.
- The diversity of plant life forms (woody plants, grasses and forbs) shall determine what is reasonable given the physical environment of the reclamation.
- Woody plant species shall be established to an approved density with an 80 percent statistical confidence, or
- Other reasonable, attainable standards approved by the Director.

To establish revegetation success standards, NMCC will work with the MMD and BLM to develop the appropriate, reasonable, and attainable success standards for the site. They may include use of a reference area to develop technical standards from the analysis of vegetation data collected in native plant communities, the performance of areas reclaimed in the pre-production phase, interpretation of the ecological site potential and the anticipated differences in community structure among the reference area and reclaimed lands, or other reasonable means. The revegetation success standards agreed to will not be applied to the open pit area.

At the time of monitoring for financial assurance release, vegetation in reclaimed areas will likely represent an early-seral stage, grass-shrub community whereas the reference area will be representative of a mature plant community. The selection of the reference area and establishment of any technical achievable revegetation success standards for reclaimed areas will be developed in coordination with the MMD and/or the BLM.

Vegetation sampling techniques and statistical protocols for data analysis and hypothesis testing will also be developed in consultation with the agencies. The limitations associated with sampling and statistical analyses of vegetation data from heterogeneous semi-arid plant communities (i.e., minor components are often not represented in monitoring data) will be considered in selecting these appropriate sampling and analysis protocols. Standard plant ecology field methods and agency technical guidance will be used to create a robust and defensible vegetation monitoring program.

Revegetation success will be determined by monitoring the vegetation parameters in the final two years of the financial assurance period (years 11 and 12 following final reclamation). Data collection will be performed using the same methods and techniques on both reference and reclaimed areas. Vegetation success monitoring will be conducted once per year in the early fall after the tenth growing season. Two years of achieving the revegetation criteria will be considered a demonstration of success of the revegetation program.

5.8 Perpetual Care

The Reclamation and Closure Plan for the Copper Flat facility is designed to meet, without perpetual care, all applicable environmental requirements for post-mining, reclaimed sites and support a SSE. Details regarding perpetual care are provided in Section 4.8 of the Updated Mine Operations and Reclamation Plan.

6.0 REFERENCES

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FIGURES

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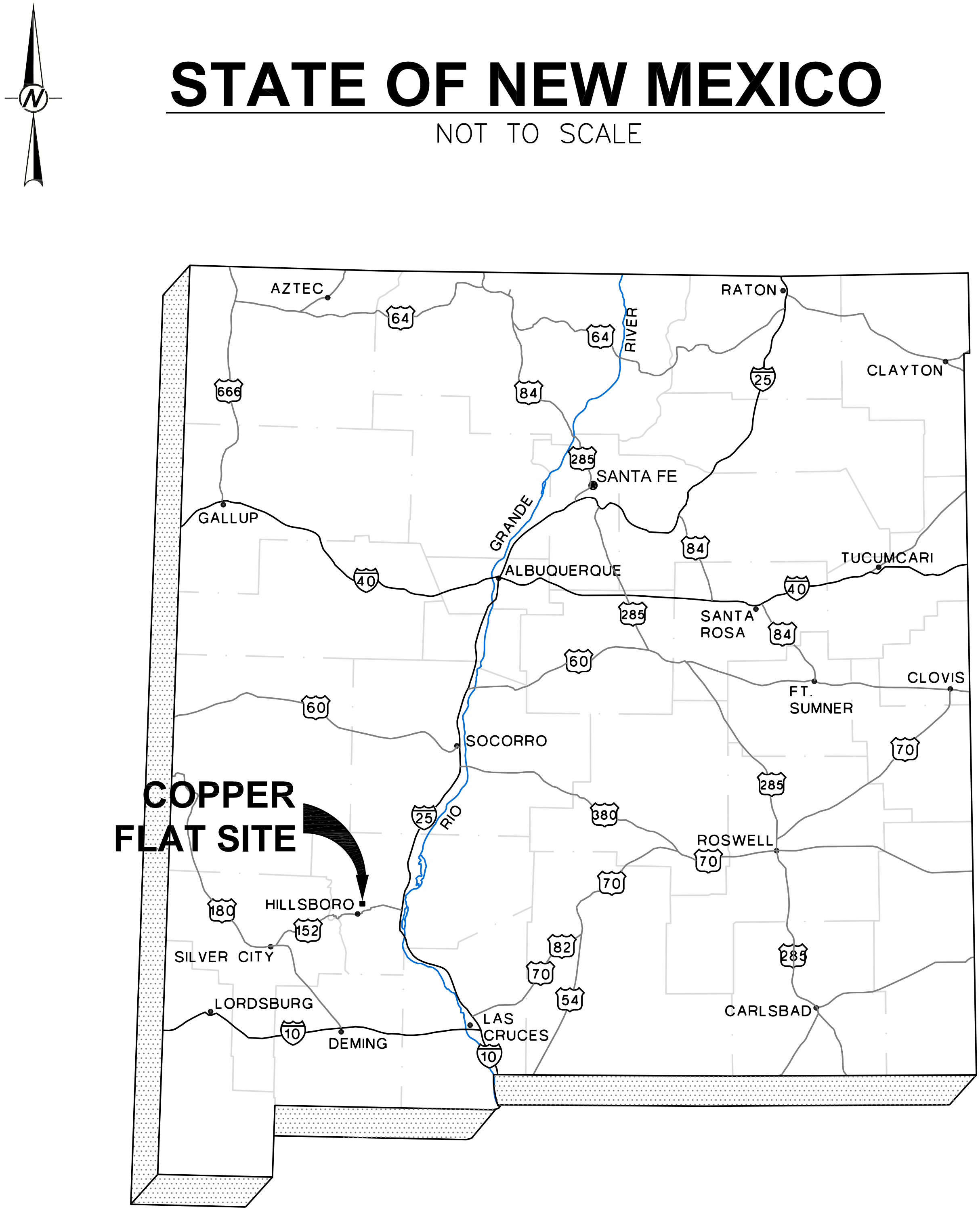

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DESIGN	TS
REVIEW	TS
APPROVED	TS

PROJECT

COPPER FLAT PROJECT

MINE RECLAMATION AND CLOSURE PLAN

TITLE

SITE LOCATION MAP

PROJECT No.	PHASE	Rev.	FIGURE
1531453	0300	0	E1

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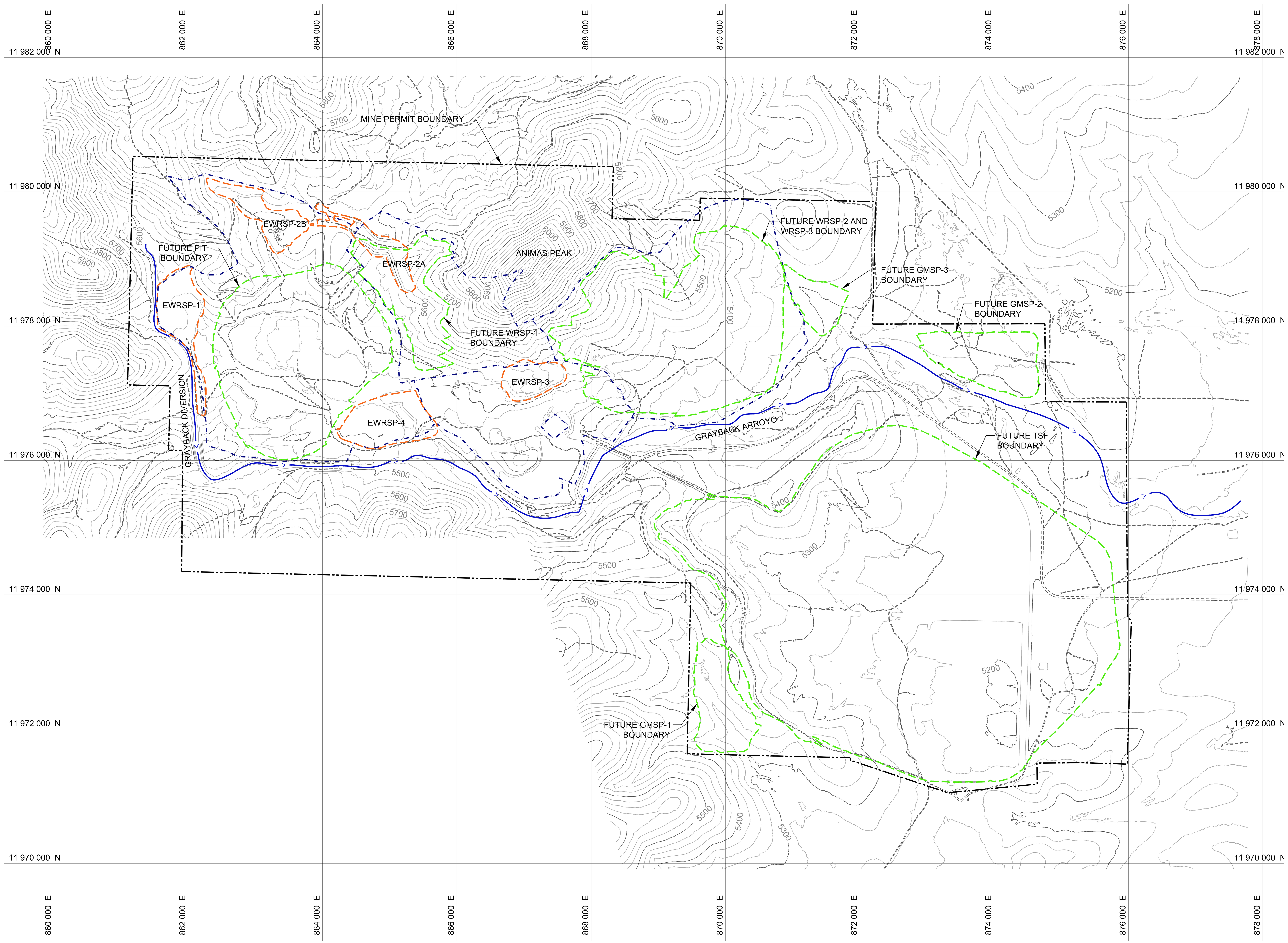

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
	MINE PERMIT BOUNDARY
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	PROPOSED FACILITY BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
GMSP	GROWTH MEDIA STOCKPILE

NOTES

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0 800 1600
1" = 800' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2016-10-07	PRELIMINARY FOR AGENCY REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT
EXISTING SITE CONDITIONS

PROJECT NO.	CONTROL	REV.		FIGURE
1531453	0500	A	1 of 1	E2

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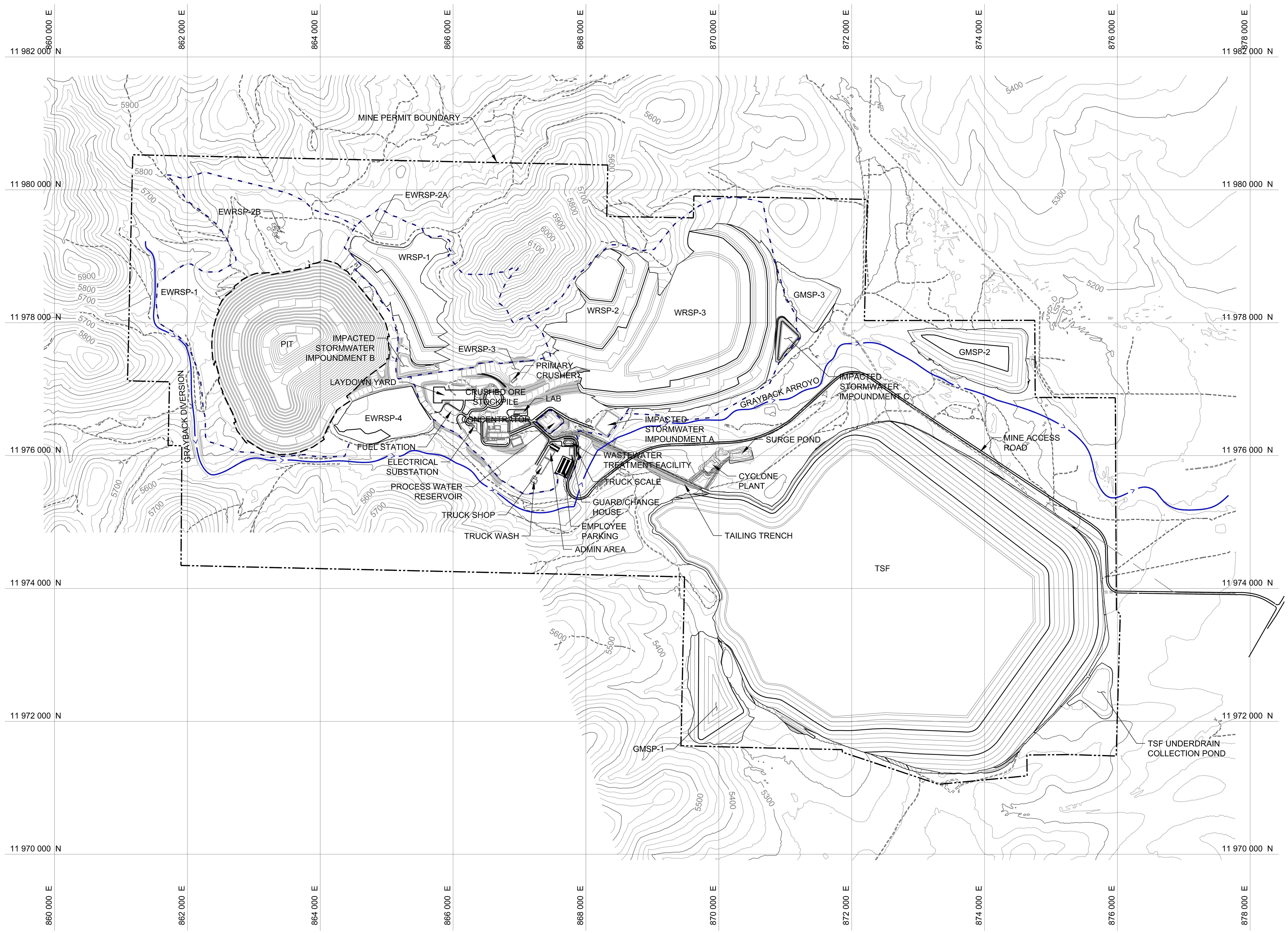

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
5400	PROPOSED DESIGN CONTOURS (ft-MSL)
	MINE PERMIT BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
GMSP	GROWTH MEDIA STOCKPILE

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TITLE
GENERAL ARRANGEMENT AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.		FIGURE
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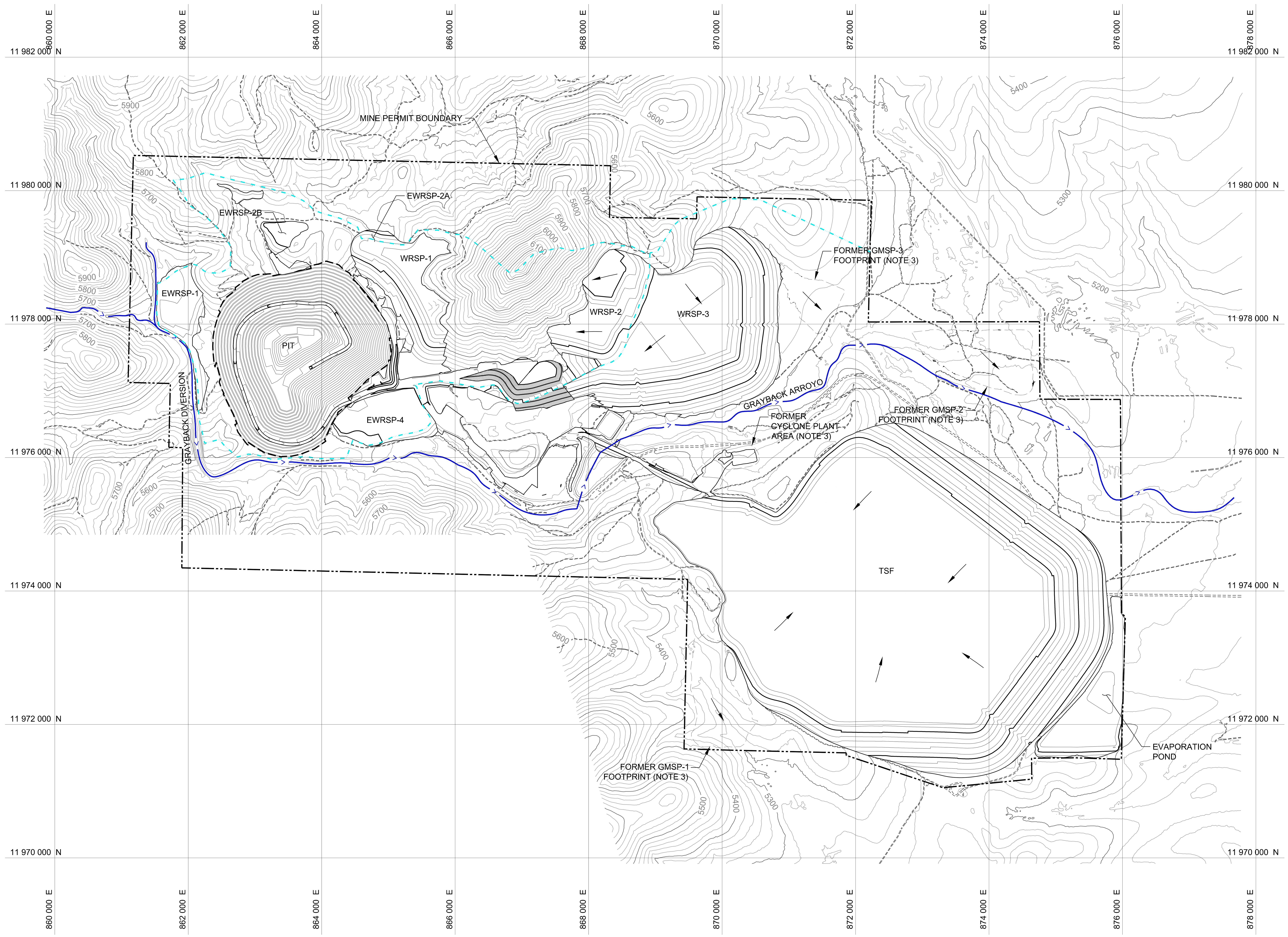

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
5400	PROPOSED DESIGN CONTOURS (ft-MSL)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
GMSP	GROWTH MEDIA STOCKPILE

NOTES

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2. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.
3. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILES AND THE CYCLONE PLANT AREA WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT
FINAL RECLAMATION TOPOGRAPHY

PROJECT NO.	CONTROL	REV.		FIGURE
1531453	0500	A	1 of 1	E4

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ATTACHMENT E1
MINE RECLAMATION AND CLOSURE DESIGN PLAN DESIGNS

COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN
SIERRA COUNTY, NEW MEXICO
OCTOBER 2016

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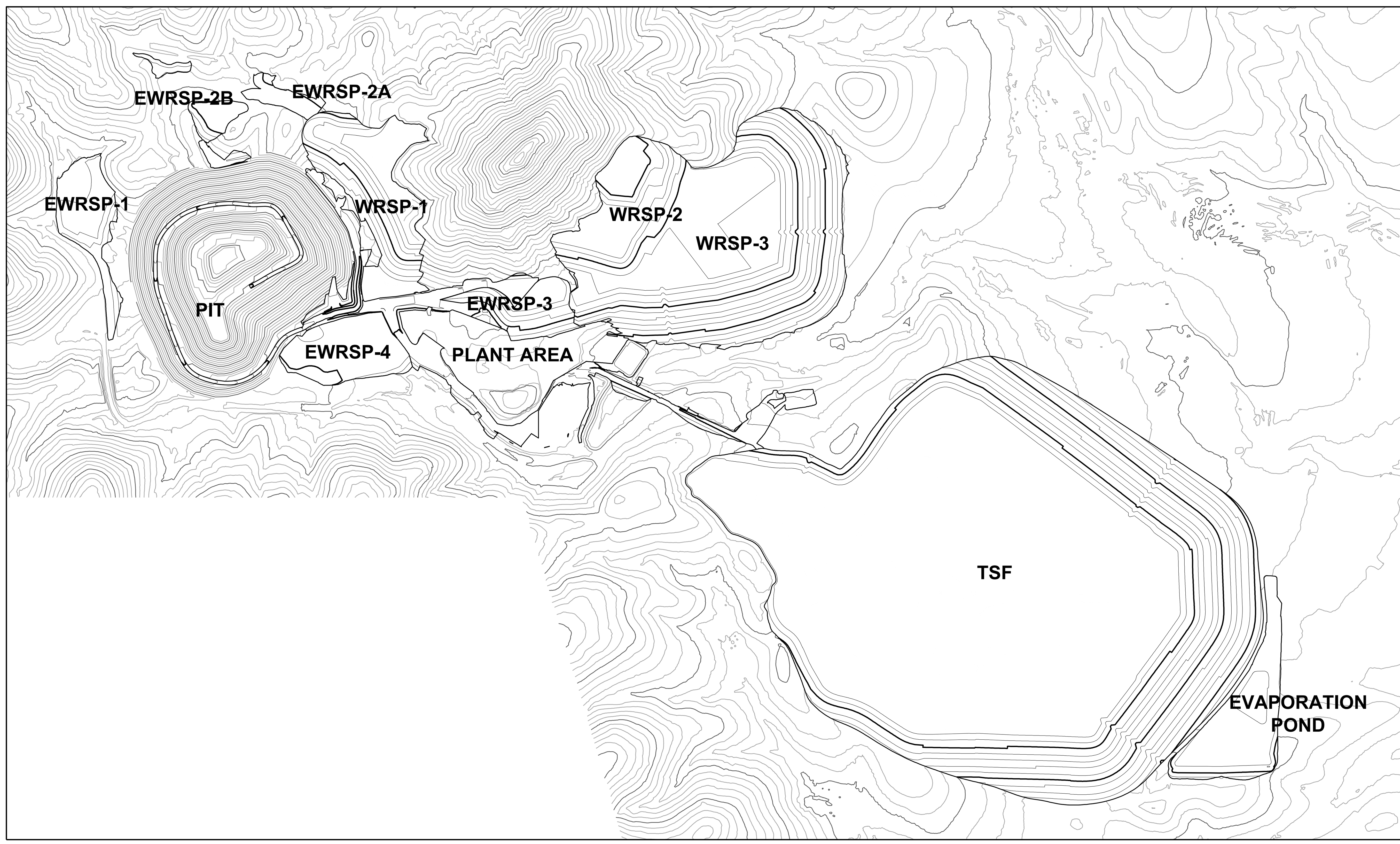

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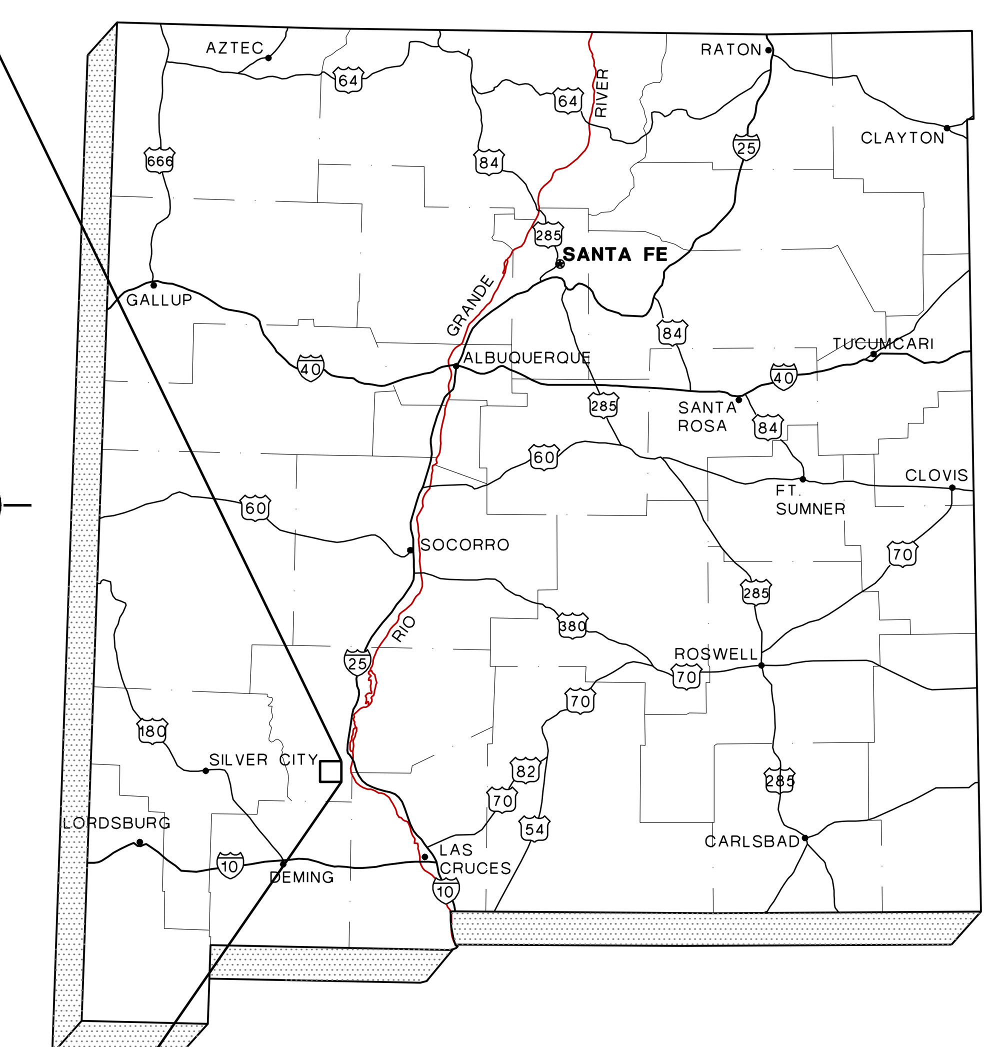

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LIST OF DRAWINGS	
DRAWING NUMBER	DRAWING TITLE
G-001	TITLE SHEET
G-002	GENERAL ARRANGEMENT EXISTING SITE CONDITIONS
G-003	GENERAL ARRANGEMENT AT FINAL BUILDOUT
G-004	GENERAL ARRANGEMENT FINAL RECLAMATION TOPOGRAPHY
C-001	EWRSP-1 EXISTING FACILITY LAYOUT
C-002	EWRSP-1 REGRADE AND DRAINAGE PLAN
C-003	EWRSP-2B EXISTING FACILITY LAYOUT
C-004	EWRSP-2B REGRADE AND DRAINAGE PLAN
C-005	EWRSP-4 EXISTING FACILITY LAYOUT
C-006	EWRSP-4 REGRADE AND DRAINAGE PLAN
C-007	WRSP-1 AT FINAL BUILDOUT
C-008	WRSP-1 REGRADE AND DRAINAGE PLAN
C-009	WRSP-2 AND WRSP-3 AT FINAL BUILDOUT
C-010	WRSP-2 AND WRSP-3 REGRADE AND DRAINAGE PLAN
C-011	TSF AT FINAL BUILDOUT
C-012	TSF RECLAMATION AND DRAINAGE PLAN
C-013	PIT AT FINAL BUILDOUT
C-014	PIT RECLAMATION AND DRAINAGE PLAN
C-015	PLANT AREA AT FINAL BUILDOUT
C-016	PLANT AREA RECLAMATION AND DRAINAGE PLAN
C-017	EWRSP RECLAMATION SECTIONS
C-018	WRSP RECLAMATION SECTIONS
C-019	TSF, PIT AND PLANT RECLAMATION SECTIONS
C-020	TYPICAL SECTIONS AND DETAILS (1 OF 2)
C-021	TYPICAL SECTIONS AND DETAILS (2 OF 2)

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
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TITLE
TITLE SHEET

PROJECT NO.	CONTROL	REV.		DRAWING
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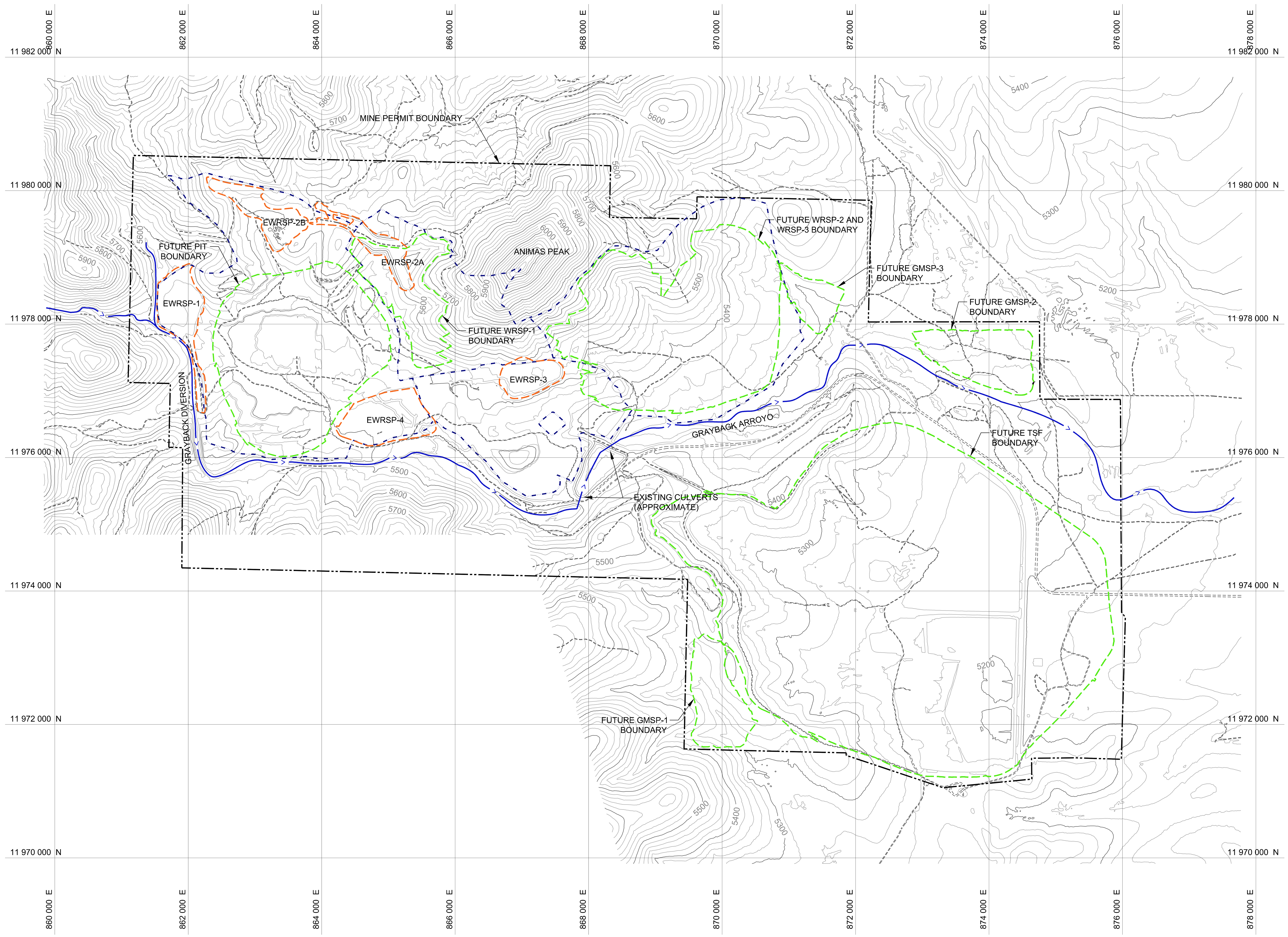

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS - 20 ft CONTOUR INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	PROPOSED FACILITY BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
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	EXISTING ROAD
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FEET

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TITLE
GENERAL ARRANGEMENT
EXISTING SITE CONDITIONS

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	2 of 25	G-002

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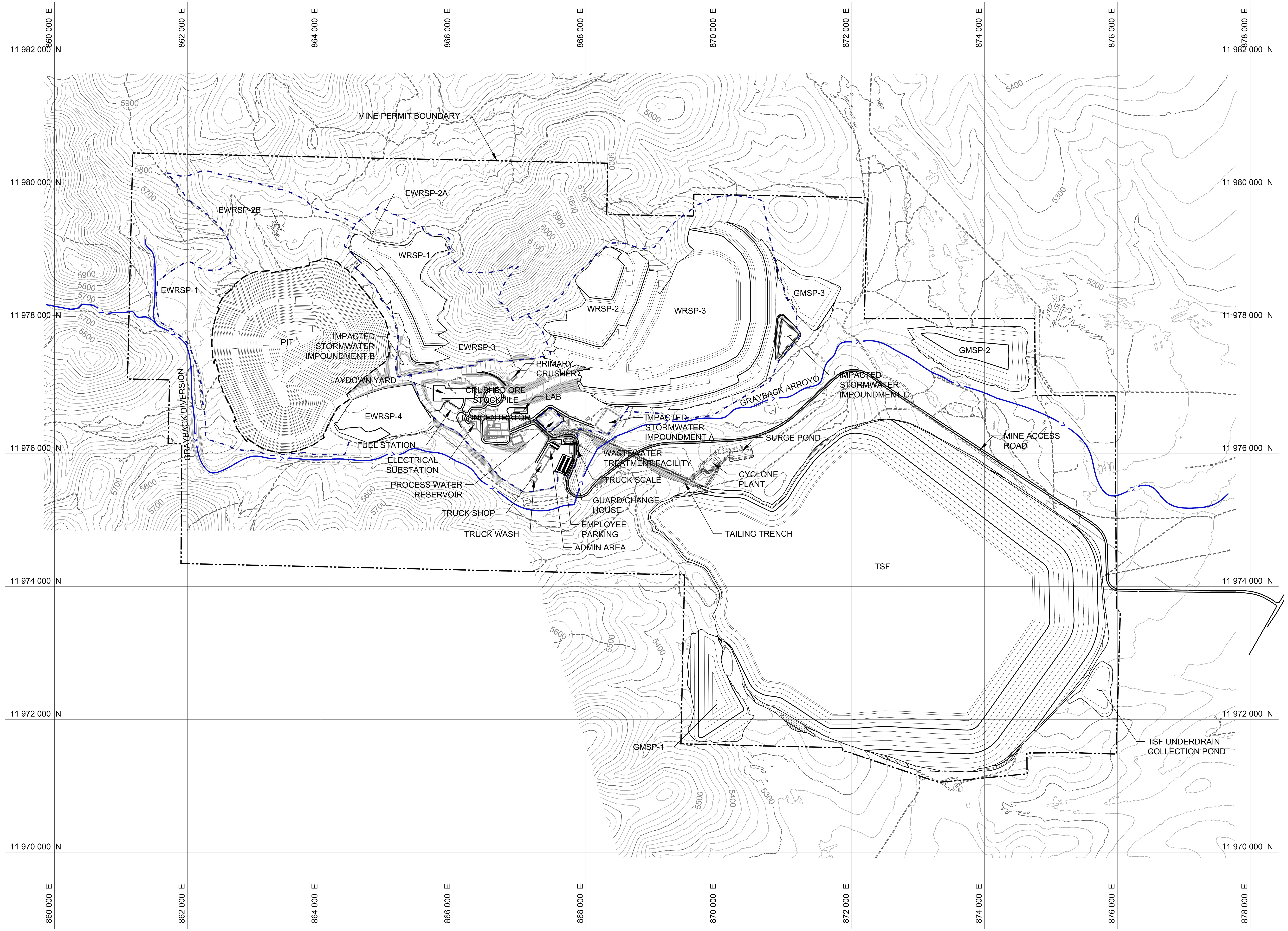

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS - 20 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 20 ft INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
WRSP	WASTE ROCK STOCKPILE
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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.	3 of 25	DRAWING
1531453	0300	C		G-003

Path: \\tucson\cadd\2015 Projects\1531453\PRODUCTION\0300 | File Name: 1531453-0300-G-003.dwg

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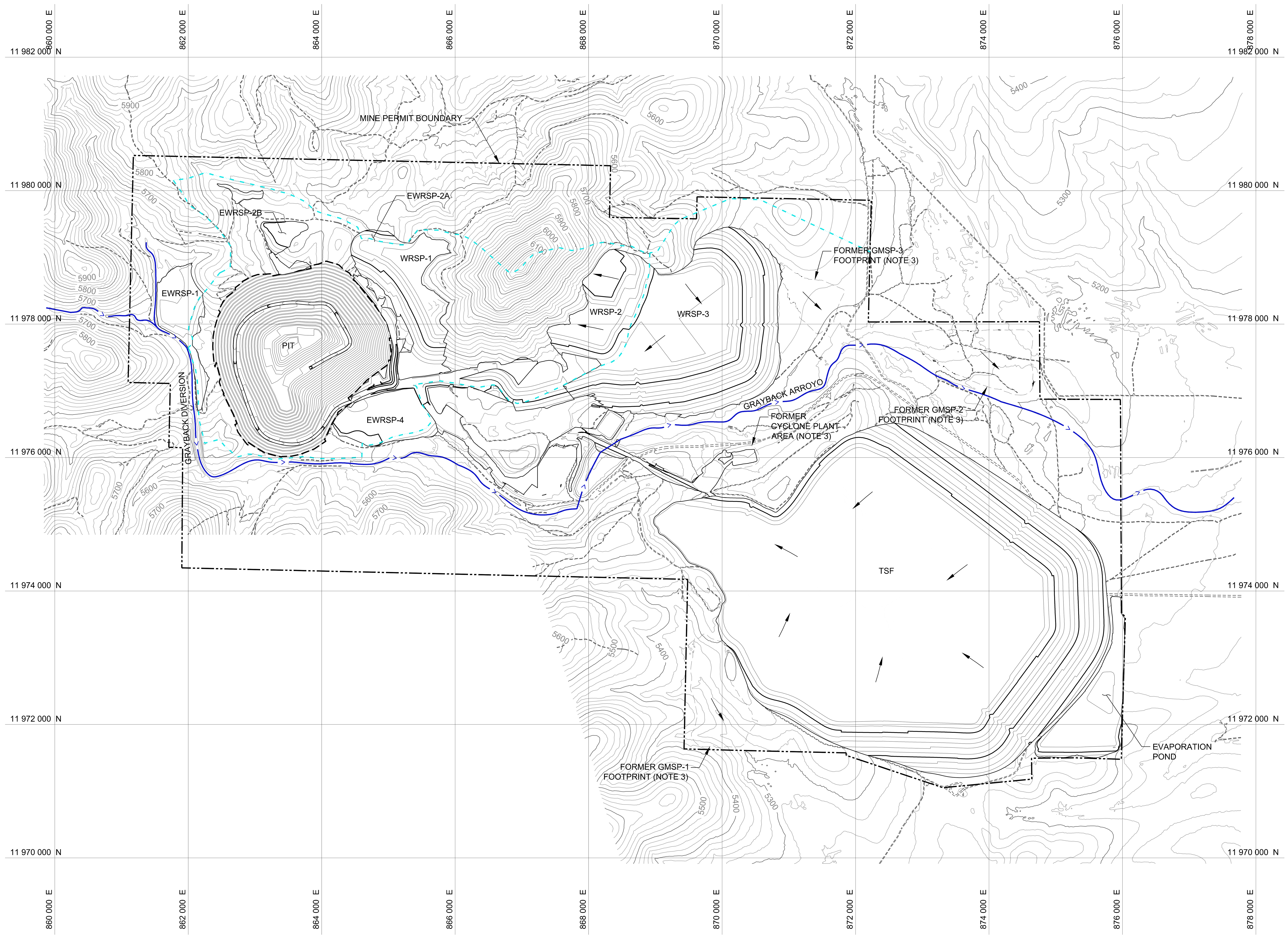

GENERAL LEGEND

5400	EXISTING GROUND CONTOURS - 20 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 20 ft INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
GMSP	GROWTH MEDIA STOCKPILE

NOTES

1. EXISTING GROUND TOPOGRAPHY WAS DEVELOPED BY COOPER AERIAL SURVEYS BASED ON JUNE 18, 2011 AERIAL SURVEY AND PROVIDED BY THEMAC RESOURCES.
2. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.
3. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILES AND THE CYCLONE PLANT AREA WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.

0 800 1600
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-13	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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FOR AGENCY REVIEW

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT
FINAL RECLAMATION TOPOGRAPHY

PROJECT NO.	CONTROL	REV.	4 of 25	DRAWING
1531453	0300	C		G-004

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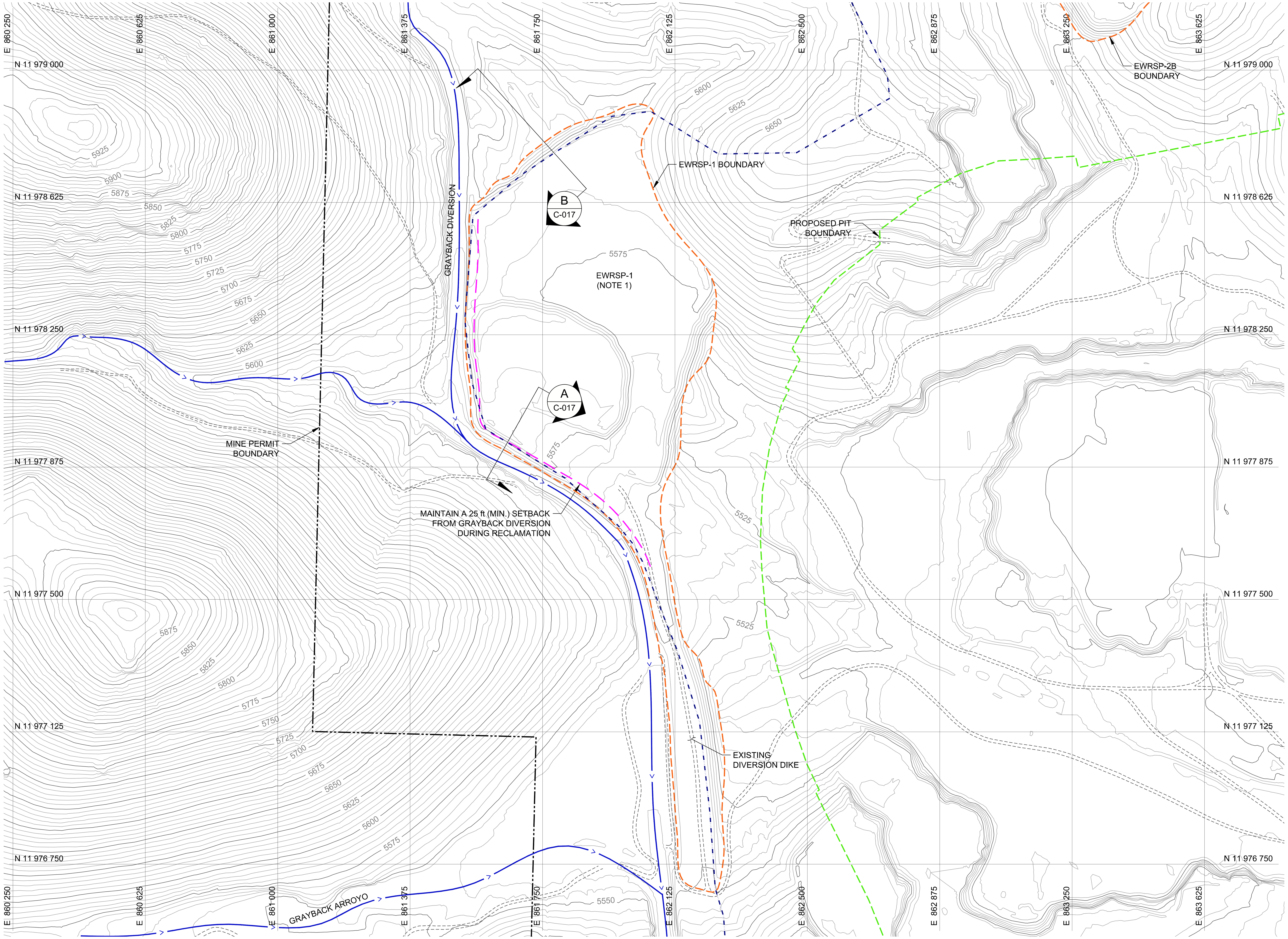

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	PROPOSED FACILITY BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	PROPOSED SETBACK
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
EWRSP	EXISTING WASTE ROCK STOCKPILE
MIN.	MINIMUM

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.

0 150 300
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-1 EXISTING FACILITY LAYOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	5 of 25	C-001

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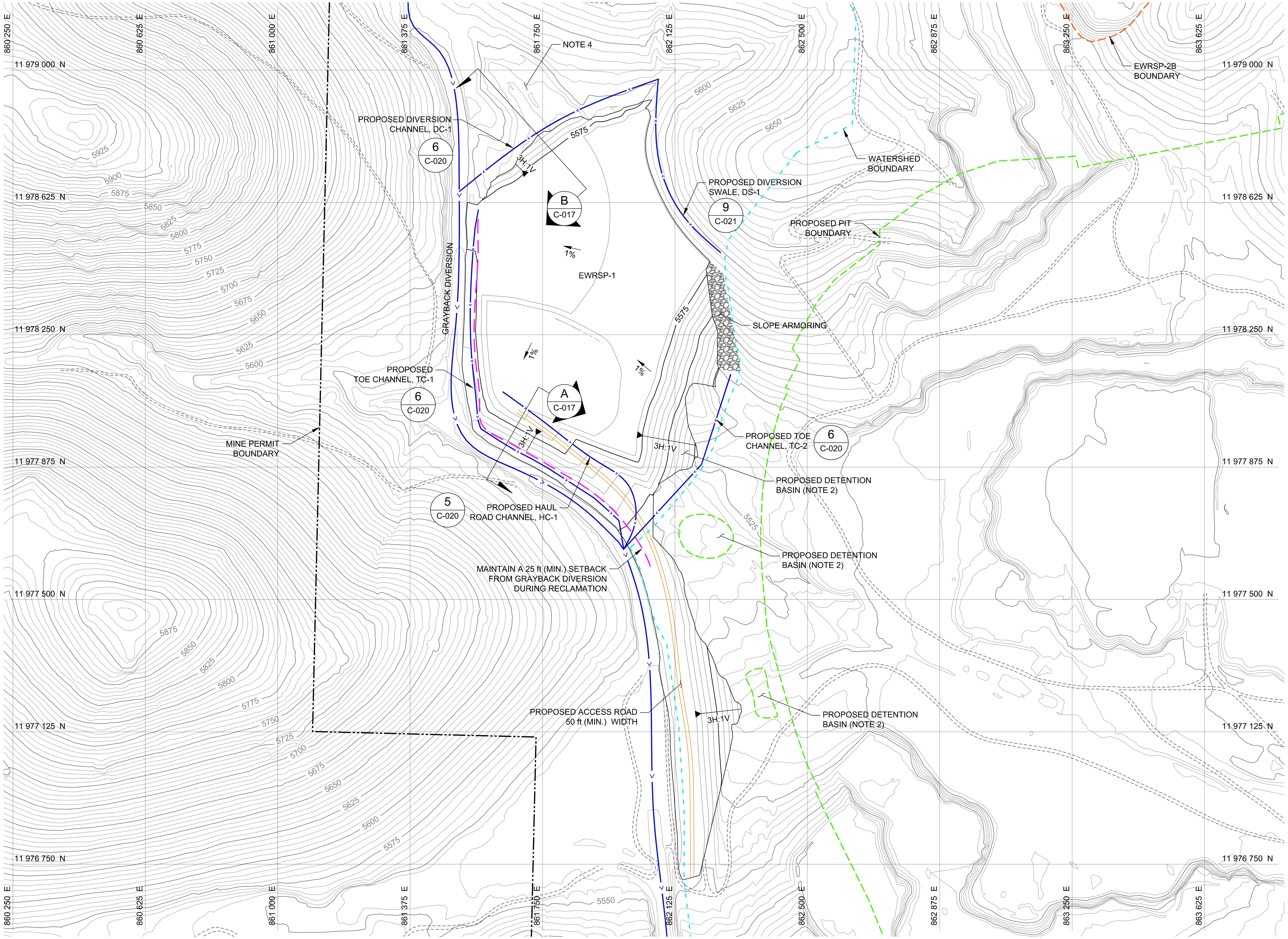

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 5)
	MINE PERMIT BOUNDARY
	PROPOSED FACILITY BOUNDARY
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	PROPOSED ROAD
	PROPOSED SETBACK
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
1 C-020	DETAIL CALLOUT DETAIL ID DRAWING LOCATION
A C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
EWRSP	EXISTING WASTE ROCK STOCKPILE
MIN.	MINIMUM
	SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. DETENTION BASINS SHALL BE CONSTRUCTED FOR EVAPORATION AND USE AS A WILDLIFE HABITAT.
3. RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 1% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(2). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
4. PLACE FILL MATERIAL TO PROMOTE POSITIVE DRAINAGE TOWARD PROPOSED DIVERSION CHANNEL, DC-1, AND THE EXISTING GRAYBACK DIVERSION.
5. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

0 150 300
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-1 REGRADE AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.	6 of 25	DRAWING
1531453	0300	C		C-002

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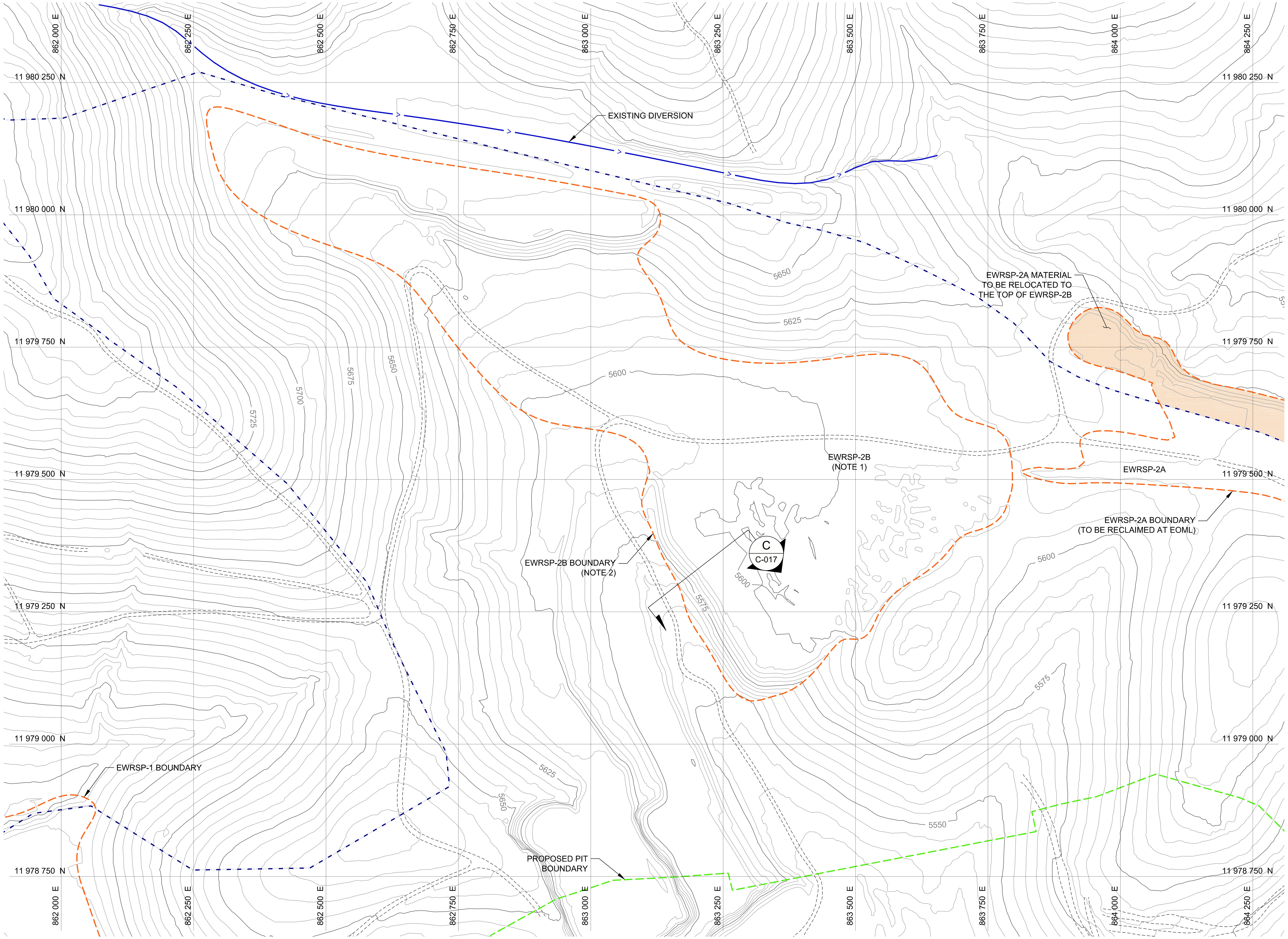

LEGEND

- 5400 — EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
- EXISTING FACILITY BOUNDARY (APPROXIMATE)
- PROPOSED FACILITY BOUNDARY
- WATERSHED BOUNDARY (BY OTHERS)
- EXISTING DIVERSION OR ARROYO
- EXISTING ROAD
- A / C-017 — SECTION CALLOUT: SECTION ID, DRAWING LOCATION
- EWRSP — EXISTING WASTE ROCK STOCKPILE
- EOML — END OF MINE LIFE

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. EXISTING EWRSP-2B FACILITY FOOTPRINT INCLUDES ASSOCIATED DISTURBED AREAS.

0 100 200
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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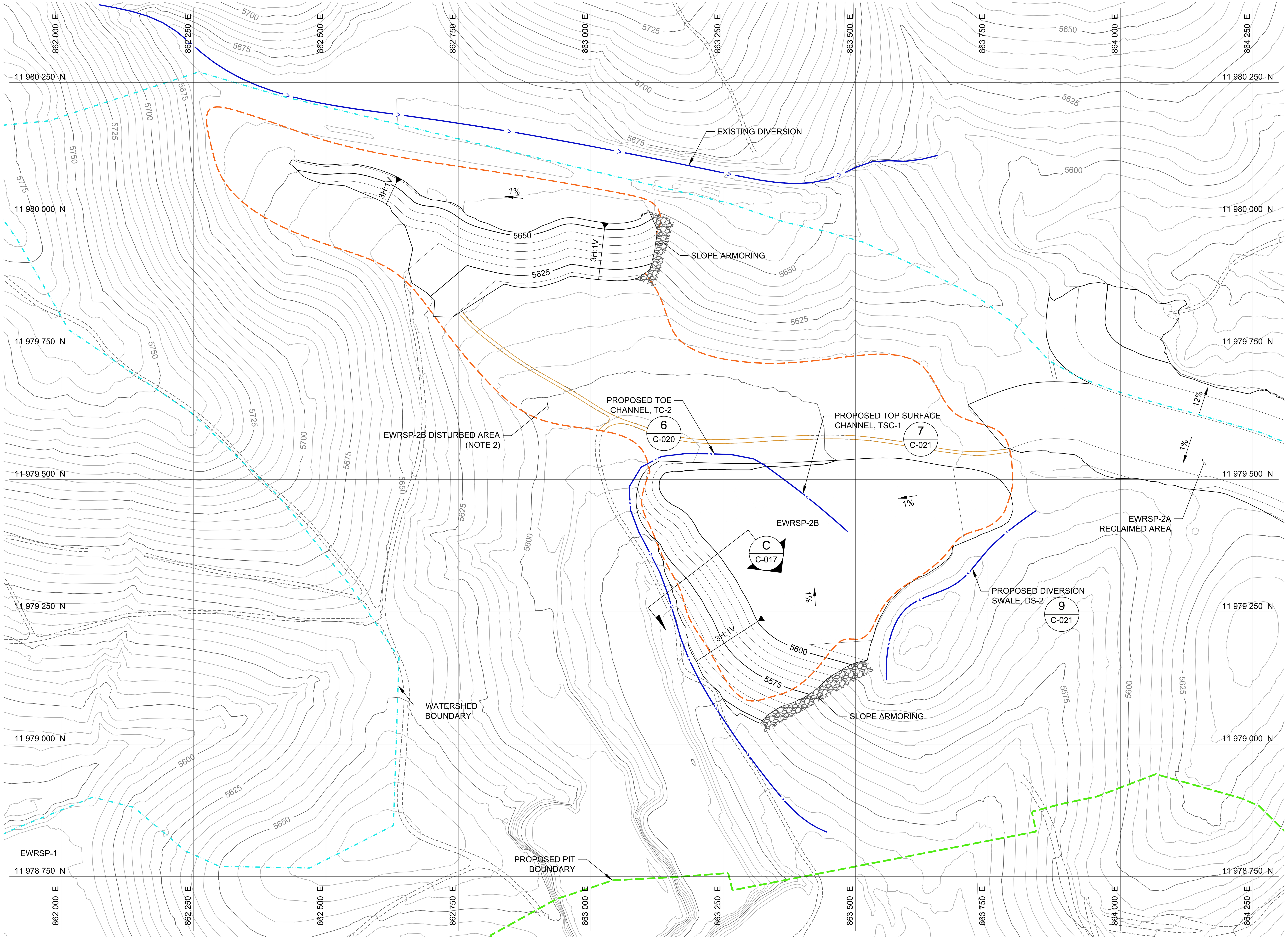
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-2B EXISTING FACILITY LAYOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	7 of 25	C-003



LEGEND

5400 — EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)

5400 — PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 4)

EXISTING FACILITY BOUNDARY (APPROXIMATE)

PROPOSED FACILITY BOUNDARY

RECLAMATION WATERSHED BOUNDARY

EXISTING DIVERSION OR ARROYO

PROPOSED CHANNEL CENTERLINE (APPROXIMATE)

EXISTING ROAD

PROPOSED ROAD

3H:1V — SLOPE INDICATOR

1% — GRADE INDICATOR

1 / C-020 — DETAIL CALLOUT: DETAIL ID, DRAWING LOCATION

A / C-017 — SECTION CALLOUT: SECTION ID, DRAWING LOCATION

EWRSP — EXISTING WASTE ROCK STOCKPILE

SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. EWRSP-2B TOP SURFACE SHALL BE GRADED TO PROPOSED TOE CHANNEL, TC-2, FOR FLOW CONVEYANCE TOWARD PIT PERIMETER CHANNEL, PC-1. EWRSP-2B FACILITY FOOTPRINT INCLUDES ASSOCIATED DISTURBED AREAS TO BE GRADED, RIPPED AND VEGETATED.
3. EWRSP-2B RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(2). A 1% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(2). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORWATER CONVEYANCE.
4. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-2B REGRADE AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	8 of 25	C-004

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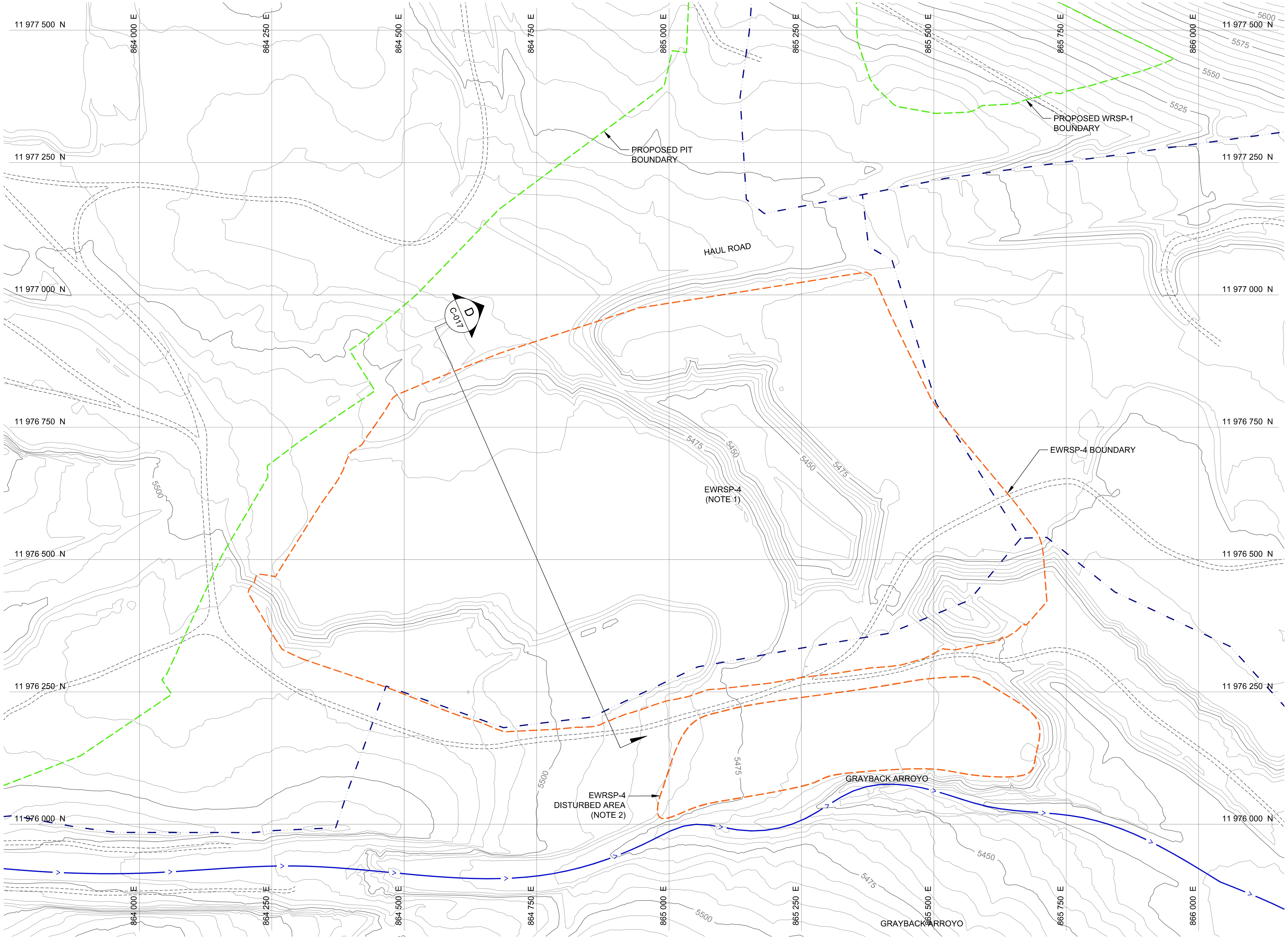

LEGEND

- 5400 — EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
- EXISTING FACILITY BOUNDARY (APPROXIMATE)
- PROPOSED FACILITY BOUNDARY
- WATERSHED BOUNDARY (BY OTHERS)
- EXISTING DIVERSION OR ARROYO
- EXISTING ROAD
- A / C-017 — SECTION CALLOUT, SECTION ID, DRAWING LOCATION
- EWRSP — EXISTING WASTE ROCK STOCKPILE
- WRSP — WASTE ROCK STOCKPILE

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. EXISTING EWRSP-4 FACILITY FOOTPRINT INCLUDES ASSOCIATED DISTURBED AREAS.

0 100 200 FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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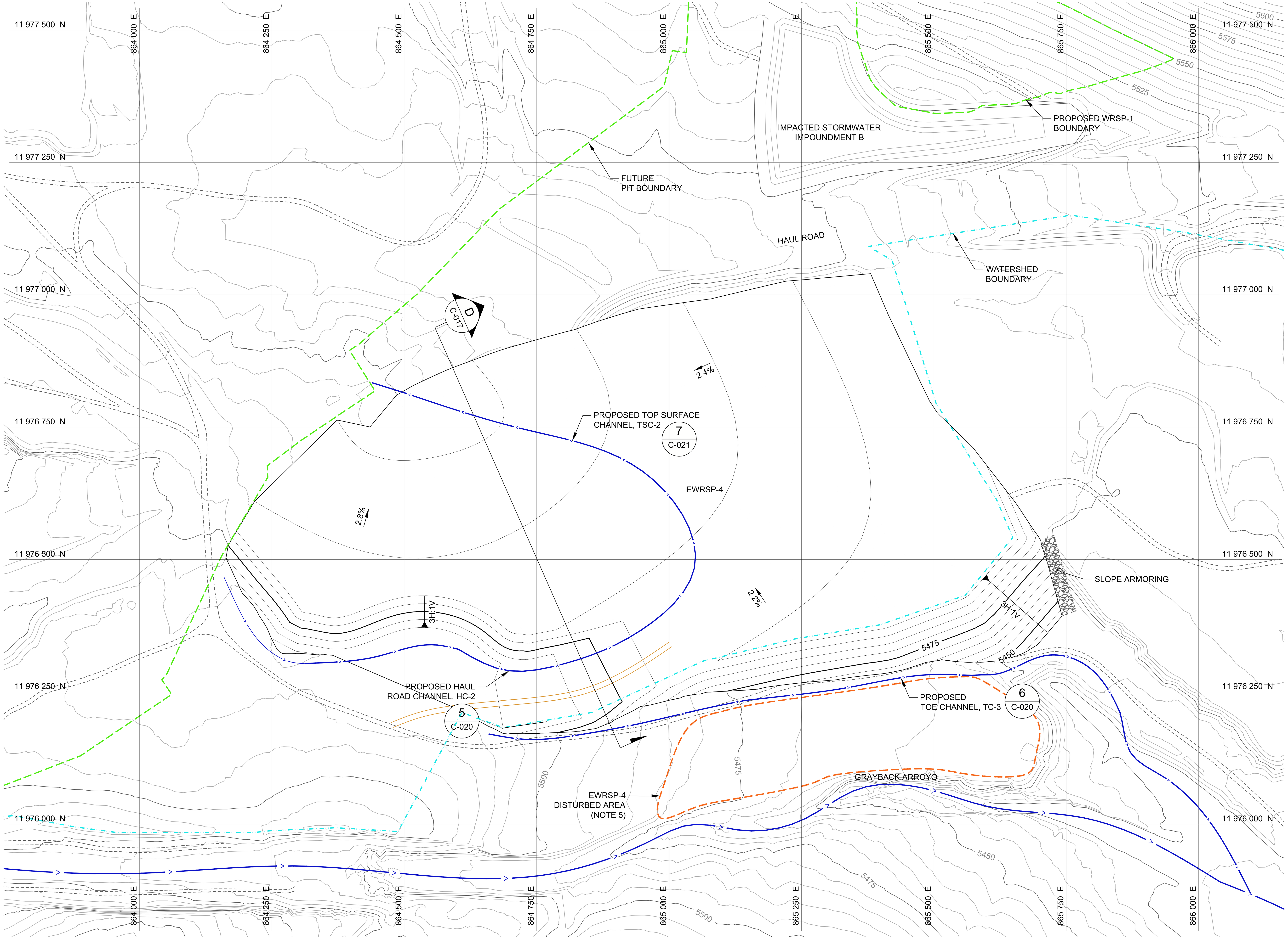
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-4 EXISTING FACILITY LAYOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	9 of 25	C-005



LEGEND

- 5400 EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
- 5400 PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 4)
- EXISTING FACILITY BOUNDARY (APPROXIMATE)
- PROPOSED FACILITY BOUNDARY
- RECLAMATION WATERSHED BOUNDARY
- EXISTING DIVERSION OR ARROYO
- PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
- EXISTING ROAD
- PROPOSED ROAD
- 3H:1V SLOPE INDICATOR
- 1% GRADE INDICATOR
- 1 / C-020 DETAIL CALLOUT: DETAIL ID, DRAWING LOCATION
- A / C-017 SECTION CALLOUT: SECTION ID, DRAWING LOCATION
- WRSP WASTE ROCK STOCKPILE
- EWRSP EXISTING WASTE ROCK STOCKPILE
- SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. EWRSP-4 TOP SURFACE SHALL BE GRADED TO A PROPOSED HAUL ROAD CHANNEL, HC-3, FOR FLOW CONVEYANCE TOWARD THE PIT.
3. EWRSP-4 RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 1% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(2). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT, AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
4. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.
5. EXISTING EWRSP-4 FACILITY FOOTPRINT INCLUDES ASSOCIATED DISTURBED AREAS.

0 100 200
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENGY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP-4 REGRADE AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	10 of 25	C-006

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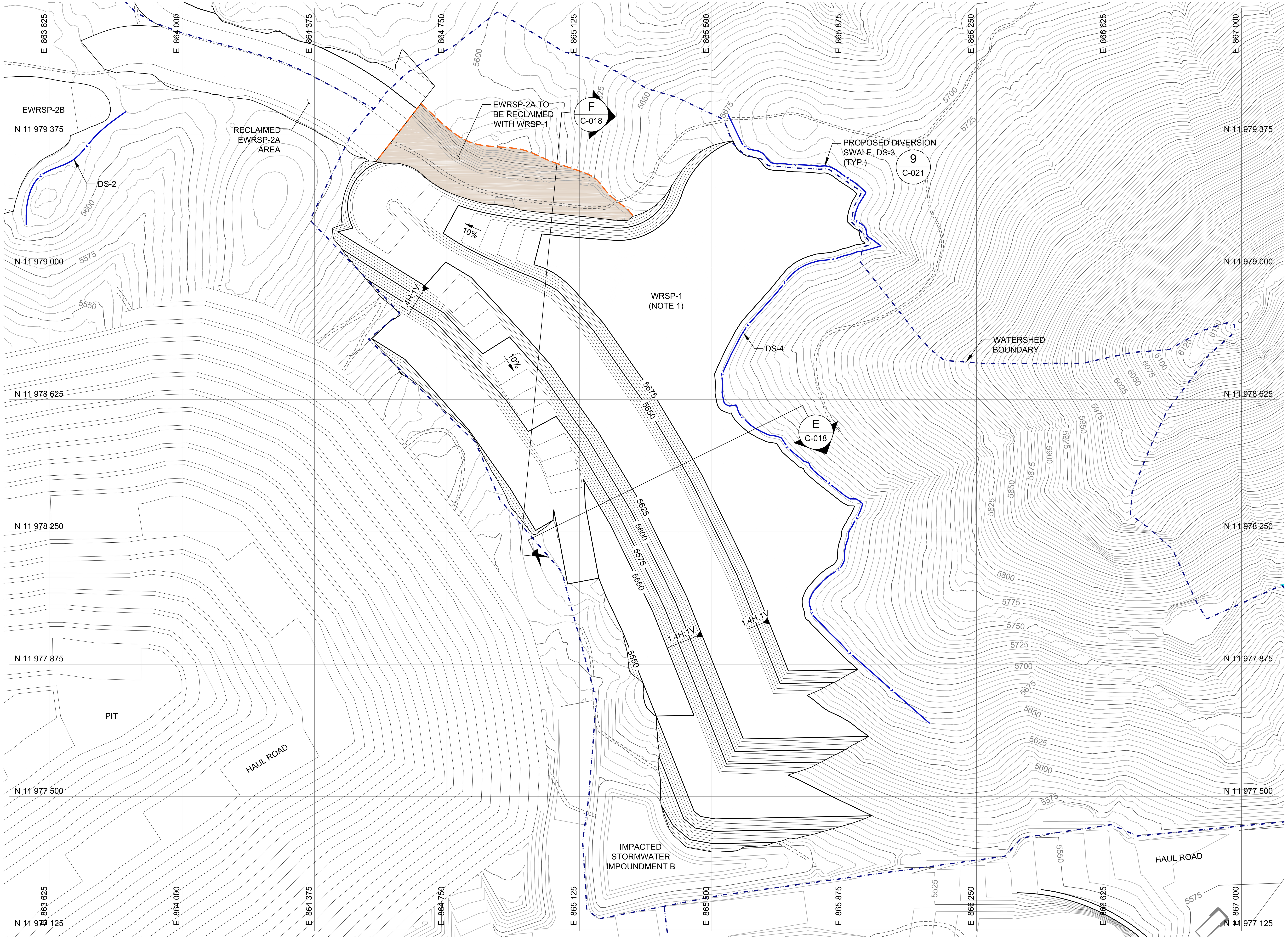

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 1)
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TYP.	TYPICAL

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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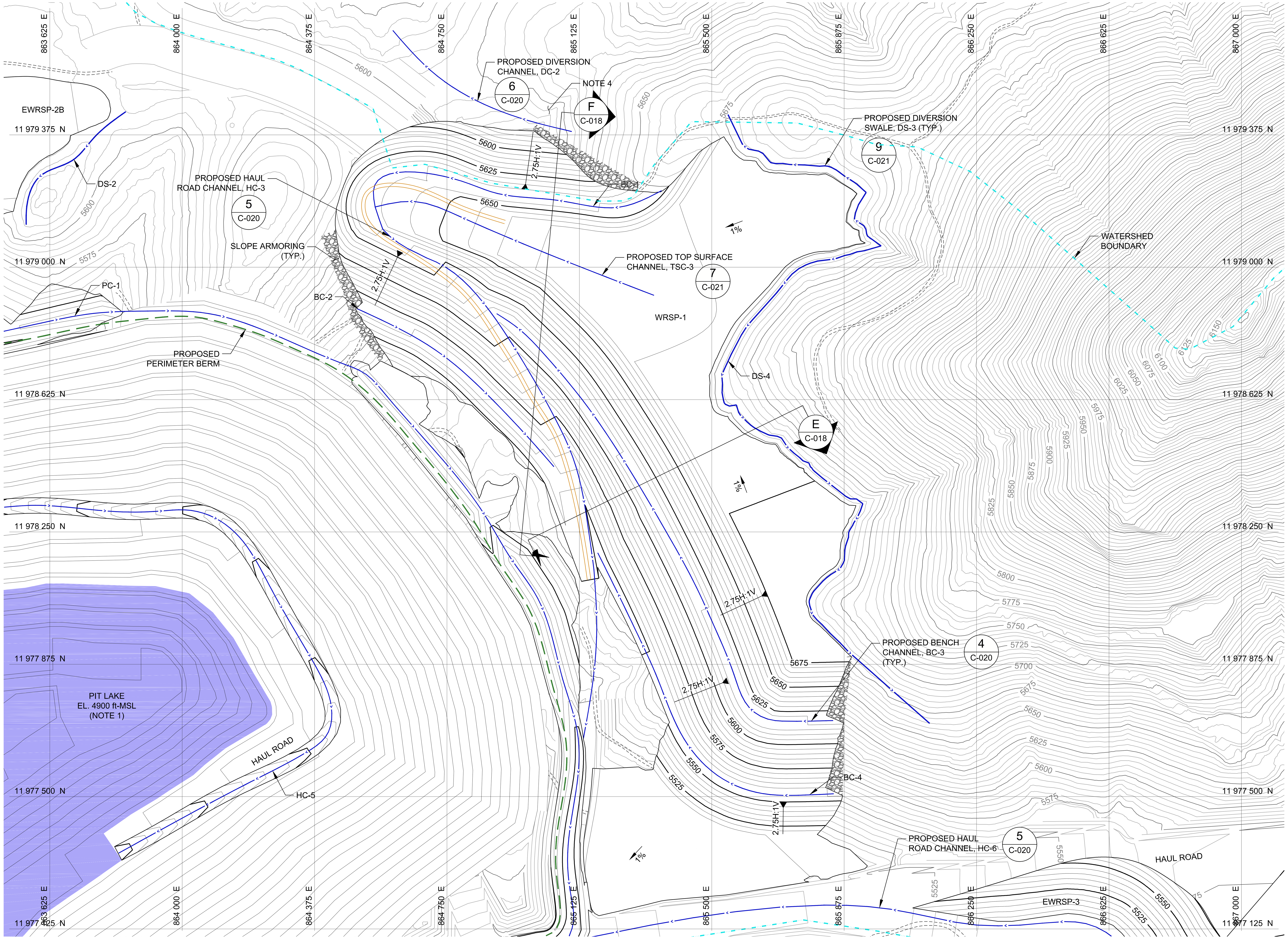
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
WRSP-1 AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	11 of 25	C-007



LEGEND

Symbol	Description
5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 5)
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	PROPOSED ROAD
	PROPOSED PERIMETER BERM
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
1 / C-020	DETAIL CALLOUT DETAIL ID DRAWING LOCATION
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE
TYP.	TYPICAL
	PIT LAKE EL. 4900 ft-MSL (NOTE 1)
	SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC. PIT LAKE ELEVATION PROVIDED BY NMCC.
2. WRSP-1 TOP SURFACE SHALL BE GRADED TO A HAUL ROAD CHANNEL FOR FLOW CONVEYANCE TOWARD THE PIT.
3. WRSP-1 RECLAMATION DESIGN SHALL UTILIZE 2.75H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 1% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(2). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
4. PLACE FILL MATERIAL TO PROMOTE DRAINAGE AWAY FROM THE RECLAIMED WRSP-1 TOE.
5. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
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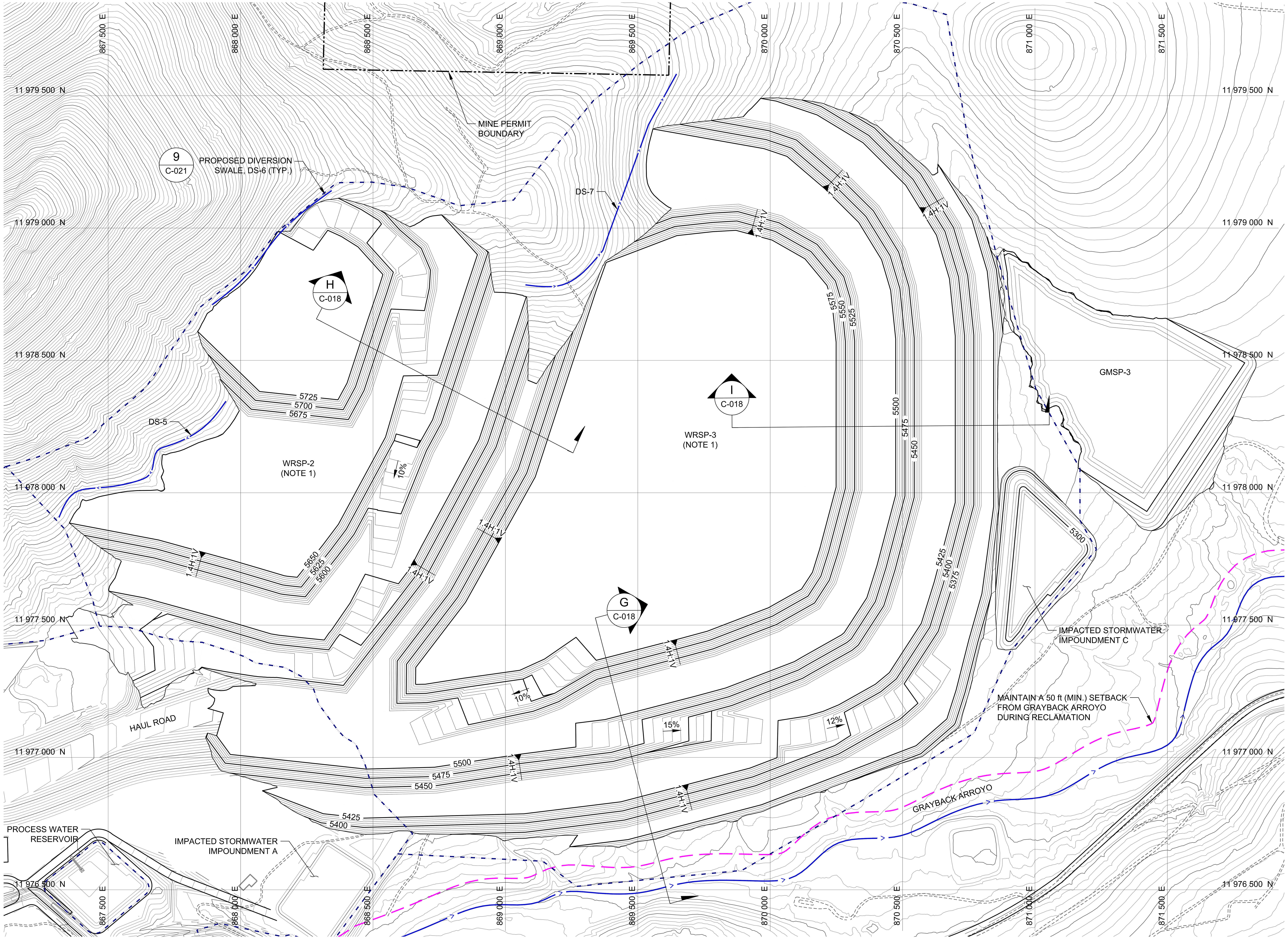
MINE RECLAMATION AND CLOSURE PLAN

TITLE
WRSP-1 REGRADE AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.	12 of 25	DRAWING
1531453	0300	C		C-008



LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	SETBACK
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
A C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
GMSP	GROWTH MEDIA STOCKPILE
MIN.	MINIMUM
TYP.	TYPICAL

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.

0 200 400
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
WRSP-2 AND WRSP-3 AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	13 of 25	C-009

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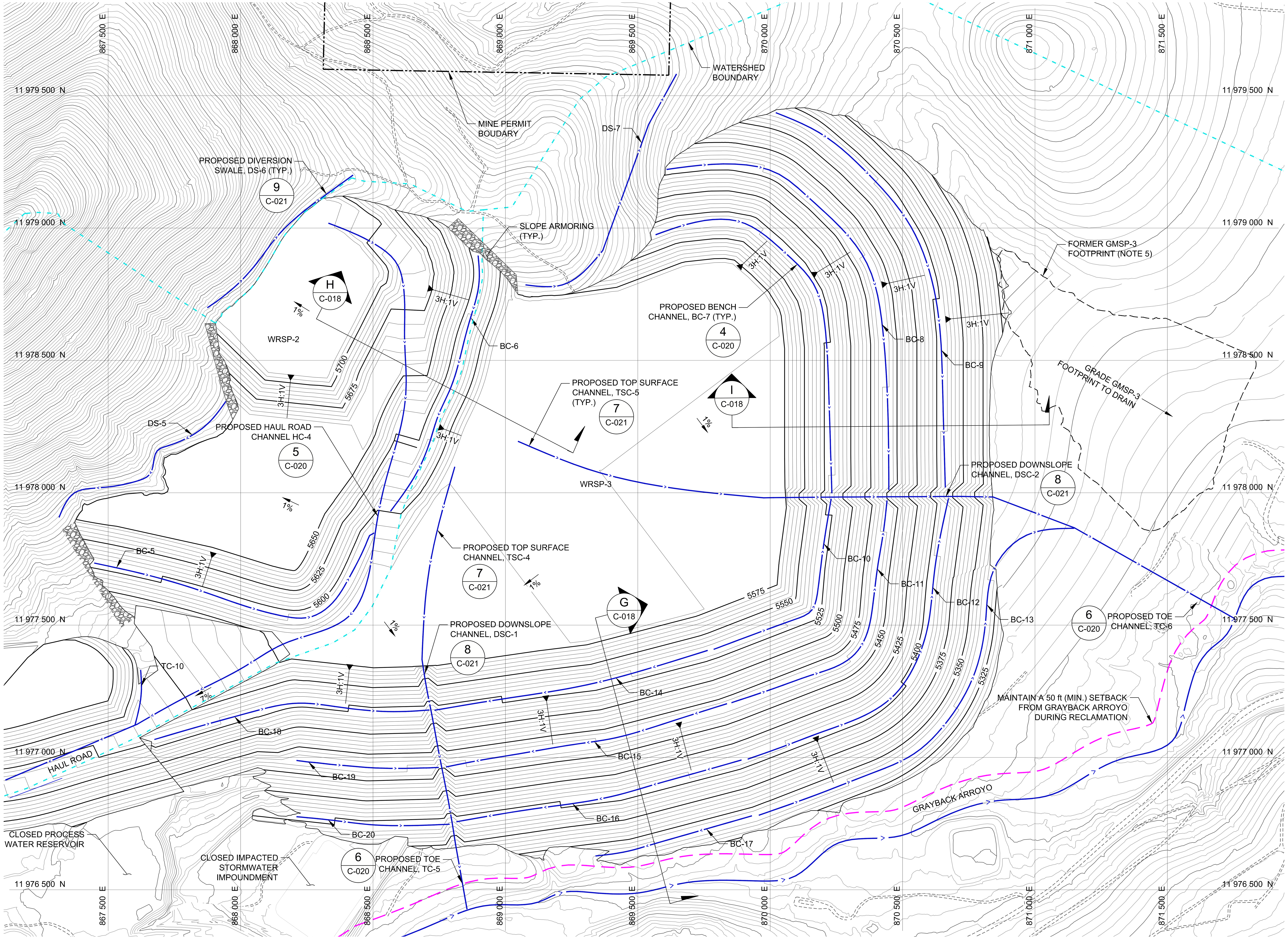

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 6)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	PROPOSED ROAD
	SETBACK
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
1 C-020	DETAIL CALLOUT DETAIL ID DRAWING LOCATION
A C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
TYP.	TYPICAL
	SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. WRSP-2 AND WRSP-3 TOP SURFACE SHALL BE GRADED TOWARD THE SOUTH, WEST AND EAST, AND UTILIZE PLANNED HAUL ROADS WHERE PRACTICAL FOR STORMWATER CONVEYANCE.
3. WRSP-2 AND WRSP-3 RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 1% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(2). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
4. IMPACTED STORMWATER IMPOUNDMENT A AND THE PROCESS WATER RESERVOIR TO BE RECLAIMED AS PART OF THE PLANT AREA RECLAMATION PLAN (SEE DRAWING C-016).
5. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILE 3 WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.
6. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

0 200 400
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
WRSP-2 AND WRSP-3 REGRADE AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.	14 of 25	DRAWING
1531453	0300	C		C-010

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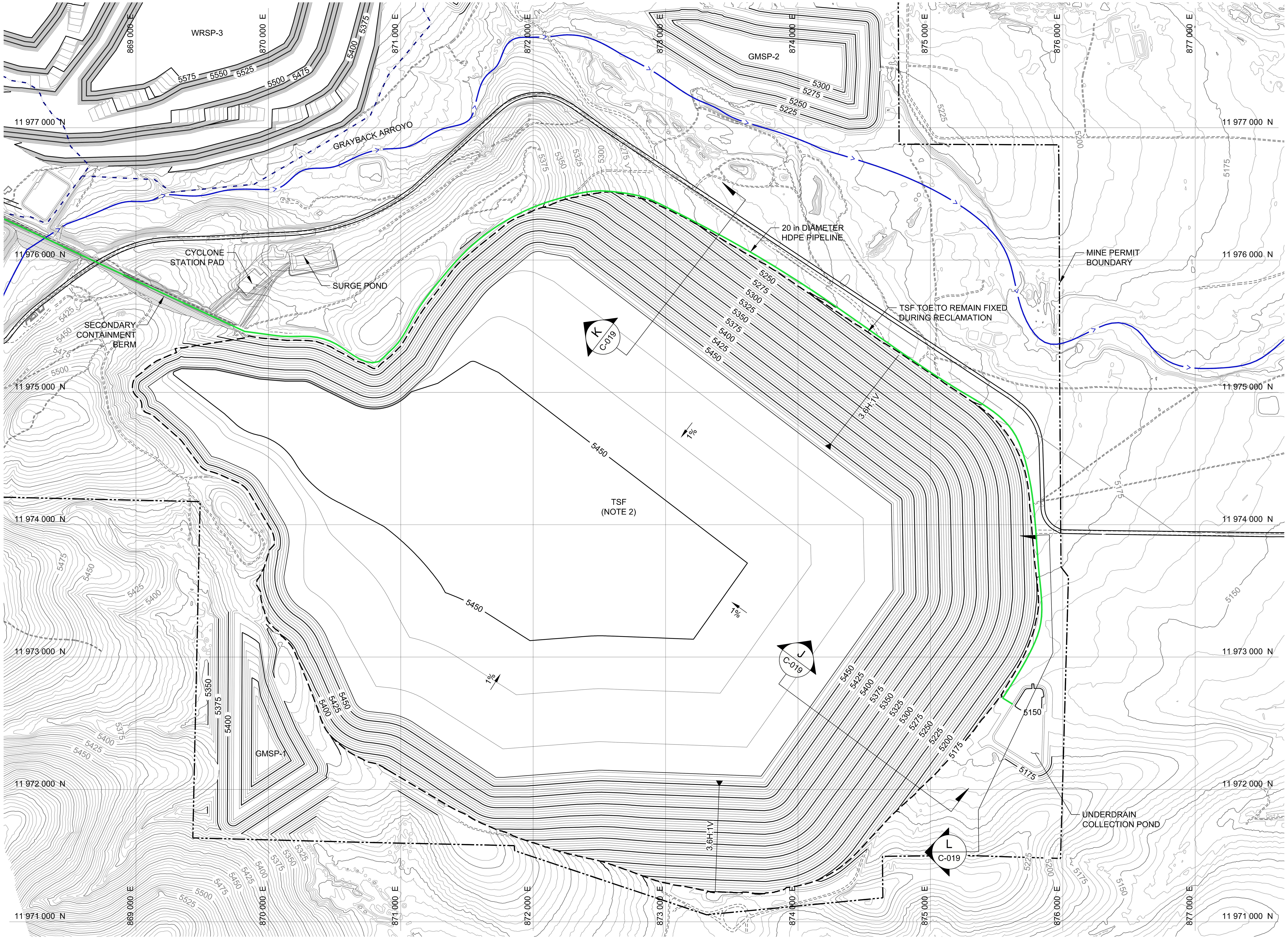

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTES 1 AND 2)
	MINE PERMIT BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
A C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
GMSP	GROWTH MEDIA STOCKPILE
TSF	TAILING STORAGE FACILITY

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. FINAL BUILDOUT TOPOGRAPHY FOR THE TSF WAS DEVELOPED BY GOLDER AND IS FROM THE 30K TPD TAILINGS STORAGE FACILITY FEASIBILITY DESIGN REPORT (GOLDER, 2015).

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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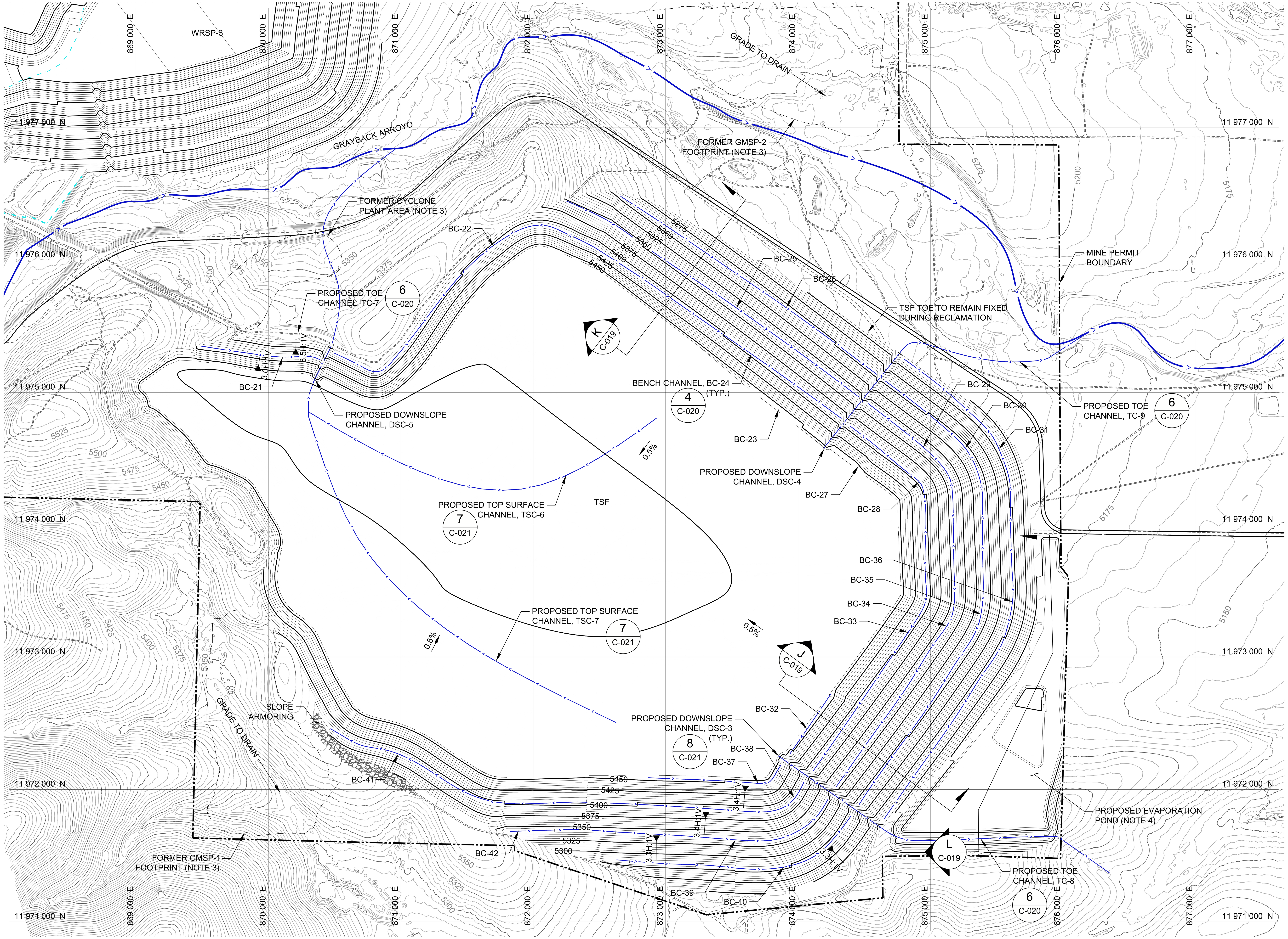
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
TSF AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	15 of 25	C-011



LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 5)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	PROPOSED ROAD
	SETBACK
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
1 / C-020	DETAIL CALLOUT DETAIL ID DRAWING LOCATION
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY
	SLOPE ARMORING

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 0.5% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(1). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
3. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILES AND CYCLONE PLANT AREA WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.
4. EVAPORATION POND WILL BE CONSTRUCTED IN YEAR 5 FOLLOWING CESSATION OF MINING, NEAR THE END OF THE ACTIVE EVAPORATION PROGRAM. EVAPORATION POND WILL BE RECLAIMED AT THE END OF THE PASSIVE EVAPORATION PROGRAM.
5. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016--09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE PERMIT CLOSURE DESIGN

TITLE
TSF RECLAMATION AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.	16 of 25	DRAWING
1531453	0300	C		C-012

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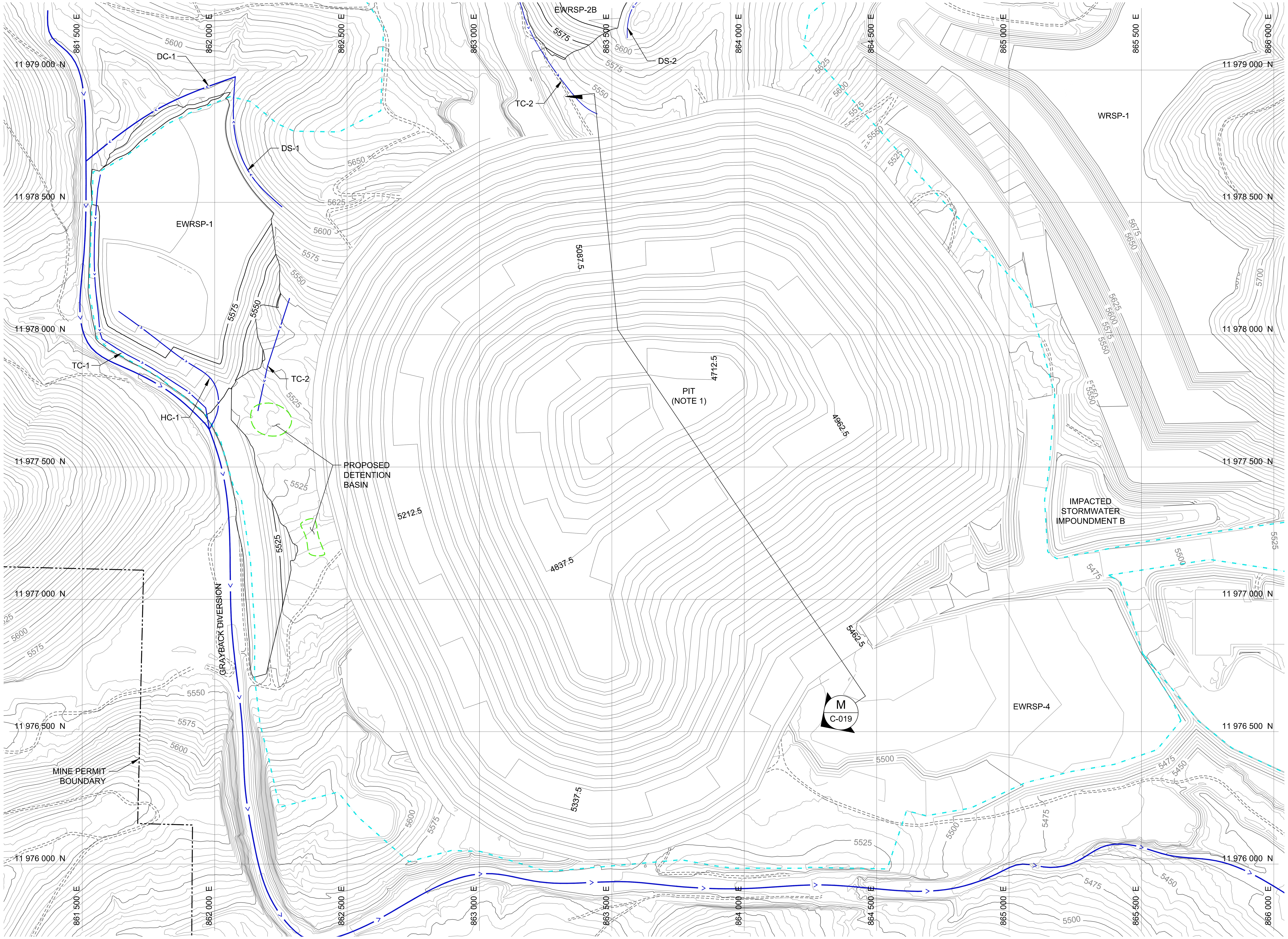

LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL)
	MINE PERMIT BOUNDARY
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	PROPOSED FACILITY BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE

NOTES

1. PLANNED END OF MINE LIFE TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.

0 200 400
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
PIT AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.	17 of 25	DRAWING
1531453	0300	C		C-013

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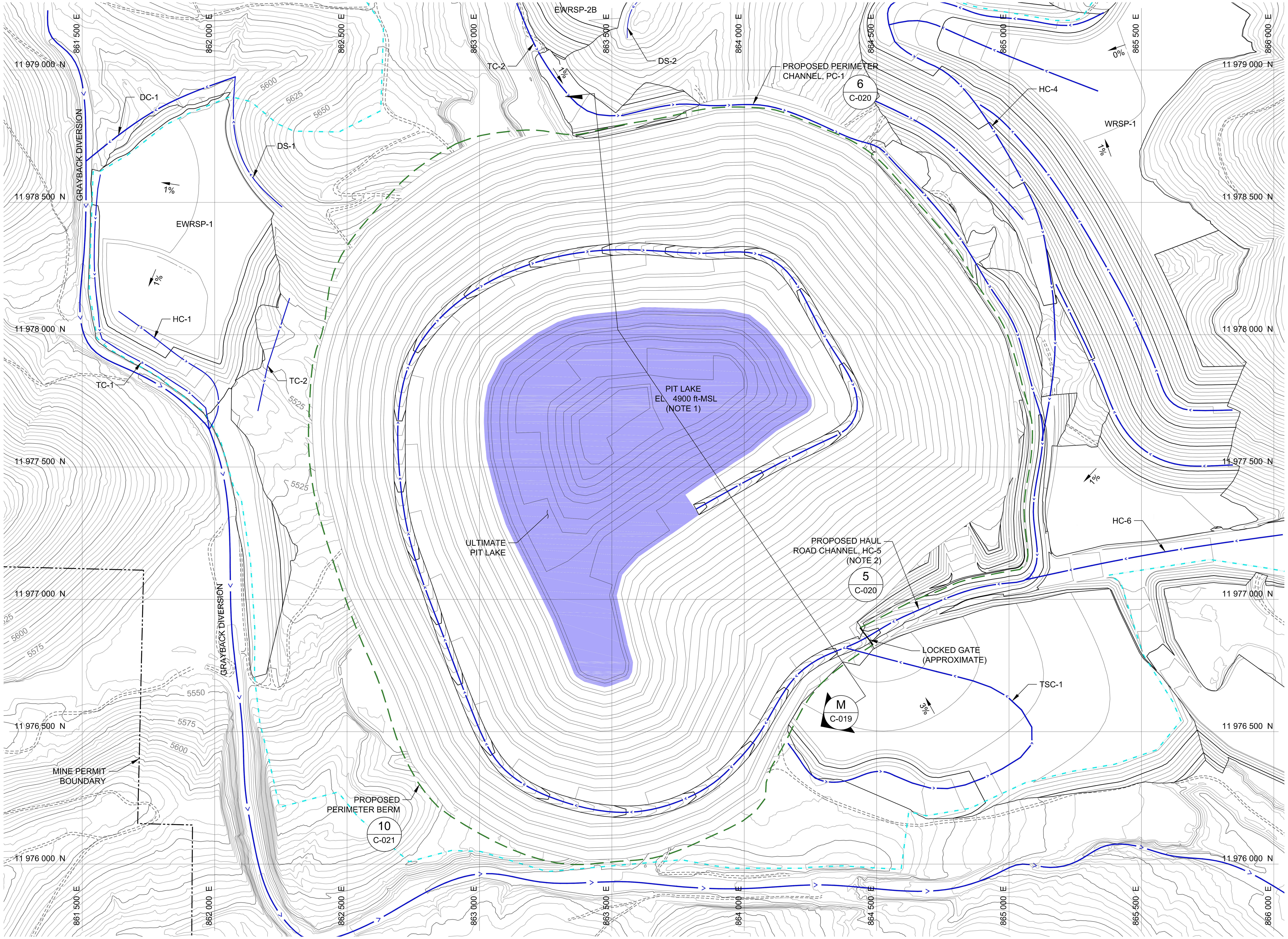

LEGEND

- 5400 — EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
- 5400 — PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 4)
- MINE PERMIT BOUNDARY
- RECLAMATION WATERSHED BOUNDARY
- EXISTING DIVERSION OR ARROYO
- PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
- EXISTING ROAD
- PROPOSED PERIMETER BERM
- 1% — GRADE INDICATOR
- 1 / C-020 — DETAIL CALLOUT: DETAIL ID, DRAWING LOCATION
- A / C-017 — SECTION CALLOUT: SECTION ID, DRAWING LOCATION
- WRSP — WASTE ROCK STOCKPILE
- EWRSP — EXISTING WASTE ROCK STOCKPILE
- PIT LAKE EL. 4900 ft-MSL (NOTE 1)

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC. PIT LAKE ELEVATION PROVIDED BY NMCC.
2. THE PLANNED HAUL ROADS SHALL BE UTILIZED FOR STORMWATER CONVEYANCE TO THE PIT.
3. ASSUMED 100 foot WIDE DISTURBANCE AREA AROUND PERIMETER OF THE PIT TO BE RECLAIMED.
4. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

0 200 400
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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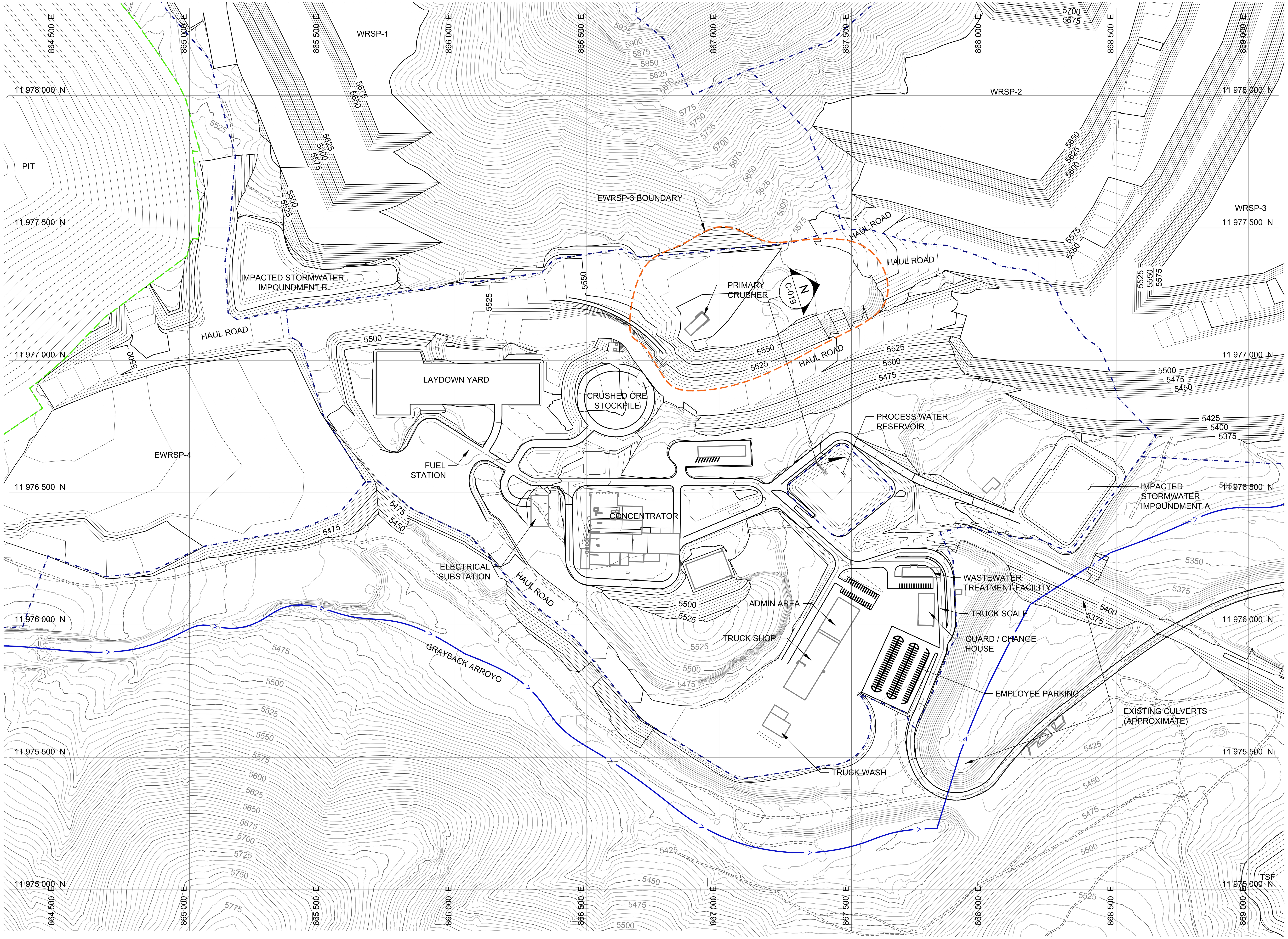
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PERMIT

TITLE
PIT RECLAMATION AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	18 of 25	C-014



LEGEND

5400	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
5400	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 1)
	EXISTING FACILITY BOUNDARY (APPROXIMATE)
	PROPOSED FACILITY BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.

0 200 400
FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-02	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
PLANT AREA AT FINAL BUILDOUT

PROJECT NO.	CONTROL	REV.	19 of 25	DRAWING
1531453	0300	C		C-015

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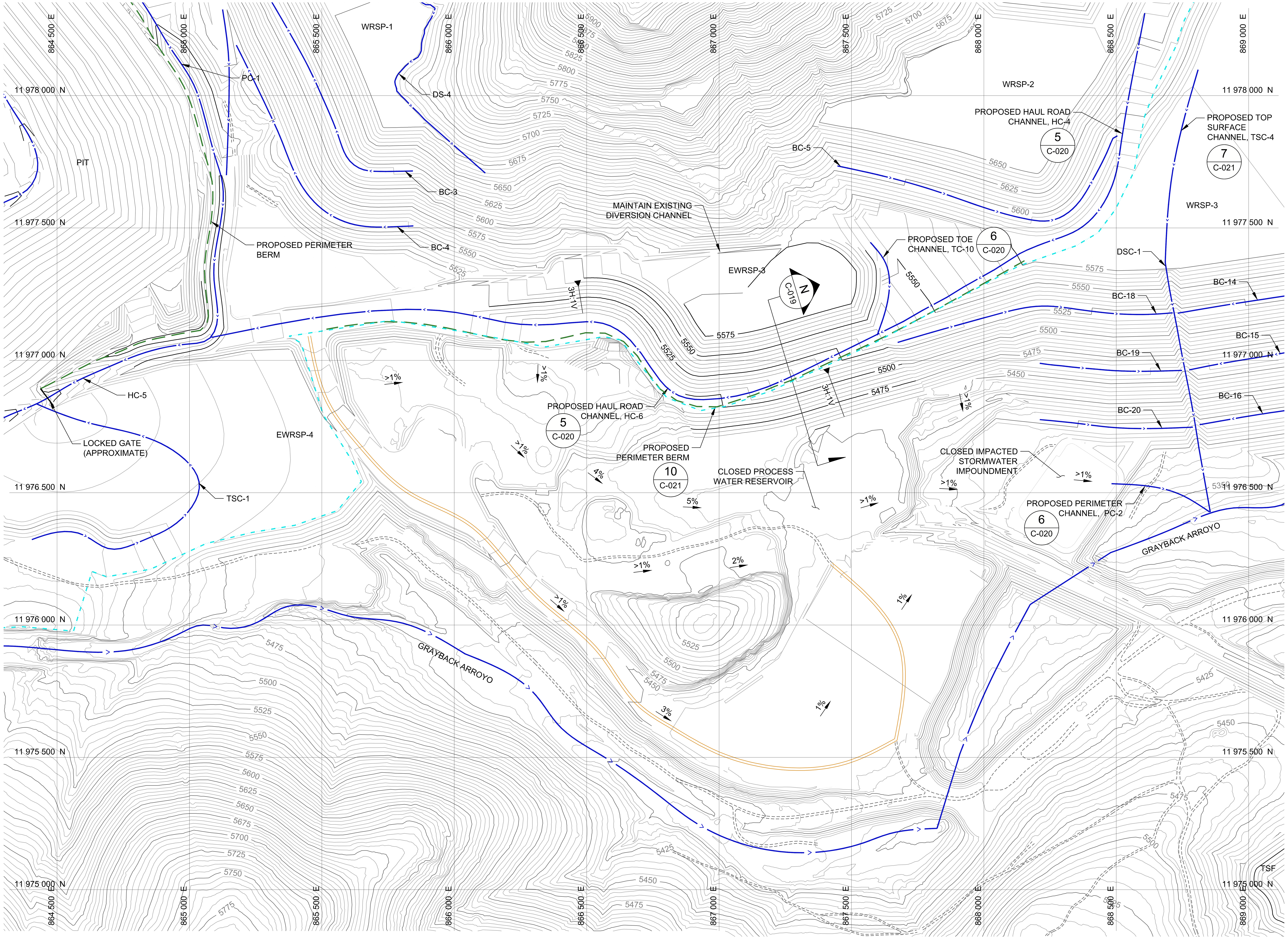

LEGEND

7600	EXISTING GROUND CONTOURS - 5 ft INTERVAL (ft-MSL)
7580	PROPOSED DESIGN CONTOURS - 5 ft INTERVAL (ft-MSL) (NOTE 4)
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	PROPOSED ROAD
	PROPOSED PERIMETER BERM
3H:1V	SLOPE INDICATOR
1%	GRADE INDICATOR
1 / C-020	DETAIL CALLOUT DETAIL ID DRAWING LOCATION
A / C-017	SECTION CALLOUT SECTION ID DRAWING LOCATION
WRSP	WASTE ROCK STOCKPILE
EWRSP	EXISTING WASTE ROCK STOCKPILE

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. FINAL BUILDOUT TOPOGRAPHY FOR THE TSF WAS DEVELOPED BY GOLDER AND IS FROM THE 30K TPD TAILINGS STORAGE FACILITY FEASIBILITY DESIGN REPORT (GOLDER, 2015).
3. PLANNED HAUL ROADS WILL BE UTILIZED FOR STORMWATER CONVEYANCE TO THE PIT.
4. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-14	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	TC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
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MINE RECLAMATION AND CLOSURE PLAN

TITLE
PLANT AREA RECLAMATION AND DRAINAGE PLAN

PROJECT NO.	CONTROL	REV.	20 of 25	DRAWING
1531453	0300	C		C-016

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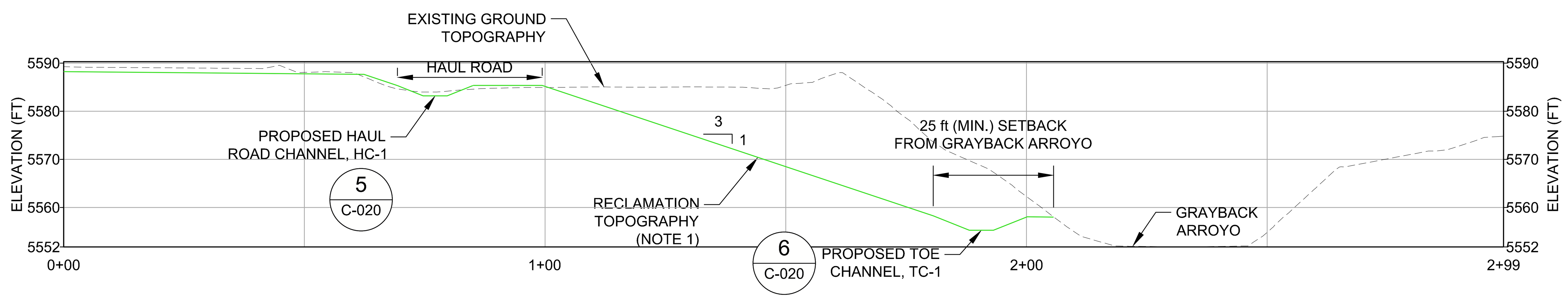
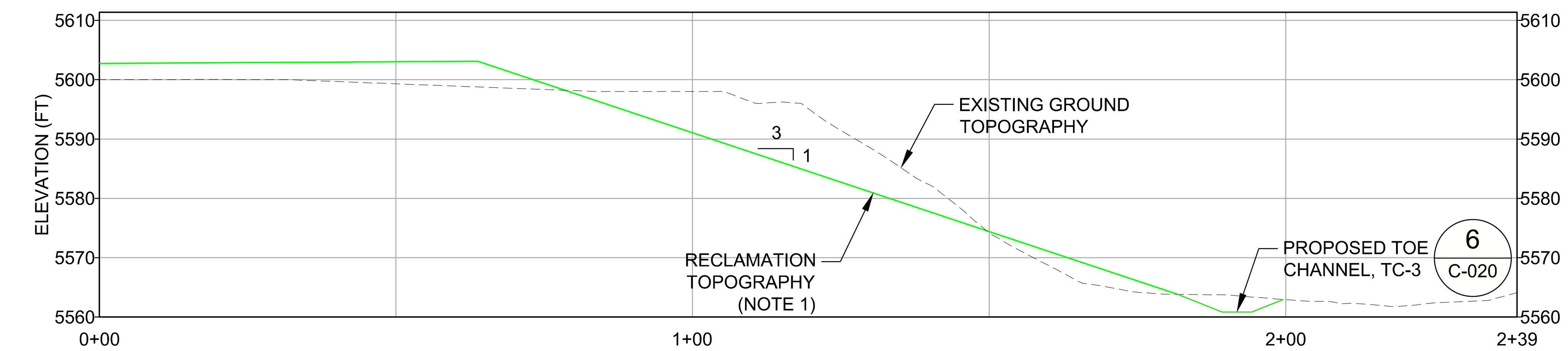
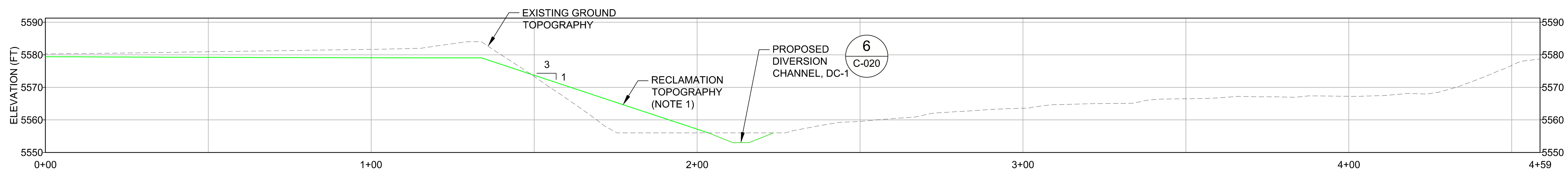


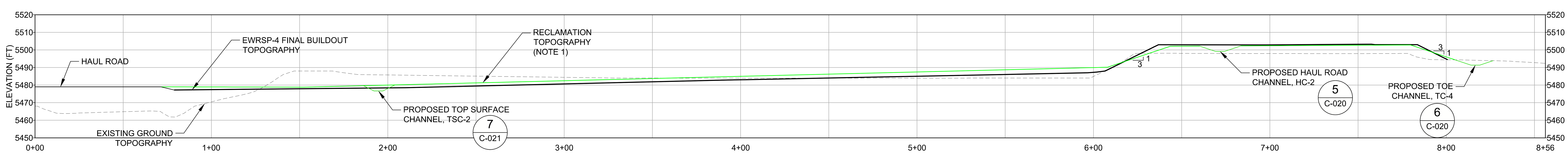
EWRSP-1 OUTSLOPE SECTION A
(SEE DRAWING C-002)
SCALE N.T.S. A C-017



EWRSP-2B OUTSLOPE SECTION C
(SEE DRAWING C-004)
SCALE N.T.S. C C-017



EWRSP-1 OUTSLOPE SECTION B
(SEE DRAWING C-002)
SCALE N.T.S. B C-017



EWRSP-4 SECTION D
(SEE DRAWING C-006)
SCALE N.T.S. D C-017

NOTES

1. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-10-15	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	JC
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
EWRSP RECLAMATION SECTIONS

PROJECT NO. 1531453 | CONTROL 0300 | REV. C | 21 of 25 | DRAWING C-017

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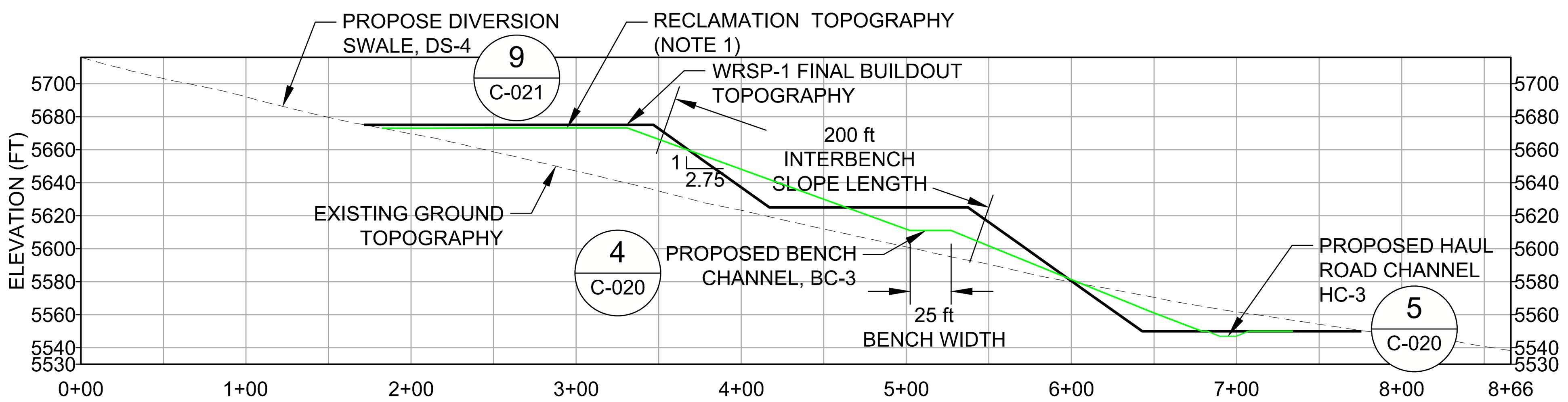
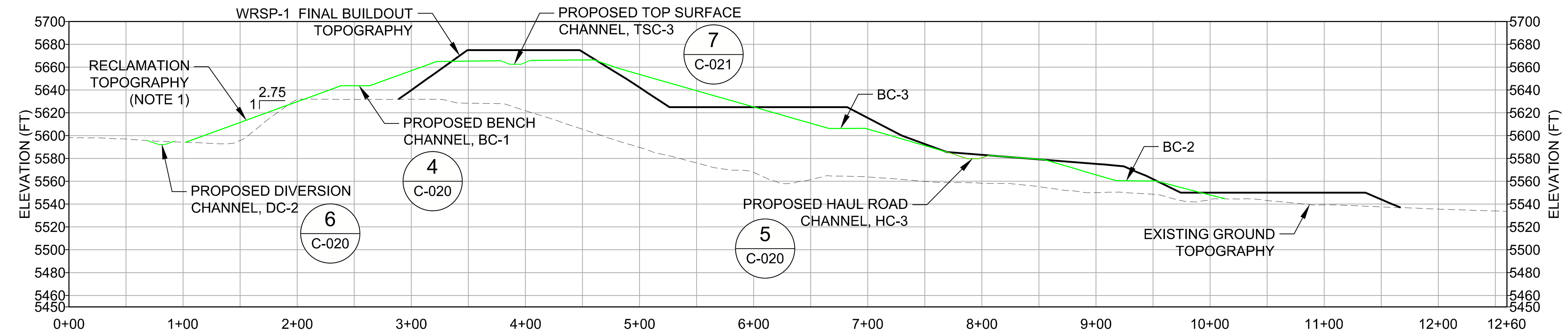


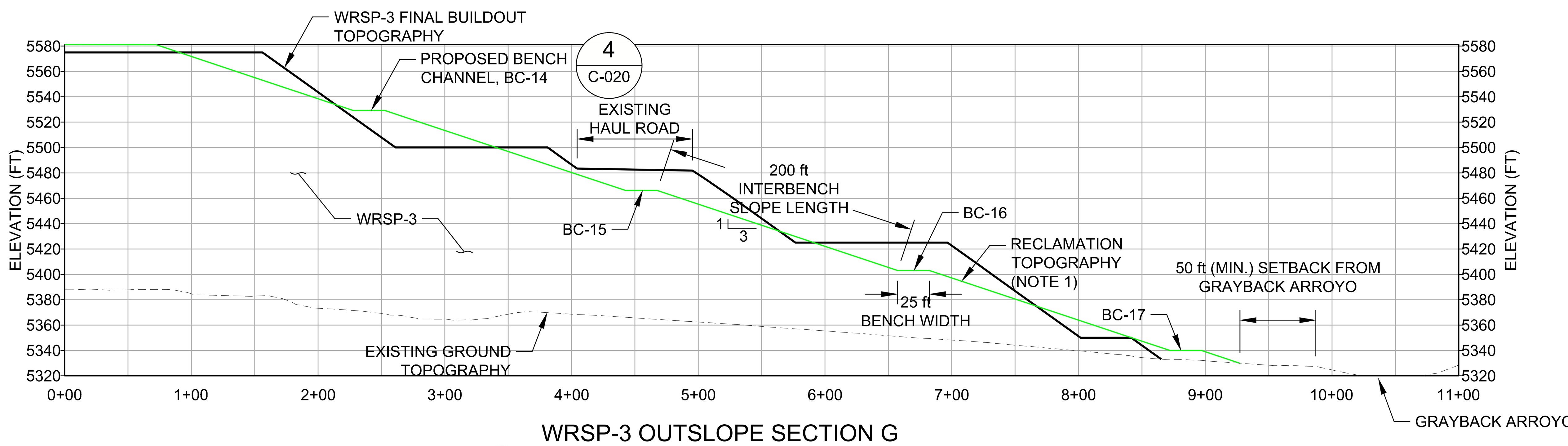
WRSP-1 OUTSLOPE SECTION E
(SEE DRAWING C-008)

SCALE N.T.S. E C-018



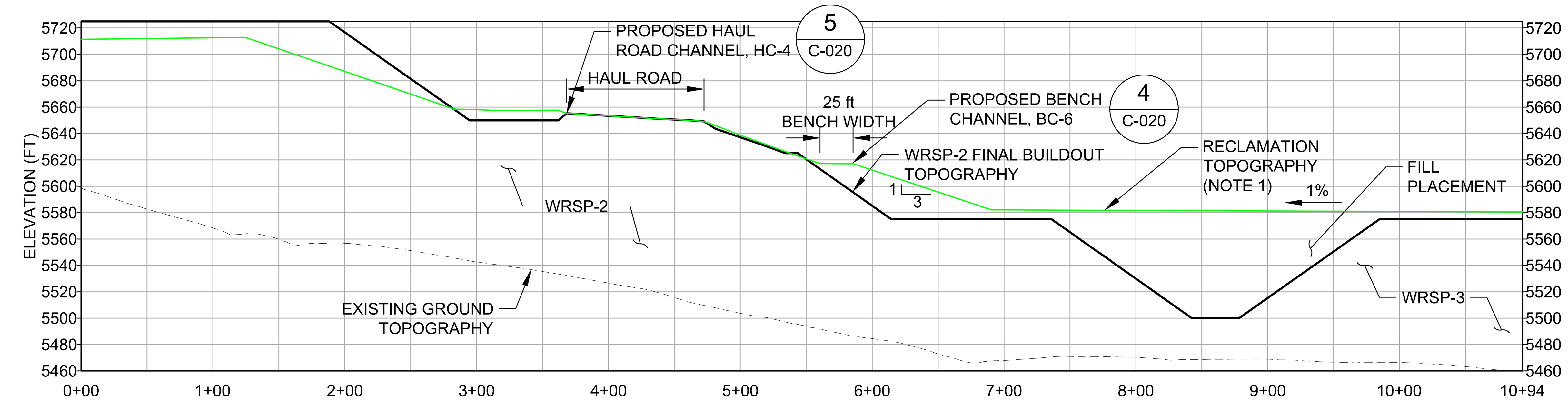
WRSP-1 SECTION F
(SEE DRAWING C-008)

SCALE N.T.S F C-018



WRSP-3 OUTSLOPE SECTION G
(SEE DRAWING C-010)

SCALE N.T.S. G C-018



WRSP-2 AND WRSP-3 OUTSLOPE SECTION H
(SEE DRAWING C-010)

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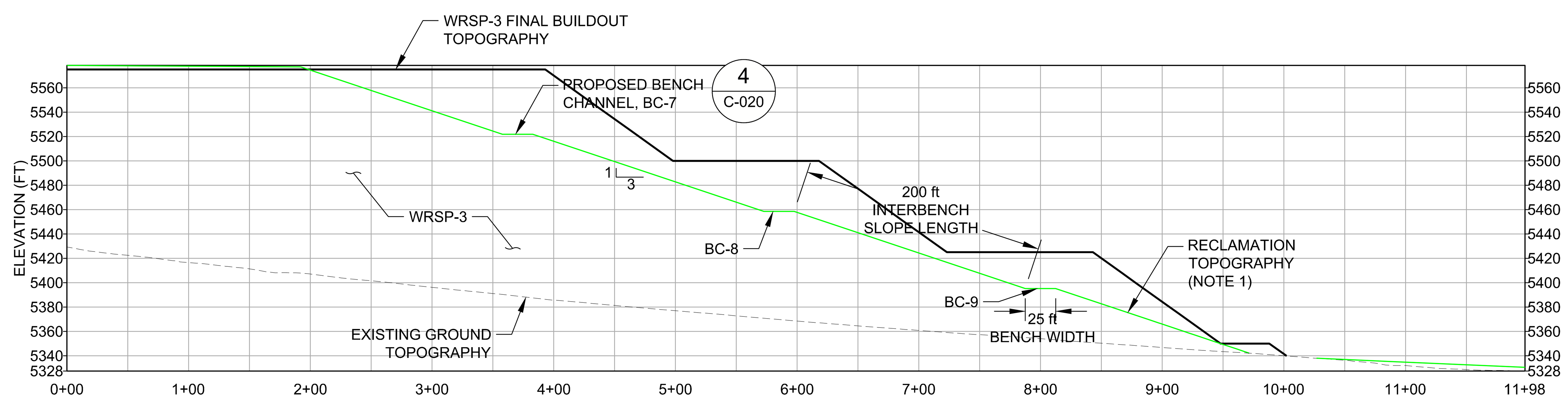

WRSP-3 OUTSLOPE SECTION I
(SEE DRAWING C-010)

SCALE N.T.S. I C-018

NOTES

1. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.

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B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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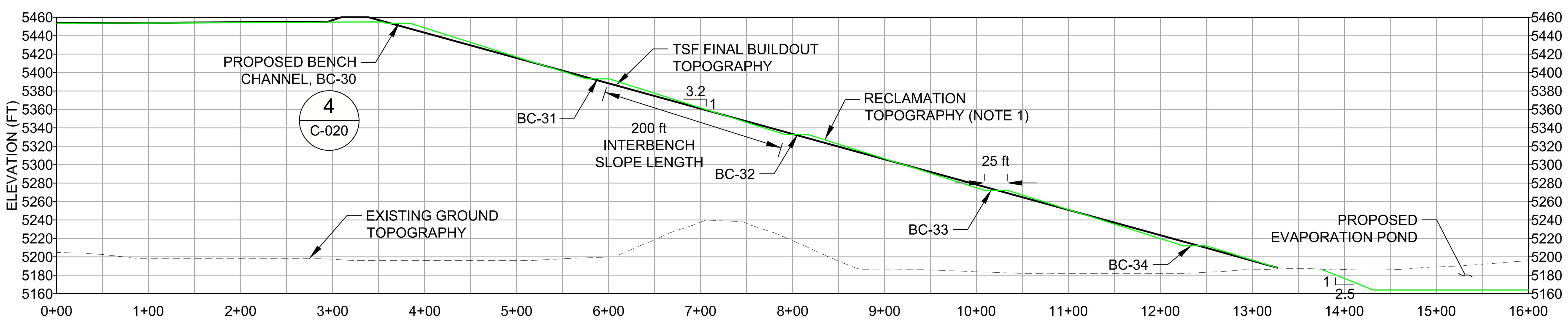
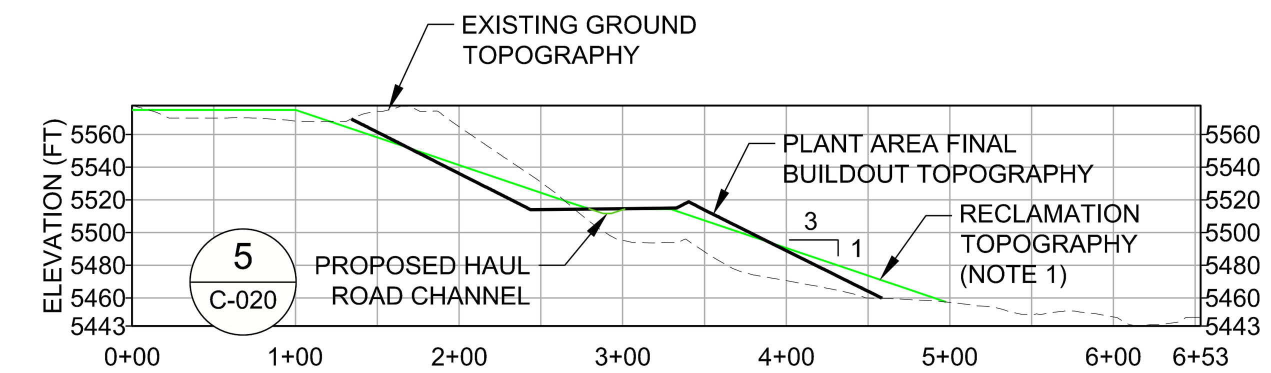
PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
WRSP RECLAMATION SECTIONS

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	22 of 25	C-018



SCALE N.T.S. J C-019 TSF OUTSLOPE SECTION J (SEE DRAWING C-012)



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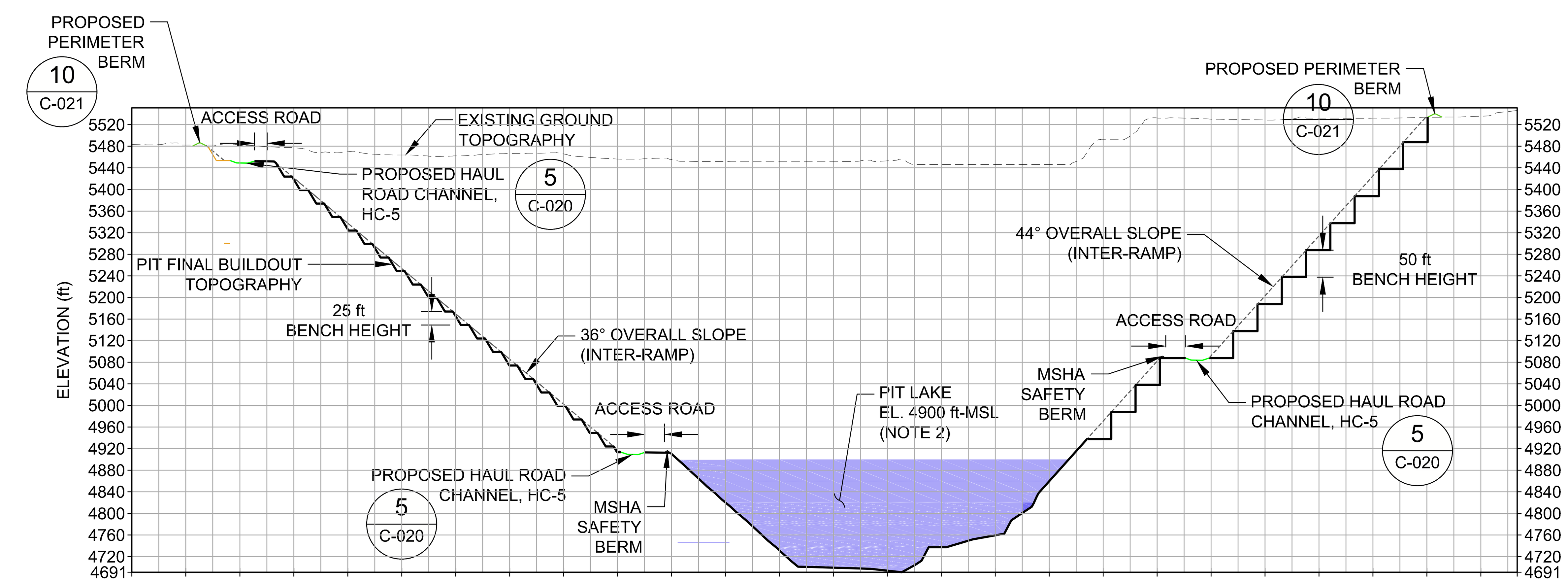

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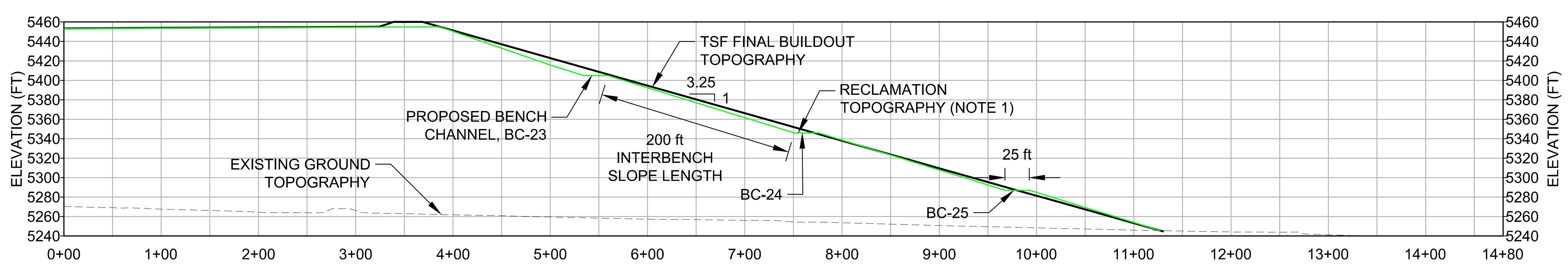
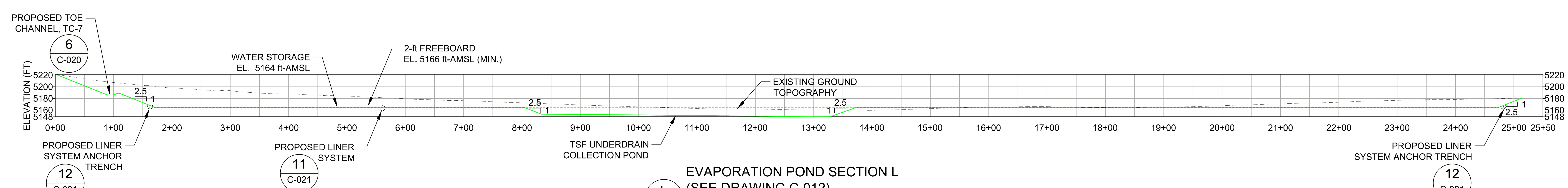


SCALE N.T.S. K C-019 TSF OUTSLOPE SECTION K (SEE DRAWING C-012)

NOTES

1. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY.
2. PIT LAKE ELEVATION PROVIDED BY NMCC.



SCALE N.T.S. L C-019 EVAPORATION POND SECTION L (SEE DRAWING C-012)

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A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
TSF, PIT AND PLANT RECLAMATION SECTIONS

PROJECT NO. 1531453 | CONTROL 0300 | REV. C | 23 of 25 | DRAWING C-019

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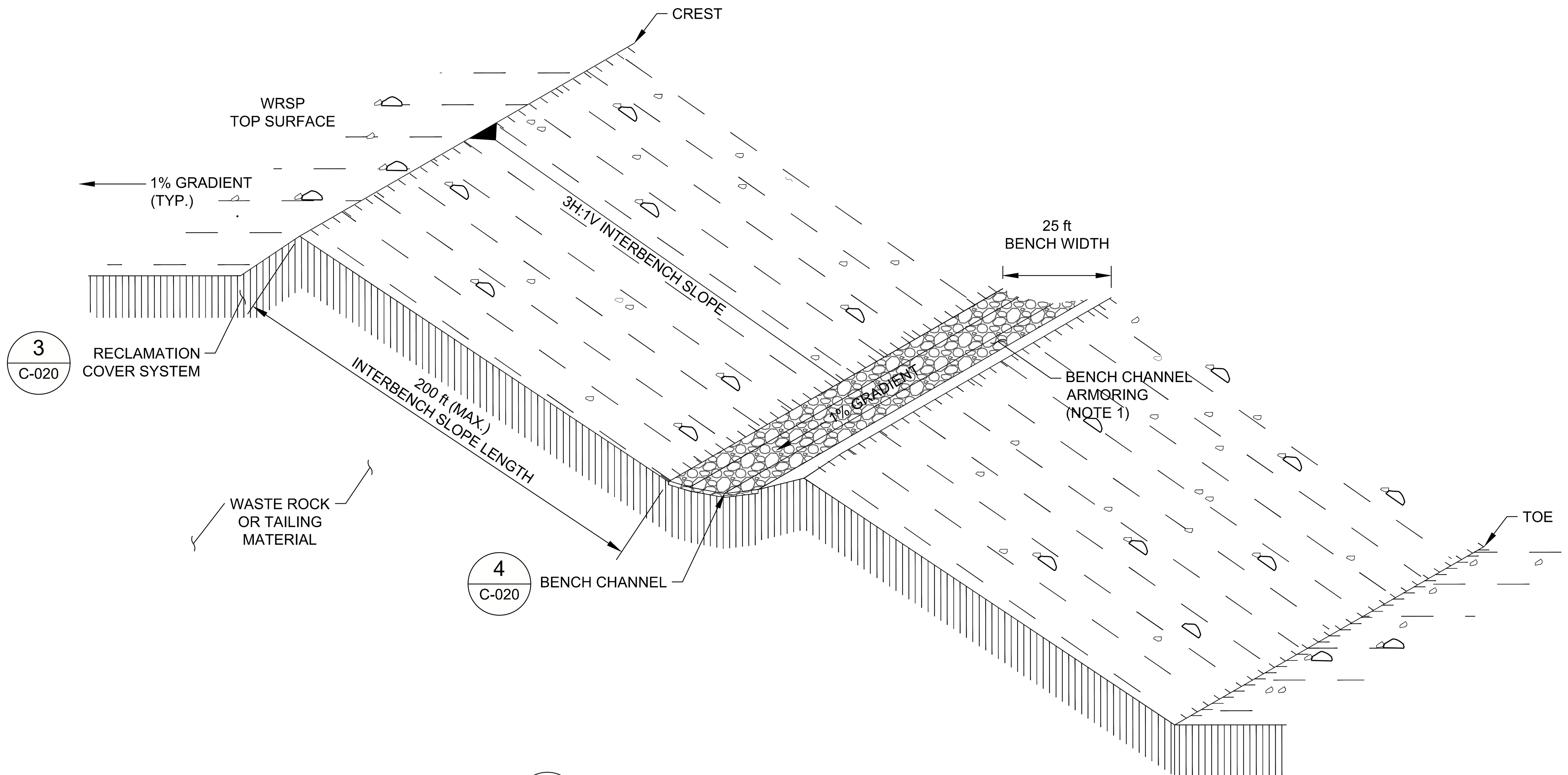
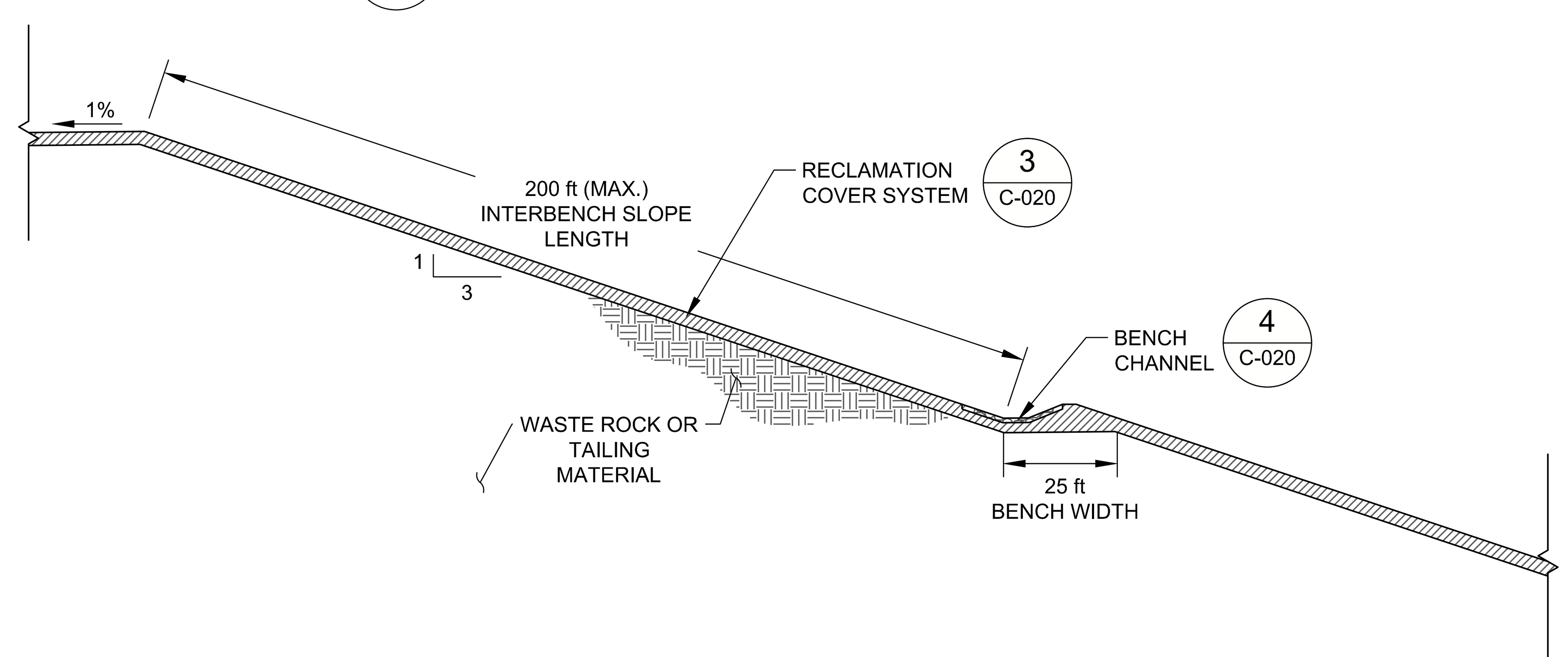


SCALE N.T.S. 1 C-020 TYPICAL OUTSLOPE DETAIL



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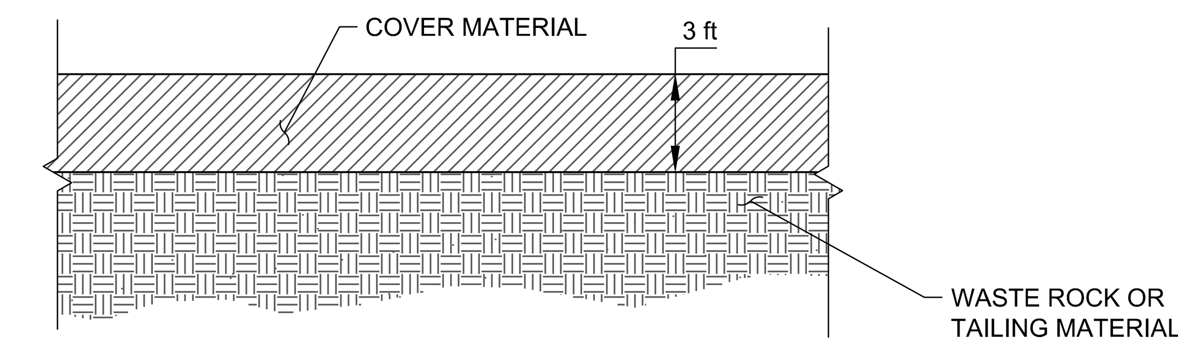

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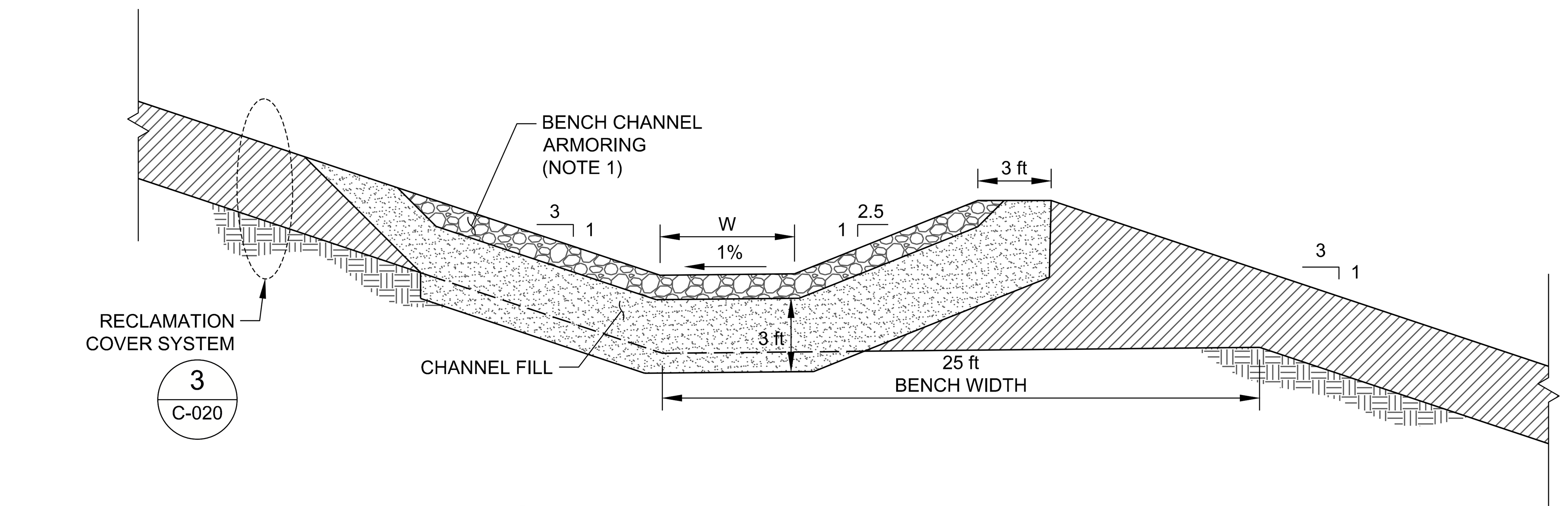

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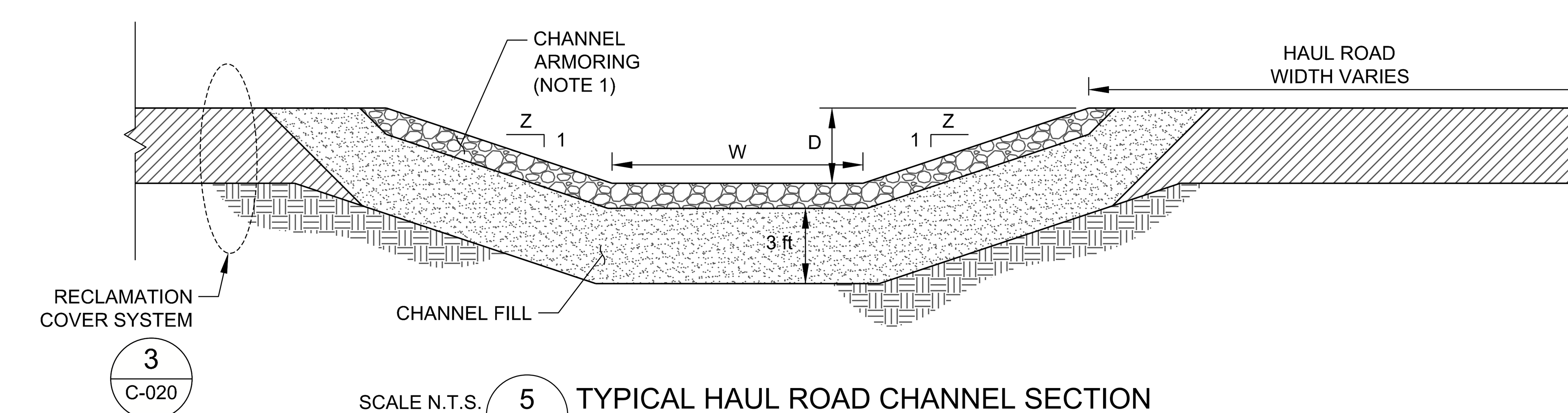

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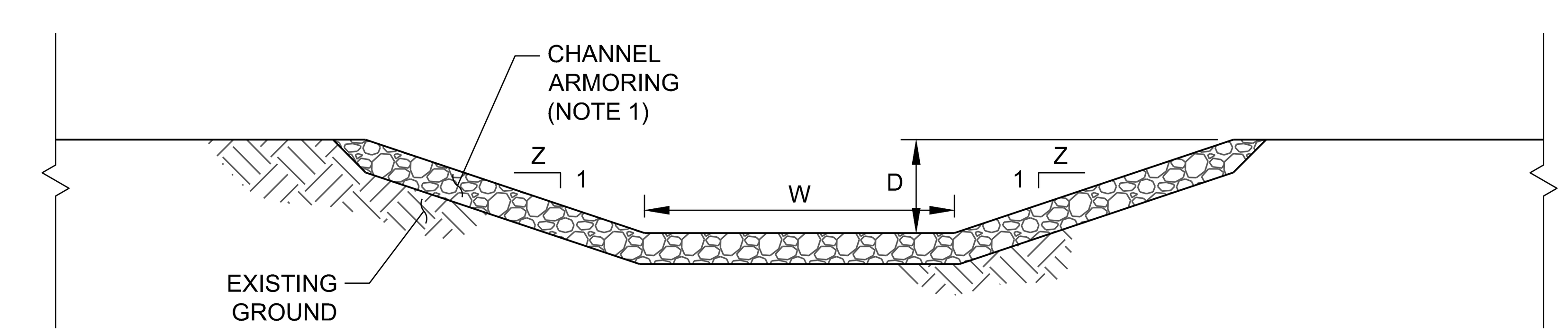

SCALE N.T.S. 6 C-020 TYPICAL DIVERSION, TOE, AND PERIMETER CHANNEL

NOTES

1. SEE CHANNEL SCHEDULE FOR DIMENSION AND ARMORING REQUIREMENTS. MINIMUM RIPRAP THICKNESS SHALL BE 2 X D_{50}. MINIMUM BEDDING THICKNESS IS 6 in.

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PROJECT
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MINE RECLAMATION AND CLOSURE PLAN

TITLE
TYPICAL SECTIONS AND DETAILS (1 OF 2)

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	24 of 25	C-020

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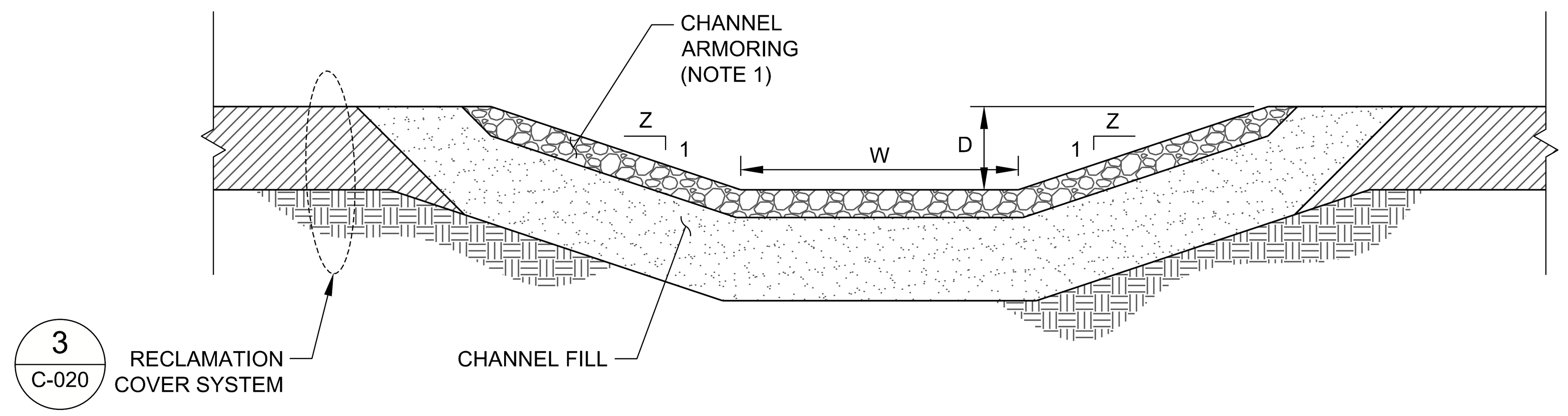
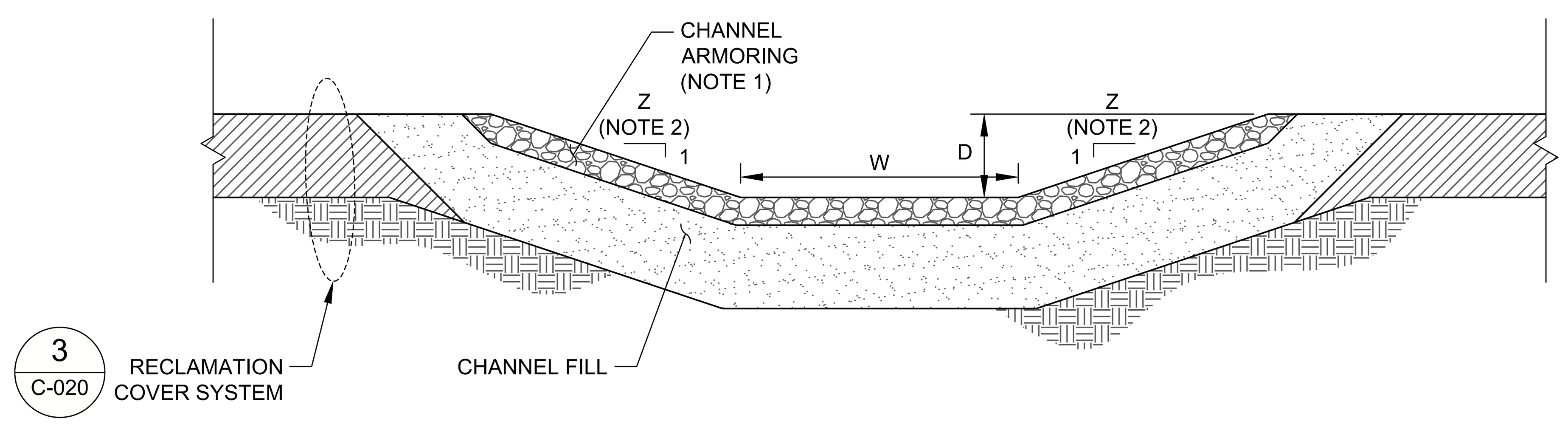
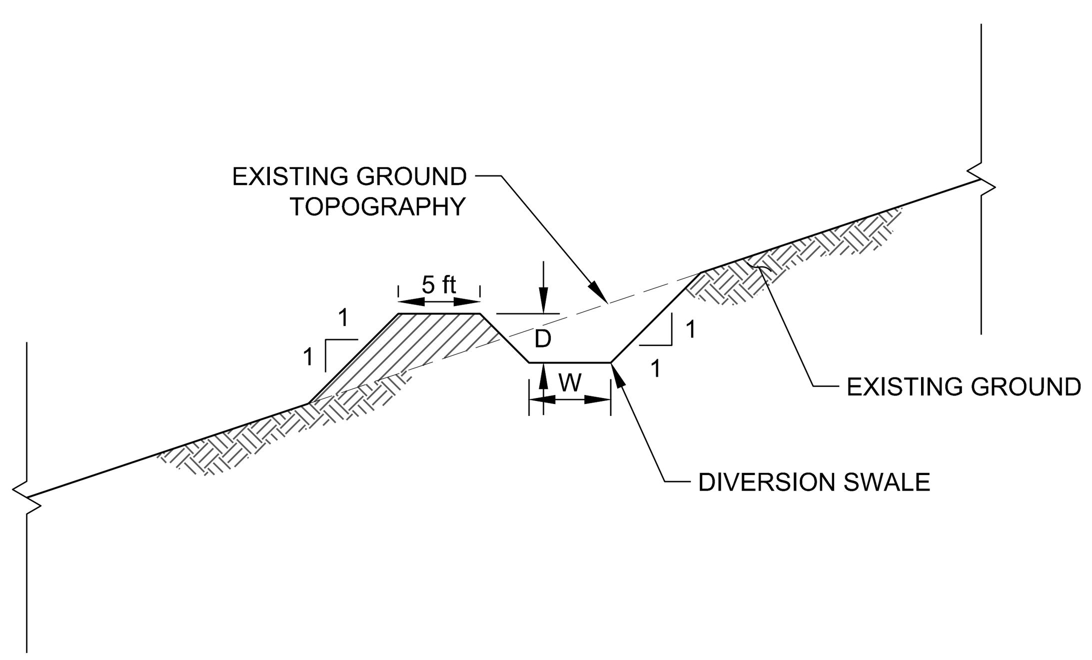


SCALE N.T.S. 7 C-021 TYPICAL TOP SURFACE CHANNEL SECTION



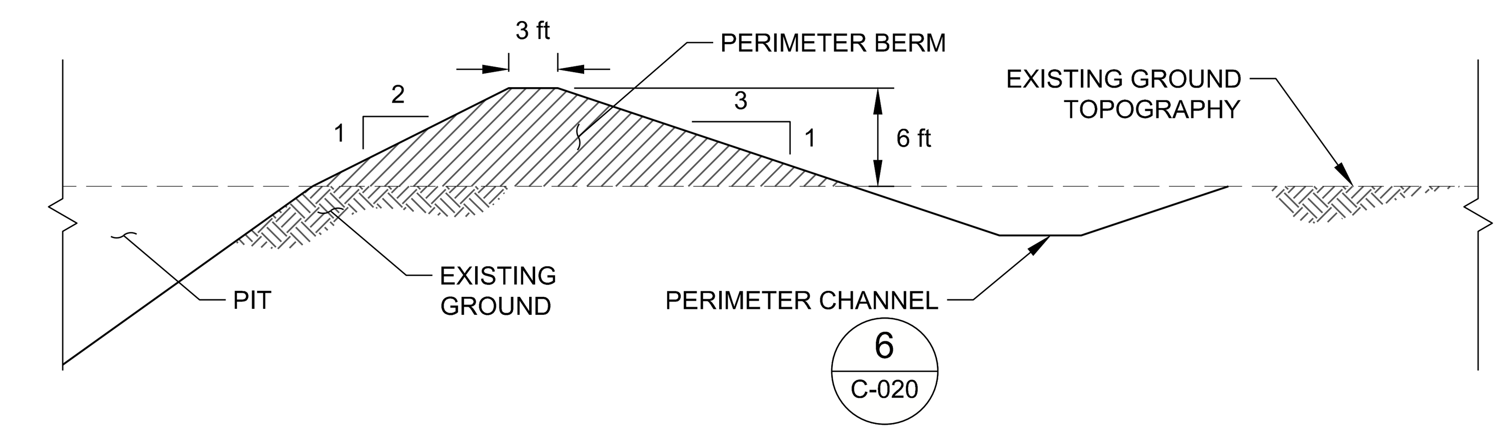
SCALE N.T.S. 8 C-021 TYPICAL DOWNSLOPE CHANNEL SECTION



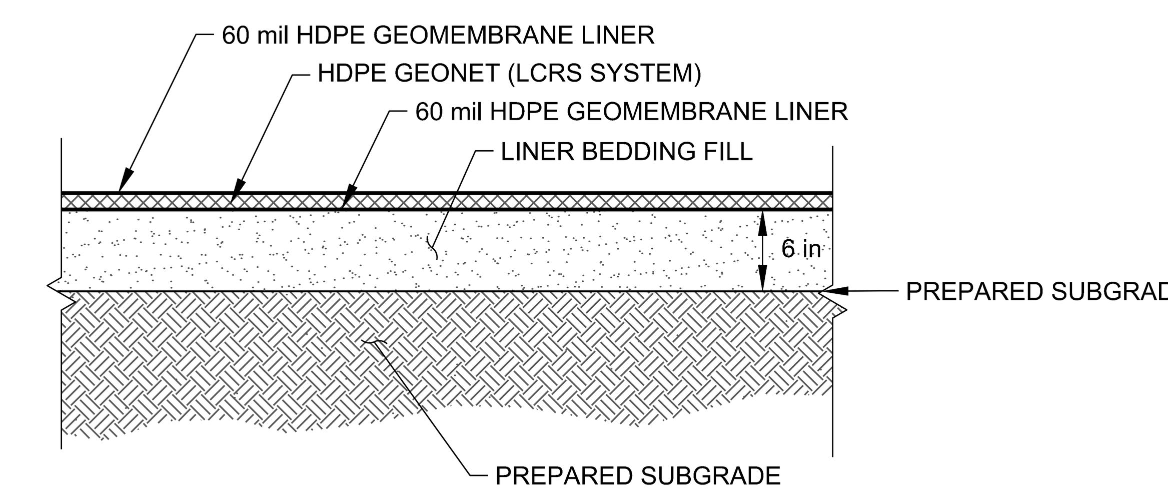
SCALE N.T.S. 9 C-021 TYPICAL DIVERSION SWALE DETAIL

NOTES

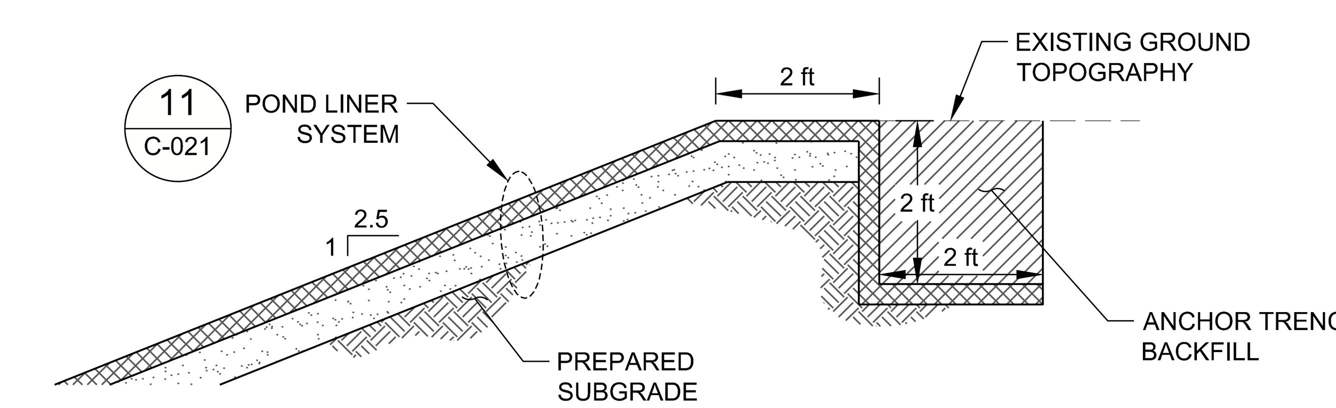
1. SEE CHANNEL SCHEDULE FOR DIMENSION AND ARMORING REQUIREMENTS. MINIMUM RIPRAP THICKNESS SHALL BE 2 X D_{50}. MINIMUM BEDDING THICKNESS IS 6 in.
2. DOWNSLOPE CHANNEL SIDESLOPES SHALL MAINTAIN A 3H:1V SLOPE PERPENDICULAR TO THE FLOW DIRECTION.



SCALE N.T.S. 10 C-021 PERIMETER BERM DETAIL



SCALE N.T.S. 11 C-021 EVAPORATION POND LINER SYSTEM



SCALE N.T.S. 12 C-021 EVAPORATION POND LINER SYSTEM ANCHOR TRENCH

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PROJECT
COPPER FLAT PROJECT
MINE CLOSURE AND RECLAMATION PLAN

TITLE
TYPICAL SECTIONS AND DETAILS (2 OF 2)

PROJECT NO.	CONTROL	REV.		DRAWING
1531453	0300	C	25 of 25	C-021

Golder Associates

CALCULATIONS

Date:	October 10, 2016	**Made by:**	HNL
Project No.:	1531453	**Checked by:**	TLS
Subject:	Channel Schedule	**Reviewed by:**	TLS
Project Short Title:	COPPER FLAT MORP AND MINE PERMIT APPLICATION		

CHANNEL SCHEDULE

Reach Designation[1]	Q_{design} (cfs)	Reach Design							
		Bottom Width (ft)	Bed Slope (%)	Left Side Slope (H:1V)	Right Side Slope (H:1V)	Normal Flow Depth (ft)	Average Velocity (fps)	Min. D50 (in)	Reports to
EWRSP-1									
Diversion Channel, DC-1	100.0	10	0.5	3.0	3.0	2.1	3.0	3.0	Grayback Diversion
Diversion Swale, DS-1	12.0	10	0.5	3.0	3.0	0.6	1.6	3.0	Grayback Diversion
Toe Channel, TC-1	27.0	10	3.0	3.0	3.0	0.6	3.7	3.0	Grayback Diversion
Toe Channel, TC-2	17.0	10	0.5	3.0	3.0	0.8	1.8	3.0	Grayback Diversion
Haul Road Channel, HC-1	12.9	10	10.0	3.0	3.0	0.3	4.2	6.0	Grayback Diversion
EWRSP-2B									
Top Surface Channel, TSC-1	81.2	10	1.0	3.0	3.0	0.3	1.0	3.0	Pit Perimeter Channel to Pit
Toe Channel, TC-3	125.6	10	2.9	3.0	3.0	1.5	3.6	12.0	Pit Perimeter Channel to Pit
Diversion Swale, DS-2	3.4	10	0.5	3.0	3.0	1.5	6.0	-	Pit Perimeter Channel to Pit
EWRSP-4									
Top Surface Channel, TSC-2	86.0	10	2.5	3.0	3.0	1.2	5.1	3.0	Haul Road Channel HC-2 to Pit
Haul Road Channel, HC-2	20.0	10	6.7	3.0	3.0	0.4	4.4	3.0	Pit
Toe Channel, TC-4	13.0	10	7.4	3.0	3.0	0.3	3.9	3.0	Grayback Arroyo
WRSP-1									
Diversion Swale, DS-3	27.0	10	0.5	3.0	3.0	1.0	2.0	3.0	Off Site
Diversion Swale, DS-4	69.0	10	0.5	3.0	3.0	1.7	2.7	3.0	Natural Ground to Pit
Diversion Channel, DC-2	39.0	10	0.5	3.0	3.0	1.3	2.3	3.0	Off Site
Top Surface Channel-3	32.5	10	5.6	3.0	3.0	0.6	4.9	6.0	Pit Perimeter Channel to Pit
Bench Channels, BC-1 through BC-4	97.0	10	1.0	3.0	3.0	0.4	1.7	3.0	Pit Perimeter Channel to Pit
Haul Road Channel, HC-3	97.0	10	10.3	3.0	3.0	0.9	8.6	12.0	Pit Perimeter Channel to Pit
WRSP-2 and WRSP-3									
Diversion Swale, DS-5	112.0	10	0.5	3.0	3.0	2.2	3.1	3.0	Natural Ground to Pit
Diversion Swale, DS-6	52.0	10	0.5	3.0	3.0	1.5	2.5	3.0	Off Site
Diversion Swale, DS-7	26.0	10	0.5	3.0	3.0	1.0	2.0	3.0	Off Site
Haul Road Channel, HC-4	63.9	10	9.6	3.0	3.0	0.7	7.3	12.0	Pit
Top Surface Channel, TSC-4	42.0	10	1.0	3.0	3.0	1.1	3.0	3.0	Grayback Arroyo
Top Surface Channel, TSC-5	100.0	10	1.0	3.0	3.0	1.7	3.8	18.0	Grayback Arroyo
Downslope Channel, DSC-1	127.1	20	29.0	3.0	3.0	0.3	22.0	ACB	Grayback Arroyo
Downslope Channel, DSC-2	240.1	20	30.2	3.0	3.0	0.4	28.4	ACB	Grayback Arroyo
Toe Channel, TC-5	229.8	10	13.0	3.0	3.0	1.0	10.1	3.0	Grayback Arroyo
Toe Channel, TC-6	242.9	10	8.6	3.0	3.0	1.6	10.7	18.0	Grayback Arroyo
Bench Channels, BC-5 through BC-20	39.0	10	1.0	3.0	3.0	1.0	2.9	3.0	WRSP-2 to Pit, WRSP-3 to Grayback Arroyo
TSF									
Downslope Channel, DSC-3	181.8	20	27.6	3.0	3.0	0.4	24.9	ACB	Off Site
Downslope Channel, DSC-4	165.6	20	27.8	3.0	3.0	0.3	24.0	ACB	Grayback Arroyo
Downslope Channel, DSC-5	478.0	20	29.0	3.0	3.0	0.6	36.1	ACB	Grayback Arroyo
Top Surface Channel, TSC-6	243.0	10	0.5	3.0	3.0	2.8	3.7	3.0	DSC-5 to Grayback Arroyo
Top Surface Channel, TSC-7	236.4	10	0.5	3.0	3.0	2.8	3.7	3.0	DSC-5 to Grayback Arroyo
Bench Channels, BC-21 through BC-42	38.0	10	1.0	3.0	3.0	1.0	2.8	3.0	Off Site or Grayback Arroyo
Toe Channel, TC-7	487.7	15	0.5	3.0	3.0	4.0	4.5	3.0	Off Site
Toe Channel, TC-8	213.2	10	0.5	3.0	3.0	3.0	3.7	3.0	Grayback Arroyo
Toe Channel, TC-9	192.5	10	3.5	3.0	3.0	1.7	7.3	12.0	Grayback Arroyo
PLANT									
Perimeter Channel, PC-2	200.0	10	1.0	3.0	3.0	2.5	4.7	3.0	Grayback Arroyo
Toe Channel, TC-10	36.0	10	1.0	3.0	3.0	1.0	2.8	3.0	Pit
PIT									
Perimeter Channel, PC-1	294.0	10	2.0	3.0	3.0	2.5	6.7	3.0	Pit
Haul Road Channel, HC-5	984.4	10	10.0	3.0	3.0	1.8	36.7	ACB	Pit

Notes:
1 - See Mine Reclamation and Closure Plan drawing set for location of specific reach. Hydrolgy and Hydraulics calculation packet available upon request.
ACB - Articulated concrete block.
cfs - Cubic feet per second
ft - Feet
fps - Feet per second
in - Inch
Qdesign - Design flows for channel determined from Hydrologic Modeling System (HEC-HMS) developed by the Hydrologic Engineering Center within the U.S. Army Corps of Engineers.
Min. D50 - median diameter or the medium value of the particle size distribution
Rip Rap size calculations based on the following criteria: U.S. Army Corps of Engineers (USACE, 1994) mild slope, <2% slopes; USACE steep slope, >2% to <20% slopes; Robinson method (1997), >20% to ,40% slopes; ACB for all downslope channels.

ATTACHMENT E2
TSF CLOSURE WATER MANAGEMENT PROGRAM

DRAFT REPORT

ATTACHMENT E2

TSF POST-OPERATIONS WATER MANAGEMENT PLAN

COPPER FLAT MINE

Submitted To: Mr. Jeffrey Smith, PE
Chief Operating Officer
THEMAC Resources Group Ltd.
Copper Flat Mine Project
4253 Montgomery Blvd. NE, Suite 130
Albuquerque, NM 87109

Submitted By: Golder Associates Inc.
5200 Pasadena Avenue N.E., Suite C
Albuquerque, NM 87113 USA

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October 7, 2016 1531453

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

Golder Associates has been contracted by New Mexico Copper Corporation (NMCC) to prepare a Reclamation and Closure Plan for its Copper Flat project located near Hillsboro, New Mexico in Sierra County (**Figure E1**). The Reclamation and Closure Plan describes the designs and strategy for reclamation of all of the disturbed areas described in NMCC's Mine Operations and Reclamation Plan document to which this document is attached as Appendix E. As part of this Plan, Golder has developed the following plan for management of drain down and surface runoff waters from the Tailings Storage Facility (TSF) following cessation of operations. The following sections detail the sources of water to be managed, the performance objectives of the water management plan, and the associated plan for management of these waters, including designs for both active and passive evaporation water management systems.

1.1 Sources of Water to be Managed

The flow components that will need to be managed from the TSF at the end of operations include drainage water collected from the impoundment and dam underdrain collection systems, and surface water runoff from the embankment. As described in Section 6.5.2 of the TSF Feasibility Level Design Report (FLDR) [Golder, 2015], the maximum underdrain flow rate from the TSF at final buildout will be approximately 66 gallons per minute (gpm) from the impoundment underdrain and approximately 448 gpm from the dam underdrain. Surface water runoff estimates from the TSF are provided in the water balance calculations included in Appendix G of the FLDR. The estimated surface water runoff from the embankment ranges between 1.4 gpm in April and 86 gpm in July. These three flow components represent the maximum flows estimated to be managed. The flows will be reduced over time as drain down from the TSF decreases and the TSF gets reclaimed and covered. Following cover placement on the TSF embankment, surface water runoff will be routed to the nearest natural drainage.

1.2 Performance Objectives

The performance objective for the water management program is to collect and eliminate, using evaporation techniques, drain down waters and surface water runoff from uncovered slopes associated with the TSF following the cessation of mining and processing operations at Copper Flat. To meet the performance objectives the following strategy will be utilized:

- A short-term active evaporative water management system (AEWMS) will be utilized to capture and evaporate all tailing drain down waters and surface water runoff from the TSF embankment outslopes for the first five years following closure, or until flows reduce to a point to where they can be managed exclusively through passive evaporation.
- A long-term passive evaporative water management system (PEWMS) will be utilized to evaporate the residual tailing drain down waters beginning in year six and continuing for an estimated 20 years thereafter.

2.0 BACKGROUND

The purpose of the TSF water management program is to provide an environmentally sound and cost effective approach to manage, reduce, and eventually eliminate drain down waters and surface water runoff from uncovered slopes associated with the TSF following cessation of mining and processing operations at Copper Flat. The water management program assumes that tailings delivery to the TSF will terminate following the cessation of processing operations at Copper Flat.

2.1 TSF Facility

Golder completed a feasibility level design of the TSF in 2015 (Golder, 2015). The proposed TSF will include an HDPE-lined tailings impoundment with an associated underdrain collection system and underdrain collection pond for the impoundment and the dam, and a water reclaim or recycle system to maximize water reuse. The TSF and associated ancillary facilities will cover approximately 564 acres in size at full capacity (**Figure E2**) and will be constructed using the centerline construction method. The TSF design will comply with the design and dam-safety guidelines of the New Mexico Office of the State Engineer Dam Safety Bureau. The tailings impoundment is designed to store 113 million tons of tailings produced over approximately 11 years, with tailings deposition occurring at an average rate of approximately 27,900 tons per day over the life of the mine.

The underdrain collection pond will be constructed along the southeastern corner of the TSF to contain drainage water from the TSF impoundment and dam underdrains, as well as runoff from the downstream face of the tailings dam. The pond is designed for full TSF operation, including dam construction. Flow to the underdrain collection pond will begin to decrease immediately once dam construction stops. The pond is sized to contain 24 hours of tailing drainage flow at maximum estimated drainage rates, runoff from the 100-year, 24-hour storm event of 3.73 inches (National Oceanic and Atmospheric Administration, 2006) incident on the downstream dam face, and an additional minimum 2-feet of freeboard. This pond will be utilized after mine operations cease as part of the TSF water management program.

At reclamation, the TSF outslope will, first, be graded down to interbench slopes of between 3.0H:1V and 3.5H:1V with 25 foot wide terrace benches on the outslope at maximum slope lengths of between 200 feet (3H:1V) and 250 feet (3.5:1V). Reclamation of the TSF includes grading of the TSF top surface to a final grade of between 1 and 5% to direct storm water to the back side of the TSF and out to Grayback Arroyo after cover placement. The top surfaces and outslopes of the TSF will be covered with 36 inches of growth media and seeded to reestablish vegetation. Surface water conveyance channels will be constructed on the top surface of the TSF and terrace benches to direct surface water off the covered TSF surfaces and ultimately to Grayback Arroyo and other natural drainages to the exterior of the mine.

2.2 Climate

The Copper Flat property is located within an arid, high desert area in the Basin and Range physiographic province subject to hot summers and relatively mild winters. Maximum summer temperatures can exceed 100 degrees Fahrenheit (^oF) while the average maximum daily temperature during winter months is approximately 60 ^oF. Average annual rainfall is approximately 12.4 inches and the property receives snow periodically (**Table E1**).

Most rainfall occurs in July through September and is associated with high intensity, short duration, convective storms and moisture from the Gulf of Mexico. Winter precipitation is associated with west to east moving Pacific frontal storms. These storms typically produce less intense precipitation over a longer duration.

Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation. Annual pan evaporation measured at Caballo Dam is approximately 107 inches, and ranges between approximately 3.5 inches in December to 14.8 inches in June (**Table E2**). Equivalent free water evaporation rates for the Copper Flat site are calculated based on these data and an applied pan coefficient of 0.7. Annual equivalent free water evaporation is estimated at approximately 74.9 inches, and ranges between approximately 2.4 inches in December to 10.4 inches in June (**Table E2**). The estimated amount of excess water evaporated from surface water bodies at the Copper Flat site is calculated as equivalent free water evaporation minus precipitation. The estimated annual excess evaporation for surface water bodies at Copper Flat is approximately 62.5 inches, and ranges between 1.6 inches in December to 9.7 inches in June (**Table E3**). Annual excess evaporation is equivalent to passive evaporation within the context of this plan.

3.0 TSF POST-OPERATIONS WATER MANAGEMENT PLAN

The FLDR for the TSF indicates that the maximum drain down flow rate will be approximately 448 gpm from the dam underdrain and 66 gpm from the impoundment underdrain. Due to the coarser nature of the tailings sands used to construct the TSF dam and the higher permeability of these materials, the TSF embankment will drain quickly in comparison to the impoundment. It is estimated that it will take approximately 2 to 3 years for the TSF embankment to drain sufficiently to begin reclamation. It is also anticipated that some reclamation of the impoundment can begin within 5 years of cessation of operations as the impoundment continues to drain and dry, allowing construction equipment to be utilized to commence cover placement.

The underdrain systems will continue to operate after cessation of mining and processing as drain-down of the TSF will continue to produce water for a number of years thereafter. This Plan assumes that drain-down will continue for 25 years. The actual amount of time required to so is a function of porosity of tailings materials in the long-term and the volume of water remaining in the TSF. An "active" water management program (short-term AEWMS) will be implemented at the end of operations. Water captured in the TSF underdrain collection pond will be pumped back to the impoundment surface of the TSF. A forced or enhanced evaporation system will be installed within the impoundment to dispose of the water. The duration of operation of the "active" water management system will be determined by the volume of water that continues to drain from the impoundment. However, for planning purposes it has been assumed that there will be 5 years of operation of the active program followed by 20 years of "passive" drain-down water management. During the active evaporation phase, reclamation of the TSF will continue such that grading will have been completed and the cover will have been placed on the TSF. Toward the end of the active evaporation phase, an evaporation pond will be constructed that will incorporate the underdrain collection pond. Once complete, the "passive" evaporation phase (PEWMS) will be initiated.

After decommissioning of the active program and full reclamation of the TSF, water that may continue to drain from the TSF will be captured and evaporated in the new evaporation pond (**Figure E3**). Details of the short-term AEWMS and the PEWMS are provided in the following sections.

3.1 Short-Term Active Evaporative Water Management System (AEWMS)

The short-term AEWMS consists of forced evaporation and wetted surface evaporation of water collected from the TSF underdrain collection system and surface water runoff from the TSF embankment. The collected waters will be pumped to the top of the TSF into a designated ponding/spray area and actively and passively evaporated (**Figure E3**). The "active" or forced evaporation system consists of a 15 acre ponding/spray area to maximize the evaporation rate of the waters. Forced evaporation will be accomplished with a mechanical spray system designed to handle flows up to 380 gpm per unit. Spray evaporation estimates are based on a daily evaporation chart for Model 1210 evaporator systems provided by Minetek (2012). The typical spray pattern for these systems covers an area approximately 500 feet long by 300 feet wide. A 4 unit spray system with a capacity to handle up to 1,520 gpm will be installed. Passive evaporation of the TSF drain down waters will also continue to occur at the same time within the TSF impoundment surface and on the ponded surface of the TSF underdrain collection pond.

3.1.1 AEWMS Estimates

Based on the daily evaporation chart provided by Minetek (2012), it is estimated that the four unit spray system will be capable of evaporating between approximately 520 gpm (December) and 1,018 gpm (June), with an average evaporation rate of approximately 789 gpm (**Table E4**). The residual water in the ponded area will either evaporate through surface evaporation or will drain into the underlying tailing material and back to the TSF underdrain collection system. The estimated amount of passive evaporation of the waters within the TSF underdrain collection pond ranges between approximately 4 gpm in December to approximately 25 gpm in June. The estimated monthly and annual evaporation potential of the short-term AEWMS is summarized in **Table E4**.

The short-term AEWMS will continue to operate until drain down reduces to a point to where the flows can be handled through passive evaporation within the evaporation pond discussed later, herein. Underdrain flows will diminish over time once tailing discharge to the top of the TSF is discontinued. Due to the high permeability of the tailings sands used to construct the TSF embankment, drain down of the TSF embankment will occur more rapidly than within TSF impoundment area, where the permeability of the slimes fraction of the tailings is much lower. Thus, the largest flow component (448 gpm) will drop off more rapidly than the flow component from the impoundment.

A conceptual drain down curve was developed for the Copper Flat TSF based on evaluation of measured drain down flow rates from four closed tailing storage facilities in Nevada and a conceptual tailings storage facility drain down curve developed by the Nevada Department of Environmental Protection (2011). These drain down curves are presented in terms of relative flows (drain down flow relative to the maximum flow at the beginning of closure) in **Figure E4.** The conceptual Copper Flat TSF drain down curve developed for the purpose of this water management plan is also presented in **Figure E4**. **Figure E5** presents the conceptual Copper Flat TSF drain down curve in terms of estimated flows in gpm over time following cessation of mining and processing operations at Copper Flat.

It is anticipated that the TSF embankment will be regraded, covered and revegetated within three years following cessation of operations. Once the embankment area has been reclaimed, surface water runoff from the outslope of the embankment will no longer need to be captured and will be directed to the nearest drainage. However, for water management planning purposes, the surface water runoff component is included throughout the 5 year AEWMS operational period.

3.1.1 AEWMS Water Balance

The maximum flows that will be encountered during the short-term AEWMS will occur during the first year of operation as the higher permeability sands within the TSF embankment drain. As shown on **Table E5**, the four unit spray system will provide excess evaporation potential under these maximum flow conditions. It is anticipated that the number of spray units and/or their hours of operation will be adjusted throughout the AEWMS program based on the actual flows encountered during the initial months of operation and as the TSF drain down flows decline. The AEWMS will be capable of providing even greater excess evaporation potential in the remaining four years of AEWMS operation as the TSF drain down flows decline over time. Although it is estimated that the AEWMS will operate for a period of 5 years, the duration of operation will be determined when TSF drain down reduces to a point to where the flows can be handled through passive evaporation within the evaporation pond. As described in Section 3.2, the maximum flow that can be handled with the PEWMS is approximately 70 gpm.

3.2 Long-Term Passive Evaporative Water Management System (PEWMS)

A long-term PEWMS will be utilized to evaporate residual tailing drain down waters after operation of the AEWMS is no longer required. Prior to the start of the PEWMS, a new HDPE-lined evaporation pond will be constructed to provide sufficient surface area to passively evaporate the residual drain down waters from the TSF. The following sections provide details of the evaporation pond construction and the evaporation schedule associated with the PEWMS.

3.2.1 Evaporation Pond Construction

The location of the evaporation pond is shown on **Figure E6**. The existing TSF underdrain collection pond will be incorporated into the new evaporation pond by removing the existing collection pond embankment and fusing new HDPE liner onto the remaining collection pond liner. The evaporation pond will essentially be an extension of the existing TSF underdrain collection pond and will incorporate all the design features of the underdrain collection pond. The evaporation pond will be double-lined with an 80-mil HDPE geomembrane top liner and a 60-mil HDPE geomembrane bottom liner. An HDPE geonet will be placed between the liners to serve as the evaporation pond leakage collection and recovery system (LCRS) and minimize the head on the lower pond liner. The existing TSF underdrain collection pond and LCRS pump will be utilized to recover any leakage through the upper geomembrane.

Drain down water from the TSF impoundment and dam will be conveyed to the evaporation pond through the existing underdrain collection system. The pond will cover an area of 22.3 acres and is sized to contain one foot of TSF drain down water for passive evaporation, and an additional minimum 2-feet of freeboard. At a stage of one foot, the surface area of the pond will cover 21.6 acres. The pond capacity is approximately 21.93 million gallons with 2 feet of dry freeboard below the crest of the pond (top of pond liner).

3.2.2 PEWMS Estimates

TSF drain down water will be allowed to fill to a maximum depth of one foot within the pond and will be maintained at this depth throughout the PEWMS operation for passive evaporation. At a depth of one foot, the surface area of the pond will cover 21.6 acres. Based on the surface water evaporation estimates provided in **Table E3**, it is estimated that the 21.6 acre water body will evaporate an average of approximately 135 acre-feet/year (average 84 gpm annually), and incident precipitation will amount to approximately 22 acre-feet/year (average 14 gpm annually). Excess evaporation (free water evaporation minus incident precipitation) from the 21.6 acre water body is estimated at approximately 113 acre-feet/year (average 70 gpm annually). This excess evaporation is referred to herein as passive evaporation.

3.2.3 PEWMS Water Balance

The TSF drain down estimates over the 25 year TSF water management program are summarized in **Table E6** along with the PEWMS water balance over the 20 year operational period. The maximum TSF drain down flow during the PEWMS operation is estimated at 67 gpm immediately following the AEWMS operation and will reduce to rates below 5 gpm after 16 years of PEWMS operation. The TSF water management plan assumes 20 years of PEWMS operation. The duration of the PEWMS operation will be dependent on when the volume of drain down from the TSF is reduced to a point to where the evaporation pond is no longer required. This point in time will be determined in collaboration with the Agencies and the evaporation pond will be reclaimed thereafter in accordance with the Reclamation and Closure Plan.

4.0 SUMMARY

The TSF closure water management plan includes both a short-term AEWMS and a long-term PEWMS to manage drain down waters and surface water runoff from the TSF following cessation of mining operations at Copper Flat. The TSF underdrain systems will continue to operate after cessation of operations, and the AEWMS program will commence thereafter. The AEWMS will include pumping captured water from the TSF underdrain collection pond to the impoundment surface of the TSF and use of forced or enhanced evaporation equipment to minimize or eliminate the water. The AEWMS will utilize a forced evaporation system at a dedicated spray area on top of the TSF. Forced evaporation of these waters will be accomplished with a 4 unit mechanical spray system with a capacity to handle up to 1,520 gpm. Additional passive evaporation of the TSF drain down waters will also occur on the ponded surface of the TSF underdrain collection pond.

A conceptual drain down curve was developed for the Copper Flat TSF based on evaluation of measured drain down flow rates from four closed tailing storage facilities in Nevada and a conceptual tailings storage facility drain down curve developed by the Nevada Department of Environmental Protection (2011). Based on this conceptual drain down curve and estimated surface water runoff from the TSF embankment provided in the FLDR (Golder, 2015) it is estimated that the AEWMS will operate for approximately 5 years. Although it is estimated that the AEWMS will operate this long, the duration of operation will be determined when the volume of TSF drain down water reduces to a point to where the flows can be handled through passive evaporation within a constructed evaporation pond. The maximum flow that can be handled with the PEWMS is approximately 70 gpm.

After decommissioning of the active program and reclamation of the TSF, water that may continue to drain from the TSF will be captured in a new 22.3 acre evaporation pond that will be constructed below the toe of the TSF within the mine permit area coincident with the underdrain pond. TSF drain down water will be allowed to fill to a maximum depth of one foot within the pond and will be maintained at this depth throughout the PEWMs program to be passively evaporated. At a depth of one foot, the surface area of the pond will cover 21.6 acres. Approximately 113 acre-feet/year (average 70 gpm annually) will passively evaporate from a 21.6 acre surface water body at Copper Flat. The maximum TSF drain down flow during the PEWMS operation is estimated at 67 gpm immediately following the AEWMS operation and will reduce to rates below 5 gpm over time. While the TSF water management plan assumes 20 years of PEWMS operation, the actual duration of the PEWMS operation will continue until the volume of drain down water from the TSF reduces to the point where the evaporation pond is no longer required. This point in time will be determined in collaboration with the Agencies and the evaporation pond will be reclaimed thereafter.

5.0 REFERENCES

Golder. 2015. Feasibility Level Design, 30,000 TPD Tailings Storage Facility, Copper Flat Project, Sierra County, New Mexico. Submitted to New Mexico Copper Corporation THEMAC Resources Group Ltd. November 30, 2015.

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New Mexico Office of the State Engineer Dam Safety Bureau. 2010. Rules and Regulations Governing Dam Design, Construction and Dam Safety. December 31, 2010.

National Oceanic and Atmospheric Administration. 2006. Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 1, Version 4.0, Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, and Utah. G. M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley. National Weather Service, Silver Spring, Maryland. 2004, revised October 4, 2006.

TABLES

Table E1. Average Monthly Temperatures and Precipitation Near the Copper Flat Project Area[1]

Month	Average Temperature ° F		Average Precipitation Inches
	Min	Max	Total
January	25.0	55.9	0.57
February	28.1	59.8	0.56
March	33.5	66.4	0.38
April	39.7	74.4	0.32
May	47.4	82.5	0.52
June	56.1	91.7	0.71
July	61.3	91.2	2.30
August	59.6	88.5	2.42
September	52.8	83.4	2.08
October	42.0	73.8	1.17
November	31.3	62.8	0.55
December	24.9	54.3	0.83
Annual	**41.8**	**73.6**	**12.40**

Notes:
(1) Data from the Western Regional Climate Center covering the period between 1893 and 2016 from Hillsboro, NM Climate Station #294009.

Table E2. Average Monthly Pan Evaporation and Free Water Evaporation Near the Copper Flat Project Area

Period	Average Pan Evaporation[1]	Estimated Average Free Water Evaporation[2]
	inches	inches
	Total	Total
January	4.42	3.09
February	5.10	3.57
March	8.56	5.99
April	11.37	7.96
May	13.59	9.51
June	14.80	10.36
July	13.08	9.16
August	11.35	7.95
September	9.26	6.48
October	7.27	5.09
November	4.78	3.35
December	3.48	2.44
Annual	**107.06**	**74.94**

Notes:
(1) Pan evaporation data from the Western Regional Climate Center for Caballo Dam covering the period between 1938 and 2005.
(2) Estimated free water evaporation based on applying a pan coefficient of 0.7 to the measured pan evaporation values.

Table E3. Estimated Amount of Excess Water Evaporated from Surface Water Bodies at the Copper Flat Site

Month	Estimated Average Free Water Evaporation[1]	Average Precipitation[2]	Excess Evaporation[3]
	Inches	Inches	Inches
	Total	Total	Total
January	3.09	0.57	2.52
February	3.57	0.56	3.01
March	5.99	0.38	5.61
April	7.96	0.32	7.64
May	9.51	0.52	8.99
June	10.36	0.71	9.65
July	9.16	2.30	6.86
August	7.95	2.42	5.53
September	6.48	2.08	4.40
October	5.09	1.17	3.92
November	3.35	0.55	2.80
December	2.44	0.83	1.61
Annual	**74.94**	**12.40**	**62.53**

Notes:

(1) Estimated free water evaporation based on applying a pan coefficient of 0.7 to the measured pan evaporation values. Pan evaporation data from the Western Regional Climate Center for Caballo Dam covering the period between 1938 and 2005.

(2) Average monthly precipitation from the Western Regional Climate Center covering the period between 1893 and 2016 from Hillsboro, NM Climate Station #294009.

(3) Excess evaporation equals estimated free water evaporation minus precipitation.

Table E4. AEWMS Evaporation Potential at the Copper Flat Site

Month	Estimated Passive Evaporation[1]		Estimated Active Evaporation[2]		Total AEWMS Evaporation Potential[3]	
	gallons	gpm	gallons	gpm	gallons	gpm
January	278,947	6.2	24,302,594	544	24,581,542	551
February	332,659	8.3	26,454,042	656	26,786,701	664
March	620,227	13.9	35,638,915	798	36,259,142	812
April	844,247	19.5	39,994,440	926	40,838,687	945
May	993,888	22.3	44,760,458	1,003	45,754,346	1,025
June	1,066,498	24.7	43,966,426	1,018	45,032,925	1,042
July	757,711	17.0	43,450,773	973	44,208,484	990
August	610,612	13.7	39,389,900	882	40,000,511	896
September	486,500	11.3	33,221,181	769	33,707,681	780
October	433,120	9.7	29,292,662	656	29,725,782	666
November	309,008	7.2	24,491,661	567	24,800,669	574
December	177,492	4.0	23,197,969	520	23,375,461	524
Annual	**6,910,908**	**---**	**408,161,022**	**---**	**415,071,930**	**---**

Notes:

(1) Estimated passive evaporation from the TSF underdrain collection pond equals free water evaporation (surface area of 4.07 acres @ 2' of freeboard) minus incident precipitation.

(2) Estimated active evaporation based on a daily evaporation chart for Model 1210 evaporator systems provided by Duane Thompson of Minetek on June 28, 2012. Four unit system assumed for AEWMS

(3) Total AEWMS evaporation potential equals estimated passive evaporation plus estimated active evaporation.

Table E5. Estimated AEWMS Program Water Balance for the First Year Following Closure

Month	Surface Water Runoff(1)	TSF Drain Down(1)	Total Inflows to AEWMS(3)	Total AEWMS Evaporation Potential(4)	Excess Evaporation Potential(5)
	gpm	gpm	gpm	gpm	gpm
January	7.3	514	521	551	29
February	7.7	500	508	664	157
March	2.3	486	488	812	324
April	1.3	472	473	945	472
May	5.8	458	464	1,025	561
June	12.4	444	456	1,042	586
July	88.3	430	518	990	472
August	46.8	416	463	896	433
September	35.2	402	437	780	343
October	7.6	388	395	666	270
November	6.9	374	381	574	193
December	16.5	360	376	524	147

Notes:

(1) Surface water runoff from the TSF embankment prior to regrading and cover placement. Runoff estimates from the Feasibility Level Design, 30,000 TPD Tailings Storage Facility, Copper Flat Project, Sierra County, New Mexico (Golder, 2015).

(2) Estimated TSF drain down from the conceptual Copper Flat TSF drain down curve developed herein.

(3) Total inflows to the AEWMS equals surface water runoff plus TSF drain down.

(4) Total AEWMS evaporation potential equals estimated passive evaporation plus estimated active evaporation.

(5) Excess evaporation potential equals total AEWMS evaporation potential minus total inflows to the AEWMS.

Table E6. Estimated PEWMS Program Water Balance Over 20 Year Operating Period

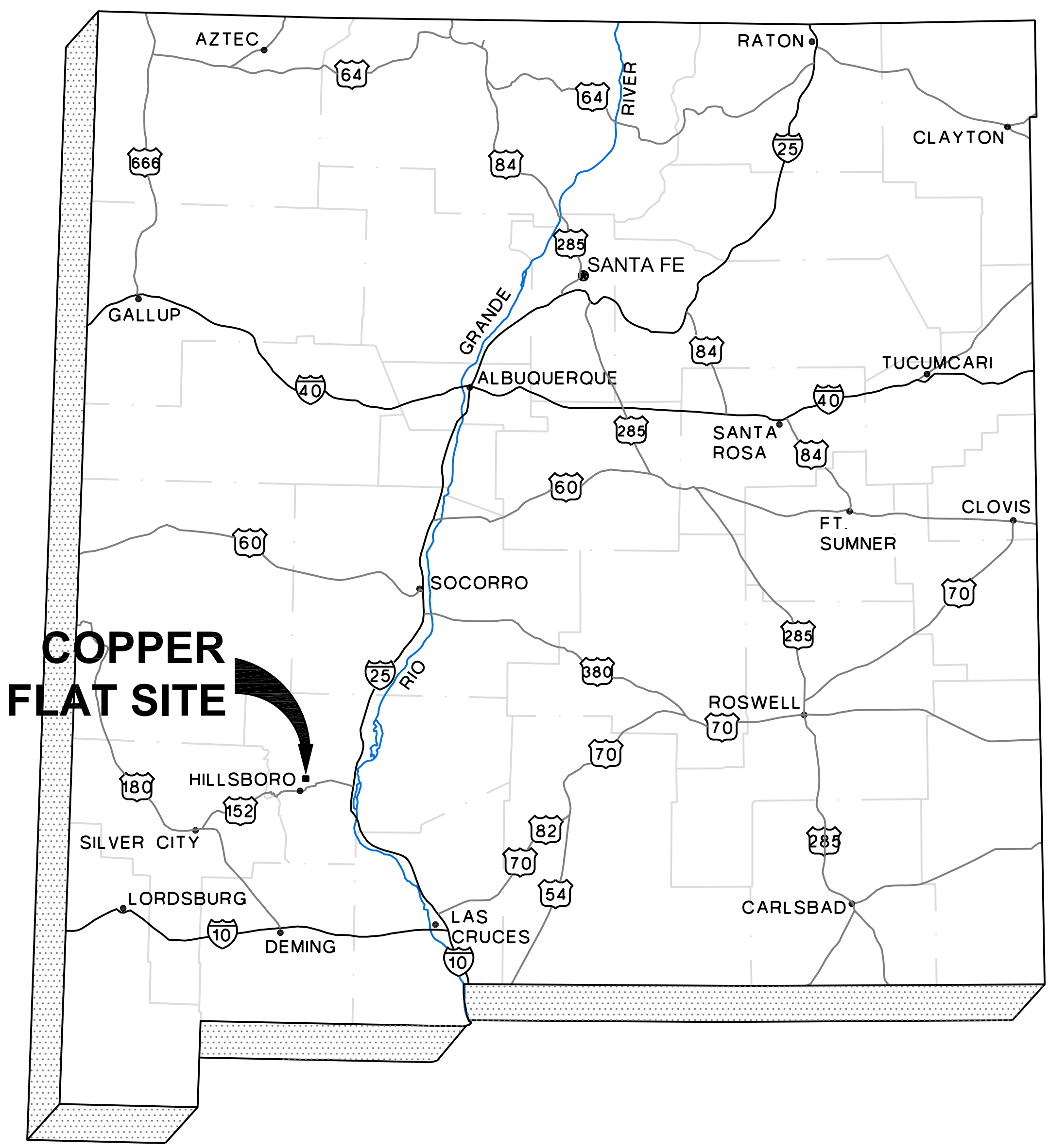
Year[1]	TSF Drain Down [2]	Passive Evaporation[3]	Excess Evaporation Potential[4]
	gpm	gpm	gpm
Short-Term Active Evaporative Water Management System Operation			
1	514	NA	NA
2	360	NA	NA
3	252	NA	NA
4	170	NA	NA
5	113	NA	NA
Long-Term Passive Evaporative Water Management System Operation			
6	67	70	3
7	51	70	18
8	44	70	26
9	39	70	31
10	33	70	36
11	28	70	42
12	23	70	47
13	21	70	49
14	18	70	52
15	12.9	70	57
16	11.3	70	58
17	10.3	70	60
18	9.8	70	60
19	9.3	70	61
20	7.2	70	63
21	5.1	70	65
22	4.1	70	66
23	3.9	70	66
24	3.8	70	66
25	3.6	70	66

Notes:
NA – Not applicable
(1) Closure year. Cessation of operations = Year 1.
(2) Maximum estimated drain down flows for the year based on conceptual Copper Flat TSF drain down curve.
(3) Estimated passive evaporation from the 21.6 acre ponded surface within the evaporation pond.
(4) Excess evaporation potential from the 21.6 acre surface within the evaporation pond.

FIGURES

STATE OF NEW MEXICO

NOT TO SCALE



DRAFT

CLIENT

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

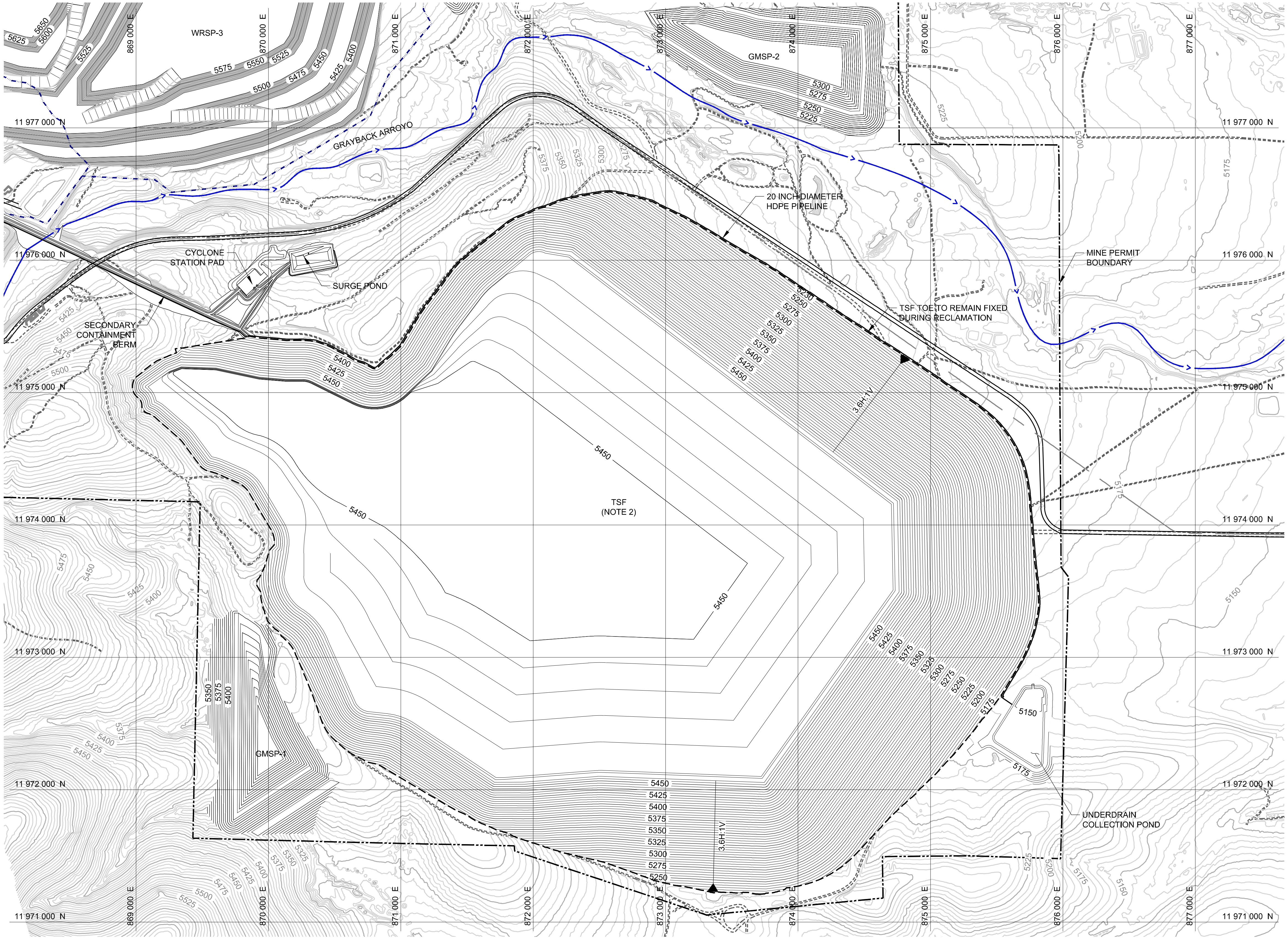
CONSULTANT

Golder Associates

YYYY-MM-DD	2016-10-05
PREPARED	CM
DESIGN	TS
REVIEW	TS
APPROVED	TS

TITLE
SITE LOCATION MAP

PROJECT No.	PHASE	Rev.	FIGURE
1531453	0300	0	E1



LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
5400	PROPOSED DESIGN CONTOURS (ft-MSL) (NOTES 1 AND 2)
	MINE PERMIT BOUNDARY
	WATERSHED BOUNDARY (BY OTHERS)
	EXISTING DIVERSION OR ARROYO
	EXISTING ROAD
	SLOPE INDICATOR
1%	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
GMSP	GROWTH MEDIA STOCKPILE
TSF	TAILING STORAGE FACILITY
AEWMS	ACTIVE EVAPORATION WATER MANAGEMENT SYSTEM

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. FINAL BUILDOUT TOPOGRAPHY FOR THE TSF WAS DEVELOPED BY GOLDER AND IS FROM THE 30K TPD TAILINGS STORAGE FACILITY FEASIBILITY DESIGN REPORT (GOLDER, 2015).

PRELIMINARY FOR AGENCY REVIEW

0 400 800
1" = 400' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-09-10	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	TS
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
GENERAL ARRANGEMENT TSF AREA AT FINAL BUILT OUT

PROJECT NO.	CONTROL	REV.	15 of 25	FIGURE
1531453	0300	C		E2

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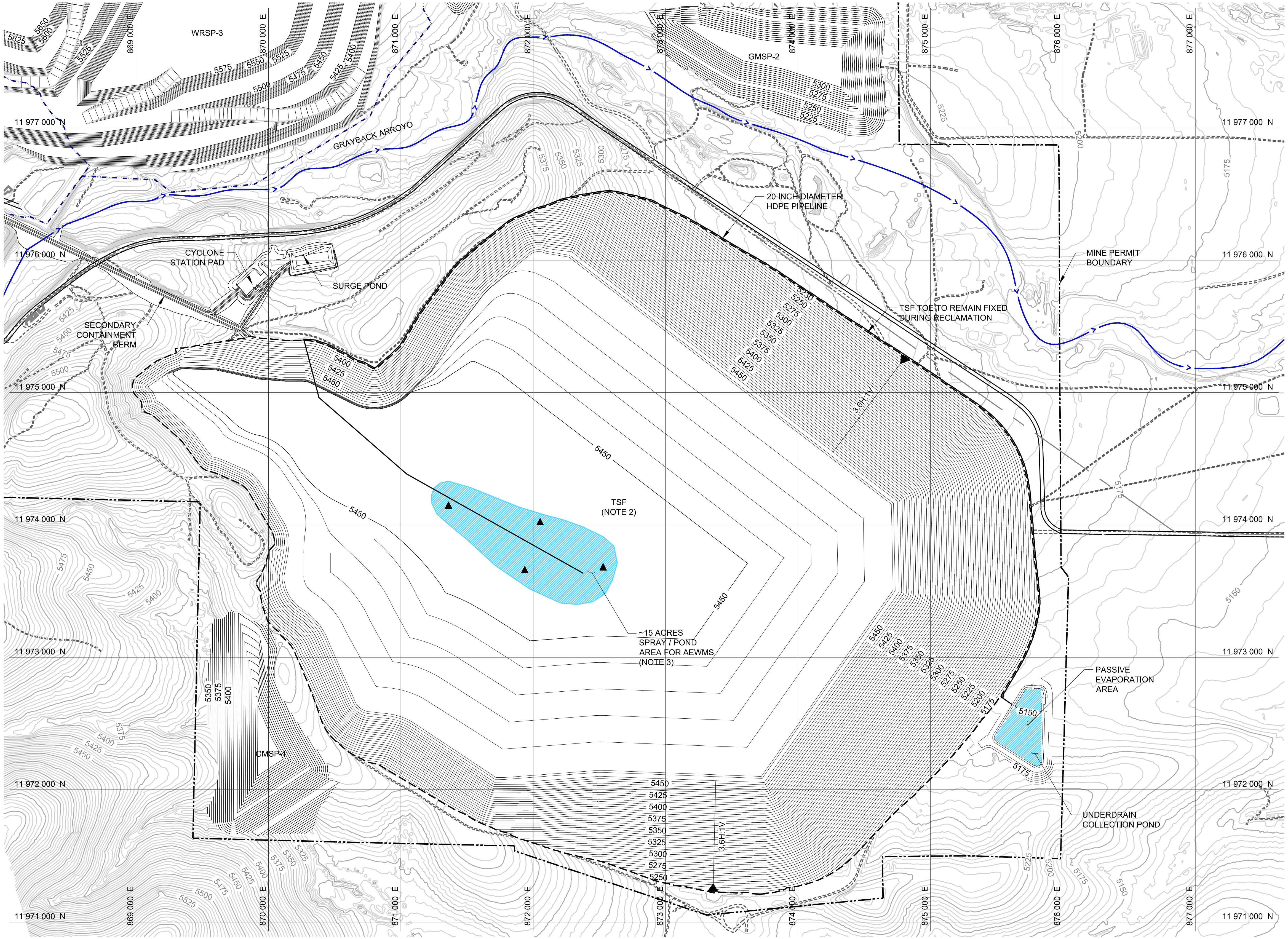

LEGEND

—— 5400 ——	EXISTING GROUND CONTOURS (ft-MSL)
—— 5400 ——	PROPOSED DESIGN CONTOURS (ft-MSL) (NOTES 1 AND 2)
—··—··—	MINE PERMIT BOUNDARY
—·—·—	WATERSHED BOUNDARY (BY OTHERS)
——<——	EXISTING DIVERSION OR ARROYO
=========	EXISTING ROAD
▶——	SLOPE INDICATOR
1% →	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
GMSP	GROWTH MEDIA STOCKPILE
TSF	TAILING STORAGE FACILITY
AEWMS	ACTIVE EVAPORATION WATER MANAGEMENT SYSTEM
▲	MECHANICAL SPRAY SYSTEM

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. FINAL BUILDOUT TOPOGRAPHY FOR THE TSF WAS DEVELOPED BY GOLDER AND IS FROM THE 30K TPD TAILINGS STORAGE FACILITY FEASIBILITY DESIGN REPORT (GOLDER, 2015).
3. APPROXIMATE LOCATION OF SPRAY/POND. SIZE AND LOCATION MAY BE ADJUSTED TO MAXIMIZE EVAPORATION CAPACITY BASE. ON ACTUAL FLOWS TO BE MANAGED.

PRELIMINARY FOR AGENCY REVIEW

0 400 800
1" = 400' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-09-10	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	TS
B	2016-09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

CLIENT

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PROJECT
COPPER FLAT PROJECT
MINE RECLAMATION AND CLOSURE PLAN

TITLE
ACTIVE EVAPORATION WATER MANAGEMENT SYSTEM LAYOUT

PROJECT NO.	CONTROL	REV.	15 of 25	FIGURE
1531453	0300	C		E3

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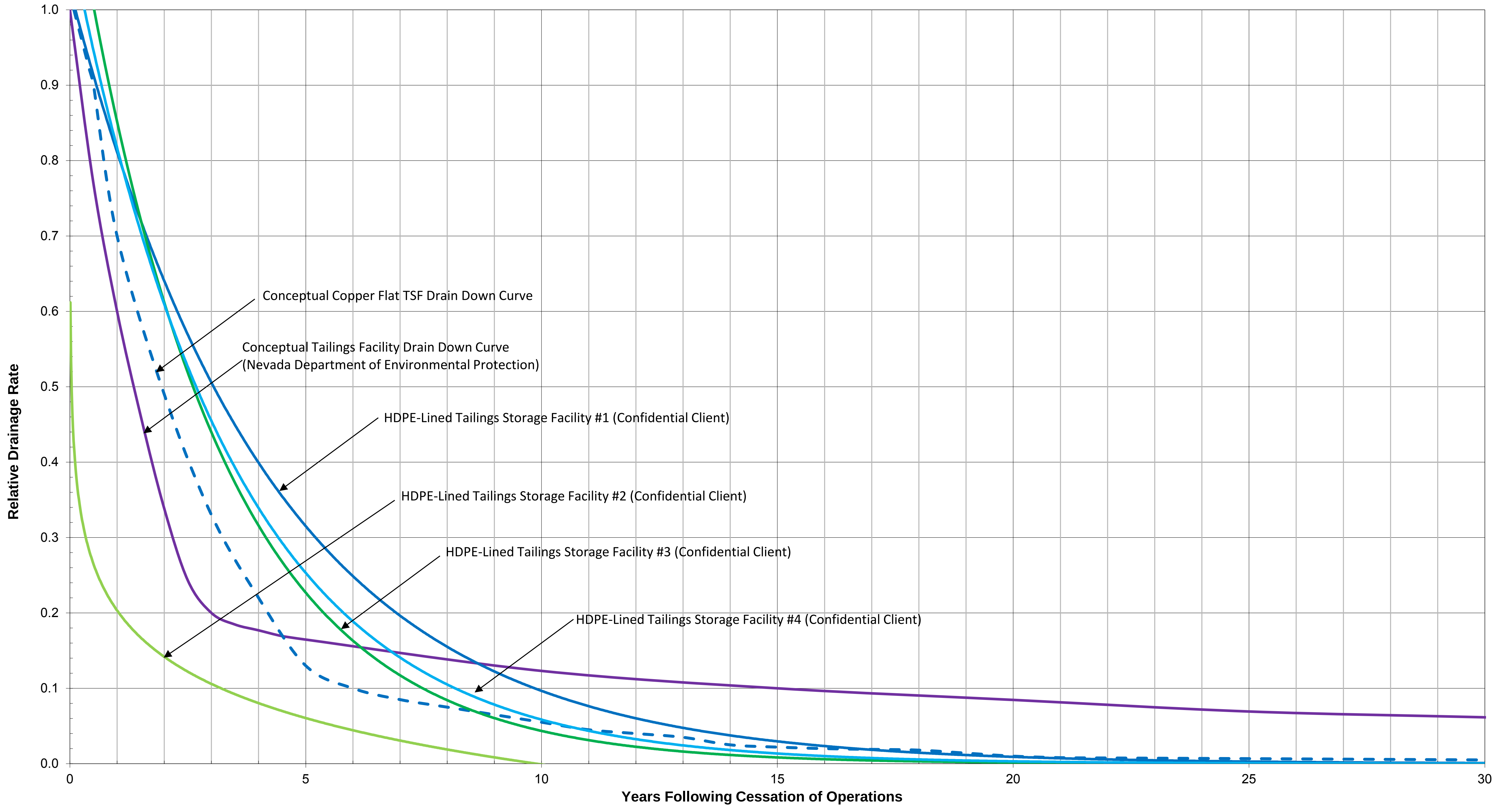
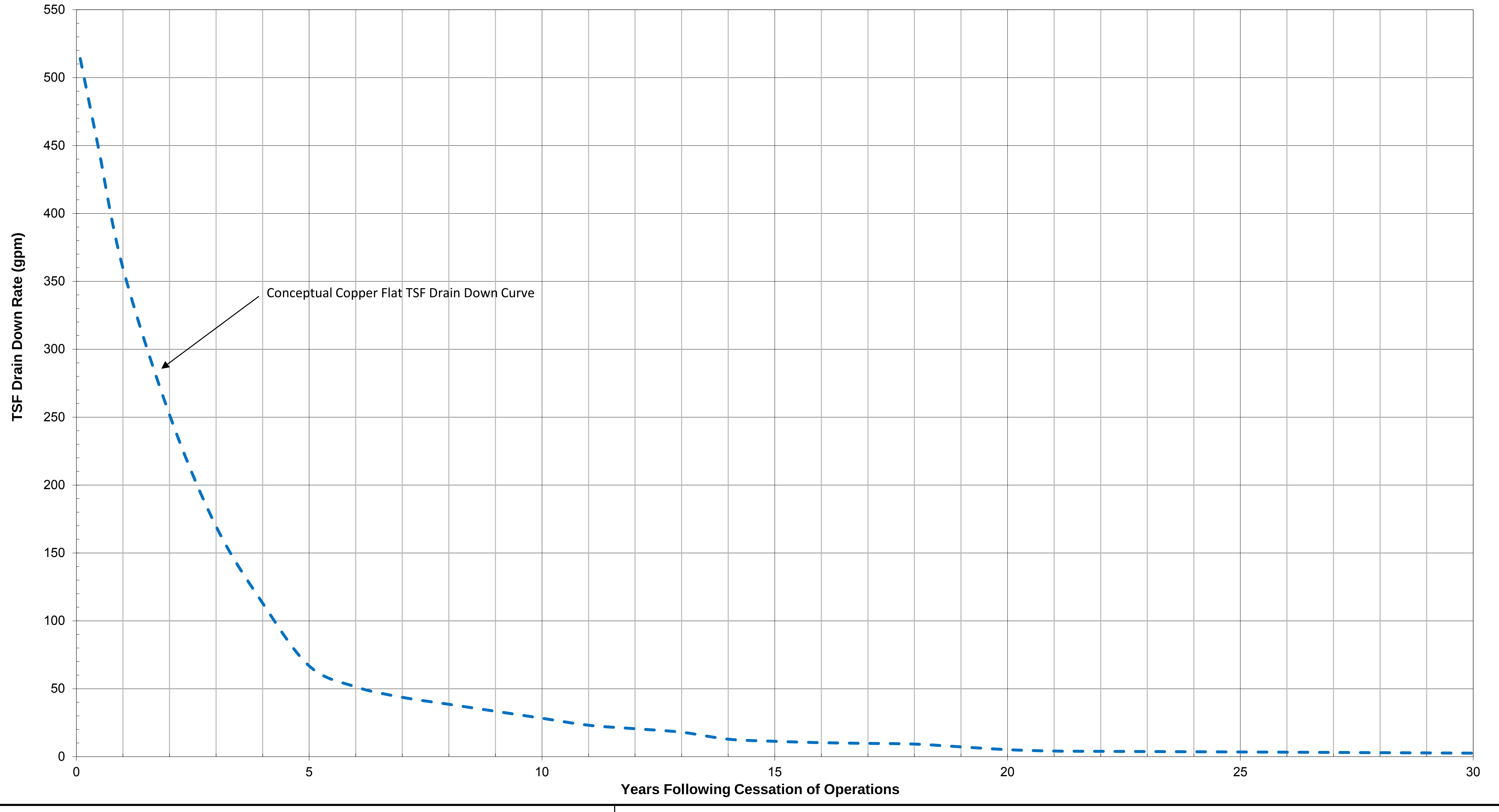


Golder Associates — Albuquerque, New Mexico

TITLE	**Example Tailings Storage Facility Drain Down Curves**		
CLIENT/PROJ: **THEMAC Resources Group Ltd. Copper Flat Mine Project**	DRAWN: TS	DATE: 09/29/2016	JOB NO. 153-1453
	CHECKED: TS	SCALE: NA	**FIGURE E4**
	REVIEWED: TS	FILE: Copper Flat Water Balance 09072016	



Golder Associates

Albuquerque, New Mexico

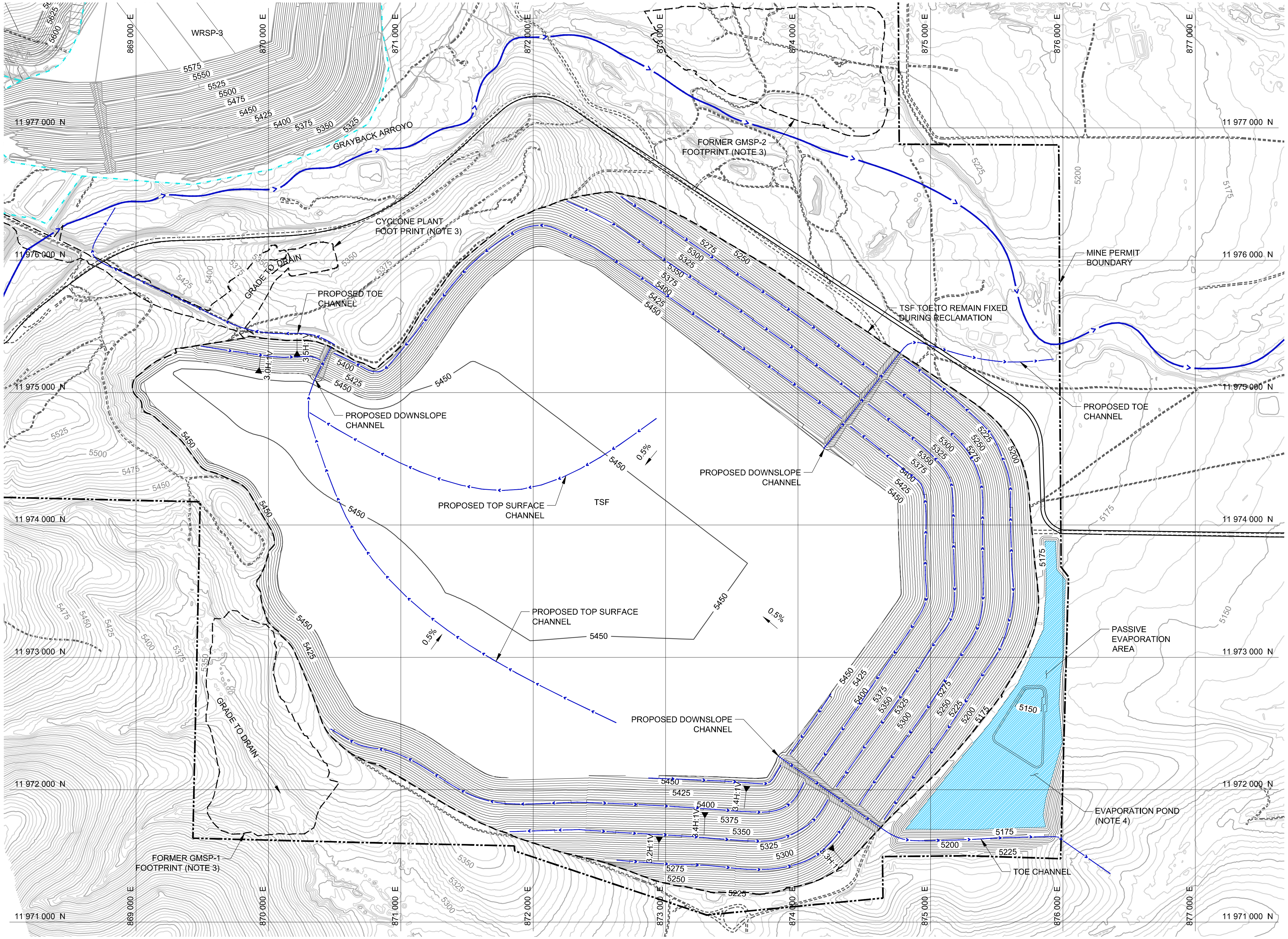
TITLE

Conceptual Copper Flat TSF Drain Down Curve

CLIENT/PROJ

THEMAC Resources Group Ltd.
Copper Flat Mine Project

DRAWN TS	DATE 09/29/2016	JOB NO. 153-1453	
CHECKED TS	SCALE NA	**FIGURE E5**	
REVIEWED TS	FILE Copper Flat Water Balance 09072016		



LEGEND

5400	EXISTING GROUND CONTOURS (ft-MSL)
5400	PROPOSED DESIGN CONTOURS (ft-MSL) (NOTE 5)
	MINE PERMIT BOUNDARY
	RECLAMATION WATERSHED BOUNDARY
	EXISTING DIVERSION OR ARROYO
	PROPOSED CHANNEL CENTERLINE (APPROXIMATE)
	EXISTING ROAD
	SLOPE INDICATOR
1%	GRADE INDICATOR
WRSP	WASTE ROCK STOCKPILE
TSF	TAILING STORAGE FACILITY

NOTES

1. FINAL BUILDOUT TOPOGRAPHY FOR THE PIT, WRSPs, AND GMSPs WAS DEVELOPED BY OTHERS AND PROVIDED BY NMCC.
2. RECLAMATION DESIGN SHALL UTILIZE 3H:1V INTERBENCH REGRADE SLOPES AND 200 FOOT INTERBENCH SLOPE LENGTHS PER NMAC 20.6.7.33. C(3). A 0.5% (MIN.) TOP SURFACE REGRADE GRADIENT SHALL BE ESTABLISHED PER NMAC 20.6.7.33. C(1). A 25 FOOT BENCH WIDTH, 1% BENCH CROSS SLOPE GRADIENT AND 1% LONGITUDINAL BENCH SLOPE GRADIENT WILL BE UTILIZED FOR STORMWATER CONVEYANCE.
3. FOOTPRINT OF FORMER GROWTH MEDIA STOCKPILES WILL BE GRADED TO APPROXIMATE SURROUNDING TOPOGRAPHY, RIPPED AND REVEGETATED.
4. EVAPORATION POND WILL BE CONSTRUCTED IN YEAR 5 FOLLOWING CESSATION OF MINING, NEAR THE END OF THE ACTIVE EVAPORATION PROGRAM. EVAPORATION POND WILL BE RECLAIMED AT THE END OF THE PASSIVE EVAPORATION PROGRAM.
5. PROPOSED DESIGN CONTOURS REPRESENT THE RECLAMATION SUBGRADE, PRE-COVER PLACEMENT TOPOGRAPHY. THIS FACILITY WILL HAVE 3FT OF COVER SO FINAL RECLAIMED SURFACE WILL BE 3RT HIGHER THAN CONTOURS SHOWN.

PRELIMINARY FOR AGENCY REVIEW

0 400 800
1" = 400' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2016-09-30	ISSUED FOR AGENCY REVIEW	HNL	HNL	TS	TS
B	2016--09-09	ISSUED FOR CLIENT REVIEW	HNL	HNL	TS	TS
A	2016-09-02	ISSUED FOR INTERNAL REVIEW	HNL	HNL	TS	TS

CLIENT
THEMAC RESOURCES — NEW MEXICO COPPER CORPORATION
Environmentally Responsible. Community-Minded. Local Opportunities.

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PROJECT
COPPER FLAT PROJECT
MINE PERMIT CLOSURE DESIGN

TITLE
PASSIVE EVAPORATION WATER MANAGEMENT SYSTEM LAYOUT

PROJECT NO.	CONTROL	REV.	16 of 25	FIGURE
1531453	0300	C		E6

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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Engineering Earth's Development, Preserving Earth's Integrity