

**Appendix D**

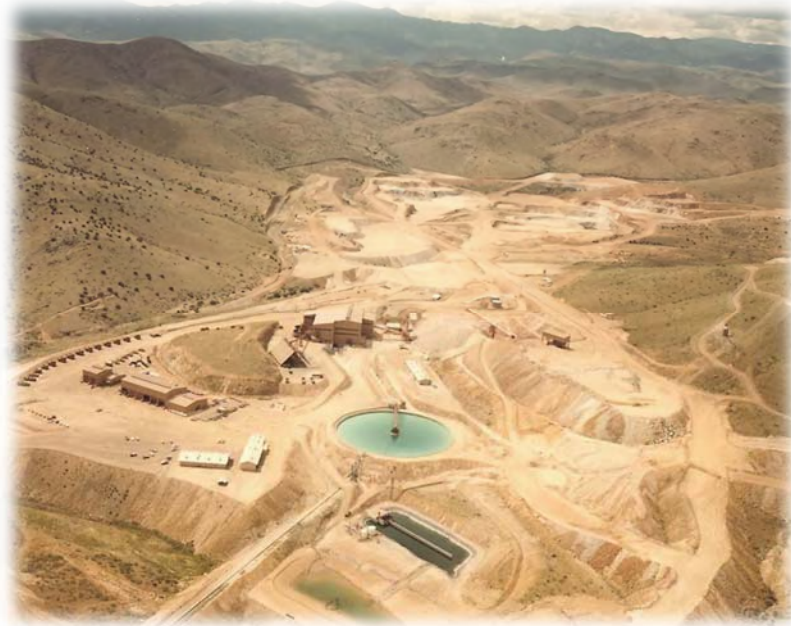
**Copper Flat**

**Site Diversion Analysis**

**M3 Engineering & Technology Corporation**

**Revised, June 2016**

# Copper Flat Project



## Site Diversion Analysis Report

Prepared For:

**THEMAC**  
RESOURCES 

**Certified Professional Engineer Seal**

This report documents work conducted under the oversight of the following Engineer:

Harry Lewsley, P.E.



Harry Lewsley  
Signature


Exp. 12/31/2017  
Date 12/5/2015

SITE DIVERSION ANALYSIS  
COPPER FLAT PROJECT

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*Harry J. Lewsley*  
*12/7/2015*



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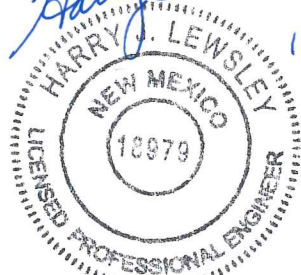
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B	HydroCAD Results for Pre-Quintana Watersheds
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**1 PURPOSE AND SCOPE OF ANALYSIS**

The Copper Flat Project proposed for mine development by THEMAC Resources, 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,  $L_c$ , 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**

<b>Watershed ID</b>	<b>Area (ac)</b>	<b>Lc (ft)</b>	<b>Avg. Sc (ft/ft)</b>	<b>Tc (min)</b>	<b>Q100 (cfs)</b>	<b>Q200 (cfs)</b>	<b>Q500 (cfs)</b>
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  
Sc = Slope

Tc = Time of concentration  
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 existing diversions and control structures are adequate to protect the site from flooding during the modeled flow events.

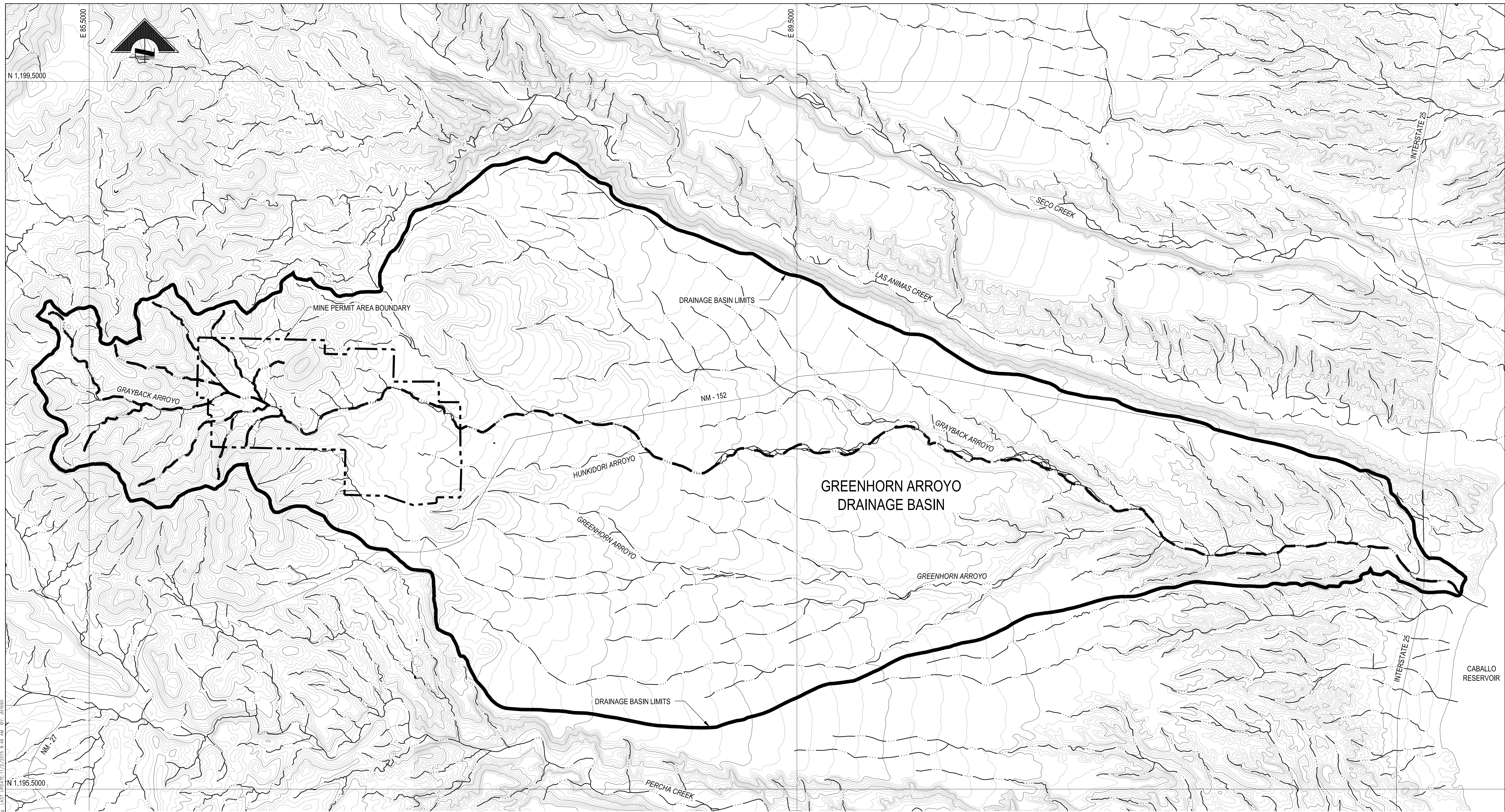
The analyses conducted also determined that both culvert crossings are capable of conveying the Q500 without overtopping the adjacent roadway or pipeline corridor. This conclusion is based on the assumption that the culverts analyzed are in good working condition. Field inspection of the culverts completed 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'



SCALE IN FEET  
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DO NOT SCALE 11x17 DRAWINGS

**PRELIMINARY**  
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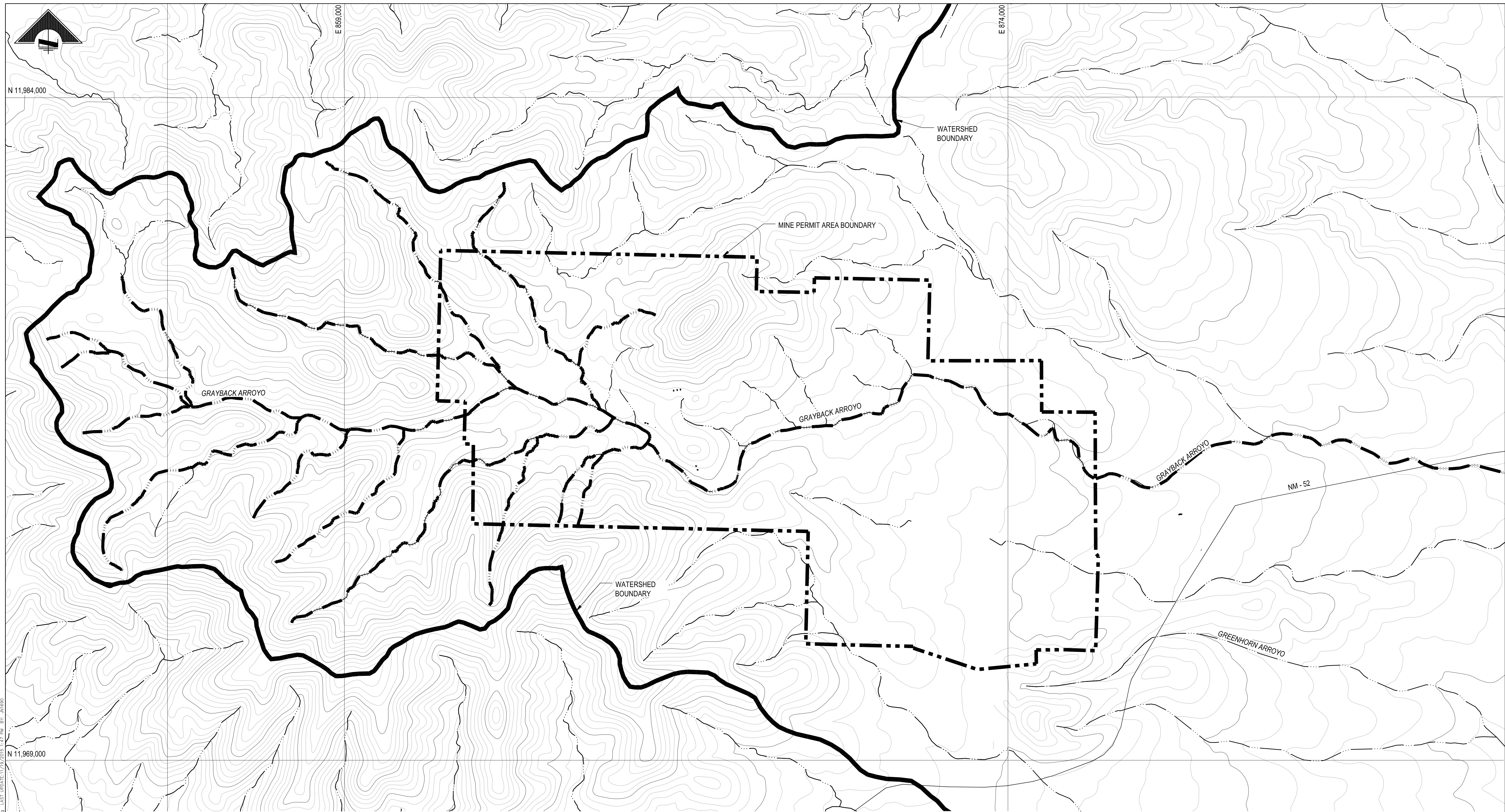
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**COPPER FLAT PROJECT**

**GENERAL SITE CIVIL GREENHORN ARROYO PRE-MINING WATERSHED BASIN**

JOB NO. M3 PN-12085  
DWG. NO. **0000-CI-100**  
REV. NO. P2 DATE 20 NOV 15

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**LEGEND**

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

**SITE PLAN**  
SCALE: 1" = 1000'



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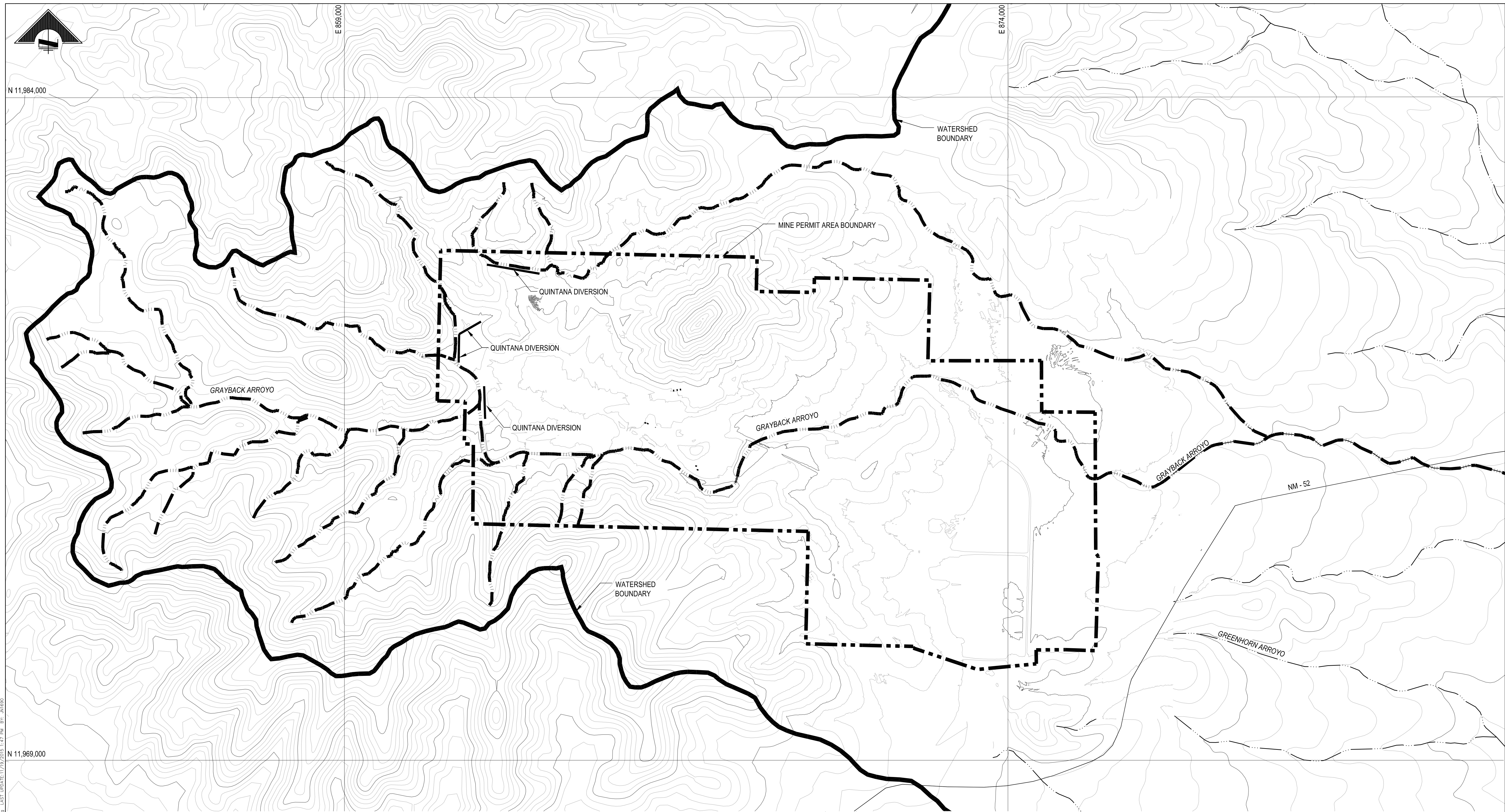
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**GENERAL SITE  
COPPER FLAT SITE  
EXISTING HYDROLOGY  
PRE-QUINTANA MINING**

JOB NO. M3 PN-120085  
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**LEGEND**

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

**SITE PLAN**  
SCALE: 1" = 1000'



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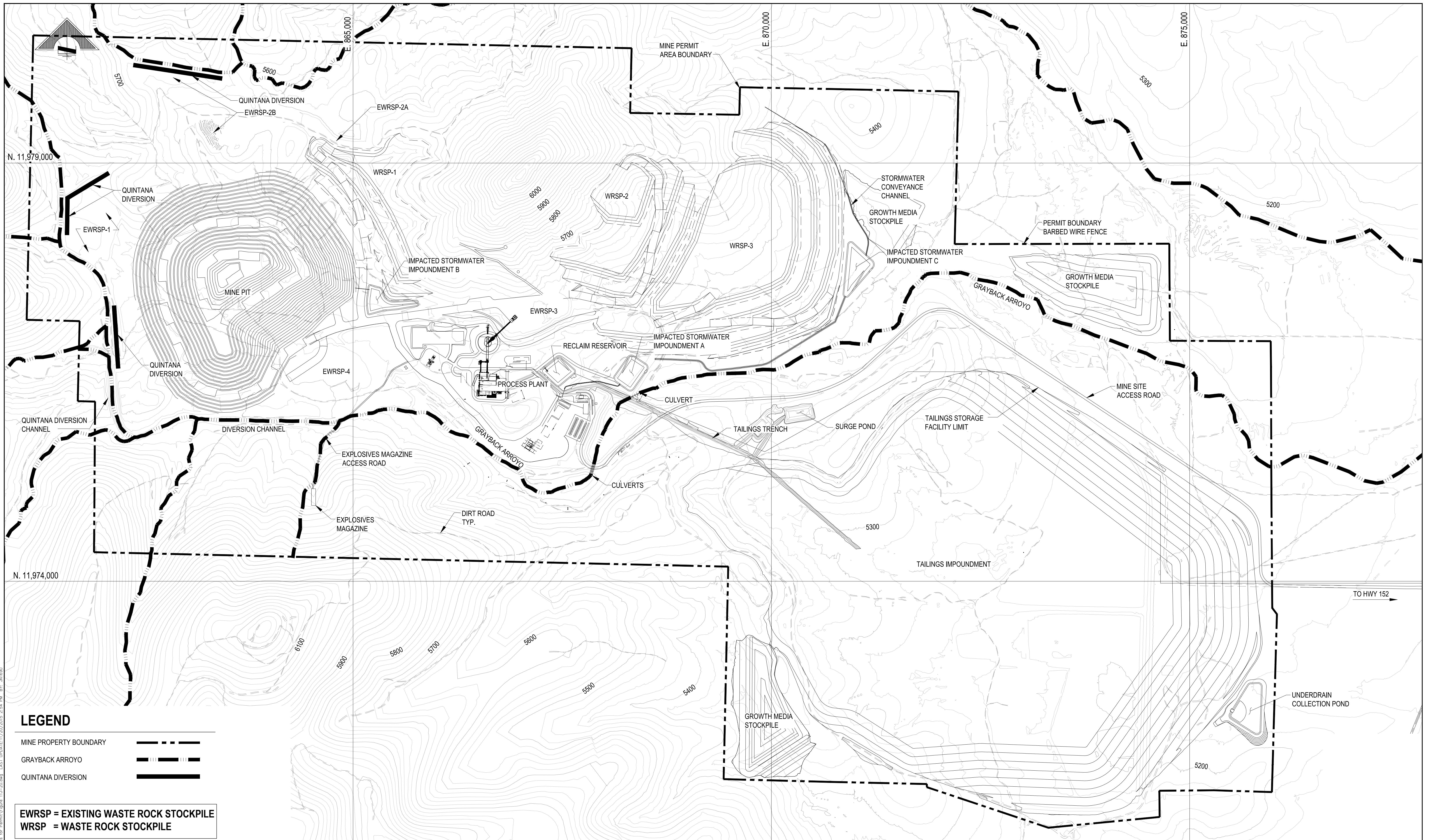
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**COPPER FLAT PROJECT**

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

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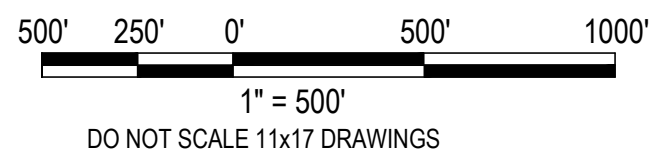


**LEGEND**

- MINE PROPERTY BOUNDARY
- GRAYBACK ARROYO
- QUINTANA DIVERSION

**EWRSP = EXISTING WASTE ROCK STOCKPILE**  
**WRSP = WASTE ROCK STOCKPILE**

**SITE PLAN**  
SCALE: 1:500



**PRELIMINARY**  
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**COPPER FLAT PROJECT**

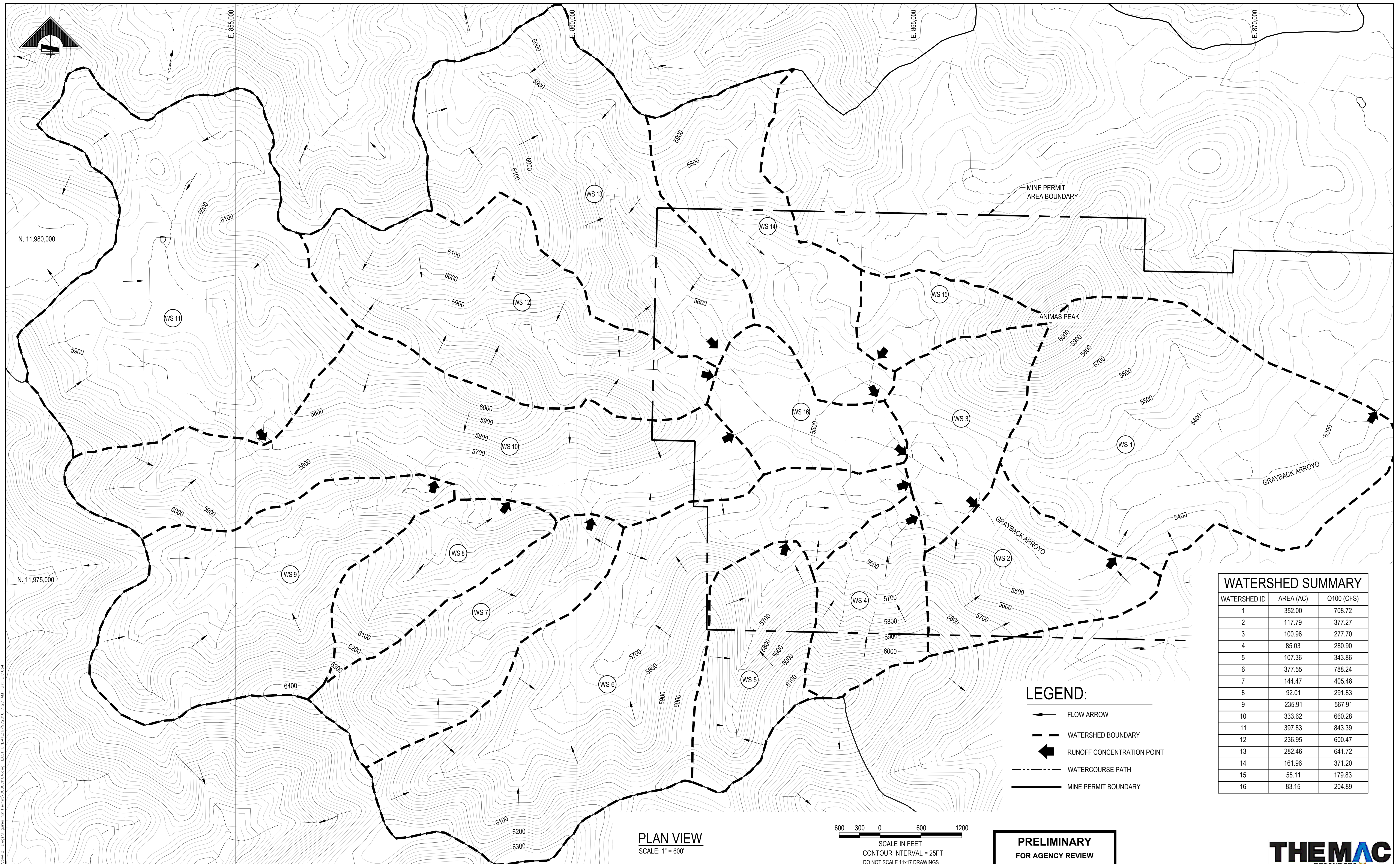
**SITE GENERAL CIVIL**  
**GRAYBACK ARROYO DIVERSION THROUGH NMCC PROJECT SITE**

JOB NO. M3 PN-12085  
 DWG. NO. **0000-CI-103**  
 REV. NO. P2 DATE 20 NOV 15

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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

- LEGEND:**
- FLOW ARROW
  - WATERSHED BOUNDARY
  - RUNOFF CONCENTRATION POINT
  - WATERCOURSE PATH
  - MINE PERMIT BOUNDARY

**PLAN VIEW**  
SCALE: 1" = 600'

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SCALE IN FEET  
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DO NOT SCALE 11x17 DRAWINGS

**PRELIMINARY**  
**FOR AGENCY REVIEW**



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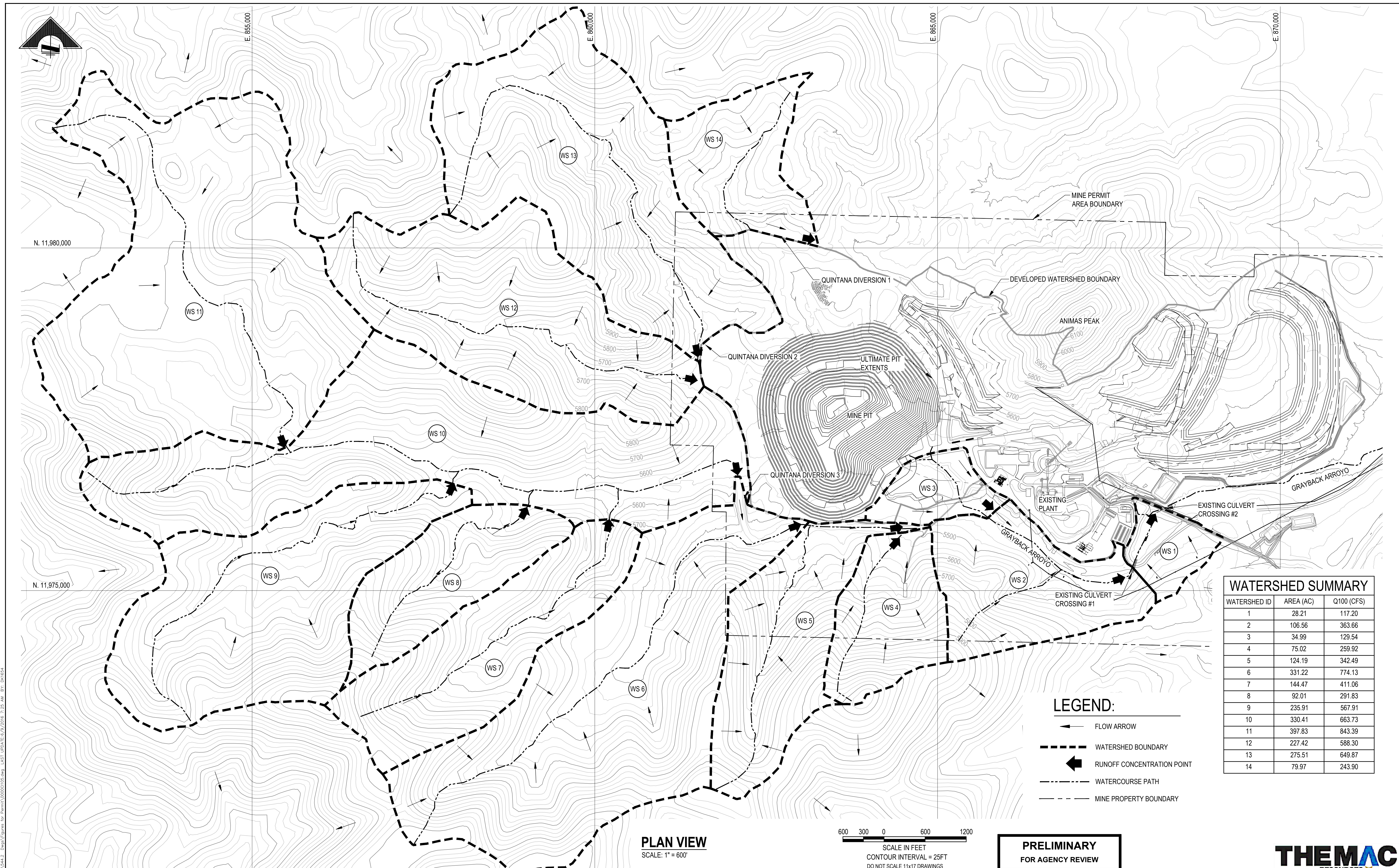
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**COPPER FLAT PROJECT**

**GENERAL SITE CIVIL PRE QUINTANA EXISTING WATERSHED AREAS**

JOB NO. M3 PN-12085  
DWG NO. **0000-CI-104**  
REV NO. P2 DATE 09 JUN 16

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N. 11,975,000

E. 865,000

E. 860,000

E. 865,000

E. 870,000

**PLAN VIEW**  
SCALE: 1" = 600'



SCALE IN FEET  
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DO NOT SCALE 11x17 DRAWINGS

- LEGEND:**
- ← FLOW ARROW
  - WATERSHED BOUNDARY
  - ◀ RUNOFF CONCENTRATION POINT
  - - - WATERCOURSE PATH
  - MINE PROPERTY BOUNDARY

**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

**PRELIMINARY**  
**FOR AGENCY REVIEW**



**COPPER FLAT PROJECT**

**GENERAL SITE CIVIL**  
**POST QUINTANA**  
**EXISTING WATERSHED AREAS**

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REFERENCES				REFERENCES				REVISIONS				REVISIONS				SCALE: 1" = 600'	DATE
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	DATE	

File: P:\2013\200805\CIVIL\_04131442 - Dept\Updates for Permit\00000105.dwg LAST UPDATE: 6/9/2016 7:25 AM BY: DW/USA

APPENDIX A

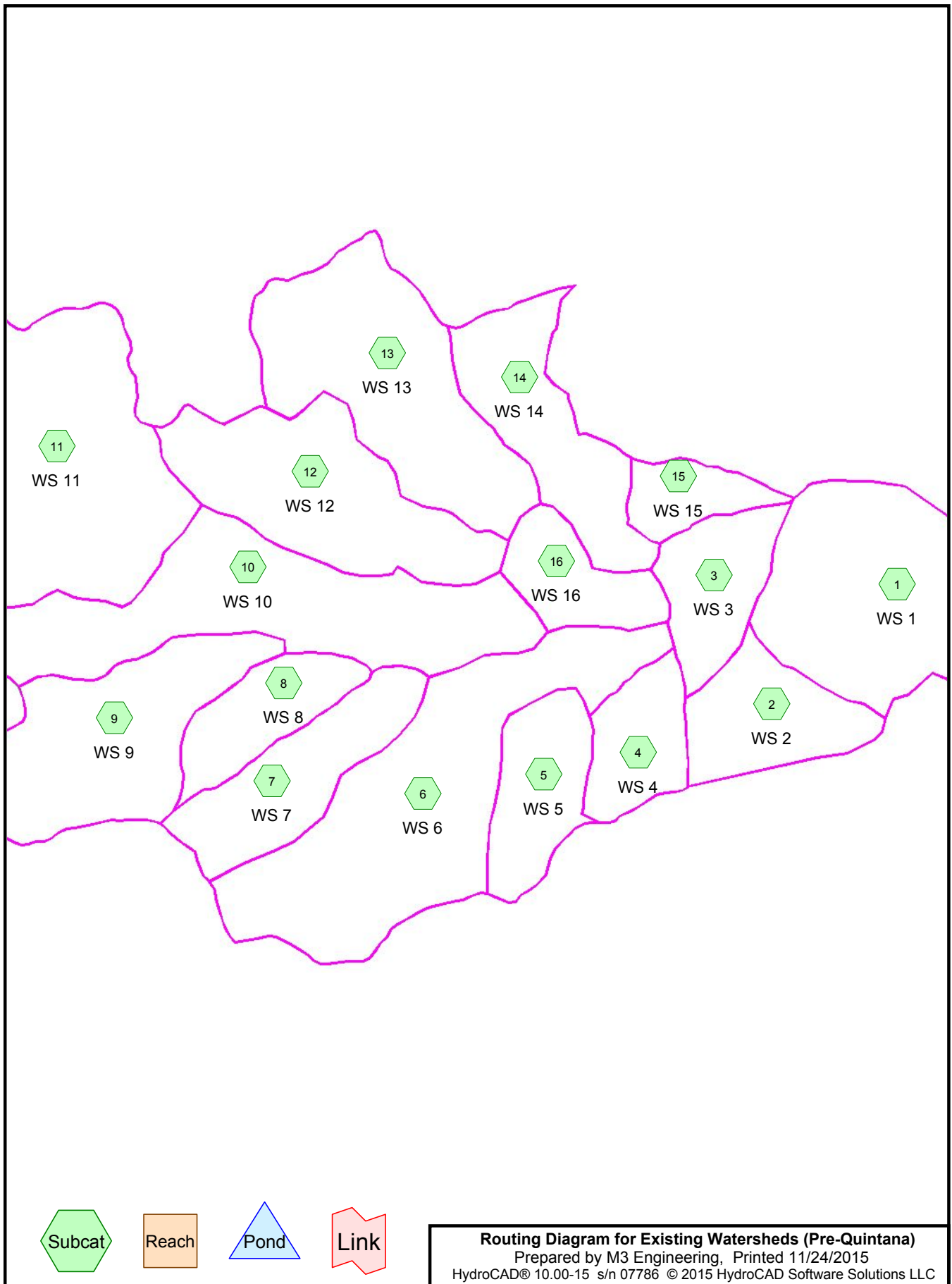


WATERSHED SUMMARY - EXISTING

Pre-Quintana Existing												
Watershed ID	Area	Total Area	Desert Shrub CN=86	Impervious Area CN=98	Pit Material CN=80	L <sub>c</sub>	Avg. S <sub>c</sub>	Q <sub>100</sub> - SCS	Tc Method	Tc	Weighted SCS CN	Soil Type
--	<i>sq. feet</i>	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>ft</i>	<i>ft/ft</i>	<i>cfs</i>	--	<i>min</i>	--	--
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 <sub>c</sub>	Avg. S <sub>c</sub>	Q <sub>100</sub> - SCS	Tc Method	Tc	Weighted SCS CN	Soil Type
--	<i>sq. feet</i>	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>ft</i>	<i>ft/ft</i>	<i>cfs</i>	--	<i>min</i>	--	--
1 (pond)	1,228,747	28.21	25.39	2.82	0.00	0	0.249	<b>117.20</b>	Minimum	5.00	87	D
2	4,641,978	106.56	95.91	10.66	0.00	3,068	0.314	<b>363.66</b>	SCS Lag	11.00	87	D
3	1,523,968	34.99	31.49	3.50	0.00	1,603	0.177	<b>129.54</b>	SCS Lag	8.70	87	D
4	3,267,841	75.02	67.52	7.50	0.00	3,047	0.339	<b>259.92</b>	SCS Lag	10.50	87	D
5	5,409,568	124.19	111.77	12.42	0.00	5,976	0.340	<b>342.49</b>	SCS Lag	18.00	87	D
6	14,427,914	331.22	298.10	33.12	0.00	8,173	0.310	<b>774.13</b>	SCS Lag	24.20	87	D
7	6,292,945	144.47	130.02	14.45	0.00	5,064	0.296	<b>411.06</b>	SCS Lag	16.90	87	D
8	4,008,126	92.01	82.81	9.20	0.00	3,617	0.274	<b>291.83</b>	SCS Lag	13.40	87	D
9	10,276,128	235.91	212.32	23.59	0.00	7,005	0.268	<b>567.91</b>	SCS Lag	23.00	87	D
10	14,392,904	330.41	297.37	33.04	0.00	10,278	0.276	<b>663.73</b>	SCS Lag	30.80	87	D
11	17,329,719	397.83	358.05	39.78	0.00	7,149	0.182	<b>843.39</b>	SCS Lag	28.30	87	D
12	9,906,558	227.42	204.68	22.74	0.00	6,590	0.315	<b>588.30</b>	SCS Lag	20.20	87	D
13	12,001,134	275.51	247.96	27.55	0.00	7,744	0.293	<b>649.87</b>	SCS Lag	23.80	87	D
14	3,483,496	79.97	71.97	8.00	0.00	3,545	0.224	<b>243.90</b>	SCS Lag	14.60	87	D

**APPENDIX B**



**Existing Watersheds (Pre-Quintana)**

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Page 2

**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)
<b>3,164.140</b>	<b>87</b>	<b>TOTAL AREA</b>

**Existing Watersheds (Pre-Quintana)**

Prepared by M3 Engineering

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**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	
<b>3,164.140</b>		<b>TOTAL AREA</b>

**Existing Watersheds (Pre-Quintana)**

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**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
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>3,164.140</b>	<b>0.000</b>	<b>3,164.140</b>	<b>TOTAL AREA</b>	

**Existing Watersheds (Pre-Quintana)***Type II 24-hr 100-yr Event Rainfall=3.70"*

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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

<b>Subcatchment1: WS 1</b>	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	
<b>Subcatchment2: WS 2</b>	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	
<b>Subcatchment3: WS 3</b>	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	
<b>Subcatchment4: WS 4</b>	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	
<b>Subcatchment5: WS 5</b>	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	
<b>Subcatchment6: WS 6</b>	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	
<b>Subcatchment7: WS 7</b>	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	
<b>Subcatchment8: WS 8</b>	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	
<b>Subcatchment9: WS 9</b>	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	
<b>Subcatchment10: WS 10</b>	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	
<b>Subcatchment11: WS 11</b>	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	
<b>Subcatchment12: WS 12</b>	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	
<b>Subcatchment13: WS 13</b>	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	
<b>Subcatchment14: WS 14</b>	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	
<b>Subcatchment15: WS 15</b>	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	
<b>Subcatchment16: WS 16</b>	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	

**Existing Watersheds (Pre-Quintana)**

*Type II 24-hr 100-yr Event Rainfall=3.70"*

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**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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 1: WS 1**

Runoff = 708.72 cfs @ 12.25 hrs, Volume= 69.315 af, Depth= 2.36"

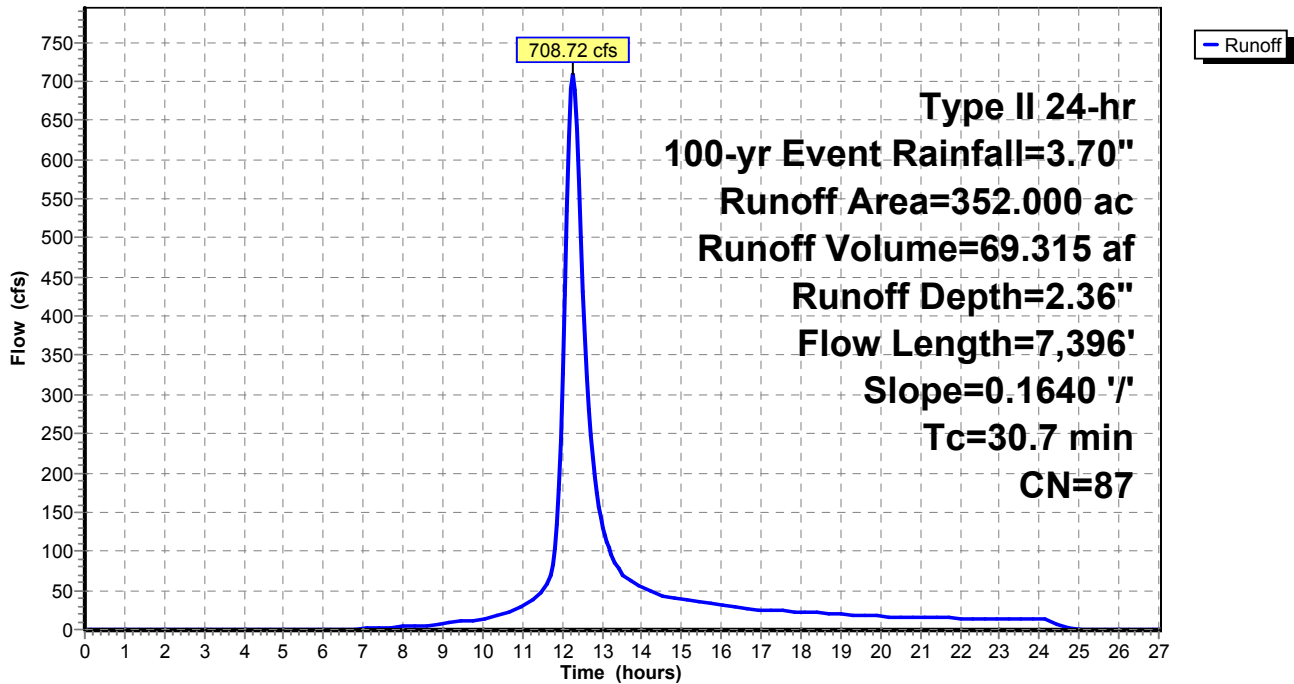
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 2: WS 2**

Runoff = 377.27 cfs @ 12.05 hrs, Volume= 23.195 af, Depth= 2.36"

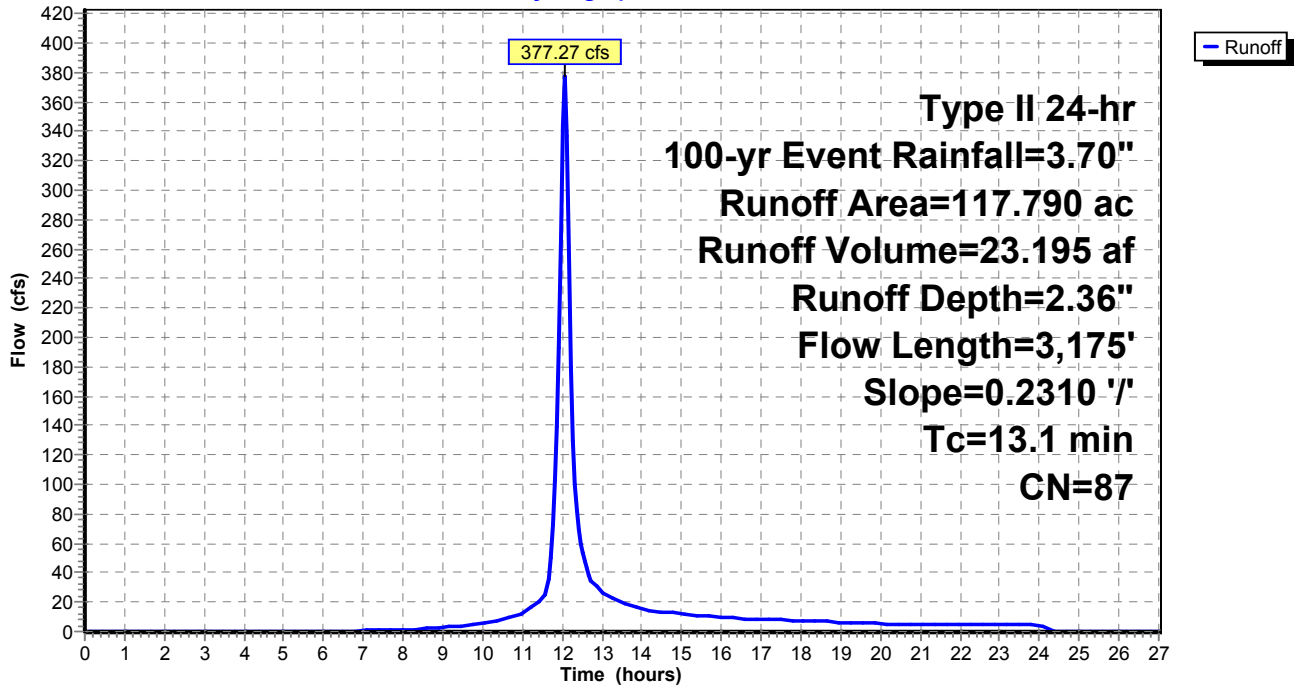
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 3: WS 3**

Runoff = 277.70 cfs @ 12.10 hrs, Volume= 19.883 af, Depth= 2.36"

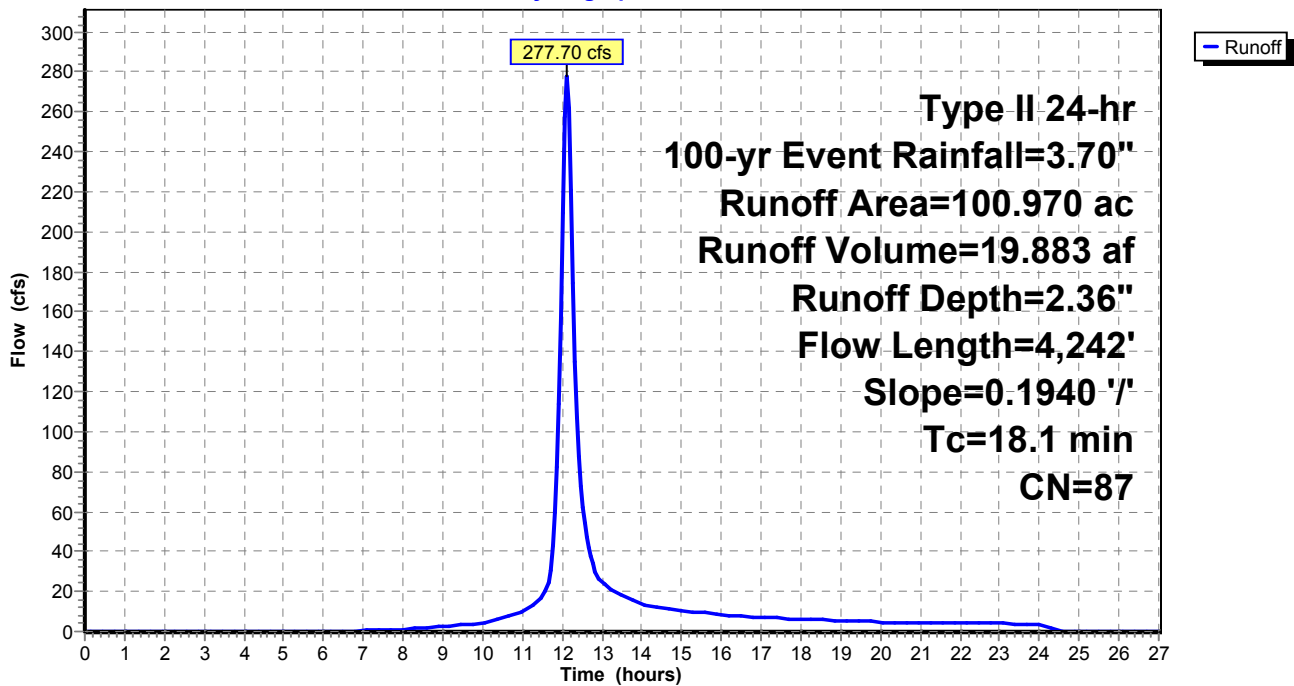
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 4: WS 4**

Runoff = 280.90 cfs @ 12.04 hrs, Volume= 16.744 af, Depth= 2.36"

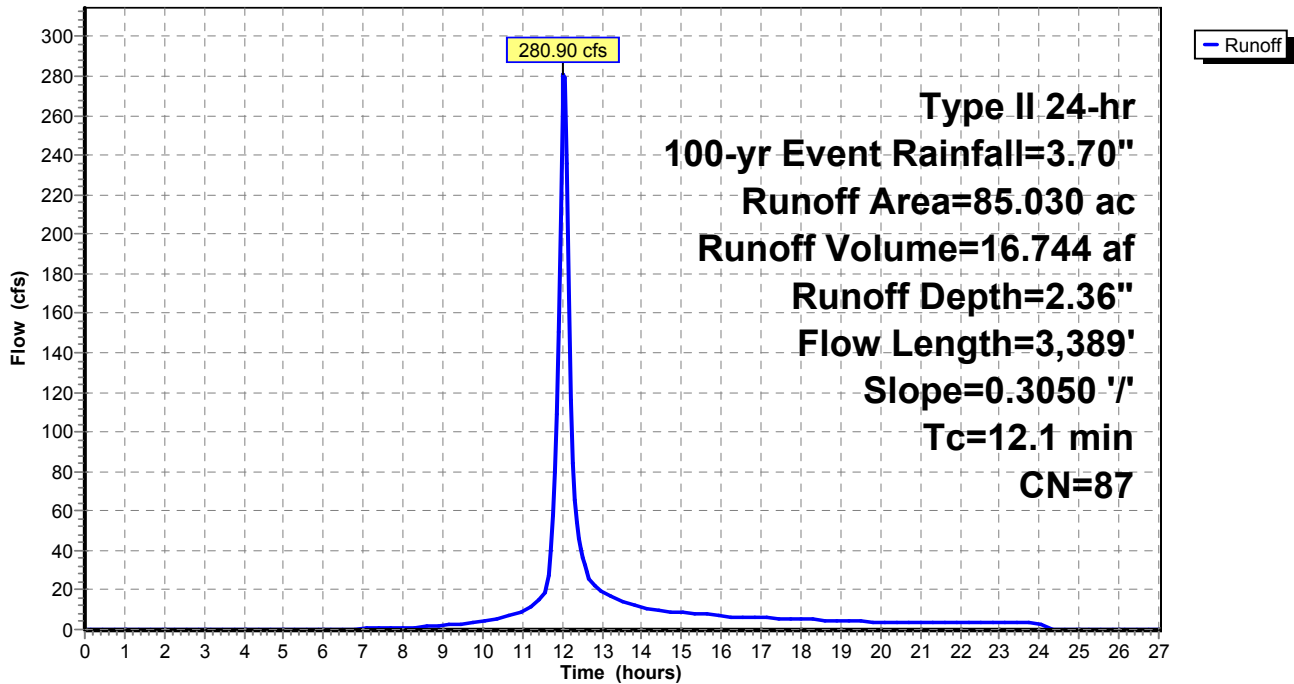
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 5: WS 5**

Runoff = 343.86 cfs @ 12.05 hrs, Volume= 21.141 af, Depth= 2.36"

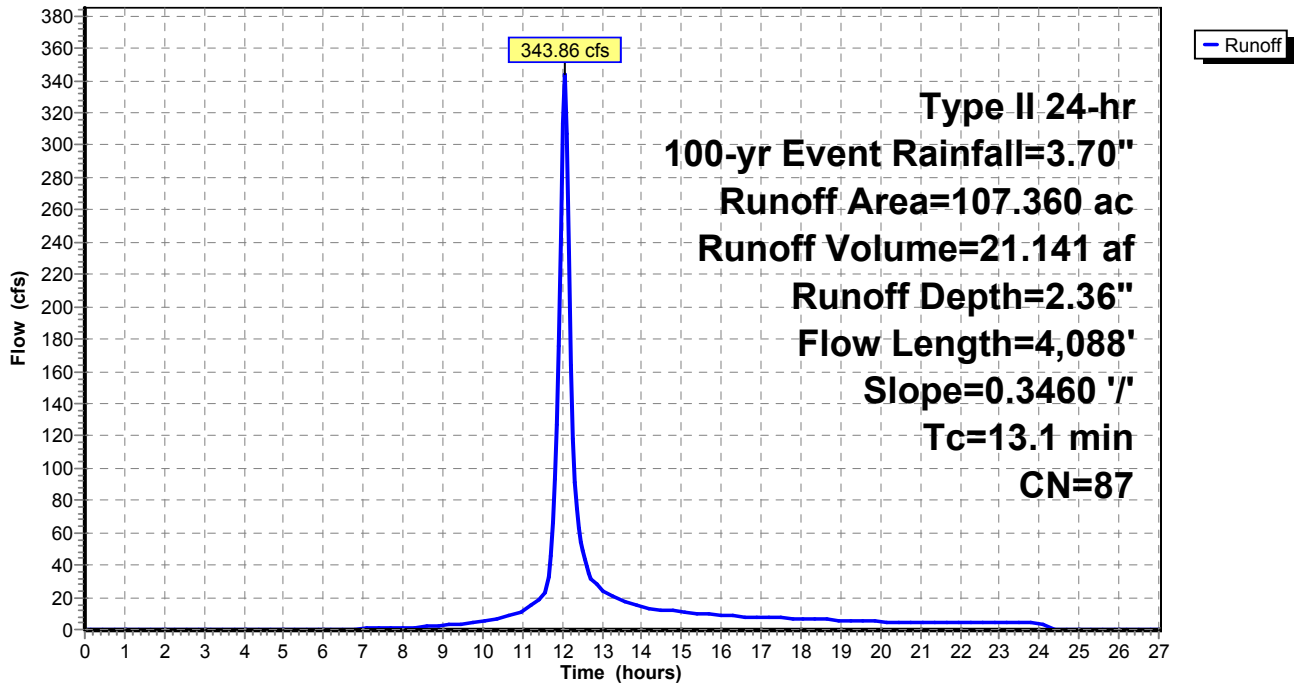
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 6: WS 6**

Runoff = 788.24 cfs @ 12.23 hrs, Volume= 74.344 af, Depth= 2.36"

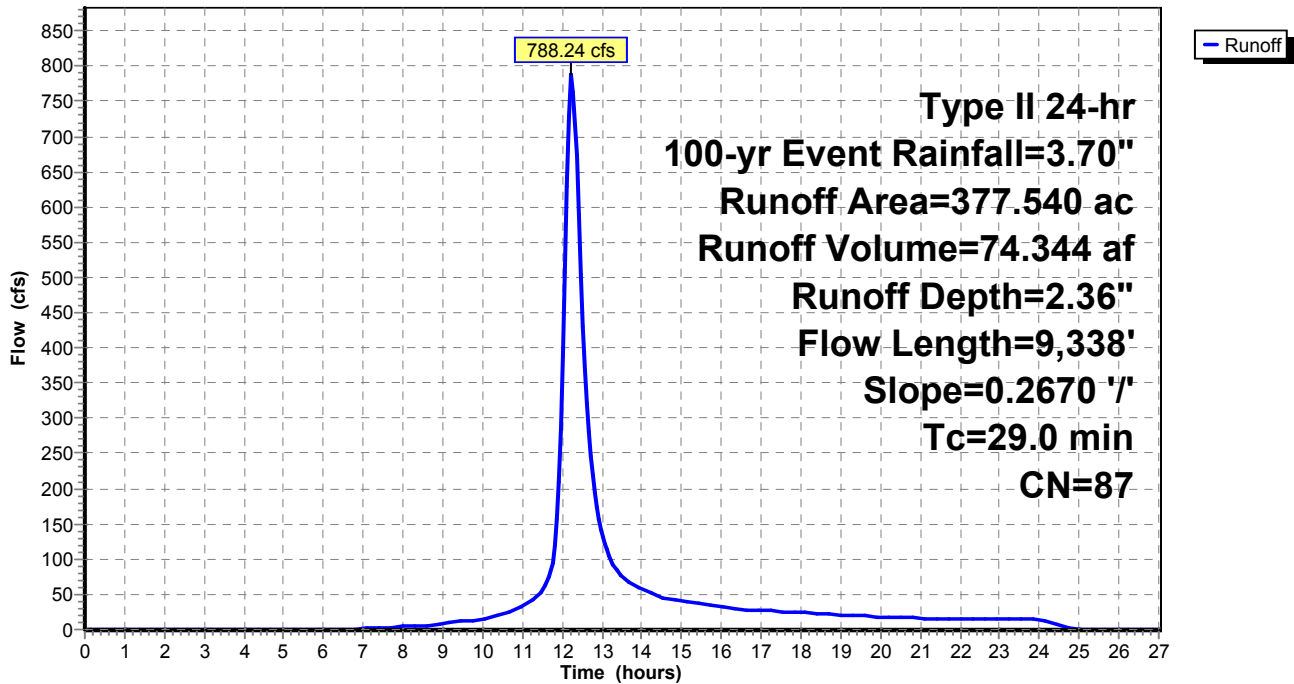
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 7: WS 7**

Runoff = 405.48 cfs @ 12.10 hrs, Volume= 28.449 af, Depth= 2.36"

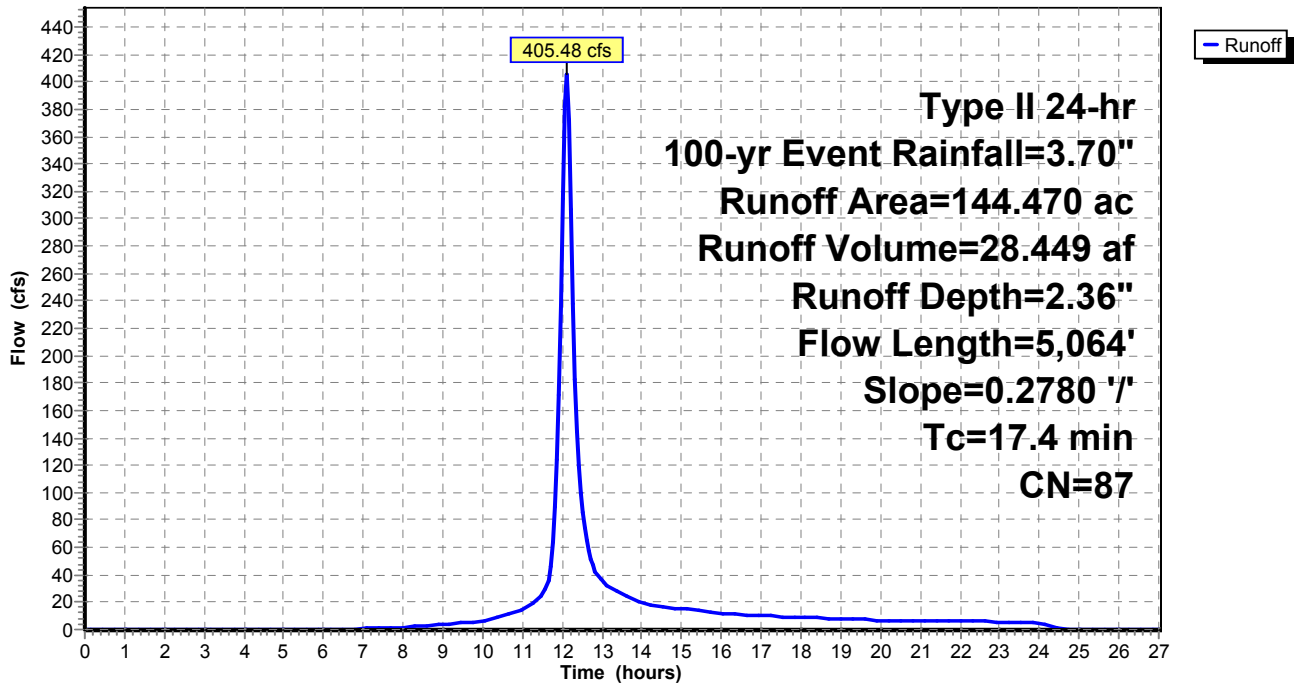
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 8: WS 8**

Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

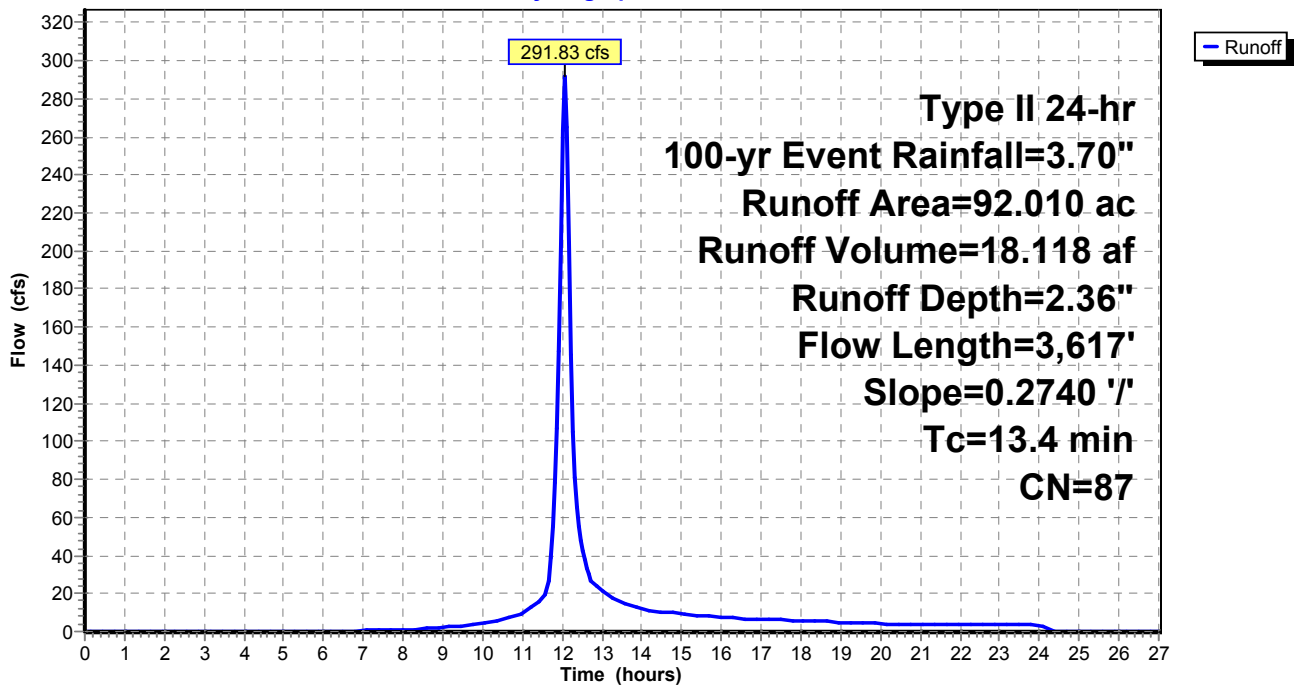
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 9: WS 9**

Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

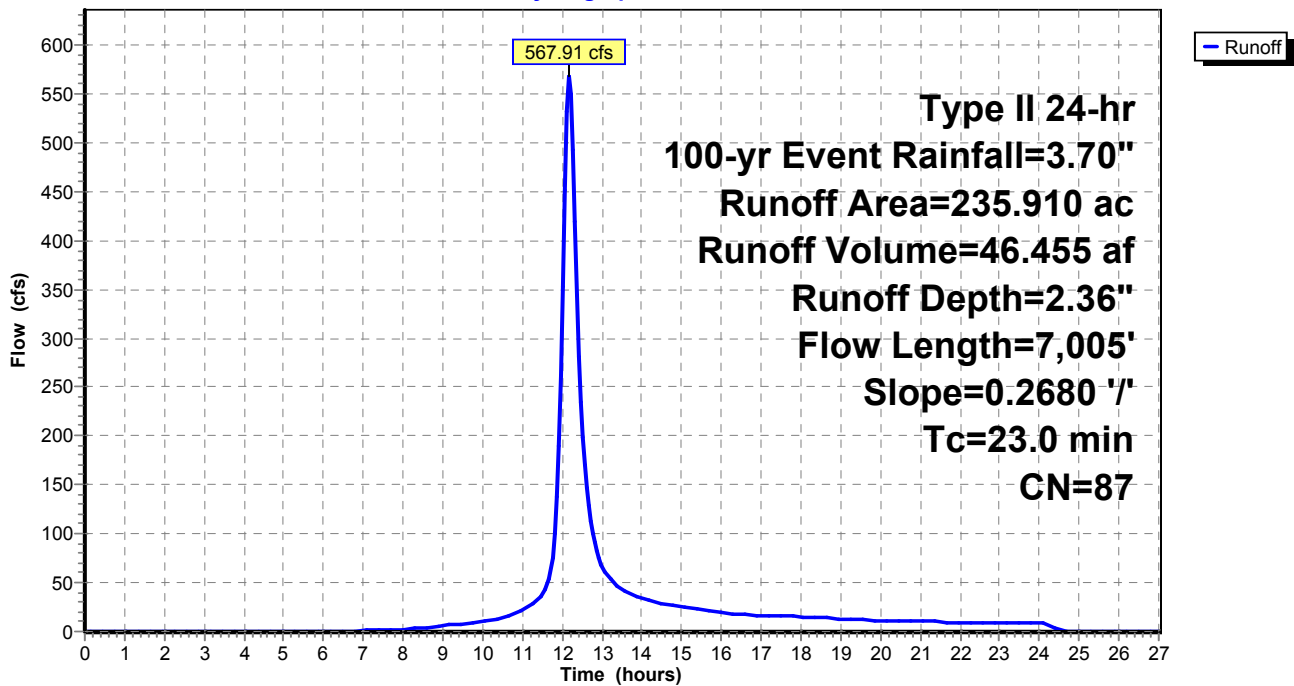
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 10: WS 10**

Runoff = 660.28 cfs @ 12.26 hrs, Volume= 65.695 af, Depth= 2.36"

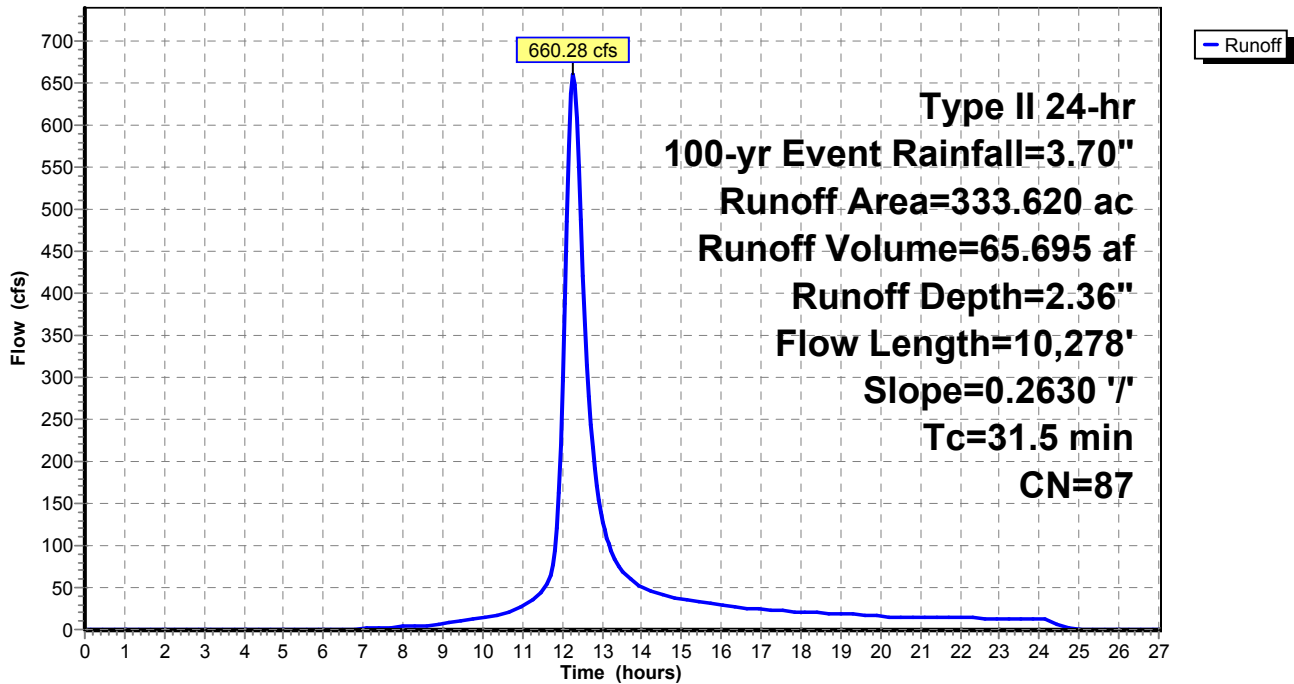
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 11: WS 11**

Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

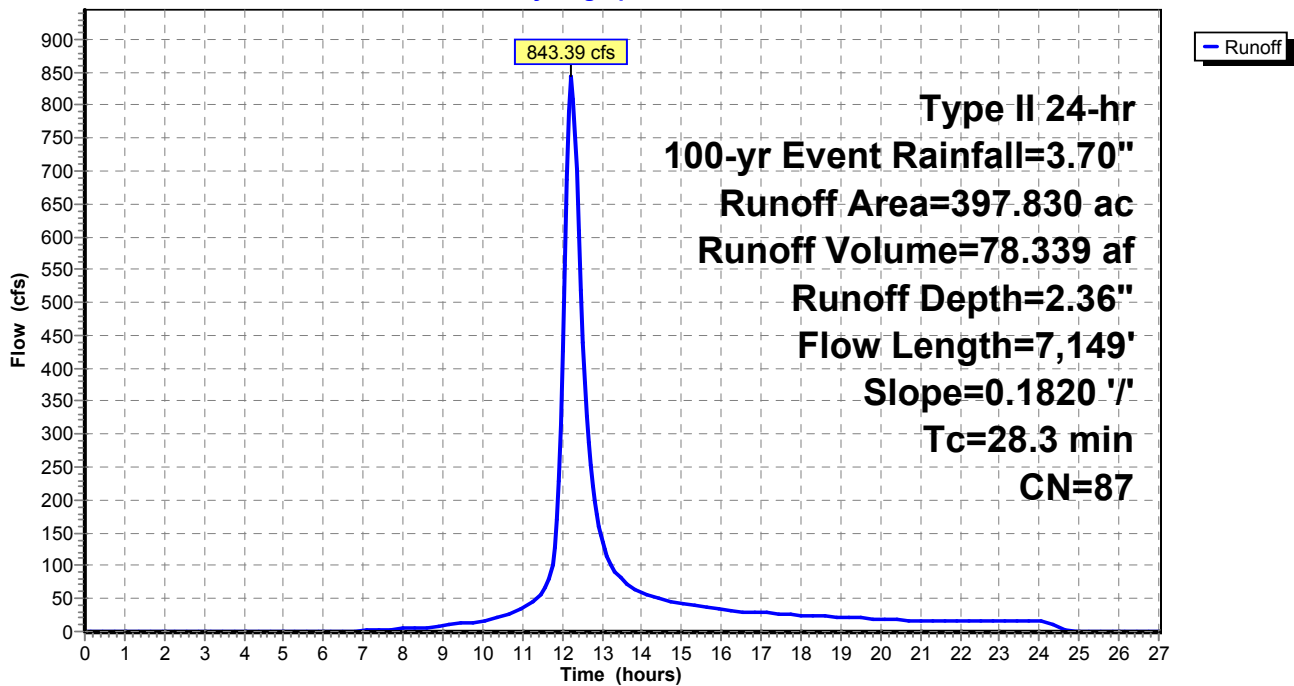
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 12: WS 12**

Runoff = 600.47 cfs @ 12.14 hrs, Volume= 46.657 af, Depth= 2.36"

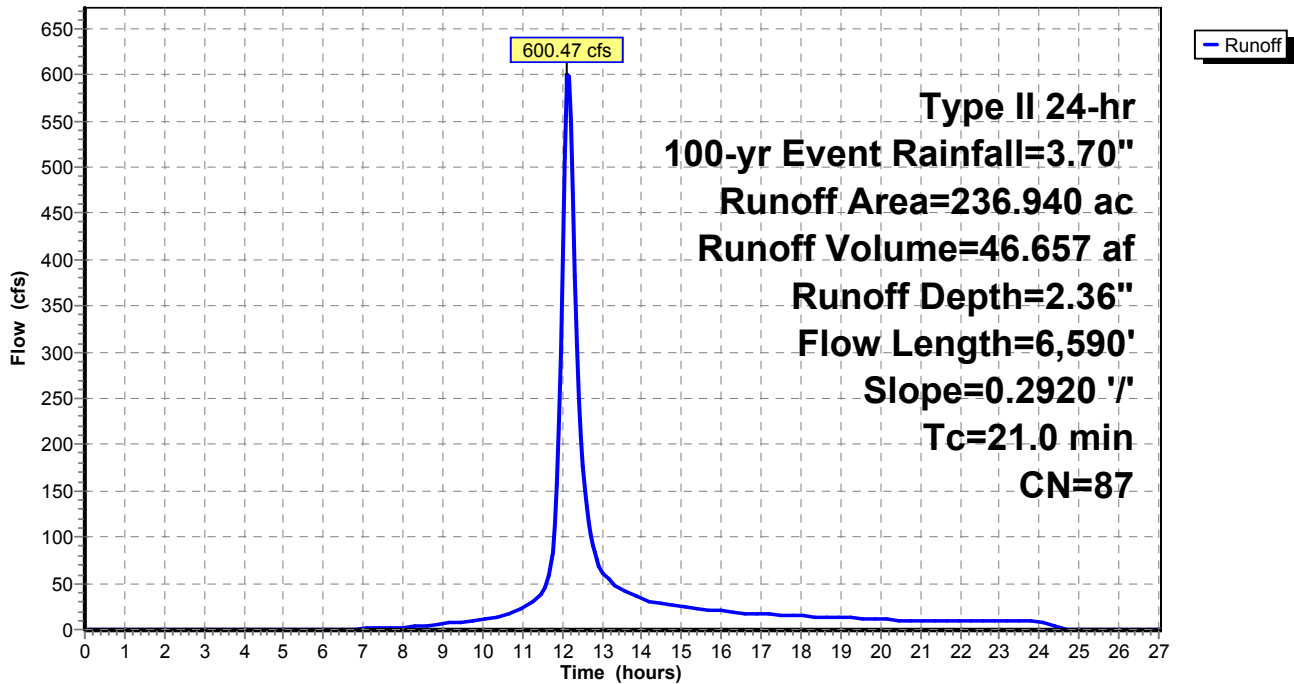
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 13: WS 13**

Runoff = 641.72 cfs @ 12.18 hrs, Volume= 55.621 af, Depth= 2.36"

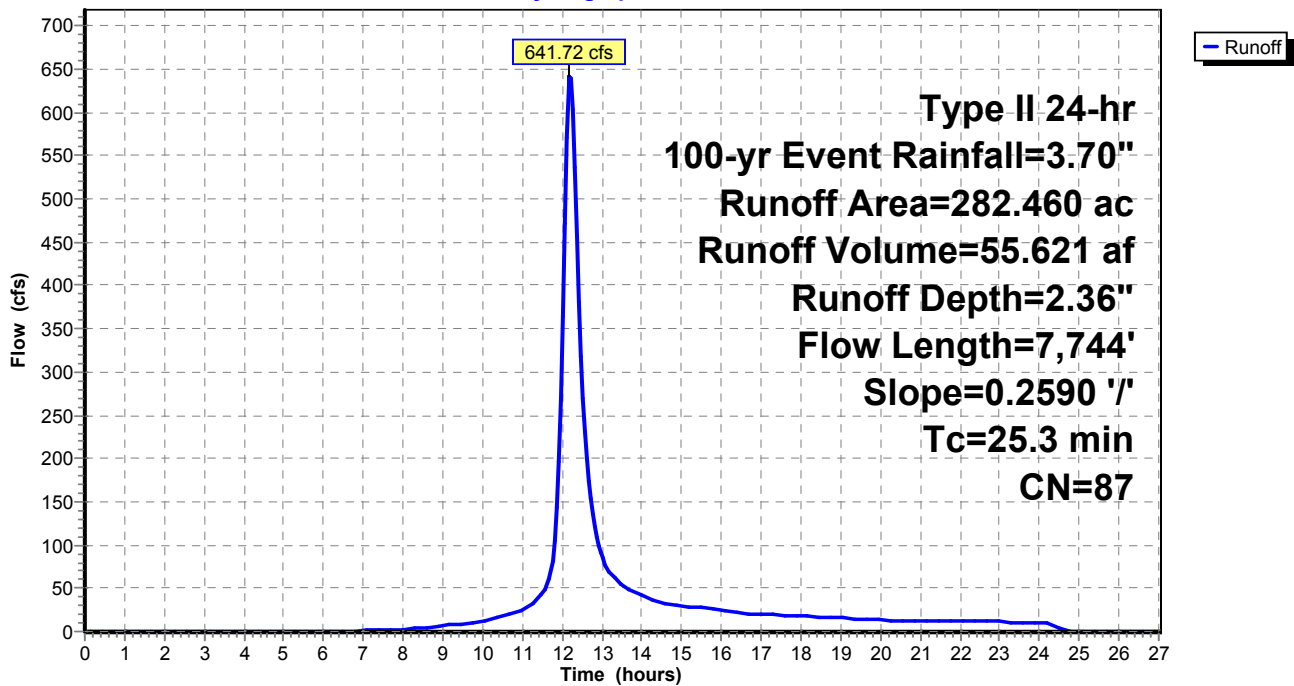
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 14: WS 14**

Runoff = 371.20 cfs @ 12.18 hrs, Volume= 31.893 af, Depth= 2.36"

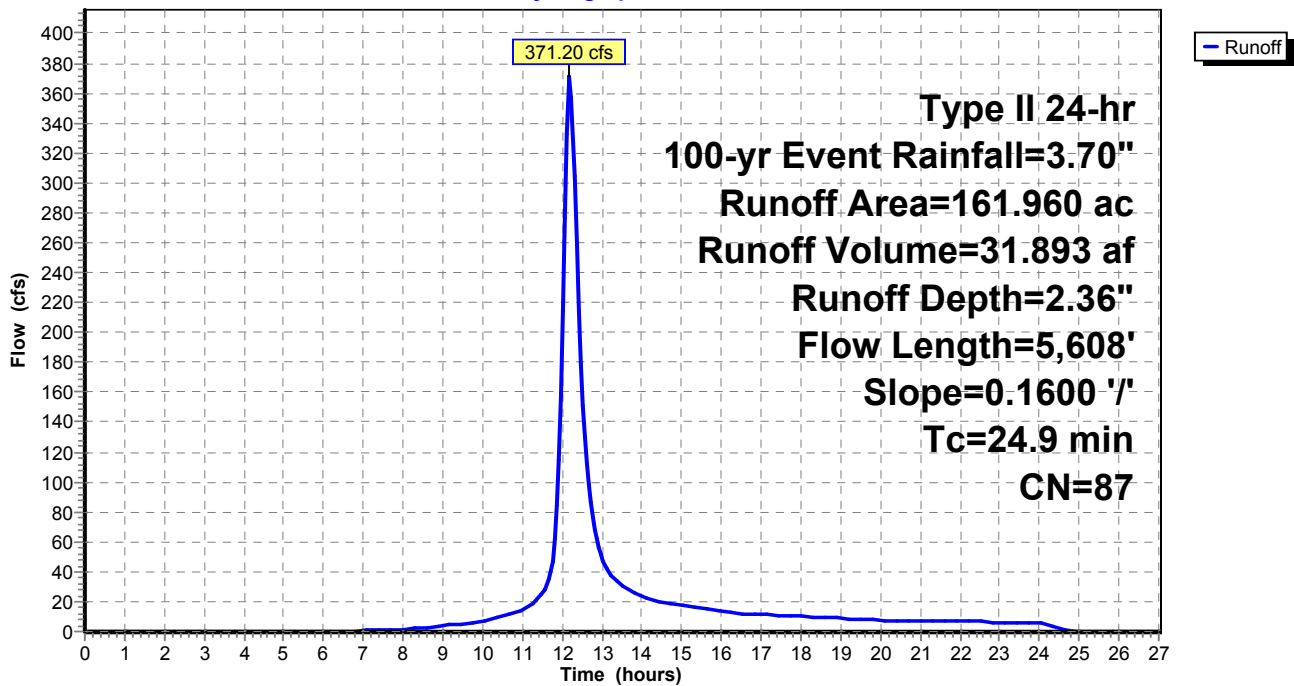
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 15: WS 15**

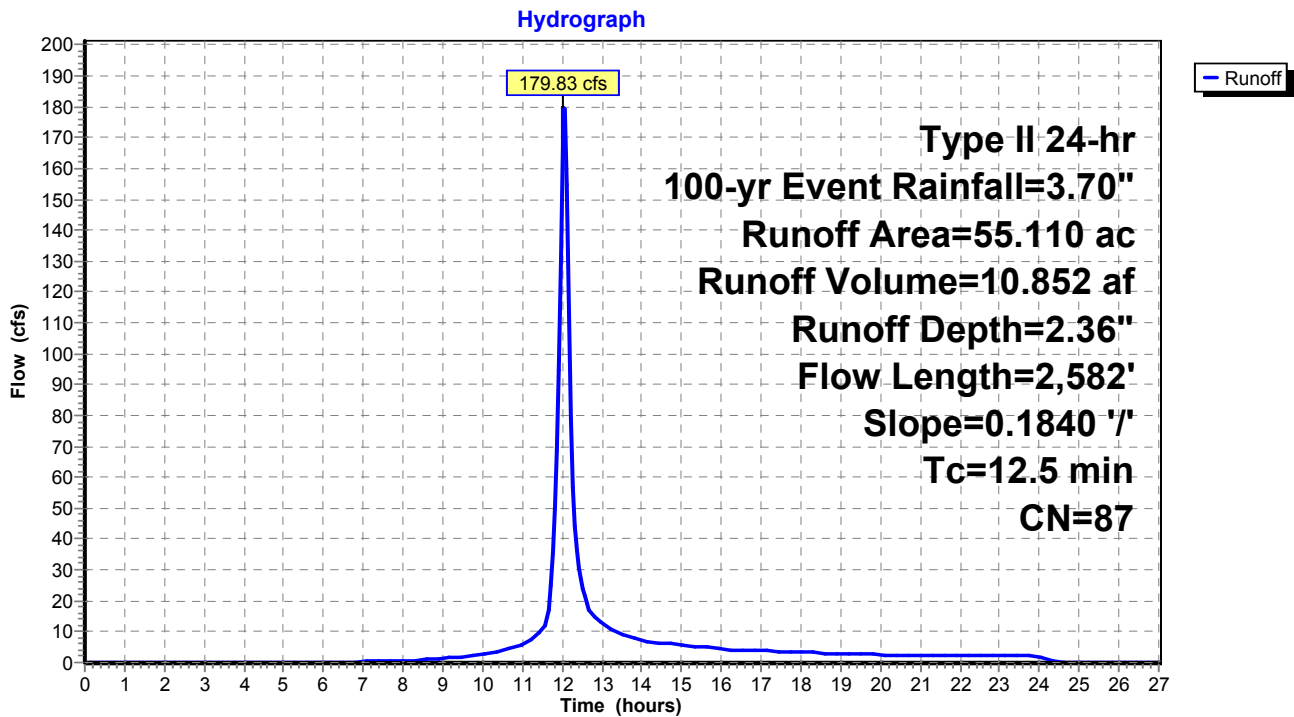
Runoff = 179.83 cfs @ 12.04 hrs, Volume= 10.852 af, Depth= 2.36"

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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 16: WS 16**

Runoff = 204.89 cfs @ 12.15 hrs, Volume= 16.372 af, Depth= 2.36"

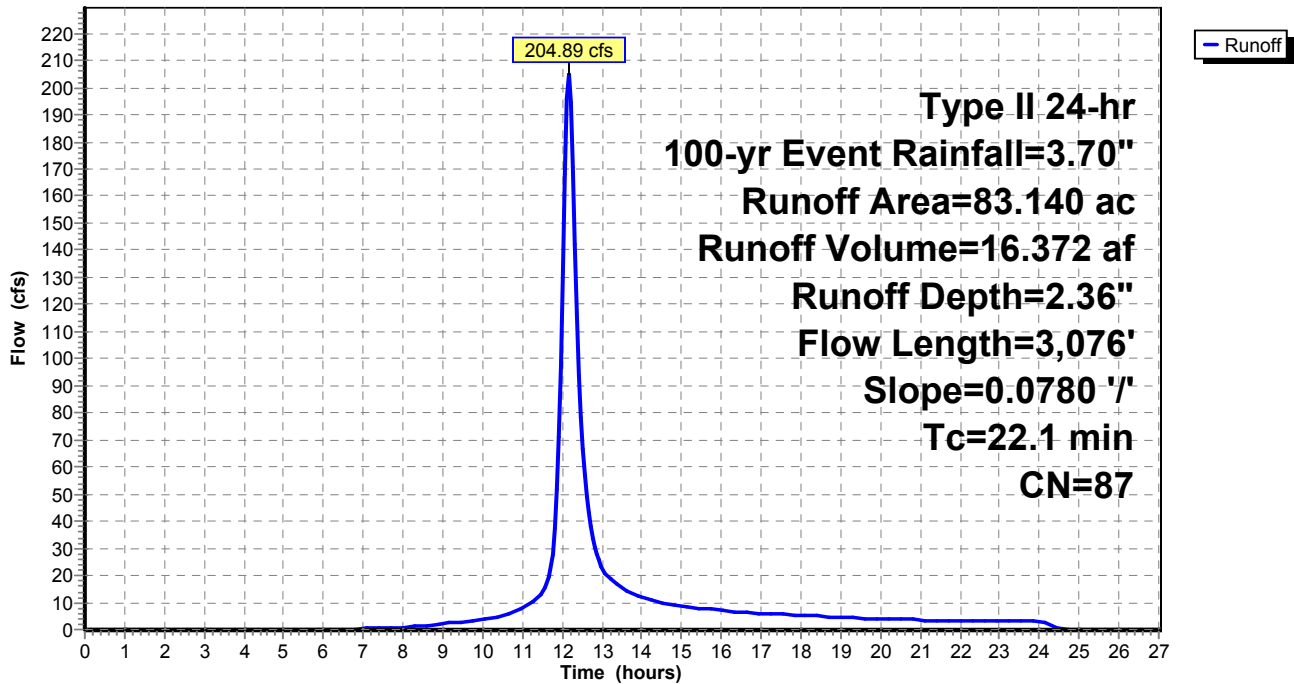
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Existing Watersheds (Pre-Quintana)***Type II 24-hr 200-yr Event Rainfall=4.09"*

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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

<b>Subcatchment1: WS 1</b>	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	
<b>Subcatchment2: WS 2</b>	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	
<b>Subcatchment3: WS 3</b>	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	
<b>Subcatchment4: WS 4</b>	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	
<b>Subcatchment5: WS 5</b>	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	
<b>Subcatchment6: WS 6</b>	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	
<b>Subcatchment7: WS 7</b>	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	
<b>Subcatchment8: WS 8</b>	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	
<b>Subcatchment9: WS 9</b>	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	
<b>Subcatchment10: WS 10</b>	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	
<b>Subcatchment11: WS 11</b>	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	
<b>Subcatchment12: WS 12</b>	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	
<b>Subcatchment13: WS 13</b>	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	
<b>Subcatchment14: WS 14</b>	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	
<b>Subcatchment15: WS 15</b>	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	
<b>Subcatchment16: WS 16</b>	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	

**Existing Watersheds (Pre-Quintana)**

*Type II 24-hr 200-yr Event Rainfall=4.09"*

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**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**

**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 1: WS 1**

Runoff = 813.94 cfs @ 12.25 hrs, Volume= 79.767 af, Depth= 2.72"

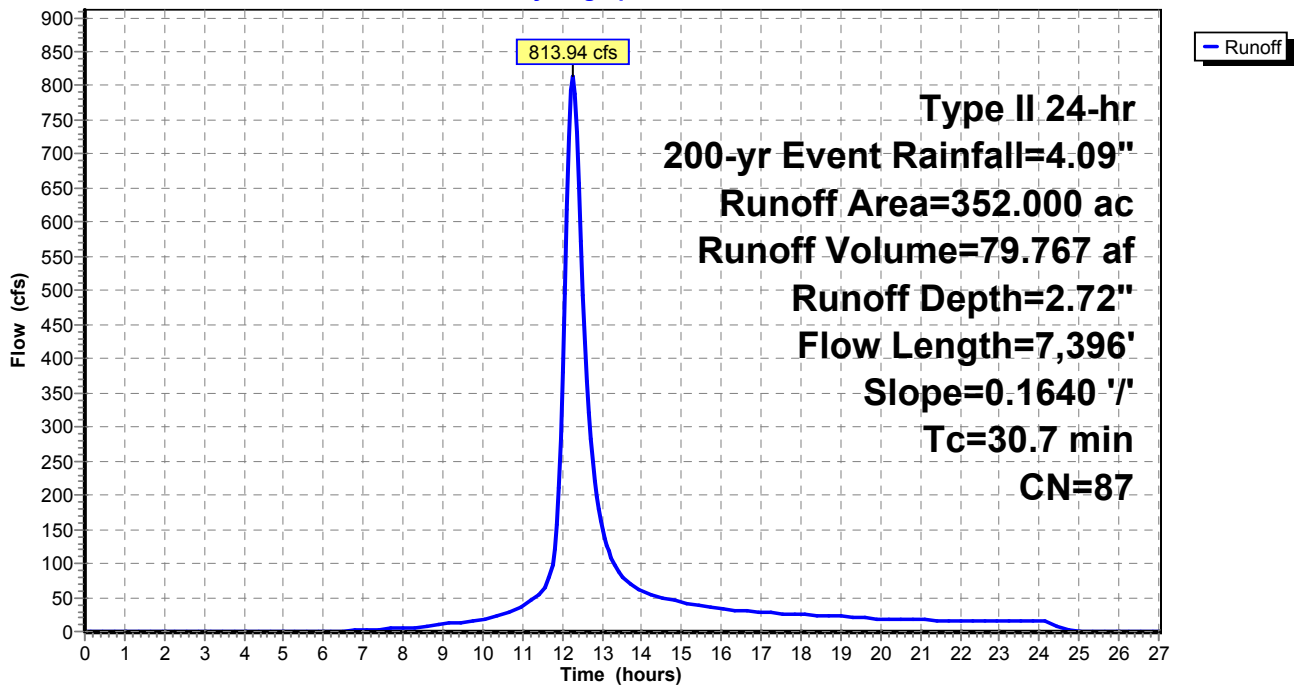
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 2: WS 2**

Runoff = 432.11 cfs @ 12.05 hrs, Volume= 26.693 af, Depth= 2.72"

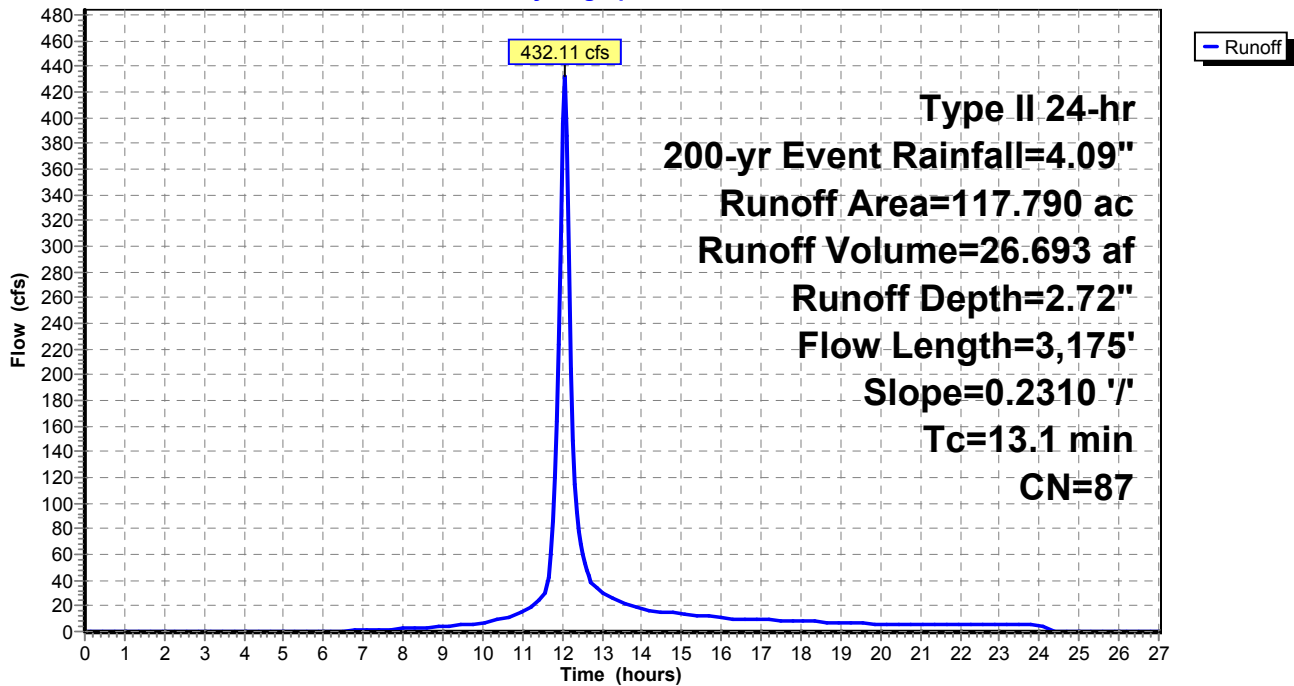
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 3: WS 3**

Runoff = 318.42 cfs @ 12.10 hrs, Volume= 22.881 af, Depth= 2.72"

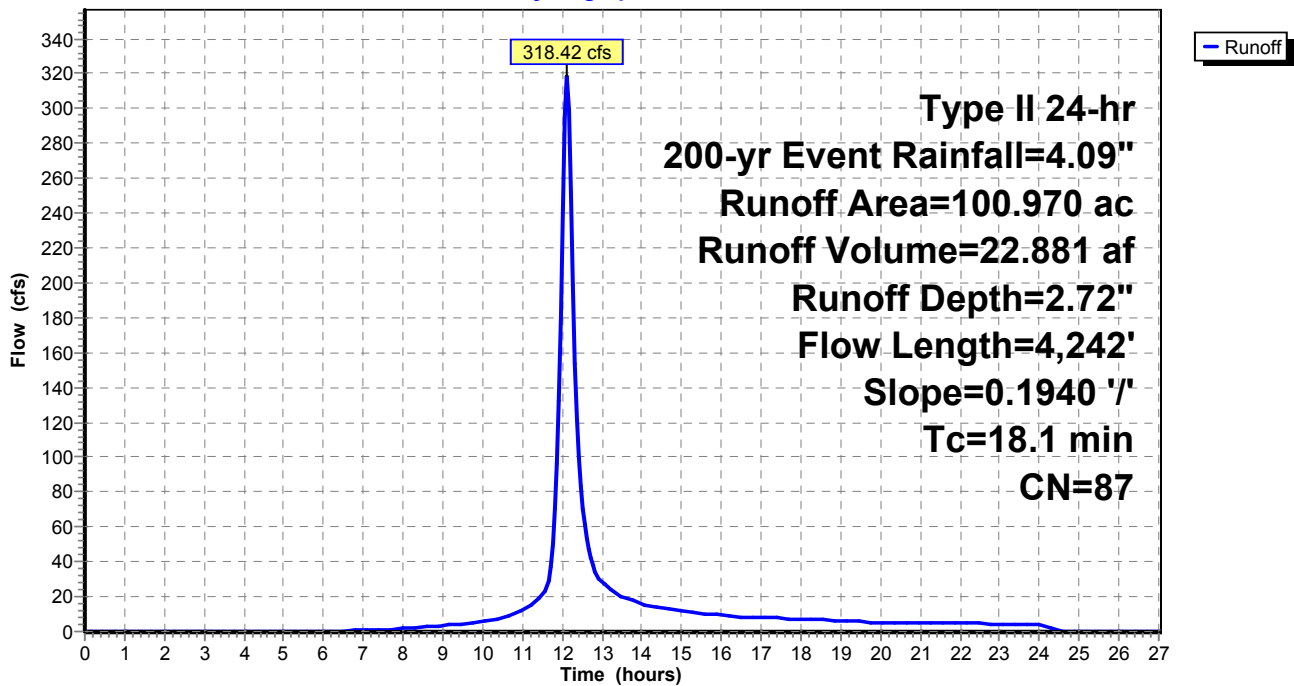
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 4: WS 4**

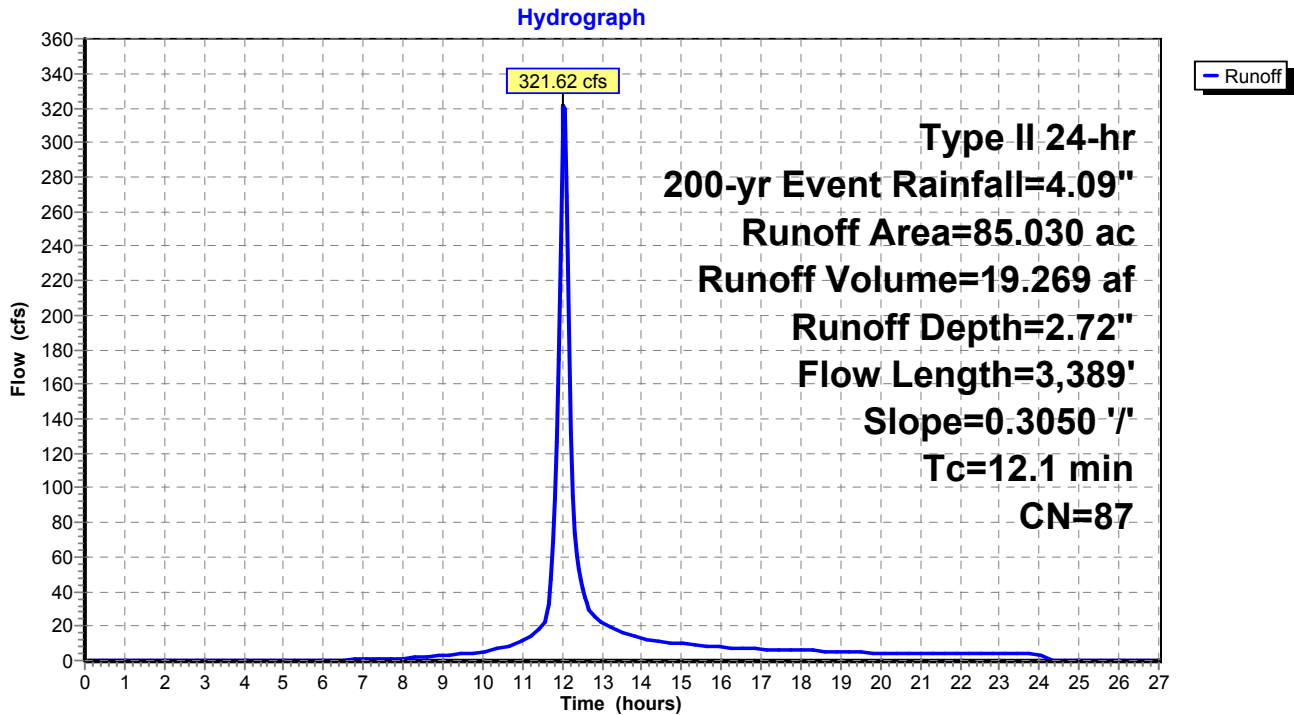
Runoff = 321.62 cfs @ 12.04 hrs, Volume= 19.269 af, Depth= 2.72"

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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 5: WS 5**

Runoff = 393.85 cfs @ 12.05 hrs, Volume= 24.329 af, Depth= 2.72"

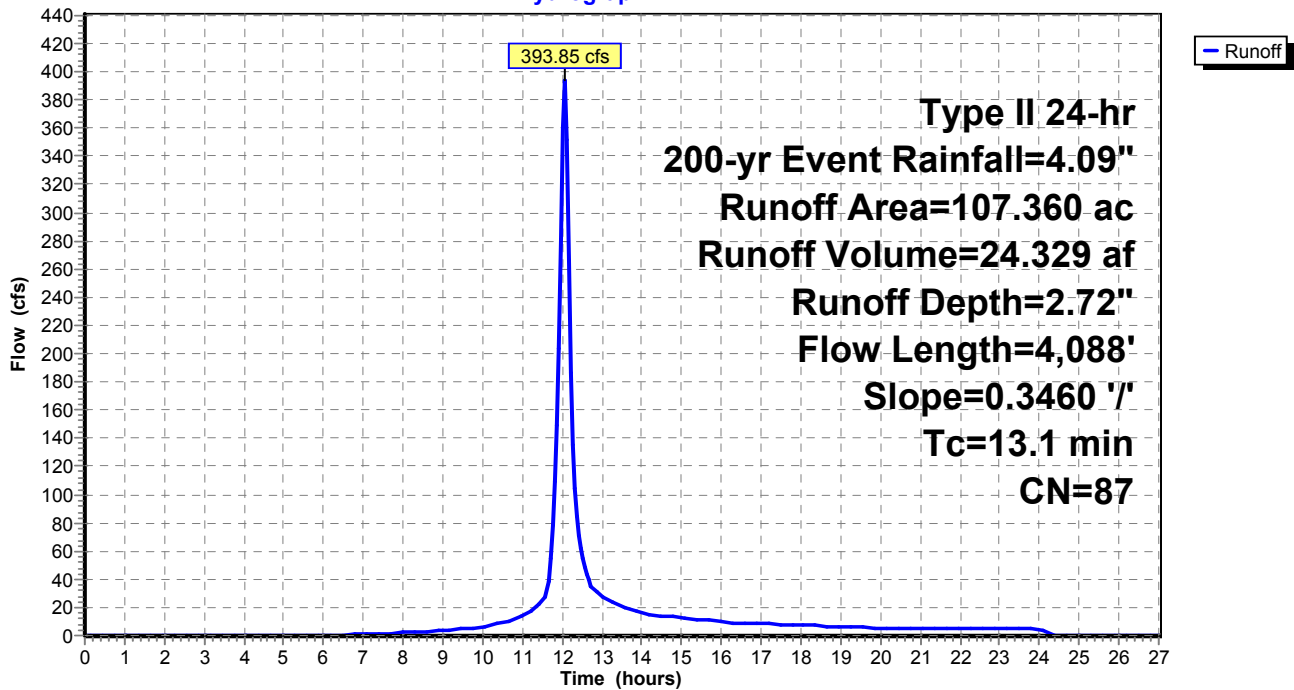
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 6: WS 6**

Runoff = 906.94 cfs @ 12.22 hrs, Volume= 85.555 af, Depth= 2.72"

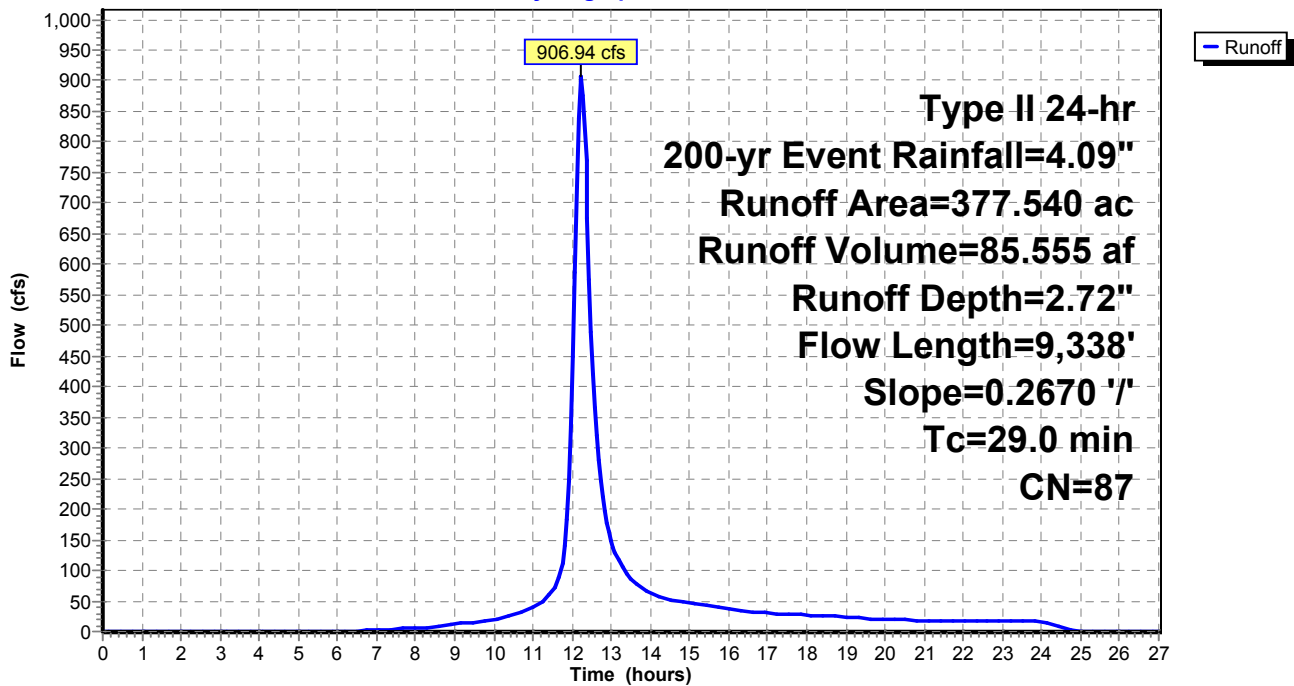
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph





**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 7: WS 7**

Runoff = 464.86 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

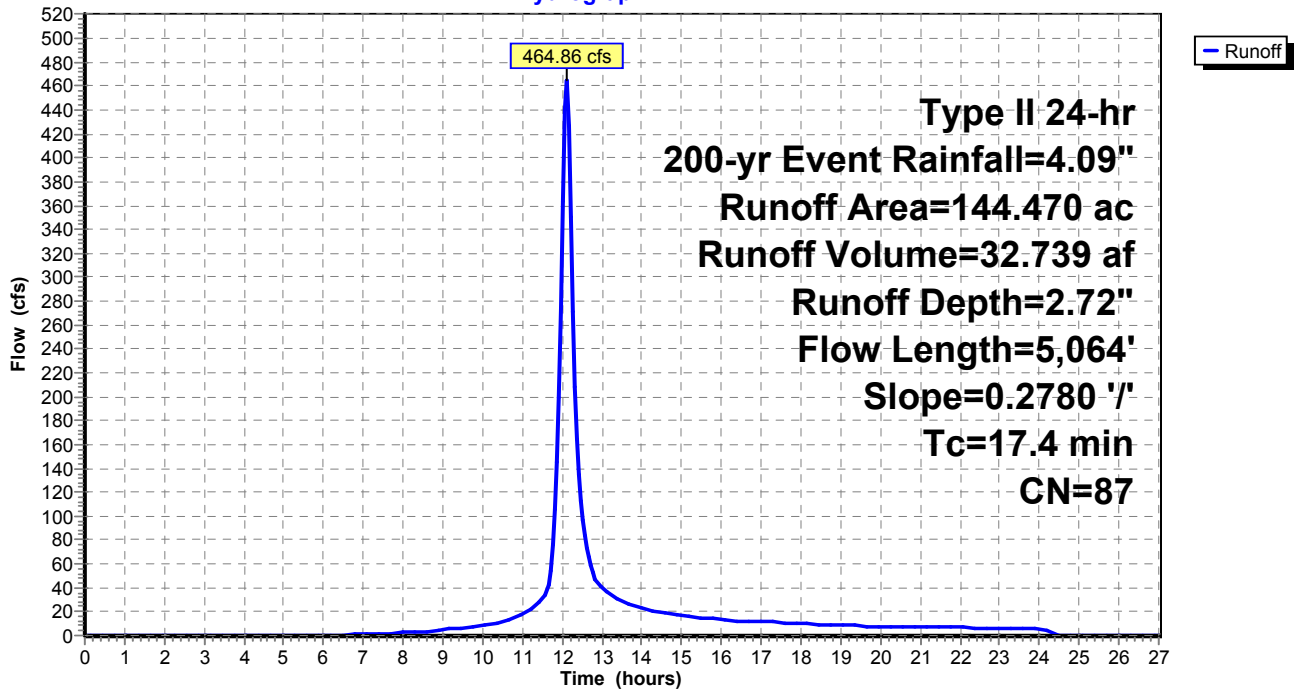
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 8: WS 8**

Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

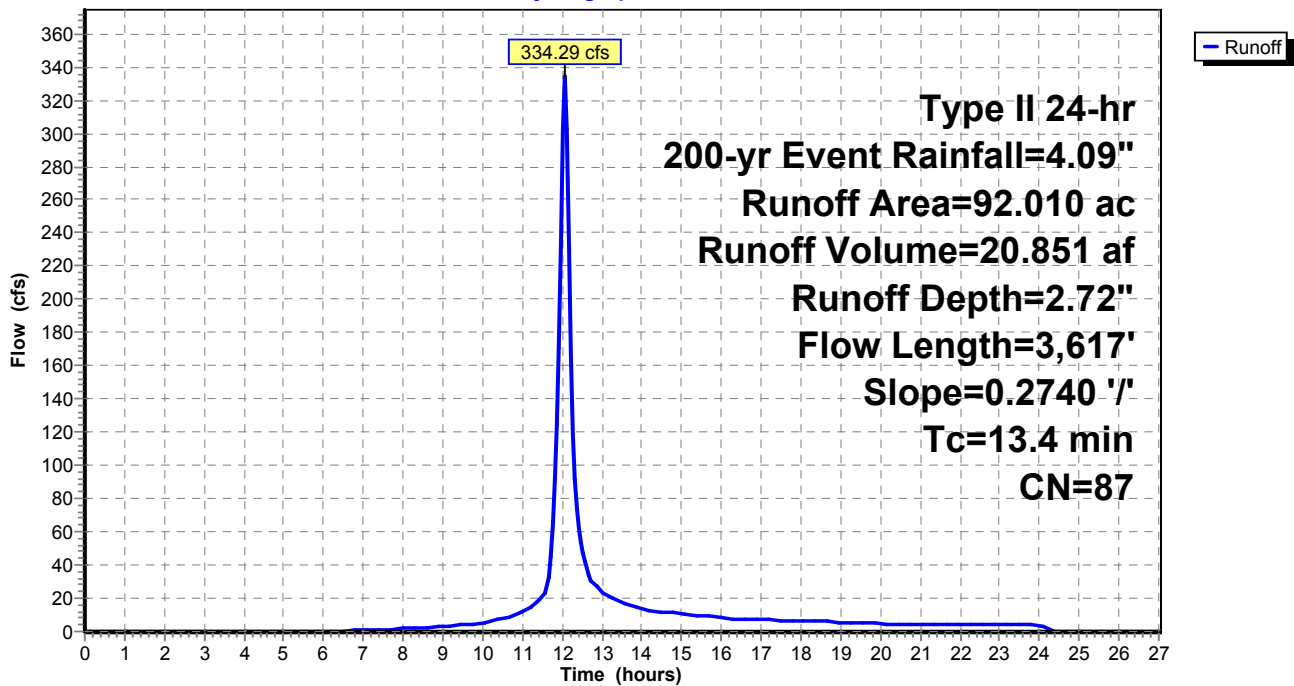
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 9: WS 9**

Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

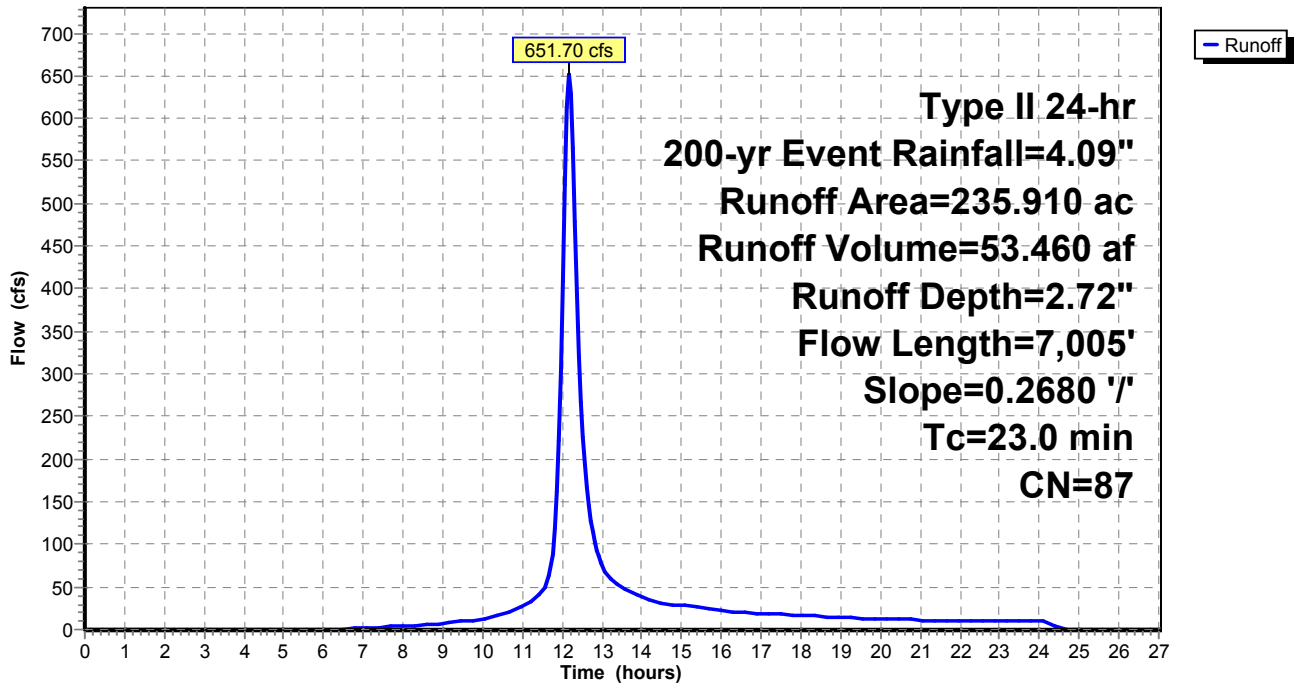
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 10: WS 10**

Runoff = 758.38 cfs @ 12.26 hrs, Volume= 75.602 af, Depth= 2.72"

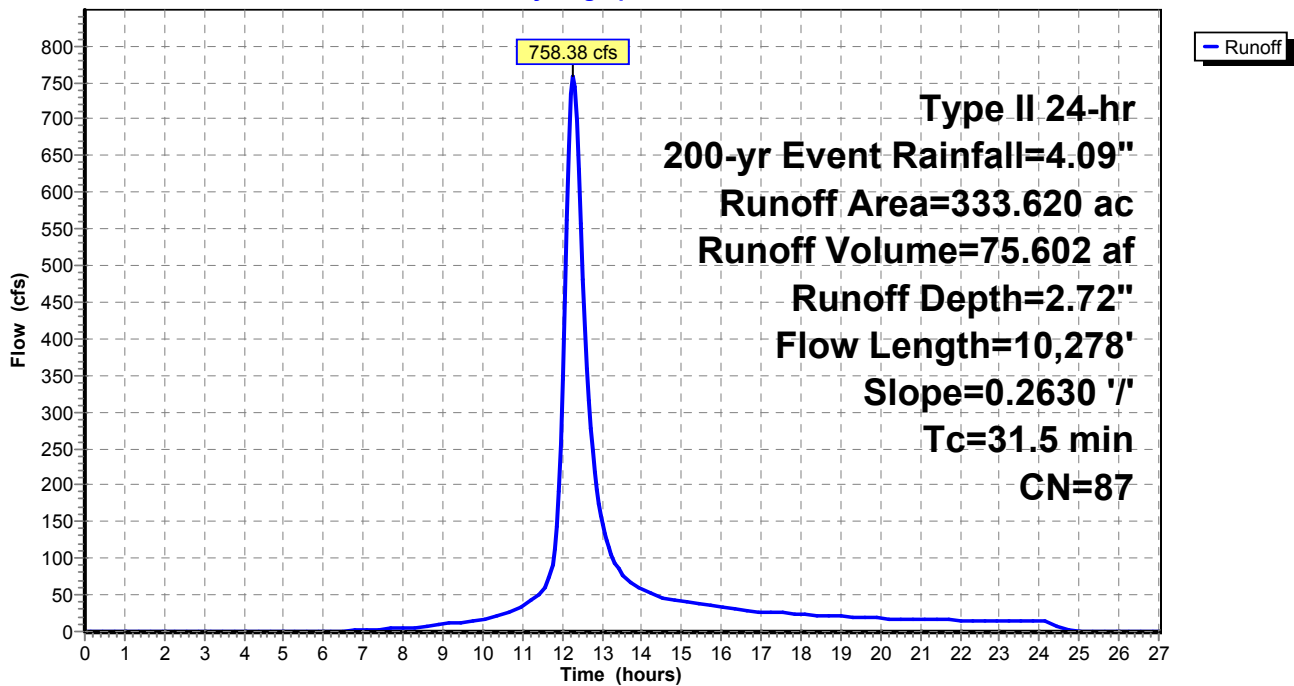
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 11: WS 11**

Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

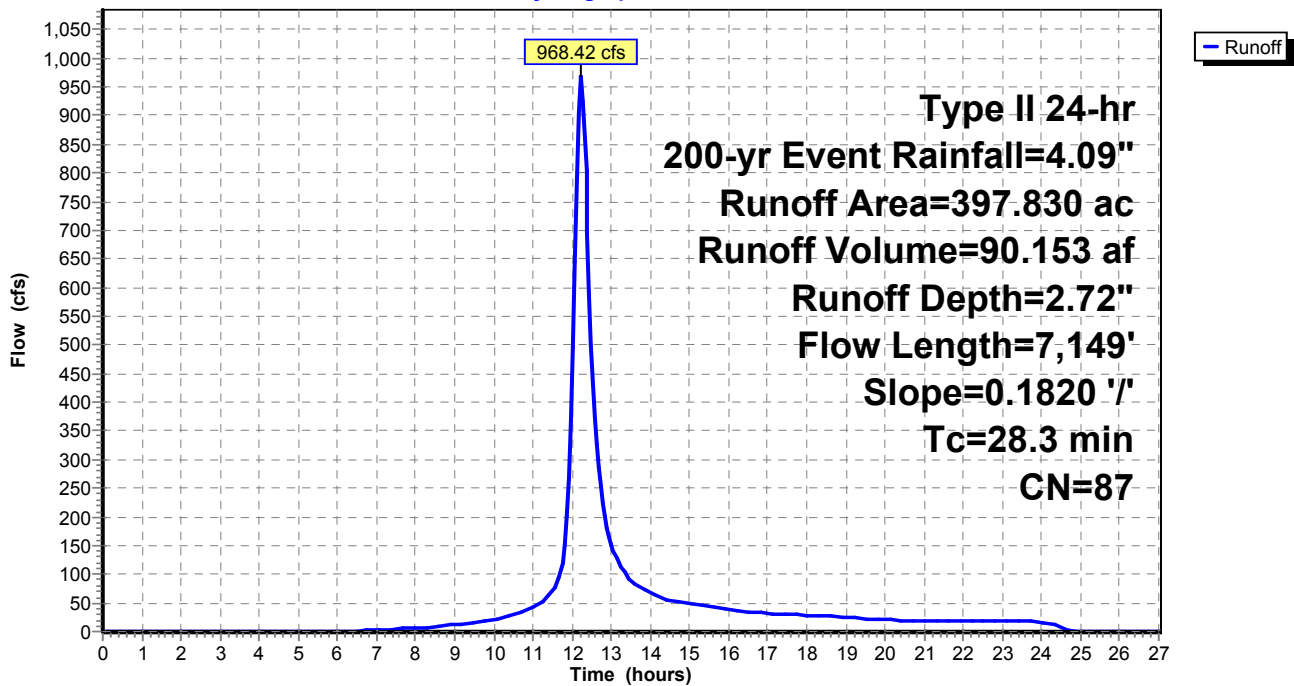
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 12: WS 12**

Runoff = 688.82 cfs @ 12.13 hrs, Volume= 53.693 af, Depth= 2.72"

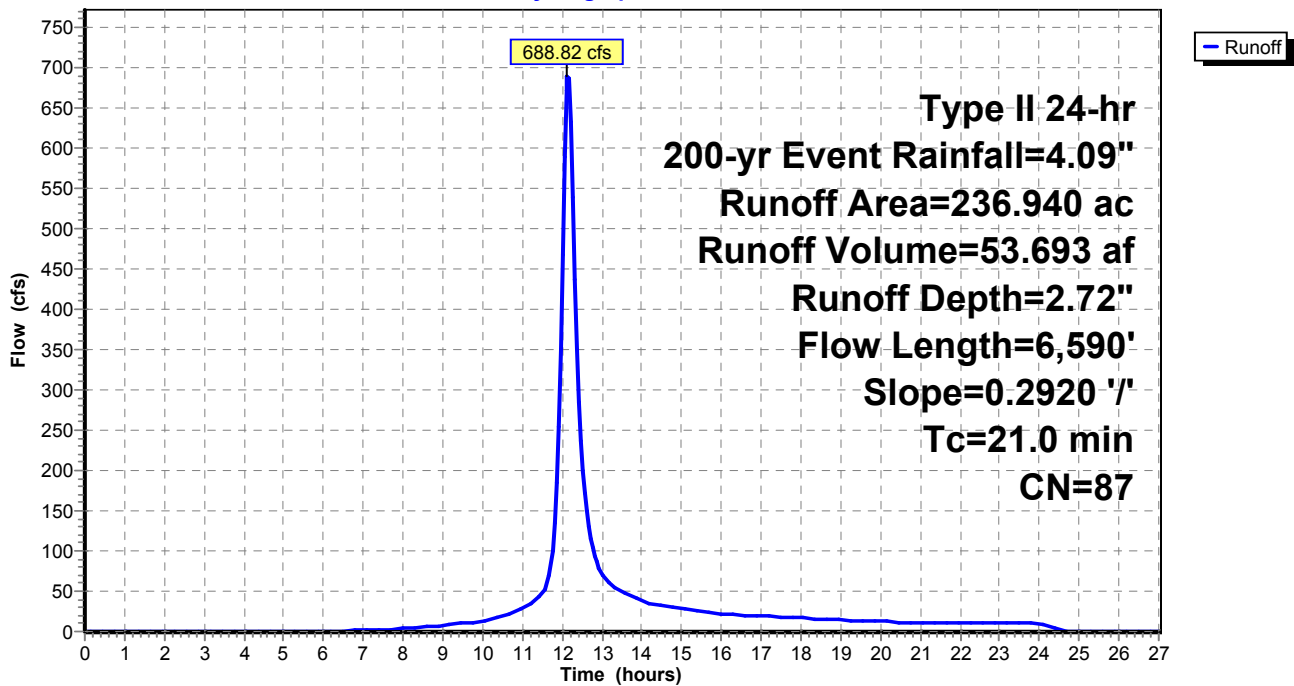
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 13: WS 13**

Runoff = 736.61 cfs @ 12.18 hrs, Volume= 64.009 af, Depth= 2.72"

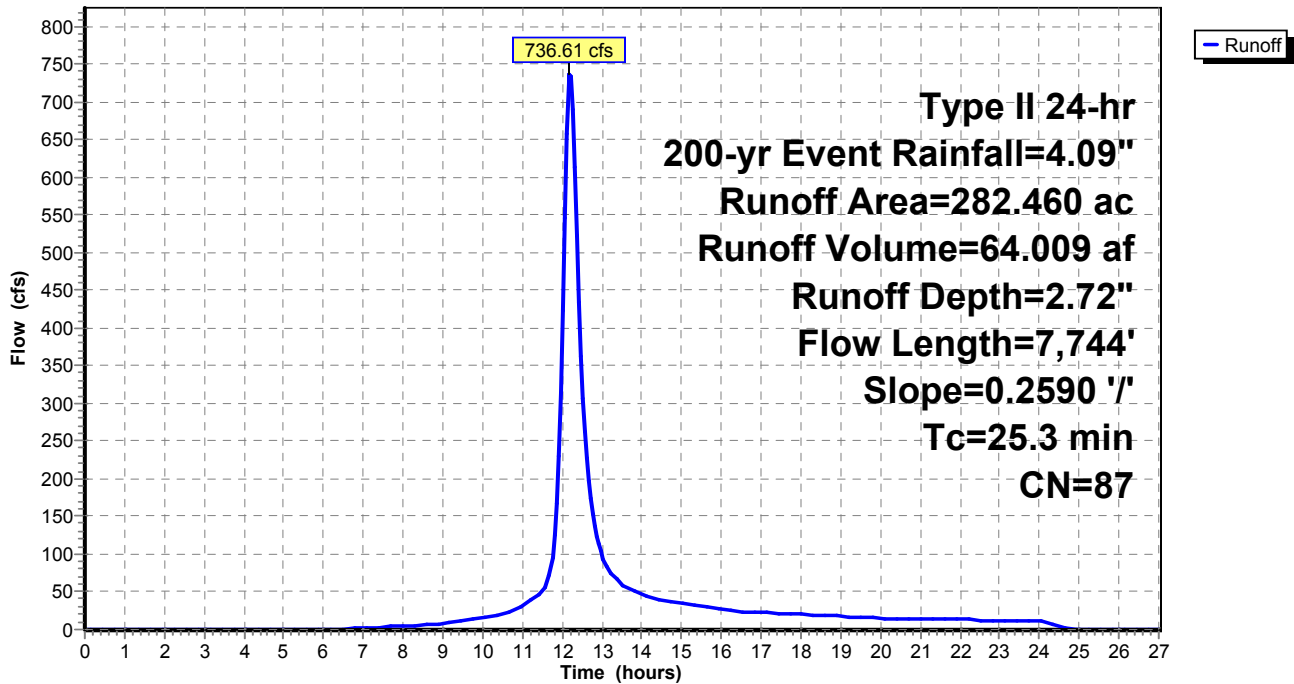
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 14: WS 14**

Runoff = 426.07 cfs @ 12.18 hrs, Volume= 36.702 af, Depth= 2.72"

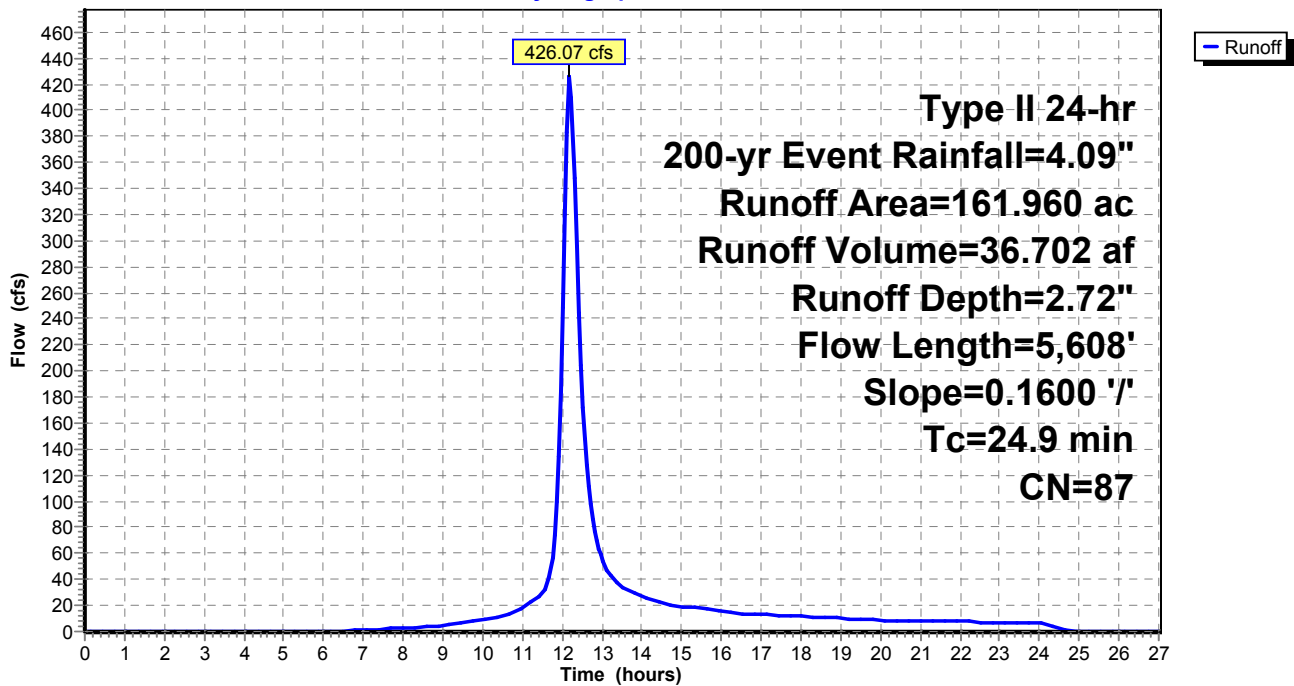
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph





**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 15: WS 15**

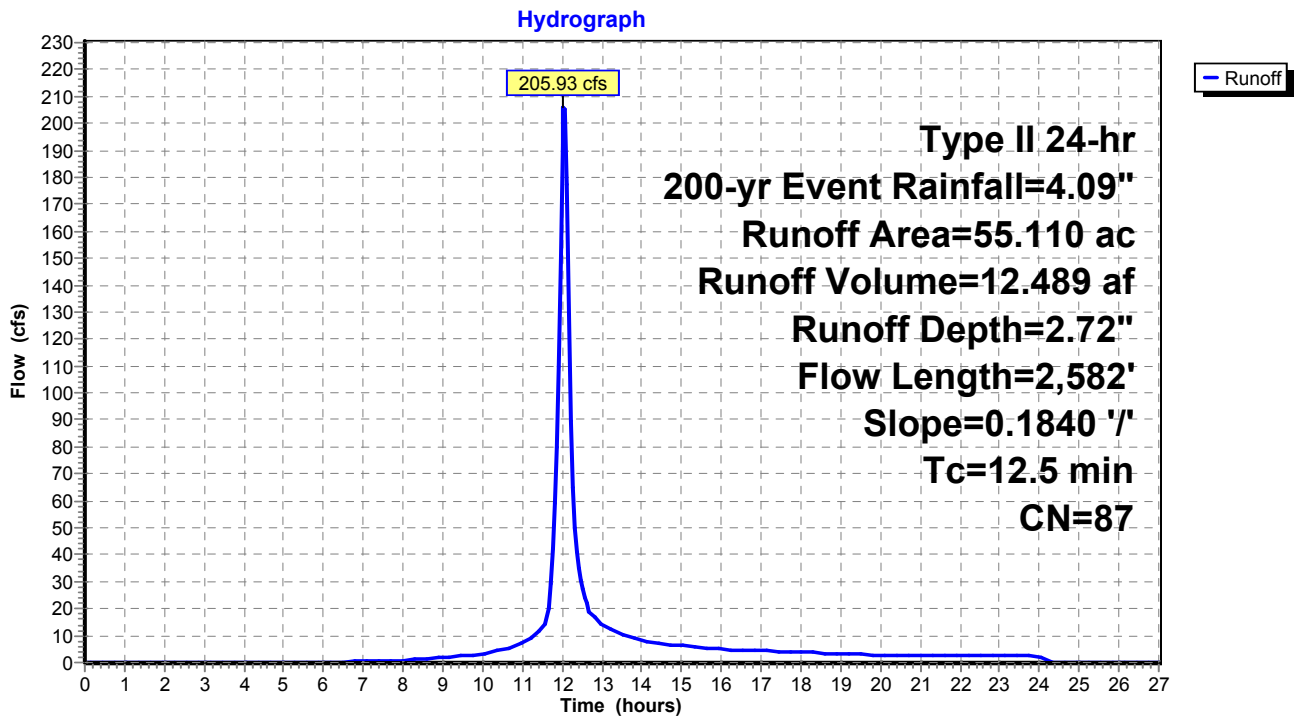
Runoff = 205.93 cfs @ 12.04 hrs, Volume= 12.489 af, Depth= 2.72"

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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 16: WS 16**

Runoff = 235.08 cfs @ 12.15 hrs, Volume= 18.841 af, Depth= 2.72"

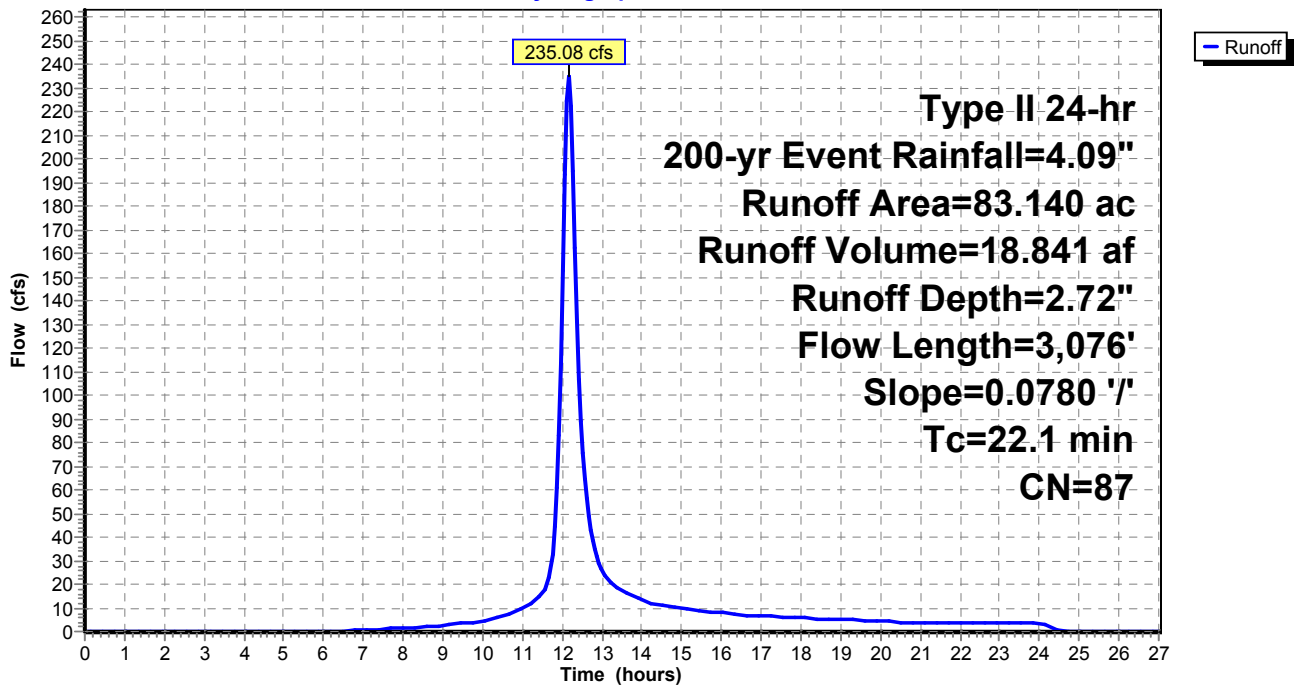
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)***Type II 24-hr 500-yr Event Rainfall=4.60"*

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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

<b>Subcatchment1: WS 1</b>	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	
<b>Subcatchment2: WS 2</b>	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	
<b>Subcatchment3: WS 3</b>	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	
<b>Subcatchment4: WS 4</b>	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	
<b>Subcatchment5: WS 5</b>	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	
<b>Subcatchment6: WS 6</b>	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	
<b>Subcatchment7: WS 7</b>	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	
<b>Subcatchment8: WS 8</b>	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	
<b>Subcatchment9: WS 9</b>	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	
<b>Subcatchment10: WS 10</b>	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	
<b>Subcatchment11: WS 11</b>	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	
<b>Subcatchment12: WS 12</b>	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	
<b>Subcatchment13: WS 13</b>	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	
<b>Subcatchment14: WS 14</b>	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	
<b>Subcatchment15: WS 15</b>	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	
<b>Subcatchment16: WS 16</b>	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	

**Existing Watersheds (Pre-Quintana)**

*Type II 24-hr 500-yr Event Rainfall=4.60"*

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**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**

**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 1: WS 1**

Runoff = 952.23 cfs @ 12.25 hrs, Volume= 93.637 af, Depth= 3.19"

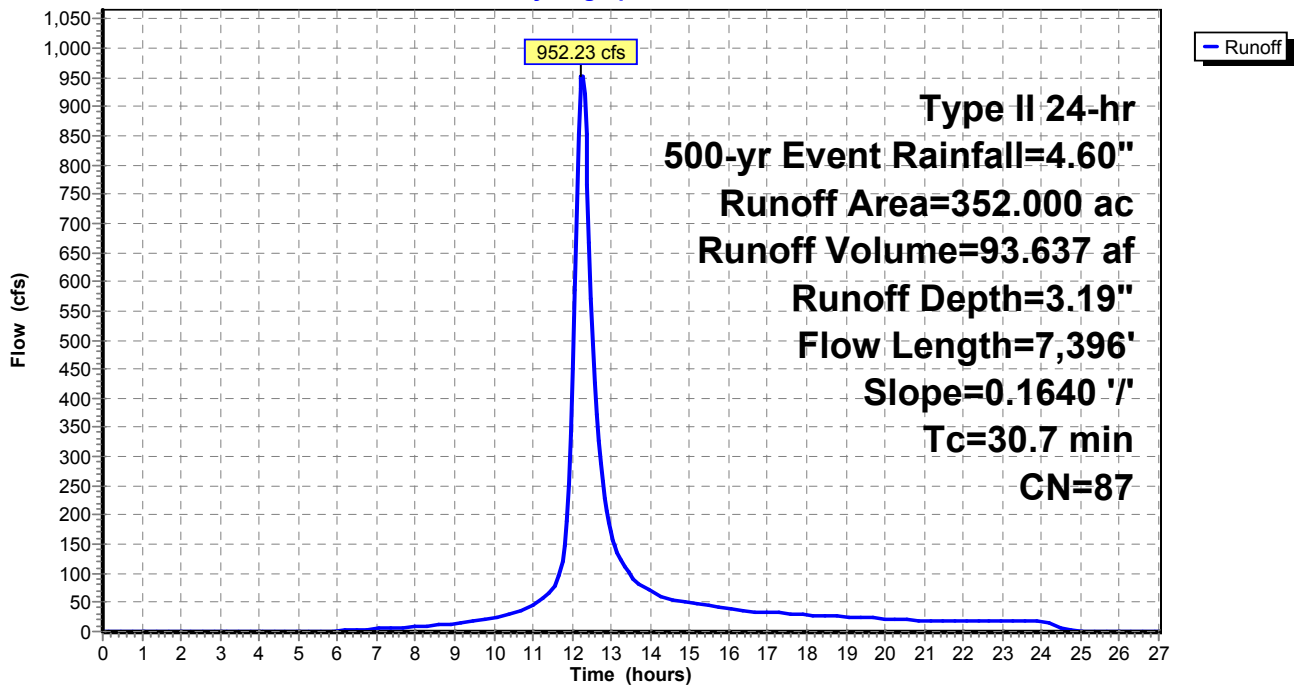
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 2: WS 2**

Runoff = 504.05 cfs @ 12.05 hrs, Volume= 31.334 af, Depth= 3.19"

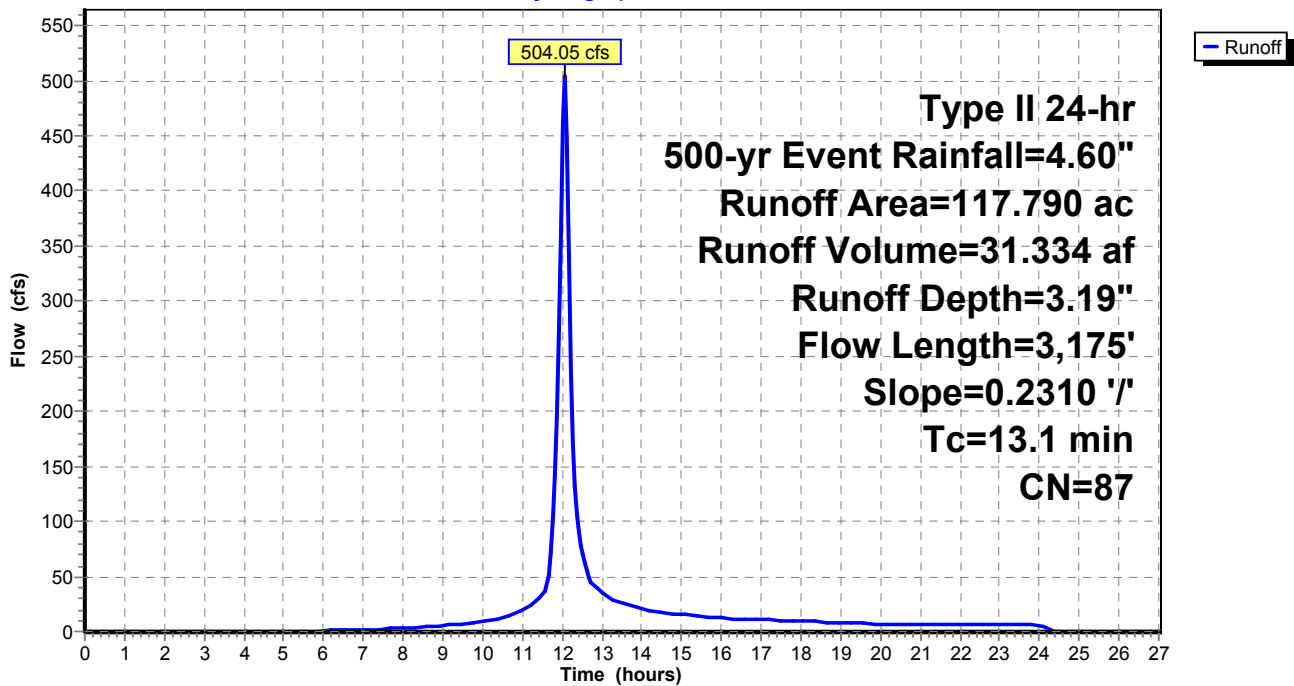
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 3: WS 3**

Runoff = 371.87 cfs @ 12.10 hrs, Volume= 26.859 af, Depth= 3.19"

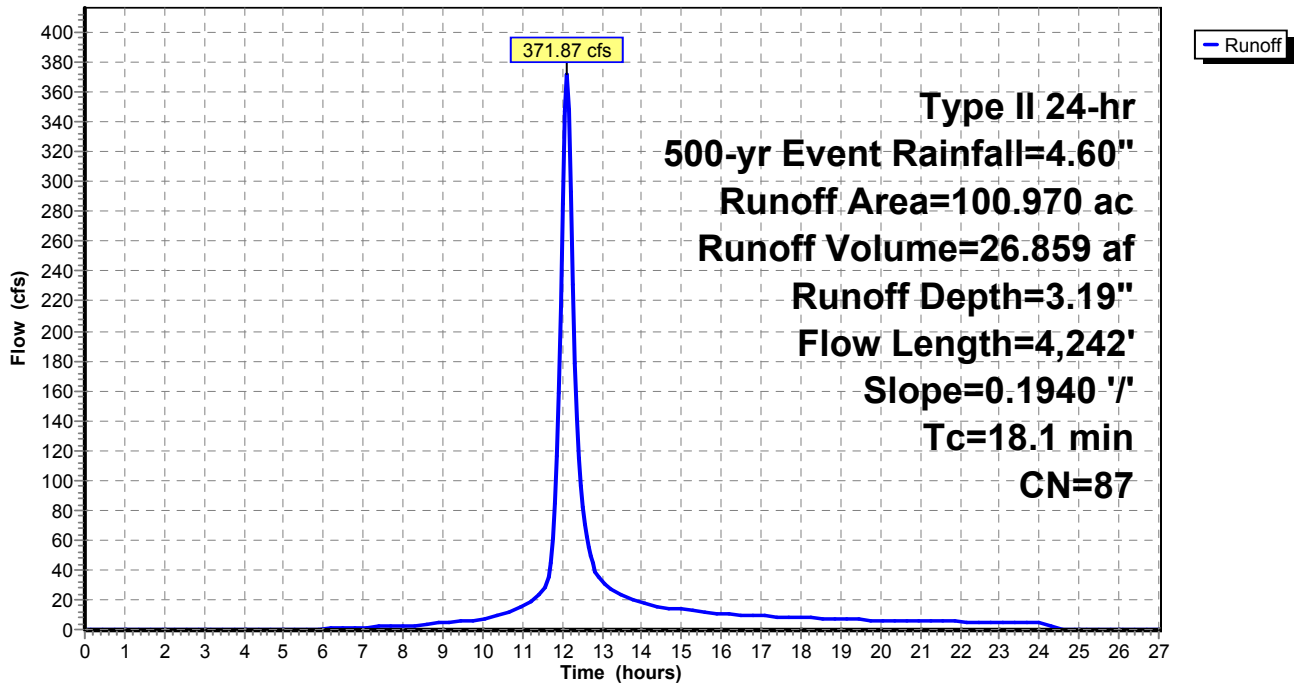
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 4: WS 4**

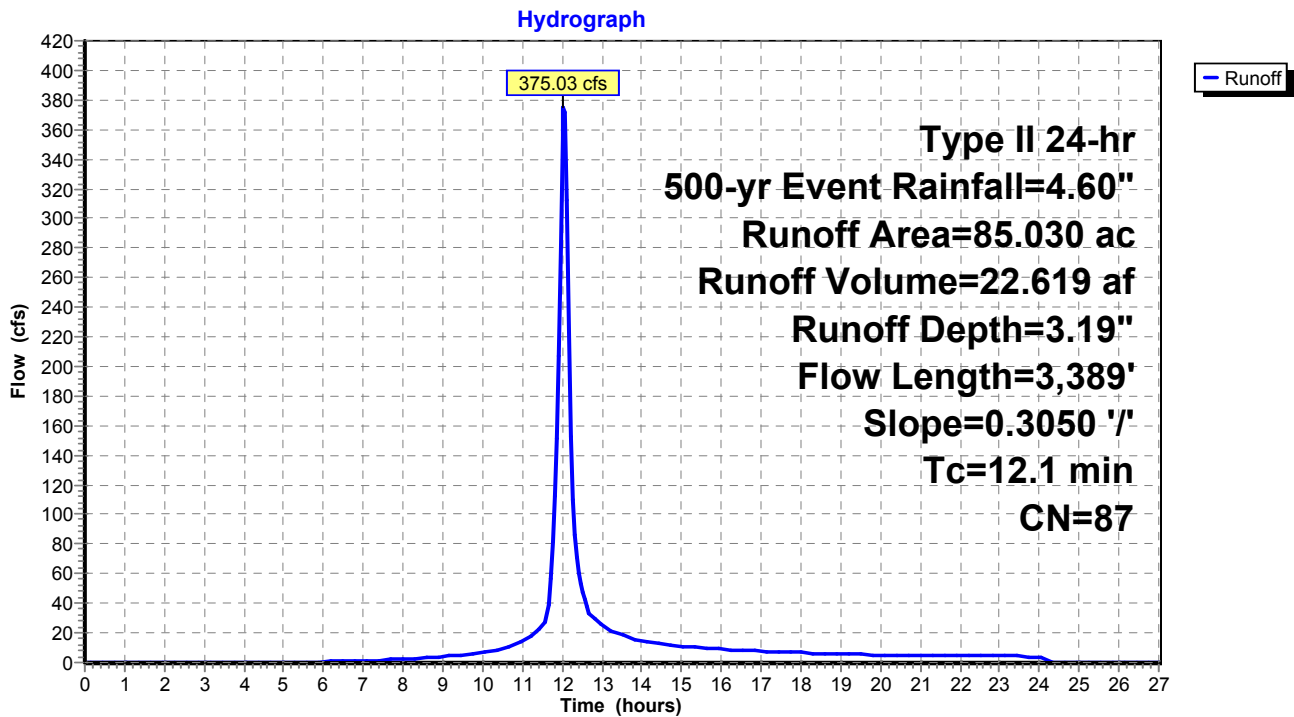
Runoff = 375.03 cfs @ 12.04 hrs, Volume= 22.619 af, Depth= 3.19"

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**





**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 5: WS 5**

Runoff = 459.42 cfs @ 12.05 hrs, Volume= 28.559 af, Depth= 3.19"

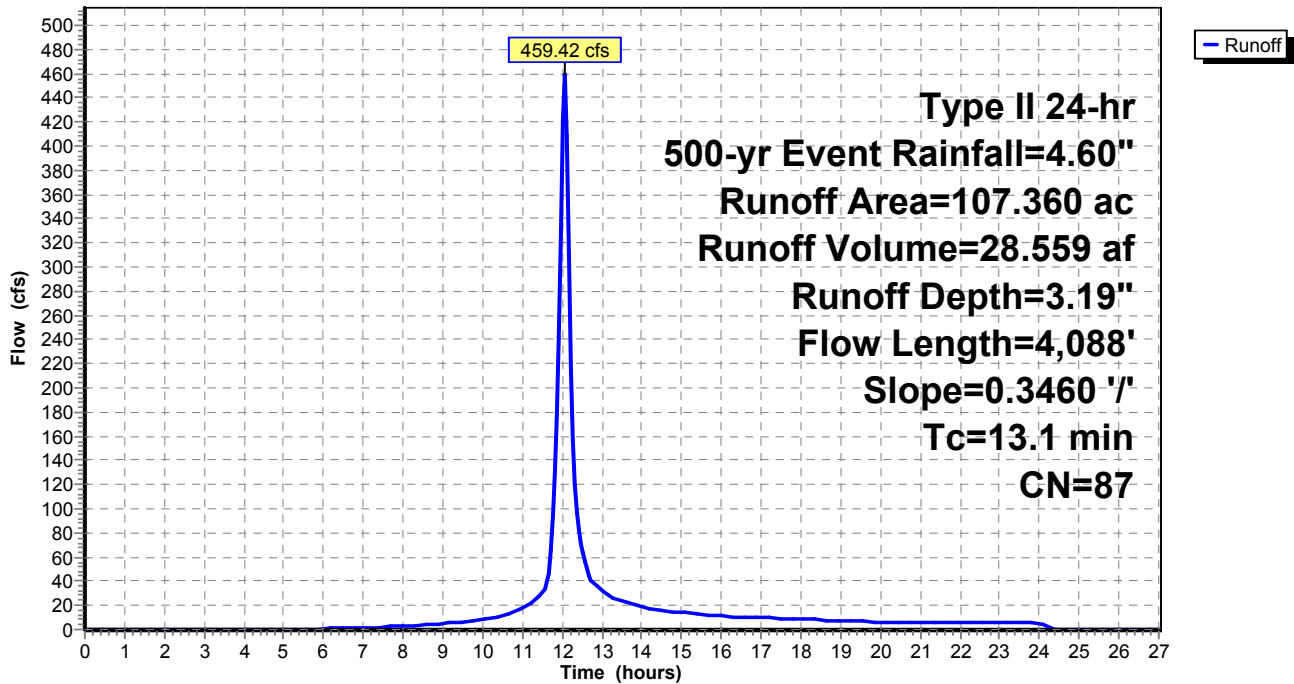
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 6: WS 6**

Runoff = 1,060.97 cfs @ 12.22 hrs, Volume= 100.431 af, Depth= 3.19"

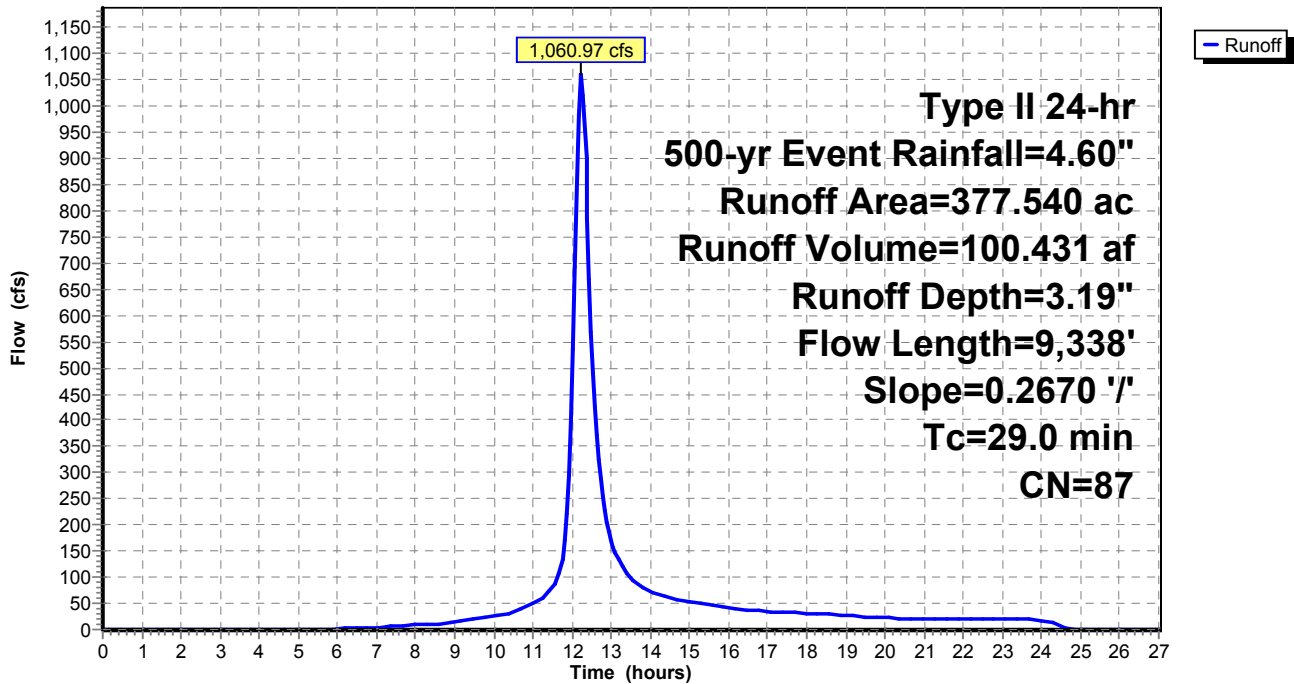
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 7: WS 7**

Runoff = 542.79 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

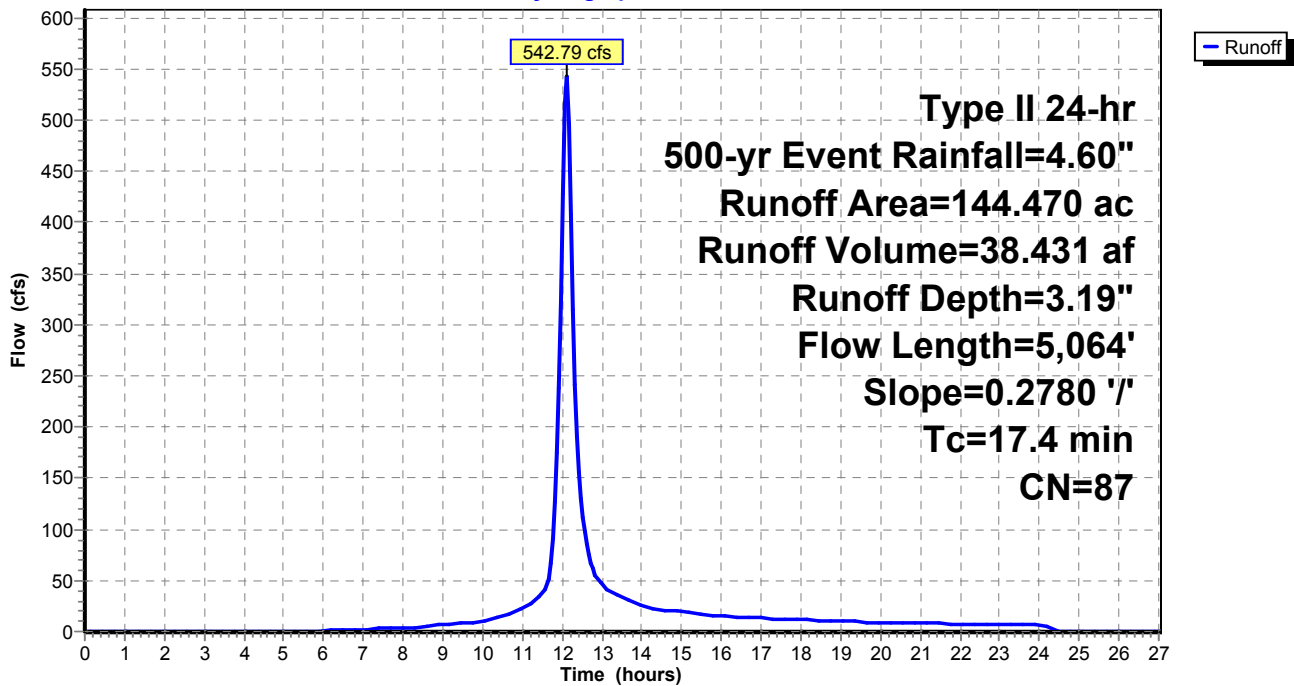
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 8: WS 8**

Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

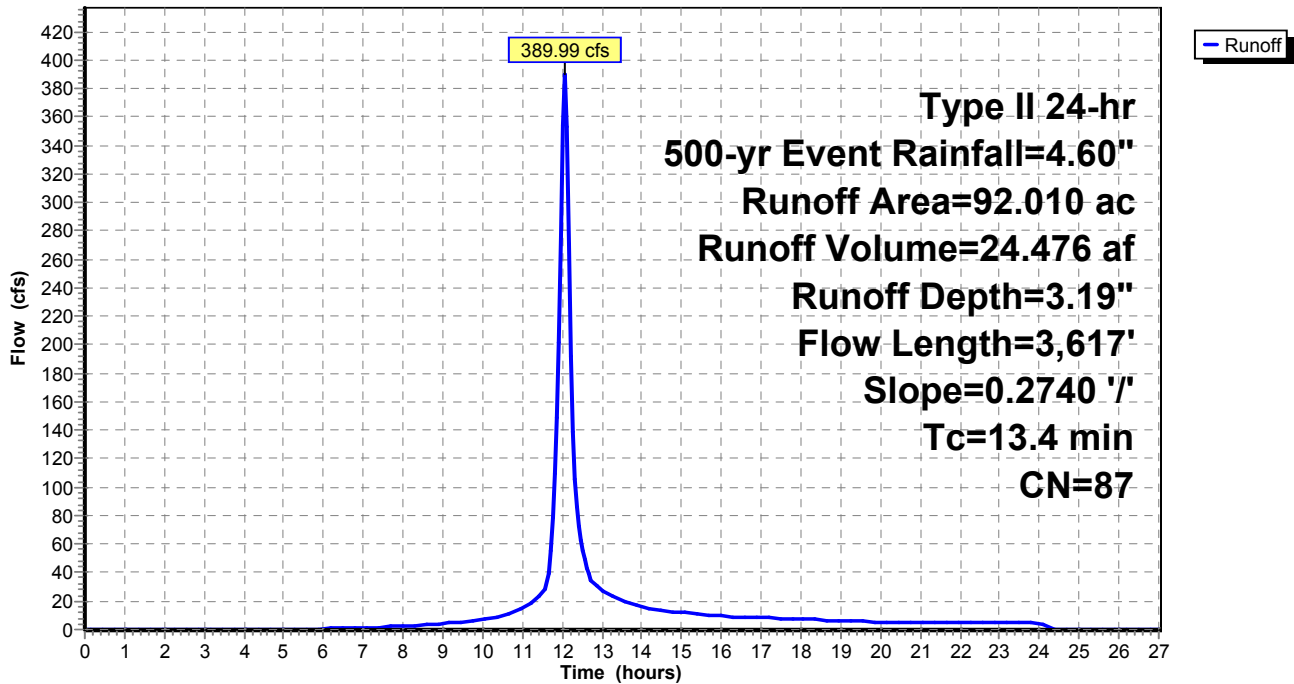
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 9: WS 9**

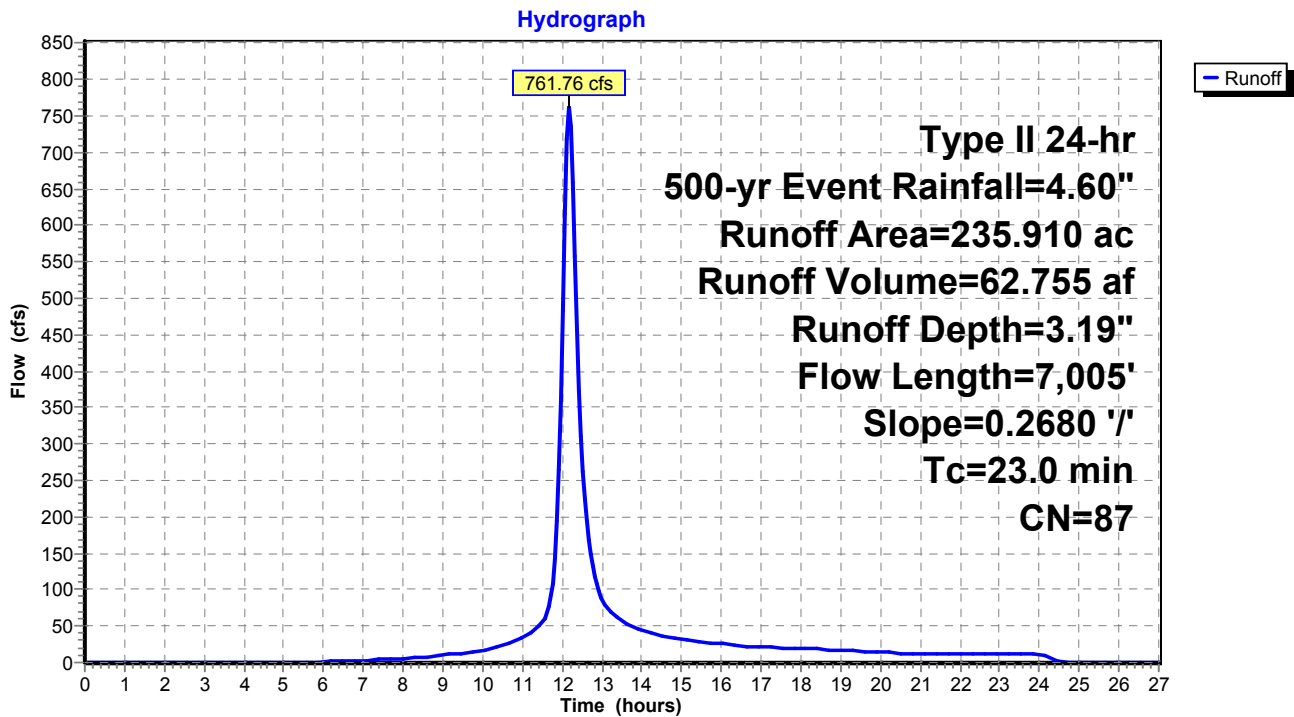
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 10: WS 10**

Runoff = 887.32 cfs @ 12.26 hrs, Volume= 88.748 af, Depth= 3.19"

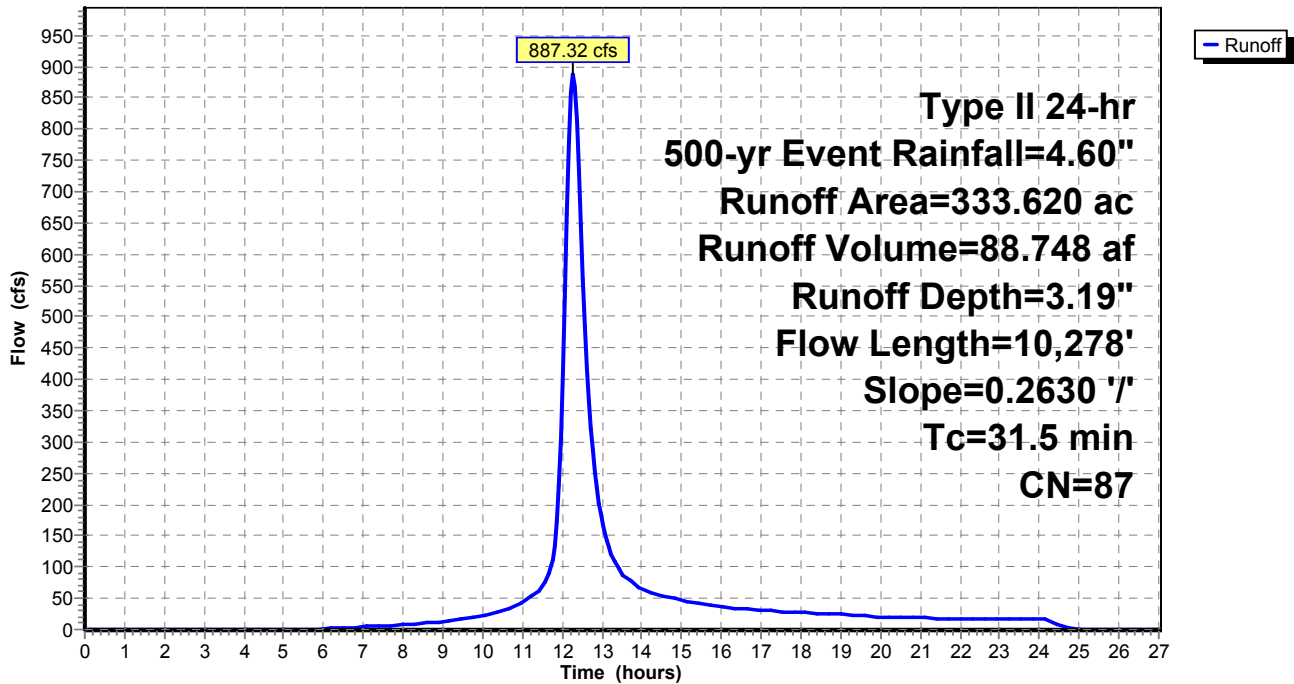
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 11: WS 11**

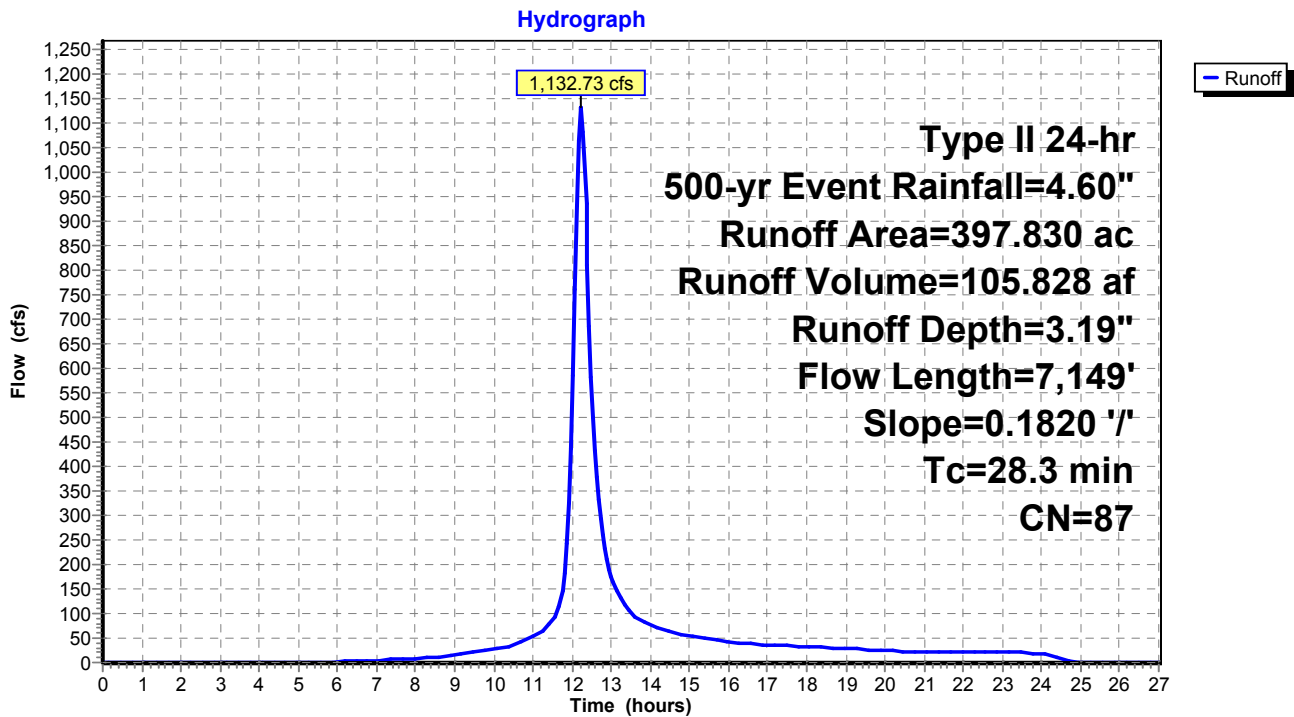
Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

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**



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 12: WS 12**

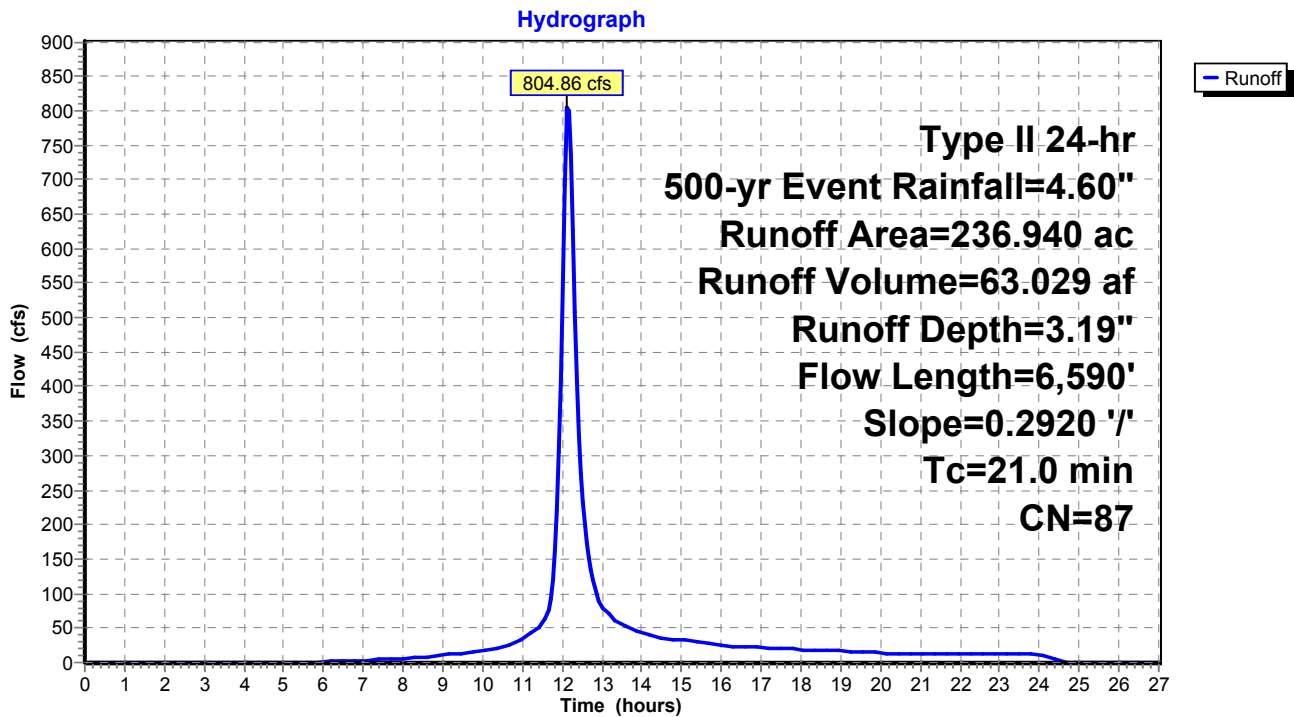
Runoff = 804.86 cfs @ 12.13 hrs, Volume= 63.029 af, Depth= 3.19"

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**





**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 13: WS 13**

Runoff = 861.28 cfs @ 12.18 hrs, Volume= 75.138 af, Depth= 3.19"

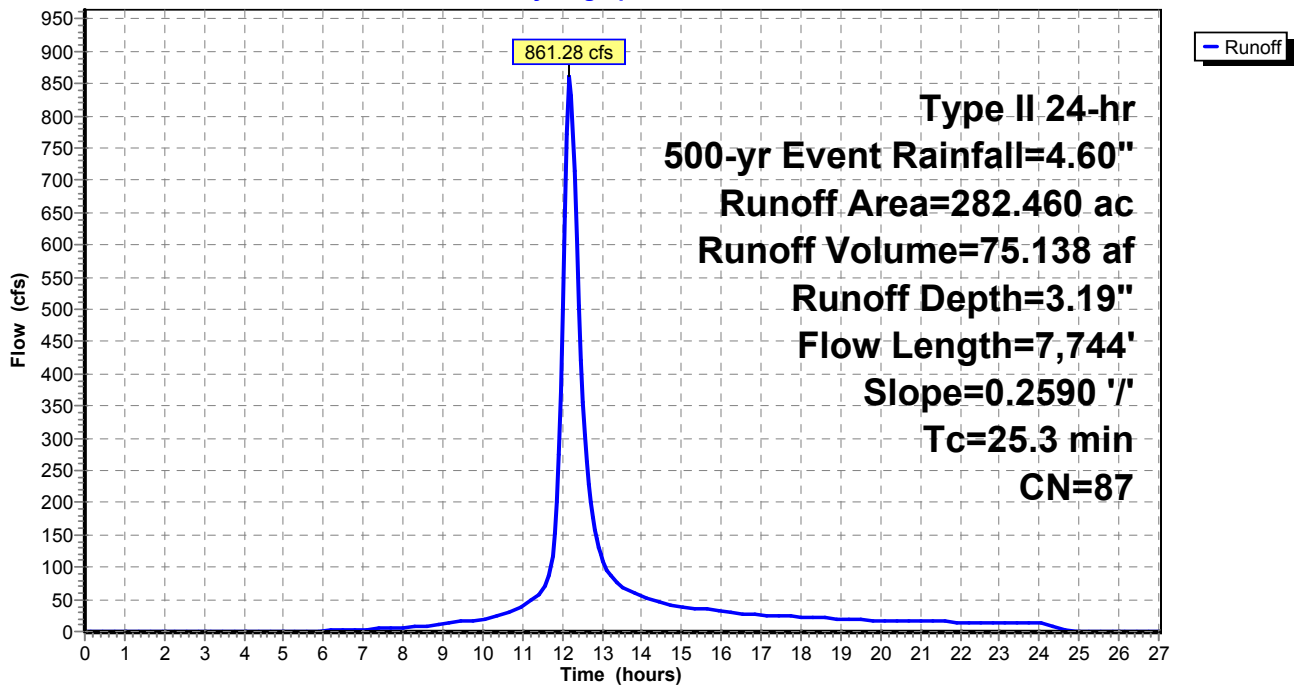
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 14: WS 14**

Runoff = 498.15 cfs @ 12.18 hrs, Volume= 43.084 af, Depth= 3.19"

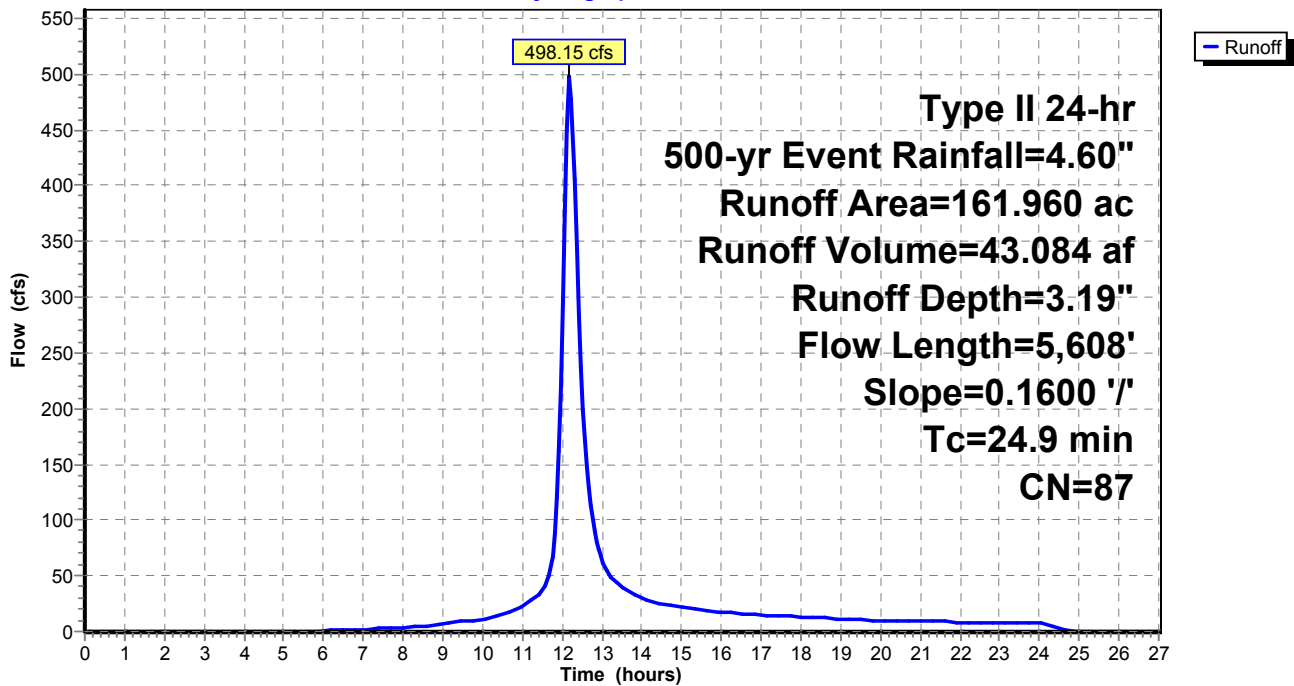
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 15: WS 15**

Runoff = 240.16 cfs @ 12.04 hrs, Volume= 14.660 af, Depth= 3.19"

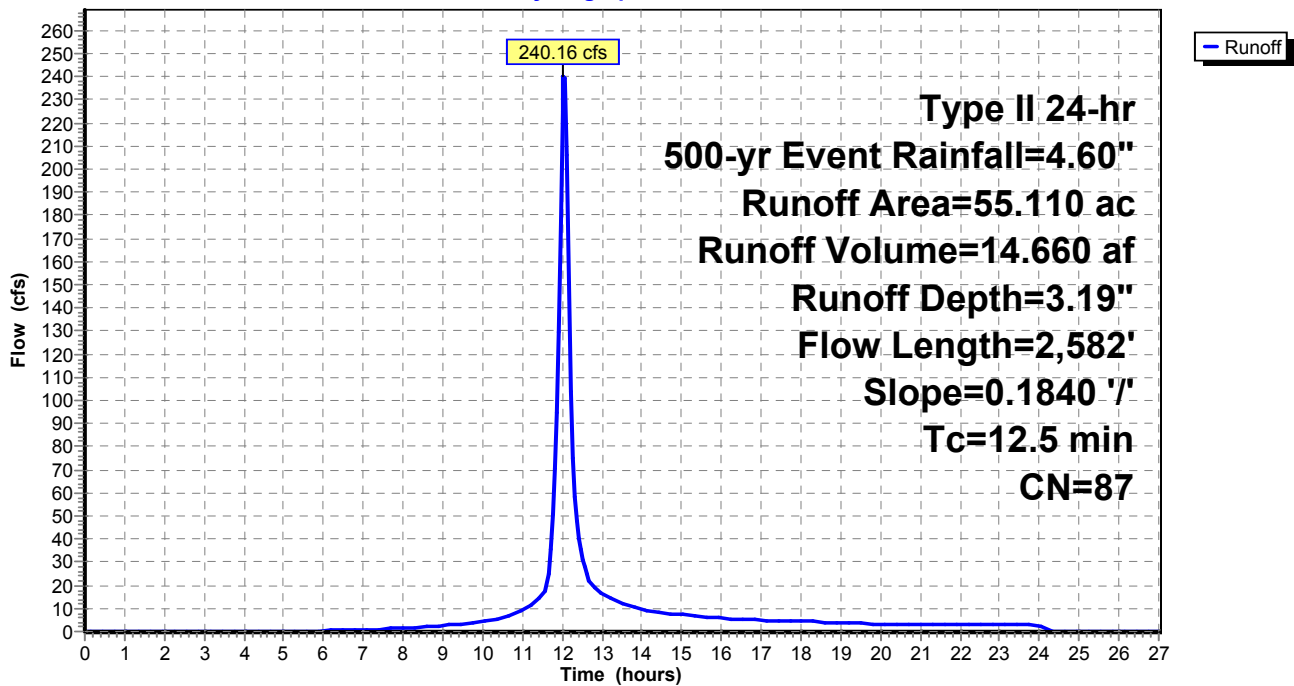
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Pre-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 16: WS 16**

Runoff = 274.73 cfs @ 12.15 hrs, Volume= 22.116 af, Depth= 3.19"

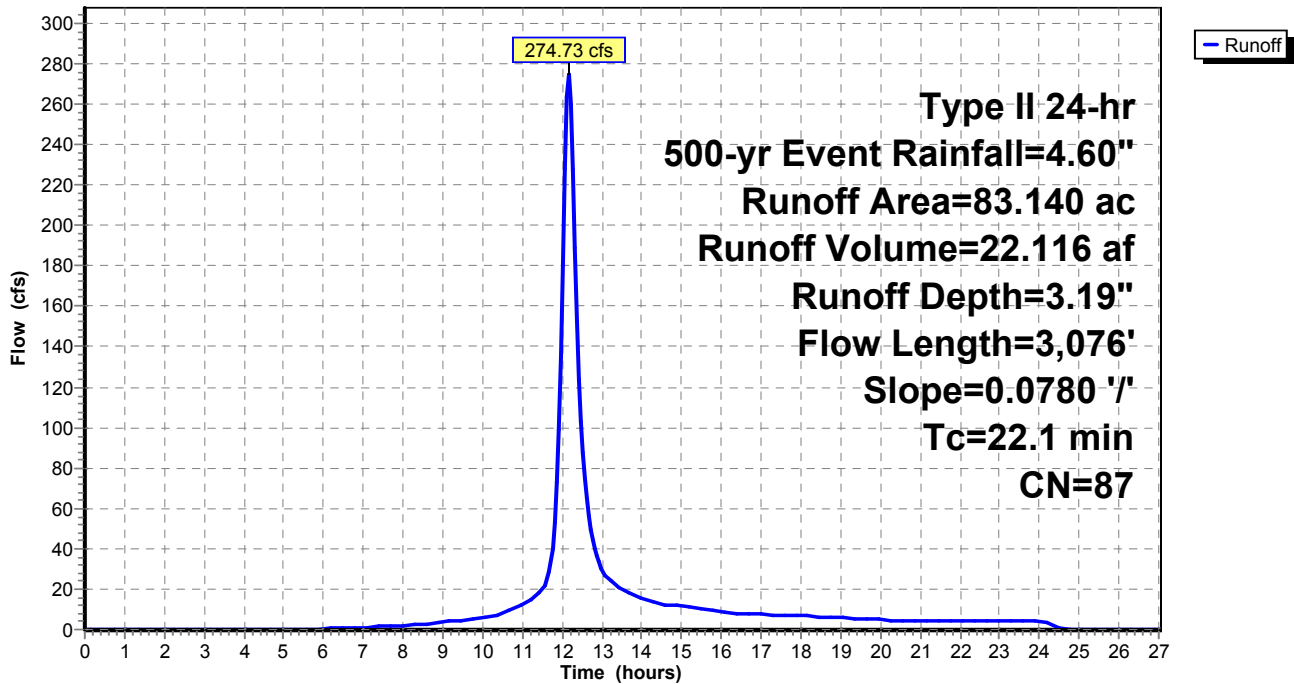
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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

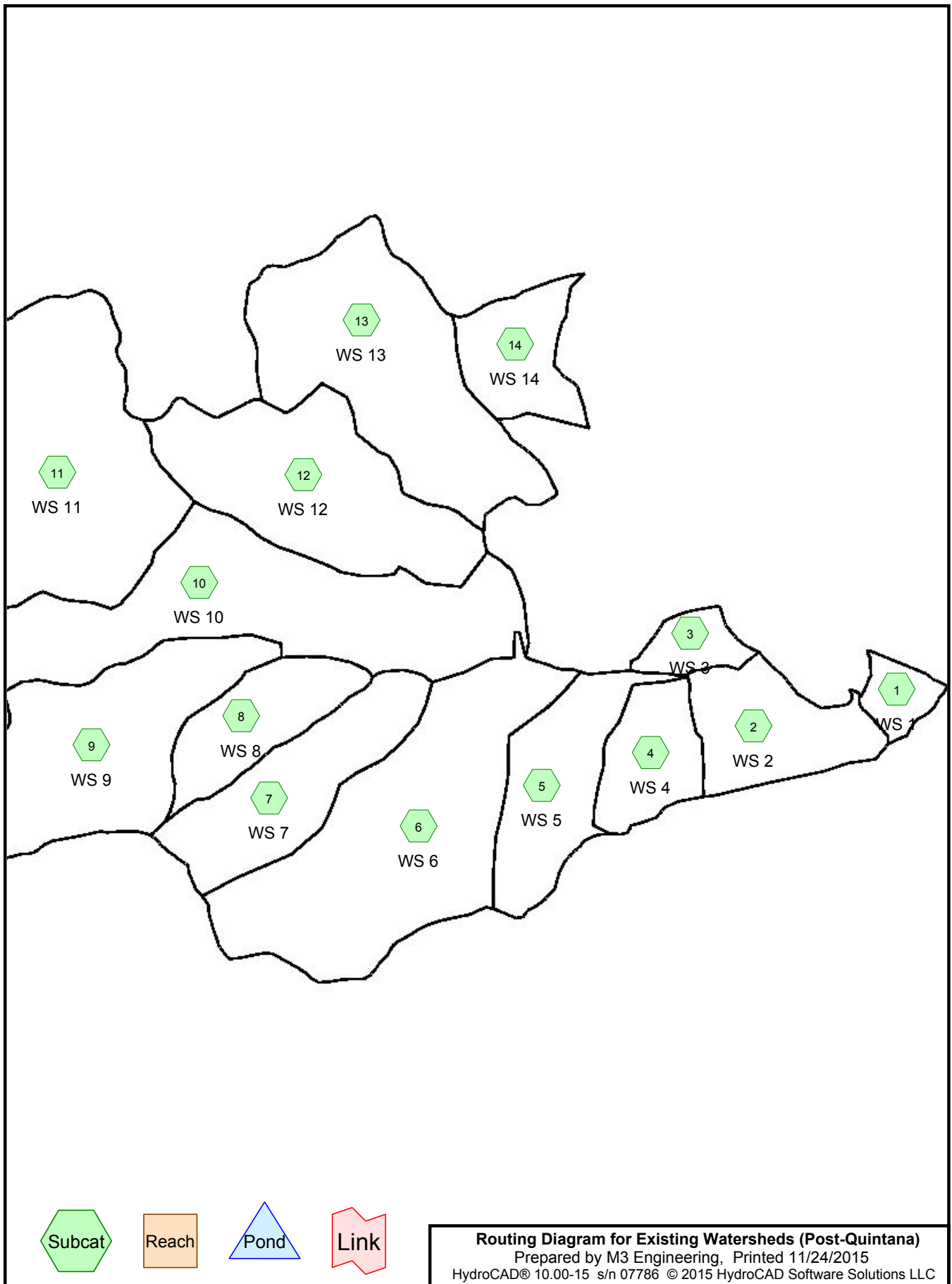
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	3,076	0.0780	2.32		Lag/CN Method,

**Subcatchment 16: WS 16**

Hydrograph



## APPENDIX C



**Existing Watersheds (Post-Quintana)**

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**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)
<b>2,483.730</b>	<b>87</b>	<b>TOTAL AREA</b>

**Existing Watersheds (Post-Quintana)**

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**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	
<b>2,483.730</b>		<b>TOTAL AREA</b>



**Existing Watersheds (Post-Quintana)**

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**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
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2,483.730</b>	<b>0.000</b>	<b>2,483.730</b>	<b>TOTAL AREA</b>	

**Existing Watersheds (Post-Quintana)***Type II 24-hr 100-yr Event Rainfall=3.70"*

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Subcatchment14: WS 14</b>	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**

**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 1: WS 1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 117.20 cfs @ 11.95 hrs, Volume= 5.555 af, Depth= 2.36"

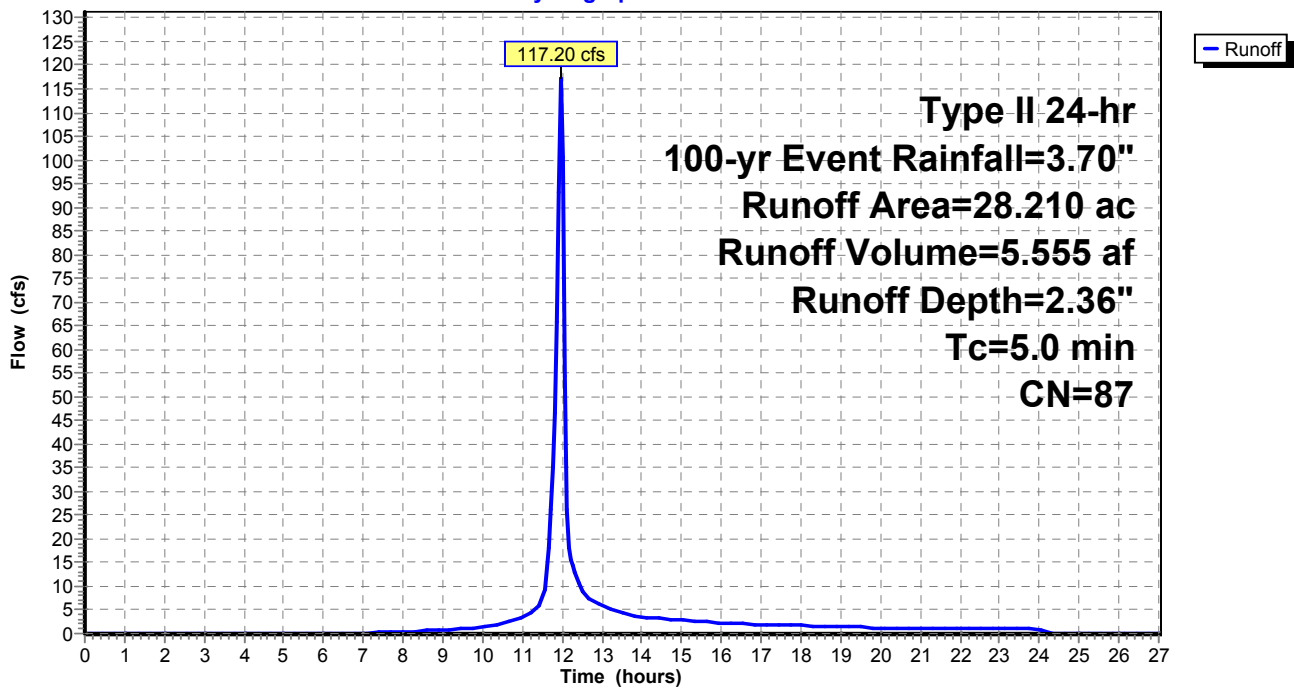
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 2: WS 2**

Runoff = 363.66 cfs @ 12.03 hrs, Volume= 20.985 af, Depth= 2.36"

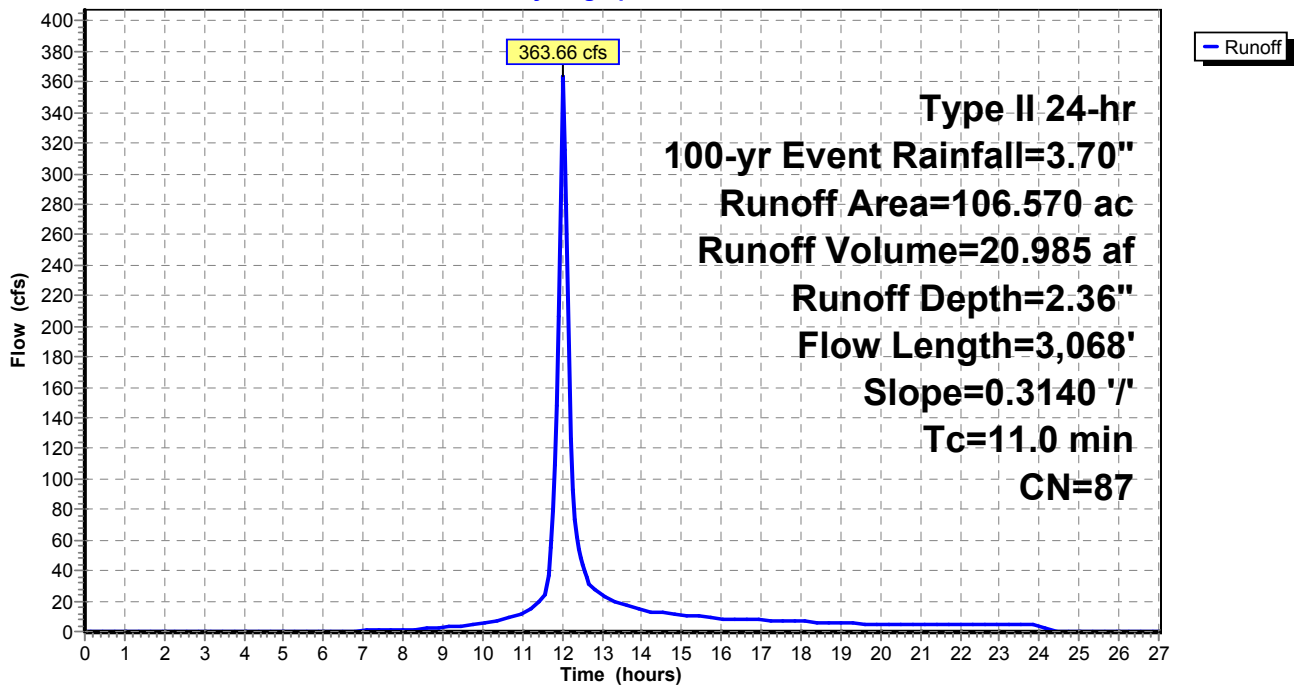
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 3: WS 3**

Runoff = 129.54 cfs @ 12.00 hrs, Volume= 6.890 af, Depth= 2.36"

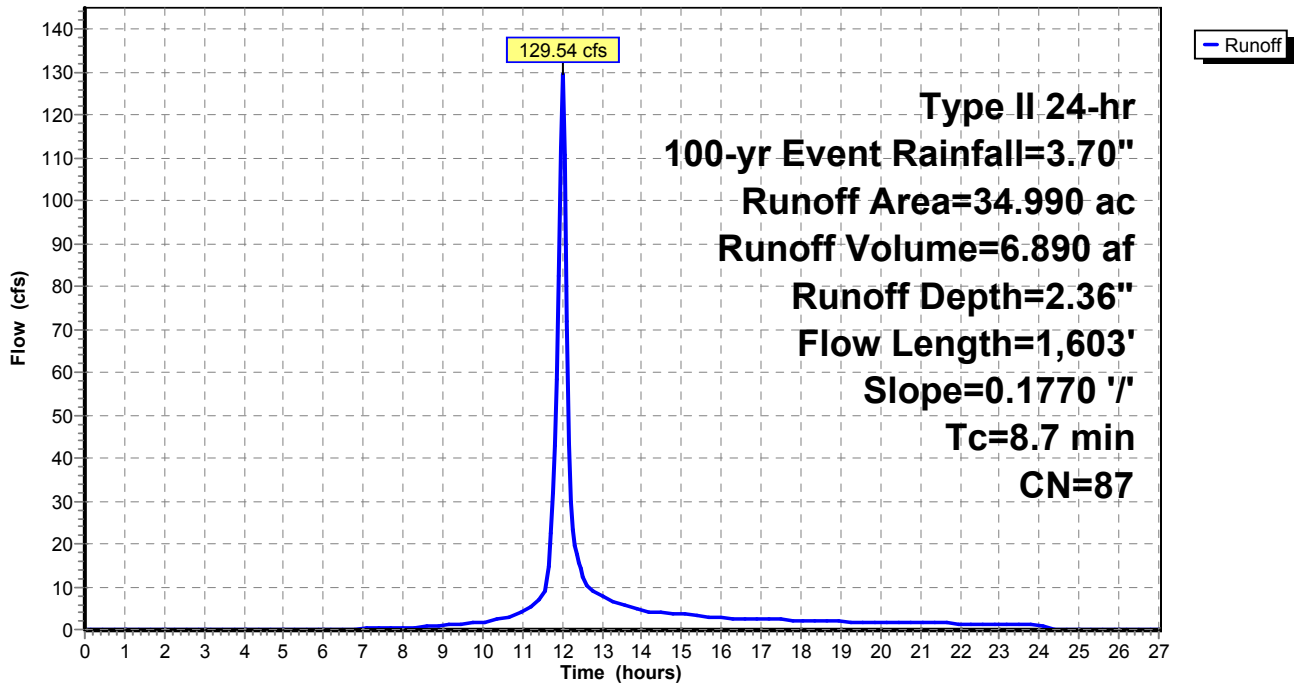
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 4: WS 4**

Runoff = 259.92 cfs @ 12.02 hrs, Volume= 14.773 af, Depth= 2.36"

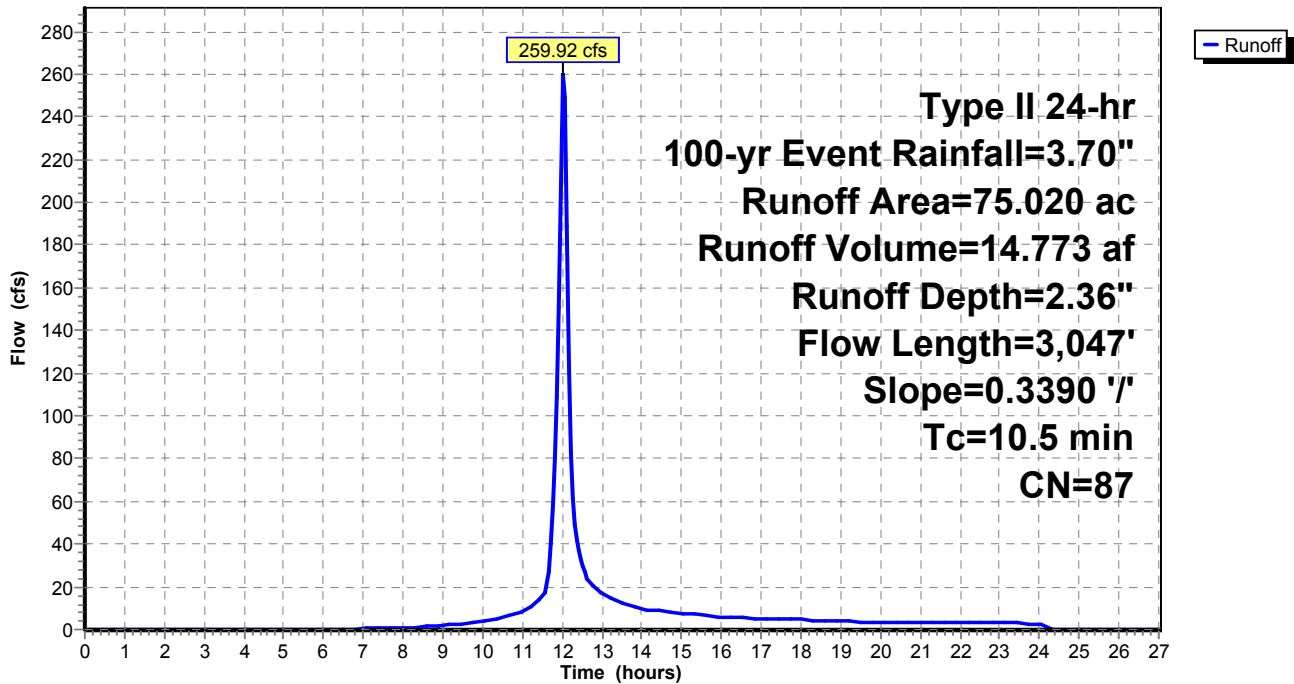
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 5: WS 5**

Runoff = 342.49 cfs @ 12.10 hrs, Volume= 24.455 af, Depth= 2.36"

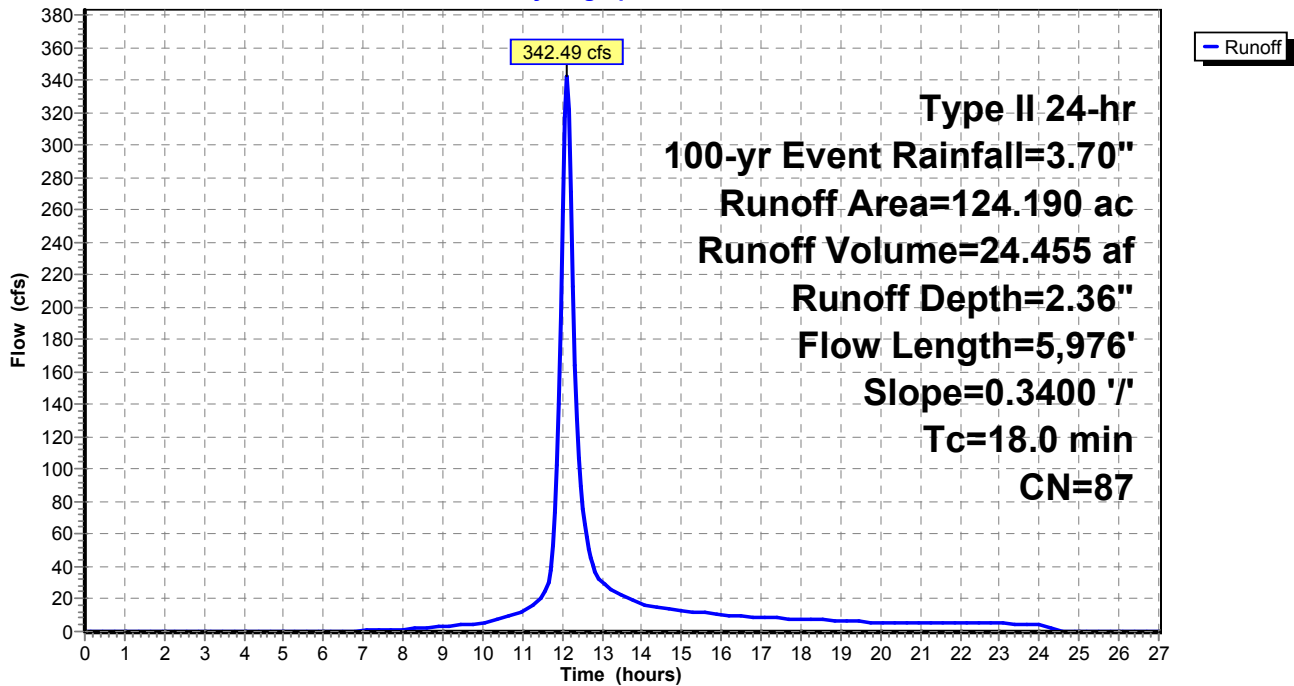
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 6: WS 6**

Runoff = 774.13 cfs @ 12.17 hrs, Volume= 65.223 af, Depth= 2.36"

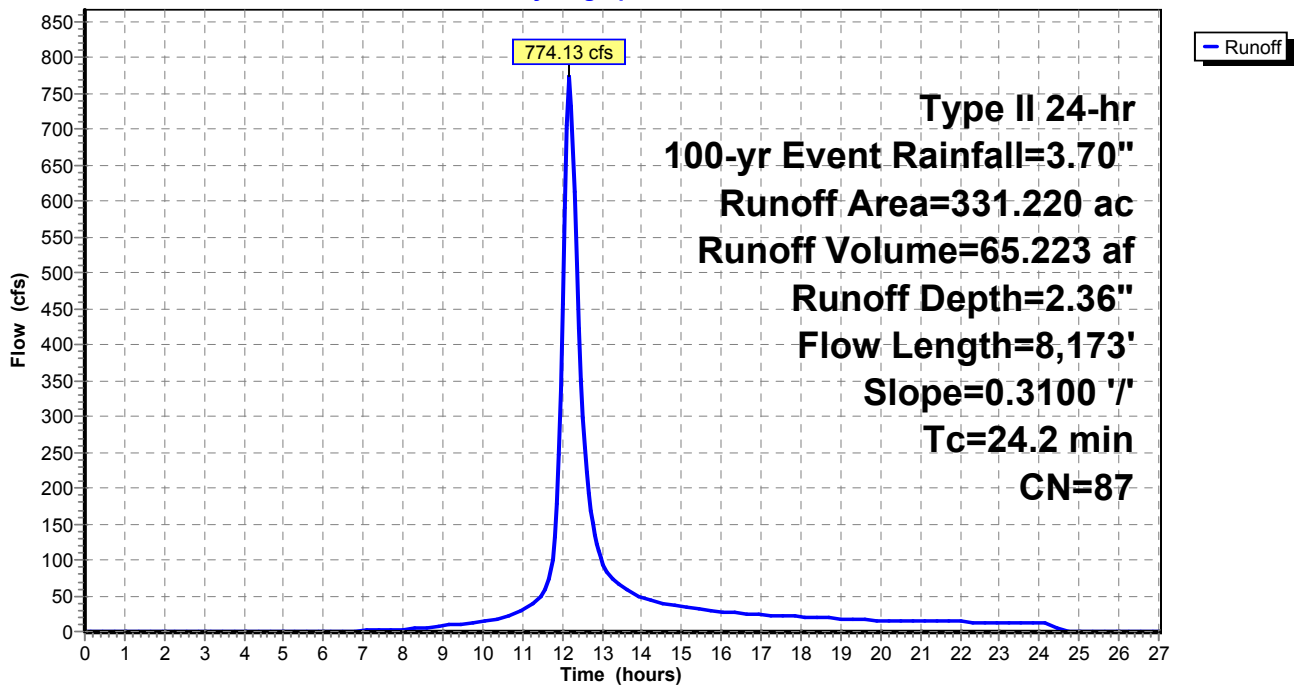
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 7: WS 7**

Runoff = 411.06 cfs @ 12.09 hrs, Volume= 28.449 af, Depth= 2.36"

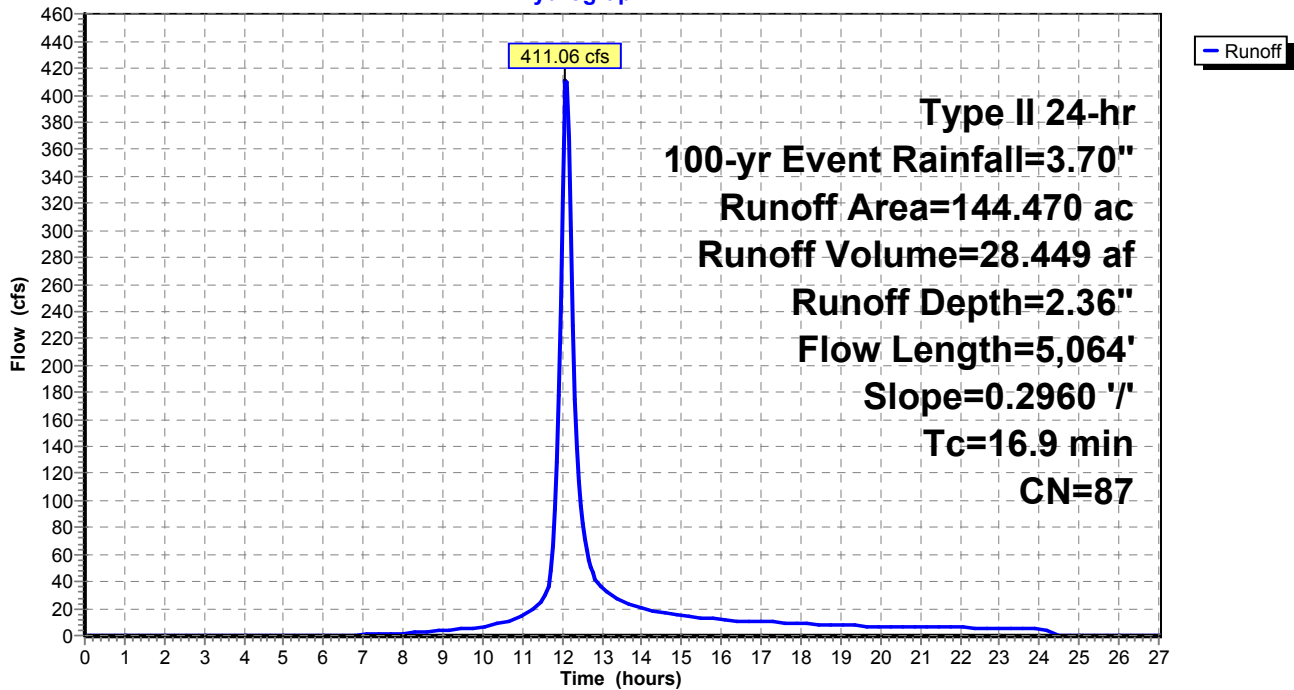
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 8: WS 8**

Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

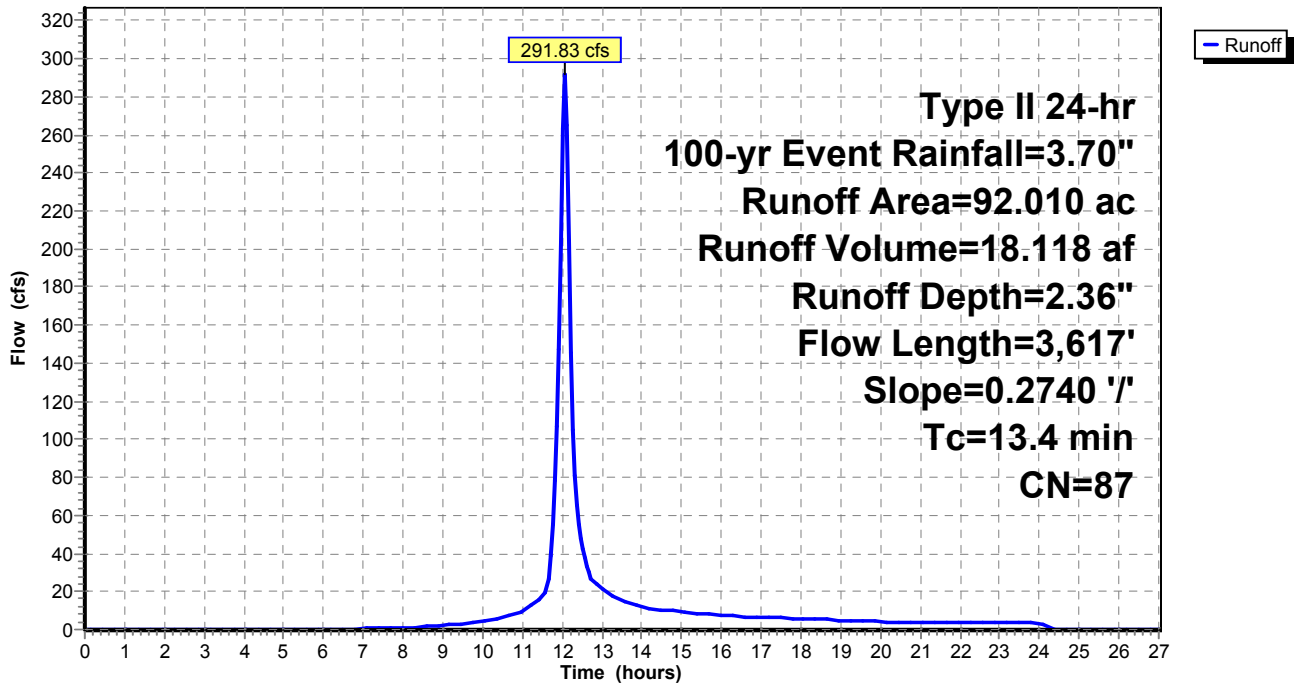
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 9: WS 9**

Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

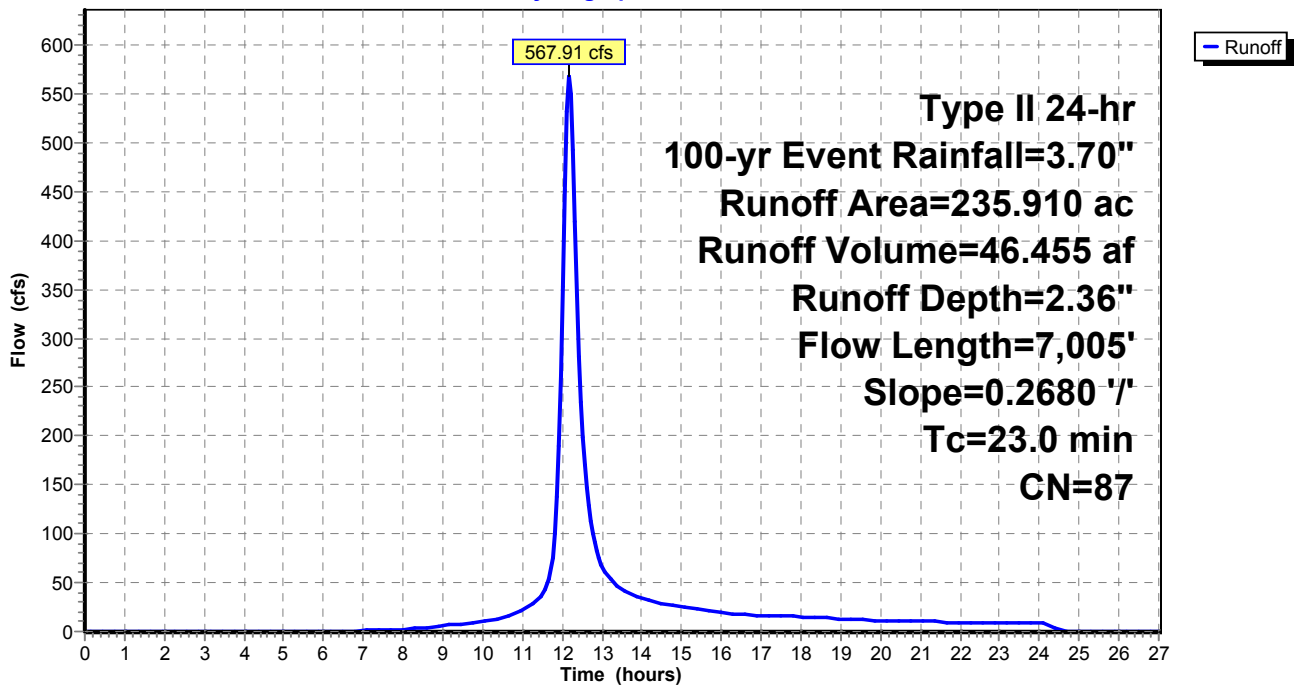
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 10: WS 10**

Runoff = 663.73 cfs @ 12.25 hrs, Volume= 65.063 af, Depth= 2.36"

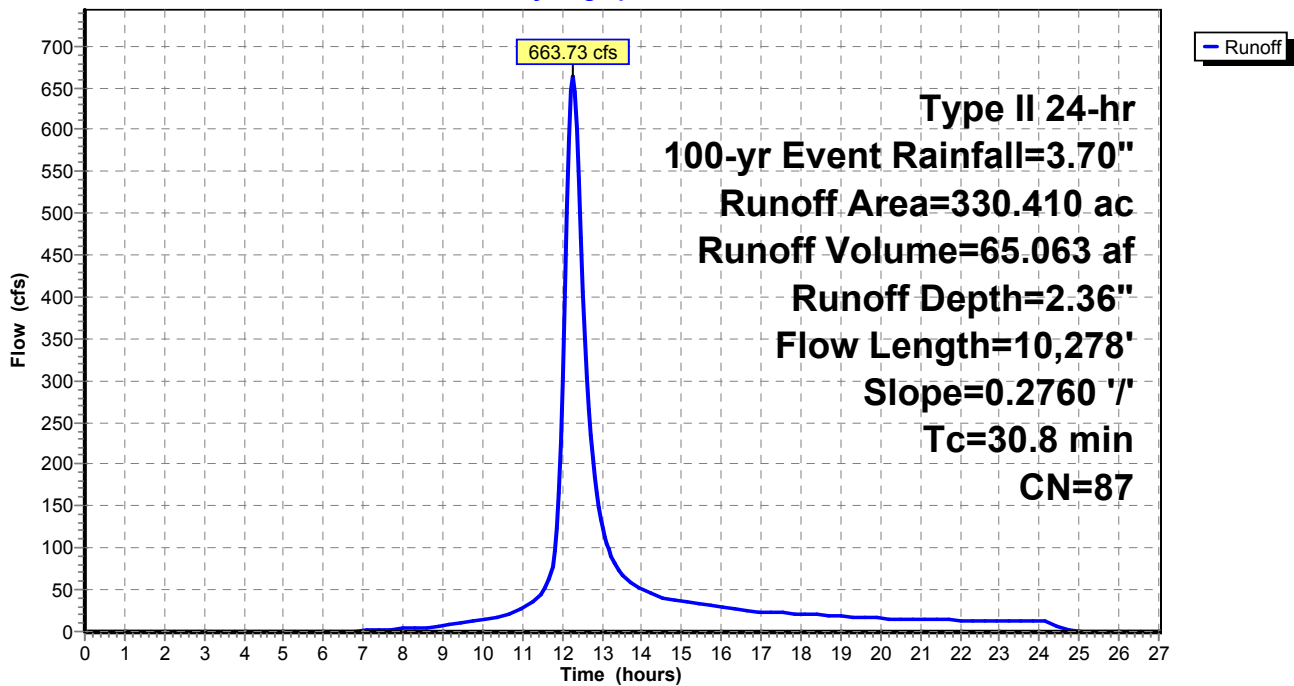
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 11: WS 11**

Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

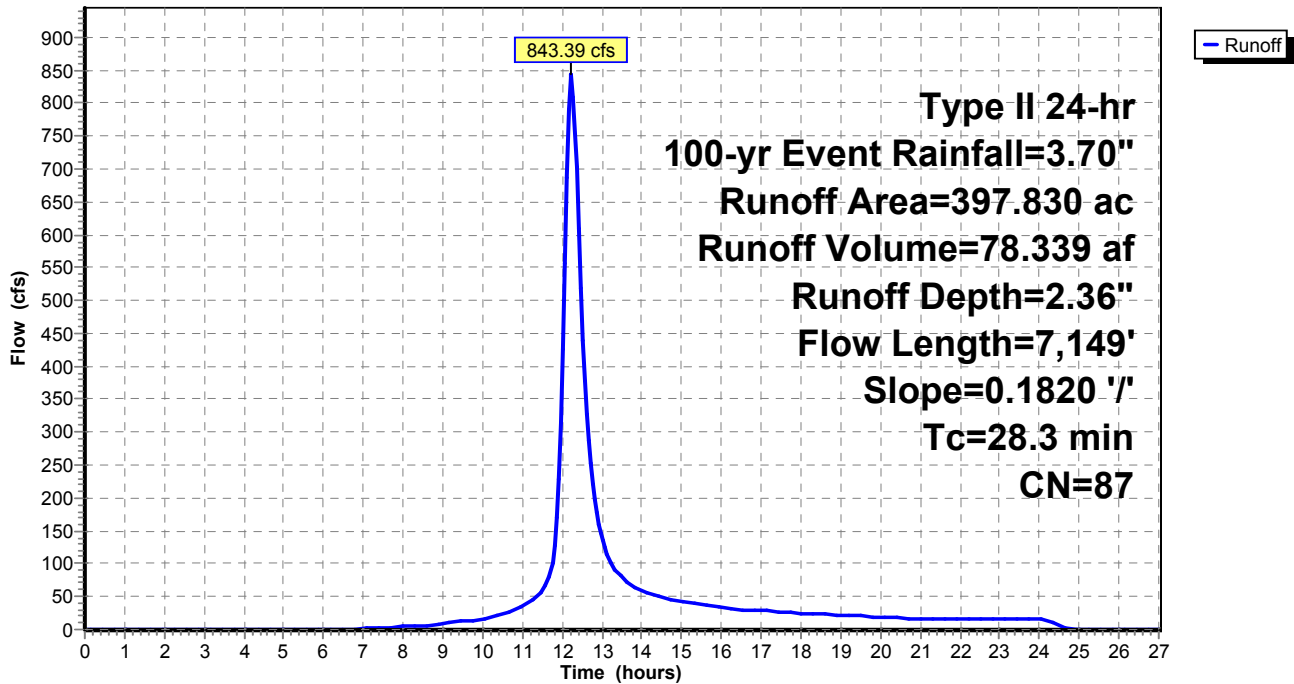
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 12: WS 12**

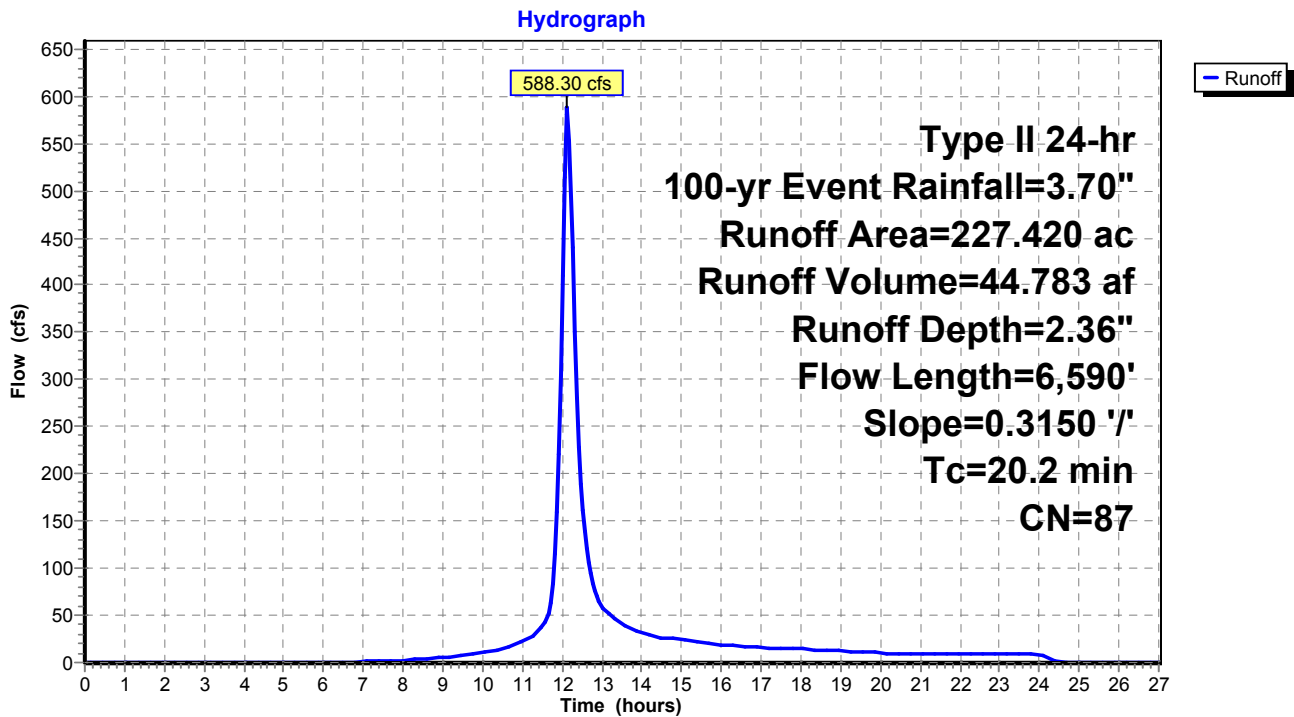
Runoff = 588.30 cfs @ 12.13 hrs, Volume= 44.783 af, Depth= 2.36"

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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 13: WS 13**

Runoff = 649.87 cfs @ 12.17 hrs, Volume= 54.252 af, Depth= 2.36"

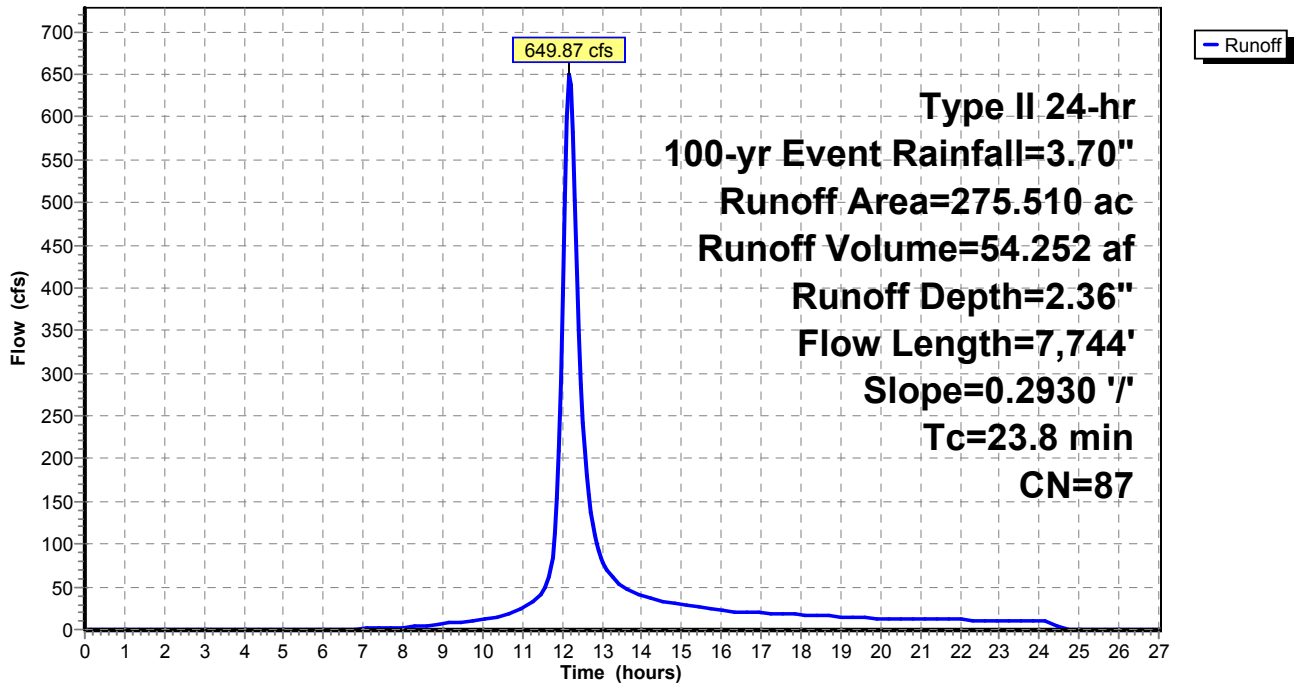
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 14: WS 14**

Runoff = 243.90 cfs @ 12.06 hrs, Volume= 15.747 af, Depth= 2.36"

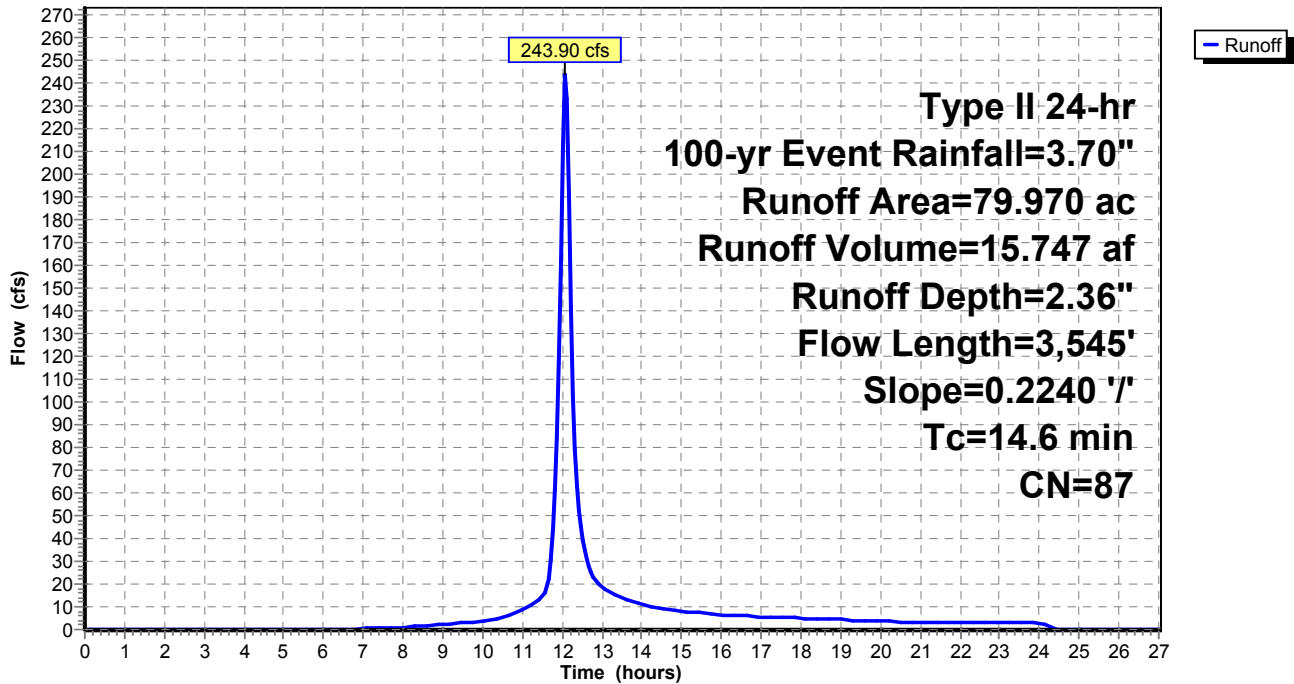
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Existing Watersheds (Post-Quintana)***Type II 24-hr 200-yr Event Rainfall=4.09"*

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Subcatchment14: WS 14</b>	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**

**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 1: WS 1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

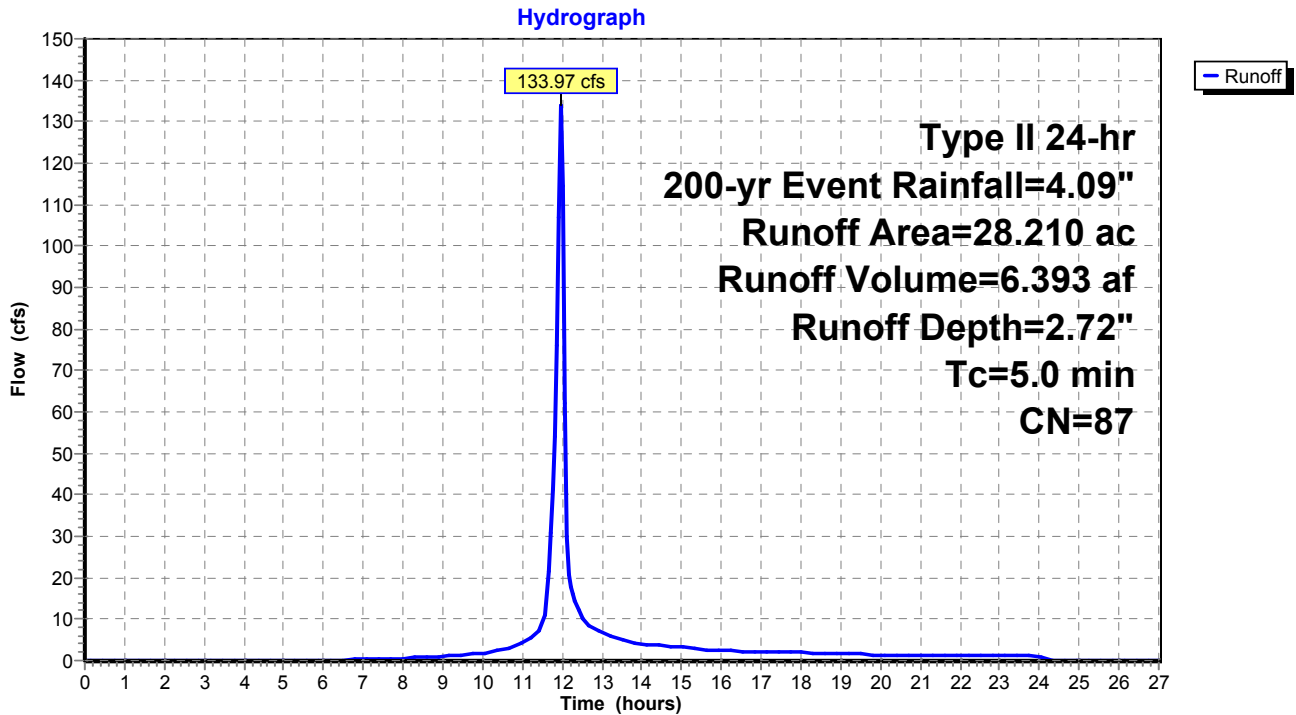
Runoff = 133.97 cfs @ 11.95 hrs, Volume= 6.393 af, Depth= 2.72"

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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 2: WS 2**

Runoff = 415.35 cfs @ 12.02 hrs, Volume= 24.150 af, Depth= 2.72"

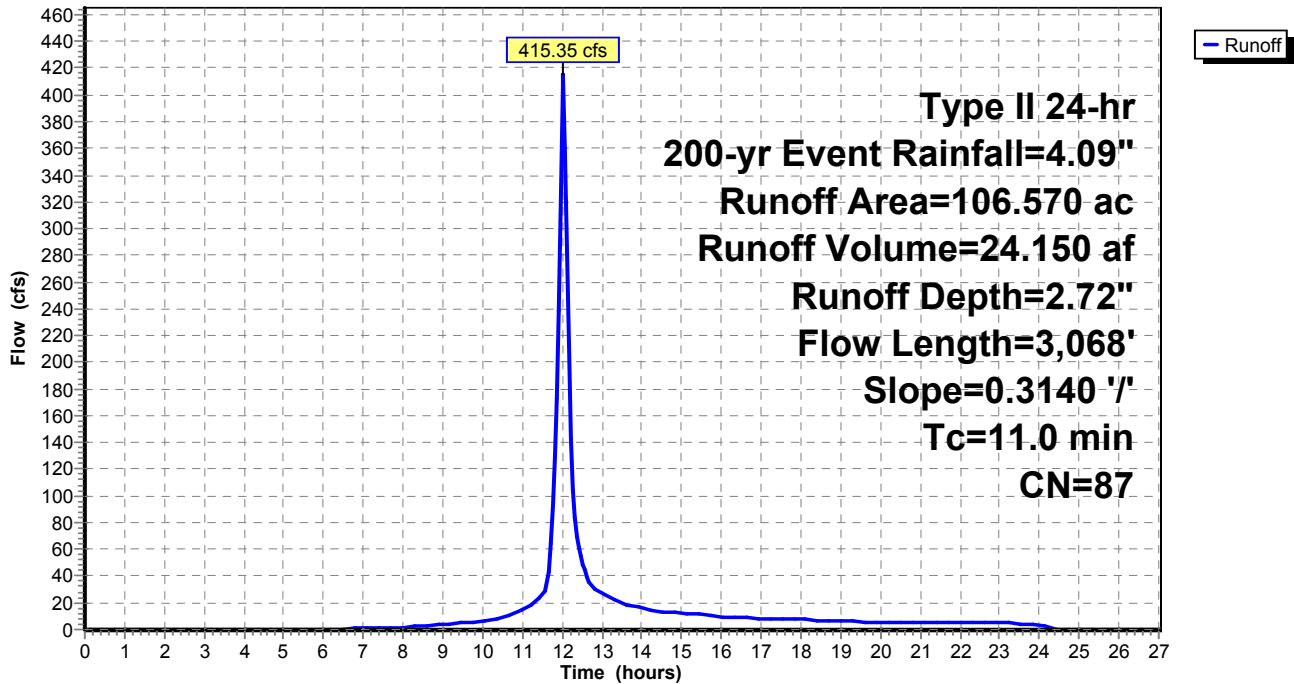
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 3: WS 3**

Runoff = 148.20 cfs @ 12.00 hrs, Volume= 7.929 af, Depth= 2.72"

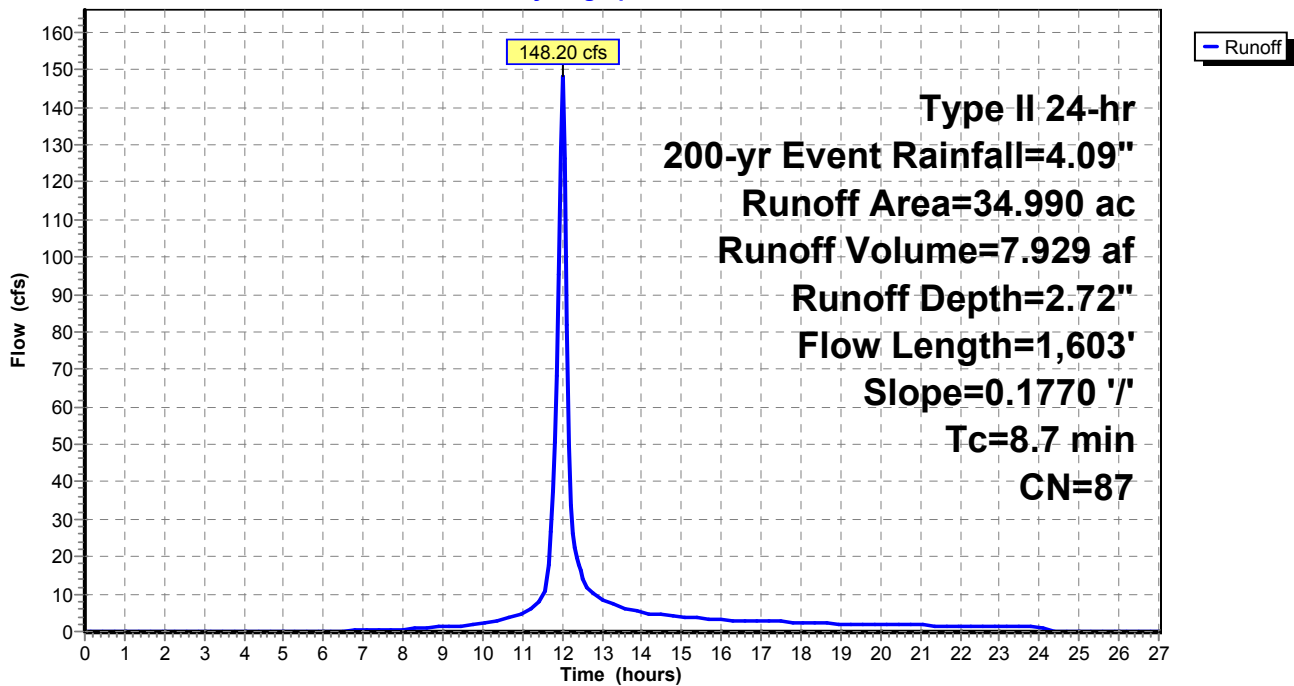
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 4: WS 4**

Runoff = 297.56 cfs @ 12.02 hrs, Volume= 17.000 af, Depth= 2.72"

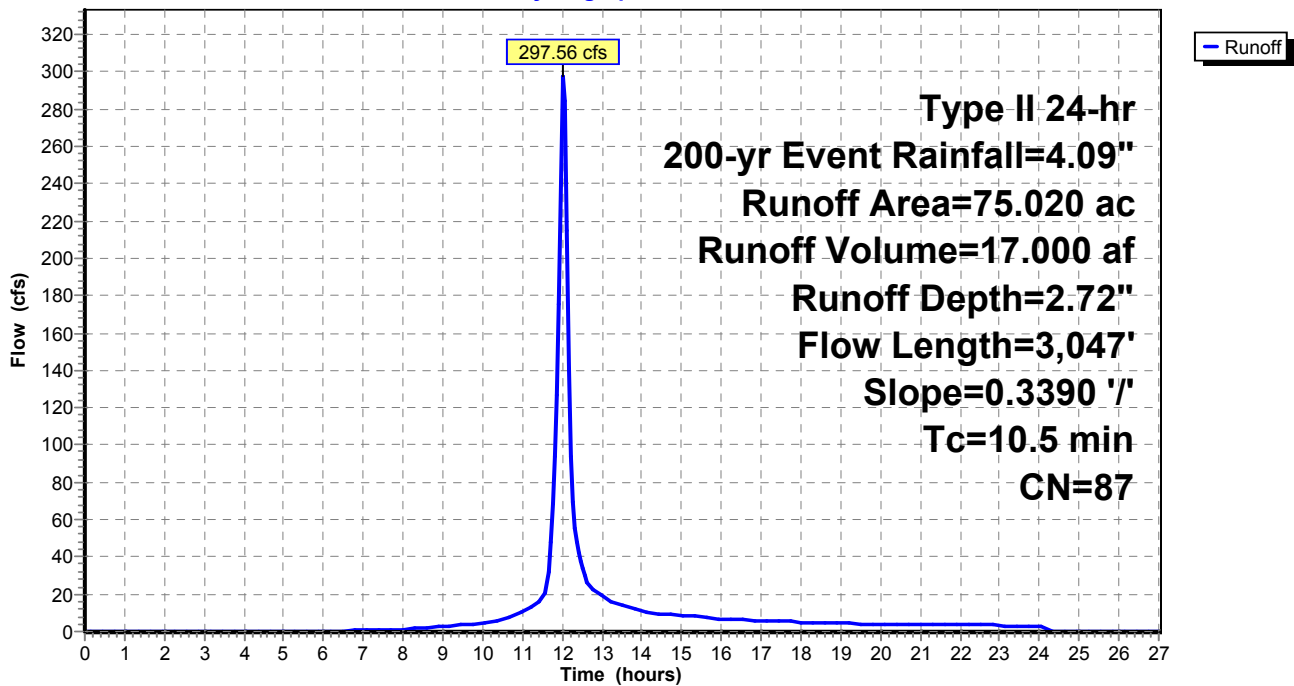
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 5: WS 5**

Runoff = 392.70 cfs @ 12.10 hrs, Volume= 28.143 af, Depth= 2.72"

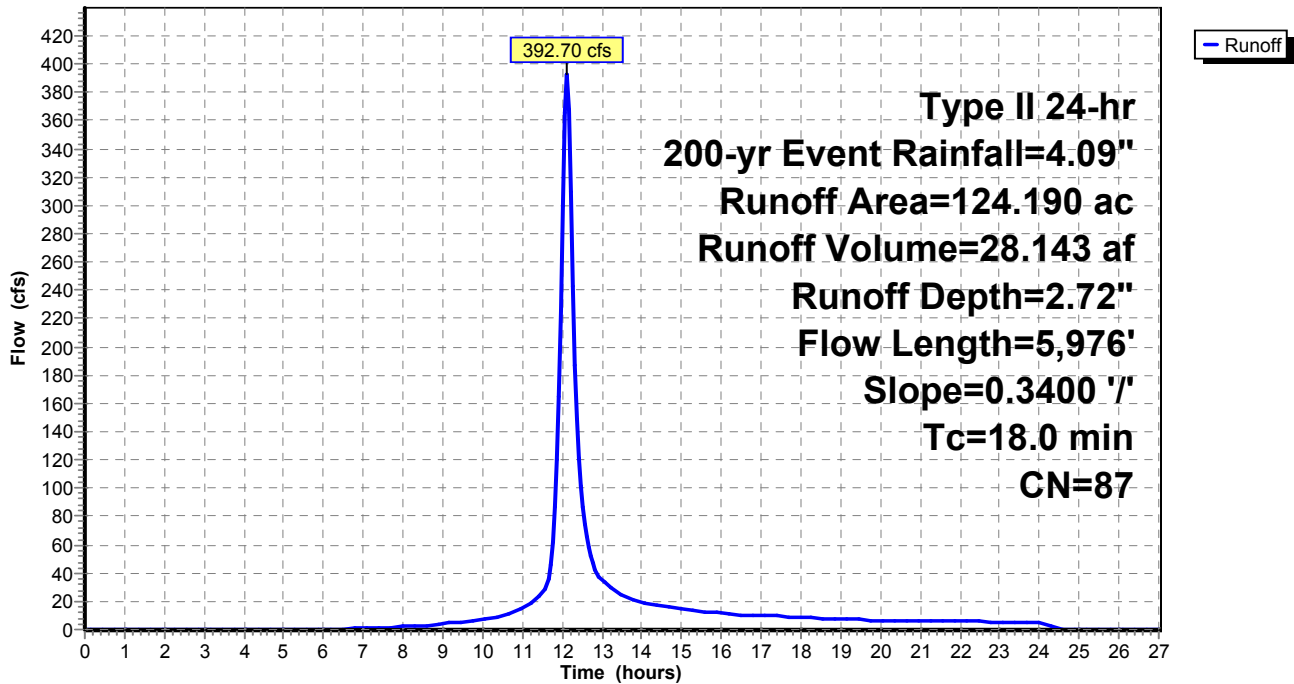
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 6: WS 6**

Runoff = 888.50 cfs @ 12.17 hrs, Volume= 75.058 af, Depth= 2.72"

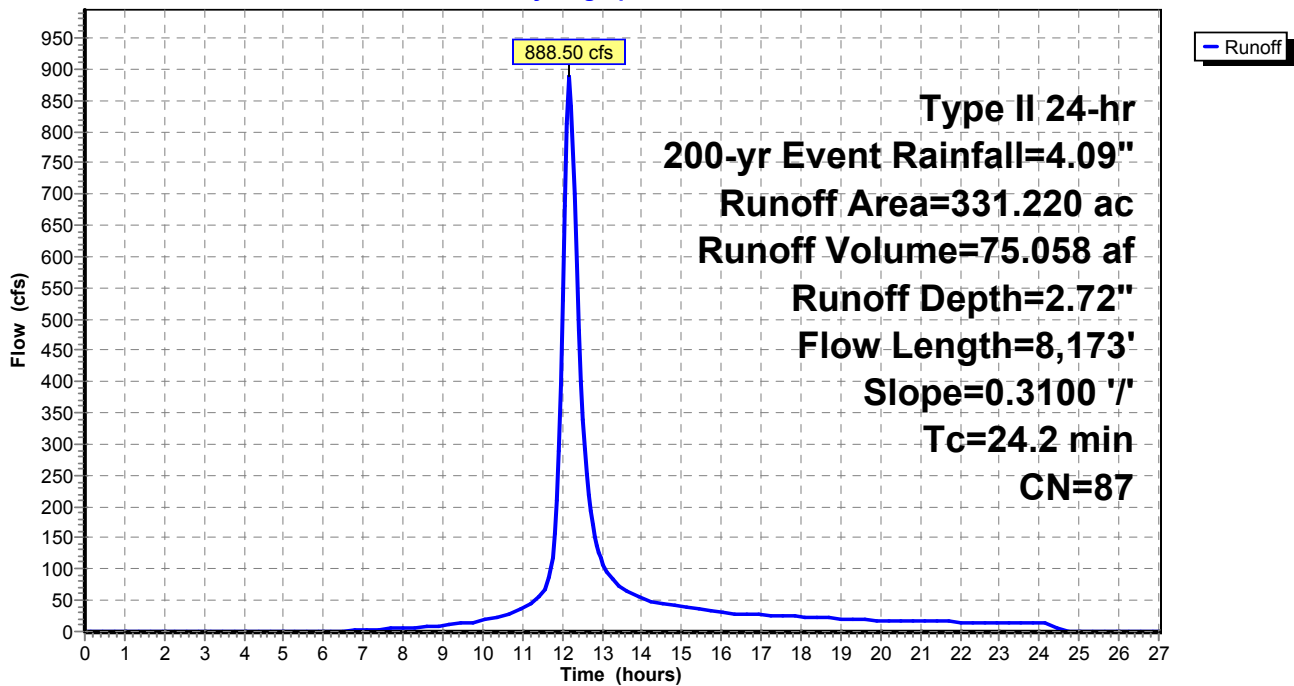
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 7: WS 7**

Runoff = 471.20 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

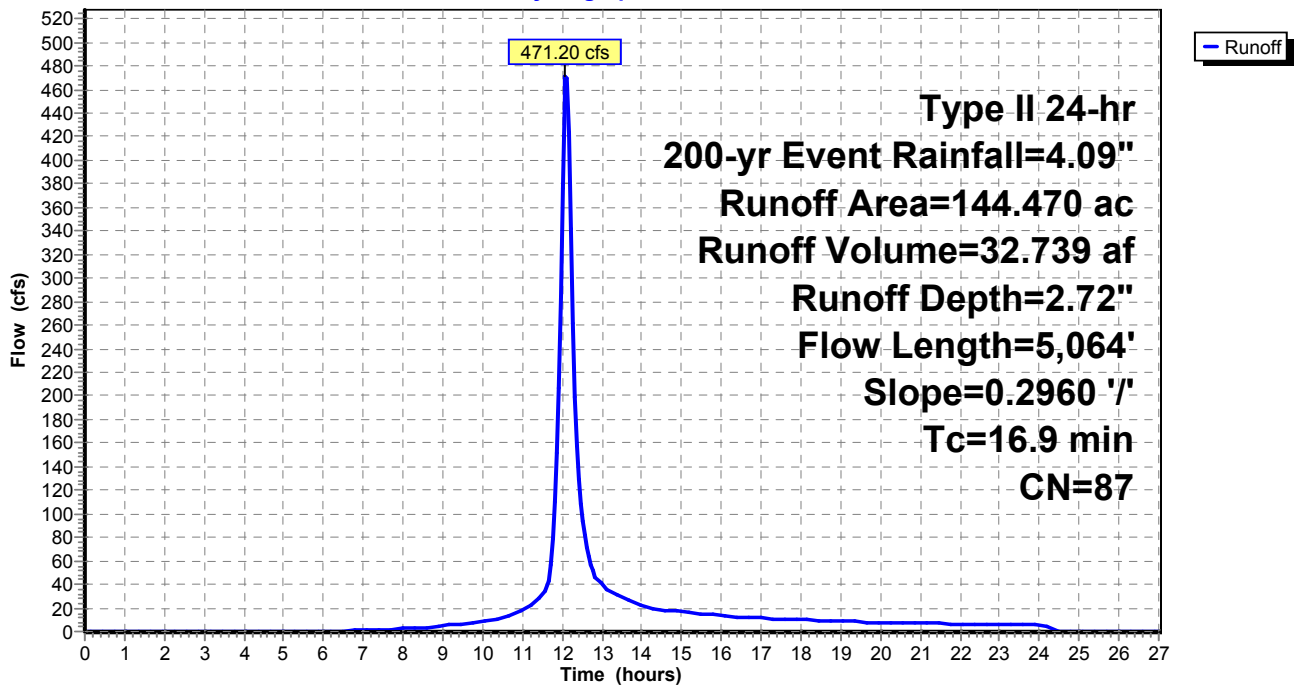
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph





**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 8: WS 8**

Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

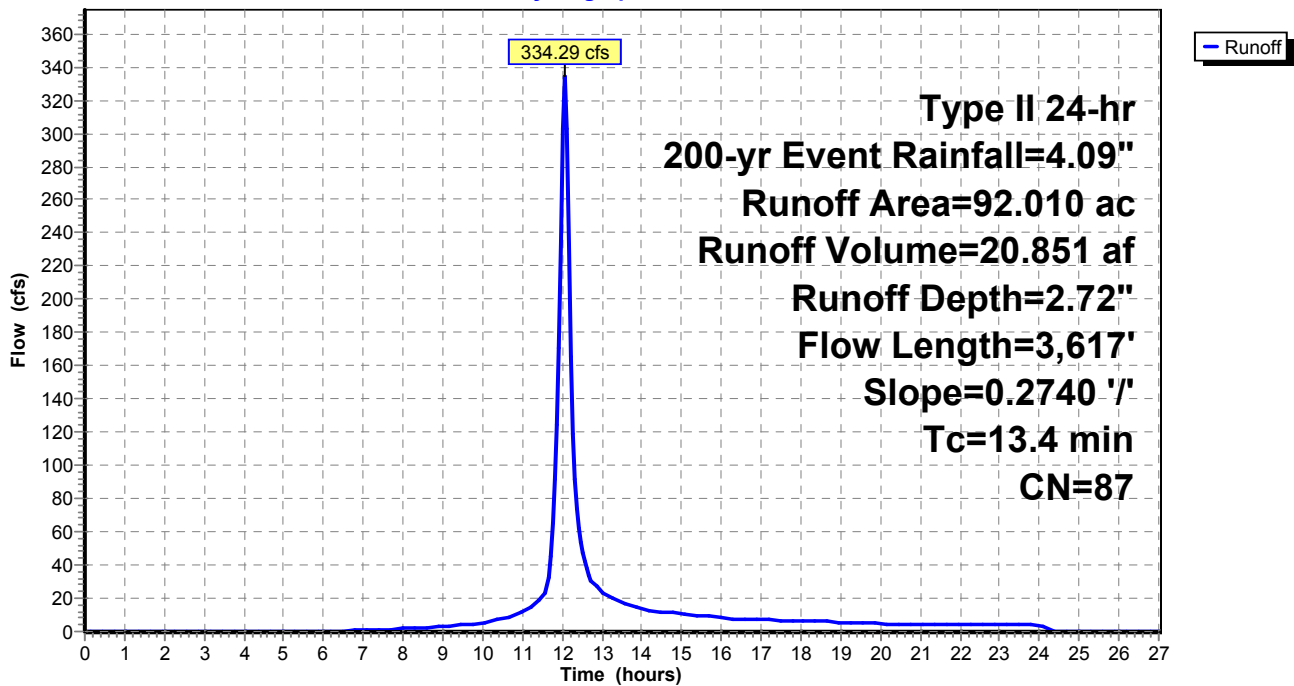
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 9: WS 9**

Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

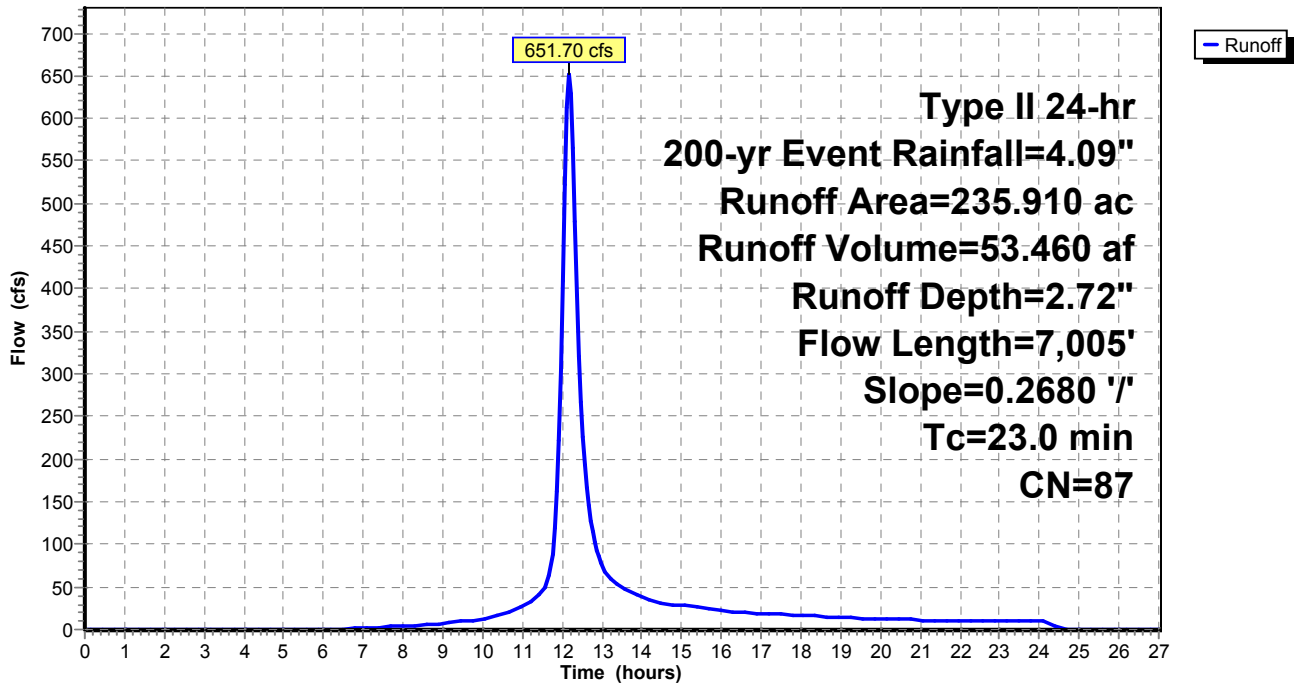
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 10: WS 10**

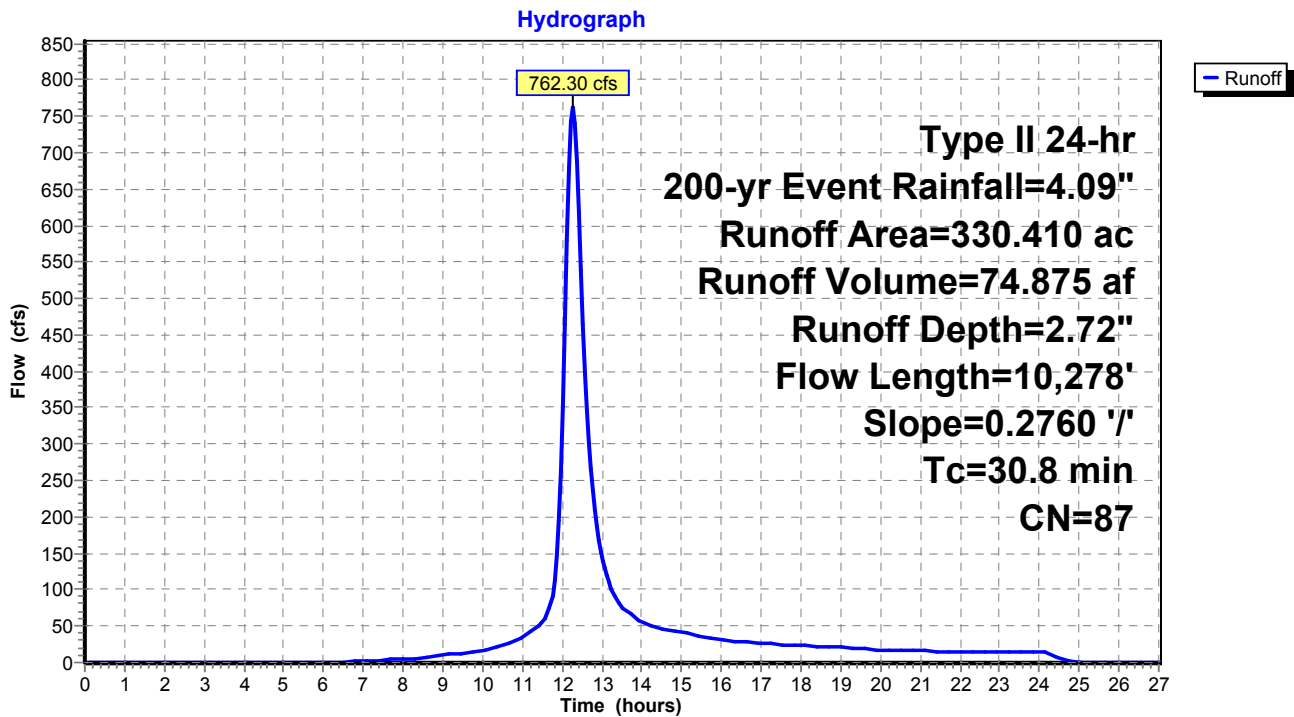
Runoff = 762.30 cfs @ 12.25 hrs, Volume= 74.875 af, Depth= 2.72"

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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 11: WS 11**

Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

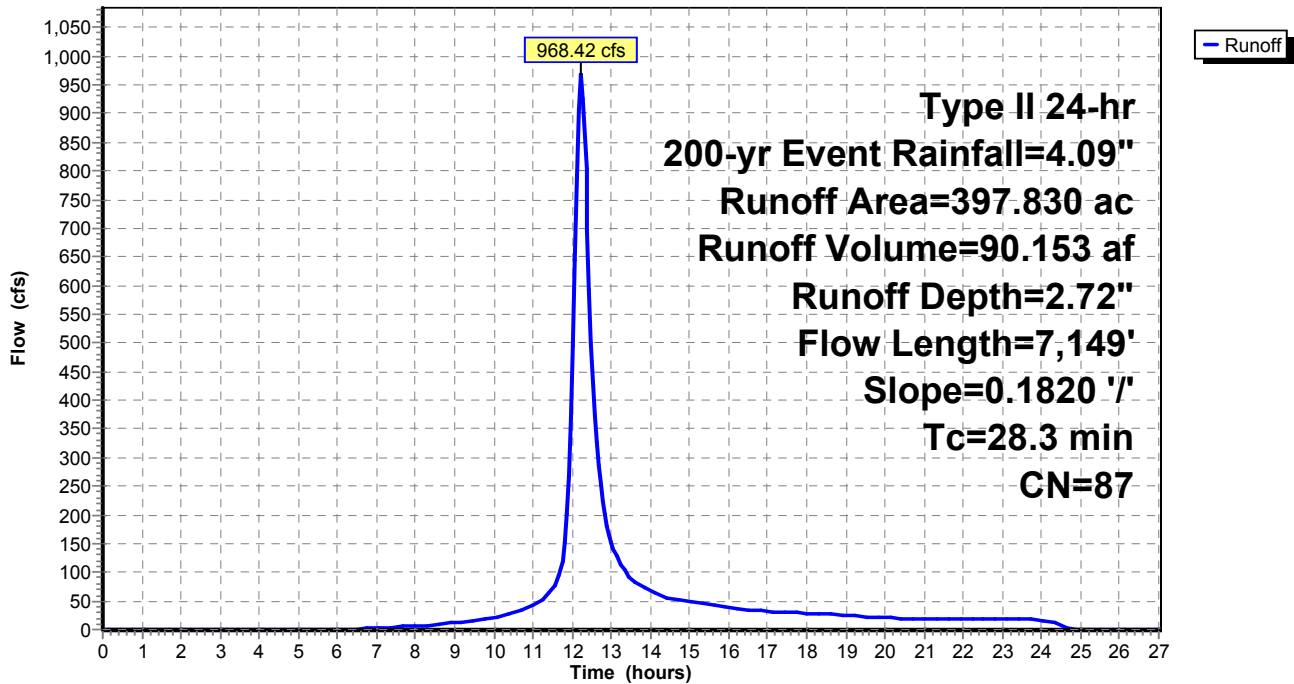
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 12: WS 12**

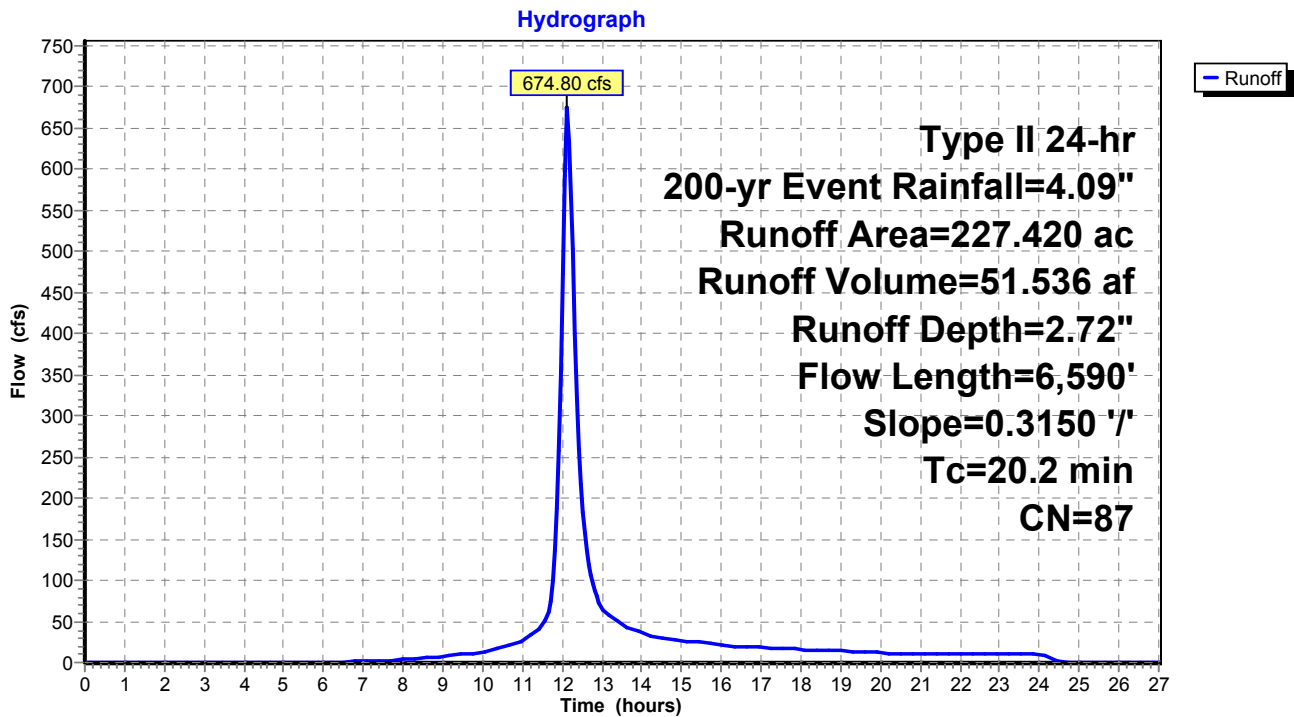
Runoff = 674.80 cfs @ 12.13 hrs, Volume= 51.536 af, Depth= 2.72"

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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 13: WS 13**

Runoff = 745.85 cfs @ 12.17 hrs, Volume= 62.434 af, Depth= 2.72"

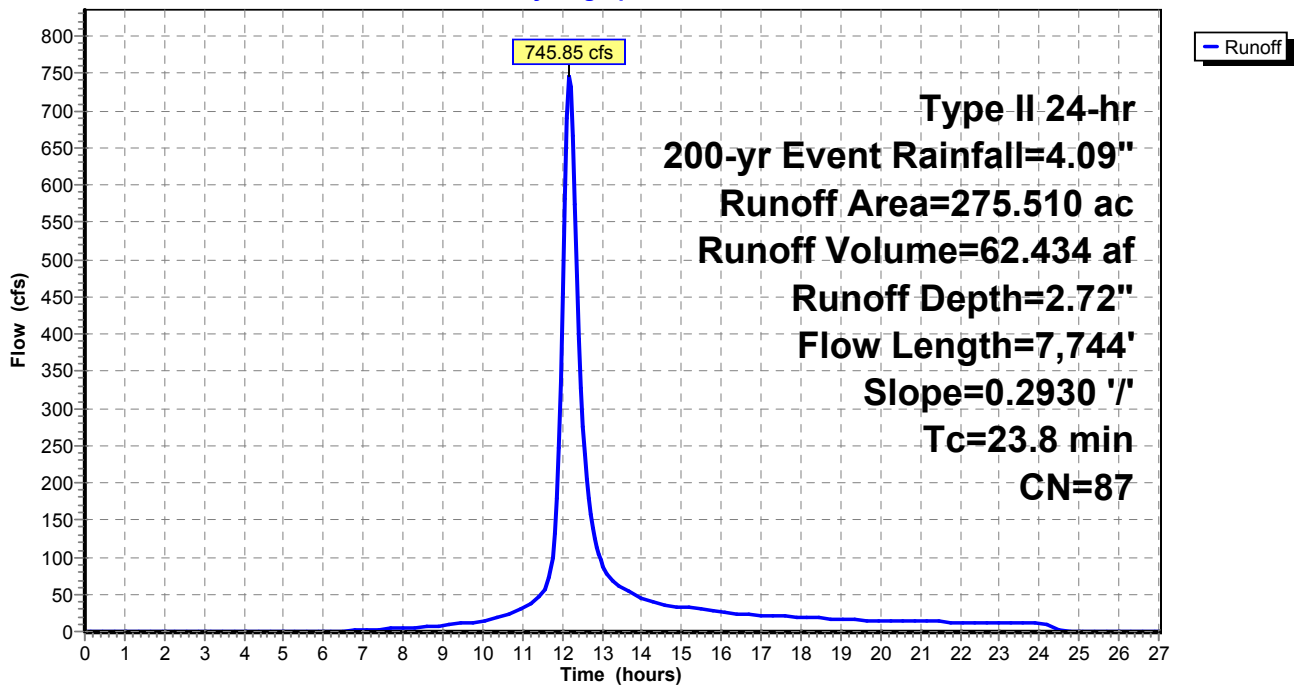
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 14: WS 14**

Runoff = 279.49 cfs @ 12.06 hrs, Volume= 18.122 af, Depth= 2.72"

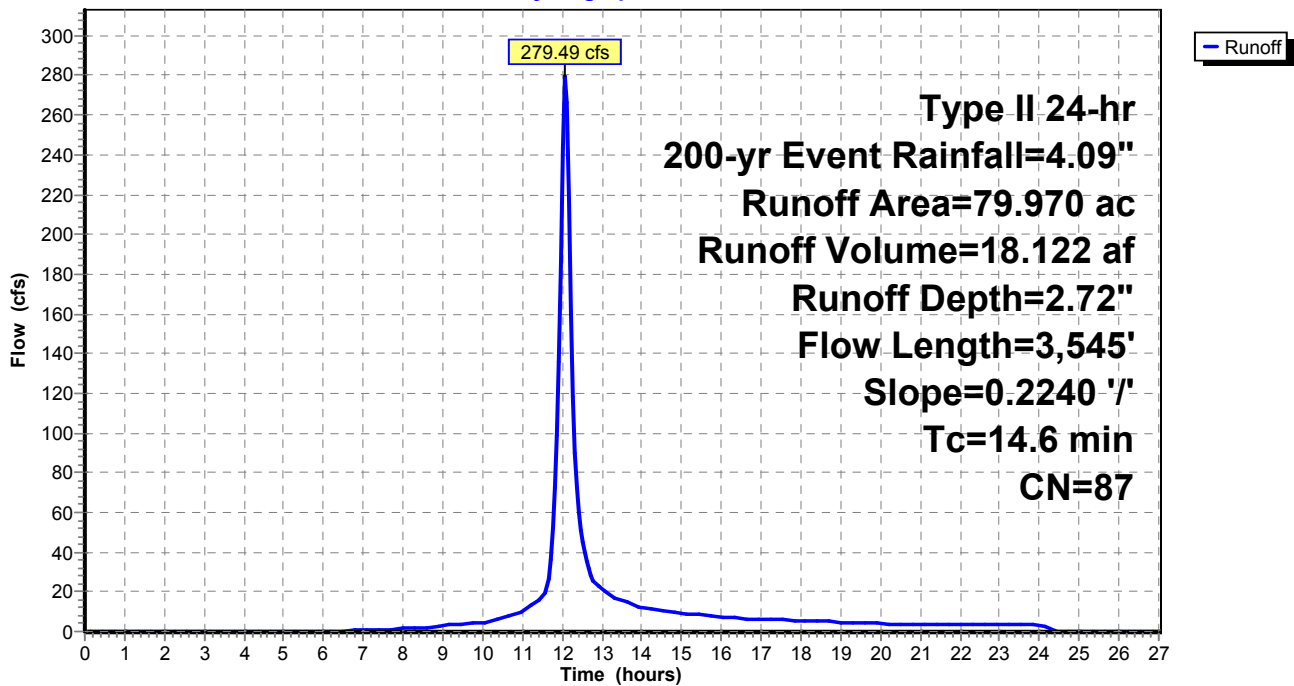
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)***Type II 24-hr 500-yr Event Rainfall=4.60"*

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Subcatchment14: WS 14</b>	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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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"

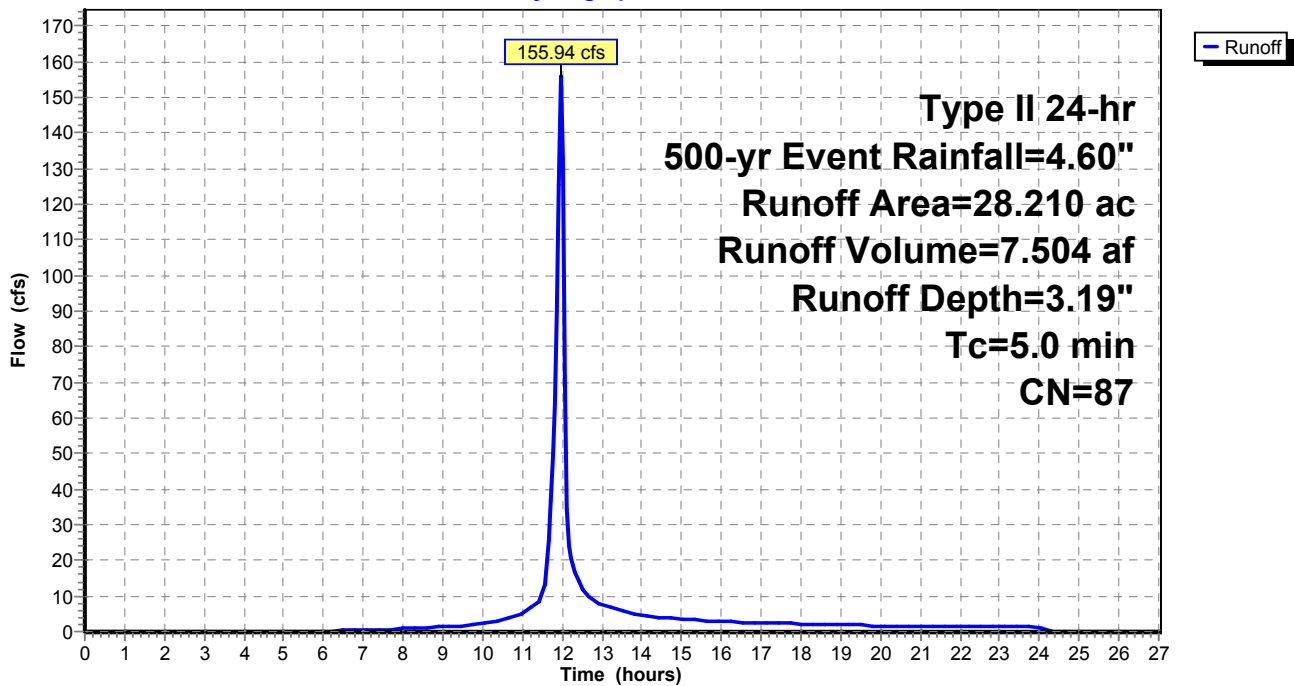
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 2: WS 2**

Runoff = 484.31 cfs @ 12.02 hrs, Volume= 28.349 af, Depth= 3.19"

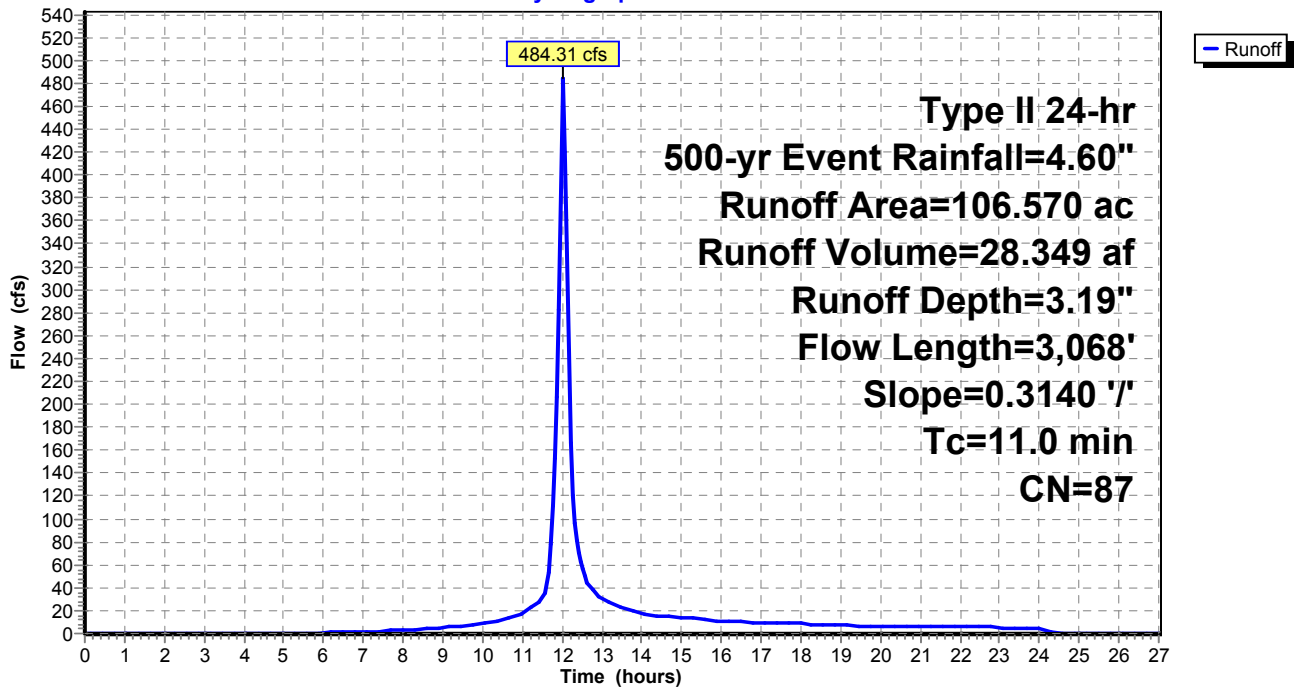
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 3: WS 3**

Runoff = 172.66 cfs @ 12.00 hrs, Volume= 9.308 af, Depth= 3.19"

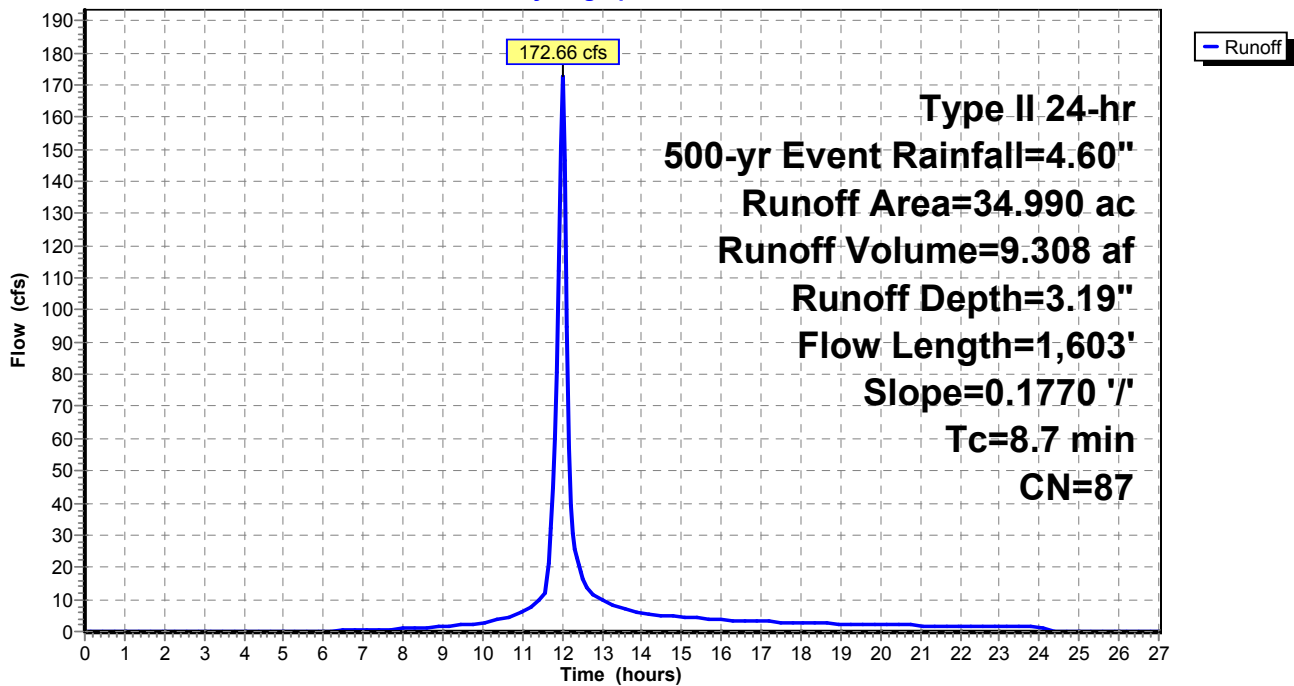
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 4: WS 4**

Runoff = 346.92 cfs @ 12.02 hrs, Volume= 19.956 af, Depth= 3.19"

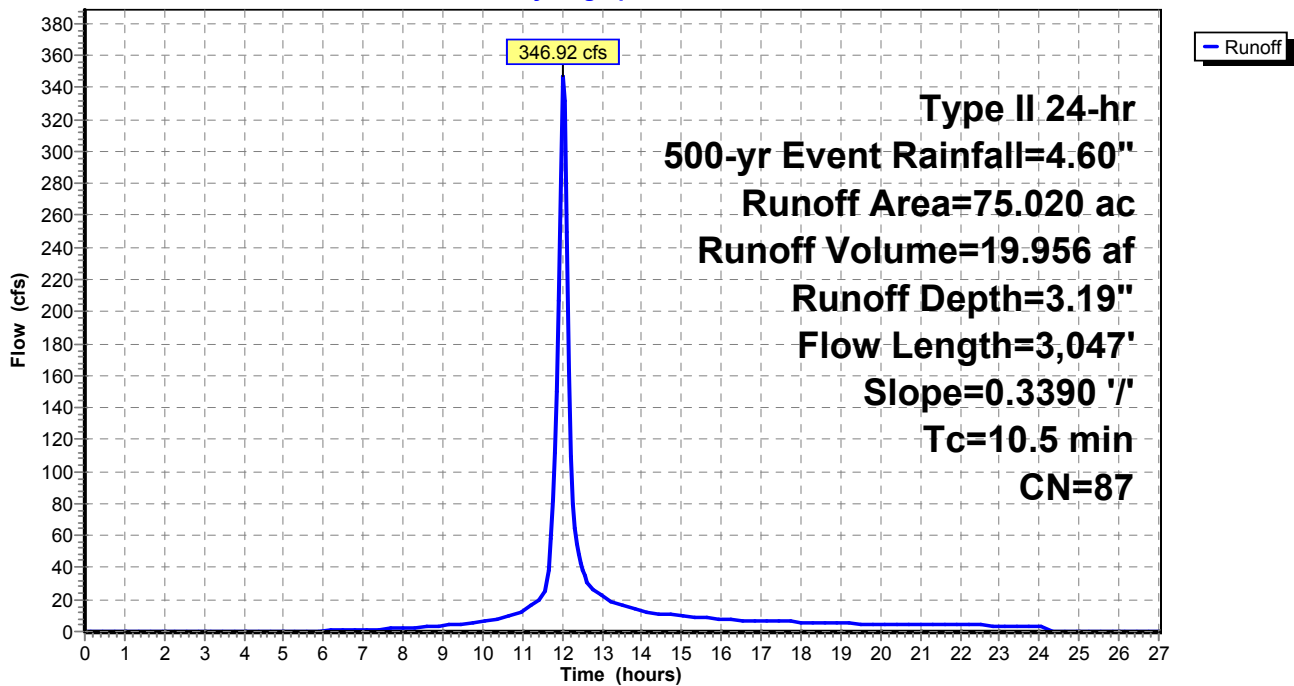
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 5: WS 5**

Runoff = 458.61 cfs @ 12.10 hrs, Volume= 33.036 af, Depth= 3.19"

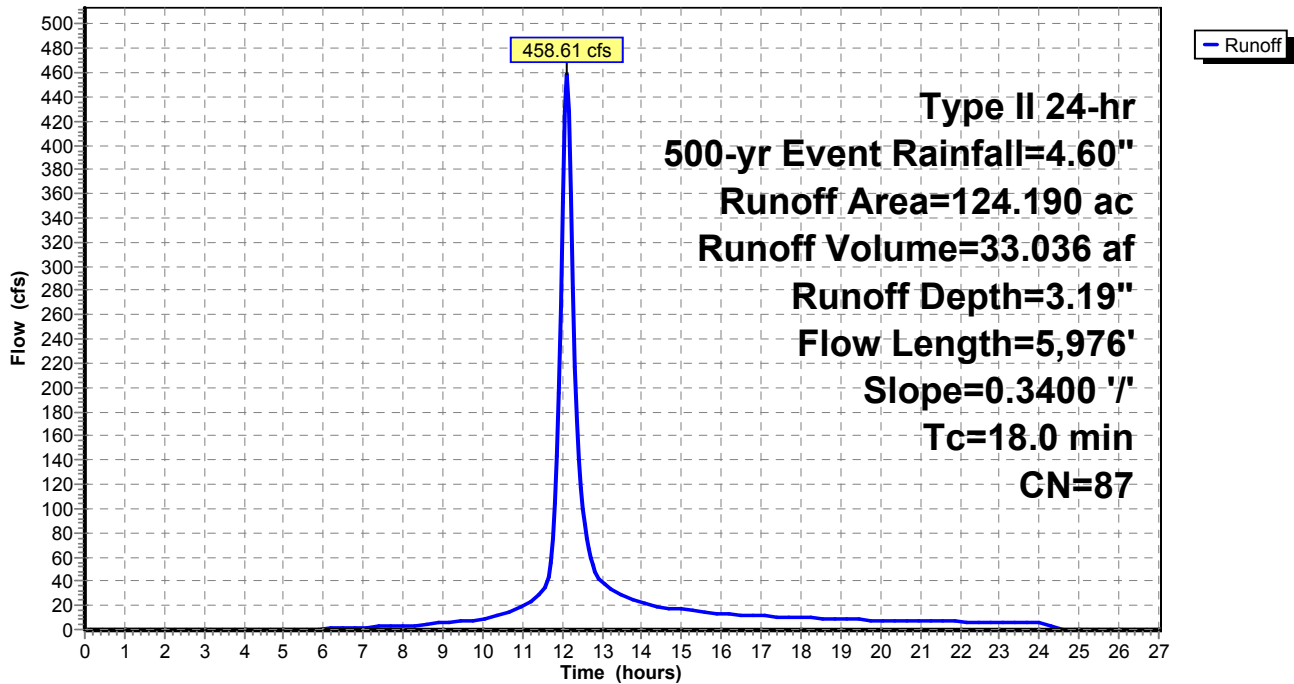
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 6: WS 6**

Runoff = 1,038.74 cfs @ 12.17 hrs, Volume= 88.109 af, Depth= 3.19"

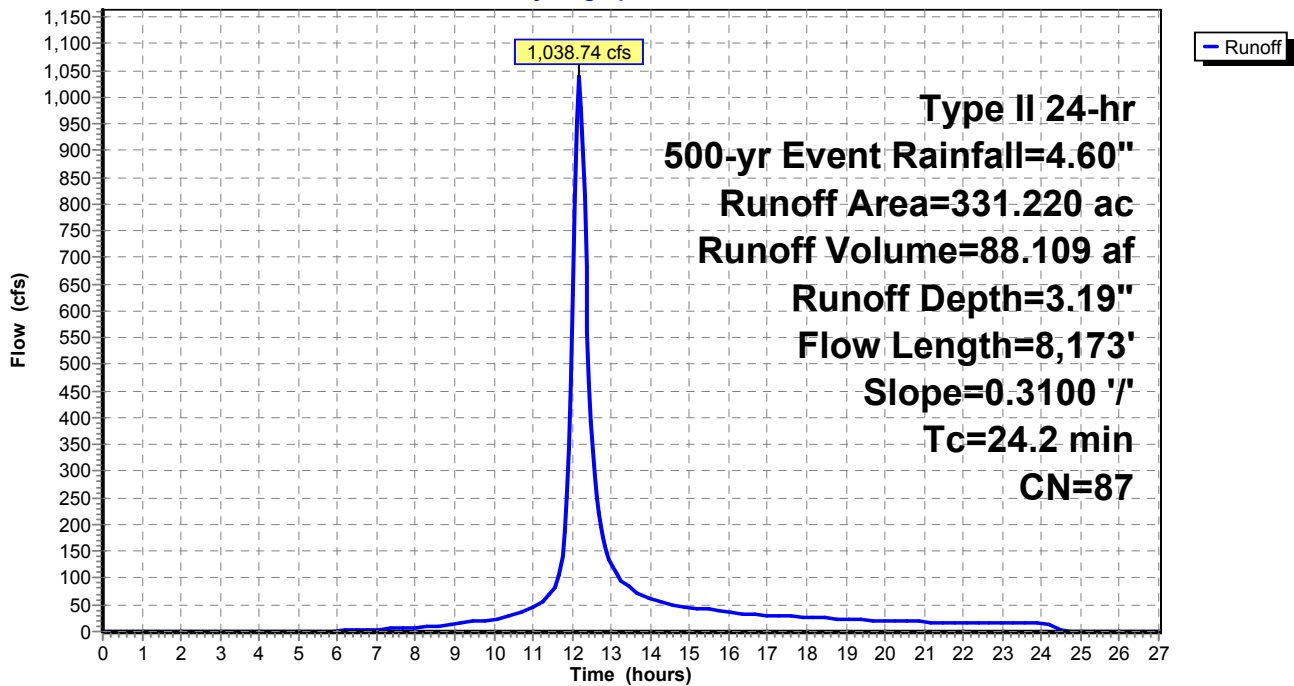
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 7: WS 7**

Runoff = 550.14 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

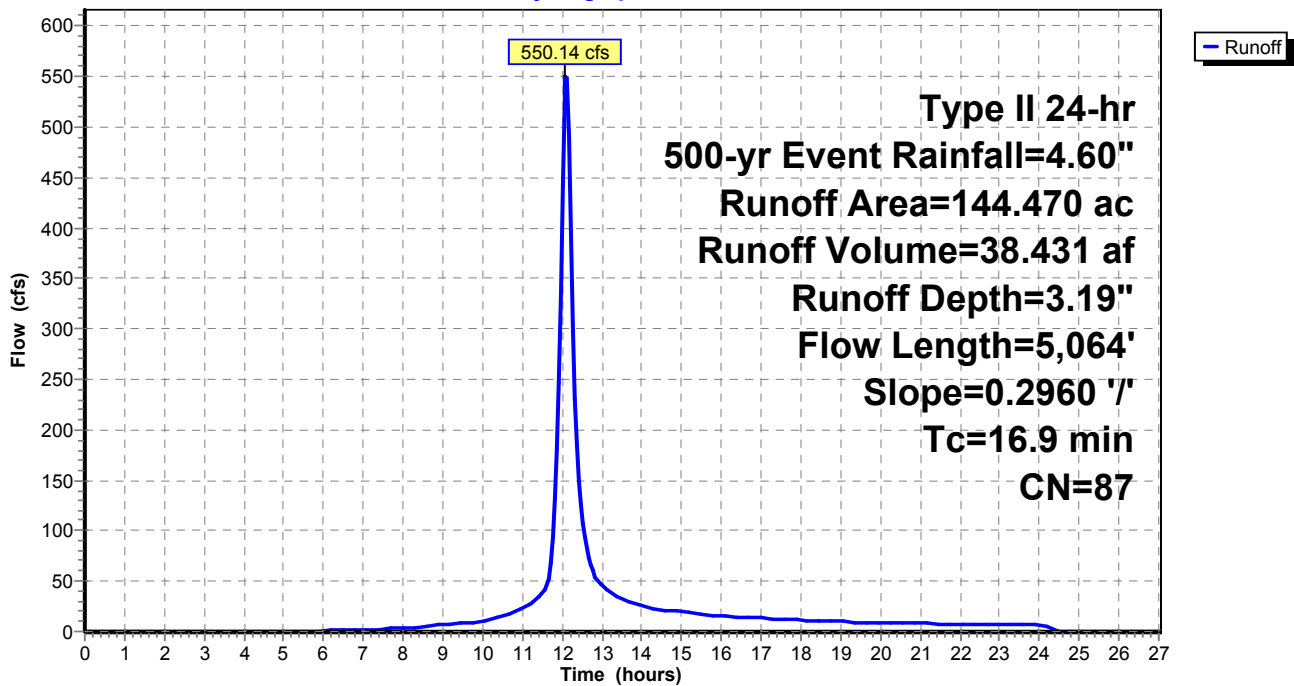
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 8: WS 8**

Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

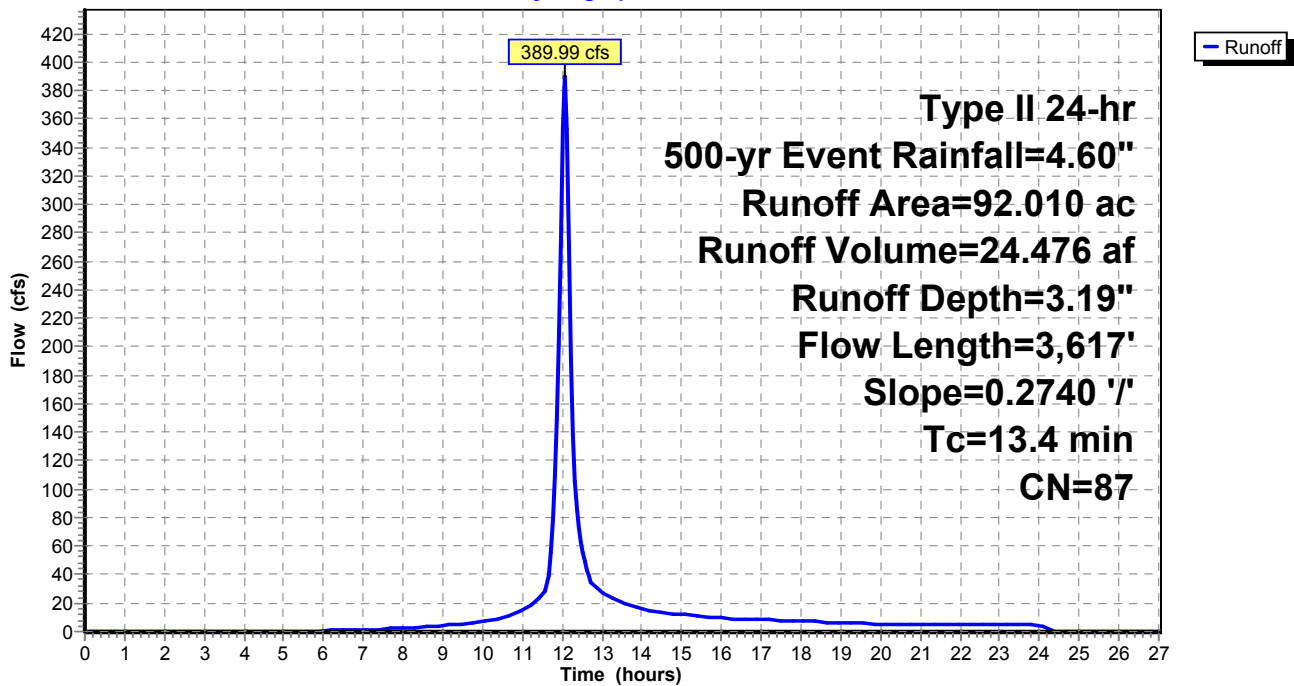
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph





**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 9: WS 9**

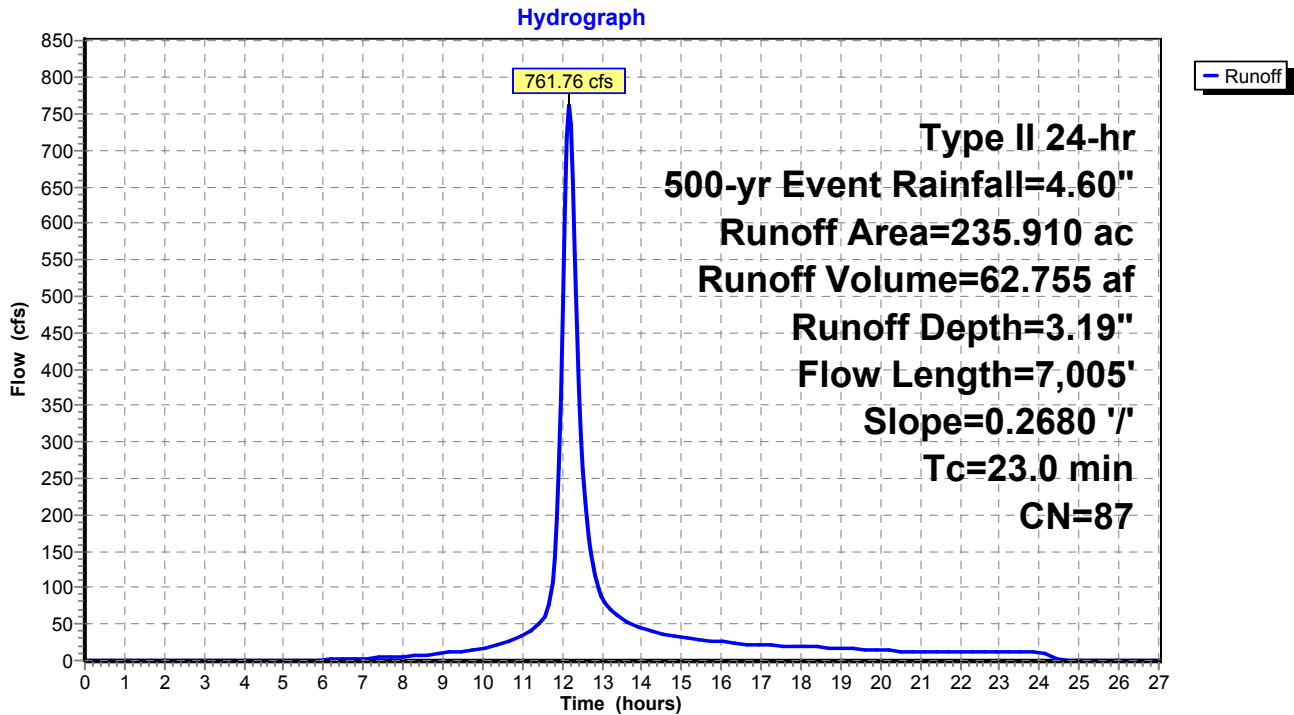
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

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**



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 10: WS 10**

Runoff = 891.85 cfs @ 12.25 hrs, Volume= 87.894 af, Depth= 3.19"

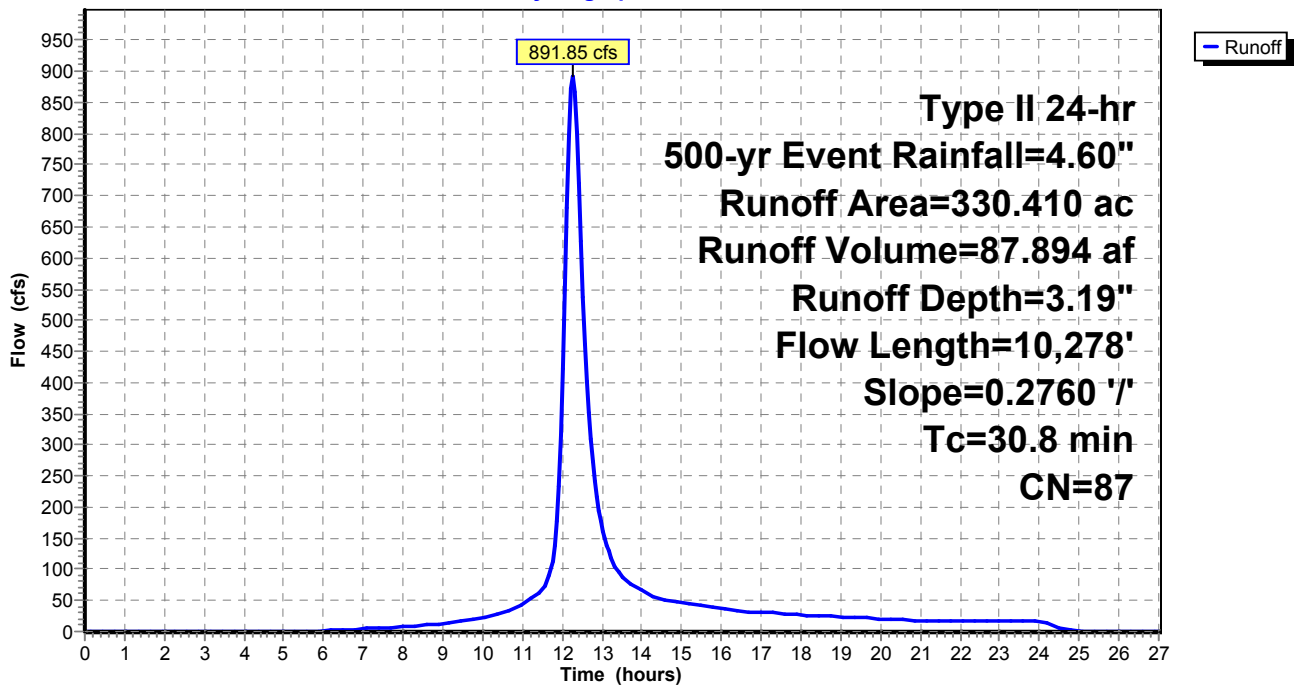
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 11: WS 11**

Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

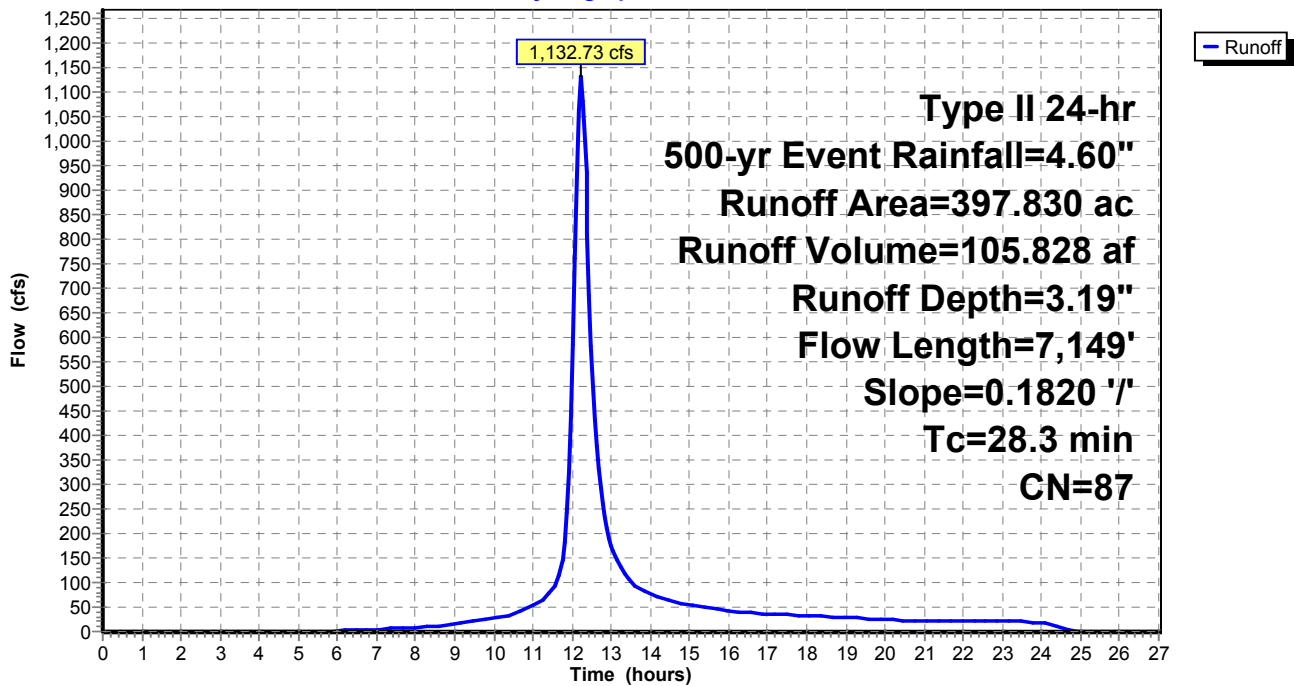
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 12: WS 12**

Runoff = 789.72 cfs @ 12.12 hrs, Volume= 60.497 af, Depth= 3.19"

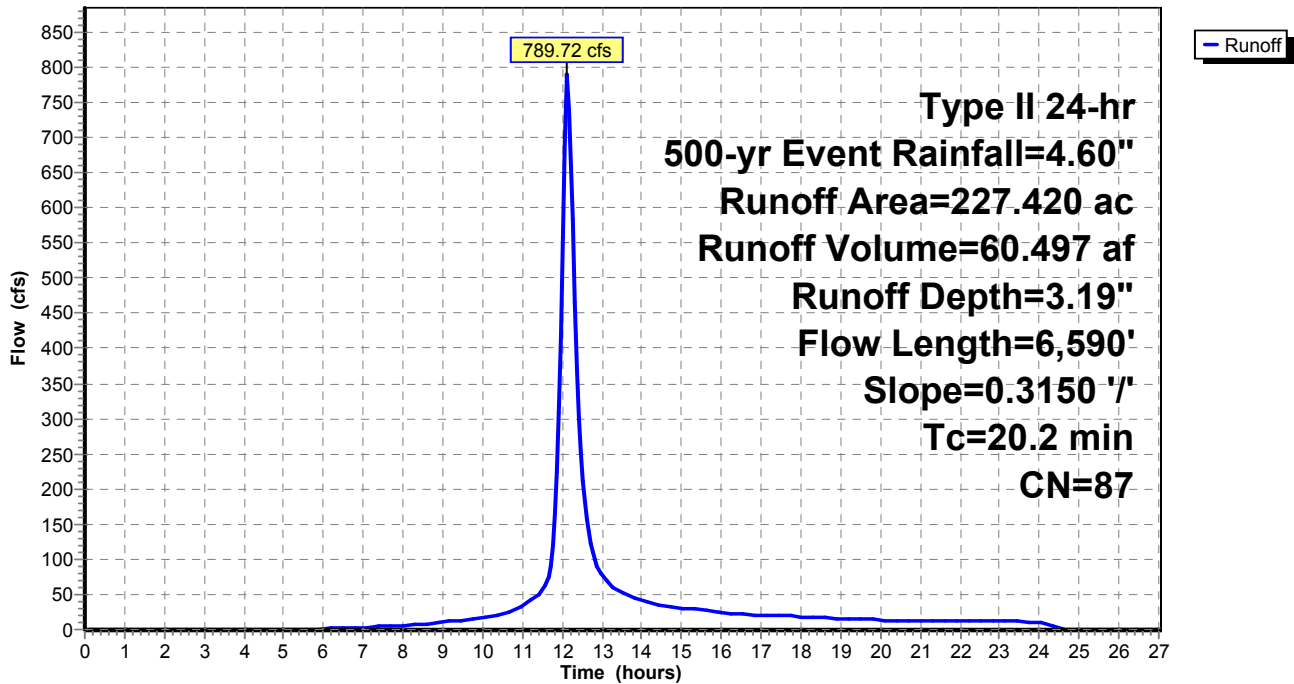
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 13: WS 13**

Runoff = 871.93 cfs @ 12.16 hrs, Volume= 73.289 af, Depth= 3.19"

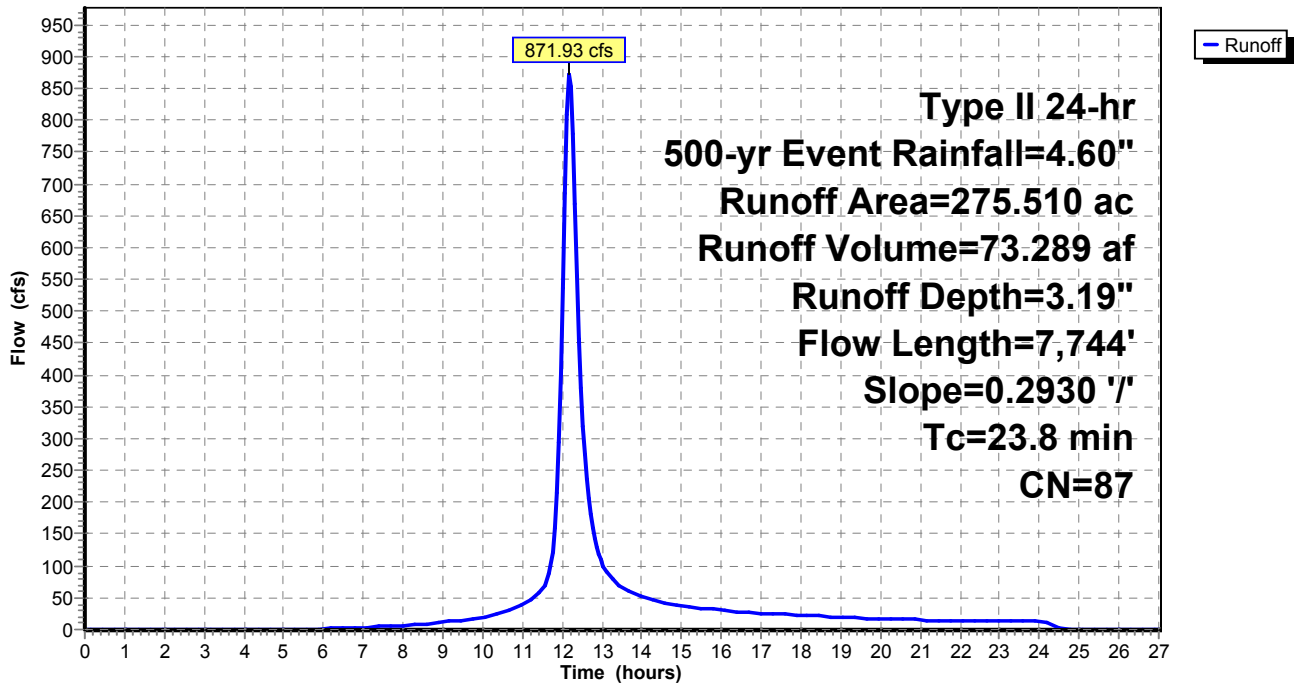
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Existing Watersheds (Post-Quintana)**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 14: WS 14**

Runoff = 326.19 cfs @ 12.06 hrs, Volume= 21.273 af, Depth= 3.19"

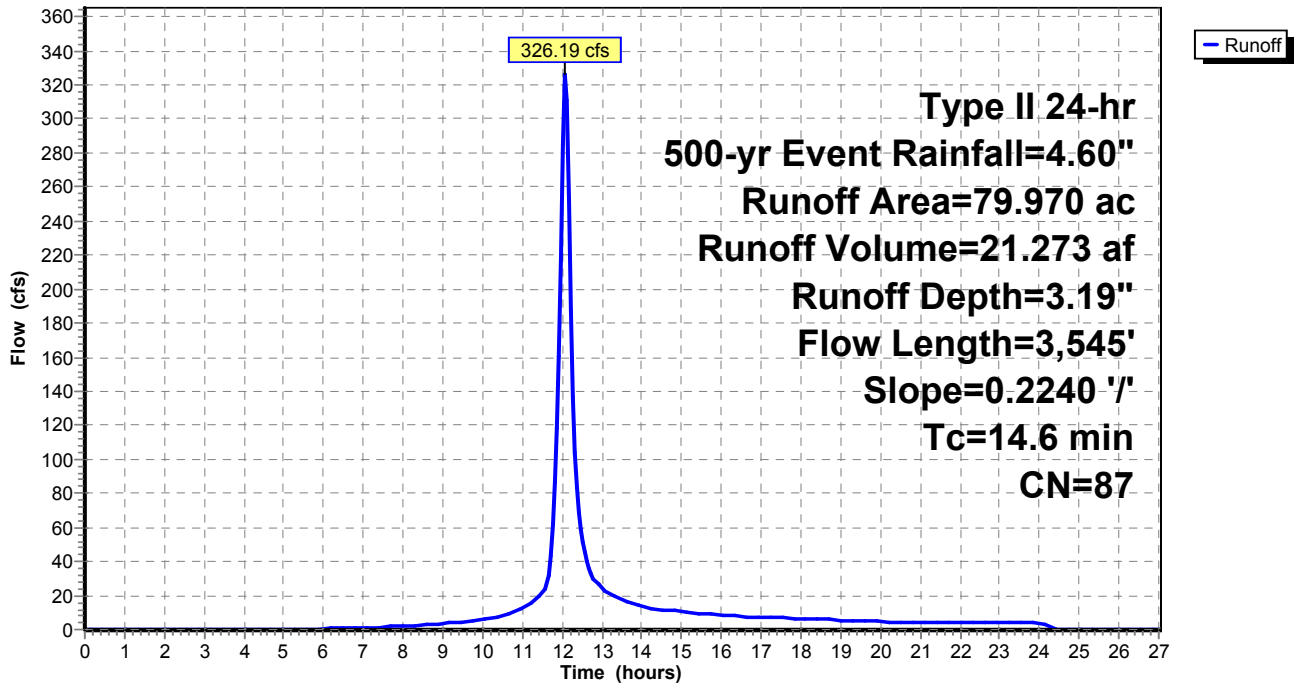
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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

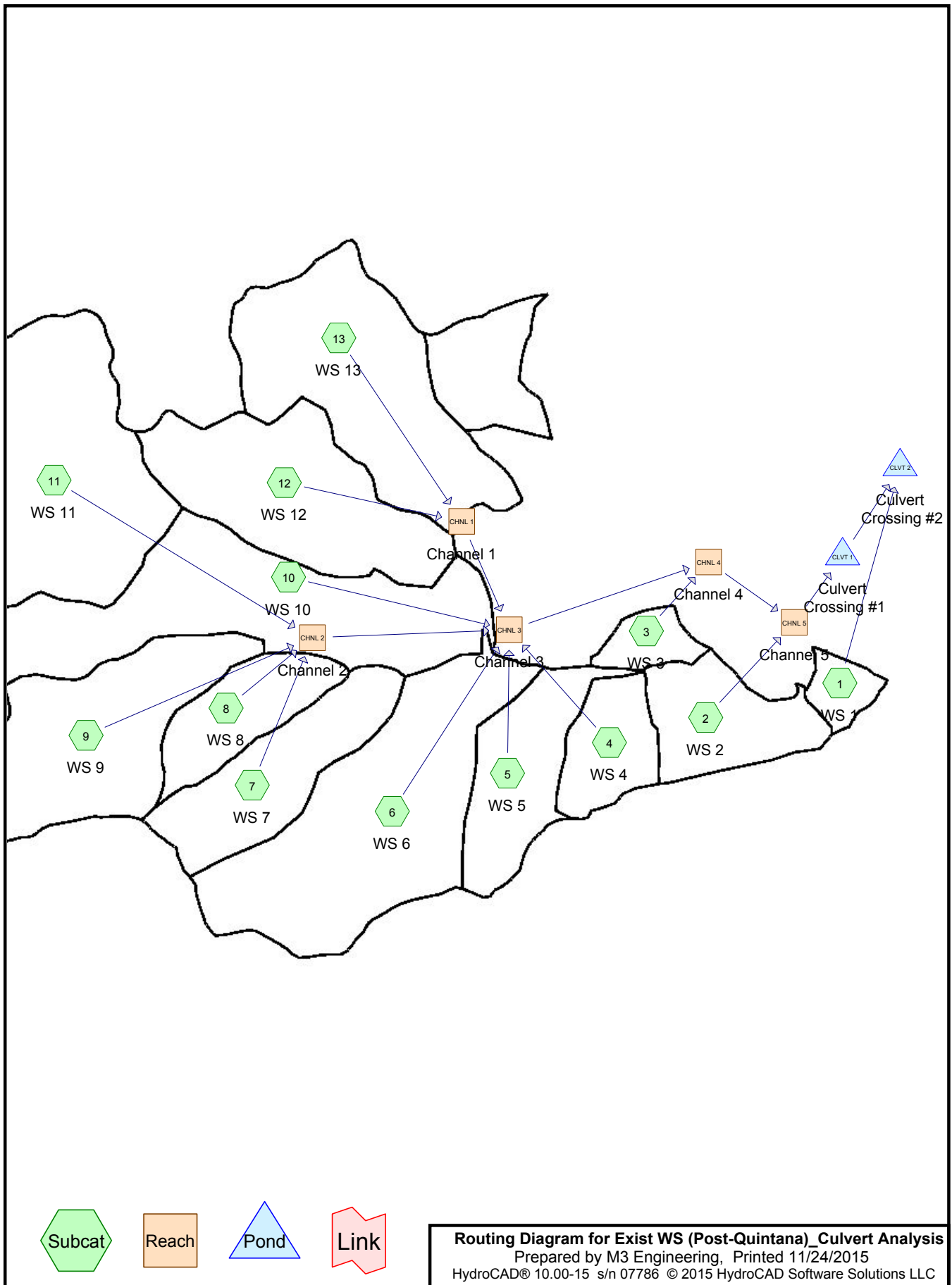
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	3,545	0.2240	4.05		Lag/CN Method,

**Subcatchment 14: WS 14**

Hydrograph



APPENDIX D





**Exist WS (Post-Quintana)\_Culvert Analysis**

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**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)
<b>2,403.760</b>	<b>87</b>	<b>TOTAL AREA</b>

**Exist WS (Post-Quintana)\_Culvert Analysis**

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**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	
<b>2,403.760</b>		<b>TOTAL AREA</b>

**Exist WS (Post-Quintana)\_ Culvert Analysis**

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**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
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2,403.760</b>	<b>0.000</b>	<b>2,403.760</b>	<b>TOTAL AREA</b>	

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Reach CHNL 1: Channel 1</b>	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
<b>Reach CHNL 2: Channel 2</b>	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
<b>Reach CHNL 3: Channel 3</b>	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

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 100-yr Event Rainfall=3.70"*

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**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**

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 1: WS 1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 117.20 cfs @ 11.95 hrs, Volume= 5.555 af, Depth= 2.36"

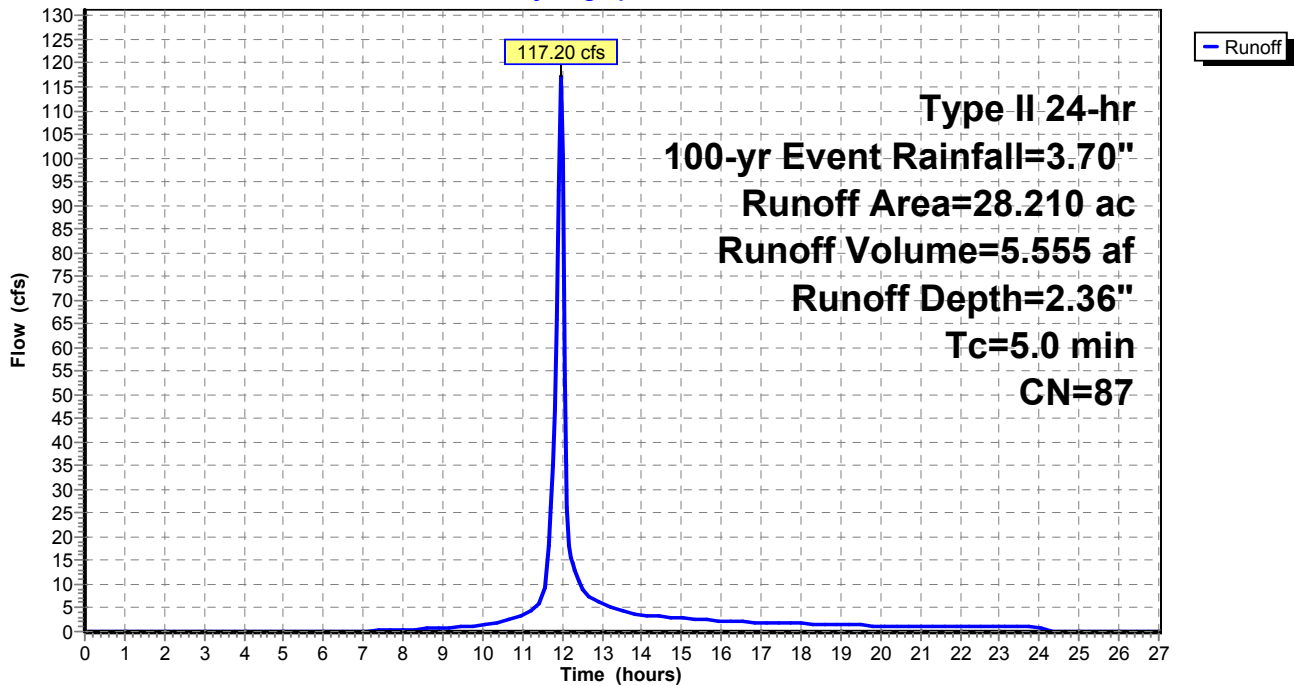
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 2: WS 2**

Runoff = 363.66 cfs @ 12.03 hrs, Volume= 20.985 af, Depth= 2.36"

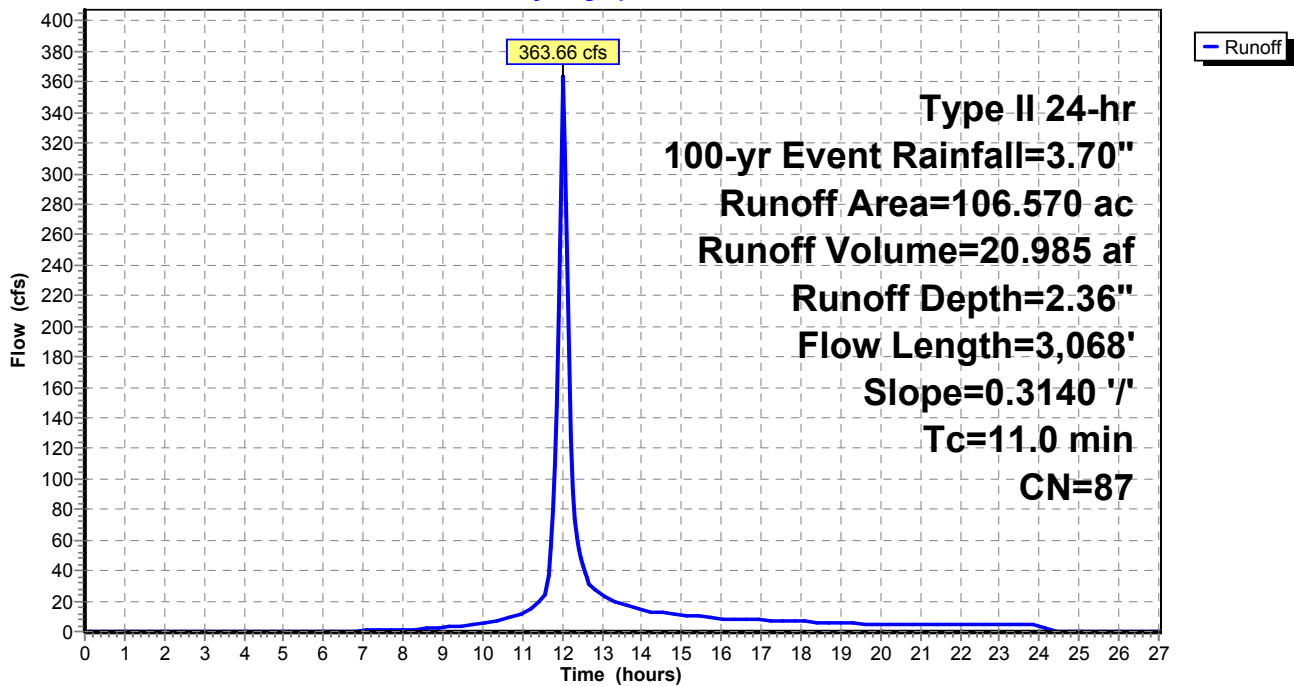
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 3: WS 3**

Runoff = 129.54 cfs @ 12.00 hrs, Volume= 6.890 af, Depth= 2.36"

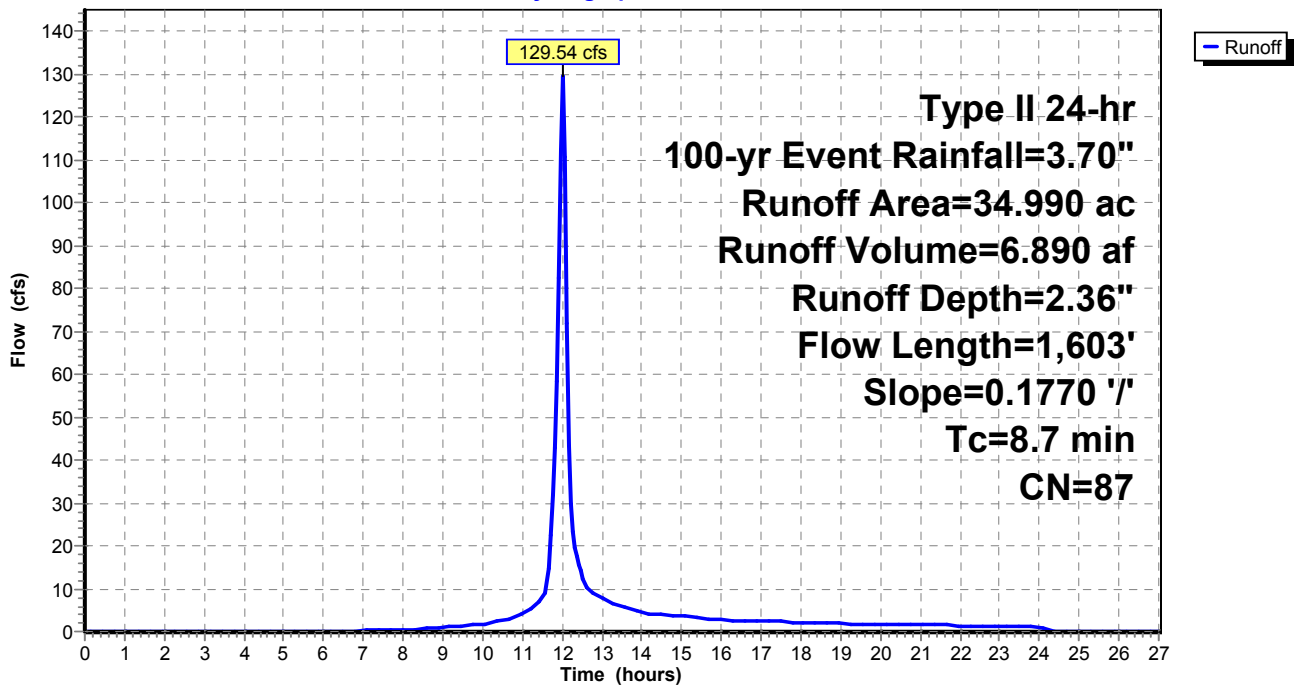
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 4: WS 4**

Runoff = 259.92 cfs @ 12.02 hrs, Volume= 14.773 af, Depth= 2.36"

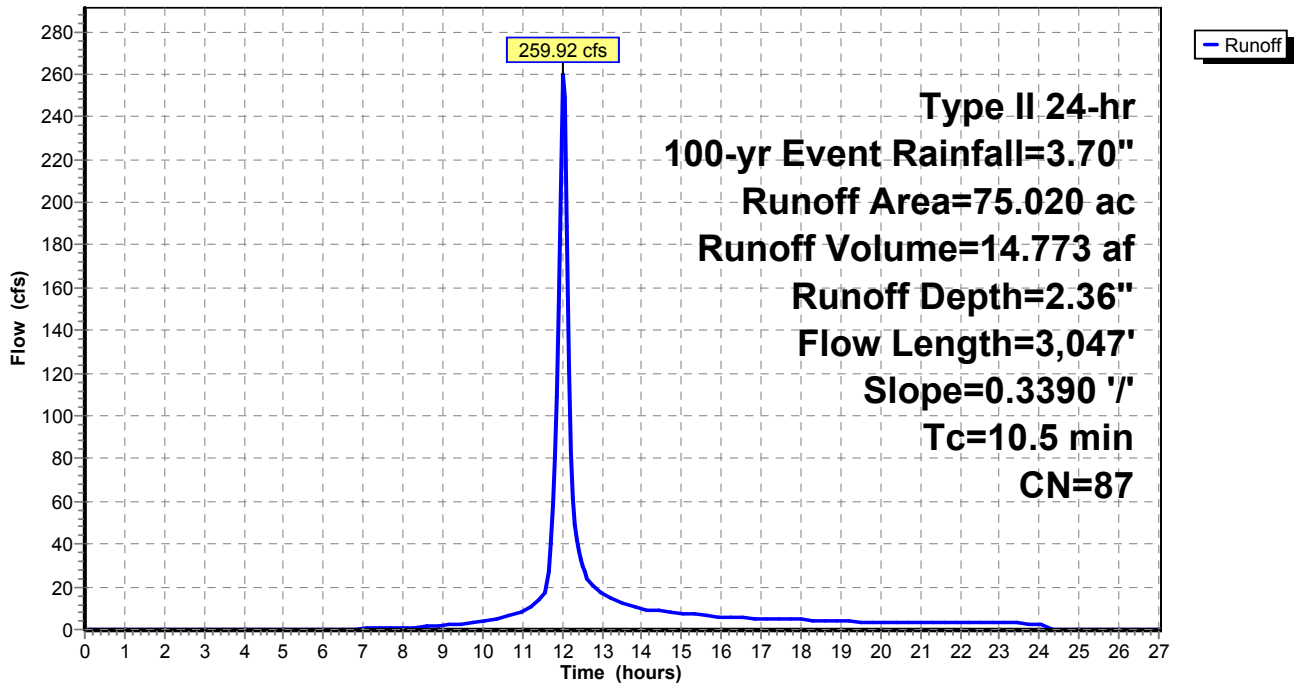
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 5: WS 5**

Runoff = 342.49 cfs @ 12.10 hrs, Volume= 24.455 af, Depth= 2.36"

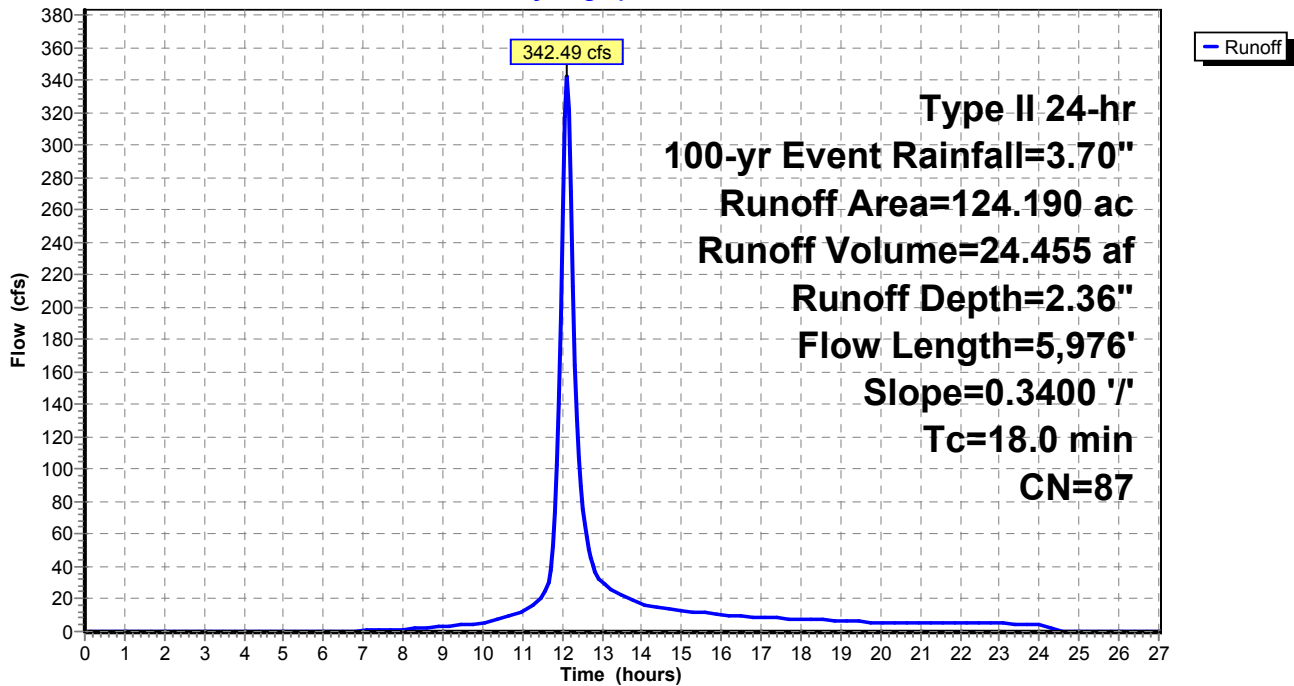
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 6: WS 6**

Runoff = 774.13 cfs @ 12.17 hrs, Volume= 65.223 af, Depth= 2.36"

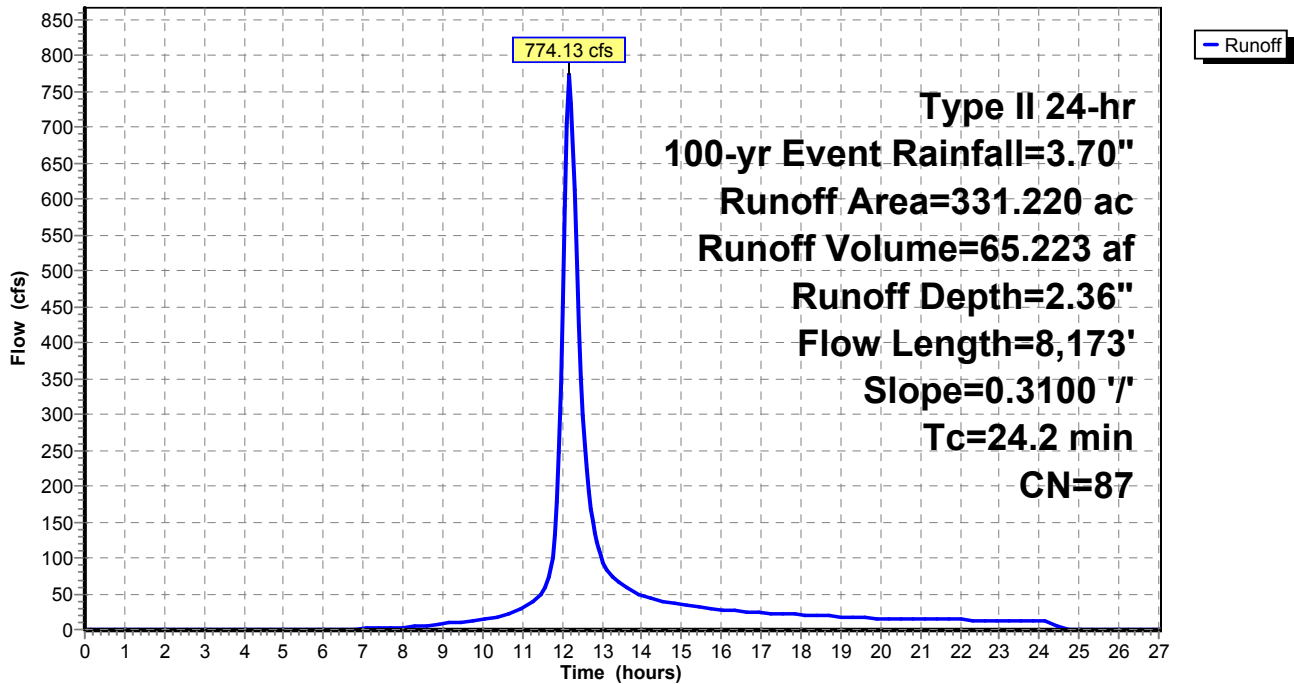
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 7: WS 7**

Runoff = 411.06 cfs @ 12.09 hrs, Volume= 28.449 af, Depth= 2.36"

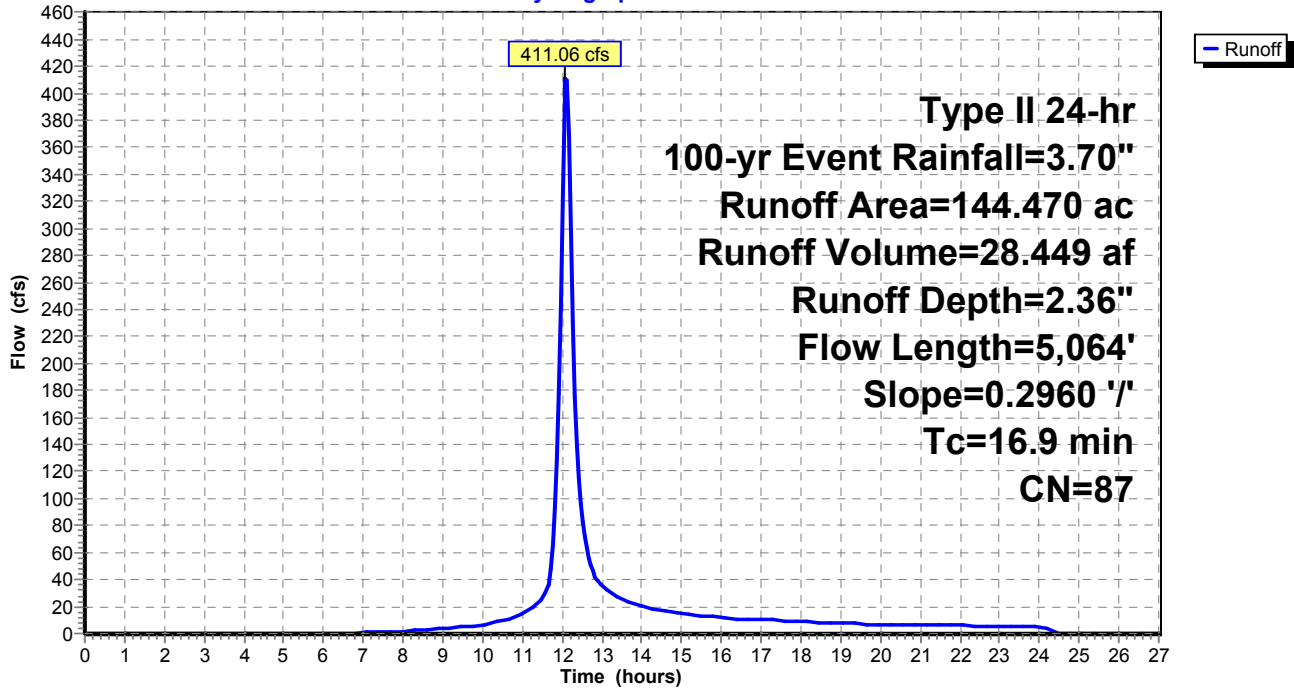
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 8: WS 8**

Runoff = 291.83 cfs @ 12.05 hrs, Volume= 18.118 af, Depth= 2.36"

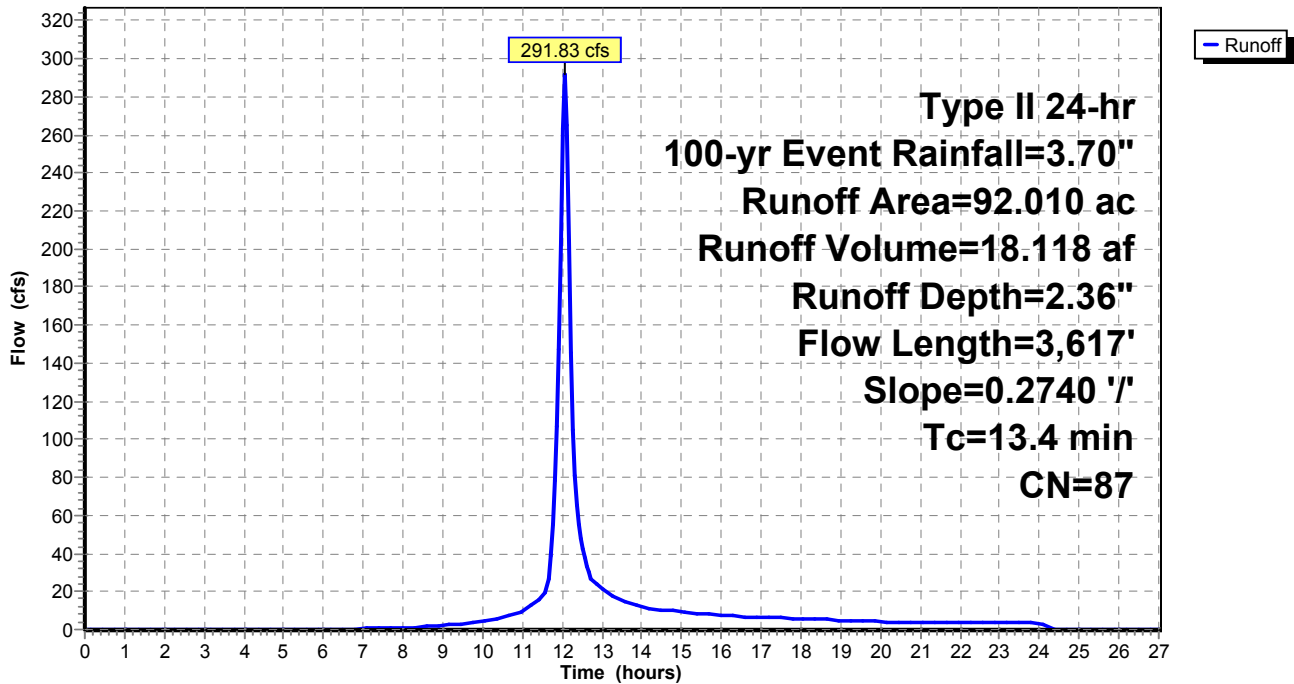
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 9: WS 9**

Runoff = 567.91 cfs @ 12.16 hrs, Volume= 46.455 af, Depth= 2.36"

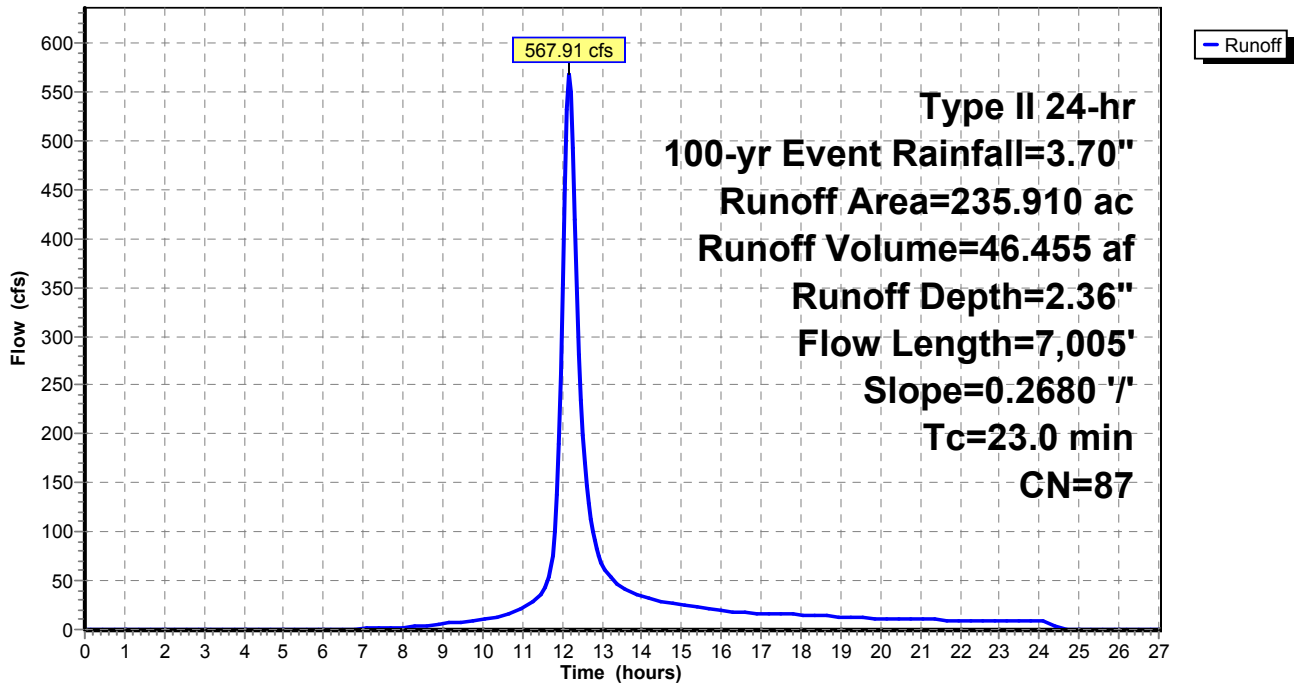
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 10: WS 10**

Runoff = 663.73 cfs @ 12.25 hrs, Volume= 65.063 af, Depth= 2.36"

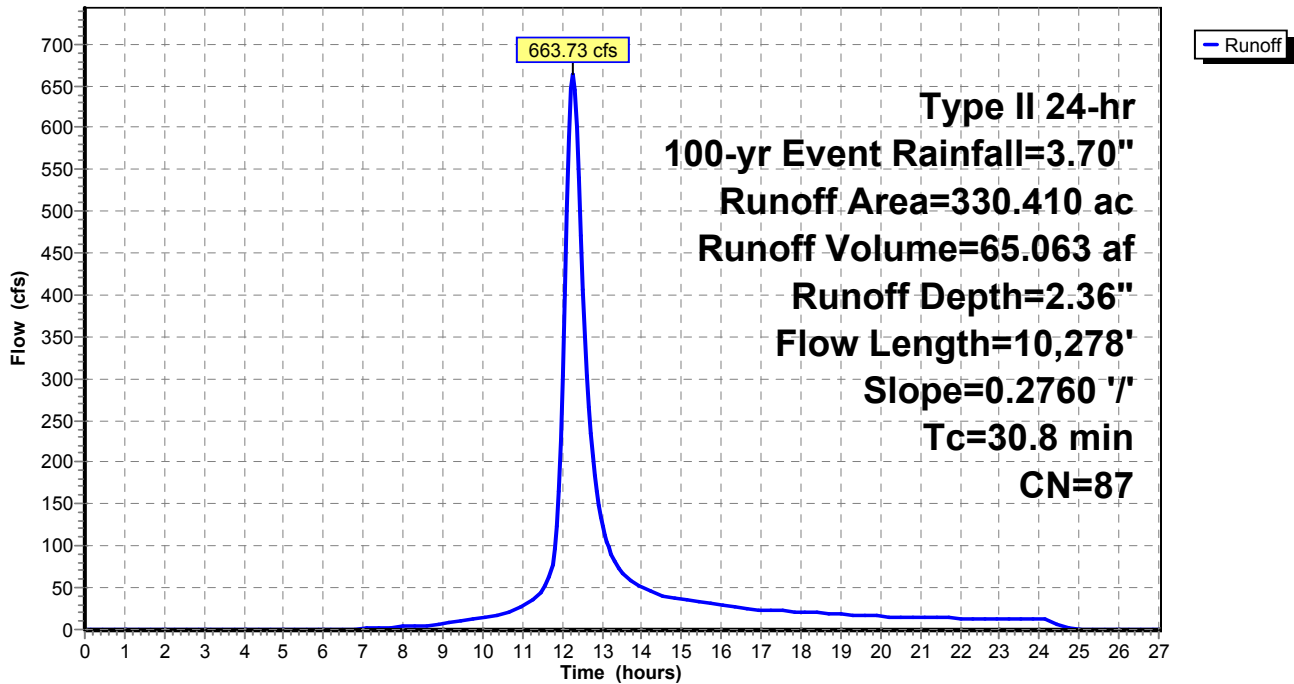
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 11: WS 11**

Runoff = 843.39 cfs @ 12.22 hrs, Volume= 78.339 af, Depth= 2.36"

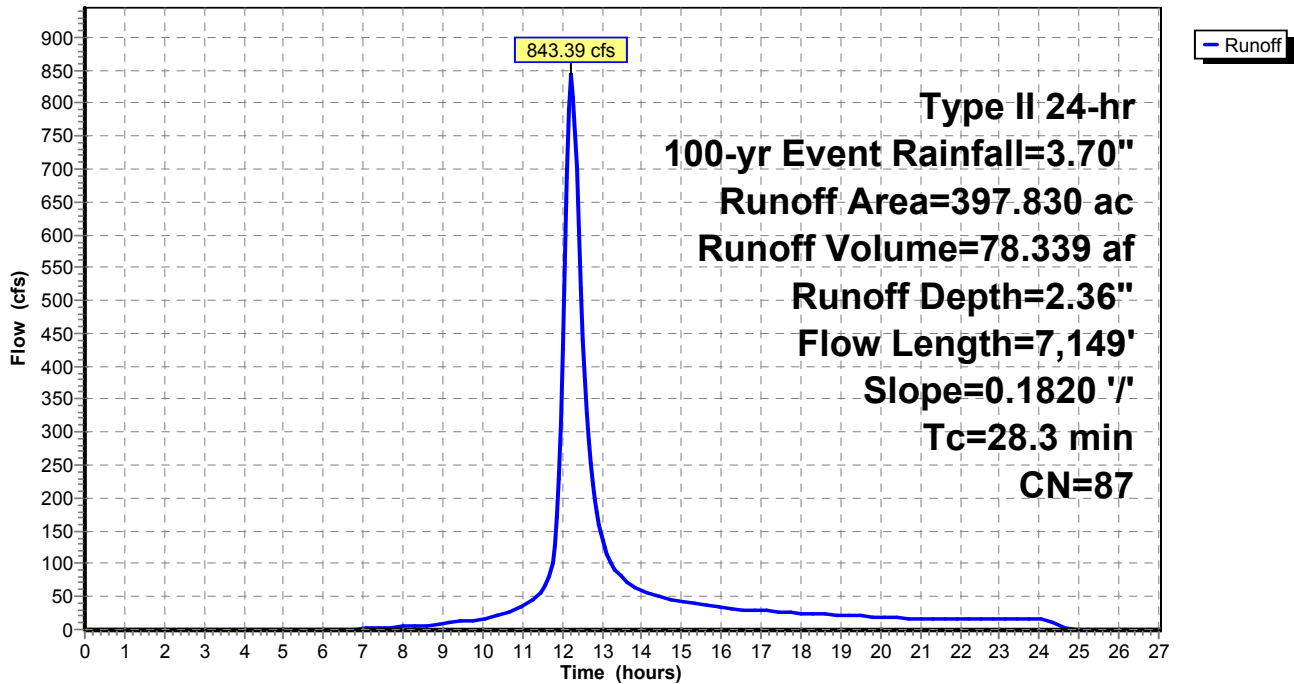
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph





**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 12: WS 12**

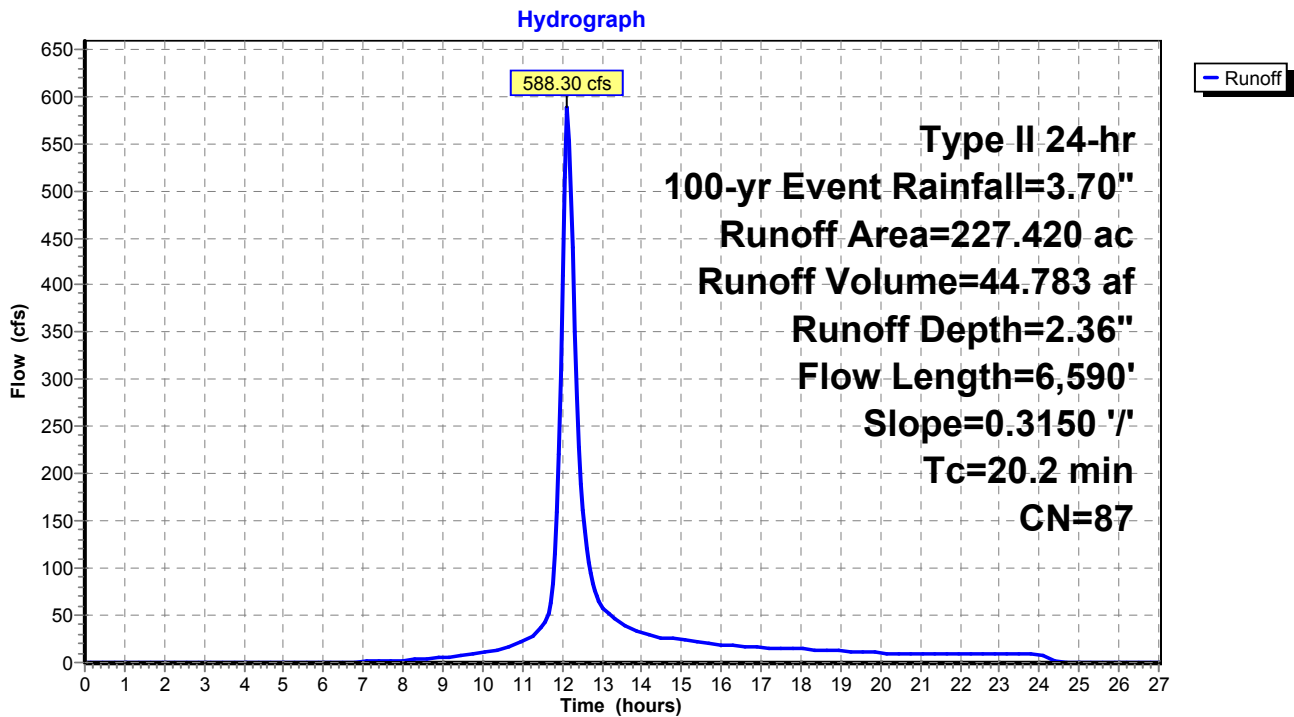
Runoff = 588.30 cfs @ 12.13 hrs, Volume= 44.783 af, Depth= 2.36"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Subcatchment 13: WS 13**

Runoff = 649.87 cfs @ 12.17 hrs, Volume= 54.252 af, Depth= 2.36"

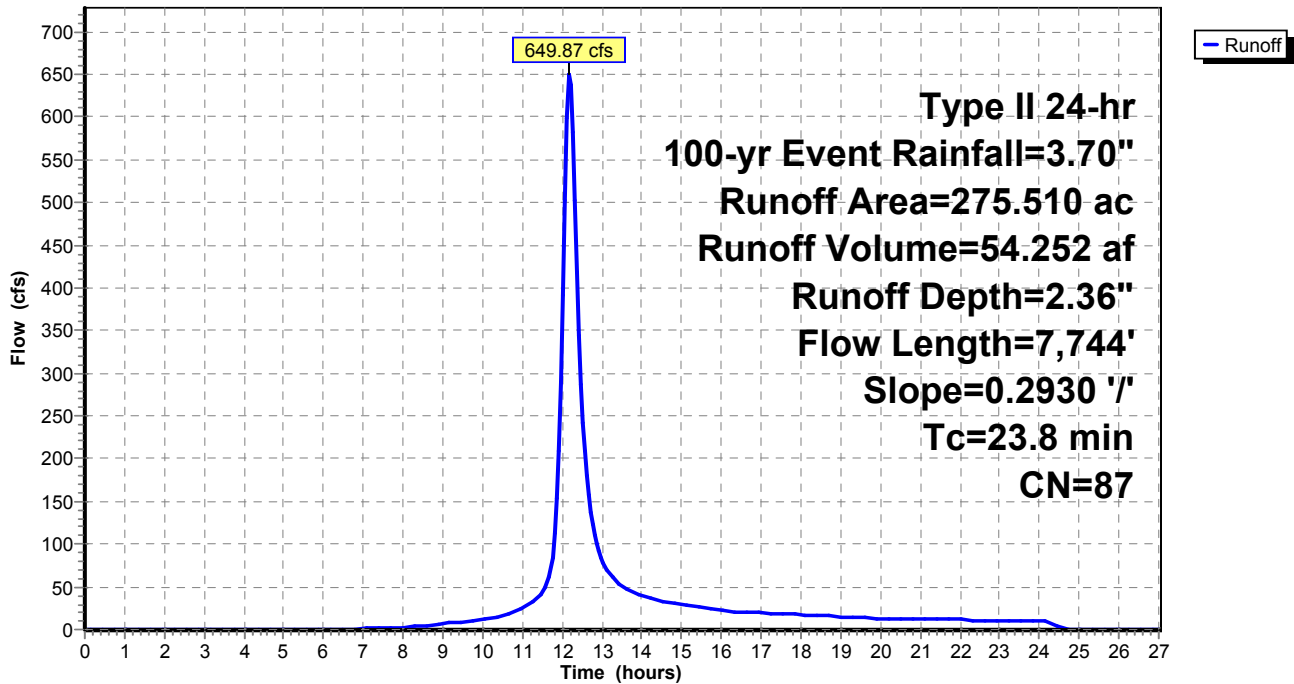
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Event Rainfall=3.70"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**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

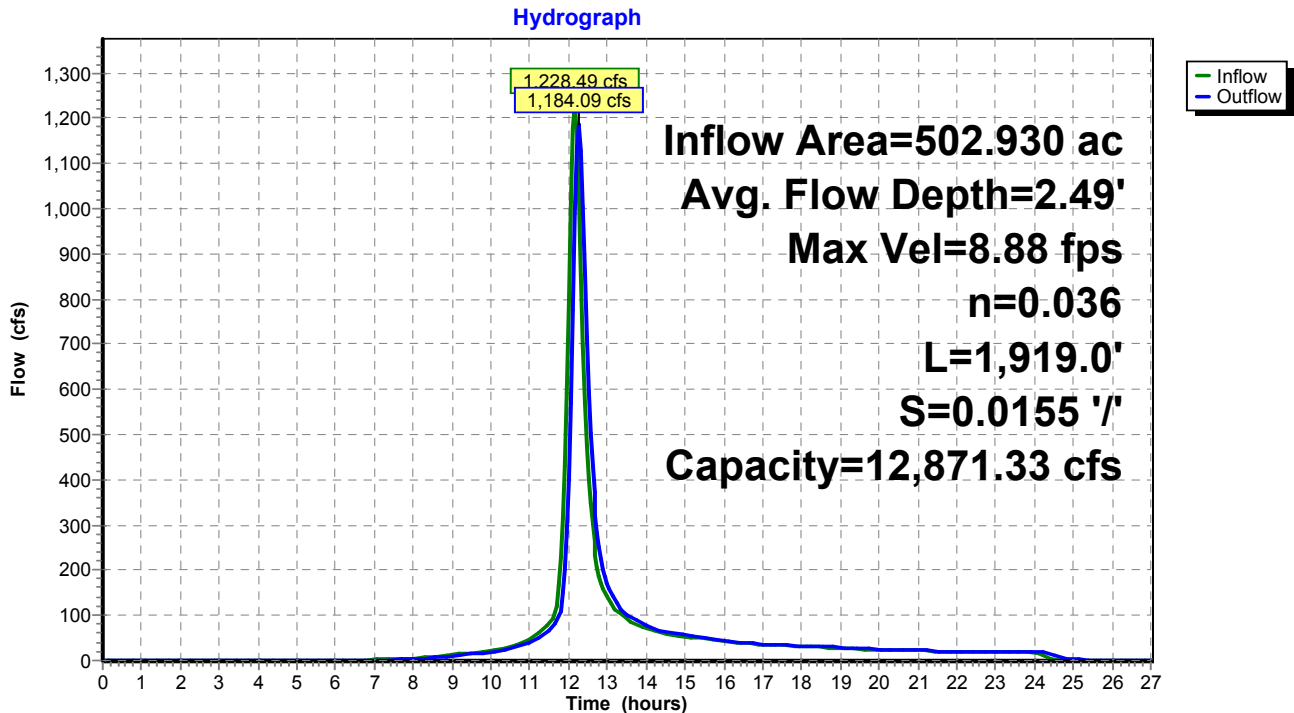
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.88 fps, Min. Travel Time= 3.6 min  
 Avg. Velocity = 2.21 fps, Avg. Travel Time= 14.4 min

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**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

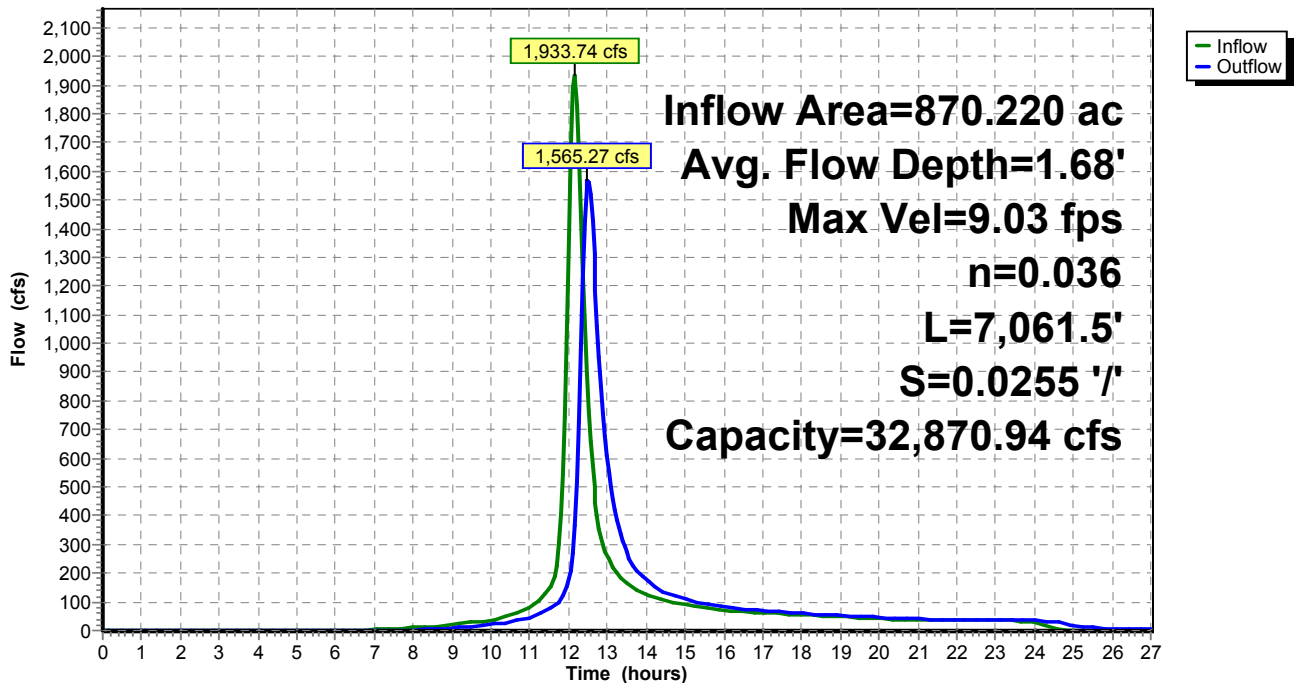
Peak Storage= 1,228,925 cf @ 12.27 hrs  
 Average Depth at Peak Storage= 1.68'  
 Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 100-yr Event Rainfall=3.70"*

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**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'



### Exist WS (Post-Quintana)\_Culvert Analysis

Type II 24-hr 100-yr Event Rainfall=3.70"

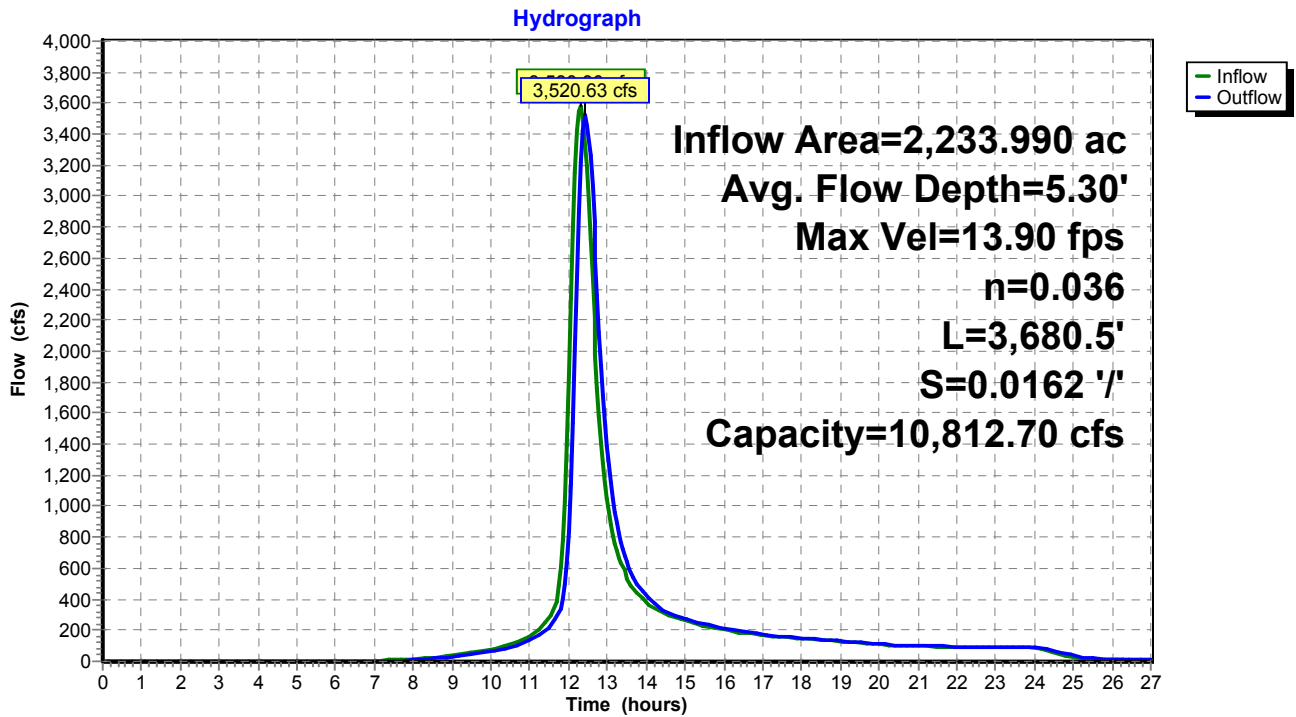
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### Reach CHNL 3: Channel 3



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**Summary for Reach CHNL 4: Channel 4**

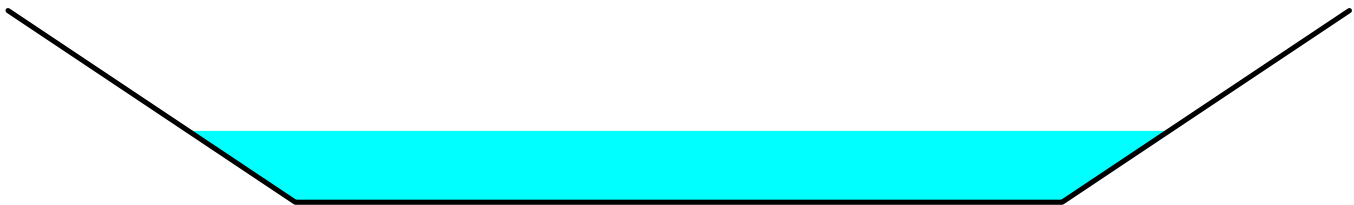
[61] Hint: Exceeded Reach CHNL 3 outlet invert by 3.72' @ 12.45 hrs

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

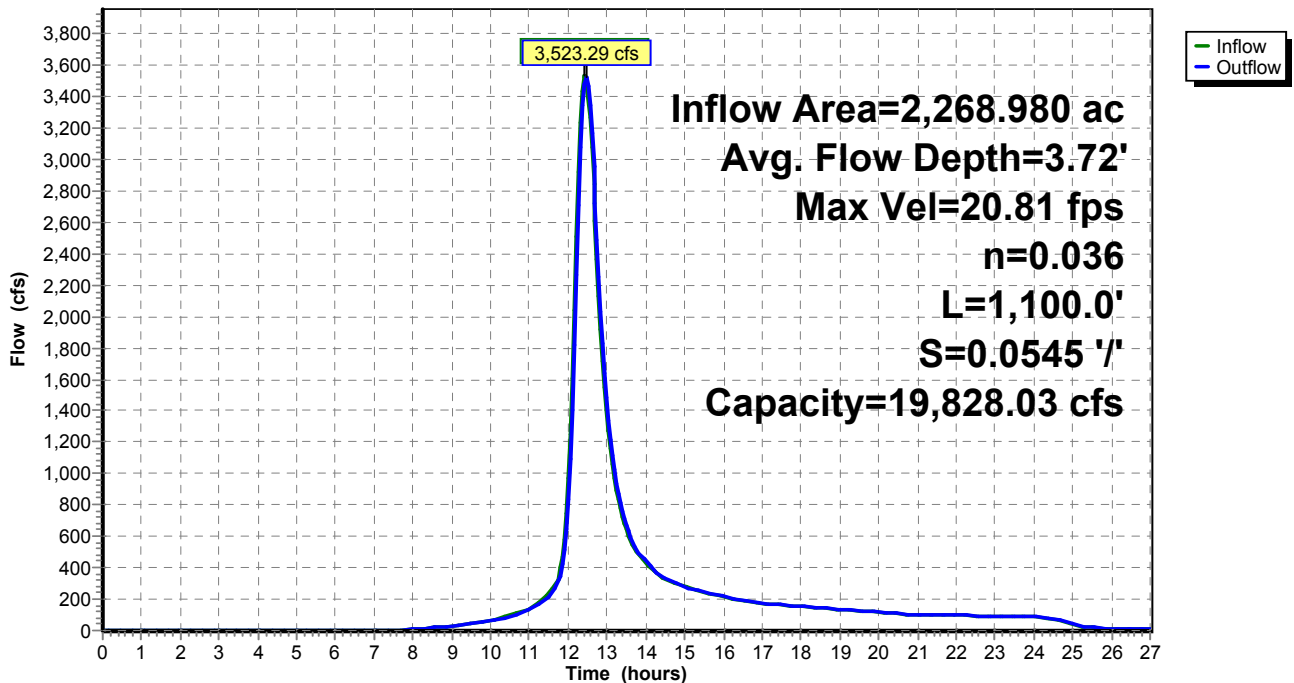
Peak Storage= 186,563 cf @ 12.43 hrs  
 Average Depth at Peak Storage= 3.72'  
 Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**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

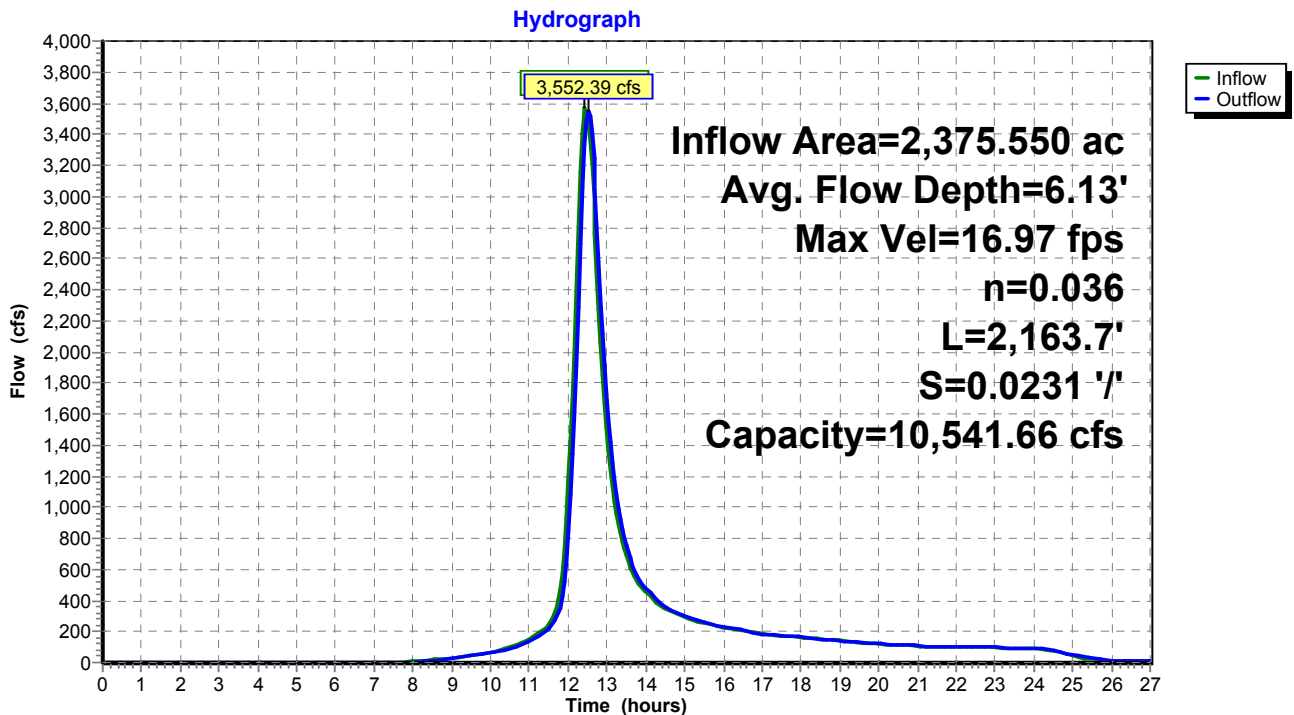
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 16.97 fps, Min. Travel Time= 2.1 min  
 Avg. Velocity = 5.55 fps, Avg. Travel Time= 6.5 min

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**





**Exist WS (Post-Quintana)\_ Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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**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	<b>Culvert Crossing #1</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 100-yr Event Rainfall=3.70"*

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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

**Exist WS (Post-Quintana)\_ Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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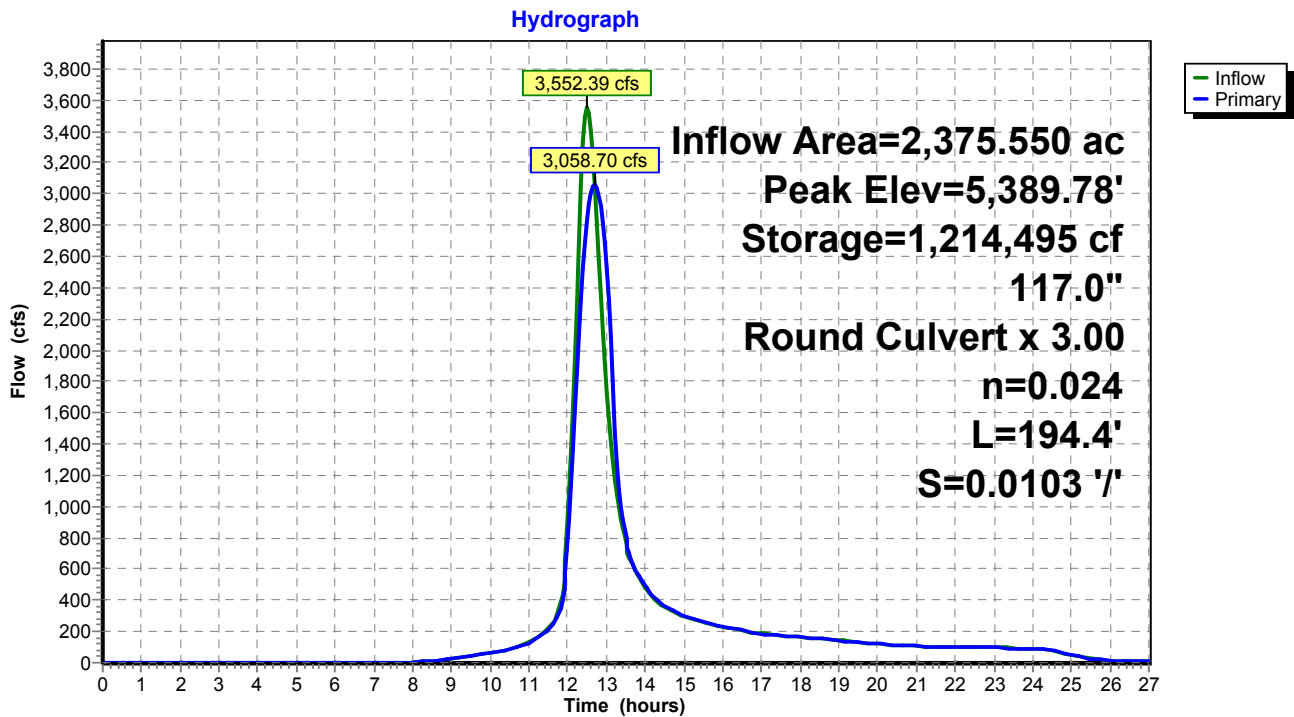
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Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	<b>117.0" Round Culvert X 3.00</b> L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/ Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

**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**



Legend:  
 - Inflow (Green line)  
 - Primary (Blue line)

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**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	<b>Existing Pond</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 100-yr Event Rainfall=3.70"*

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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

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 100-yr Event Rainfall=3.70"

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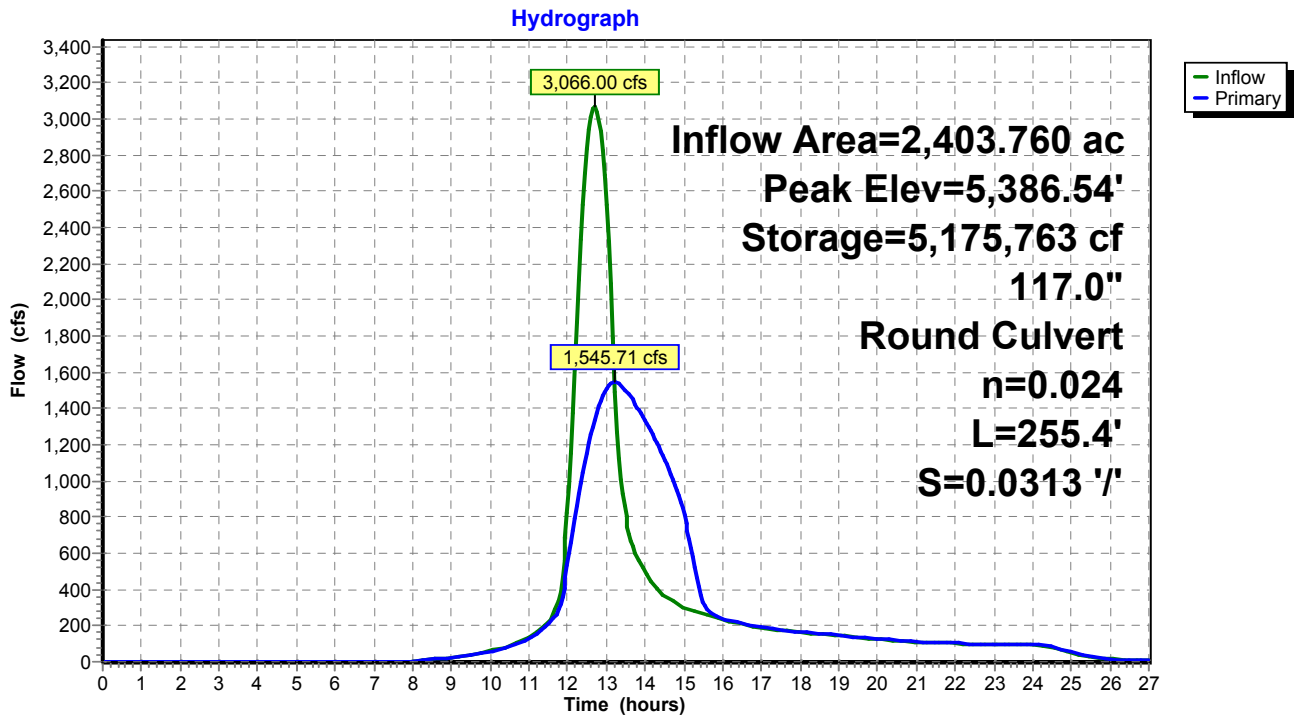
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5,402.00      9,814,540  
 5,403.00      10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	<b>117.0" Round Culvert</b> 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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Reach CHNL 1: Channel 1</b>	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
<b>Reach CHNL 2: Channel 2</b>	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
<b>Reach CHNL 3: Channel 3</b>	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

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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**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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 1: WS 1**

[49] Hint:  $T_c < 2dt$  may require smaller dt

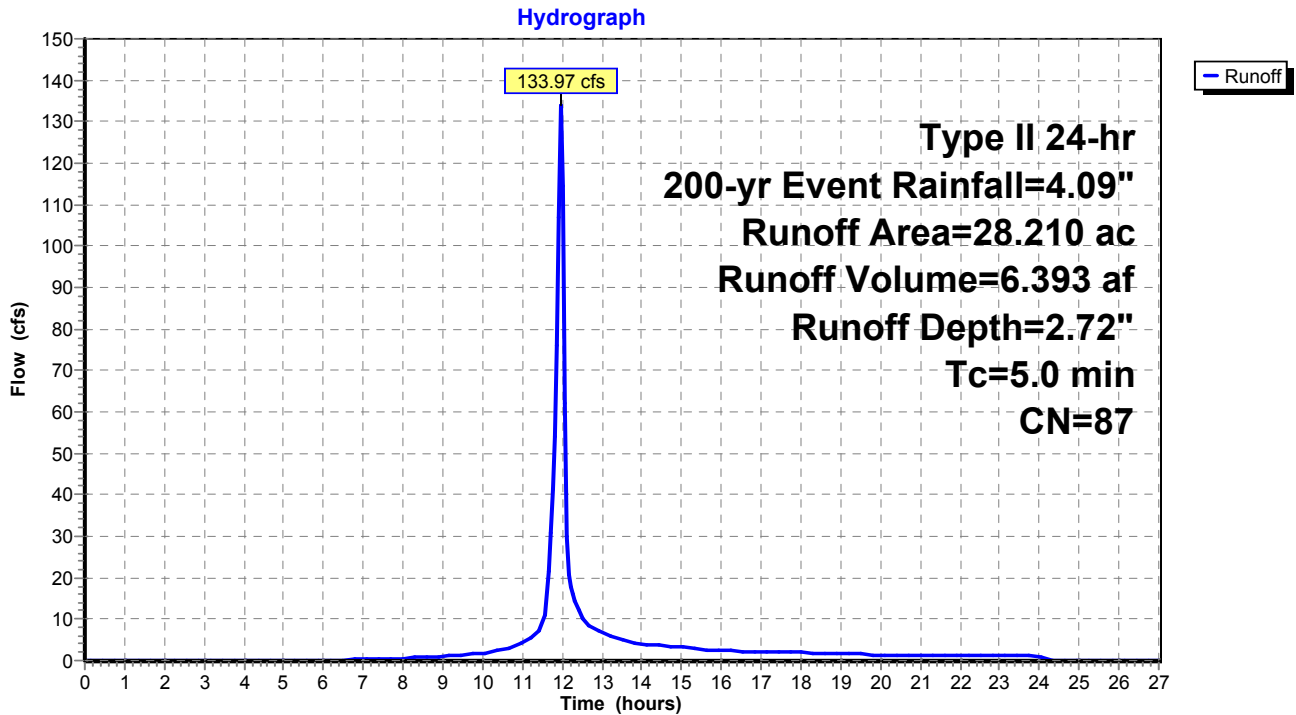
Runoff = 133.97 cfs @ 11.95 hrs, Volume= 6.393 af, Depth= 2.72"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 2: WS 2**

Runoff = 415.35 cfs @ 12.02 hrs, Volume= 24.150 af, Depth= 2.72"

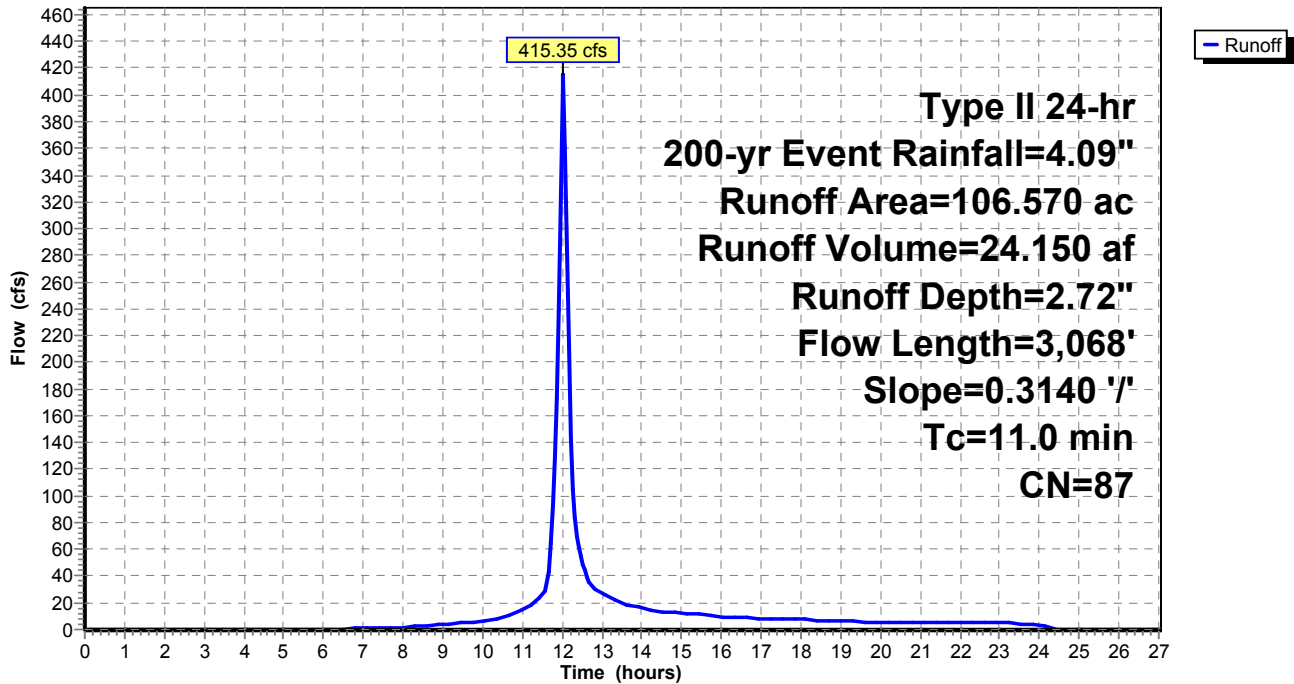
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 3: WS 3**

Runoff = 148.20 cfs @ 12.00 hrs, Volume= 7.929 af, Depth= 2.72"

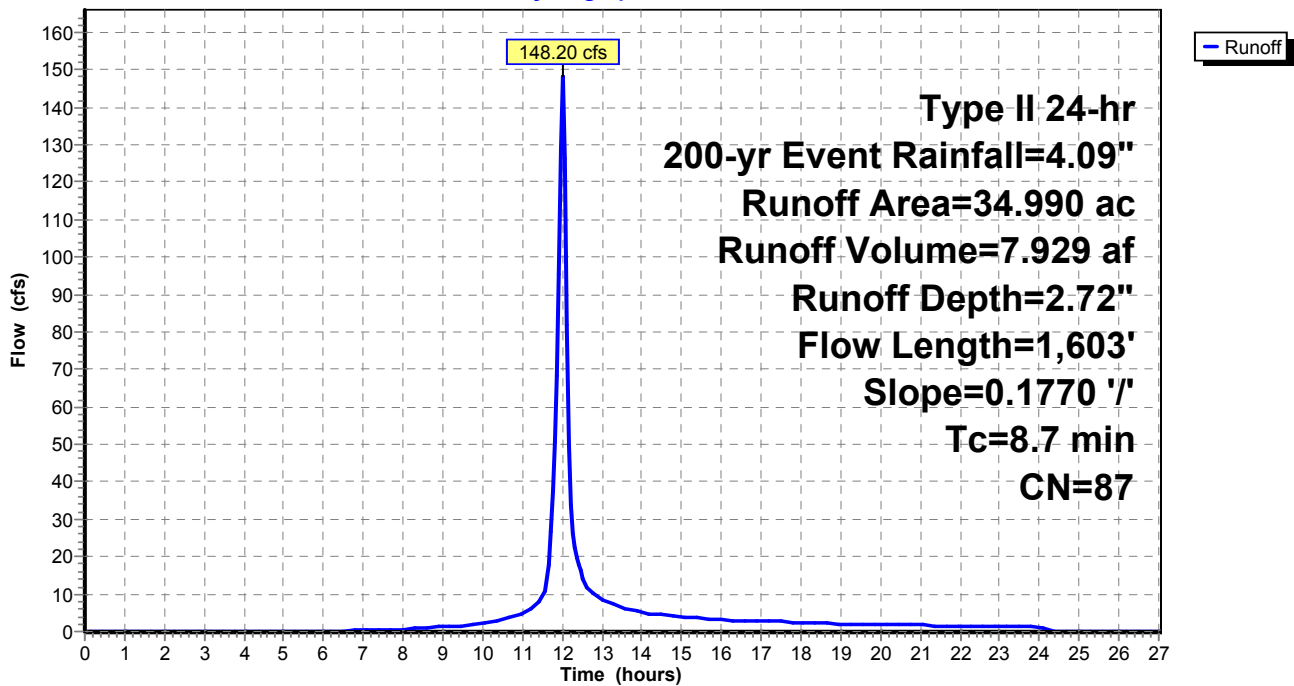
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 4: WS 4**

Runoff = 297.56 cfs @ 12.02 hrs, Volume= 17.000 af, Depth= 2.72"

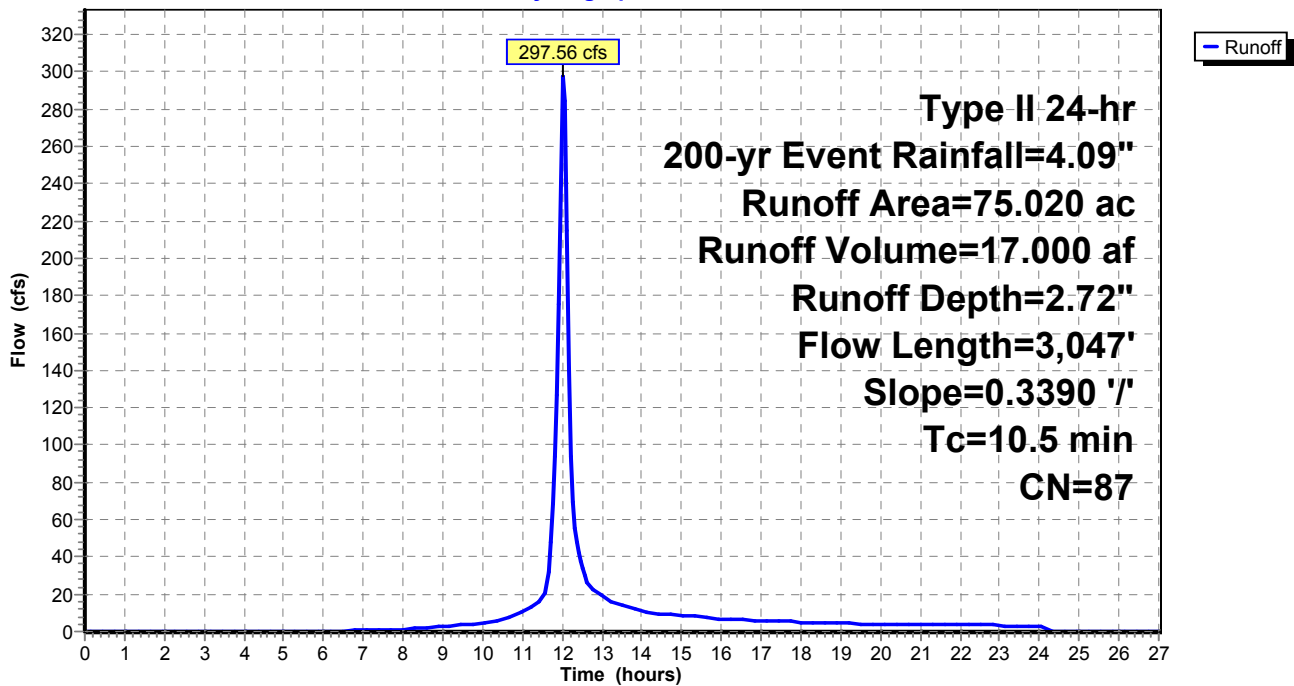
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 5: WS 5**

Runoff = 392.70 cfs @ 12.10 hrs, Volume= 28.143 af, Depth= 2.72"

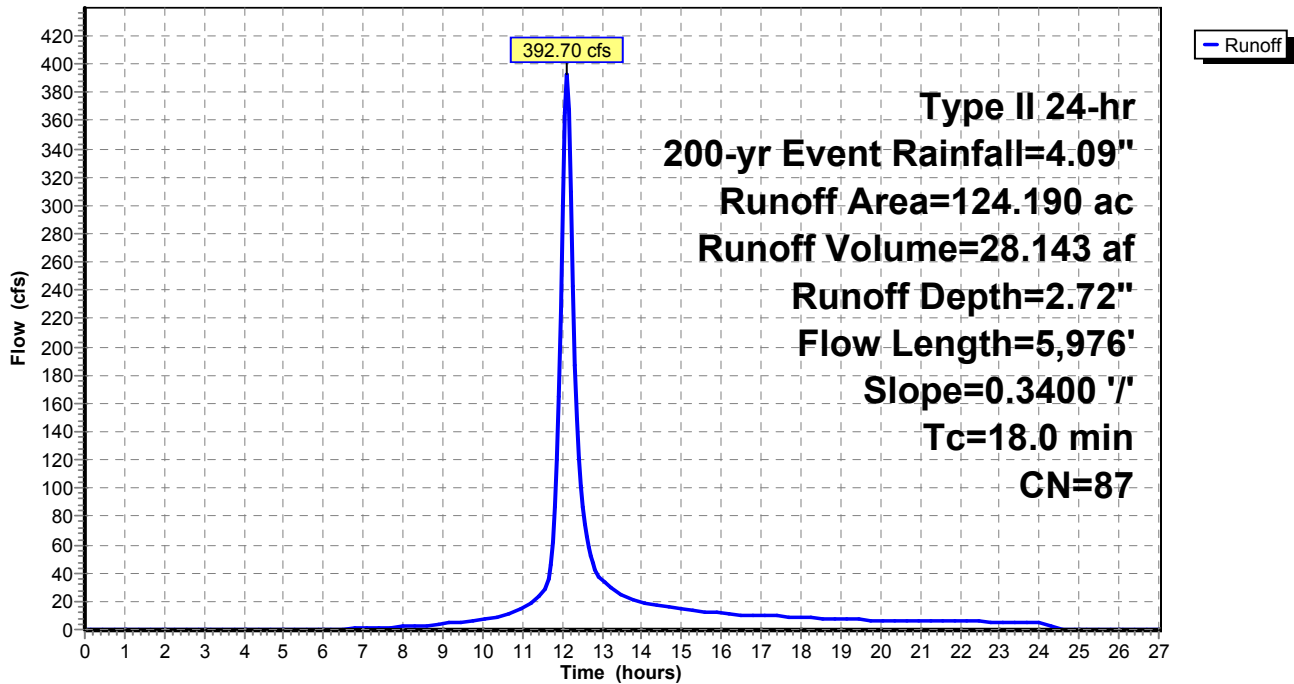
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 6: WS 6**

Runoff = 888.50 cfs @ 12.17 hrs, Volume= 75.058 af, Depth= 2.72"

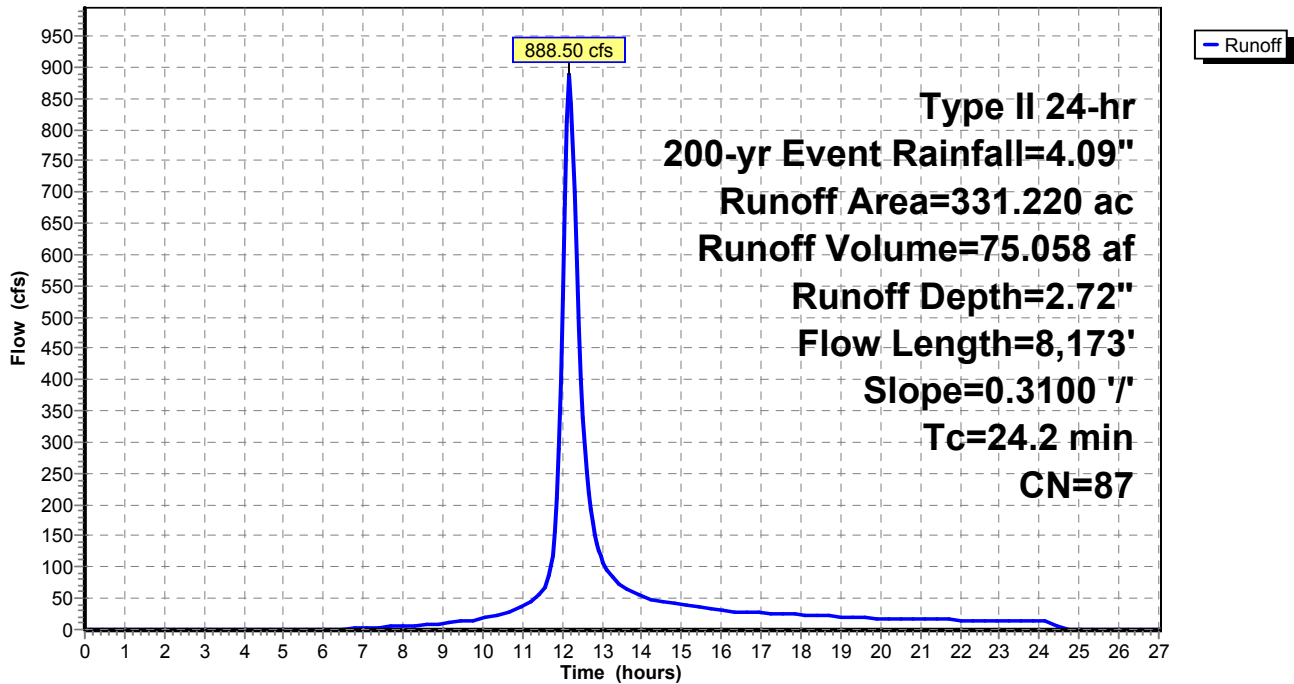
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 7: WS 7**

Runoff = 471.20 cfs @ 12.09 hrs, Volume= 32.739 af, Depth= 2.72"

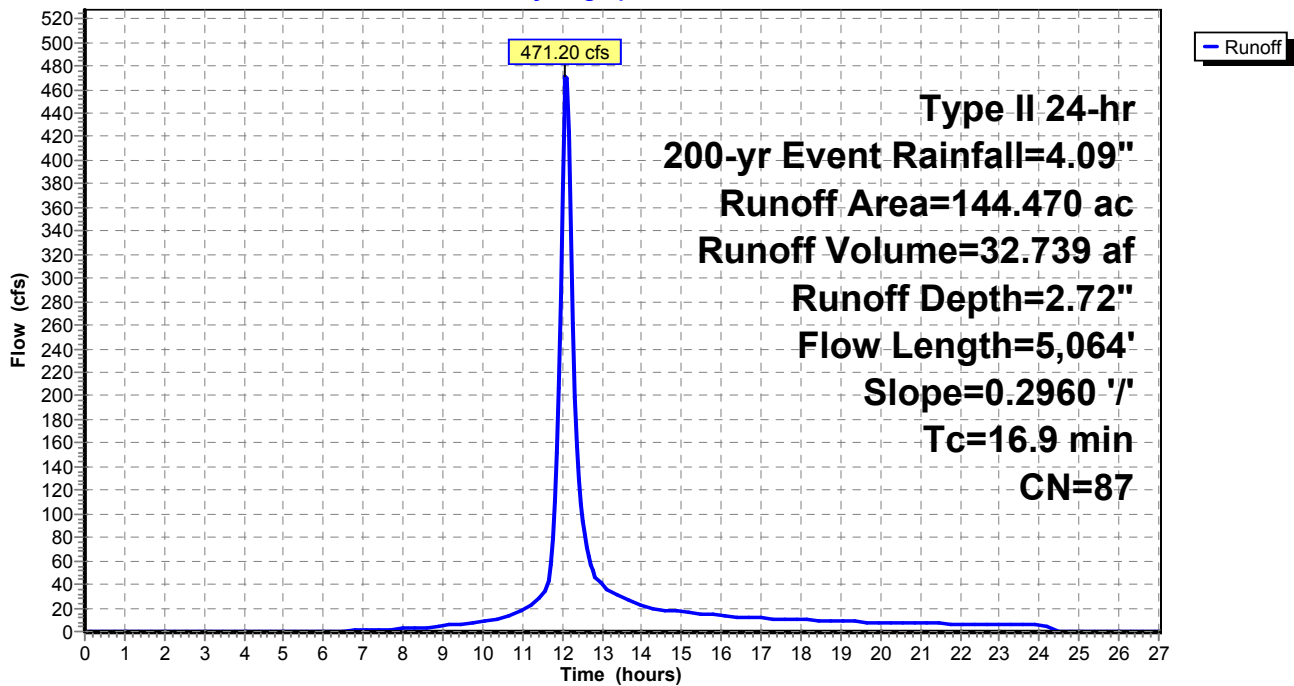
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 8: WS 8**

Runoff = 334.29 cfs @ 12.05 hrs, Volume= 20.851 af, Depth= 2.72"

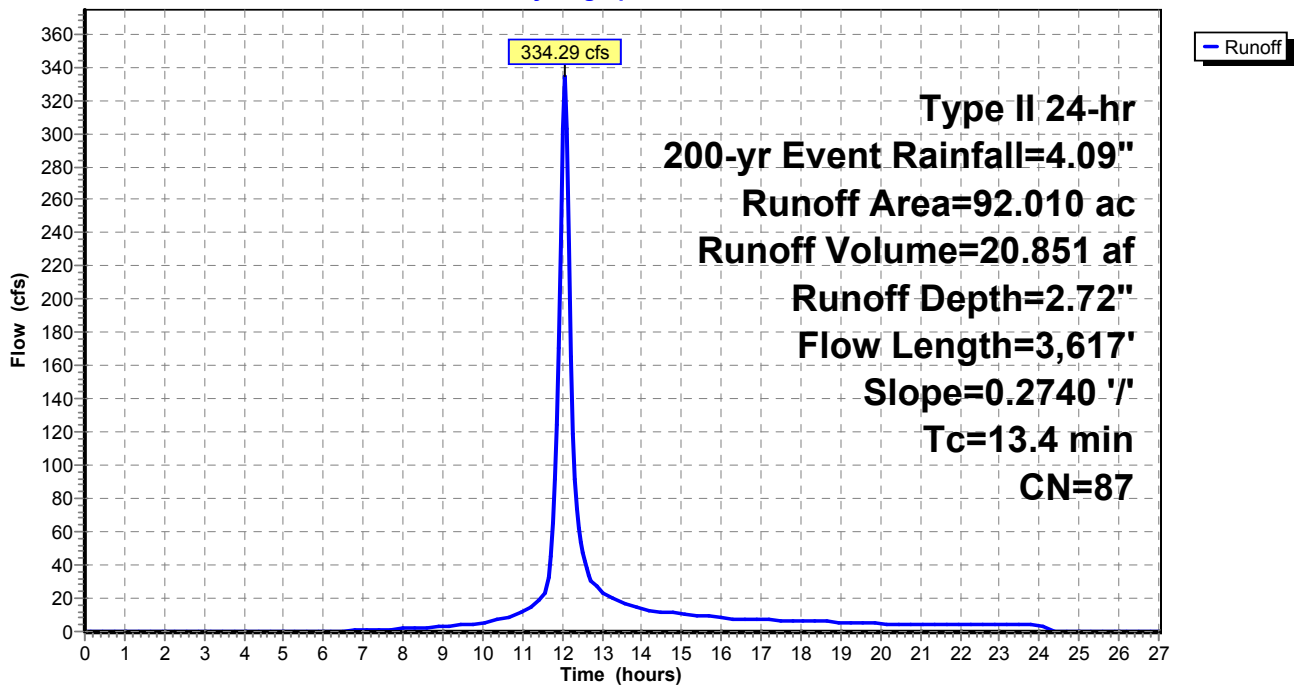
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph





**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 9: WS 9**

Runoff = 651.70 cfs @ 12.16 hrs, Volume= 53.460 af, Depth= 2.72"

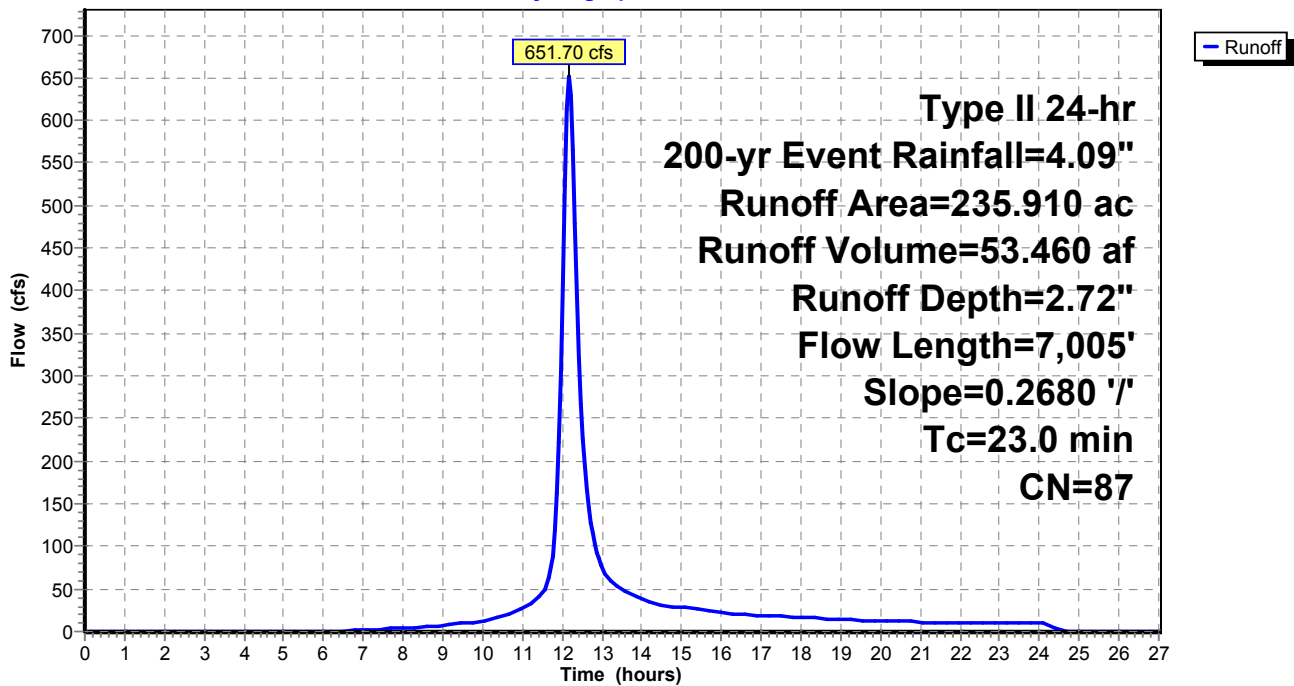
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 10: WS 10**

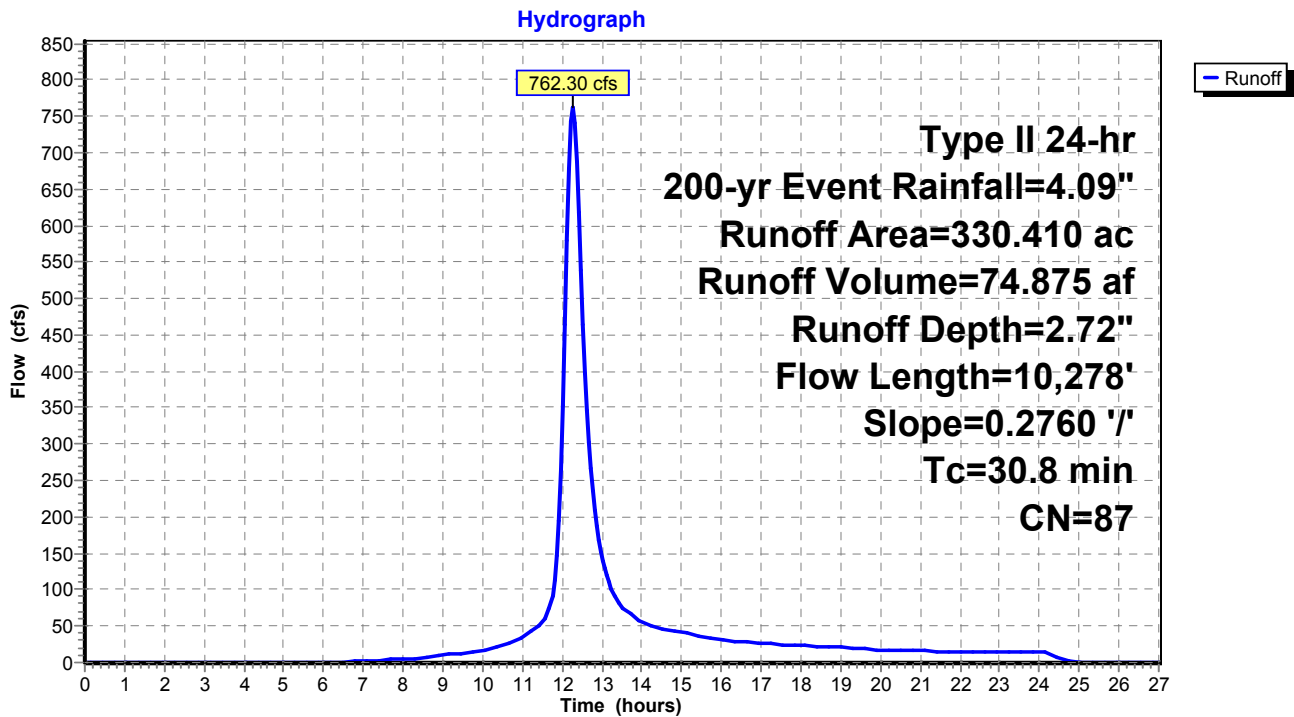
Runoff = 762.30 cfs @ 12.25 hrs, Volume= 74.875 af, Depth= 2.72"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 11: WS 11**

Runoff = 968.42 cfs @ 12.22 hrs, Volume= 90.153 af, Depth= 2.72"

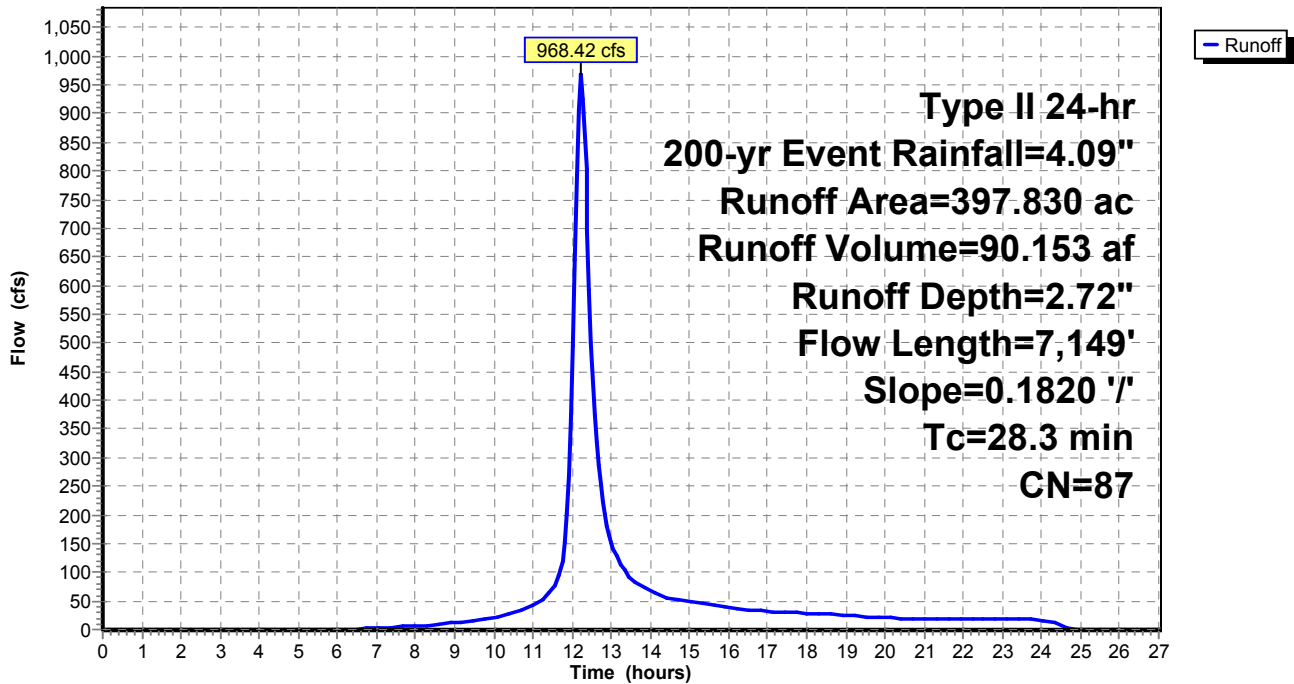
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 12: WS 12**

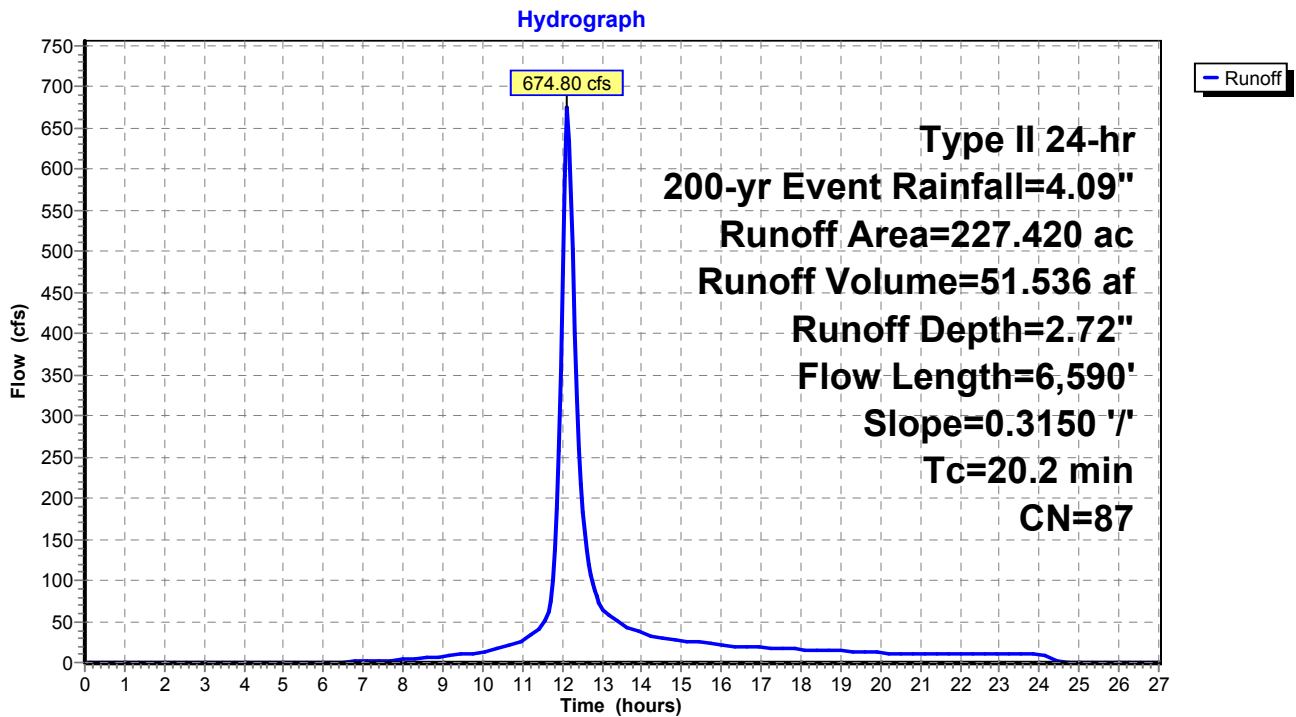
Runoff = 674.80 cfs @ 12.13 hrs, Volume= 51.536 af, Depth= 2.72"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**Summary for Subcatchment 13: WS 13**

Runoff = 745.85 cfs @ 12.17 hrs, Volume= 62.434 af, Depth= 2.72"

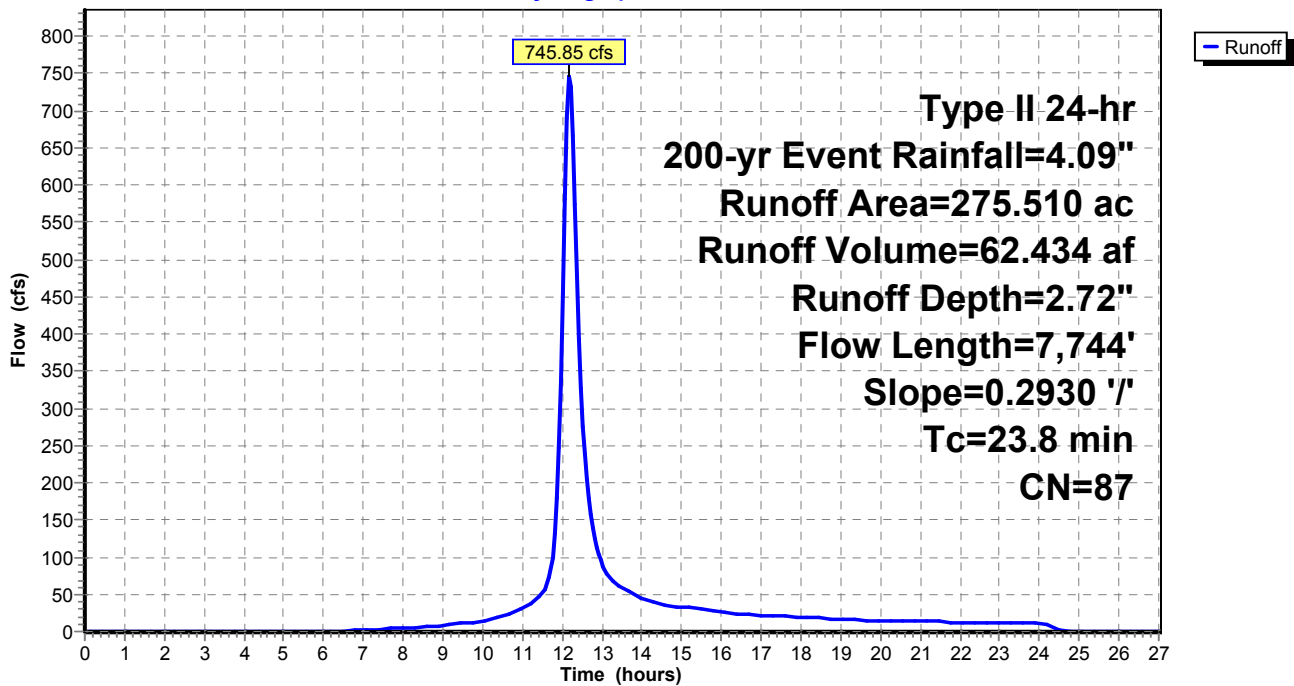
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 200-yr Event Rainfall=4.09"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**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

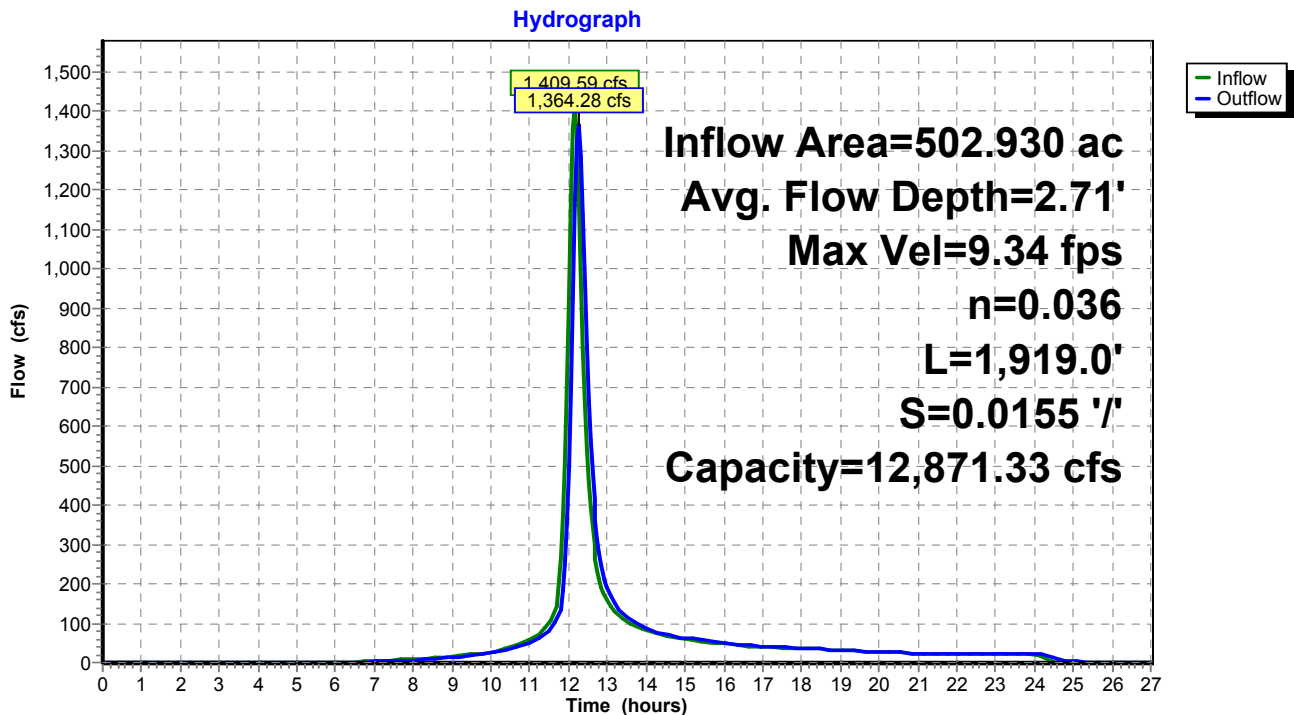
Routing by Stor-Ind+Trans method, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.34 fps, Min. Travel Time= 3.4 min  
 Avg. Velocity = 2.31 fps, Avg. Travel Time= 13.9 min

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**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

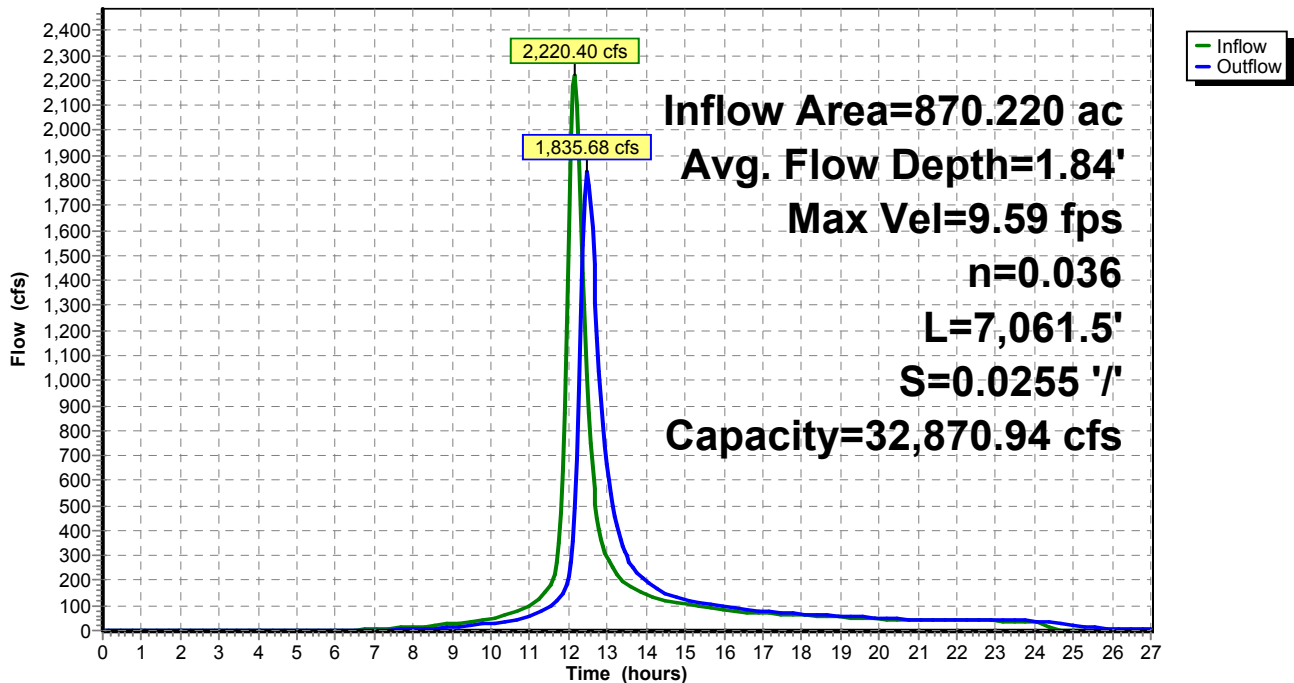
Peak Storage= 1,352,568 cf @ 12.27 hrs  
 Average Depth at Peak Storage= 1.84'  
 Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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**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'





### Exist WS (Post-Quintana)\_Culvert Analysis

Type II 24-hr 200-yr Event Rainfall=4.09"

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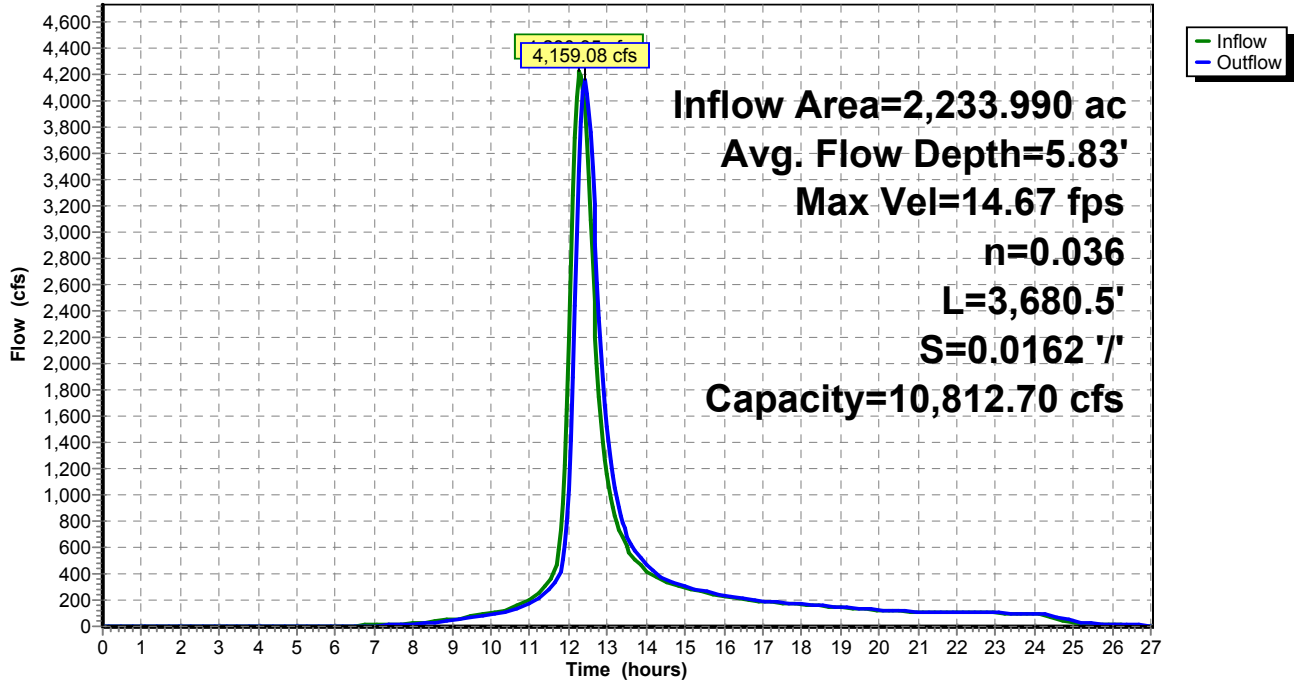
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### Reach CHNL 3: Channel 3

Hydrograph



Legend:  
— Inflow (green line)  
— Outflow (blue line)

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**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

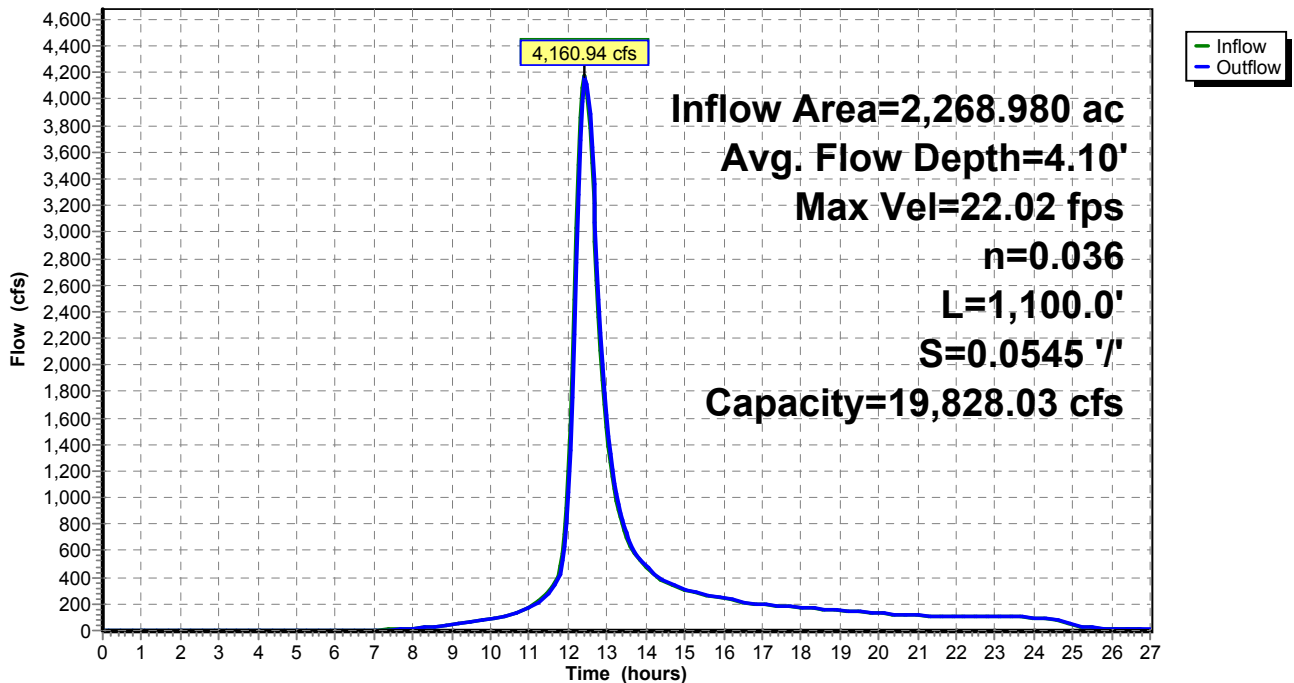
Peak Storage= 208,374 cf @ 12.42 hrs  
 Average Depth at Peak Storage= 4.10'  
 Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

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**

**Hydrograph**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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**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

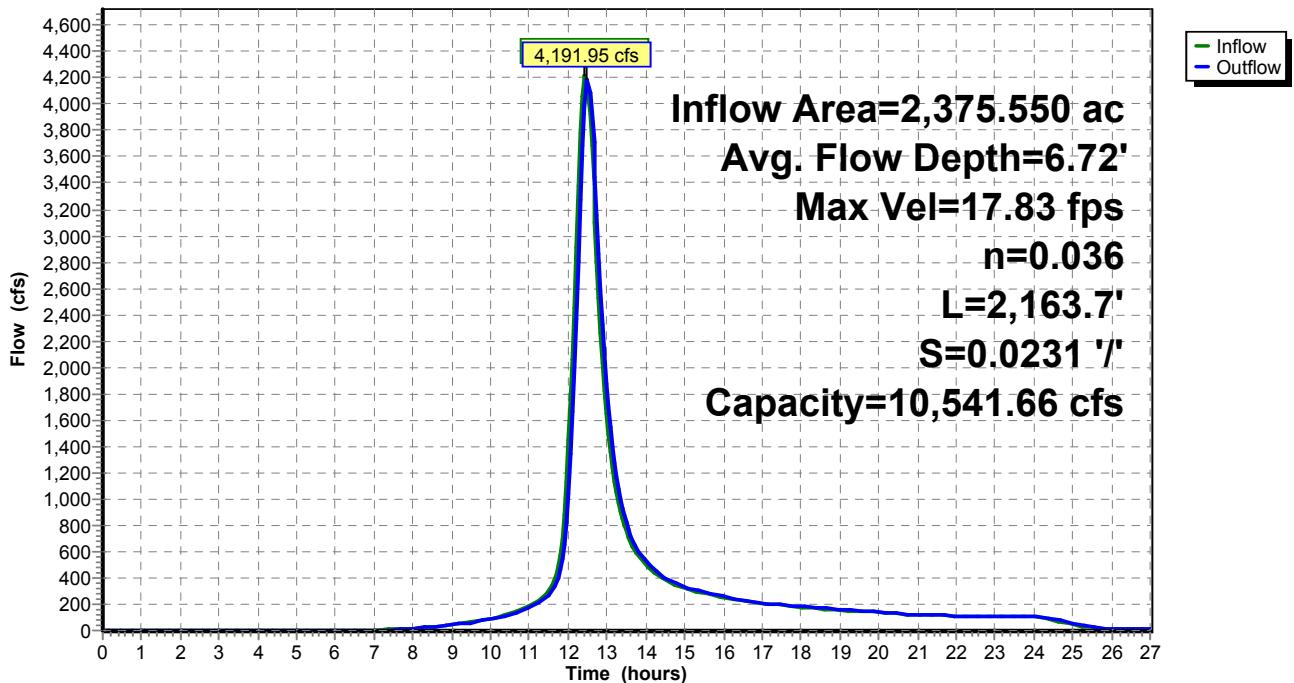
Peak Storage= 510,334 cf @ 12.46 hrs  
 Average Depth at Peak Storage= 6.72'  
 Bank-Full Depth= 11.00' Flow Area= 456.5 sf, Capacity= 10,541.66 cfs

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**

**Hydrograph**



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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**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	<b>Culvert Crossing #1</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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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

**Exist WS (Post-Quintana)\_ Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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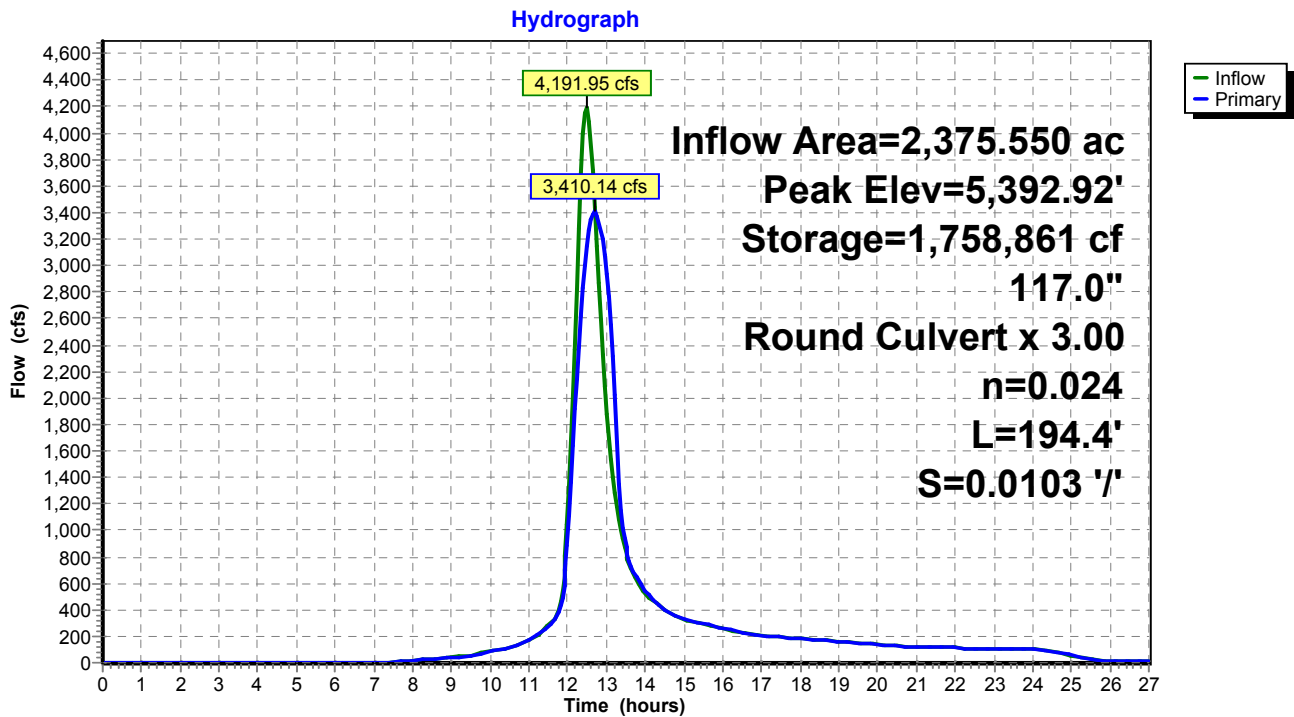
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Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	<b>117.0" Round Culvert X 3.00</b> L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/ Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

**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**



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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**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	<b>Existing Pond</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 200-yr Event Rainfall=4.09"*

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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



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 200-yr Event Rainfall=4.09"

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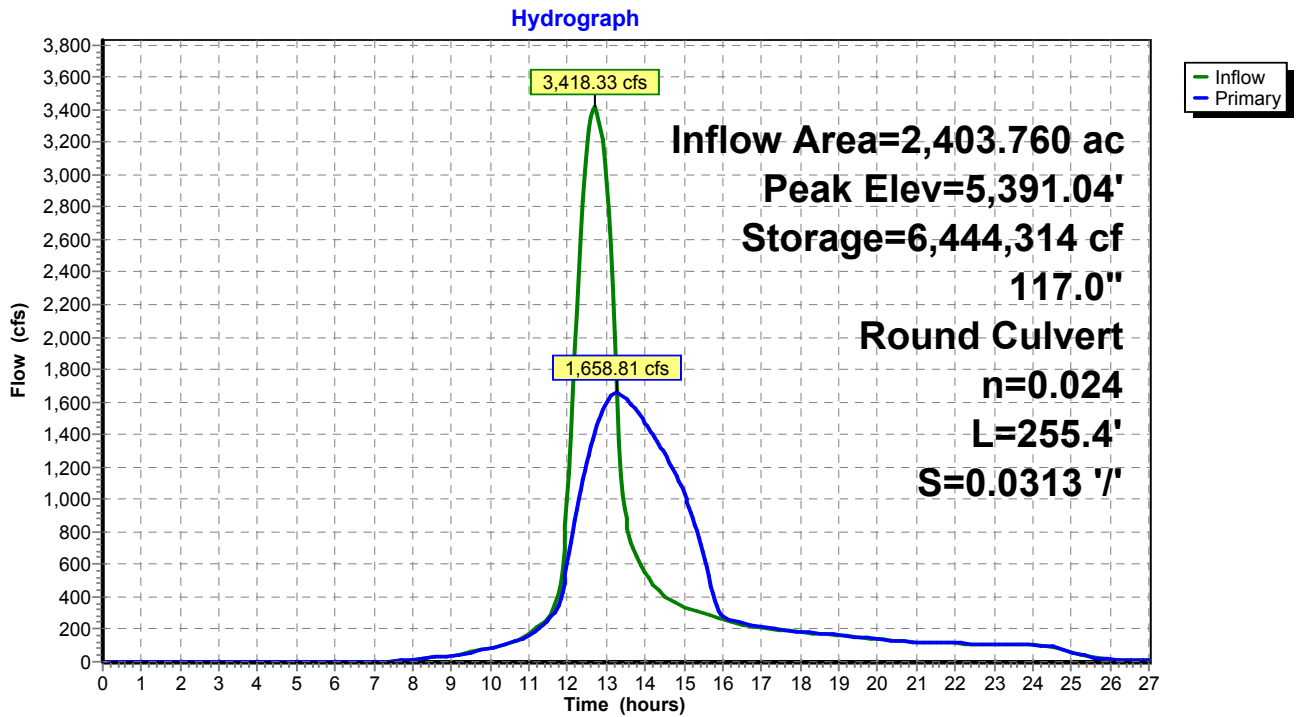
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5,402.00      9,814,540  
 5,403.00      10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	<b>117.0" Round Culvert</b> 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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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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

<b>Subcatchment1: WS 1</b>	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
<b>Subcatchment2: WS 2</b>	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
<b>Subcatchment3: WS 3</b>	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
<b>Subcatchment4: WS 4</b>	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
<b>Subcatchment5: WS 5</b>	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
<b>Subcatchment6: WS 6</b>	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
<b>Subcatchment7: WS 7</b>	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
<b>Subcatchment8: WS 8</b>	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
<b>Subcatchment9: WS 9</b>	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
<b>Subcatchment10: WS 10</b>	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
<b>Subcatchment11: WS 11</b>	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
<b>Subcatchment12: WS 12</b>	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
<b>Subcatchment13: WS 13</b>	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
<b>Reach CHNL 1: Channel 1</b>	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
<b>Reach CHNL 2: Channel 2</b>	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
<b>Reach CHNL 3: Channel 3</b>	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

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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**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**

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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"

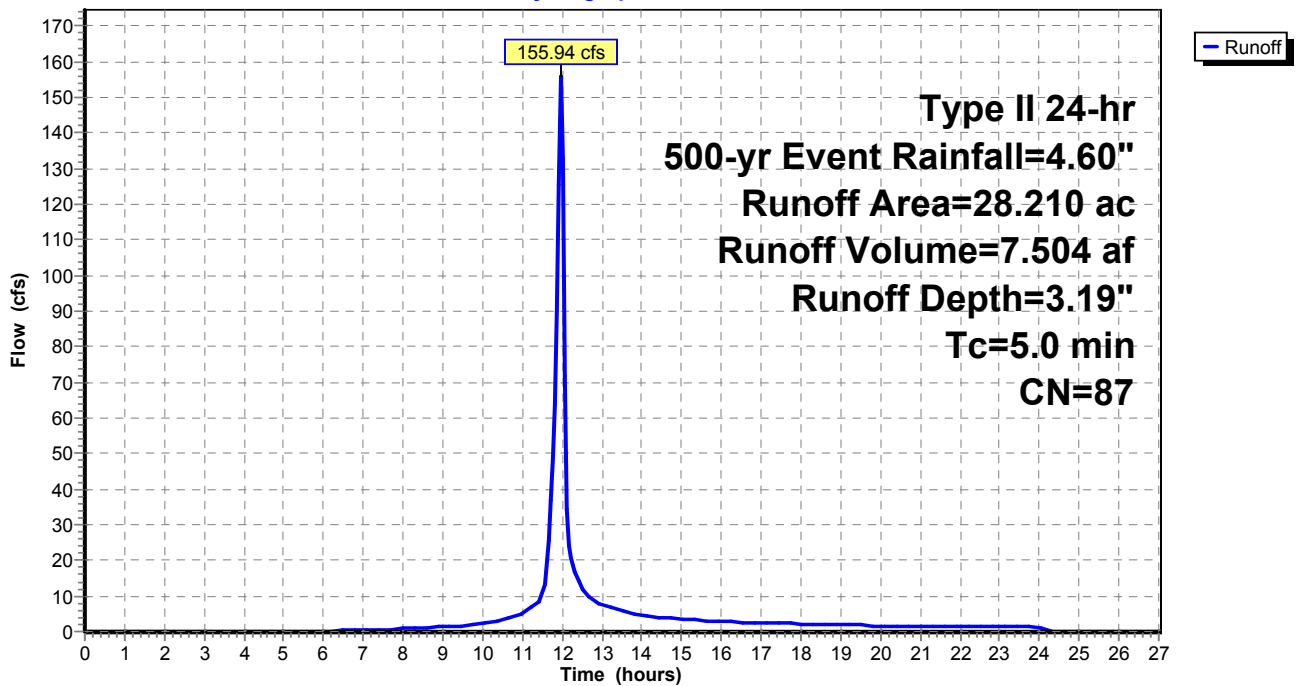
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 2: WS 2**

Runoff = 484.31 cfs @ 12.02 hrs, Volume= 28.349 af, Depth= 3.19"

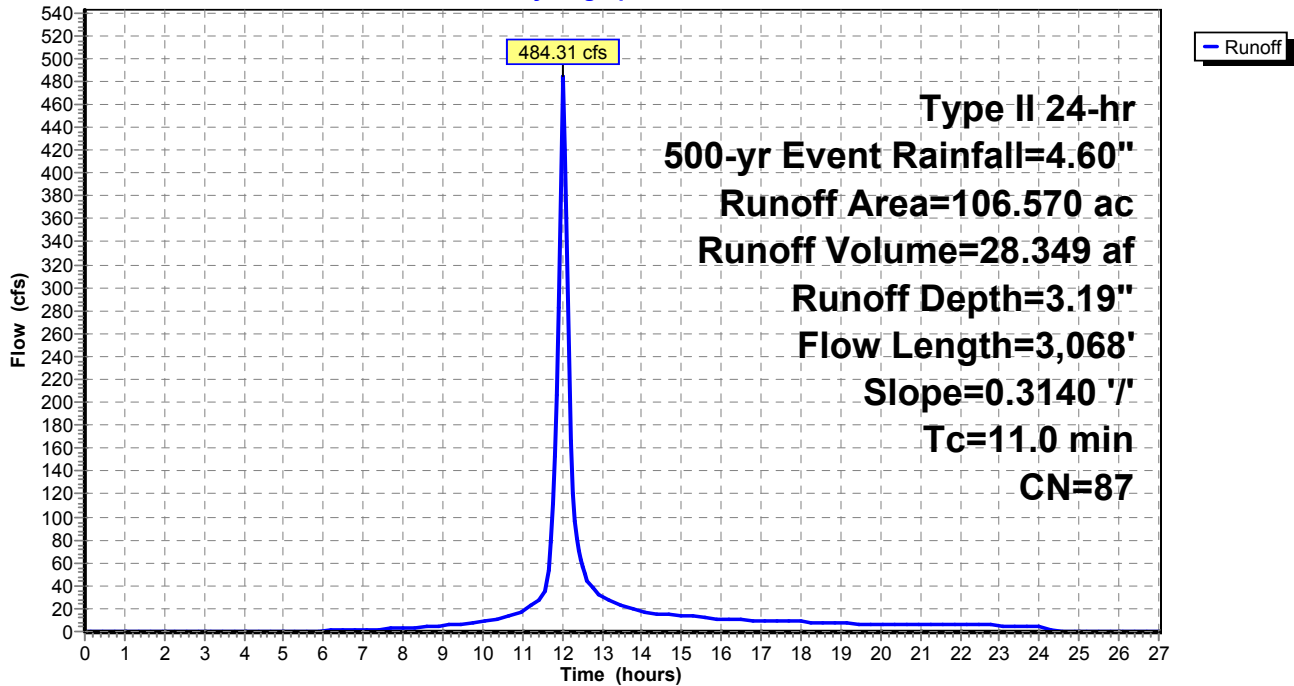
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 3: WS 3**

Runoff = 172.66 cfs @ 12.00 hrs, Volume= 9.308 af, Depth= 3.19"

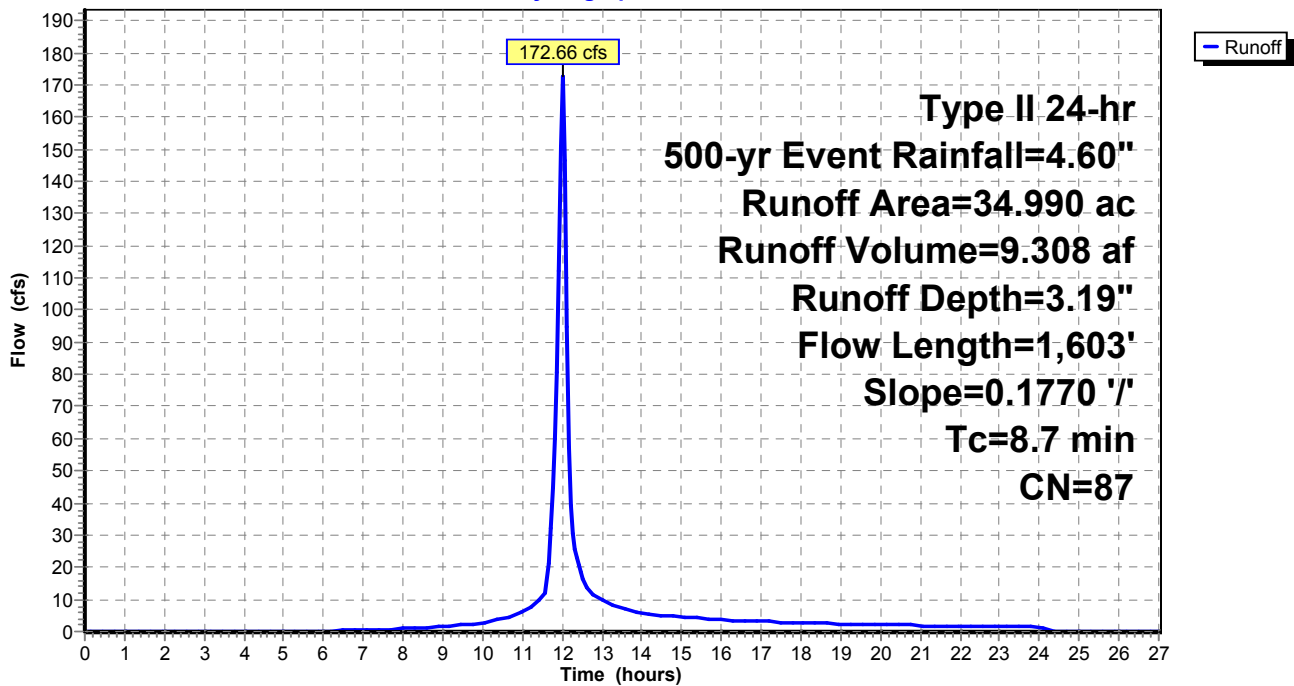
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 4: WS 4**

Runoff = 346.92 cfs @ 12.02 hrs, Volume= 19.956 af, Depth= 3.19"

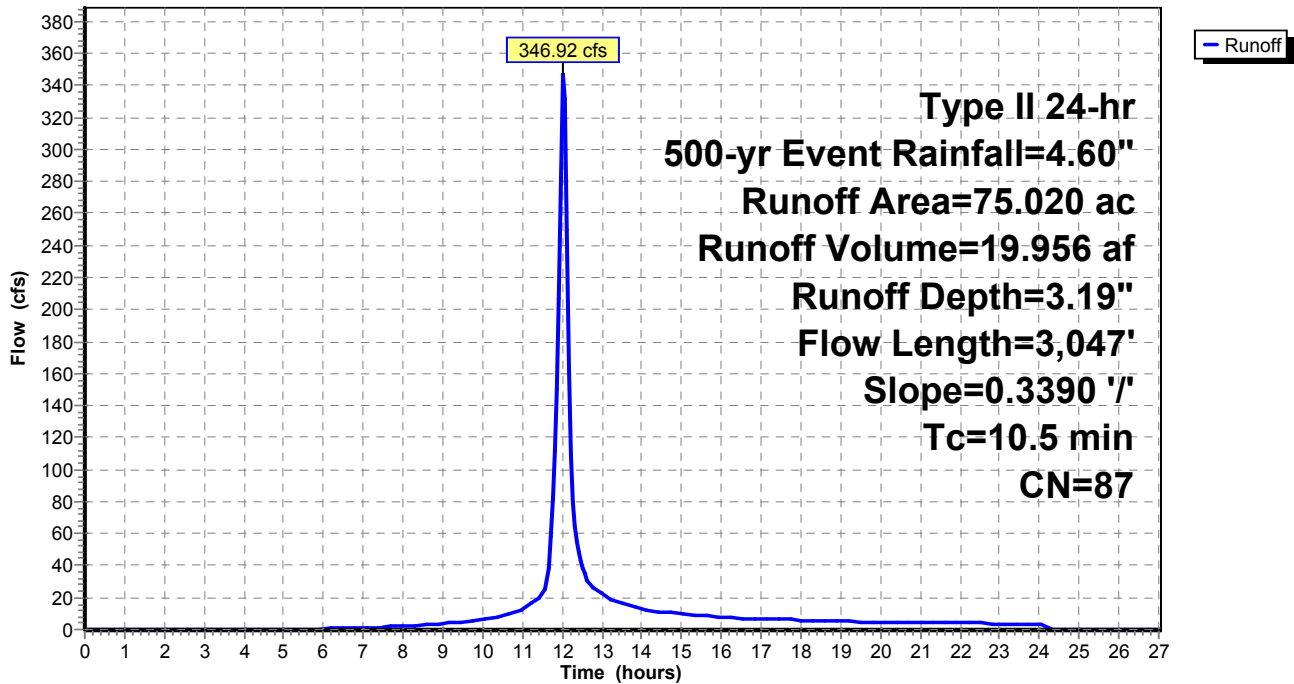
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 5: WS 5**

Runoff = 458.61 cfs @ 12.10 hrs, Volume= 33.036 af, Depth= 3.19"

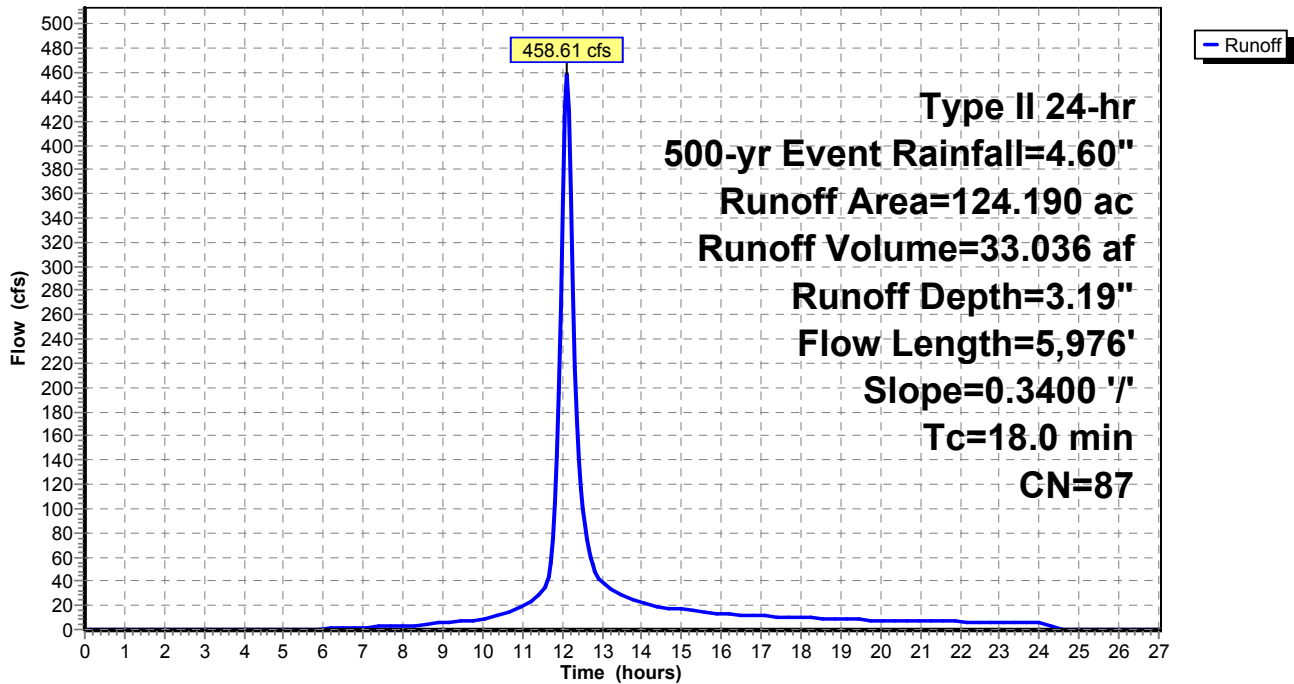
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph





**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 6: WS 6**

Runoff = 1,038.74 cfs @ 12.17 hrs, Volume= 88.109 af, Depth= 3.19"

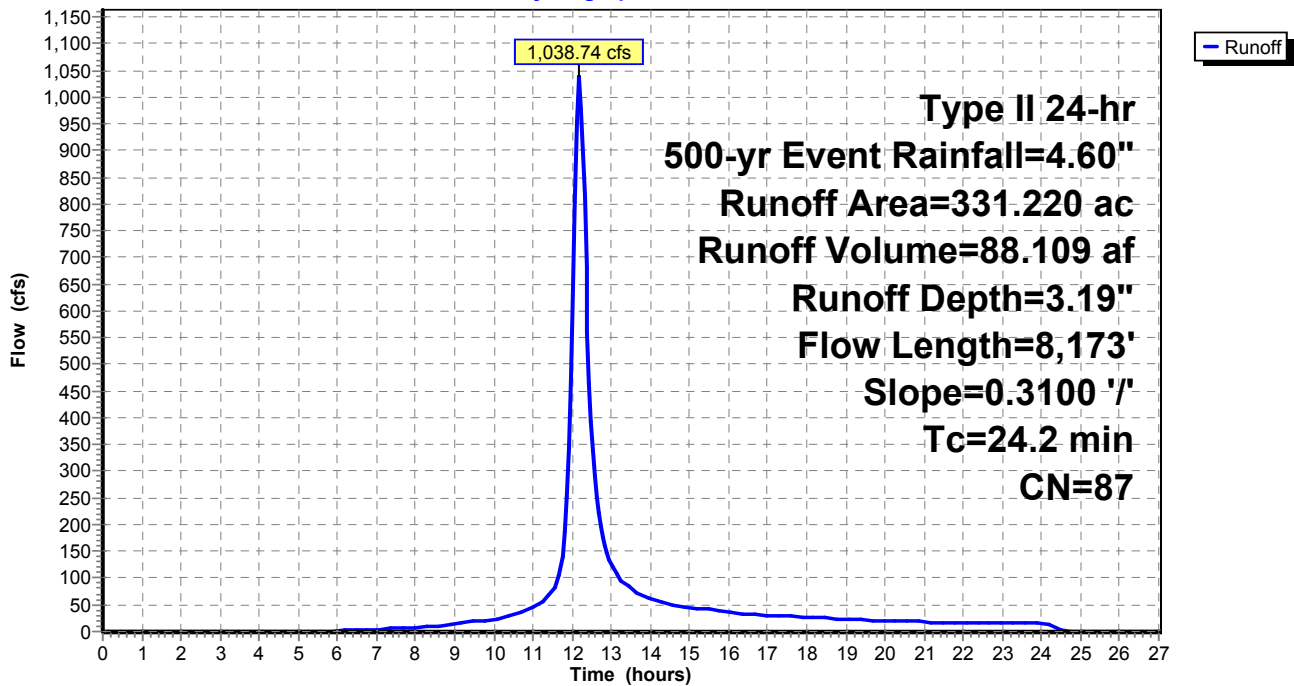
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 7: WS 7**

Runoff = 550.14 cfs @ 12.09 hrs, Volume= 38.431 af, Depth= 3.19"

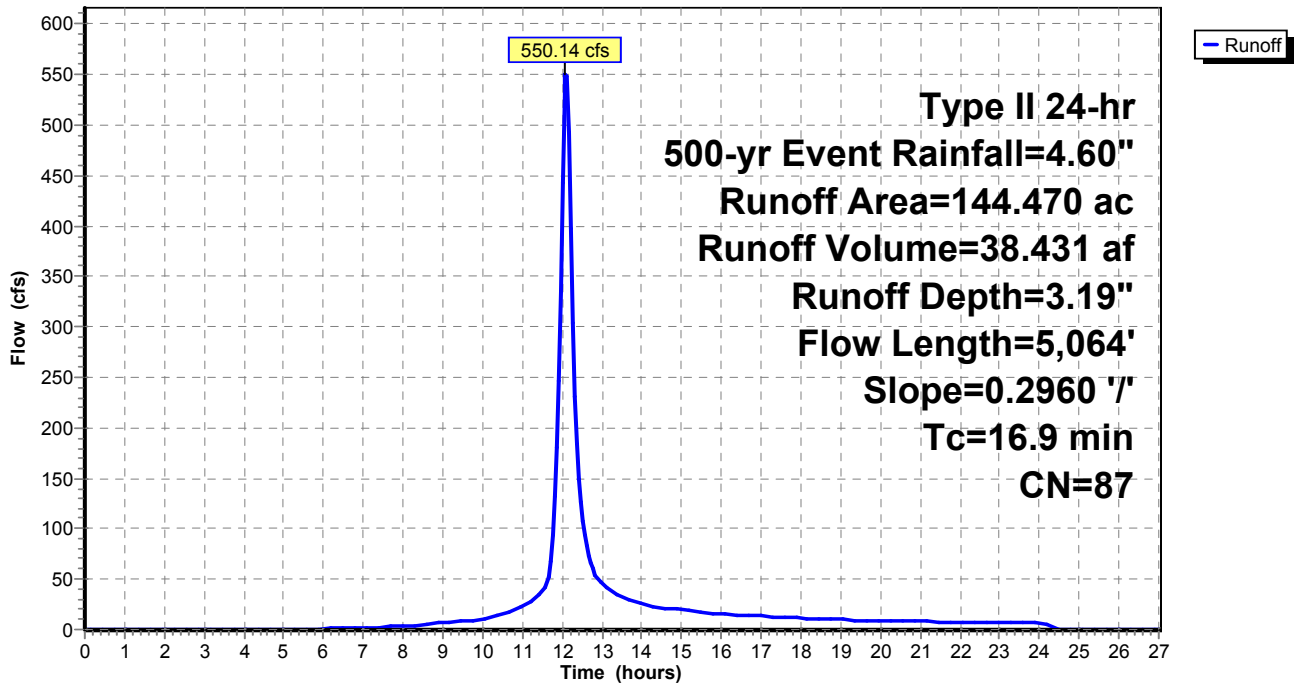
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 8: WS 8**

Runoff = 389.99 cfs @ 12.05 hrs, Volume= 24.476 af, Depth= 3.19"

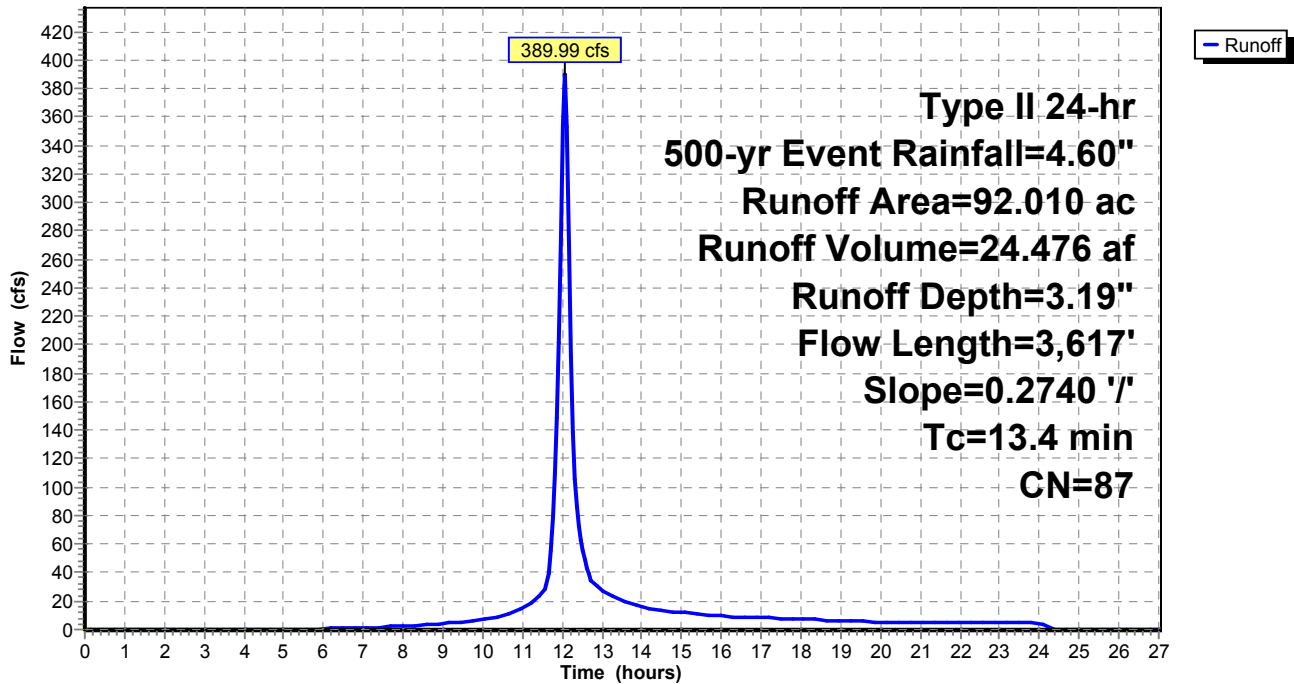
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 9: WS 9**

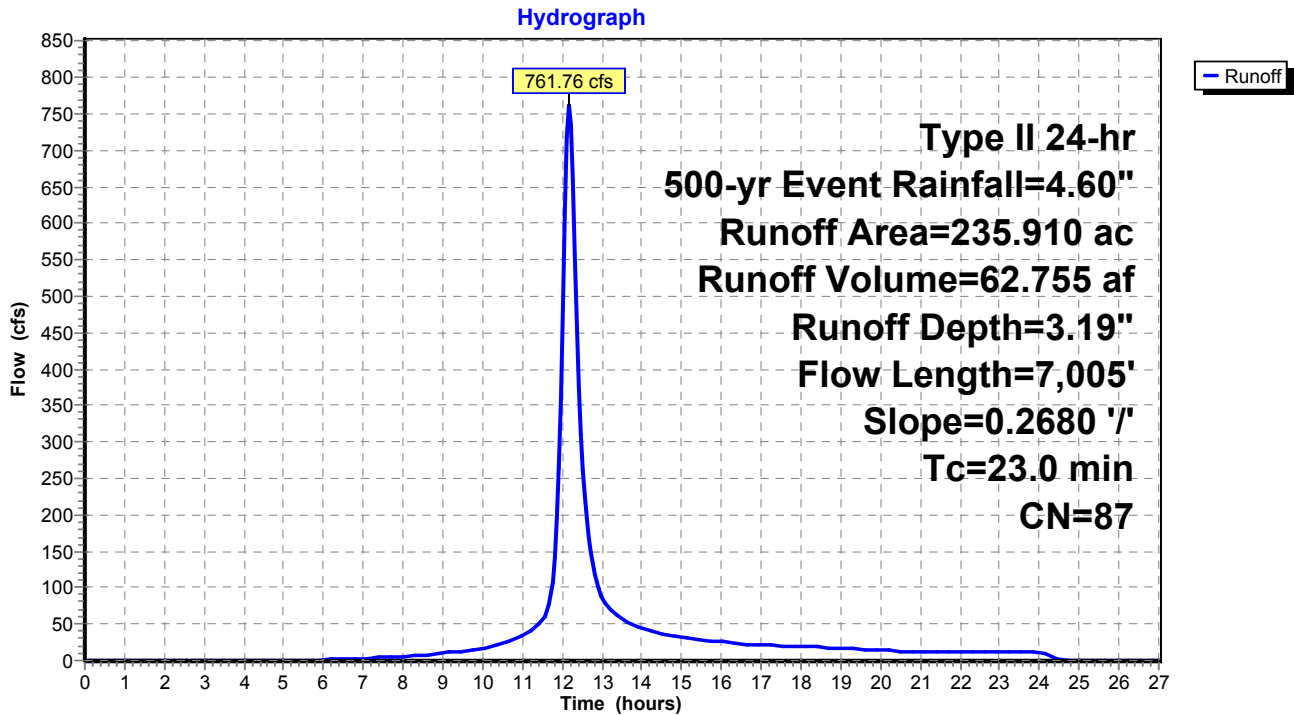
Runoff = 761.76 cfs @ 12.16 hrs, Volume= 62.755 af, Depth= 3.19"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 10: WS 10**

Runoff = 891.85 cfs @ 12.25 hrs, Volume= 87.894 af, Depth= 3.19"

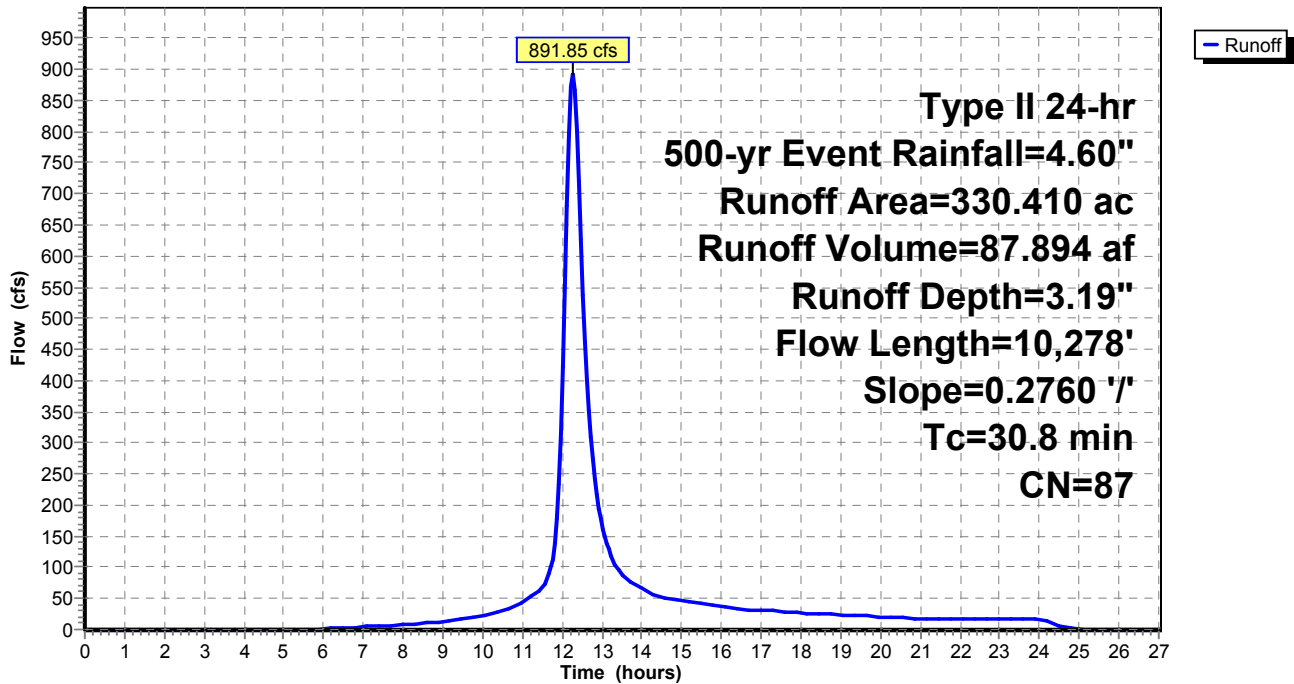
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 11: WS 11**

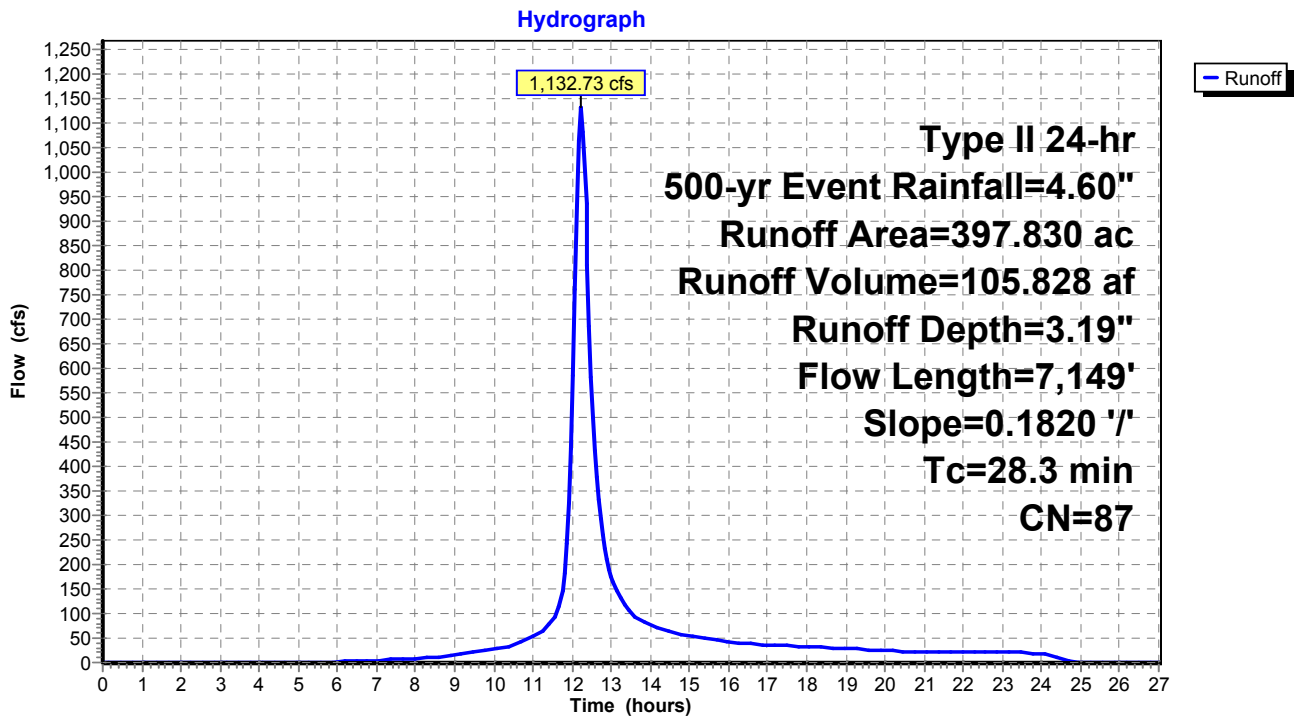
Runoff = 1,132.73 cfs @ 12.22 hrs, Volume= 105.828 af, Depth= 3.19"

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**



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 12: WS 12**

Runoff = 789.72 cfs @ 12.12 hrs, Volume= 60.497 af, Depth= 3.19"

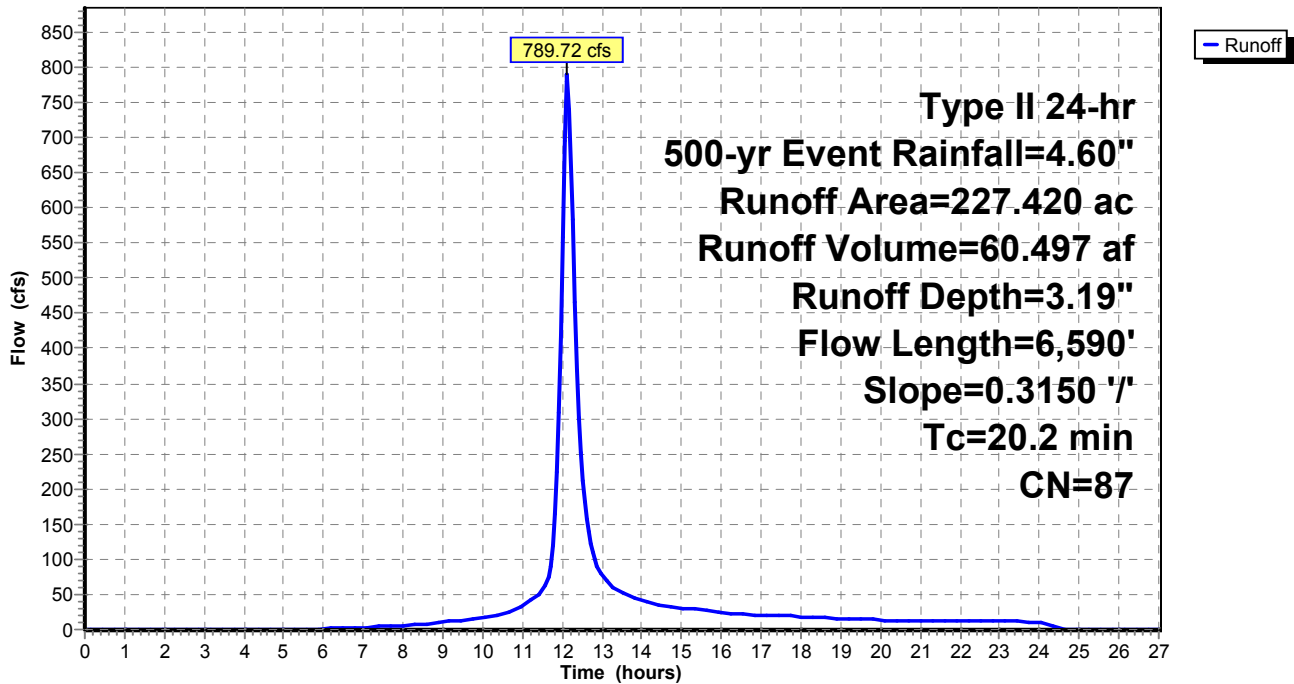
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**Summary for Subcatchment 13: WS 13**

Runoff = 871.93 cfs @ 12.16 hrs, Volume= 73.289 af, Depth= 3.19"

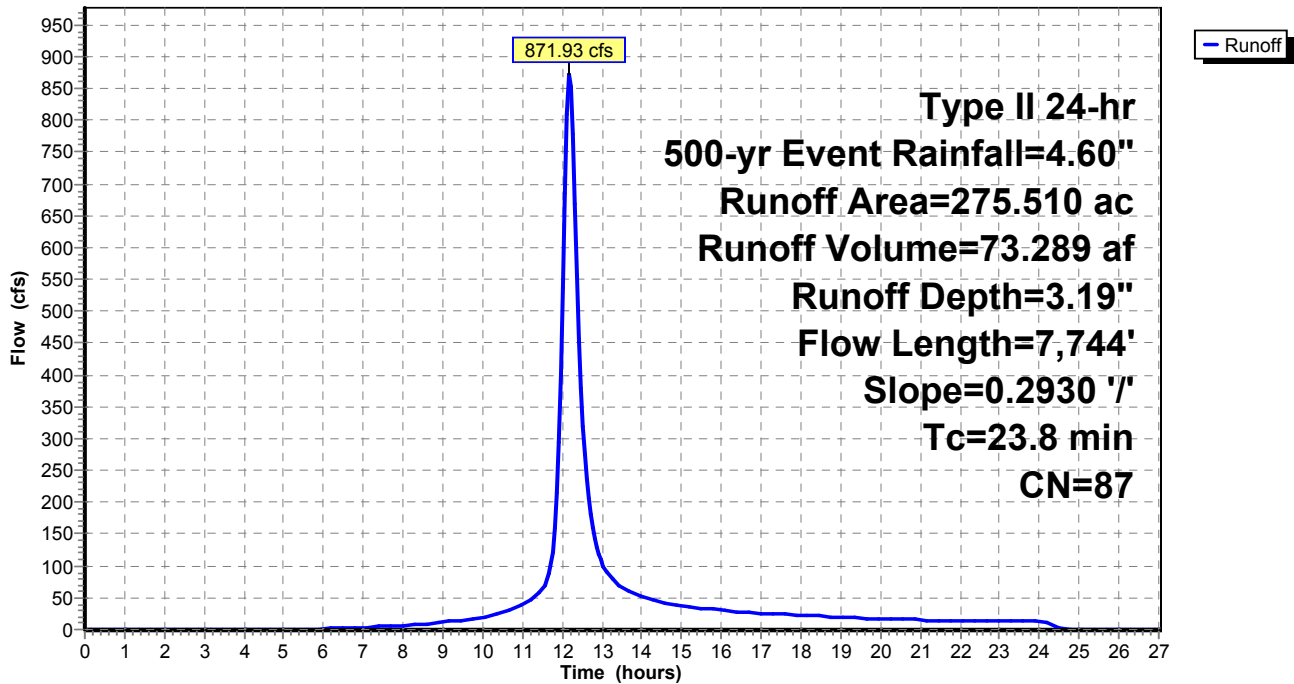
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-27.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 500-yr Event Rainfall=4.60"

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**

Hydrograph





**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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

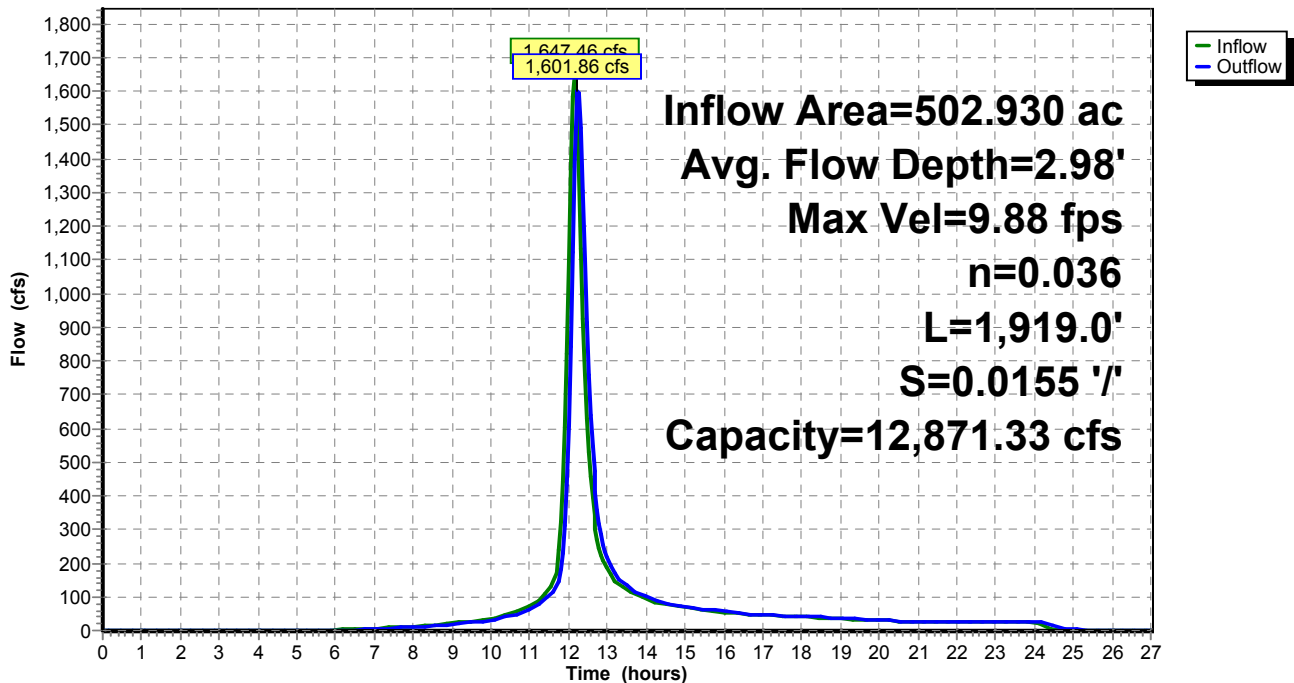
Peak Storage= 311,381 cf @ 12.18 hrs  
 Average Depth at Peak Storage= 2.98'  
 Bank-Full Depth= 10.00' Flow Area= 650.0 sf, Capacity= 12,871.33 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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

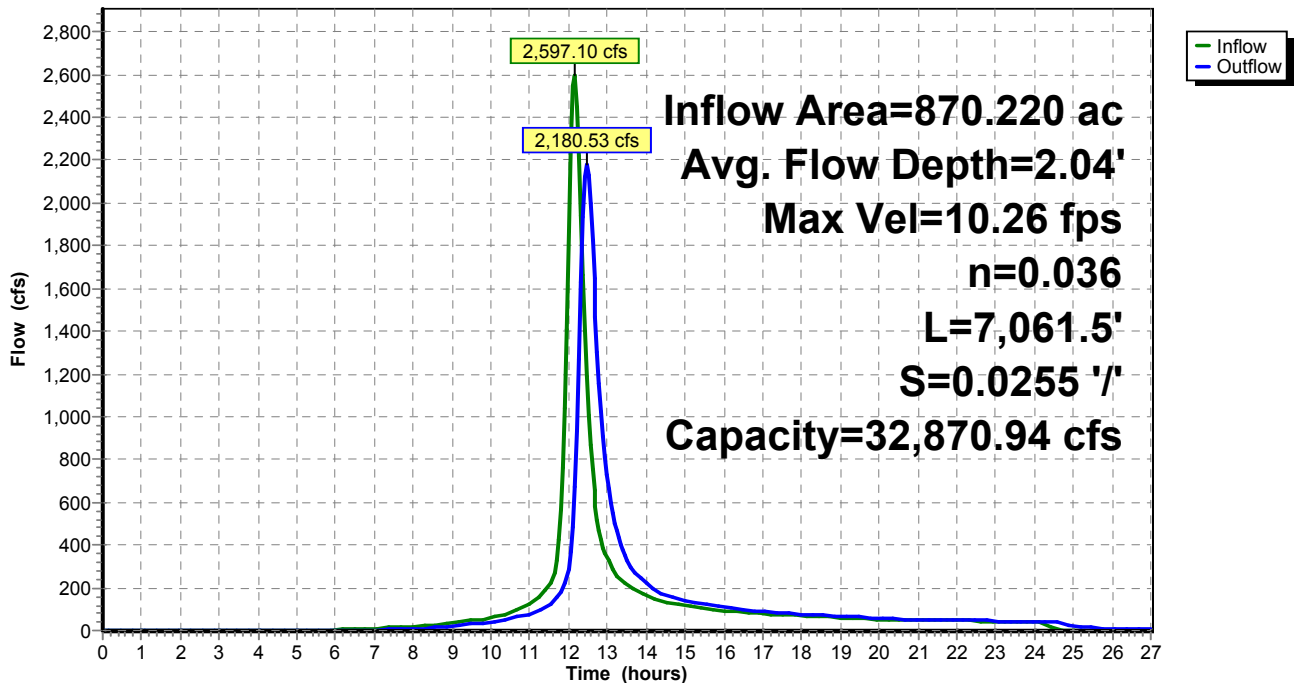
Peak Storage= 1,506,746 cf @ 12.26 hrs  
 Average Depth at Peak Storage= 2.04'  
 Bank-Full Depth= 10.00' Flow Area= 1,225.0 sf, Capacity= 32,870.94 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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**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'



### Exist WS (Post-Quintana)\_Culvert Analysis

Type II 24-hr 500-yr Event Rainfall=4.60"

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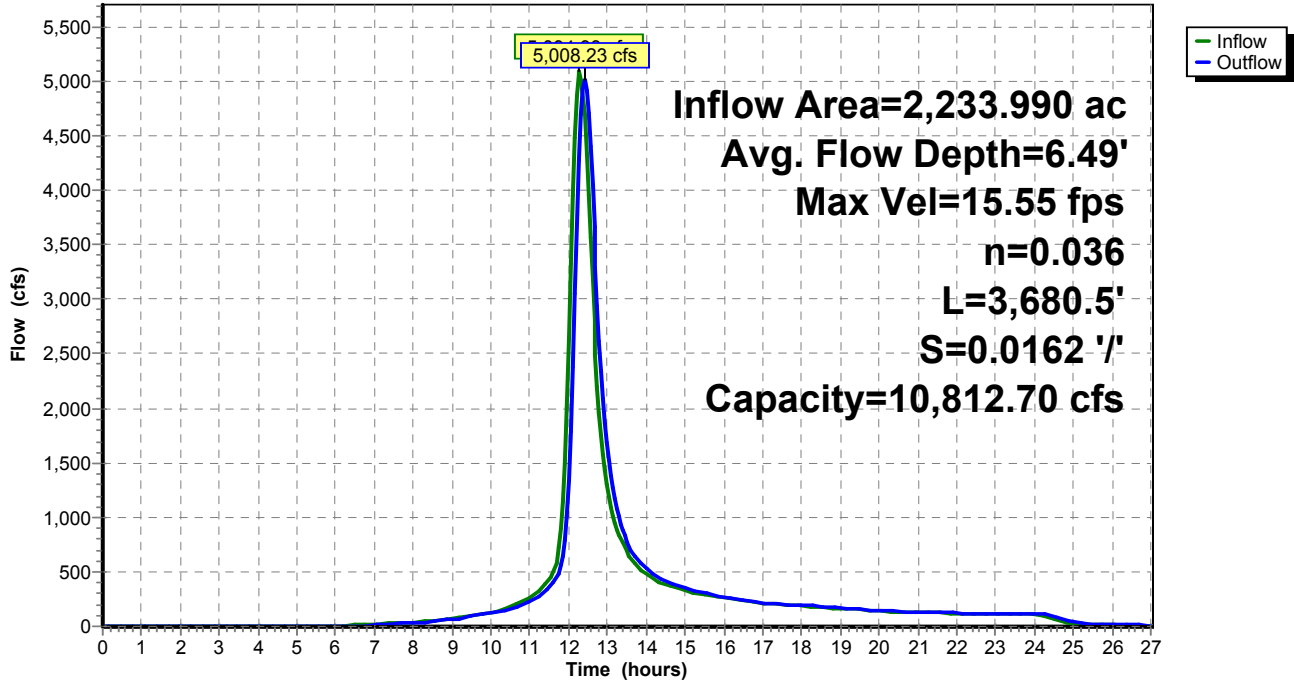
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### Reach CHNL 3: Channel 3

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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

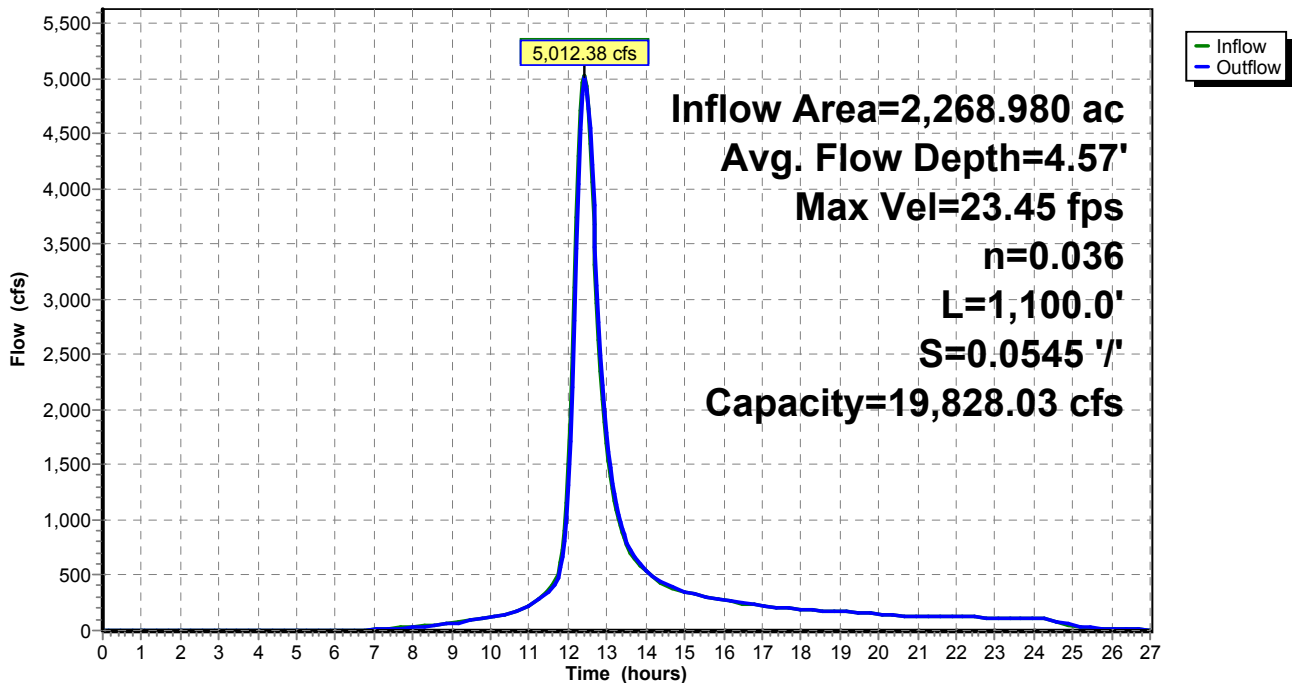
Peak Storage= 235,792 cf @ 12.41 hrs  
 Average Depth at Peak Storage= 4.57'  
 Bank-Full Depth= 10.00' Flow Area= 550.0 sf, Capacity= 19,828.03 cfs

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**

Hydrograph



**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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**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

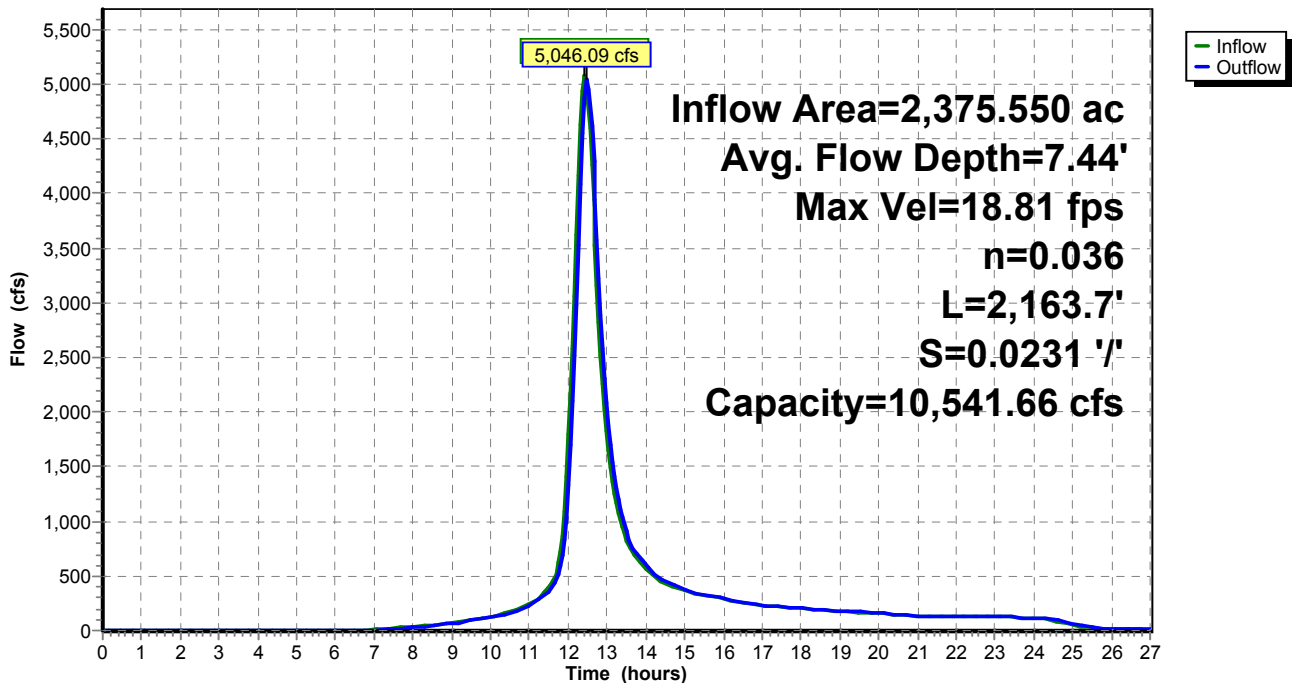
Peak Storage= 582,162 cf @ 12.44 hrs  
 Average Depth at Peak Storage= 7.44'  
 Bank-Full Depth= 11.00' Flow Area= 456.5 sf, Capacity= 10,541.66 cfs

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'



**Reach CHNL 5: Channel 5**

Hydrograph



**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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**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	<b>Culvert Crossing #1</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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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



**Exist WS (Post-Quintana)\_ Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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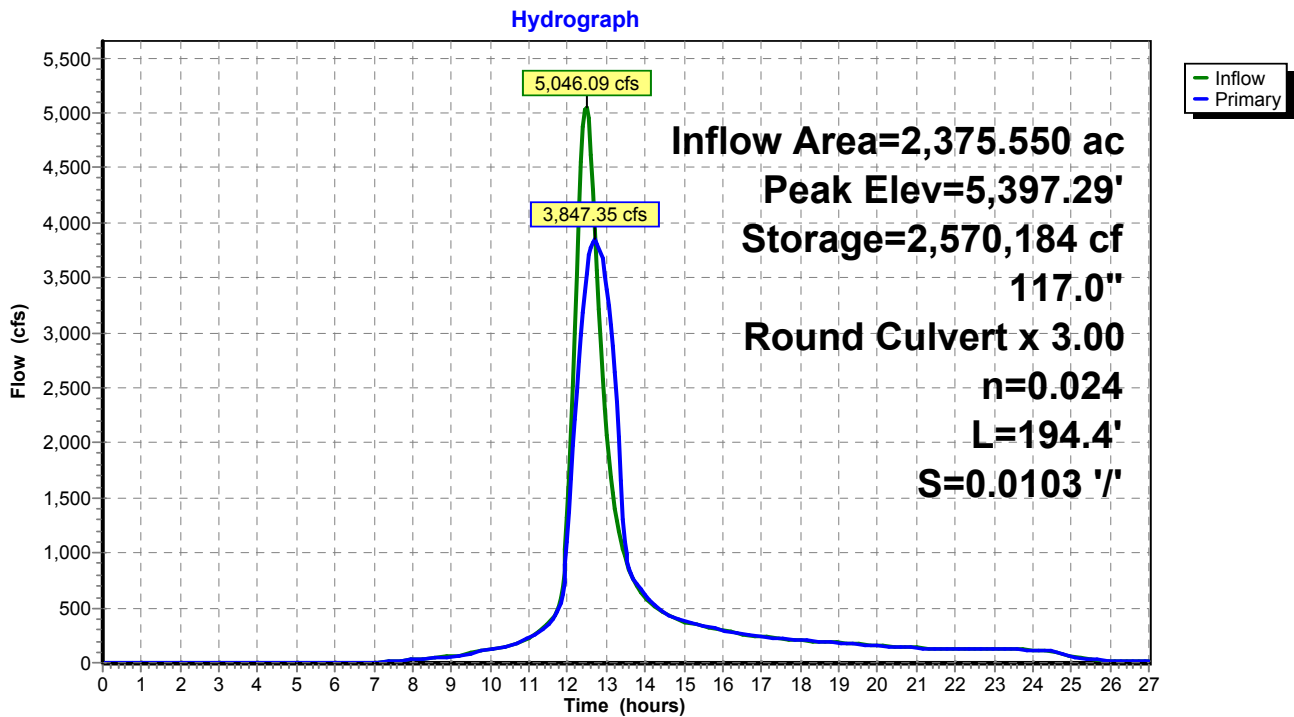
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Device	Routing	Invert	Outlet Devices
#1	Primary	5,372.00'	<b>117.0" Round Culvert X 3.00</b> L= 194.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 5,372.00' / 5,370.00' S= 0.0103 '/ Cc= 0.900 n= 0.024, Flow Area= 74.66 sf

**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**



Legend:  
 - Inflow (Green line)  
 - Primary (Blue line)

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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**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	<b>Existing Pond</b> Listed below

**Exist WS (Post-Quintana)\_ Culvert Analysis***Type II 24-hr 500-yr Event Rainfall=4.60"*

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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

**Exist WS (Post-Quintana)\_Culvert Analysis**

Type II 24-hr 500-yr Event Rainfall=4.60"

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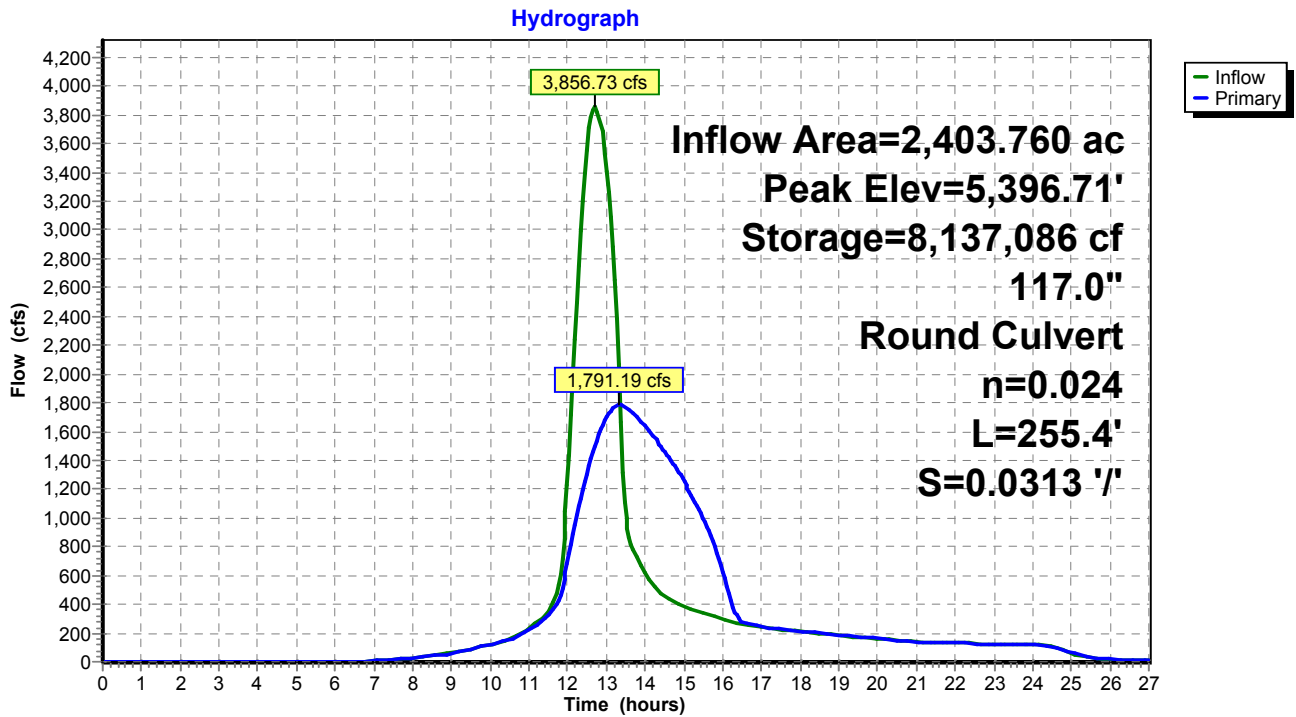
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5,402.00      9,814,540  
 5,403.00      10,142,539

Device	Routing	Invert	Outlet Devices
#1	Primary	5,352.00'	<b>117.0" Round Culvert</b> 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