FINAL DRAINAGE REPORT

FOR

WOODY MOUNTAIN CAMPGROUND
Phase 1 Construction

July 12, 2019

COF No. PZ-18-00210

Project Location:

2727 W Route 66
Flagstaff, AZ 86001

Prepared For:

Wanderland Flagstaff LLC
2502 E Camelback Rd No 214
Phoenix, Arizona 85016

Prepared By:

EXPIRES 06-30-2020

Sirisha Kalluri, P.E, **CFM**

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124 N. Elden St. • Flagstaff, AZ • 86001-5262
Phone: (928) 774-4636
www.woodsoneng.com

WE Project No. 118044

Final Drainage Report
for
Woody Mountain Campground
Phase 1 Construction

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1. INTRODUCTION

This is the final drainage report for the proposed Woody Mountain Campground (Campground) development on parcels 112-01-007, 102-01-008 and 102-01-701, with an area of 20.53 acres. The current zoning is Rural Residential (RR). The site is located in Section 19, Township 21 N, and Range 07E, located south of Route 66 and east of Woody Mountain Road in the City of Flagstaff. Please note that the northwest corner of the site (the portion of the site in County's jurisdiction) has no proposed improvements. However, since it naturally flows east along with other contributing areas to the subject site, it is included (Sub-3C) in the drainage analysis to account for the flow generated by it.

The site is currently used as a campground with RV sites in the western half of the site. The proposed layout calls for 80 RV sites, 41 park model houses and 42 tent sites with other amenities which include ramadas, bath houses and numerous trails. Figure 1 shows the parcel map for the subject site. The site will be accessed via a driveway on Route 66 and an emergency access driveway from Woody Mountain Road.

Wildwood Hills (WWH) Mobile Home Park (MHP) located east of the subject site is a senior living community and has a history of frequent flooding. The original design and construction of the MHP made little or no allowance for the conveyance of off-site stormwater entering the property from the west. The historic flow pattern of the stormwater enters the MHP around the location of Unit 9 and travels in an east-southeast direction towards Unit 47 and discharging into the Kit Carson RV Park. The flow discharged into the WWH flows through the development with no positive drainage consideration except for some make-shift rock channels built later as an effort to mitigate flooding. Flood walls and flood proofing measures have been attempted by the WWH residents with little success. There are no underground piping facilities to take even a portion of the flow. Establishing a flood conduit for the 100-year flow in Wildwood Hills would be projected to cost more than $1.1 million.

Large rainfall events, typically during the Flagstaff monsoon season, are clearly subjecting the WWH residents to flooding conditions. Flows ripping through and between homes and streets in this nature create massive, forceful momentum that can pick up objects, knock down people and cause significant property damages. It also poses hazardous conditions for not only vehicles but also for pedestrian accessibility.

The Woody Mountain Campground project, thru a joint project with the City of Flagstaff, includes a detention basin that mitigates the increased flow due to proposed Campground improvements and provides significant peak flow attenuation for flood mitigation purposes for Wildwood Hills. The project would like to accommodate some of the offsite flow in the proposed detention basin

to provide relief to the flooding on the neighboring development. Since the detention basin is proposed at a natural concentration point, it is a great opportunity to detain and mitigate the flow released into the WWH MHP thereby assisting the senior living community in partnership with the City of Flagstaff.

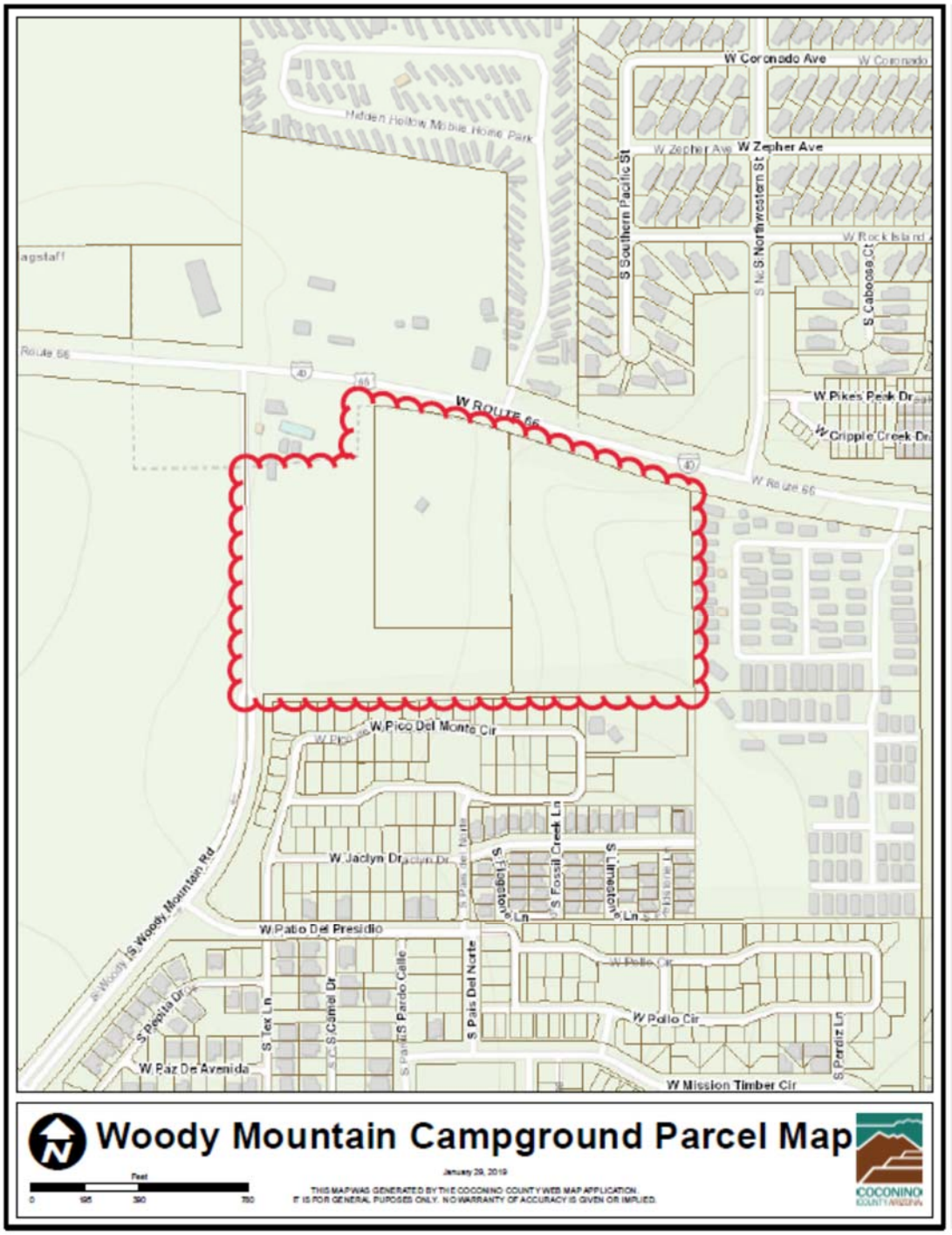


Figure 1: Parcel Map

2. DEVELOPMENT PHASES

Due to the onset of the monsoons and the risk of continued flooding at WWH's, the Woody Mountain Campground improvements will be performed in two Phases to prioritize the detention basin construction to help mitigate WWH MHP flooding risk. This report will serve as a Master Drainage Report for the WMC improvements with the following phases:

i) Phase I

Phase 1 will consist of the construction and installation of most of the proposed improvements on the easterly 8-acre parcel plus a portion of access drive in the middle 8-acre parcel. The work will include the detention basin including the liner and permanent pond portion, outlet pipes and overflow structures, LID basins, culverts, improved channels, access drive, utilities, trails, gazebo, tent sites and other site amenities. This work is anticipated to occur this fall.

ii) Phase 2

Phase 2 will consist of all of the remaining improvements on the middle and westerly parcels. There are RV sites, Park model units, access drives, utilities, bath houses. This work is anticipated to occur this fall into the spring of 2020. All of the main stormwater management facilities will be installed with Phase 1. Only conveyances, etc. will be part of Phase 2 construction. We intend to provide an Addendum to this Final Drainage Report at that time to cover the improvements proposed in Phase 2.

Also, it should be noted that there are no proposed improvements in the northwest portion of the site (County's jurisdiction). However, as it naturally flows to the proposed detention pond, the pond is sized to provide stormwater mitigation for the future improvements on this portion of the site. A separate drainage report will be prepared as and when needed to the concerned jurisdiction to address the future improvements on this portion of the site.

3. OBJECTIVES AND PROCEDURES

The purpose of this Final Drainage Report is to support the Phase 1 Construction Plan submittal and to provide calculations and results of the proposed stormwater management facilities and outlets.

i) Objectives

- To provide Low Impact Development ("LID") Integrated Management Practices ("IMP's") based on the City of Flagstaff (COF or City) Ordinance No. 2009-07. The Runoff Control Volume ("ROCV") is incorporated within the LID basins.
- To provide stormwater detention facilities to mitigate the increase in flowrate from existing to proposed conditions.
- In addition, stormwater mitigation is provided for the increase in flowrate from the future half street improvements of the adjacent Right-of-Way (ROW) off Rte 66 and Woody Mountain Road.
- In addition, the proposed detention basin **mitigates about 72% of the offsite flow rate to help alleviate the flooding problems of the WWH MHP**. The pond serves as a multi-

purpose facility by providing detention for onsite and offsite flows and also functions as an amenity to the Campground.

ii) Methodology

- The proposed improvements include three (3) Bio-Retention Basins (BRB) to provide the ROCV from the proposed onsite improvements.
- Bio-Retention basins consists of a low-lying vegetated area underlain by a sand/soil bed and gravel/underdrain system. A shallow surcharge zone exists above the bio-retention for temporary storage of the ROCV. During a storm, accumulated runoff ponds in the vegetated zone and infiltrates into the underlying sand/soil bed, filling the void spaces of the sand. The underdrain gradually dewaters the sand/soil bed and discharges the runoff to a nearby channel, swale or storm sewer. If the site has a percolation rate greater than 1 inch per hour, underdrain and the supporting gravel layers may be eliminated.
- The flow is then directed to the stormwater detention basin to address the flow rate control requirements and provide a regional detention benefit.

iii) Procedures

- Hydrologic calculations are performed per the of Flagstaff Stormwater Design Manual (SWDM) Chapter 3. United States Army Corps Engineer's (USACE) Hydrologic Engineering Center software (HEC-1), Version 4.1 is used for the runoff computation as this analysis references hydrology from previous drainage studies for the Presidio in the Pines development which used HEC-1 analysis for runoff computation. We are matching procedures for the major contributing watershed.

- Time of Concentration (Tc) calculations are performed per SWDM section 3.1.6.

- Rainfall depths are referenced from the COF SWDM Table 3-2 for a 6-hour storm duration since the watershed area is less than 1 square mile.

- Per SWDM Section 3.2, Curve Numbers for undeveloped forest are referenced from Arizona Department of Water Resources' (ADWR) "Oak Creek Flood Warning System Hydrology Report, TR 90-4, September 1990" (will be referred to as Oak Creek Hydrology Report hereafter). Curve Numbers for other land cover types are referenced from Natural Resources Conservation Services' (NRCS) National Engineering Handbook (NEH) Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Complexes Tables 9-2 (runoff curve numbers for arid and semiarid rangelands) and Table 9-5 (runoff curve numbers for urban areas). Please note the runoff curve number tables from NEH are the same as the runoff curve number tables from the NRCS Technical Release-55 (TR-55).

- The project site lies within Zone X per FEMA FIRM 04005C6804G, 04005C6808G, 04005C6816G and 04005C6812G dated September 3, 2010.

- Federal Emergency Management Agency (FEMA) defines Zone X as areas of moderate flood hazard which are areas outside the Special flood Hazard Area (SFHA) and higher

than the elevation of the 0.2% annual-chance flood. The following Figure shows the FEMA's flood zones.

Figure 2: Floodzone Map

4. RUNOFF CONTROL VOLUME (ROCV)

This project proposes three (3) Bio-Retention basins and one (1) detention basin to address the LID and detention needs.

i) Impervious Area Summary

There is an existing building with some paved areas in the northwest corner of the site. The existing impervious area on the site is 2150 SF (excluding the parcel in the County's jurisdiction).

The total impervious area in the proposed condition is 130,101 SF. Thus, the total increase in the impervious area of the site is 127,952 SF. Please see Appendix B for the breakdown of the impervious areas in the proposed condition.

ii) ROCV Calculations

ROCV required $= ((1" \, Rain)/12) \times Area$
$= ((1" \, Rain)/12) \times 127952 \, sq.ft = 10{,}663 \, cu.ft$=0. 24 ac-ft

Where: Area = increase in the impervious area (Roofs, streets, and paved parking areas)

ROCV provided $= 0.27 \, ac.ft$ (Sum of ROCV in LID ponds 1 thru 3)
ROCV provided (0.27 ac.ft) >ROCV required (0.24ac.ft).

iii) LID Basins Summary

The following table summarizes the volume of the proposed Bio-Retention basin volumes. Please see Appendix B for elevation volume calculations of the LID basins.

Table 1-Summary of Bio-Retention Basin Volumes

ID	Vol. (CF)
LID-1	5952
LID-2	2297
LID-3	3704
Total	**11953**

Geotechnical exploration was performed for the detention pond and it was found that the soils on the site generally have good infiltration rates (more than 1 inch/hr). Therefore, no under drain system is proposed to drain the ROCV. Please see Appendix D for the geotechnical report.

5. REFERENCE DRAINAGE STUDIES

The subject site and the contributing offsite watershed areas were included in previous drainage studies for Presidio in the Pines (Presidio). The hydrologic analysis from the Presidio drainage study has been referenced into the HEC-1 analysis of the current study. Excerpts from the Presidio drainage study are included in Appendix D for reference.

6. HYDROLOGY

The City's Stormwater Design Manual (SWDM) guidelines are followed to analyze the runoff generated by the site. Pre-developed and Post developed runoff is computed to design the detention facilities to mitigate the increase in flow rate from pre to post developed condition.

i) Rainfall

Rainfall depths are referenced from COF SWDM Table 3-2 for 6-hour storm duration since the watershed area is less than 1 square mile.

Table 2-Rainfall Depths

Storm Event	Intensity	Depth
	(inches/hour)	**(inches)**
10	0.36	2.16
25	0.43	2.58
100	0.53	3.18

ii) Time of Concentration (Tc)

Tc calculations were performed per SWDM's section 3.1.6 and are included in Appendix B. Some of the calculated Tc values were too low. Thus, a minimum Tc of 15 mins and 10 mins are used for the pre and post developed conditions.

As a guidance to the minimum Tc, ADOT Hydrologic Drainage Design Manual, HDDM Section 2.2.4 has been referenced, the minimum Tc per HDDM is 10 minutes which is more realistic for Improved/Impervious areas. With the ADOT improvements which mostly include paved/impervious areas, the minimum Tc of 10 minutes is used for post developed condition. With this approach, the minimum Tc for pre-developed condition uses a slightly higher Tc of 15 minutes. While the minimum Tc for pre-developed condition could use 10 minutes, it would underestimate the increase in flow rate from pre to post developed condition. Please note that the standard TR-55 Tc calculations do not include a component to account for the time the rain drop takes to traverse from roof top, pass thru roof gutters and then join the surface/overland flow. Thus, it is believed that the Tc of 15 minutes and 10 minutes is apt for the pre and the post developed condition.

iii) Hydrologic Soil Group (HSG)

The soils information is referenced from Natural Resources Conservation Services' (NRCS) Web Soil Survey (WSS). WSS references soil map for Oak Creek-San Francisco Peaks Area which shows the soils on site to be composed of cobbly clay loam and stony clay loam with Hydrologic Soil Group "C" and "D" (HSG C and HSG D). Curve numbers are referenced from Oak Creek Hydrology Report and NRCS curve numbers tables. Composite curve number calculations are performed to account for the landcover/land use and different hydrologic soil groups. (Please see Appendix B for Soils Information and Curve Number tables).

iv) Existing Condition

The offsite watershed area includes both developed and undeveloped areas. The contributing offsite watershed area is comprised of the Vintage 37-acre parcel located southwest of Route 66 and Woody Mountain Road, northwest portion of Presidio in Pines and southern tip of Hidden Hollow Manufactured Homes and a portion of Rail Road Springs located north of Rte 66.

The Vintage 37-acre parcel was a part of the 2006 Woody Fire burn area. To reflect this existing condition, the current analysis uses curve numbers for the post burn condition.

The Campground site receives offsite flows from the following three locations:

- South perimeter: Offsite flow is released as a point source on southern boundary from the Presidio subdivision via a 30-inch cmp. The majority of the Vintage 37-acre parcel (drainage area SUB-1A), most of the Woody Mountain Road (SUB-1B) and a portion of the Presidio subdivision discharge flow to the 30-inch cmp. The flow from the Vintage parcel and the flow generated by the Woody Mountain Road discharge into a 4'x3' RCBC under Woody Mountain Road that connects into a storm drain system in Presidio. The storm drain system conveys onsite flows from Presidio and offsite flows and eventually discharges into a 30-inch cmp that drains into the Campground site. Please note that there is some portion of Timber Sky development Blocks 1 and 2 that historically drains east towards the WWH MHP. Per City's request to Timber Sky development, this area is diverted to flow west to provide relief to the flooding issues on WWH-MHP.
- North perimeter: An existing 24-inch cmp under Rte 66 discharges flow from Hidden Hollow north of Rte 66 (SUB-2) and a portion of Rte 66 (SUB-2A) discharges into the 24-inch cmp via an existing catch basin in Rte 66. Also flow from Rte 66 flows along the roadside ditch on the south side of the road which eventually terminates and discharges into the Campground site.
- West perimeter: An existing 24"x36" arch cmp under Woody Mountain Road discharges flow from a minor portion of the Vintage 37-acre parcel (SUB-1) and Rte 66 (SUB-2A) which flows in the roadside ditch which eventually terminates and discharges into the Campground site.

The onsite watershed area is divided into three (3) drainage areas: Sub-3A, Sub-3B and Sub-3C. Drainage area Sub-3A which includes the southwest quadrant of the site, flows in a southeasterly direction, along the south perimeter wall. This flow eventually combines with the offsite flow released from the Presidio subdivision, the combined flow then continues northeasterly towards the existing pond in the campground site.

The drainage area SUB-3B comprises the majority of the site. Runoff generated by Sub-3B and 3C traverses through the existing swales and eventually continues as ditches at the steeper easterly portion of the site.

All the onsite and offsite flow ultimately discharges into a makeshift pond that was roughly excavated to pond flows before the flow continues east into the WWH MHP. Based on the existing pond size, it appears that the pond may detain flows generated by smaller storms only. Once the pond fills up, the flow enters the MHP at the west perimeter of the MHP via two (2) rock/grouted channels located on north and south sides of WWH MHP unit 9. This is the single outlet for the stormwater discharged from the Campground site into the WWH MHP. The following table summarizes the 10-year and the 100-year storm event flows discharged at the Outlet in existing condition. Please see Exhibit 1 and Exhibit-2 for the offsite drainage map and the existing condition onsite drainage map included in Appendix A.

Table 3-Existing Condition-Outlet Flow Summary

Storm Event	Flow Rate (cfs)
10-year	97
100-year	199

v) Proposed Condition-Unattenuated

The offsite flow patterns remain the same as in the existing condition. However, per COF, the runoff generated by the additional impervious area for future half street improvements of the adjacent ROWs has been included in the post developed hydrologic calculations and in the detention facility design. Curve numbers are revised for the drainage areas SUB-1B and SUB-2A to account for the future street improvements.

The campground intends to maintain the existing grades to the maximum possible extent except for the pond grading and grading for RV pads and roads. For the onsite drainage areas SUB-3A and SUB-3B, the curve numbers area was revised to account for the newly added impervious areas. Sub-3C is assumed to have commercial improvements in the future and thus appropriate curve numbers for future improvements are used to estimate runoff in the proposed condition. Again, the improvements in SUB-3C are not a part of this project. The proposed runoff is computed just to accommodate mitigation of the increased flow from this portion of the site. A separate drainage study or addendum will be prepared as and when needed to address improvements on this portion of the site in future. Please refer to the composite curve number calculations included in Appendix B. Post developed runoff calculations are performed to account for the newly added impervious areas and the future half street improvements of adjacent ROWs. The following table summarizes the 10-year and the 100-year storm events flows discharged at the Outlet in post developed unattenuated condition.

Table 4-Proposed Condition Unattenuated-Outlet Flow Summary

Storm Event	Flow Rate (cfs)
10-year	118
100-year	234

vi) Post-Developed Condition-Attenuated

The detention basin is proposed at the downstream end of the campground, along the east perimeter of the site. The proposed detention basin serves as a campground amenity by maintaining a body of water year-round. The pond provides mitigation to the increased flows due to the proposed Campground improvements, and also mitigates the offsite flows discharged into the WWH MHP by almost 72%. Please see Section 7 of the report for the detention basin design description. The following table summarizes the 10-year and the 100-year storm event flows discharged at the Outlet in post developed attenuated condition.

Table 5-Proposed Condition Attenuated-Outlet Flow Summary

Storm Event	Flow Rate (cfs)
10-year	37
100-year	55

7. DETENTION BASIN

The pond will have 4' of dead storage at the bottom, with 8' live storage above the permanent pool. It should be noted that the dead storage volume is not included in the pond routing calculations. The pond will have rock lined sides with Malapai boulders to mimic a natural stream/waterbody. Please see Appendix B for the detention volume calculations.

The flow from the proposed improvements will be routed to the LID basins first and then directed to the detention basin. Rock swales/channels are proposed to bring the flow to the detention basin along the existing drainage paths. The rock swales are also analyzed to ensure that the 100-year storm event is contained within the channel. Please see Appendix C for channel calculations. The following table summarizes the pond elevations and volume.

Table 6-Detention Basin Elevation and Volume Summary

Permanent Pool		Detention				Emergency Spillway	Freeboard min. (1 ft)
Bottom	**Top**	**Bottom**	**Top**	**Vol. (ac-ft)**	**100-yr WSE**	**Elev.**	**Elev.**
6988	6992	6992	7000	8.31	6998.5	6998.5	1.5

The Arizona Department of Water Resources (ADWR) defines "jurisdictional dam" as an artificial barrier for the impounding or diversion of water either 25 feet or more in height or having a storage capacity of more than 50 ac-ft. From the above table, the total height is 12' and the embankment height is 8' and the storage capacity is 8.31 ac-ft. Thus, the proposed detention basin is not categorized as a "jurisdictional dam". The following chart from ADWR's "Jurisdictional dam" criteria shows the height and the volume limits.

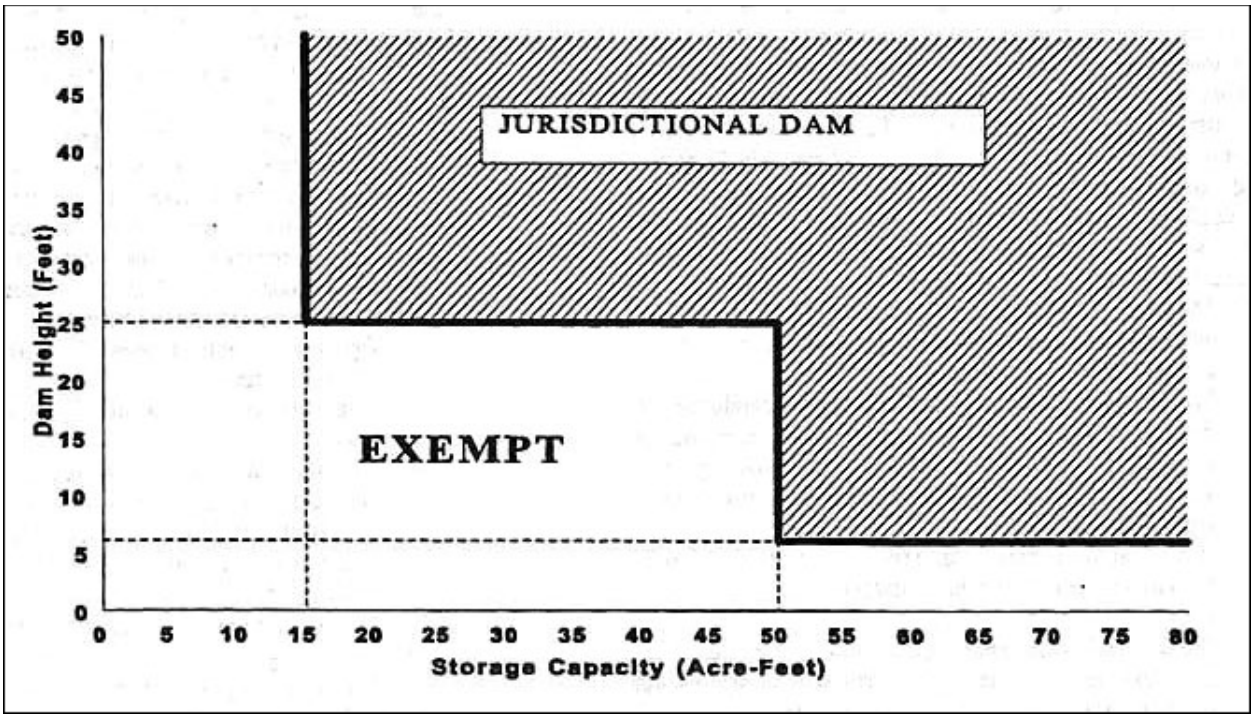


Figure 3: ADWR Dam Criteria Chart

i) Detention Embankment

The detention embankment is twelve (12) feet. As per the COF SWM manual section 8.4.6, a geotechnical engineering study and slope stability analysis is required for the embankments exceeding ten (10) feet. Thus, the embankment will be analyzed by a geotechnical engineer.

The top width of the embankment is eight (8) feet and is more than ½ of the height of the embankment per the COF SWM manual section 8.4.6.

ii) Outlet Facilities

Two (2) outlet pipes are proposed to discharge the detained volume. Both the outlet pipes are 21-inch cmps and will have an invert elevation of 6,988', above the permanent pond elevation.

Outlet pipe-1 discharges flow into the existing south channel east of the basin. Outlet pipe-2 discharges flow into the existing north channel east of the basin. Safety gates will be proposed at the inlet and the outlet ends of the pipes to capture debris and to limit access through the pipes. Please see Appendix C for the outlet flow calculations.

The combined 100-year discharge from the outlet pipes is about 62 cfs which is slightly higher than the 100-year outflow from the detention basin (55 cfs). Thus, the pipes are sized adequately to convey the 100-year outflow released from the detention basin.

iii) Emergency Spillway

Per COF SWDM Section 8.4.6.1, emergency overflow facilities/spillways are required for instances where the primary outlet structure fails or storm events greater than the design capacity

occur. The emergency overflow shall be designed to pass the 100-year peak discharge at a minimum.

Since the flow from the subject site discharges into two (2) existing channels in Wildwood Hills Mobile Home Park, two (2) emergency overflow weirs are proposed to convey the 100-year flow. The emergency overflow weirs are sized to discharge the 100-year inflow released into the detention basin (234 cfs). The total flow is distributed between both the spillways. Thus, each spillway is designed to discharge about 118 cfs. Shallow rectangular concrete flumes are proposed on the slope of the embankment to carry the flow from the emergency overflow weirs and convey it to the existing channels. Please see Appendix C for weir sizing and concrete flume sizing calculations.

iv) Maintenance Road

A 10’ access drive is proposed to provide access into the pond for maintenance. The pond will be maintained privately by the property owner. However, easement is provided to the City to access the pond.

8. HYDRAULICS

i) Culvert Crossings

Culvert crossings are proposed under access roads and trails. Per COF SWDM manual section 5.2.1, culverts under local streets are designed for a 25-year storm event. While the access roads are private roads, the culvert crossings are designed for 100-year storm event (with no overtopping of roads/trails) with exception to culverts 4 and 5 which are designed for 25-year storm event. Safety gates are proposed at the culvert ends to restrict entry into the culverts.

Culvert analysis is performed for both 25-year and 100-year storm events to ensure the Hw/D (Headwater depth/diameter to be less than 1.50) criteria is met per COF SWDM section 5.2.3. Please refer to Appendix C for culvert analysis calculations.

The culverts daylight into either riprap-lined or gabion-lined channels which provide erosion protection. Riprap protection is proposed at the culvert inlets where needed.

The following table summarizes the culvert flows, sizes and Hw/D for 25-yr and 100-yr storm events.

Table 7 : Culvert Summary Table

Culvert ID	Contributing Catchment	Pipe Size	Q25 (cfs)	Hw/D 25 yr	Q100 (cfs)	Hw/D 100 yr
BC1	35% of 3B	1-24" cmp	11	0.96	15	1.21
BC2	3B+2A+1	2-36" cmp	66	1.02	90	1.29
BC3	Sub-2	1-24" cmp	8	0.75	12	1.01
BC4	CP-30	1-9'x3' RCBC	99	0.92	137	1.19
1	Sub-2A+Sub-1	2-30" cmp	36	0.88	48	1.1
2	Sub-2	1-24" cmp	8	0.76	12	1.01
4	65% of 3B	2-24" cmp	20	0.85	27	1.07
5	35% of 3B	2-18" cmp	11	0.98	15	1.24
6	35% of 3B	2-18" cmp	11	0.91	15	1.17

ii) Channels

Channels are proposed to convey offsite flows released into the site to the detention basin and from LID basins to the detention basins. Per COF SWDM Section 4.3, the channels are designed for 25-year storm event and checked for 100-year storm event. The site's natural terrain is steep which leads to steep channels with high velocities. Due to the high velocity, the channels are proposed to be gabion lined with D50=6" rock. Stepped weir structures are adopted to break the natural steep grades and to slow down the flows.

Following is the summary of the channel flow rates.

Table 8: Channel Flow Rate Summary

Channel ID	Contributing Catchment	Q25 (cfs)	Q100 (cfs)
A	Sub-2	8	12
B	Sub-2A+Sub-1	36	48
C	Sub-3B	30	42
D	35% of 3B	11	15
E	CP-30	99	137
F	Sub-3A	9	14

9. SUMMARY AND CONCLUSIONS

- The proposed stormwater management facilities satisfy the rate control and the LID/ROCV requirement. Rate control is provided for the increased flows due to proposed improvements. In addition, mitigation is provided for offsite flows to alleviate flooding on WWH MHP.
- While this serves as a Master Drainage Report for the entire site including the northwest parcel, the Phase I improvements are for the easterly 8-acre parcel. Any future improvements on the rest of the Campground site will be covered by a future addendum. The future improvements on the northwest parcel will have a separate addendum as and when improvements will be proposed in future on that parcel. Since all of the site discharges into the natural low point where the proposed detention is planned, the pond is designed to address mitigation for increased flows due to proposed and future improvements along with additional mitigation to alleviate WWH MHP historic flooding.
- Though the proposed flow attenuation facilities do not completely reduce the flows to the capacity of existing drainage/conveyance facilities in WWH MHP, the flows are significantly lower than the existing condition flows (72% reduction).
- All the impervious areas are directed to the proposed LID basins to address the ROCV requirements to the maximum possible extent.
- The outlet location and the flow pattern in post developed condition is the same as pre-developed condition.
- Post developed flow rate released at the outlets is less than or equal to pre-developed flow rate.
- The drainage areas from the 2006 burn area use an existing burn condition for the curve numbers for the hydrologic analysis. This a conservative approach as the vegetation will eventually be re-established and the curve number will drop significantly.
- To reduce flows from the west of Woody Mountain Road to Wildwood Hills MHP, some areas of Timber Sky that naturally drain east will be routed west as recommended by the City with the Timber Sky improvements.
- The proposed detention basin is at the same location as the existing makeshift pond which is a natural concentration point with more than one inflow points. The proposed detention basin maintains the same flow pattern as in the existing condition. The permanent pond provides an additional site amenity.

10.REFERENCES

City of Flagstaff Stormwater Management Design Manual, City of Flagstaff Engineering Division, 2000

City of Flagstaff Low Impact Development Manual (January 2009)

Natural Resources Conservation Services' (NRCS) Web Soil Survey

Natural Resources Conservation Services' (NRCS) National Engineering Handbook.

Arizona Department of Water Resources (ADWR) Oak Creek Flood Warning System Hydrology Report, TR 90-4, September 1990

United States Army Corps Engineer's (USACE) Hydrologic Engineering Center software

(HEC-1), Version 4.1

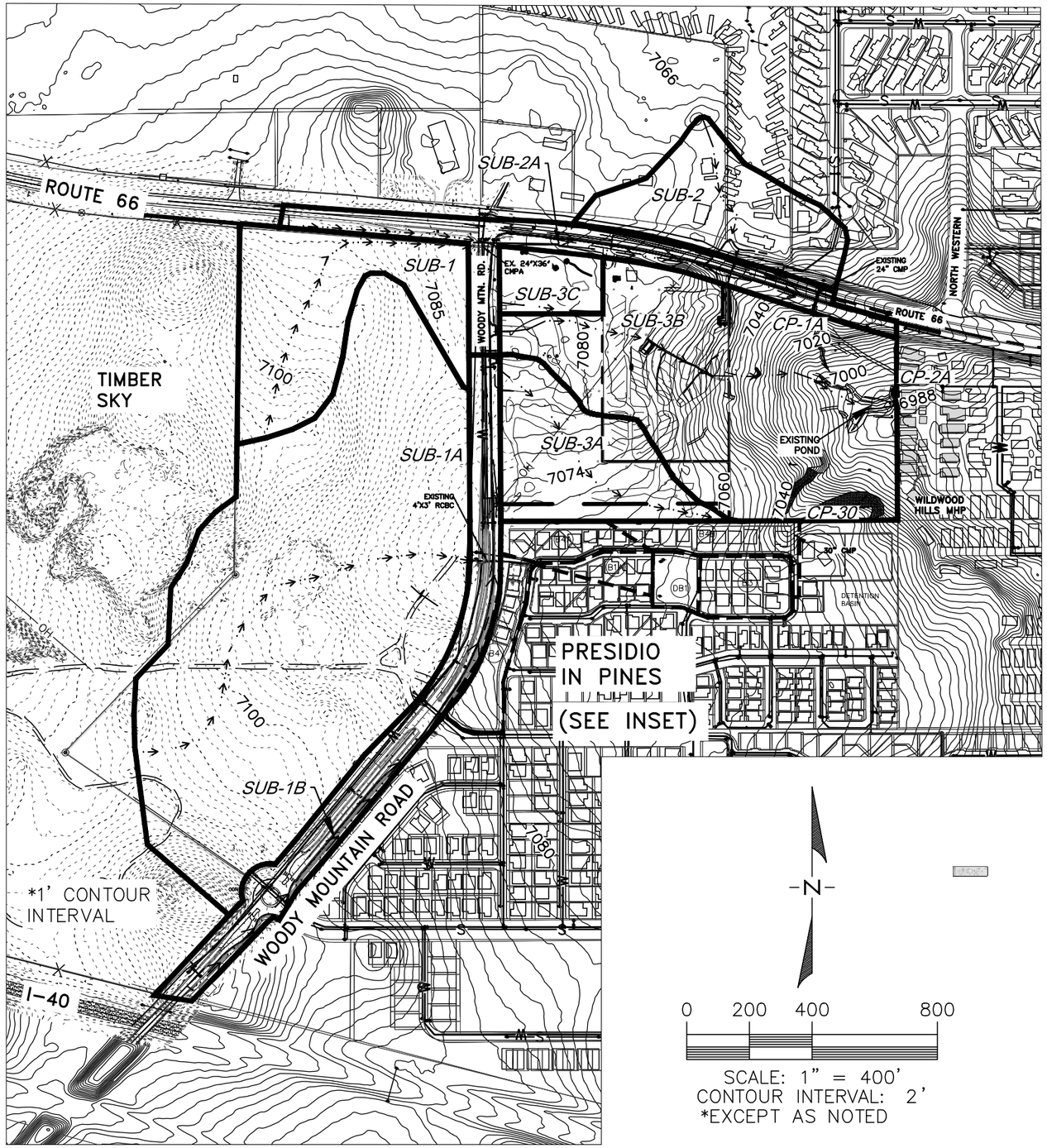
Hydraflow Express Extension for Autodesk AutoCAD Civil 3D by Autodesk, Inc.

Gabion structures, Maccaferri, Inc.

Presidio in Pines Drainage Report excerpts (December 2004)

APPENDIX A

Exhibit 1- Drainage Area Map-Offsite Drainage Areas
Exhibit 2 - Drainage Area Map -Existing Conditions
Exhibit 3 - Drainage Area Map -Proposed Conditions
Exhibit 4 - Overall Plan



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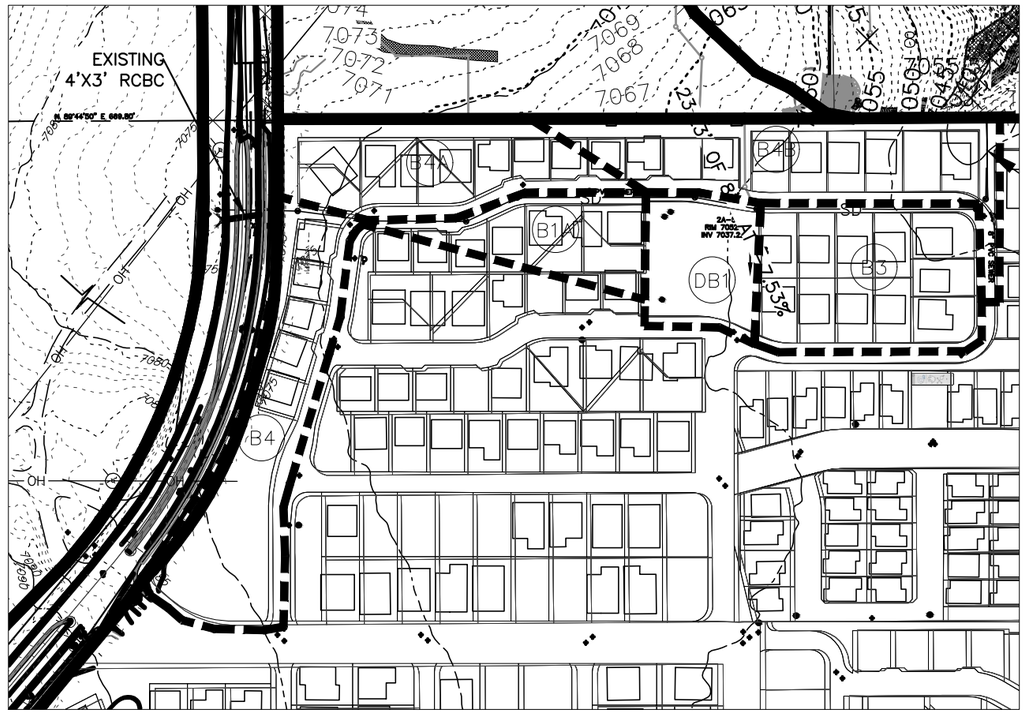

PRESIDIO IN THE PINES
DRAINAGE AREAS

LEGEND

SUB-1	DRAINAGE AREA ID
———	DRAINAGE AREA LIMITS
· · →· · →· ·	TRAVEL TIME PATH

DRAFTED BY:	SK
DATE:	06/24/19
PROJ. NO.:	118044
FN:	118044-Drainage

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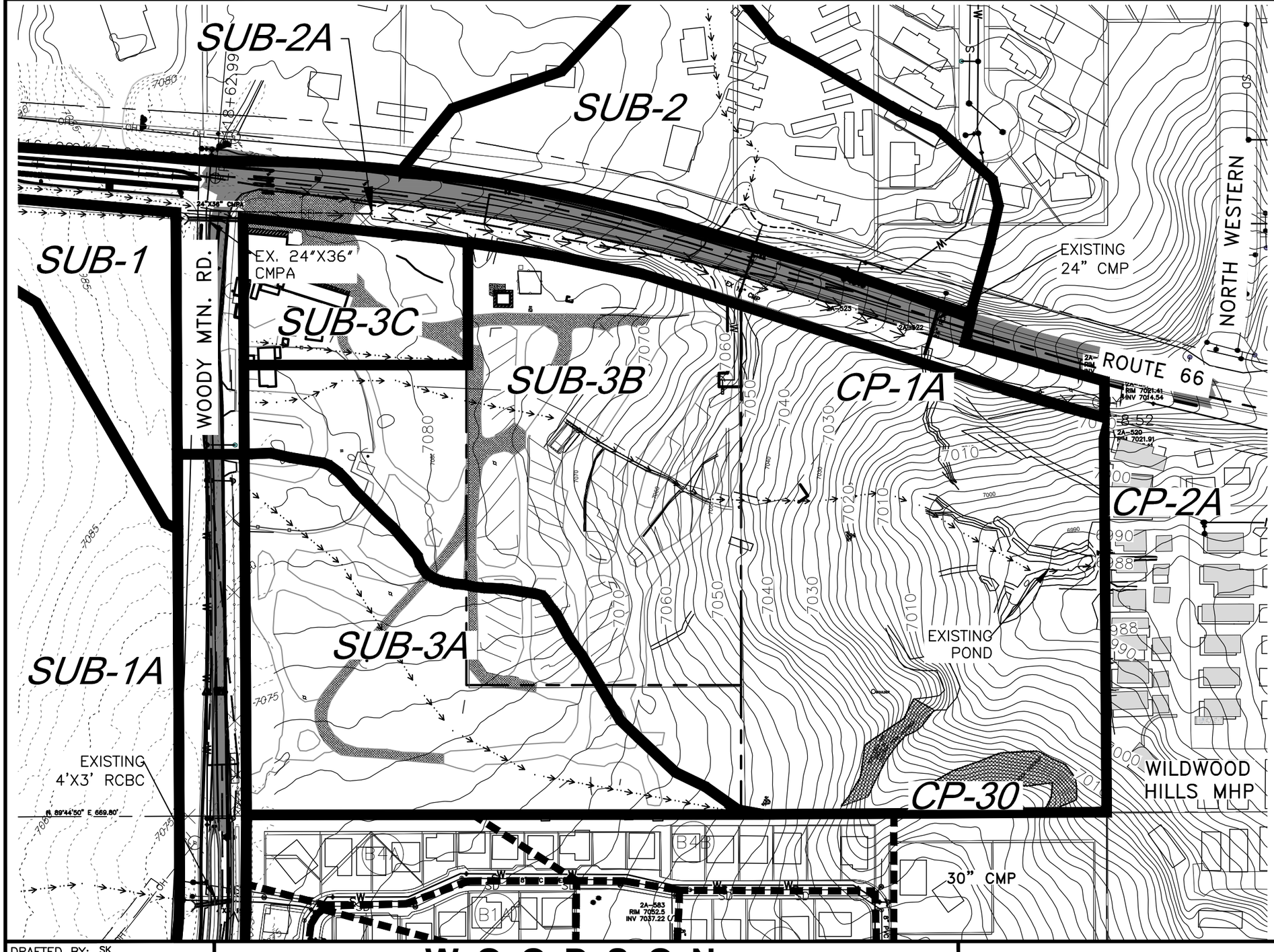
WOODY MOUNTAIN CAMPGROUND
EXHIBIT 1-OFFSITE DRAINAGE AREA MAP



LEGEND

SUB1	DRAINAGE AREA ID
▬▬	DRAINAGE AREA LIMITS
···→···	TRAVEL TIME PATH

PLEASE SEE OFFSITE DRAINAGE AREA MAP FOR THE COMPLETE EXTENTS OF THE OFFSITE DRAINAGE AREAS.

N

0 75 150 300

SCALE: 1" = 150'
CONTOUR INTERVAL: 1'

DRAFTED BY:	SK
DATE:	07/15/2019
PROJ. NO.:	118044
FN:	118044 Drainage.dwg

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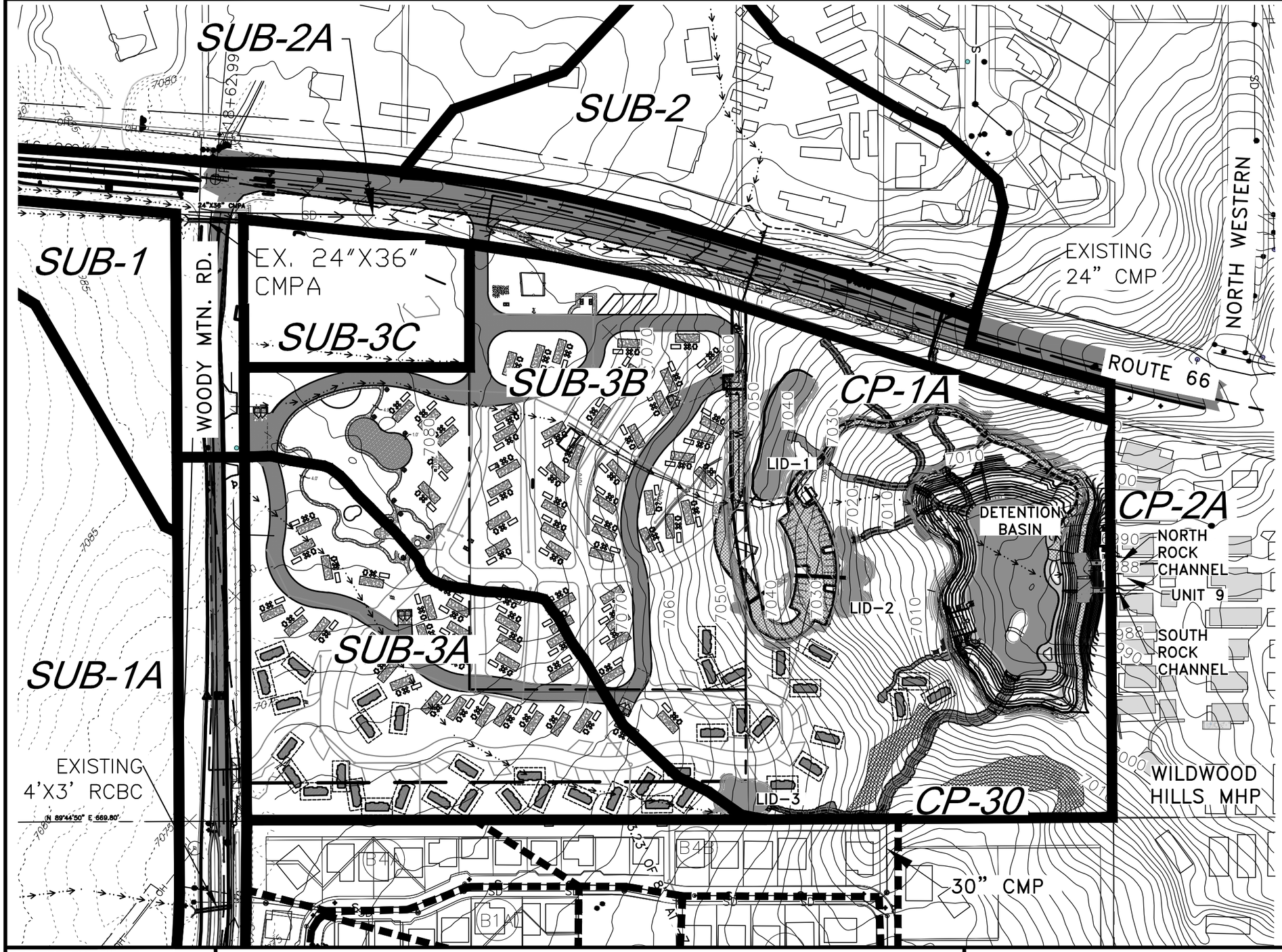
WOODY MOUNTAIN CAMPGROUND
EXHIBIT 2-DRAINAGE AREA MAP EXISTING CONDITION



LEGEND

SUB 1 DRAINAGE AREA ID

DRAINAGE AREA LIMITS

TRAVEL TIME PATH

PLEASE SEE OFFSITE DRAINAGE AREA MAP FOR THE COMPLETE EXTENTS OF THE OFFSITE DRAINAGE AREAS.

THE PHASE II IMPROVEMENTS ON THE CAMPGROUND ARE SHOWN FOR REFERENCE ONLY. PLEASE SEE EXHIBIT 4 FOR THE OVERALL PLAN THAT SHOWS THE PROPOSED IMPROVEMENTS IN PHASE I.

N

0 75 150 300

SCALE: 1" = 150'
CONTOUR INTERVAL: 1'

DRAFTED BY:	SK
DATE:	07/15/19
PROJ. NO.:	118044
FN:	118044-Drainage.dwg

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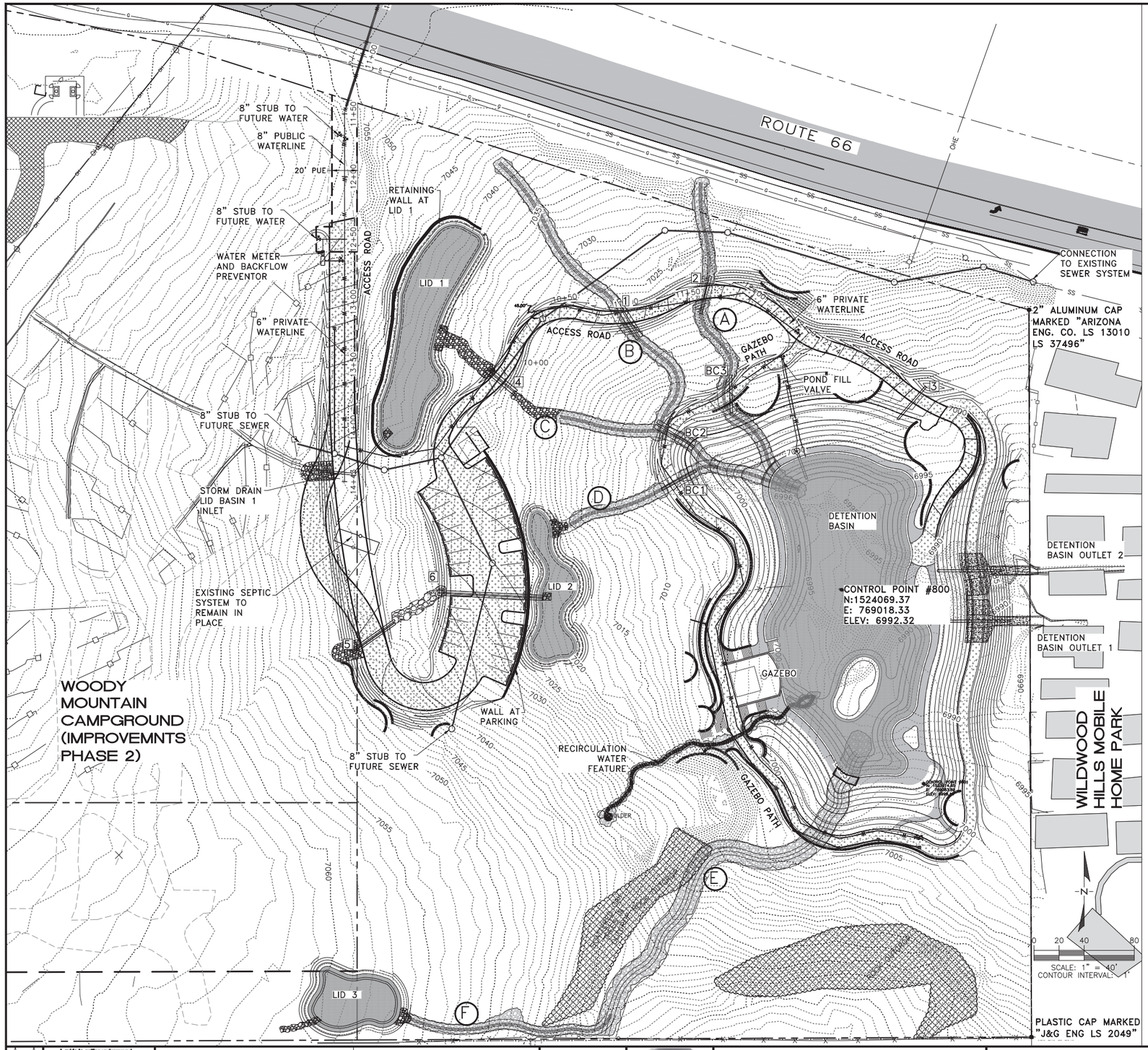
WOODY MOUNTAIN CAMPGROUND

EXHIBIT 3-DRAINAGE AREA MAP PROPOSED CONDITION



CIVIL INDEX

LEGEND

(D)	CHANNEL NAME
6	CULVERT NAME

EARTHWORK QUANTITIES (CY)

	DETENTION BASIN	LID1	LID2	LID3	ACCESS ROAD	GAZEBO ROAD	TOTAL
EXCAVATION	9,787	1,166	294	360	1,176	516	13,300
EMBANKMENT	3,394	35	90	12	3,084	62	6,677

BY SIGNING THESE PLANS, THE DESIGNER OF THE LANDSCAPING PLANS CONFIRMS THAT THESE GRADING PLANS HAVE BEEN REVIEWED, IS AWARE OF THE SCOPE OF THE PROJECT, AND HAS IDENTIFIED AND ADDRESSED ANY POTENTIAL CONFLICTS BETWEEN THE GRADING AND LANDSCAPING PLANS.

LANDSCAPE DESIGNER DATE

WOODSON ENGINEERING AND SURVEYING, INC.
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118044

7/10/19

WOODY MTN. CAMPGROUND
PHASE 1
CONSTRUCTION PLANS

A guide to getting underground facilities located before you dig
Know what's below. Call before you dig.
ARIZONA811
Call 811 or visit www.Arizona811.com

FN: 01 TO 03 DETAILS

REVISIONS:

1994 – 2019 25 YEARS OF EXCELLENCE WOODSON ENGINEERING & SURVEYING

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WOODY MTN. CAMPGROUND
PHASE 1

OVERALL PLAN

HOR SCALE: 1"=30'
VERT SCALE: NA
DATE: 7/10/19
PROJECT NO.: 118044
AGENCY NO.: PZ18-00210
SHEET NO.: C1 OF 19

DESIGNED BY: AAS
DRAFTED BY: AAS
CHECKED BY: RLS

APPENDIX B

Soils Information
Composite Curve Number Calculations
Time of Concentration Calculations
Drainage Areas Summary Table
HEC-1 Output-Existing Condition 10-year Storm Event
HEC-1 Output-Existing Condition 100-year Storm Event
HEC-1 Output-Proposed Condition Unattenuated 10-year Storm Event
HEC-1 Output-Proposed Condition Unattenuated 100-year Storm Event
HEC-1 Output-Proposed Condition Attenuated 10-year Storm Event
HEC-1 Output-Proposed Condition Attenuated 100-year Storm Event
Summary of Impervious Area and ROCV Calculations

Search

Map Unit Legend

HSG C

HSG D

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County (AZ693)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Jacques clay loam, 0 to 2 percent slopes	31.7	4.5%
2	Brolliar stony clay loam, 0 to 2 percent slopes	159.2	22.9%
2A	Brolliar stony clay loam, 2 to 8 percent slopes	193.2	27.7%
2B	Brolliar stony clay loam, 8 to 30 percent slopes	16.2	2.3%
12	Brolliar cobbly clay loam, deep variant, 0 to 5 percent slopes	270.0	38.8%
15A	Tortugas-Daze complex, 0 to 15 percent slopes	25.9	3.7%
Totals for Area of Interest		**696.2**	**100.0%**

HSG D

HSG D

HSG C

HSG D

Soil Map

Scale (not to scale)

Warning: Soil Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps areas of contrasting soils that could have been shown at a more detailed scale.

WILDWOOD HILLS-SOILS MAP

Soil Data Available

Name	Area Symbol	Data Availability	Version
Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County	AZ693	Tabular and Spatial, incomplete	Survey Area: Version 5, Sep 14, 2014 Tabular: Version 4, Sep 14, 2014 Spatial: Version 2, Dec 17, 2013

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

1—Jacques clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1vhjq
Elevation: 6,580 to 7,080 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Jacques and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jacques

Setting

Landform: Drainageways, valleys
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 16 inches: clay loam
H2 - 16 to 60 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C

Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

2—Brolliar stony clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1vhjr
Elevation: 6,790 to 7,420 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar

Setting

Landform: Plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 3 inches: stony clay loam
H2 - 3 to 30 inches: clay
R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Percent of area covered with surface fragments: 15.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5c
Hydrologic Soil Group: D

Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

2A—Brolliar stony clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1vhjs
Elevation: 6,620 to 7,540 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar

Setting

Landform: Plains
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 3 inches: stony clay loam
H2 - 3 to 30 inches: clay
R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 2 to 8 percent
Percent of area covered with surface fragments: 15.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5c
Hydrologic Soil Group: D

Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

2B—Brolliar stony clay loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1vhjt
Elevation: 6,760 to 7,550 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 3 inches: stony clay loam
H2 - 3 to 30 inches: clay
R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 8 to 30 percent
Percent of area covered with surface fragments: 20.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5c
Hydrologic Soil Group: D

Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

12—Brolliar cobbly clay loam, deep variant, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1vhk4
Elevation: 6,870 to 7,560 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Brolliar, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brolliar, Deep

Setting

Landform: Plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 3 inches: cobbly clay loam
H2 - 3 to 60 inches: clay

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5c
Hydrologic Soil Group: C

Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County

15A—Tortugas-Daze complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1vhkb
Elevation: 6,670 to 7,090 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 90 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Tortugas and similar soils: 55 percent
Daze and similar soils: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tortugas

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium and/or residuum weathered from limestone

Typical profile

H1 - 0 to 3 inches: cobbly loam
H2 - 3 to 14 inches: very cobbly loam
R - 14 to 24 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 6 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 50 percent
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: D

Hydric soil rating: No

Description of Daze

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and sandstone

Typical profile

H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 7 inches: clay loam
H3 - 7 to 18 inches: clay
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: D
Hydric soil rating: No

Data Source Information

Soil Survey Area: Oak Creek-San Francisco Peaks Area, Arizona, Part of Coconino County
Survey Area Data: Version 5, Sep 14, 2014

OAK CREEK FLOOD WARNING SYSTEM

HYDROLOGY REPORT

ARIZONA DEPARTMENT OF WATER RESOURCES

ENGINEERING DIVISION

FLOOD MANAGEMENT SECTION

TR 90 - 4
SEPTEMBER 1990

Table 2

RUNOFF CURVE NUMBERS

Cover Type	Cover Condition	Hydrologic Soil Group	Curve Number
BARE ROCK	NO CONDITION		94
RIVERWASH	NO CONDITION		53
CINDERS/LAVA	POOR 0 - 30%		53
SPRUCE - FIR	GOOD 70 - 100%	B	41
MIXED CONIFER	GOOD 70 - 100%	B	41
MIXED CONIFER	GOOD 70 - 100%	C	51
MIXED CONIFER	FAIR 30 - 70%	A	48
MIXED CONIFER	FAIR 30 - 70%	B	53
MIXED CONIFER	FAIR 30 - 70%	C	65
MIXED CONIFER	FAIR 30 - 70%	D	75
MIXED CONIFER	POOR 0 - 30%	A	60
MIXED CONIFER	POOR 0 - 30%	B	71
MIXED CONIFER	POOR 0 - 30%	C	80
MIXED CONIFER	POOR 0 - 30%	D	87
PONDEROSA PINE	GOOD 70 - 100%	B	41
PONDEROSA PINE	GOOD 70 - 100%	C	51
PONDEROSA PINE	FAIR 30 - 70%	A	48
PONDEROSA PINE	FAIR 30 - 70%	B	53
PONDEROSA PINE	FAIR 30 - 70%	C	65
PONDEROSA PINE	FAIR 30 - 70%	D	75
PONDEROSA PINE	POOR 0 - 30%	B	71
PONDEROSA PINE	POOR 0 - 30%	C	80
PINON - JUNIPER	GOOD 70 - 100%	B	41
PINON - JUNIPER	GOOD 70 - 100%	C	61
PINON - JUNIPER	GOOD 70 - 100%	D	71
PINON - JUNIPER	FAIR 30 - 70%	A	40
PINON - JUNIPER	FAIR 30 - 70%	B	58
PINON - JUNIPER	FAIR 30 - 70%	C	73
PINON - JUNIPER	FAIR 30 - 70%	D	80
PINON - JUNIPER	POOR 0 - 30%	A	62
PINON - JUNIPER	POOR 0 - 30%	B	75
PINON - JUNIPER	POOR 0 - 30%	C	85
PINON - JUNIPER	POOR 0 - 30%	D	89
CHAPARRAL	GOOD 70 - 100%	B	52
CHAPARRAL	GOOD 70 - 100%	C	68
CHAPARRAL	GOOD 70 - 100%	D	78
CHAPARRAL	FAIR 30 - 70%	B	65
CHAPARRAL	FAIR 30 - 70%	C	77
CHAPARRAL	FAIR 30 - 70%	D	85
CHAPARRAL	POOR 0 - 30%	B	78
CHAPARRAL	POOR 0 - 30%	C	86
CHAPARRAL	POOR 0 - 30%	D	91
GRASSLAND	GOOD 70 - 100%	B	48
GRASSLAND	GOOD 70 - 100%	C	60
GRASSLAND	GOOD 70 - 100%	D	70
GRASSLAND	FAIR 30 - 70%	B	61
GRASSLAND	FAIR 30 - 70%	C	72
GRASSLAND	FAIR 30 - 70%	D	80
GRASSLAND	POOR 0 - 30%	B	74
GRASSLAND	POOR 0 - 30%	C	82
GRASSLAND	POOR 0 - 30%	D	89
FOREST PARK	FAIR 30 - 70%	A	55
FOREST PARK	FAIR 30 - 70%	C	69
FOREST PARK	POOR 0 - 30%	B	74
FOREST PARK	POOR 0 - 30%	D	89
DESERT GRASSLAND	GOOD 70 - 100%	B	62
DESERT GRASSLAND	GOOD 70 - 100%	C	74
DESERT GRASSLAND	GOOD 70 - 100%	D	85
DESERT GRASSLAND	FAIR 30 - 70%	B	71
DESERT GRASSLAND	FAIR 30 - 70%	C	81
DESERT GRASSLAND	FAIR 30 - 70%	D	89
DESERT GRASSLAND	POOR 0 - 30%	B	80
DESERT GRASSLAND	POOR 0 - 30%	C	87
DESERT GRASSLAND	POOR 0 - 30%	D	93
SONORA DESERT	GOOD 70 - 100%	A	49
SONORA DESERT	GOOD 70 - 100%	B	68
SONORA DESERT	GOOD 70 - 100%	C	79
SONORA DESERT	GOOD 70 - 100%	D	84
SONORA DESERT	FAIR 30 - 70%	A	55
SONORA DESERT	FAIR 30 - 70%	B	72
SONORA DESERT	FAIR 30 - 70%	C	81
SONORA DESERT	FAIR 30 - 70%	D	86
SONORA DESERT	POOR 0 - 30%	A	63
SONORA DESERT	POOR 0 - 30%	B	77
SONORA DESERT	POOR 0 - 30%	C	85
SONORA DESERT	POOR 0 - 30%	D	88
RIPARIAN	GOOD 70 - 100%	B	57
RIPARIAN	GOOD 70 - 100%	C	63
RIPARIAN	FAIR 30 - 70%	A	55
RIPARIAN	FAIR 30 - 70%	C	68
RIPARIAN SCRUB	FAIR 30 - 70%	A	53
MEADOW	GOOD 70 - 100%	D	70

Table 9–5 Runoff curve numbers for urban areas [1/]

Cover description cover type and hydrologic condition	Average percent impervious area [2/]	-- CN for hydrologic soil group -- A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94

1/ Average runoff condition, and $I_a = 0.2S$.

2/ The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

3/ CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space type.

4/ Composite CNs for natural desert landscaping should be computed using figures 9–3 or 9–4 based on the impervious area percentage (CN=98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

Sub-1

Sheet Flow

Input Data		
	Elev Start [ft]	7106
	Elev End [ft]	7105
	Length [ft]	70
	n (Short Grass)	0.15
OUTPUT		
	S [ft/ft]	0.01
	Tt [hr]	0.178

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7105
	Elev End [ft]	7095
	Length [ft]	335
OUTPUT		
	S [ft/ft]	0.0299
	V [ft/s]	2.79
	Tt [min]	2.00
	Tt [hr]	0.033

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7095
	Elev End [ft]	7077
	Length [ft]	695
	Manning's n	0.040
	Channel Slope [ft/ft]	0.0259
OUTPUT		
	Area [sf]	23.50
	Wetted Perimeter [ft]	41.06
	Hydraulic Radius	0.57
	Velocity [fps]	4.12
	Tt [min]	2.81
	Tt [hr]	0.047

Tc [hr]	0.258
Tc [min]	15.47
SCS Lag [hr]	0.155

Sub-1A

Sheet Flow

Input Data		
	Elev Start [ft]	7113
	Elev End [ft]	7111
	Length [ft]	98
	n (short grass)	0.15
OUTPUT		
	S [ft/ft]	0.02
	Tt [hr]	0.202

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7111
	Elev End [ft]	7098
	Length [ft]	561
	Output	
	S [ft/ft]	0.0232
	V [ft/s]	2.46
	Tt [min]	3.81
	Tt [hr]	0.063

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7098
	Elev End [ft]	7070
	Length [ft]	904
	Manning's n	0.040
	Channel Slope [ft/ft]	0.0310
	Depth [ft]	1.00
OUTPUT DATA:		
	Area [sf]	27.50
	Wetted Perimeter [ft]	40.08
	Hydraulic Radius	0.69
	Velocity [fps]	5.09
	Tt [min]	2.96
	Tt [hr]	0.049

Tc [hr]	0.314
Tc [min]	18.87
SCS Lag [hr]	0.189

Sub-1B

Sheet Flow

Input Data		
	Elev Start [ft]	7131
	Elev End [ft]	7130
	Length [ft]	36
	n (Asphalt)	0.011
OUTPUT		
	S [ft/ft]	0.03
	Tt [hr]	0.010

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7130
	Elev End [ft]	7115
	Length [ft]	490
	Output	
	S [ft/ft]	0.0306
	V [ft/s]	2.82
	Tt [min]	2.89
	Tt [hr]	0.048

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7115
	Elev End [ft]	7076
	Length [ft]	1219
	Channel Slope [ft/ft]	0.0320
	Depth [ft]	1.00
OUTPUT DATA:		
	Area [sf]	2.25
	Wetted Perimeter [ft]	4.03
	Hydraulic Radius	0.56
	Velocity [fps]	9.01
	Tt [min]	2.26
	Tt [hr]	0.038

Tc [hr]	0.096	
Tc [min]	10.00	(Min. 10 min)
SCS Lag [hr]	0.100	

Sub-2A

Sheet Flow

Input Data		
	Elev Start [ft]	7088
	Elev End [ft]	7087
	Length [ft]	35
	n (Asphalt)	0.011
OUTPUT		
	S [ft/ft]	0.03
	Tt [hr]	0.010

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7087
	Elev End [ft]	7080
	Length [ft]	674
	Output	
	S [ft/ft]	0.0104
	V [ft/s]	1.64
	Tt [min]	6.83
	Tt [hr]	0.114

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7080
	Elev End [ft]	7040
	Length [ft]	945
	Manning's n	0.020
	Channel Slope [ft/ft]	0.0423
	Depth [ft]	1.00
OUTPUT DATA:		
	Area [sf]	16.00
	Wetted Perimeter [ft]	27.09
	Hydraulic Radius	0.59
	Velocity [fps]	10.76
	Tt [min]	1.46
	Tt [hr]	0.024

Tc [hr]	0.148	
Tc [min]	10.00	(Min. 10 min)
SCS Lag [hr]	0.100	

Sub-2

Sheet Flow

Input Data		
	Elev Start [ft]	7072
	Elev End [ft]	7069
	Length [ft]	97
	n (dense grasses)	0.24
OUTPUT		
	S [ft/ft]	0.03
	Tt [hr]	0.247

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7069
	Elev End [ft]	7068
	Length [ft]	203
	Output	
	S [ft/ft]	0.0049
	V [ft/s]	1.13
	Tt [min]	2.99
	Tt [hr]	0.050

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7068
	Elev End [ft]	7060
	Length [ft]	125
	Manning's n	0.040
	Channel Slope [ft/ft]	0.0640
	Depth [ft]	1.00
OUTPUT DATA:		
	Area [sf]	7.00
	Wetted Perimeter [ft]	12.20
	Hydraulic Radius	0.57
	Velocity [fps]	6.49
	Tt [min]	0.32
	Tt [hr]	0.005

Tc [hr]	0.302
Tc [min]	18.11
SCS Lag [hr]	0.181

Sub-3A Existing Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7083
	Elev End [ft]	7081
	Length [ft]	42
	n (dense grasses)	0.24
OUTPUT		
	S [ft/ft]	0.05
	Tt [hr]	0.106

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7081
	Elev End [ft]	7050
	Length [ft]	1056
	Output	
	S [ft/ft]	0.0294
	V [ft/s]	2.76
	Tt [min]	6.37
	Tt [hr]	0.106

Tc [hr]	0.212
Tc [min]	12.74
Tc [min] used	15.00
Tc [hr] used	0.25
SCS Lag [hr]	0.150

Sub-3B Existing Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7082.6
	Elev End [ft]	7082
	Length [ft]	95
	n (Dense Grasses)	0.25
OUTPUT		
	S [ft/ft]	0.01
	Tt [hr]	0.473

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7082
	Elev End [ft]	7072
	Length [ft]	400
	Output	
	S [ft/ft]	0.0250
	V [ft/s]	2.55
	Tt [min]	2.61
	Tt [hr]	0.044

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7072
	Elev End [ft]	6988
	Length [ft]	912
	Manning's n	0.040
	Channel Slope [ft/ft]	0.0921
	Depth [ft]	2.00
OUTPUT DATA:		
	Area [sf]	90.00
	Wetted Perimeter [ft]	85.10
	Hydraulic Radius	1.06
	Velocity [fps]	11.70
	Tt [min]	1.30
	Tt [hr]	0.022

Tc [hr]	0.538
Tc [min]	32.30
SCS Lag [hr]	0.32

Sub-3C Existing Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7082.00
	Elev End [ft]	7081.25
	Length [ft]	72
	n (dense grasses)	0.03
OUTPUT		
	S [ft/ft]	0.01
	Tt [hr]	0.049

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7081.25
	Elev End [ft]	7079
	Length [ft]	245
	Output	
	S [ft/ft]	0.0092
	V [ft/s]	1.55
	Tt [min]	2.64
	Tt [hr]	0.044

Tc [hr]	0.093	
Tc [min]	15.00	(Min. 15 min)
SCS Lag [hr]	0.15	

Sub-3A Proposed Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7083
	Elev End [ft]	7081
	Length [ft]	42
	n (short grasses)	0.15
OUTPUT		
	S [ft/ft]	0.05
	Tt [hr]	0.073

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7081
	Elev End [ft]	7050
	Length [ft]	1056
	Output	
	S [ft/ft]	0.0294
	V [ft/s]	2.76
	Tt [min]	6.37
	Tt [hr]	0.106

Tc [hr]	0.179
Tc [min]	10.74
Tc [min] used	10.00
Tc [hr] used	0.17
SCS Lag [hr]	0.100

Sub-3B Proposed Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7082.75
	Elev End [ft]	7082
	Length [ft]	43
	n (dense grasses)	0.25
OUTPUT		
	S [ft/ft]	0.02
	Tt [hr]	0.167

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7082
	Elev End [ft]	7072
	Length [ft]	448
	Output	
	S [ft/ft]	0.0223
	V [ft/s]	2.41
	Tt [min]	3.10
	Tt [hr]	0.052

Open Channel Flow

INPUT DATA:		
	Elev Start [ft]	7072
	Elev End [ft]	7000
	Length [ft]	548
	Manning's n	0.040
	Channel Slope [ft/ft]	0.1314
	Depth [ft]	2.00
OUTPUT DATA:		
	Top Width [ft]	85.00
	Area [sf]	90.00
	Wetted Perimeter [ft]	85.10
	Hydraulic Radius	1.06
	Velocity [fps]	13.98
	Tt [min]	0.65
	Tt [hr]	0.011

Tc [hr]	0.230
Tc [min]	13.78
SCS Lag [hr]	0.14

Sub-3C Proposed Condition

Sheet Flow

Input Data		
	Elev Start [ft]	7082
	Elev End [ft]	7082
	Length [ft]	72
	n (dense grasses)	0.01
OUTPUT		
	S [ft/ft]	0.01
	Tt [hr]	0.030

Shallow Concentrated Flow

Unpaved		
	Elev Start [ft]	7081.5
	Elev End [ft]	7079
	Length [ft]	245
	Output	
	S [ft/ft]	0.0102
	V [ft/s]	1.63
	Tt [min]	2.51
	Tt [hr]	0.042

Tc [hr]	0.072	
Tc [min]	10.00	(Min. 10 min)
SCS Lag [hr]	0.10	

Composite Curve Number (CN) Calculations-Existing Condition

Drainage Area ID	Total Area (ac)	Total Area (sq mi)	Soil Map Symbol	Hydrologic Soil Group	Cover Type	Cover Condition	SCS Curve Number	Area for Individual CN	Composite SCS CN
*1	7.01	0.011	2A	D	Open Space (<50% grass cover)	NA	89	1.29	86.55
			12	C	Open Space (<50% grass cover)	Fair	86	5.72	
*1A	28.94	0.045	2	D	Open Space (<50% grass cover)	NA	89	13.20	87.37
			12	C	Open Space (<50% grass cover)	NA	86	15.74	
Sub-1B	5.84	0.009	2	D	Paved Street	NA	98	1.90	93.23
				D	Paved Street w/ Open Ditches		93	1.90	
				D	Dirt (including ROW)	NA	89	2.04	
Sub-2	4.97	0.008	2	D	Residential - 1/8 Acre	NA	92	0.85	79.72
			2A	D	Residential - 1/8 Acre	Fair	92	1.07	
			12	C	Ponderosa Pine (Fair)	Fair	65	1.53	
					Open Space (50% -70% cover)	NA	79	1.53	
Sub-2A	4.53	0.007	2A	D	Dirt (including ROW)	NA	89	2.101	91.15
					Paved Street w/ Open Ditches	NA	93	2.43	
Sub-3A	5.14	0.008	12	C	Ponderosa Pine (Fair)	Fair	65	2.57	72.00
					Open Space (Fair)	NA	79	2.57	
Sub-3B	15.42	0.024	2A	D	Ponderosa Pine (Fair)	Fair	75	8.97	75.49
			12	C	Ponderosa Pine (Fair)	Fair	65	3.12	
					Open Space (Fair)	NA	79	3.12	
			12	C	Roofs	Fair	98	0.22	
Sub-3C	1.51	0.002	12	C	Ponderosa Pine (Fair)	Fair	65	0.65	75.74
					Open Space (Fair)	NA	79	0.65	
					Roofs	Fair	98	0.22	

* Drainage Areas 1 and 1A use the post burn curve numbers - Open Sapce with less than 50% grass cover

Composite Curve Number (CN) Calculations-Proposed Condition

Drainage Area ID	Total Area (ac)	Total Area (sq mi)	Soil Map Symbol	Hydrologic Soil Group	Cover Type	Cover Condition	SCS Curve Number	Area for Individual CN	Composite SCS CN
*1	7.01	0.011	2A	D	Open Space (<50% grass cover)	NA	89	1.29	86.55
			12	C	Open Space (<50% grass cover)	Fair	86	5.72	
*1A	28.94	0.045	2	D	Open Space (<50% grass cover)	NA	89	13.20	87.37
			12	C	Open Space (<50% grass cover)	NA	86	15.74	
Sub-1B	5.84		2	D	Paved Street	NA	98	2.05	93.46
					Paved Street w/ Open Ditches	NA	93	1.90	
					Dirt (including ROW)	NA	89	1.89	
Sub-2	4.97	0.008	2	D	Residential - 1/8 Acre	NA	92	0.85	79.72
			2A	D	Residential - 1/8 Acre	Fair	92	1.07	
			12	C	Ponderosa Pine (Fair)	Fair	65	1.53	
					Open Space (<50% grass cover)	NA	79	1.53	
Sub-2A	4.53	0.007	2A	D	Dirt (including ROW)	NA	89	1.387	95.25
					Paved Street	NA	98	3.15	
Sub-3A	5.14	0.008	12	C	Ponderosa Pine (Fair)	Fair	65	1.75	78.72
					Open space (Fair)		79	1.75	
					Gravel		85	0.62	
					Rooftops/impervious areas	NA	98	1.02	
Sub-3B	15.42	0.024	2A	D	Ponderosa Pine (Fair)	Fair	75	3.97	86.44
					Open Space (Fair)		84	3.97	
					Permanent Pond		98	1.03	
			12	C	Ponderosa Pine (Fair)	Fair	65	2.03	
					Open space (Fair)		79	2.03	
					Gravel	NA	85	1.36	
			12		Rooftops/impervious areas	Fair	98	1.97	
Sub-3C	1.51	0.002	12	C	Open Space (Fair)	Fair	79	0.45	92.30
					Roofs	Fair	98	1.06	

* Drainage Areas 1 and 1A use the post burn curve numbers - Open Sapce with less than 50% grass cover

Drainage Area ID	Area	Area		CN	Tc	Tlag=0.6*Tc
	sq.ft	Acres	sq.miles		min	(hr)
Offsite						
Sub-1	305345	7.01	0.011	86.55	15.5	0.155
Sub-1A	1260517	28.94	0.045	87.37	18.9	0.189
Sub-1B	254229	5.84	0.009	93.23	10.0	0.100
Sub-2	216434	4.97	0.008	79.72	18.1	0.181
Sub-2A	197411	4.53	0.007	91.15	10.0	0.100
Onsite						
Sub-3A	223971	5.14	0.008	72.00	15.0	0.150
Sub-3B	671492	15.42	0.024	75.49	31.7	0.32
Sub-3C	65802	1.51	0.002	75.74	15.0	0.15

Woody Mountain Campground Drainage Area Summary-Proposed Conditions

Drainage Area ID	Area	Area		CN	Tc	Tlag=0.6*Tc
	sq.ft	Acres	sq.miles		min	(hr)
Offsite						
Sub-1	305345	7.01	0.011	86.55	15.5	0.155
Sub-1A	1260517	28.94	0.045	87.37	18.9	0.189
Sub-1B	254229	5.84	0.009	93.46	10.0	0.100
Sub-2	216434	4.97	0.008	79.72	18.1	0.181
Sub-2A	197411	4.53	0.007	95.25	10.0	0.100
Onsite						
Sub-3A	223971	5.14	0.008	78.72	10.0	0.100
Sub-3B	671492	15.42	0.024	86.44	24.2	0.242
Sub-3C	65802	1.51	0.002	92.30	10.0	0.100

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   20JUN19  TIME  17:21:18  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X         XX
                                X     X  X        X                X
                                XXXXXXX  XXXX     X        XXXXX   X
                                X     X  X        X                X
                                X     X  X        X     X          X
                                X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Proposed-Conditions with Detention Basin HEC-1 Model
              3         ID        10-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        PROPOSED CONDITION (WITH DETENTION BASIN)
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH      10    0.19    0.48    0.87    1.46    1.70    1.86    2.16
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   95.25
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   86.44
   30          UD    0.24
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   92.30
   35          UD    0.10
               *
1                                      HEC-1 INPUT                                    PAGE  2

  LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.46
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   78.72
108             UD     .10
                *
1                                       HEC-1 INPUT                                    PAGE  4

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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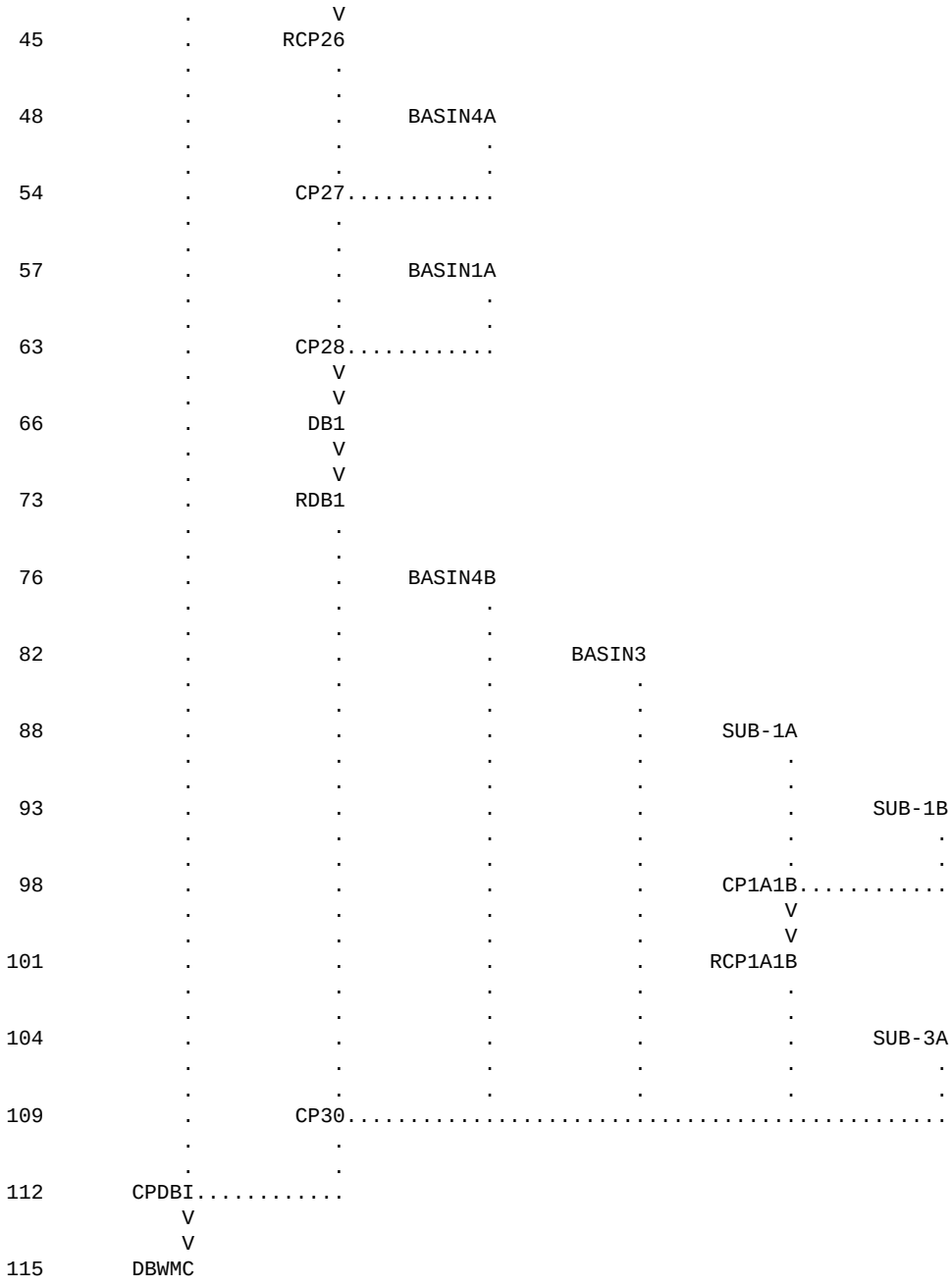
```
            109           KK    CP30
            110           KM    COMBINE HYDROGRAPHS FROM BASINS 3, 4B, DB1, SUB-3A& CP1A1B
            111           HC       5
                          *

            112           KK   CPDBI
            113           KM     COMBINE ROUTED HYDROGRAPHS FROM CP30 &,CP1A WITH SUB-3B
            114           HC       2
                          *
                          *

            115           KK   DBWMC
            116           KM    DETENTION BASIN WEST OF WILDWOOD HILLS MOBILE HOME PARK
            117           RS       1    STOR       0
            118           SV     0.0    0.76    1.59    2.49    3.46    4.52    5.69    6.96    8.31
            119           SE  6992.0  6993.0  6994.0  6995.0  6996.0  6997.0  6998.0  6999.0  7000.0
            120           SQ     0.0    28.5    24.6    33.8    40.9    47.0    52.4    57.3    61.8
                          *
            121           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23         CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36          CP2.........................
                 .
                 .
    39           .      BASIN4
                 .           V
```


RCP26
BASIN4A
CP27
BASIN1A
CP28
DB1
RDB1
BASIN4B
BASIN3
SUB-1A
SUB-1B
CP1A1B
RCP1A1B
SUB-3A
CP30
CPDBI
DBWMC

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                ****************************************
 *                                      *                *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JAN   1997             *                *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                *          609 SECOND STREET           *
 *                                      *                *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   20JUN19  TIME  17:21:18  *                *           (916) 756-1104             *
 *                                      *                *                                      *
 ****************************************                ****************************************
```

Woody Mountain Campground
Proposed-Conditions with Detention Basin HEC-1 Model
10-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
PROPOSED CONDITION (WITH DETENTION BASIN)

8 IO	OUTPUT CONTROL VARIABLES			
	IPRNT		5	PRINT CONTROL
	IPLOT		0	PLOT CONTROL
	QSCAL		0.	HYDROGRAPH PLOT SCALE
IT	HYDROGRAPH TIME DATA			
	NMIN		3	MINUTES IN COMPUTATION INTERVAL
	IDATE	1	0	STARTING DATE
	ITIME		0000	STARTING TIME
	NQ		125	NUMBER OF HYDROGRAPH ORDINATES
	NDDATE	1	0	ENDING DATE
	NDTIME		0612	ENDING TIME
	ICENT		19	CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB-1	12.	3.20	1.	1.	1.	.01		
+	HYDROGRAPH AT	SUB-2	5.	3.25	1.	1.	1.	.01		
+	HYDROGRAPH AT	SUB-2A	15.	3.10	1.	1.	1.	.01		
+	3 COMBINED AT	CP1A	29.	3.15	3.	3.	3.	.03		
+	HYDROGRAPH AT	SUB-3B	21.	3.30	3.	2.	2.	.02		
+	HYDROGRAPH AT	SUB-3C	4.	3.15	0.	0.	0.	.00		
+	3 COMBINED AT	CP2	49.	3.20	6.	6.	6.	.05		
+	HYDROGRAPH AT	BASIN4	2.	3.10	0.	0.	0.	.00		
+	ROUTED TO	RCP26	2.	3.15	0.	0.	0.	.00		
+	HYDROGRAPH AT	BASIN4A	2.	3.20	0.	0.	0.	.00		
+	2 COMBINED AT	CP27	4.	3.15	0.	0.	0.	.00		
+	HYDROGRAPH AT	BASIN1A	2.	3.10	0.	0.	0.	.00		
+	2 COMBINED AT	CP28	6.	3.15	1.	0.	0.	.01		
+	ROUTED TO	DB1	2.	3.45	0.	0.	0.	.01		
+									7053.69	3.45
+	ROUTED TO	RDB1	2.	3.45	0.	0.	0.	.01		

```
         HYDROGRAPH AT
+                      BASIN4B         3.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                       BASIN3         4.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                       SUB-1A        47.    3.25          5.          5.          5.        .05

         HYDROGRAPH AT
+                       SUB-1B        17.    3.10          1.          1.          1.        .01

         2 COMBINED AT
+                       CP1A1B        60.    3.20          6.          6.          6.        .05

         ROUTED TO
+                      RCP1A1B        59.    3.20          6.          6.          6.        .05

         HYDROGRAPH AT
+                       SUB-3A         6.    3.15          1.          0.          0.        .01

         5 COMBINED AT
+                         CP30        69.    3.20          8.          8.          8.        .07

         2 COMBINED AT
+                        CPDBI       118.    3.20         14.         13.         13.        .12

         ROUTED TO
+                        DBWMC        37.    3.65         13.         13.         13.        .12
+                                                                                        6995.42        3.65
1
                                    SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                        (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                               COMPUTATION INTERVAL
           ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                     PEAK                                    PEAK

                                (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

             RCP26  MANE          .79      2.18    187.57       .82      3.00      2.17    189.00         .82


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8735E-01 EXCESS= .0000E+00 OUTFLOW= .8723E-01 BASIN STORAGE= .1745E-03 PERCENT ERROR=   -.1


              RDB1  MANE          .40      1.99    207.20       .86      3.00      1.99    207.00         .86


 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2303E+00 EXCESS= .0000E+00 OUTFLOW= .2300E+00 BASIN STORAGE= .3864E-03 PERCENT ERROR=    .0
```

```
           RCP1A1B  MANE          .52     59.64    192.98      1.11      3.00     58.58    192.00        1.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3186E+01 EXCESS= .0000E+00 OUTFLOW= .3184E+01 BASIN STORAGE= .3936E-02 PERCENT ERROR=   -.1



*** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   24JUN19  TIME  14:22:08  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X         XX
                                X     X  X        X                X
                                XXXXXXX  XXXX     X        XXXXX   X
                                X     X  X        X                X
                                X     X  X        X     X          X
                                X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Proposed-Conditions with Detention Basin HEC-1 Model
              3         ID        25-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        PROPOSED CONDITION (WITH DETENTION BASIN)
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH      25    0.19    0.57    1.10    1.76    2.04    2.22    2.58
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   95.25
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   86.44
   30          UD    0.24
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   92.30
   35          UD    0.10
               *
```



```
  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.46
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   78.72
108             UD     .10
                *
```



```
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

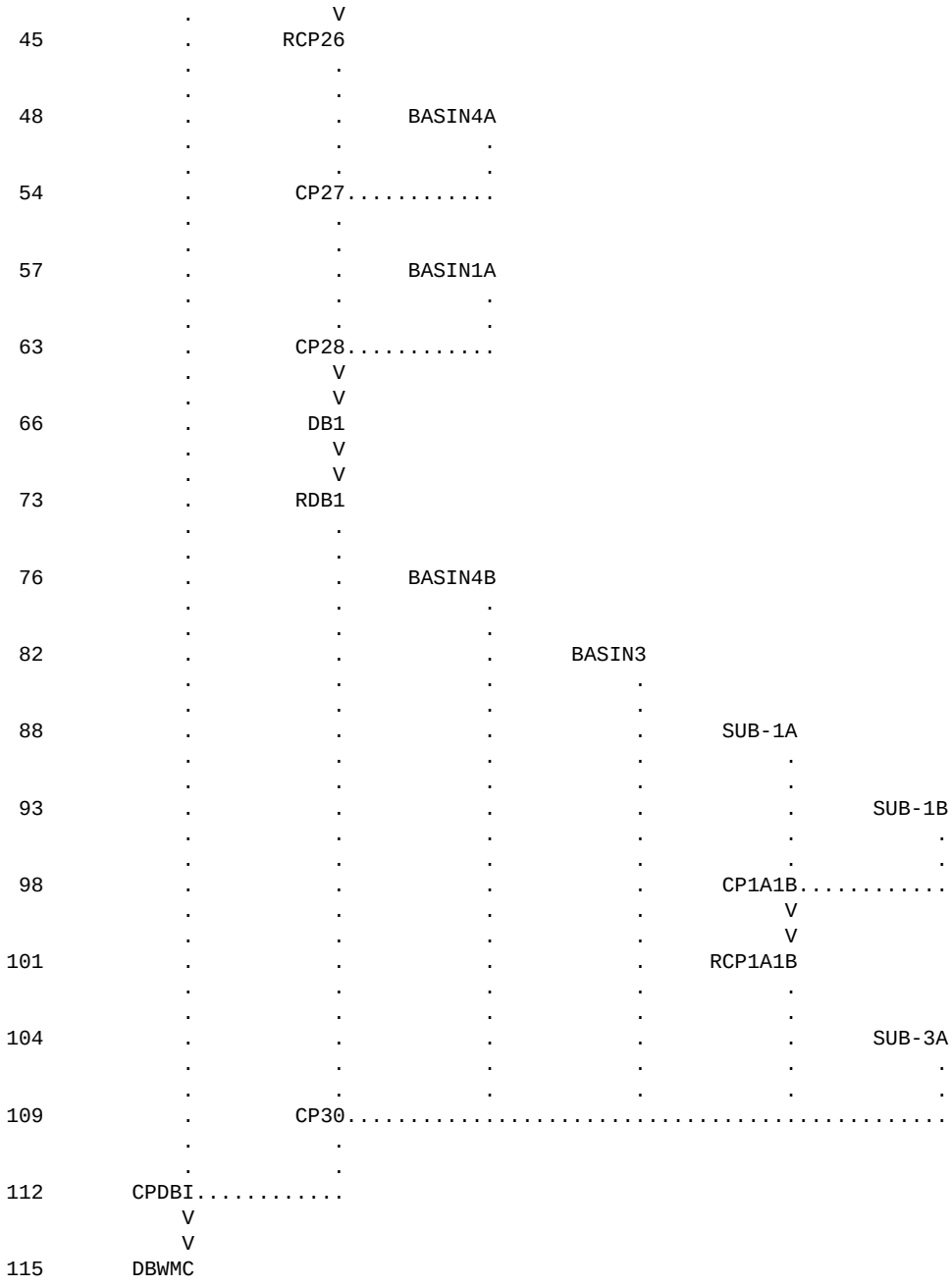
```
            109           KK    CP30
            110           KM    COMBINE HYDROGRAPHS FROM BASINS 3, 4B, DB1, SUB-3A& CP1A1B
            111           HC       5
                          *

            112           KK   CPDBI
            113           KM     COMBINE ROUTED HYDROGRAPHS FROM CP30 &,CP1A WITH SUB-3B
            114           HC       2
                          *
                          *

            115           KK   DBWMC
            116           KM    DETENTION BASIN WEST OF WILDWOOD HILLS MOBILE HOME PARK
            117           RS       1    STOR       0
            118           SV     0.0    0.76    1.59    2.49    3.46    4.52    5.69    6.96    8.31
            119           SE  6992.0  6993.0  6994.0  6995.0  6996.0  6997.0  6998.0  6999.0  7000.0
            120           SQ     0.0    28.5    24.6    33.8    40.9    47.0    52.4    57.3    61.8
                          *
            121           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                .
                .
    15          .       SUB-2
                .           .
                .           .
    19          .           .      SUB-2A
                .           .           .
                .           .           .
    23        CP1A.......................
                .
                .
    26          .      SUB-3B
                .           .
                .           .
    31          .           .      SUB-3C
                .           .           .
                .           .           .
    36         CP2.........................
                .
                .
    39          .      BASIN4
                .           V
```


RCP26
BASIN4A
CP27
BASIN1A
CP28
DB1
RDB1
BASIN4B
BASIN3
SUB-1A
SUB-1B
CP1A1B
RCP1A1B
SUB-3A
CP30
CPDBI
DBWMC

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*               JAN   1997             *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   24JUN19  TIME  14:22:08  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Woody Mountain Campground
Proposed-Conditions with Detention Basin HEC-1 Model
25-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
PROPOSED CONDITION (WITH DETENTION BASIN)

8 IO	OUTPUT CONTROL VARIABLES			
	IPRNT		5	PRINT CONTROL
	IPLOT		0	PLOT CONTROL
	QSCAL		0.	HYDROGRAPH PLOT SCALE
IT	HYDROGRAPH TIME DATA			
	NMIN		3	MINUTES IN COMPUTATION INTERVAL
	IDATE	1	0	STARTING DATE
	ITIME		0000	STARTING TIME
	NQ		125	NUMBER OF HYDROGRAPH ORDINATES
	NDDATE	1	0	ENDING DATE
	NDTIME		0612	ENDING TIME
	ICENT		19	CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUB-1	17.	3.20	2.	2.	2.	.01		
+	HYDROGRAPH AT	SUB-2	8.	3.25	1.	1.	1.	.01		
+	HYDROGRAPH AT	SUB-2A	19.	3.10	2.	2.	2.	.01		
+	3 COMBINED AT	CP1A	41.	3.15	4.	4.	4.	.03		
+	HYDROGRAPH AT	SUB-3B	30.	3.30	3.	3.	3.	.02		
+	HYDROGRAPH AT	SUB-3C	5.	3.15	0.	0.	0.	.00		
+	3 COMBINED AT	CP2	69.	3.20	8.	7.	7.	.05		
+	HYDROGRAPH AT	BASIN4	3.	3.15	0.	0.	0.	.00		
+	ROUTED TO	RCP26	3.	3.15	0.	0.	0.	.00		
+	HYDROGRAPH AT	BASIN4A	3.	3.20	0.	0.	0.	.00		
+	2 COMBINED AT	CP27	6.	3.15	1.	1.	1.	.00		
+	HYDROGRAPH AT	BASIN1A	3.	3.10	0.	0.	0.	.00		
+	2 COMBINED AT	CP28	8.	3.15	1.	1.	1.	.01		
+	ROUTED TO	DB1	3.	3.40	1.	1.	1.	.01		
+									7054.01	3.40
+	ROUTED TO	RDB1	3.	3.40	1.	1.	1.	.01		

```
         HYDROGRAPH AT
+                      BASIN4B         4.    3.10           0.          0.          0.        .00

         HYDROGRAPH AT
+                       BASIN3         5.    3.10           0.          0.          0.        .00

         HYDROGRAPH AT
+                       SUB-1A        66.    3.25           7.          7.          7.        .05

         HYDROGRAPH AT
+                       SUB-1B        23.    3.15           2.          2.          2.        .01

         2 COMBINED AT
+                       CP1A1B        84.    3.20           9.          8.          8.        .05

         ROUTED TO
+                      RCP1A1B        82.    3.20           9.          8.          8.        .05

         HYDROGRAPH AT
+                       SUB-3A         9.    3.15           1.          1.          1.        .01

         5 COMBINED AT
+                         CP30        99.    3.20          11.         10.         10.        .07

         2 COMBINED AT
+                        CPDBI       168.    3.20          18.         18.         18.        .12

         ROUTED TO
+                        DBWMC        46.    3.65          18.         17.         17.        .12
+                                                                                          6996.75        3.65
1
                                    SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                        (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                               COMPUTATION INTERVAL
          ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                    PEAK                                    PEAK

                              (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

            RCP26  MANE          .64      3.20    189.74      1.15      3.00      3.20    189.00        1.15

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1226E+00 EXCESS= .0000E+00 OUTFLOW= .1226E+00 BASIN STORAGE= .1680E-03 PERCENT ERROR=   -.2

             RDB1  MANE          .42      3.17    203.94      1.20      3.00      3.17    204.00        1.20

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3197E+00 EXCESS= .0000E+00 OUTFLOW= .3192E+00 BASIN STORAGE= .4648E-03 PERCENT ERROR=    .0
```

```
           RCP1A1B  MANE          .52     83.33    192.94      1.48      3.00     81.85    192.00        1.48

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4262E+01 EXCESS= .0000E+00 OUTFLOW= .4257E+01 BASIN STORAGE= .5004E-02 PERCENT ERROR=    .0



*** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   20JUN19  TIME  17:21:49  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X         XX
                                X     X  X        X                X
                                XXXXXXX  XXXX     X        XXXXX   X
                                X     X  X        X                X
                                X     X  X        X     X          X
                                X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Proposed-Conditions with Detention Basin HEC-1 Model
              3         ID        100-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        PROPOSED CONDITION (WITH DETENTION BASIN)
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH       1    0.19    0.71    1.37    2.21    2.56    2.76    3.18
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   95.25
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   86.44
   30          UD    0.24
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   92.30
   35          UD    0.10
               *
1                                      HEC-1 INPUT                                      PAGE  2

        LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.46
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   78.72
108             UD     .10
                *
```



```
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

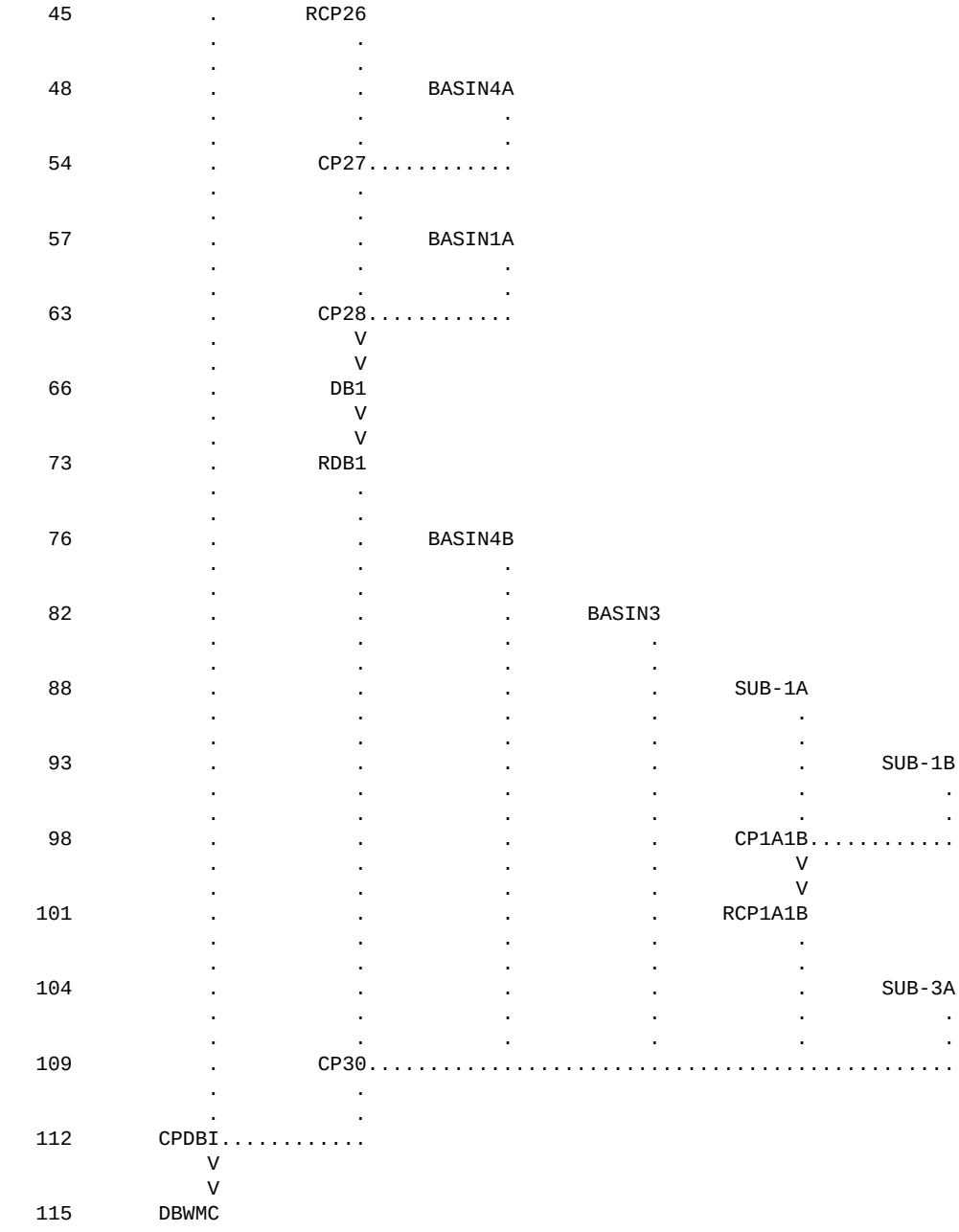
```
            109           KK    CP30
            110           KM    COMBINE HYDROGRAPHS FROM BASINS 3, 4B, DB1, SUB-3A& CP1A1B
            111           HC       5
                          *

            112           KK   CPDBI
            113           KM     COMBINE ROUTED HYDROGRAPHS FROM CP30 &,CP1A WITH SUB-3B
            114           HC       2
                          *

            115           KK   DBWMC
            116           KM    DETENTION BASIN WEST OF WILDWOOD HILLS MOBILE HOME PARK
            117           RS       1    STOR       0
            118           SV     0.0    0.76    1.59    2.49    3.46    4.52    5.69    6.96    8.31
            119           SE  6992.0  6993.0  6994.0  6995.0  6996.0  6997.0  6998.0  6999.0  7000.0
            120           SQ     0.0    28.5    24.6    33.8    40.9    47.0    52.4    57.3    61.8
                          *
            121           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36         CP2.........................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************                ****************************************
 *                                      *                *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JAN   1997             *                *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                *          609 SECOND STREET           *
 *                                      *                *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   20JUN19  TIME  17:21:49  *                *           (916) 756-1104             *
 *                                      *                *                                      *
 ****************************************                ****************************************

                              Woody Mountain Campground
                              Proposed-Conditions with Detention Basin HEC-1 Model
                              100-year, 6-hour Model
                              Woodson Engineering and Surveying
                              MAY 2019
                              PROPOSED CONDITION (WITH DETENTION BASIN)

    8 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN           3  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ         125  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME        0612  ENDING TIME
                       ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .05 HOURS
                         TOTAL TIME BASE    6.20 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT
1
                                                    RUNOFF SUMMARY
                                               FLOW IN CUBIC FEET PER SECOND
                                            TIME IN HOURS,  AREA IN SQUARE MILES
```

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	24.	3.20	2.	2.	2.	.01		
	HYDROGRAPH AT									
+		SUB-2	12.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									
+		SUB-2A	24.	3.10	2.	2.	2.	.01		
	3 COMBINED AT									
+		CP1A	56.	3.15	5.	5.	5.	.03		
	HYDROGRAPH AT									
+		SUB-3B	42.	3.30	5.	5.	5.	.02		
	HYDROGRAPH AT									
+		SUB-3C	6.	3.15	1.	0.	0.	.00		
	3 COMBINED AT									
+		CP2	97.	3.20	11.	10.	10.	.05		
	HYDROGRAPH AT									
+		BASIN4	5.	3.10	0.	0.	0.	.00		
	ROUTED TO									
+		RCP26	5.	3.15	0.	0.	0.	.00		
	HYDROGRAPH AT									
+		BASIN4A	4.	3.15	0.	0.	0.	.00		
	2 COMBINED AT									
+		CP27	9.	3.15	1.	1.	1.	.00		
	HYDROGRAPH AT									
+		BASIN1A	3.	3.10	0.	0.	0.	.00		
	2 COMBINED AT									
+		CP28	12.	3.15	1.	1.	1.	.01		
	ROUTED TO									
+		DB1	4.	3.40	1.	1.	1.	.01		
+									7054.42	3.40
	ROUTED TO									
+		RDB1	4.	3.40	1.	1.	1.	.01		
	HYDROGRAPH AT									

```
+                       BASIN4B         6.    3.10           0.          0.          0.        .00

          HYDROGRAPH AT
+                        BASIN3         7.    3.10           0.          0.          0.        .00

          HYDROGRAPH AT
+                        SUB-1A        92.    3.25           9.          9.          9.        .05

          HYDROGRAPH AT
+                        SUB-1B        29.    3.15           2.          2.          2.        .01

          2 COMBINED AT
+                        CP1A1B       115.    3.20          12.         11.         11.        .05

          ROUTED TO
+                       RCP1A1B       113.    3.20          12.         11.         11.        .05

          HYDROGRAPH AT
+                        SUB-3A        14.    3.15           1.          1.          1.        .01

          5 COMBINED AT
+                          CP30       137.    3.20          15.         14.         14.        .07

          2 COMBINED AT
+                         CPDBI       234.    3.20          25.         24.         24.        .12

          ROUTED TO
+                         DBWMC        55.    3.70          23.         22.         22.        .12
+                                                                                        6998.51        3.70
1
                                    SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                        (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                  INTERPOLATED TO
                                                                                COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                    PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .60      4.66    187.74      1.63      3.00      4.62    189.00        1.63

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1740E+00 EXCESS= .0000E+00 OUTFLOW= .1741E+00 BASIN STORAGE= .2036E-03 PERCENT ERROR=   -.2

               RDB1  MANE          .44      3.98    204.47      1.68      3.00      3.98    204.00        1.68

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4494E+00 EXCESS= .0000E+00 OUTFLOW= .4489E+00 BASIN STORAGE= .5692E-03 PERCENT ERROR=    .0
```

```
           RCP1A1B  MANE          .46    114.50    193.12      2.01      3.00    112.83    192.00        2.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5788E+01 EXCESS= .0000E+00 OUTFLOW= .5784E+01 BASIN STORAGE= .5657E-02 PERCENT ERROR=    .0



*** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   09MAY19  TIME  15:59:12  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Existing-Conditions HEC-1 Model
              3         ID        10-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        EXISTING CONDITION
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH      10    0.19    0.48    0.87    1.46    1.70    1.86    2.16
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   91.51
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   75.49
   30          UD    0.32
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   75.74
   35          UD    0.15
               *
1                                      HEC-1 INPUT                                      PAGE  2

        LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.23
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE HYDROGRAPHS FROM SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   72.00
108             UD     .15
                *
1                                       HEC-1 INPUT                                    PAGE  4

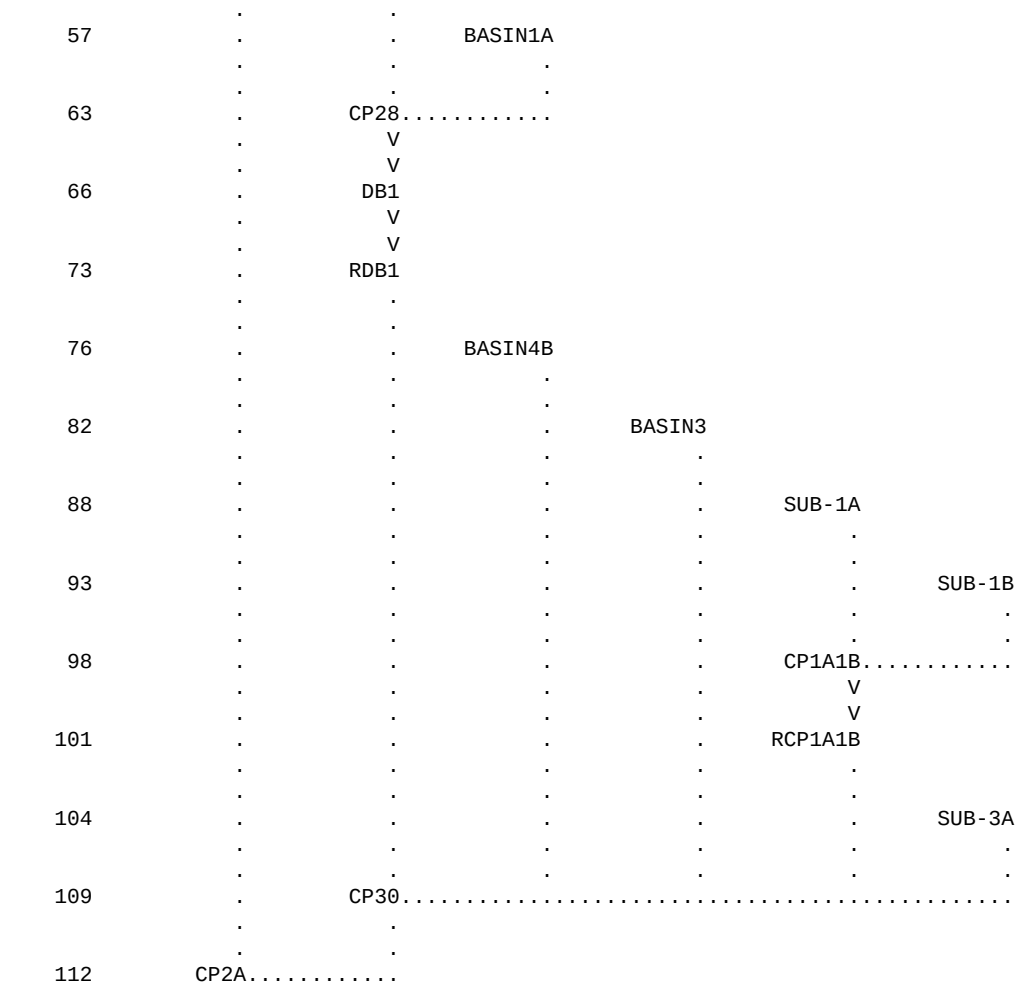
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
            109           KK    CP30
            110           KM    COMBINE BASINS 3, 4B, DB1, & RCP1A1B
            111           HC       5
                          *

            112           KK    CP2A
            113           KM     COMBINE HYDROGRAPHS FROM CP30 & CP2
            114           HC       2
                          *
            115           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36        CP2........................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
    45           .       RCP26
                 .           .
                 .           .
    48           .           .     BASIN4A
                 .           .           .
                 .           .           .
    54           .        CP27............
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JAN   1997               *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09MAY19  TIME  15:59:12   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Woody Mountain Campground
Existing-Conditions HEC-1 Model
10-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
EXISTING CONDITION

8 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 3 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 125 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0612 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	12.	3.20	1.	1.	1.	.01		
	HYDROGRAPH AT									
+		SUB-2	5.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									

```
+                    SUB-2A        12.    3.15          1.          1.          1.        .01

         3 COMBINED AT
+                      CP1A        27.    3.15          3.          3.          3.        .03

         HYDROGRAPH AT
+                    SUB-3B         7.    3.45          1.          1.          1.        .02

         HYDROGRAPH AT
+                    SUB-3C         1.    3.20          0.          0.          0.        .00

         3 COMBINED AT
+                       CP2        31.    3.20          4.          4.          4.        .05

         HYDROGRAPH AT
+                    BASIN4         2.    3.10          0.          0.          0.        .00

         ROUTED TO
+                     RCP26         2.    3.15          0.          0.          0.        .00

         HYDROGRAPH AT
+                    BASIN4A        2.    3.20          0.          0.          0.        .00

         2 COMBINED AT
+                      CP27         4.    3.15          0.          0.          0.        .00

         HYDROGRAPH AT
+                    BASIN1A        2.    3.10          0.          0.          0.        .00

         2 COMBINED AT
+                      CP28         6.    3.15          1.          0.          0.        .01

         ROUTED TO
+                       DB1        2.    3.45          0.          0.          0.        .01
+                                                                                    7053.69        3.45

         ROUTED TO
+                      RDB1         2.    3.45          0.          0.          0.        .01

         HYDROGRAPH AT
+                    BASIN4B        3.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                     BASIN3        4.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                    SUB-1A        47.    3.25          5.          5.          5.        .05

         HYDROGRAPH AT
+                    SUB-1B        17.    3.10          1.          1.          1.        .01
```

```
          2 COMBINED AT
+                         CP1A1B        60.    3.20           6.          6.          6.        .05

          ROUTED TO
+                        RCP1A1B        58.    3.20           6.          6.          6.        .05

          HYDROGRAPH AT
+                         SUB-3A         2.    3.25           0.          0.          0.        .01

          5 COMBINED AT
+                           CP30        66.    3.20           8.          7.          7.        .07

          2 COMBINED AT
+                           CP2A        97.    3.20          12.         11.         11.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                              COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                     PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .79      2.18    187.57       .82      3.00      2.17    189.00         .82

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8735E-01 EXCESS= .0000E+00 OUTFLOW= .8723E-01 BASIN STORAGE= .1745E-03 PERCENT ERROR=   -.1

               RDB1  MANE          .40      1.99    207.20       .86      3.00      1.99    207.00         .86

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2303E+00 EXCESS= .0000E+00 OUTFLOW= .2300E+00 BASIN STORAGE= .3864E-03 PERCENT ERROR=    .0

             RCP1A1B  MANE          .64     59.35    193.37      1.10      3.00     58.41    192.00        1.10

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3177E+01 EXCESS= .0000E+00 OUTFLOW= .3173E+01 BASIN STORAGE= .4051E-02 PERCENT ERROR=    .0



 *** NORMAL END OF HEC-1 ***
```

```
1****************************************                ****************************************
 *                                      *                *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                *          609 SECOND STREET           *
 *                                      *                *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   24JUN19  TIME  14:18:33  *                *           (916) 756-1104             *
 *                                      *                *                                      *
 ****************************************                ****************************************

                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Existing-Conditions HEC-1 Model
              3         ID        25-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        EXISTING CONDITION
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
  10          KK   SUB-1
  11          BA   0.011
  12          PH      25    0.19    0.57    1.10    1.76    2.04    2.22    2.58
  13          LS       0   86.55
  14          UD   0.155
              *

  15          KK   SUB-2
  16          BA   0.008
  17          LS       0   79.72
  18          UD   0.181
              *

  19          KK  SUB-2A
  20          BA   0.007
  21          LS       0   91.51
  22          UD     0.1
              *

  23          KK    CP1A
  24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
  25          HC       3
              *

  26          KK  SUB-3B
  27          KM    RUNOFF FROM SUB-3B
  28          BA    .024
  29          LS       0   75.49
  30          UD    0.32
              *

  31          KK  SUB-3C
  32          KM    RUNOFF FROM SUB-3C
  33          BA    .002
  34          LS       0   75.74
  35          UD    0.15
              *
```



```
 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  36          KK     CP2
  37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
  38          HC       3
              *

  39          KK  BASIN4
  40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
  41          KM    RUNOFF FROM BASIN 4
  42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.23
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE HYDROGRAPHS FROM SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   72.00
108             UD     .15
                *
```



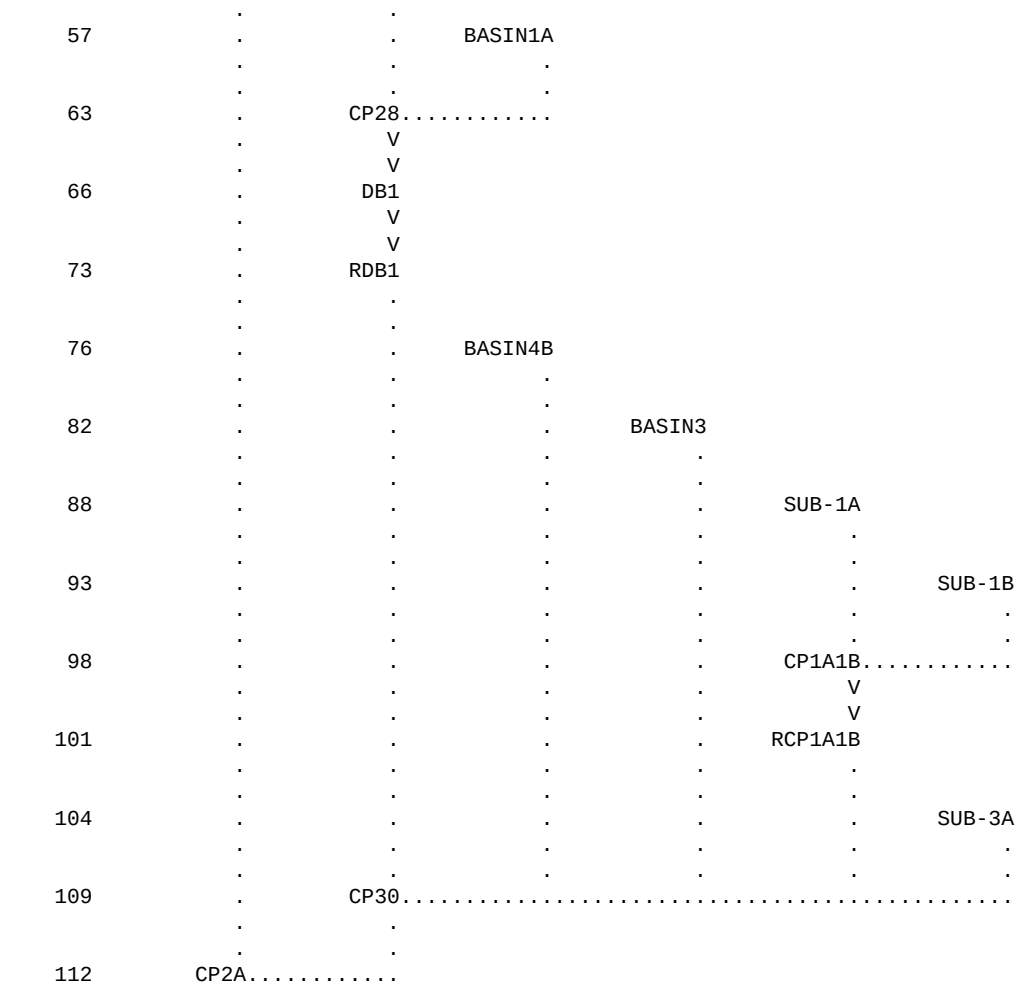
```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
            109           KK    CP30
            110           KM    COMBINE BASINS 3, 4B, DB1, & RCP1A1B
            111           HC       5
                          *

            112           KK    CP2A
            113           KM     COMBINE HYDROGRAPHS FROM CP30 & CP2
            114           HC       2
                          *
            115           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36        CP2........................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
    45           .       RCP26
                 .           .
                 .           .
    48           .           .     BASIN4A
                 .           .           .
                 .           .           .
    54           .        CP27............
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JAN   1997              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   24JUN19  TIME  14:18:33   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Woody Mountain Campground
Existing-Conditions HEC-1 Model
25-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
EXISTING CONDITION

8 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 3 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 125 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0612 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	17.	3.20	2.	2.	2.	.01		
	HYDROGRAPH AT									
+		SUB-2	8.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									

+		SUB-2A	16.	3.15	1.	1.	1.	.01	
	3 COMBINED AT								
+		CP1A	38.	3.15	4.	4.	4.	.03	
	HYDROGRAPH AT								
+		SUB-3B	12.	3.40	2.	2.	2.	.02	
	HYDROGRAPH AT								
+		SUB-3C	2.	3.20	0.	0.	0.	.00	
	3 COMBINED AT								
+		CP2	46.	3.20	6.	5.	5.	.05	
	HYDROGRAPH AT								
+		BASIN4	3.	3.15	0.	0.	0.	.00	
	ROUTED TO								
+		RCP26	3.	3.15	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN4A	3.	3.20	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP27	6.	3.15	1.	1.	1.	.00	
	HYDROGRAPH AT								
+		BASIN1A	3.	3.10	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP28	8.	3.15	1.	1.	1.	.01	
	ROUTED TO								
+		DB1	3.	3.40	1.	1.	1.	.01	
+									7054.01 3.40
	ROUTED TO								
+		RDB1	3.	3.40	1.	1.	1.	.01	
	HYDROGRAPH AT								
+		BASIN4B	4.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN3	5.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		SUB-1A	66.	3.25	7.	7.	7.	.05	
	HYDROGRAPH AT								
+		SUB-1B	22.	3.15	2.	2.	2.	.01	

```
          2 COMBINED AT
+                          CP1A1B        83.    3.20           9.          8.          8.        .05

          ROUTED TO
+                         RCP1A1B        82.    3.20           9.          8.          8.        .05

          HYDROGRAPH AT
+                          SUB-3A         5.    3.25           0.          0.          0.        .01

          5 COMBINED AT
+                            CP30        95.    3.20          10.         10.         10.        .07

          2 COMBINED AT
+                            CP2A       141.    3.20          16.         16.         16.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                  INTERPOLATED TO
                                                                               COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                    PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .64      3.20    189.74      1.15      3.00      3.20    189.00        1.15

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1226E+00 EXCESS= .0000E+00 OUTFLOW= .1226E+00 BASIN STORAGE= .1680E-03 PERCENT ERROR=   -.2

               RDB1  MANE          .42      3.17    203.94      1.20      3.00      3.17    204.00        1.20

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3197E+00 EXCESS= .0000E+00 OUTFLOW= .3192E+00 BASIN STORAGE= .4648E-03 PERCENT ERROR=    .0

             RCP1A1B  MANE          .56     83.07    192.93      1.47      3.00     81.68    192.00        1.48

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4252E+01 EXCESS= .0000E+00 OUTFLOW= .4247E+01 BASIN STORAGE= .5026E-02 PERCENT ERROR=    .0



 *** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   09MAY19  TIME  15:59:32  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Existing-Conditions HEC-1 Model
              3         ID        100-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        EXISTING CONDITION
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH       1    0.19    0.71    1.37    2.21    2.56    2.76    3.18
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   91.51
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   75.49
   30          UD    0.32
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   75.74
   35          UD    0.15
               *
1                                      HEC-1 INPUT                                    PAGE  2

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.23
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE HYDROGRAPHS FROM SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   72.00
108             UD     .15
                *
1                                       HEC-1 INPUT                                    PAGE  4

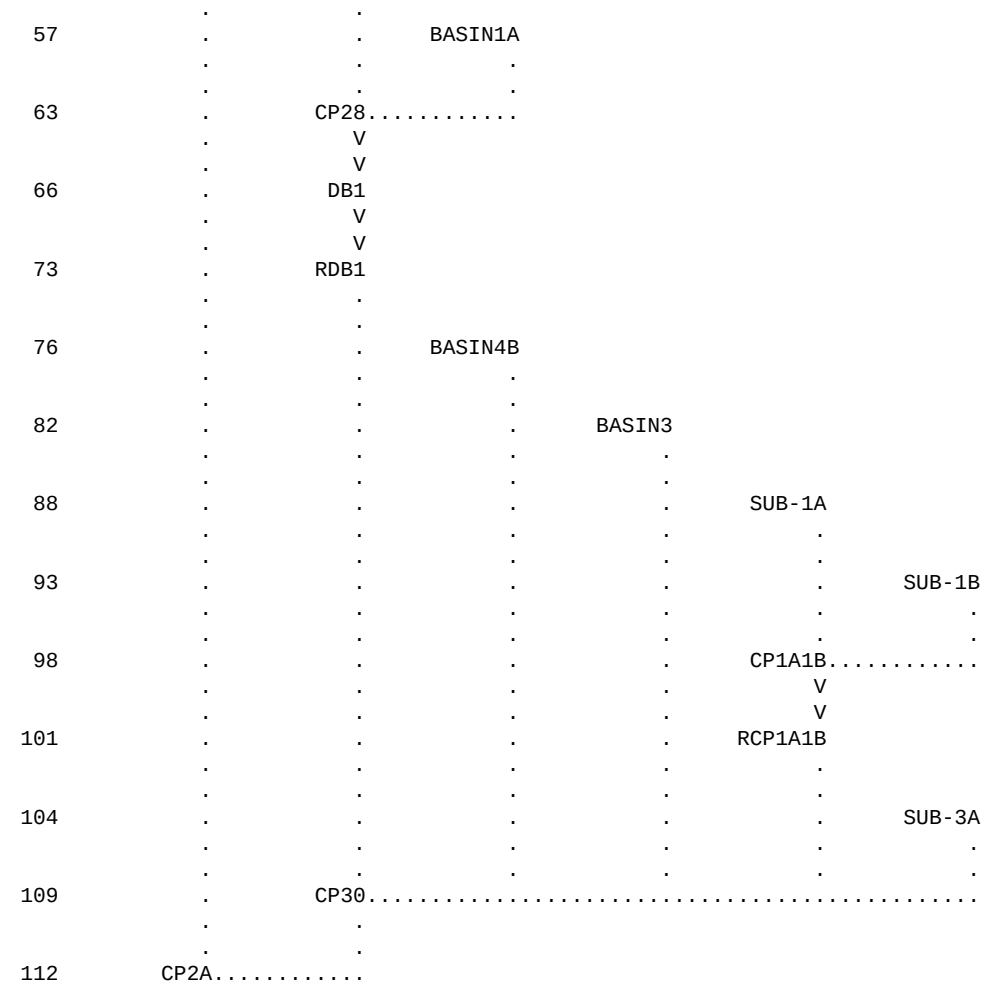
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
            109           KK    CP30
            110           KM    COMBINE BASINS 3, 4B, DB1, & RCP1A1B
            111           HC       5
                          *

            112           KK    CP2A
            113           KM     COMBINE HYDROGRAPHS FROM CP30 & CP2
            114           HC       2
                          *
            115           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36        CP2........................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
    45           .       RCP26
                 .           .
                 .           .
    48           .           .     BASIN4A
                 .           .           .
                 .           .           .
    54           .        CP27............
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JAN   1997               *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09MAY19  TIME  15:59:32   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Woody Mountain Campground
Existing-Conditions HEC-1 Model
100-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
EXISTING CONDITION

8 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 3 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 125 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0612 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	24.	3.20	2.	2.	2.	.01		
	HYDROGRAPH AT									
+		SUB-2	12.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									

+		SUB-2A	22.	3.15	2.	2.	2.	.01	
	3 COMBINED AT								
+		CP1A	54.	3.15	5.	5.	5.	.03	
	HYDROGRAPH AT								
+		SUB-3B	20.	3.40	3.	3.	3.	.02	
	HYDROGRAPH AT								
+		SUB-3C	3.	3.20	0.	0.	0.	.00	
	3 COMBINED AT								
+		CP2	67.	3.20	8.	8.	8.	.05	
	HYDROGRAPH AT								
+		BASIN4	5.	3.10	0.	0.	0.	.00	
	ROUTED TO								
+		RCP26	5.	3.15	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN4A	4.	3.15	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP27	9.	3.15	1.	1.	1.	.00	
	HYDROGRAPH AT								
+		BASIN1A	3.	3.10	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP28	12.	3.15	1.	1.	1.	.01	
	ROUTED TO								
+		DB1	4.	3.40	1.	1.	1.	.01	
+									7054.42 3.40
	ROUTED TO								
+		RDB1	4.	3.40	1.	1.	1.	.01	
	HYDROGRAPH AT								
+		BASIN4B	6.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN3	7.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		SUB-1A	92.	3.25	9.	9.	9.	.05	
	HYDROGRAPH AT								
+		SUB-1B	29.	3.15	2.	2.	2.	.01	

```
          2 COMBINED AT
+                         CP1A1B       115.    3.20          12.         11.         11.        .05

          ROUTED TO
+                        RCP1A1B       113.    3.20          12.         11.         11.        .05

          HYDROGRAPH AT
+                         SUB-3A         8.    3.20           1.          1.          1.        .01

          5 COMBINED AT
+                           CP30       132.    3.20          14.         14.         14.        .07

          2 COMBINED AT
+                           CP2A       199.    3.20          22.         22.         22.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                              COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                     PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .60      4.66    187.74      1.63      3.00      4.62    189.00        1.63

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1740E+00 EXCESS= .0000E+00 OUTFLOW= .1741E+00 BASIN STORAGE= .2036E-03 PERCENT ERROR=   -.2

               RDB1  MANE          .44      3.98    204.47      1.68      3.00      3.98    204.00        1.68

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4494E+00 EXCESS= .0000E+00 OUTFLOW= .4489E+00 BASIN STORAGE= .5692E-03 PERCENT ERROR=    .0

            RCP1A1B  MANE          .43    114.50    192.75      2.00      3.00    112.68    192.00        2.00

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5777E+01 EXCESS= .0000E+00 OUTFLOW= .5773E+01 BASIN STORAGE= .5669E-02 PERCENT ERROR=    .0



 *** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   09MAY19  TIME  16:03:06  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X         XX
                                X     X  X        X                X
                                XXXXXXX  XXXX     X        XXXXX   X
                                X     X  X        X                X
                                X     X  X        X     X          X
                                X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Proposed-Conditions without Detention Basin HEC-1 Model
              3         ID        10-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        PROPOSED CONDITION (WITHOUT DETENTION BASIN)
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH      10    0.19    0.48    0.87    1.46    1.70    1.86    2.16
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   95.25
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   86.44
   30          UD    0.24
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   92.30
   35          UD    0.10
               *
1                                      HEC-1 INPUT                                      PAGE  2

        LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.46
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   78.72
108             UD     .10
                *
1                                       HEC-1 INPUT                                    PAGE  4

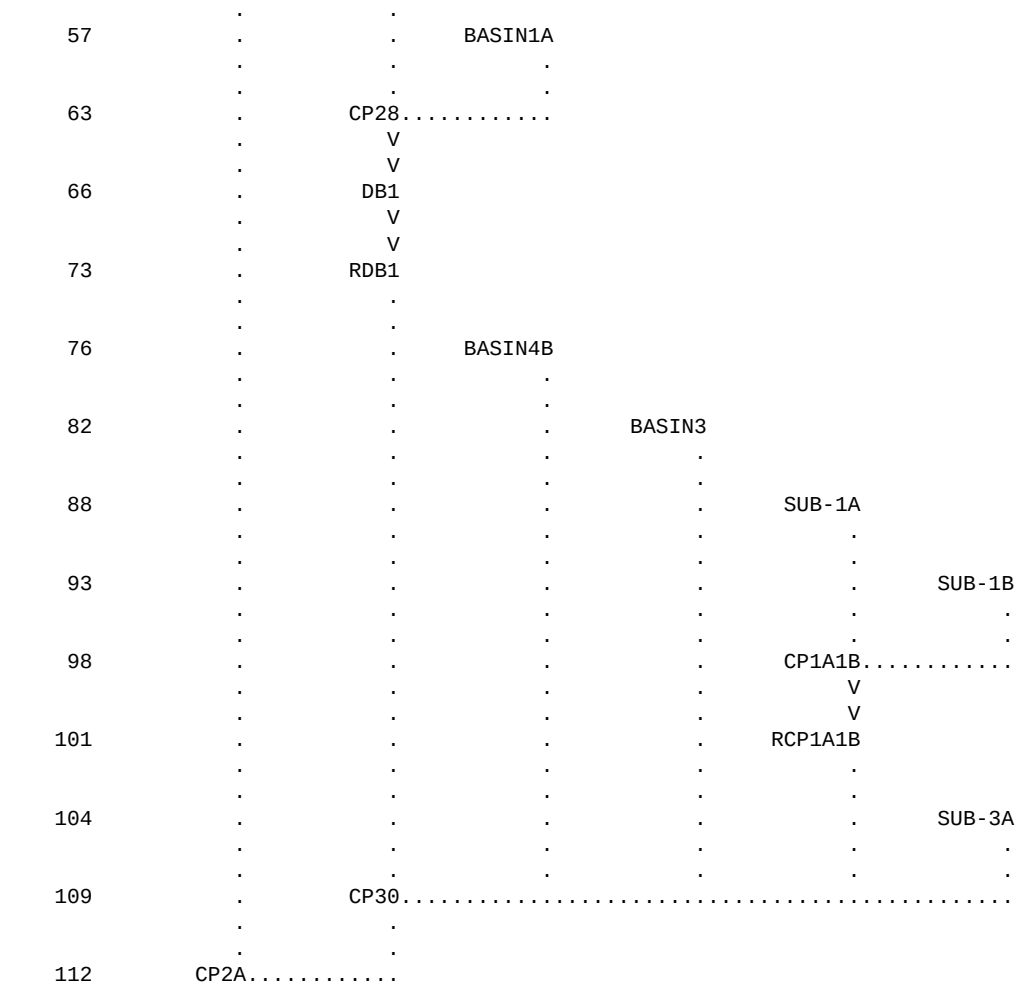
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
            109           KK    CP30
            110           KM    COMBINE HYDROGRAPHS FROM BASINS 3, 4B, DB1, SUB-3A& CP1A1B
            111           HC       5
                          *

            112           KK    CP2A
            113           KM     COMBINE HYDROGRAPHS FROM CP30 & CP-2
            114           HC       2
                          *
            115           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36         CP2.......................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
    45           .       RCP26
                 .           .
                 .           .
    48           .           .     BASIN4A
                 .           .           .
                 .           .           .
    54           .        CP27............
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JAN   1997               *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09MAY19  TIME  16:03:06   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Woody Mountain Campground
Proposed-Conditions without Detention Basin HEC-1 Model
10-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
PROPOSED CONDITION (WITHOUT DETENTION BASIN)

8 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 3 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 125 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0612 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	12.	3.20	1.	1.	1.	.01		
	HYDROGRAPH AT									
+		SUB-2	5.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									

+		SUB-2A	15.	3.10	1.	1.	1.	.01	
	3 COMBINED AT								
+		CP1A	29.	3.15	3.	3.	3.	.03	
	HYDROGRAPH AT								
+		SUB-3B	21.	3.30	3.	2.	2.	.02	
	HYDROGRAPH AT								
+		SUB-3C	4.	3.15	0.	0.	0.	.00	
	3 COMBINED AT								
+		CP2	49.	3.20	6.	6.	6.	.05	
	HYDROGRAPH AT								
+		BASIN4	2.	3.10	0.	0.	0.	.00	
	ROUTED TO								
+		RCP26	2.	3.15	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN4A	2.	3.20	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP27	4.	3.15	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN1A	2.	3.10	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP28	6.	3.15	1.	0.	0.	.01	
	ROUTED TO								
+		DB1	2.	3.45	0.	0.	0.	.01	
+									7053.69 3.45
	ROUTED TO								
+		RDB1	2.	3.45	0.	0.	0.	.01	
	HYDROGRAPH AT								
+		BASIN4B	3.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		BASIN3	4.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT								
+		SUB-1A	47.	3.25	5.	5.	5.	.05	
	HYDROGRAPH AT								
+		SUB-1B	17.	3.10	1.	1.	1.	.01	

```
          2 COMBINED AT
+                          CP1A1B        60.    3.20           6.          6.          6.        .05

          ROUTED TO
+                         RCP1A1B        59.    3.20           6.          6.          6.        .05

          HYDROGRAPH AT
+                          SUB-3A         6.    3.15           1.          0.          0.        .01

          5 COMBINED AT
+                            CP30        69.    3.20           8.          8.          8.        .07

          2 COMBINED AT
+                            CP2A       118.    3.20          14.         13.         13.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                              COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                     PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .79      2.18    187.57       .82      3.00      2.17    189.00         .82

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8735E-01 EXCESS= .0000E+00 OUTFLOW= .8723E-01 BASIN STORAGE= .1745E-03 PERCENT ERROR=   -.1

               RDB1  MANE          .40      1.99    207.20       .86      3.00      1.99    207.00         .86

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2303E+00 EXCESS= .0000E+00 OUTFLOW= .2300E+00 BASIN STORAGE= .3864E-03 PERCENT ERROR=    .0

             RCP1A1B  MANE          .52     59.64    192.98      1.11      3.00     58.58    192.00        1.11

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3186E+01 EXCESS= .0000E+00 OUTFLOW= .3184E+01 BASIN STORAGE= .3936E-02 PERCENT ERROR=   -.1



 *** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   09MAY19  TIME  15:59:12  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                        X     X  XXXXXXX   XXXXX          X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX  X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Existing-Conditions HEC-1 Model
              3         ID        10-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        MAY 2019
              6         ID        EXISTING CONDITION
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH      10    0.19    0.48    0.87    1.46    1.70    1.86    2.16
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   91.51
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   75.49
   30          UD    0.32
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   75.74
   35          UD    0.15
               *
1                                      HEC-1 INPUT                                      PAGE  2

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.23
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE HYDROGRAPHS FROM SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   72.00
108             UD     .15
                *
```



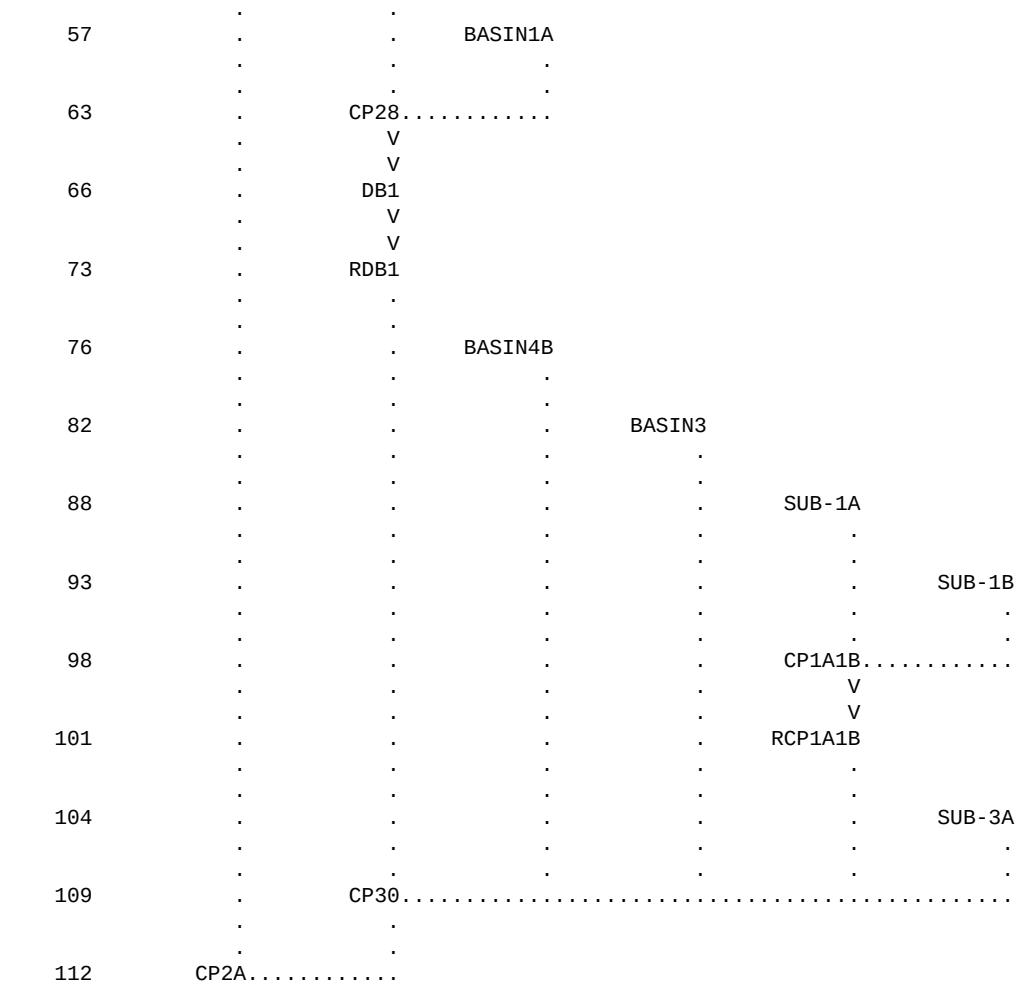
```
          LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
            109           KK    CP30
            110           KM    COMBINE BASINS 3, 4B, DB1, & RCP1A1B
            111           HC       5
                          *

            112           KK    CP2A
            113           KM     COMBINE HYDROGRAPHS FROM CP30 & CP2
            114           HC       2
                          *
            115           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                 .
                 .
    15           .       SUB-2
                 .           .
                 .           .
    19           .           .      SUB-2A
                 .           .           .
                 .           .           .
    23        CP1A.......................
                 .
                 .
    26           .      SUB-3B
                 .           .
                 .           .
    31           .           .      SUB-3C
                 .           .           .
                 .           .           .
    36         CP2.......................
                 .
                 .
    39           .      BASIN4
                 .           V
                 .           V
    45           .       RCP26
                 .           .
                 .           .
    48           .           .     BASIN4A
                 .           .           .
                 .           .           .
    54           .        CP27............
                 .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JAN   1997               *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09MAY19  TIME  15:59:12   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

Woody Mountain Campground
Existing-Conditions HEC-1 Model
10-year, 6-hour Model
Woodson Engineering and Surveying
MAY 2019
EXISTING CONDITION

8 IO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 3 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 125 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 1 0 ENDING DATE
NDTIME 0612 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 6.20 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		SUB-1	12.	3.20	1.	1.	1.	.01		
	HYDROGRAPH AT									
+		SUB-2	5.	3.25	1.	1.	1.	.01		
	HYDROGRAPH AT									

```
+                    SUB-2A        12.    3.15          1.          1.          1.        .01

         3 COMBINED AT
+                      CP1A        27.    3.15          3.          3.          3.        .03

         HYDROGRAPH AT
+                    SUB-3B         7.    3.45          1.          1.          1.        .02

         HYDROGRAPH AT
+                    SUB-3C         1.    3.20          0.          0.          0.        .00

         3 COMBINED AT
+                       CP2        31.    3.20          4.          4.          4.        .05

         HYDROGRAPH AT
+                    BASIN4         2.    3.10          0.          0.          0.        .00

         ROUTED TO
+                     RCP26         2.    3.15          0.          0.          0.        .00

         HYDROGRAPH AT
+                    BASIN4A        2.    3.20          0.          0.          0.        .00

         2 COMBINED AT
+                      CP27         4.    3.15          0.          0.          0.        .00

         HYDROGRAPH AT
+                    BASIN1A        2.    3.10          0.          0.          0.        .00

         2 COMBINED AT
+                      CP28         6.    3.15          1.          0.          0.        .01

         ROUTED TO
+                       DB1        2.    3.45          0.          0.          0.        .01
+                                                                                    7053.69        3.45

         ROUTED TO
+                      RDB1         2.    3.45          0.          0.          0.        .01

         HYDROGRAPH AT
+                    BASIN4B        3.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                     BASIN3        4.    3.10          0.          0.          0.        .00

         HYDROGRAPH AT
+                    SUB-1A        47.    3.25          5.          5.          5.        .05

         HYDROGRAPH AT
+                    SUB-1B        17.    3.10          1.          1.          1.        .01
```

```
          2 COMBINED AT
+                          CP1A1B        60.    3.20           6.          6.          6.        .05

          ROUTED TO
+                         RCP1A1B        58.    3.20           6.          6.          6.        .05

          HYDROGRAPH AT
+                          SUB-3A         2.    3.25           0.          0.          0.        .01

          5 COMBINED AT
+                            CP30        66.    3.20           8.          7.          7.        .07

          2 COMBINED AT
+                            CP2A        97.    3.20          12.         11.         11.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                              COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                     PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .79      2.18    187.57       .82      3.00      2.17    189.00         .82

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .8735E-01 EXCESS= .0000E+00 OUTFLOW= .8723E-01 BASIN STORAGE= .1745E-03 PERCENT ERROR=   -.1

               RDB1  MANE          .40      1.99    207.20       .86      3.00      1.99    207.00         .86

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .2303E+00 EXCESS= .0000E+00 OUTFLOW= .2300E+00 BASIN STORAGE= .3864E-03 PERCENT ERROR=    .0

             RCP1A1B  MANE          .64     59.35    193.37      1.10      3.00     58.41    192.00        1.10

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .3177E+01 EXCESS= .0000E+00 OUTFLOW= .3173E+01 BASIN STORAGE= .4051E-02 PERCENT ERROR=    .0



 *** NORMAL END OF HEC-1 ***
```

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JAN   1997              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   09MAY19  TIME  16:03:27  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X         XX
                                X     X  X        X                X
                                XXXXXXX  XXXX     X        XXXXX   X
                                X     X  X        X                X
                                X     X  X        X     X          X
                                X     X  XXXXXXX   XXXXX         XXX

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                        *DIAGRAM
              1         ID        Woody Mountain Campground
              2         ID        Proposed-Conditions without Detention Basin HEC-1 Model
              3         ID        100-year, 6-hour Model
              4         ID        Woodson Engineering and Surveying
              5         ID        Feb 2019
              6         ID        PROPOSED CONDITION (WITHOUT DETENTION BASIN)
              7         IT       3       0       0     125
              8         IO       5       0       0
              9         IN       5       0       0
                        *
```

```
   10          KK   SUB-1
   11          BA   0.011
   12          PH       1    0.19    0.71    1.37    2.21    2.56    2.76    3.18
   13          LS       0   86.55
   14          UD   0.155
               *

   15          KK   SUB-2
   16          BA   0.008
   17          LS       0   79.72
   18          UD   0.181
               *

   19          KK  SUB-2A
   20          BA   0.007
   21          LS       0   95.25
   22          UD     0.1
               *

   23          KK    CP1A
   24          KM     COMBINE HYDROGRAPHS FROM SUB-1,SUB-2 & SUB-2A
   25          HC       3
               *

   26          KK  SUB-3B
   27          KM    RUNOFF FROM SUB-3B
   28          BA    .024
   29          LS       0   86.44
   30          UD    0.24
               *

   31          KK  SUB-3C
   32          KM    RUNOFF FROM SUB-3C
   33          BA    .002
   34          LS       0   92.30
   35          UD    0.10
               *
1                                    HEC-1 INPUT                                    PAGE  2

        LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   36          KK     CP2
   37          KM     COMBINE HYDROGRAPHS FROM SUB-3B,SUB-3C & CP1A
   38          HC       3
               *

   39          KK  BASIN4
   40          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
   41          KM    RUNOFF FROM BASIN 4
   42          BA    .002
```

```
          43          LS       0   83.56
          44          UD    .086
                      *

          45          KK   RCP26
          46          KM    ROUTE CP26 TO CP27
          47          RK     400    0.01   0.016       0      21      10      10
                      *

          48          KK BASIN4A
          49          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          50          KM    RUNOFF FROM BASIN 4A
          51          BA    .002
          52          LS       0    86.0
          53          UD    .136
                      *

          54          KK    CP27
          55          KM    COMBINE BASINS RCP26 & BASIN4A
          56          HC       2
                      *

          57          KK BASIN1A
          58          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          59          KM    RUNOFF FROM BASIN 1A
          60          BA    .001
          61          LS       0    90.4
          62          UD    .054
                      *

          63          KK    CP28
          64          KM    COMBINE BASINS BASIN1A & CP27
          65          HC       2
                      *

          66          KK     DB1
          67          KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
          68          KM    DETENTION BASIN 1
          69          RS       1    STOR       0
          70          SV     0.0    0.02    0.09    0.15    0.23   0.31          0.39    0.40
          71          SE  7052.8  7053.0  7053.5  7054.0  7054.5  7055.0  7055.5      7055.52
          72          SQ     0.0    0.21    1.30    3.16    4.14   4.93          5.61    5.63
                      *
1                                      HEC-1 INPUT                                          PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          73          KK    RDB1
          74          KM    ROUTE DB1 TO CP30
          75          RK     320    0.01   0.013       0    CIRC     0.5
```

```
                *
 76             KK BASIN4B
 77             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 78             KM    RUNOFF FROM BASIN 4B
 79             BA    .002
 80             LS       0   87.81
 81             UD    .071
                *

 82             KK  BASIN3
 83             KM    BASIN REFERENCED FROM PRESIDIO IN PINES STUDY
 84             KM    RUNOFF FROM BASIN 3
 85             BA    .002
 86             LS       0   90.80
 87             UD    .071
                *

 88             KK  SUB-1A
 89             KM    RUNOFF FROM SUB-1A
 90             BA    .045
 91             LS       0   87.37
 92             UD    .189
                *

 93             KK  SUB-1B
 94             KM    RUNOFF FROM SUB-1B
 95             BA    .009
 96             LS       0   93.46
 97             UD     .10
                *

 98             KK  CP1A1B
 99             KM    COMBINE SUB-1A & SUB-1B
100             HC       2
                *

101             KK RCP1A1B
102             KM    ROUTE CP1A1B TO CP30
103             RK    1200    0.01   0.013       0    CIRC     2.5
                *

104             KK  SUB-3A
105             KM    RUNOFF FROM SUB-3A
106             BA    .008
107             LS       0   78.72
108             UD     .10
                *
1                                       HEC-1 INPUT                                    PAGE  4

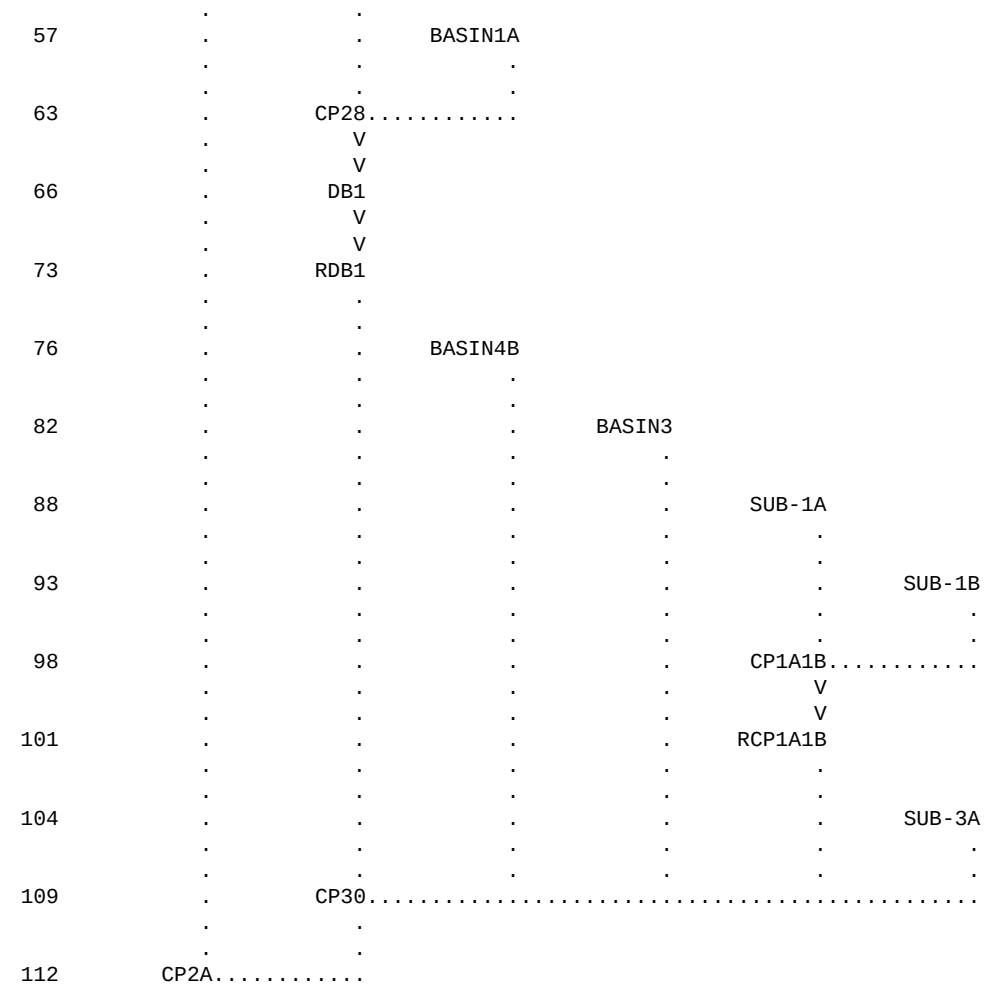
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
           109          KK    CP30
           110          KM    COMBINE HYDROGRAPHS FROM BASINS 3, 4B, DB1, SUB-3A& CP1A1B
           111          HC       5
                        *

           112          KK    CP2A
           113          KM     COMBINE HYDROGRAPHS FROM CP30 & CP-2
           114          HC       2
                        *
           115          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    10       SUB-1
                .
                .
    15          .       SUB-2
                .           .
                .           .
    19          .           .      SUB-2A
                .           .           .
                .           .           .
    23        CP1A.......................
                .
                .
    26          .      SUB-3B
                .           .
                .           .
    31          .           .      SUB-3C
                .           .           .
                .           .           .
    36         CP2.......................
                .
                .
    39          .      BASIN4
                .           V
                .           V
    45          .       RCP26
                .           .
                .           .
    48          .           .     BASIN4A
                .           .           .
                .           .           .
    54          .        CP27............
                .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JAN   1997               *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09MAY19  TIME  16:03:27   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
                          Woody Mountain Campground
                          Proposed-Conditions without Detention Basin HEC-1 Model
                          100-year, 6-hour Model
                          Woodson Engineering and Surveying
                          Feb 2019
                          PROPOSED CONDITION (WITHOUT DETENTION BASIN)

    8 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN           3  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         125  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME        0612  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .05 HOURS
                         TOTAL TIME BASE    6.20 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT
1
                                                RUNOFF SUMMARY
                                           FLOW IN CUBIC FEET PER SECOND
                                         TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
           OPERATION       STATION      FLOW     PEAK                                        AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

           HYDROGRAPH AT
+                            SUB-1        24.    3.20           2.          2.          2.        .01

           HYDROGRAPH AT
+                            SUB-2        12.    3.25           1.          1.          1.        .01

           HYDROGRAPH AT
```

+	SUB-2A	24.	3.10	2.	2.	2.	.01	
	3 COMBINED AT							
+	CP1A	56.	3.15	5.	5.	5.	.03	
	HYDROGRAPH AT							
+	SUB-3B	42.	3.30	5.	5.	5.	.02	
	HYDROGRAPH AT							
+	SUB-3C	6.	3.15	1.	0.	0.	.00	
	3 COMBINED AT							
+	CP2	97.	3.20	11.	10.	10.	.05	
	HYDROGRAPH AT							
+	BASIN4	5.	3.10	0.	0.	0.	.00	
	ROUTED TO							
+	RCP26	5.	3.15	0.	0.	0.	.00	
	HYDROGRAPH AT							
+	BASIN4A	4.	3.15	0.	0.	0.	.00	
	2 COMBINED AT							
+	CP27	9.	3.15	1.	1.	1.	.00	
	HYDROGRAPH AT							
+	BASIN1A	3.	3.10	0.	0.	0.	.00	
	2 COMBINED AT							
+	CP28	12.	3.15	1.	1.	1.	.01	
	ROUTED TO							
+	DB1	4.	3.40	1.	1.	1.	.01	
+								7054.42 3.40
	ROUTED TO							
+	RDB1	4.	3.40	1.	1.	1.	.01	
	HYDROGRAPH AT							
+	BASIN4B	6.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT							
+	BASIN3	7.	3.10	0.	0.	0.	.00	
	HYDROGRAPH AT							
+	SUB-1A	92.	3.25	9.	9.	9.	.05	
	HYDROGRAPH AT							
+	SUB-1B	29.	3.15	2.	2.	2.	.01	

```
          2 COMBINED AT
+                          CP1A1B       115.    3.20          12.         11.         11.        .05

          ROUTED TO
+                         RCP1A1B       113.    3.20          12.         11.         11.        .05

          HYDROGRAPH AT
+                          SUB-3A        14.    3.15           1.          1.          1.        .01

          5 COMBINED AT
+                            CP30       137.    3.20          15.         14.         14.        .07

          2 COMBINED AT
+                            CP2A       234.    3.20          25.         24.         24.        .12
1
                                      SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                          (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                  INTERPOLATED TO
                                                                               COMPUTATION INTERVAL
            ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                      PEAK                                    PEAK

                                 (MIN)     (CFS)      (MIN)     (IN)     (MIN)     (CFS)     (MIN)       (IN)

              RCP26  MANE          .60      4.66    187.74      1.63      3.00      4.62    189.00        1.63

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .1740E+00 EXCESS= .0000E+00 OUTFLOW= .1741E+00 BASIN STORAGE= .2036E-03 PERCENT ERROR=   -.2

               RDB1  MANE          .44      3.98    204.47      1.68      3.00      3.98    204.00        1.68

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .4494E+00 EXCESS= .0000E+00 OUTFLOW= .4489E+00 BASIN STORAGE= .5692E-03 PERCENT ERROR=    .0

             RCP1A1B  MANE          .46    114.50    193.12      2.01      3.00    112.83    192.00        2.01

 CONTINUITY SUMMARY (AC-FT) - INFLOW= .5788E+01 EXCESS= .0000E+00 OUTFLOW= .5784E+01 BASIN STORAGE= .5657E-02 PERCENT ERROR=    .0



 *** NORMAL END OF HEC-1 ***
```

LID Basin -1: Elevation Volume Summary

Elev.	Area		Increase in Depth	Incremental Area	Incremental Volume	Cumulative Volume		
	(sq.ft)	(ac)	(ft)	(sq.ft)	(cu.ft)	(cu.ft)	(ac-ft)	
7036.5	5324	0.12	0	0	0	0	0.00	
7037	5947	0.14	0.5	5636	2818	2818	0.06	
7037.5	6591	0.15	0.5	6269	3135	*5952*	0.14	ROCV
7038	7235	0.17	0.5	6913	3457	9409	0.22	

LID Basin -2: Elevation Volume Summary

Elev.	Area		Increase in Depth	Incremental Area	Incremental Volume	Cumulative Volume		
	(sq.ft)	(ac)	(ft)	(sq.ft)	(cu.ft)	(cu.ft)	(ac-ft)	
7020.5	1866	0.04	0	0	0	0	0.00	
7021	2291	0.05	0.5	2079	1039	1039	0.02	
7021.5	2738	0.06	0.5	2515	1257	*2297*	0.05	ROCV
7022	3185	0.07	1	2962	2962	4001	0.09	

LID Basin -3: Elevation Volume Summary

Elev.	Area		Increase in Depth	Incremental Area	Incremental Volume	Cumulative Volume		
	(sq.ft)	(ac)	(ft)	(sq.ft)	(cu.ft)	(cu.ft)	(ac-ft)	
7055.5	2033	0.05	0	0	0	0	0.00	
7056	2314	0.05	0.5	2174	1087	1087	0.02	
7056.5	2617	0.06	0.5	2466	1233	*2320*	0.05	
7057	2920	0.07	0.5	2769	1384	3704	0.09	ROCV

Summary of Impervious Areas

Description	Area (sf)
RV Sites	33600
Park Model	16154
Tent Sites	6132
Asphalt	63389
Site Amenities	4188
Ramada	1200
Trash Enclosures	1708
Bath House	1842
Impervious Road	1888
Total	**130101**

Summary of ROCV Calculations

Total ROCV (for 1")= 10842 CF

Impervious area in drainage area Sub-3A (SF)= 44300
ROCV required (Sub-3A) (CF)= 3692

ROCV provided in LID basin 3 (CF)= 3704

Thus, ROCV provided for SUB-3A (3704 CF) > ROCV required for SUB-3A (3692 CF)

Impervious area in Drainage area Sub-3B (SF)= 85801
ROCV required (Sub-3B) (CF)= 7150

ROCV provided in LID basins 1 & 2 (CF)= 8249

Thus, ROCV provided for SUB-3B (8914 CF) > ROCV required for SUB-3B (7150 CF)

APPENDIX C

Detention Basin Stage Volume Calculations
Detention Basin Outlet Pipes Calculations
Culvert Analysis Results
Detention Basin Emergency Spillway Weir-1
Detention Basin Emergency Spillway Weir-2
Detention Basin Emergency Spillway Weir Channel-1
Detention Basin Emergency Spillway Weir Channel-2
LID Basin 1 Weir
LID Basin 2 Weir
LID Basin 3 Weir
Channel Analysis Results

Detention Basin Stage-Volume Summary

Elev.	Area		Increase in Depth	Incremental Area	Incremental Volume	Cumulative Volume	
	(sq.ft)	(ac)	(ft)	(sq.ft)	(cu.ft)	(cu.ft)	(ac-ft)
6992	31543	0.72	0	0	0	0	0.00
6993	34546	0.79	1	33045	33045	33045	0.76
6994	37594	0.86	1	36070	36070	69115	1.59
6995	40785	0.94	1	39190	39190	108304	2.49
6996	44131	1.01	1	42458	42458	150762	3.46
6997	47978	1.10	1	46055	46055	196817	4.52
6998	53773	1.23	1	50876	50876	247692	5.69
6998.5	55301.5	1.27	0.5	54537	27269	274961	6.31
6999	56830	1.30	1	55302	55302	302994	6.96
7000	61411	1.41	1	59121	59121	362114	8.31

Detention Basin Outlet-Flow Calculations

Outlet-1

Orifice Dia.	21	in
Orifice Dia.	1.75	ft
Orifice area	2.40	sq.ft
No. of openings	1	
Elev-Inv. In	6992.00	
Elev-Inv. Out	6987.15	
Length=	54.65	
Slope=	0.0887	
Centroid	6992.875	
Orifice-top	6993.75	
Orifice Co-eff	0.6	
G (gravity)	32.2	ft/s
pipe material	cmp	
Outlet-1 Flow		
Elev.	**Flow (cfs)**	**Flow Type**
6992	0	Pipe Flow
6993	15.9	Pipe Flow
6994	12.28	Orifice
6995	16.87	Orifice
6996	20.46	Orifice
6997	23.51	Orifice
6998	26.21	Orifice
6999	28.65	Orifice
7000	30.90	Orifice

Outlet-2

Orifice Dia.	21	in
Orifice Dia.	1.75	ft
Orifice area	2.40	sq.ft
No. of openings	1	
Elev-Inv. In	6992	
Elev-Inv. Out	6989.17	
Length=	50.78	
Slope=	0.0557	
Centroid	6992.875	
Orifice-top	6993.75	
Orifice Co-eff	0.6	
G (gravity)	32.2	ft/s
Outlet-2 Flow		
Elev.	**Flow (cfs)**	**Flow Type**
6992	0	Pipe Flow
6993	12.6	Pipe Flow
6994	12.28	Orifice
6995	16.87	Orifice
6996	20.46	Orifice
6997	23.51	Orifice
6998	26.21	Orifice
6999	28.65	Orifice
7000	30.90	Orifice

Total outflow=Outlet-1+Outlet-2

Elev.	**Flow (cfs)**
6992	0.00
6993	28.50
6994	24.56
6995	33.75
6996	40.93
6997	47.02
6998	52.41
6999	57.30
7000	61.80

10-yr WSE 6995.42

Combined flow rate from outlets-1&2= 37 cfs

Approximate flow rate from outlet-1= 18.5 cfs

Approximate flow rate from outlet-2= 18.5 cfs

100-yr WSE 6998.51

Combined flow rate from outlets-1&2= 55 cfs

Approximate flow rate from outlet-1= 27.5 cfs

Approximate flow rate from outlet-2= 27.5 cfs

Culvert Report

BASIN CULVERT 1 (BC1)-Q25

Invert Elev Dn (ft)	=	6998.50
Pipe Length (ft)	=	31.03
Slope (%)	=	3.19
Invert Elev Up (ft)	=	6999.49
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

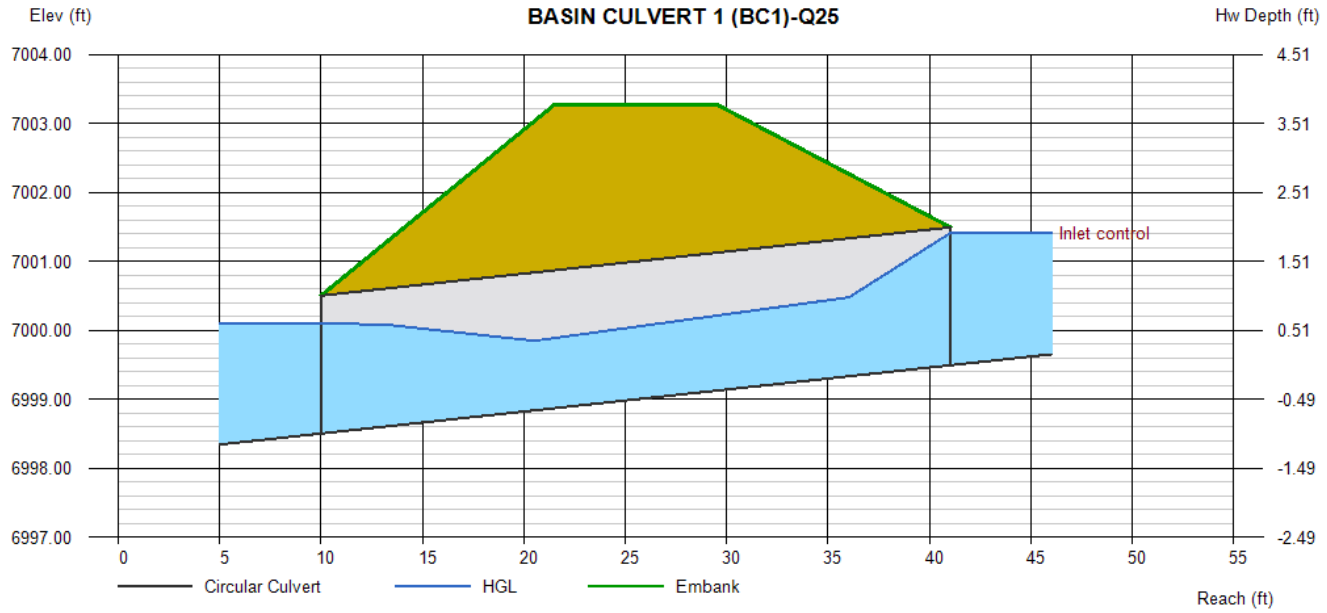
Top Elevation (ft)	=	7003.27
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	11.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	11.00
Qpipe (cfs)	=	11.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.10
Veloc Up (ft/s)	=	5.66
HGL Dn (ft)	=	7000.09
HGL Up (ft)	=	7000.68
Hw Elev (ft)	=	7001.41
Hw/D (ft)	=	0.96
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 1 (BC1)-Q100

Invert Elev Dn (ft)	=	6998.50
Pipe Length (ft)	=	31.03
Slope (%)	=	3.19
Invert Elev Up (ft)	=	6999.49
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

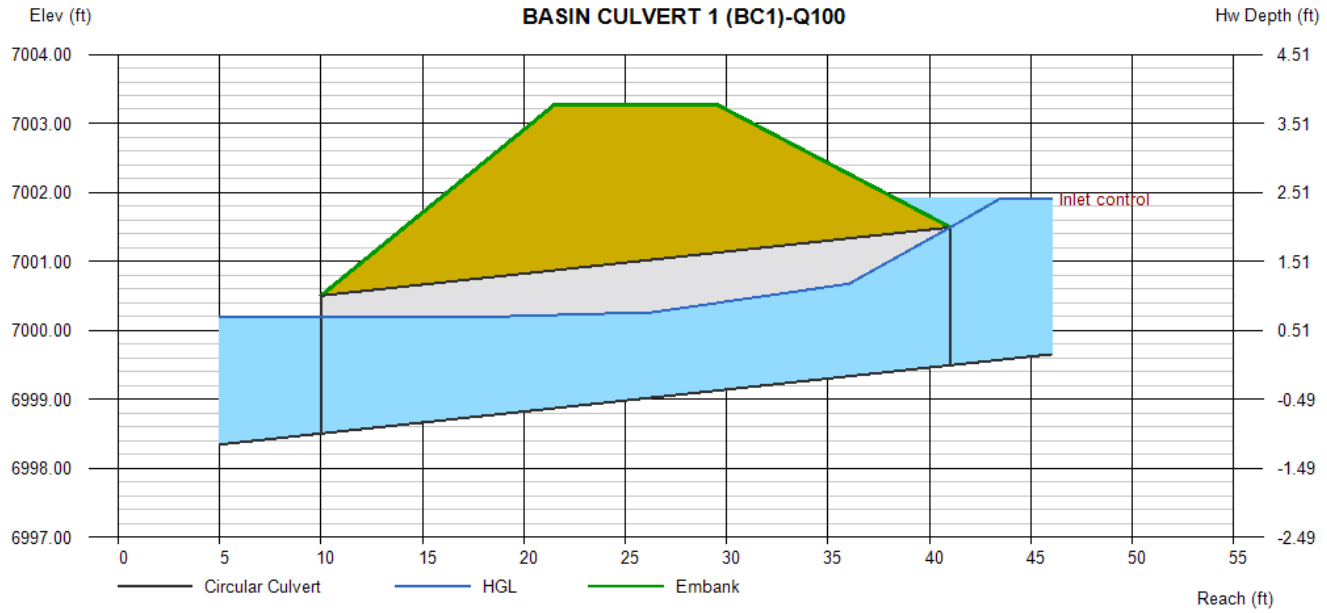
Top Elevation (ft)	=	7003.27
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	5.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	15.00
Qpipe (cfs)	=	15.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.28
Veloc Up (ft/s)	=	6.41
HGL Dn (ft)	=	7000.20
HGL Up (ft)	=	7000.89
Hw Elev (ft)	=	7001.91
Hw/D (ft)	=	1.21
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 2 (BC2)-Q25

Invert Elev Dn (ft)	=	6999.38
Pipe Length (ft)	=	35.46
Slope (%)	=	4.20
Invert Elev Up (ft)	=	7000.87
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

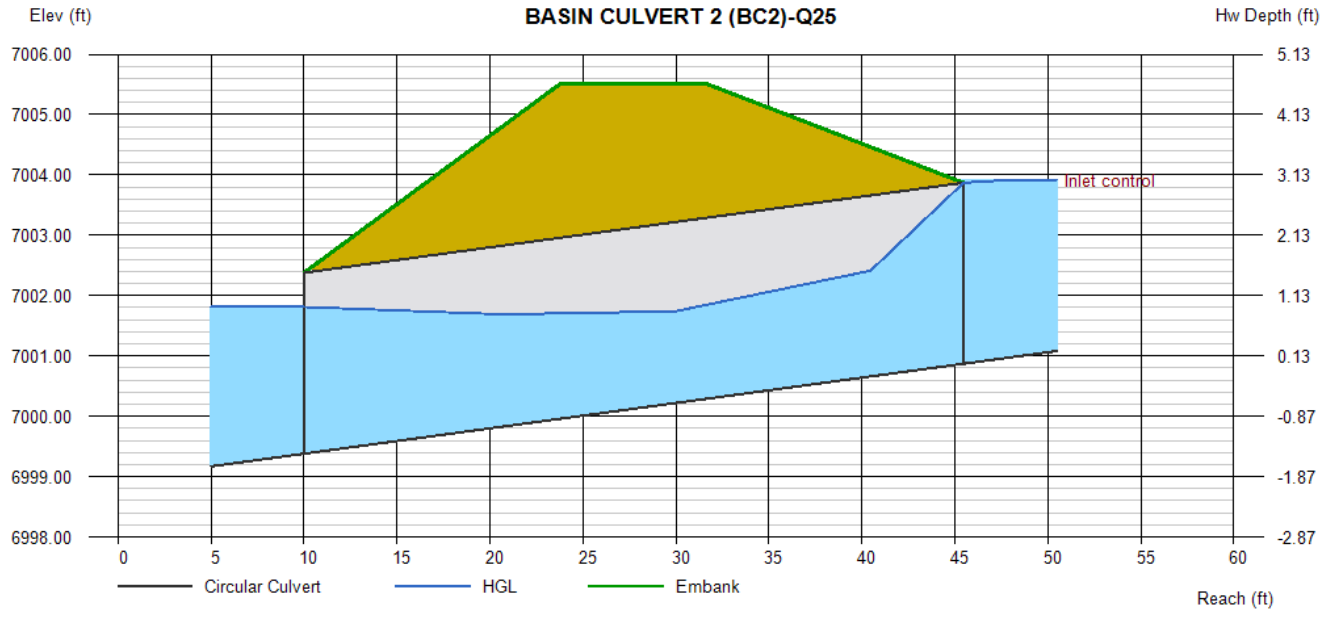
Top Elevation (ft)	=	7005.50
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	66.00
Qmax (cfs)	=	100.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	66.00
Qpipe (cfs)	=	66.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.38
Veloc Up (ft/s)	=	7.15
HGL Dn (ft)	=	7001.81
HGL Up (ft)	=	7002.73
Hw Elev (ft)	=	7003.92
Hw/D (ft)	=	1.02
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 2 (BC2)-Q100

Invert Elev Dn (ft)	=	6999.38
Pipe Length (ft)	=	35.46
Slope (%)	=	4.20
Invert Elev Up (ft)	=	7000.87
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

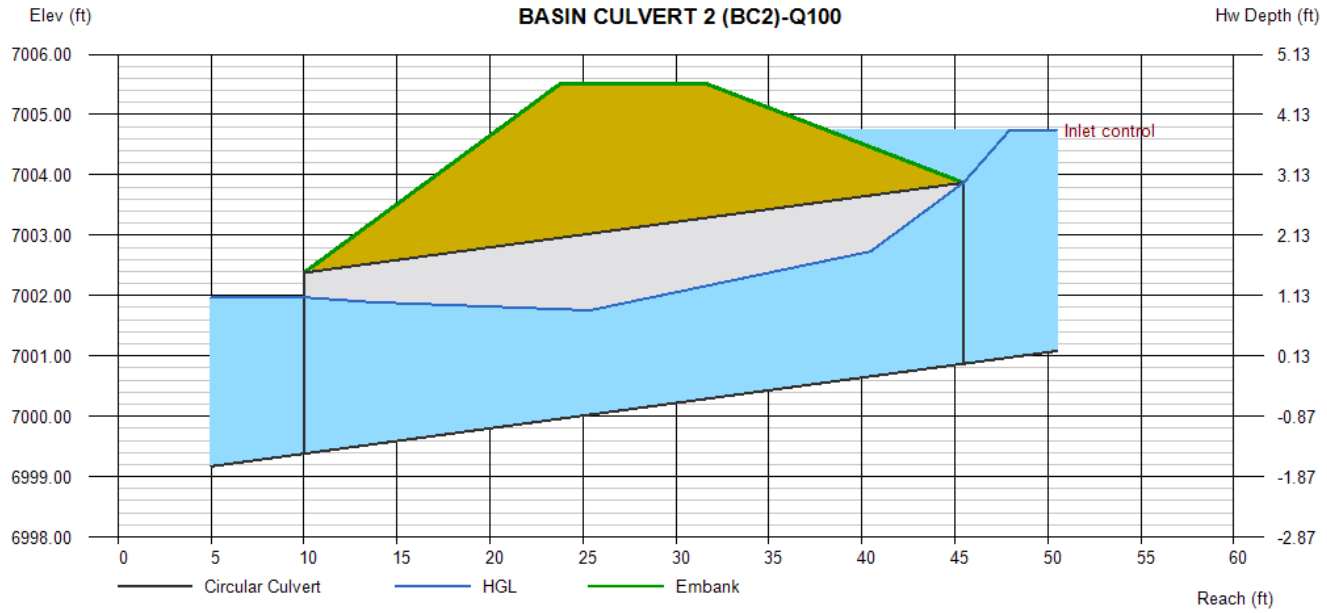
Top Elevation (ft)	=	7005.50
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	50.00
Qmax (cfs)	=	100.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	90.00
Qpipe (cfs)	=	90.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.93
Veloc Up (ft/s)	=	8.16
HGL Dn (ft)	=	7001.97
HGL Up (ft)	=	7003.05
Hw Elev (ft)	=	7004.75
Hw/D (ft)	=	1.29
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 3 (BC3)-Q25

Invert Elev Dn (ft)	=	7004.00
Pipe Length (ft)	=	30.10
Slope (%)	=	5.88
Invert Elev Up (ft)	=	7005.77
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

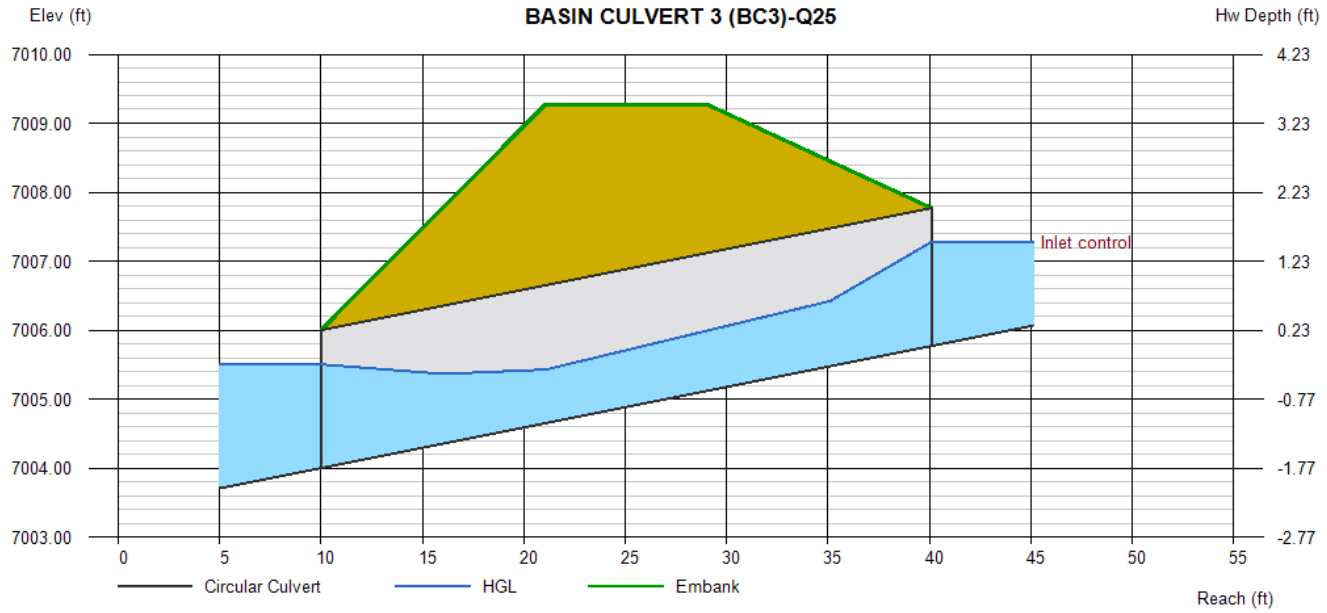
Top Elevation (ft)	=	7009.27
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	8.00
Qmax (cfs)	=	12.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.00
Qpipe (cfs)	=	8.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.16
Veloc Up (ft/s)	=	5.06
HGL Dn (ft)	=	7005.50
HGL Up (ft)	=	7006.78
Hw Elev (ft)	=	7007.28
Hw/D (ft)	=	0.75
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 3 (BC3)-Q100

Invert Elev Dn (ft)	=	7004.00
Pipe Length (ft)	=	30.10
Slope (%)	=	5.88
Invert Elev Up (ft)	=	7005.77
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

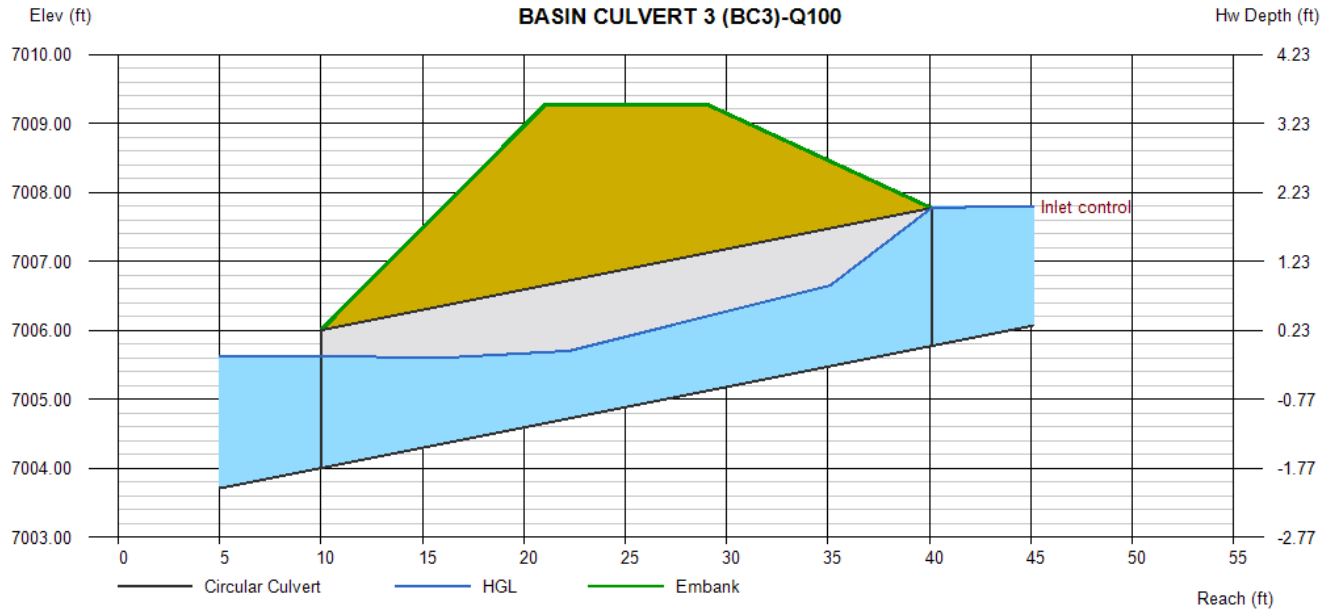
Top Elevation (ft)	=	7009.27
Top Width (ft)	=	8.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	8.00
Qmax (cfs)	=	12.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	12.00
Qpipe (cfs)	=	12.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.40
Veloc Up (ft/s)	=	5.85
HGL Dn (ft)	=	7005.62
HGL Up (ft)	=	7007.01
Hw Elev (ft)	=	7007.79
Hw/D (ft)	=	1.01
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 4 (BC4)-Q25

Invert Elev Dn (ft)	=	6999.00
Pipe Length (ft)	=	50.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6999.50
Rise (in)	=	36.0
Shape	=	Box
Span (in)	=	96.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	90D Headwall, Chamfered or Beveled Inlet Edges
Culvert Entrance	=	90D headwall w/3/4-in chamfers
Coeff. K,M,c,Y,k	=	0.515, 0.667, 0.0375, 0.79, 0.2

Embankment

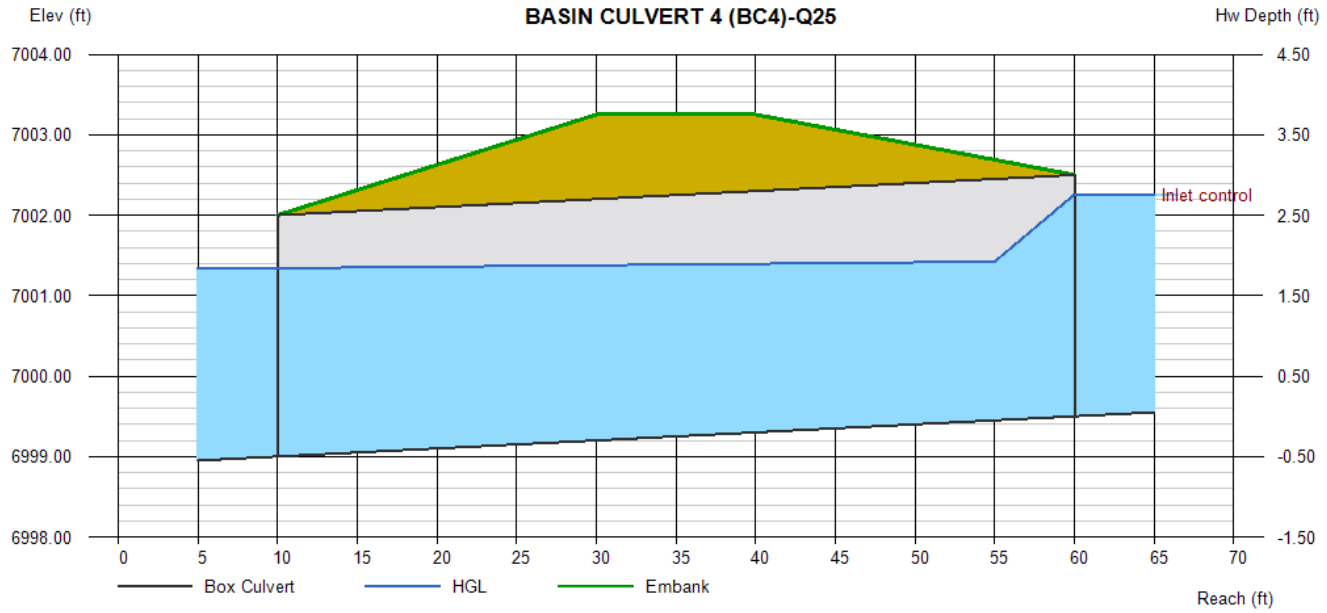
Top Elevation (ft)	=	7003.25
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	99.00
Qmax (cfs)	=	137.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	99.00
Qpipe (cfs)	=	99.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.29
Veloc Up (ft/s)	=	6.41
HGL Dn (ft)	=	7001.34
HGL Up (ft)	=	7001.43
Hw Elev (ft)	=	7002.26
Hw/D (ft)	=	0.92
Flow Regime	=	Inlet Control



Culvert Report

BASIN CULVERT 4 (BC4)-Q100

Invert Elev Dn (ft)	=	6999.00
Pipe Length (ft)	=	50.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6999.50
Rise (in)	=	36.0
Shape	=	Box
Span (in)	=	96.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	90D Headwall, Chamfered or Beveled Inlet Edges
Culvert Entrance	=	90D headwall w/3/4-in chamfers
Coeff. K,M,c,Y,k	=	0.515, 0.667, 0.0375, 0.79, 0.2

Embankment

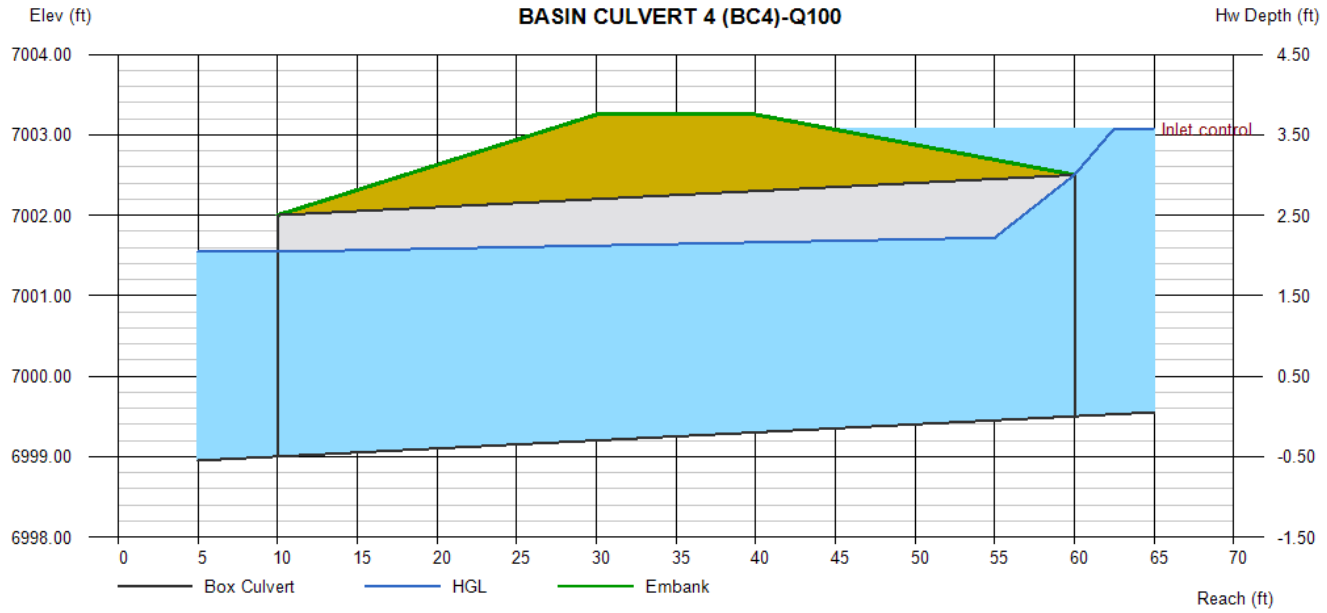
Top Elevation (ft)	=	7003.25
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	99.00
Qmax (cfs)	=	137.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	137.00
Qpipe (cfs)	=	137.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.73
Veloc Up (ft/s)	=	7.65
HGL Dn (ft)	=	7001.54
HGL Up (ft)	=	7001.74
Hw Elev (ft)	=	7003.08
Hw/D (ft)	=	1.19
Flow Regime	=	Inlet Control



Culvert Report

Culvert 1 (Q25)

Invert Elev Dn (ft)	=	7016.25
Pipe Length (ft)	=	36.83
Slope (%)	=	10.16
Invert Elev Up (ft)	=	7019.99
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

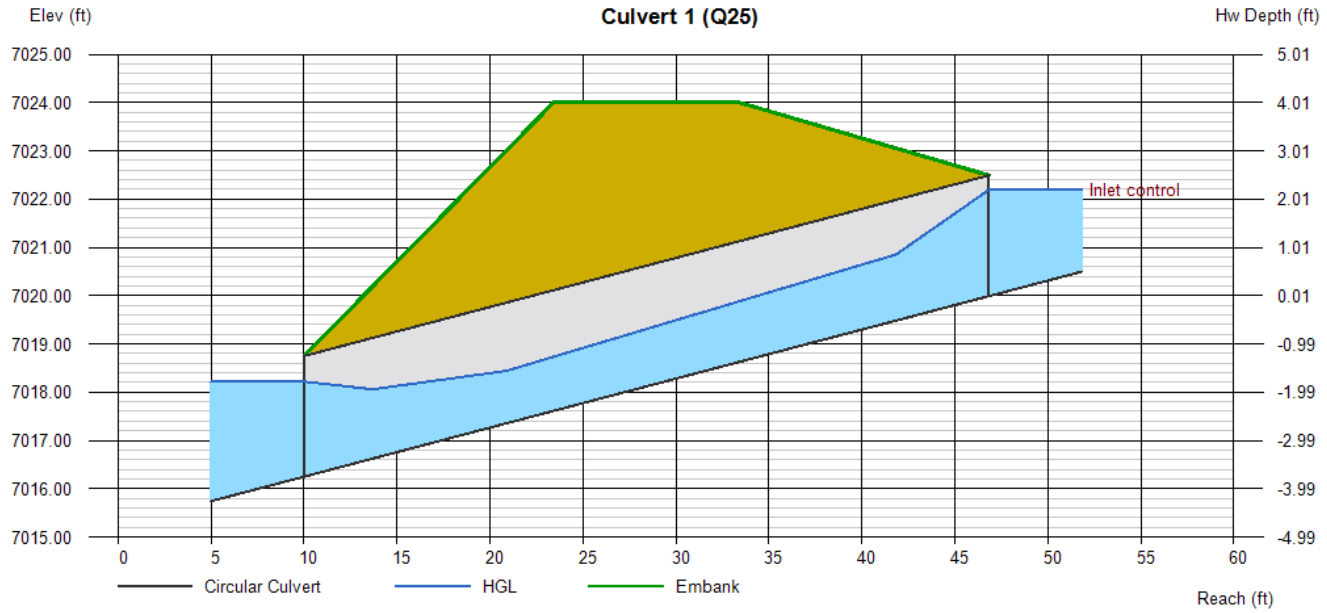
Top Elevation (ft)	=	7024.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	200.00

Calculations

Qmin (cfs)	=	36.00
Qmax (cfs)	=	48.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	36.00
Qpipe (cfs)	=	36.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.34
Veloc Up (ft/s)	=	6.17
HGL Dn (ft)	=	7018.22
HGL Up (ft)	=	7021.43
Hw Elev (ft)	=	7022.19
Hw/D (ft)	=	0.88
Flow Regime	=	Inlet Control



Culvert Report

Culvert 1 (Q100)

Invert Elev Dn (ft)	=	7016.25
Pipe Length (ft)	=	36.83
Slope (%)	=	10.16
Invert Elev Up (ft)	=	7019.99
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

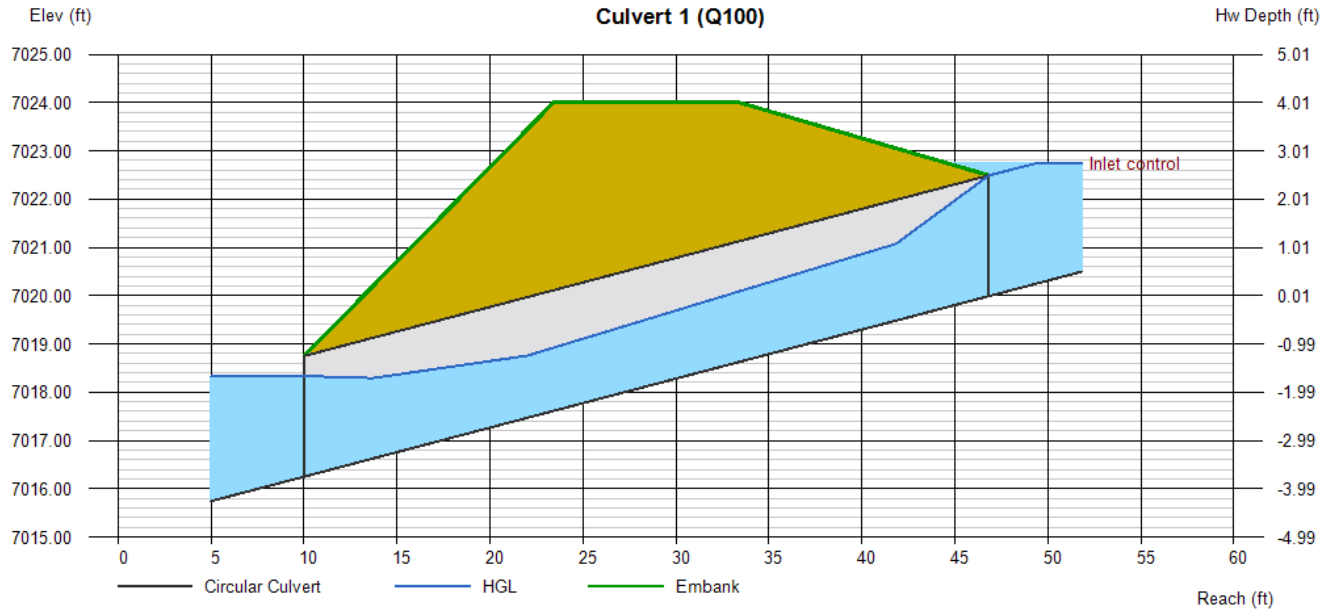
Top Elevation (ft)	=	7024.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	28.00
Qmax (cfs)	=	48.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	48.00
Qpipe (cfs)	=	48.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.49
Veloc Up (ft/s)	=	6.90
HGL Dn (ft)	=	7018.33
HGL Up (ft)	=	7021.66
Hw Elev (ft)	=	7022.73
Hw/D (ft)	=	1.10
Flow Regime	=	Inlet Control



Culvert Report

Culvert 2 (Q25)

Invert Elev Dn (ft)	=	7014.73
Pipe Length (ft)	=	30.96
Slope (%)	=	4.78
Invert Elev Up (ft)	=	7016.21
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

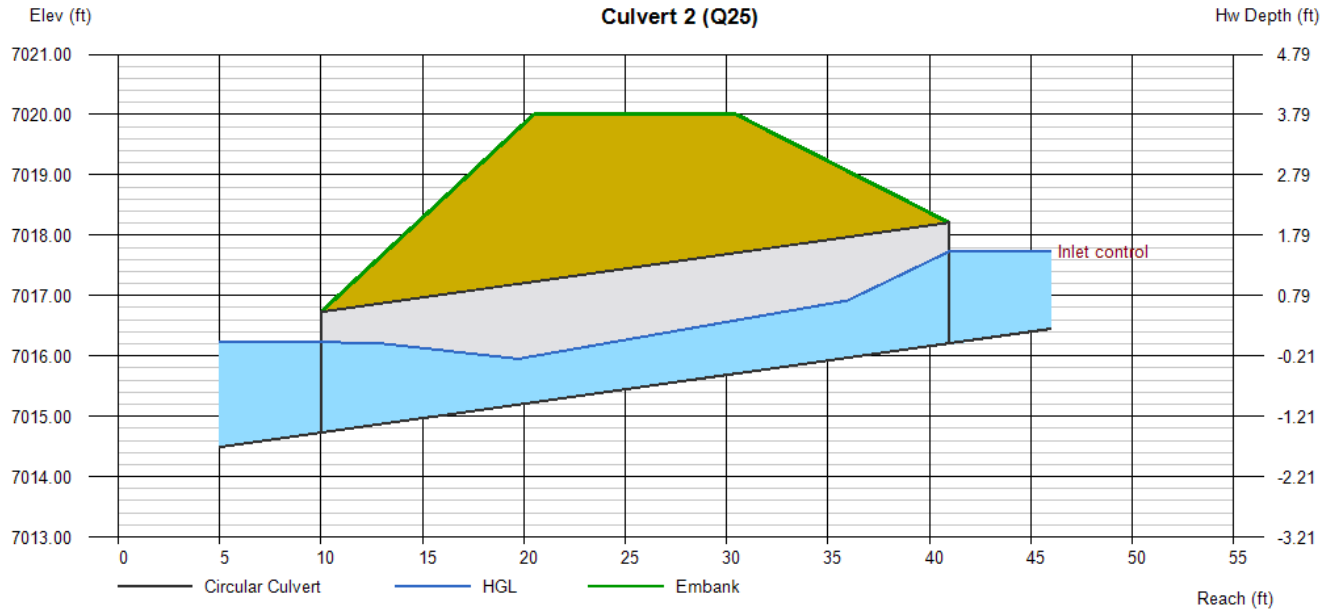
Top Elevation (ft)	=	7020.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	5.00
Qmax (cfs)	=	12.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.00
Qpipe (cfs)	=	8.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.16
Veloc Up (ft/s)	=	5.06
HGL Dn (ft)	=	7016.23
HGL Up (ft)	=	7017.22
Hw Elev (ft)	=	7017.73
Hw/D (ft)	=	0.76
Flow Regime	=	Inlet Control



Culvert Report

Culvert 2 (Q100)

Invert Elev Dn (ft)	=	7014.73
Pipe Length (ft)	=	30.96
Slope (%)	=	4.78
Invert Elev Up (ft)	=	7016.21
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

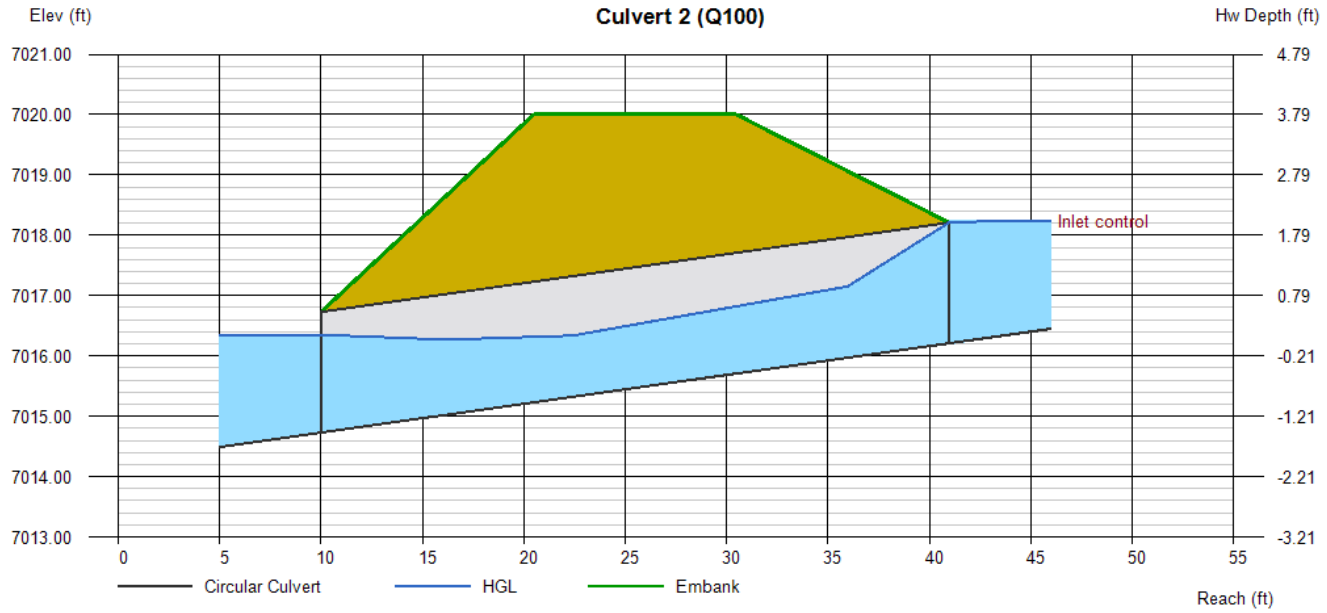
Top Elevation (ft)	=	7020.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	6.00
Qmax (cfs)	=	12.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	12.00
Qpipe (cfs)	=	12.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.40
Veloc Up (ft/s)	=	5.85
HGL Dn (ft)	=	7016.35
HGL Up (ft)	=	7017.45
Hw Elev (ft)	=	7018.24
Hw/D (ft)	=	1.01
Flow Regime	=	Inlet Control



Culvert Report

Culvert 4 (Q25)

Invert Elev Dn (ft)	=	7026.09
Pipe Length (ft)	=	30.76
Slope (%)	=	13.07
Invert Elev Up (ft)	=	7030.11
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

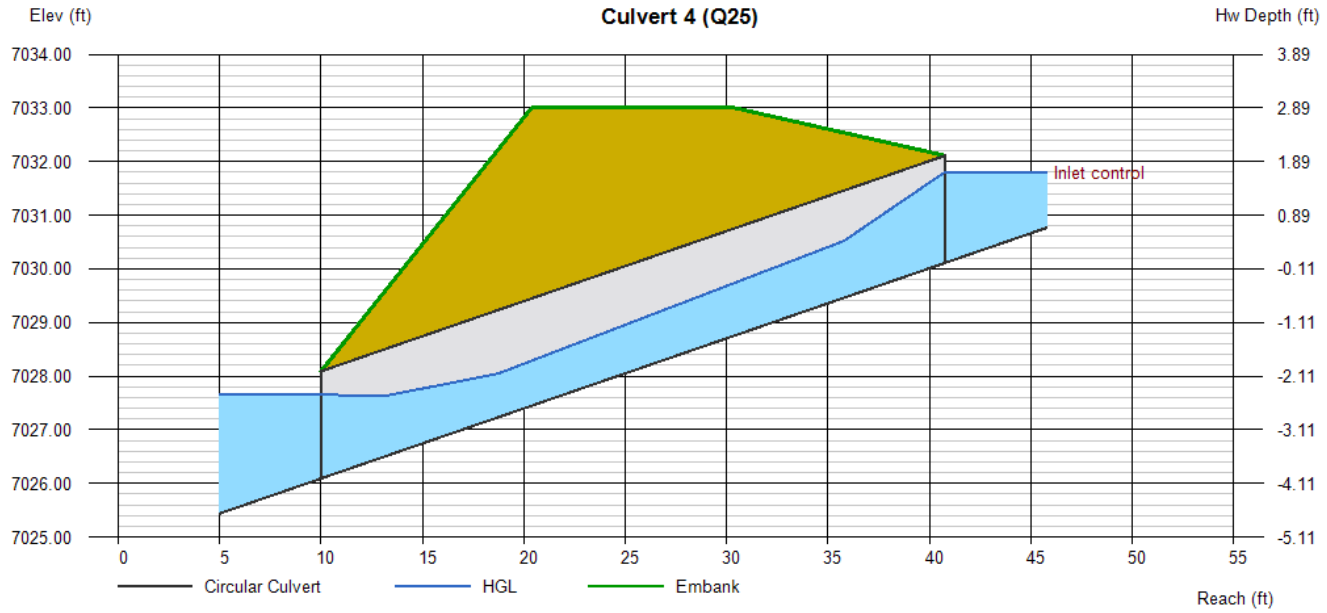
Top Elevation (ft)	=	7033.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	20.00
Qmax (cfs)	=	28.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	20.00
Qpipe (cfs)	=	20.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.79
Veloc Up (ft/s)	=	5.46
HGL Dn (ft)	=	7027.66
HGL Up (ft)	=	7031.24
Hw Elev (ft)	=	7031.80
Hw/D (ft)	=	0.85
Flow Regime	=	Inlet Control



Culvert Report

Culvert 4 (Q100)

Invert Elev Dn (ft)	=	7026.09
Pipe Length (ft)	=	30.76
Slope (%)	=	13.07
Invert Elev Up (ft)	=	7030.11
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

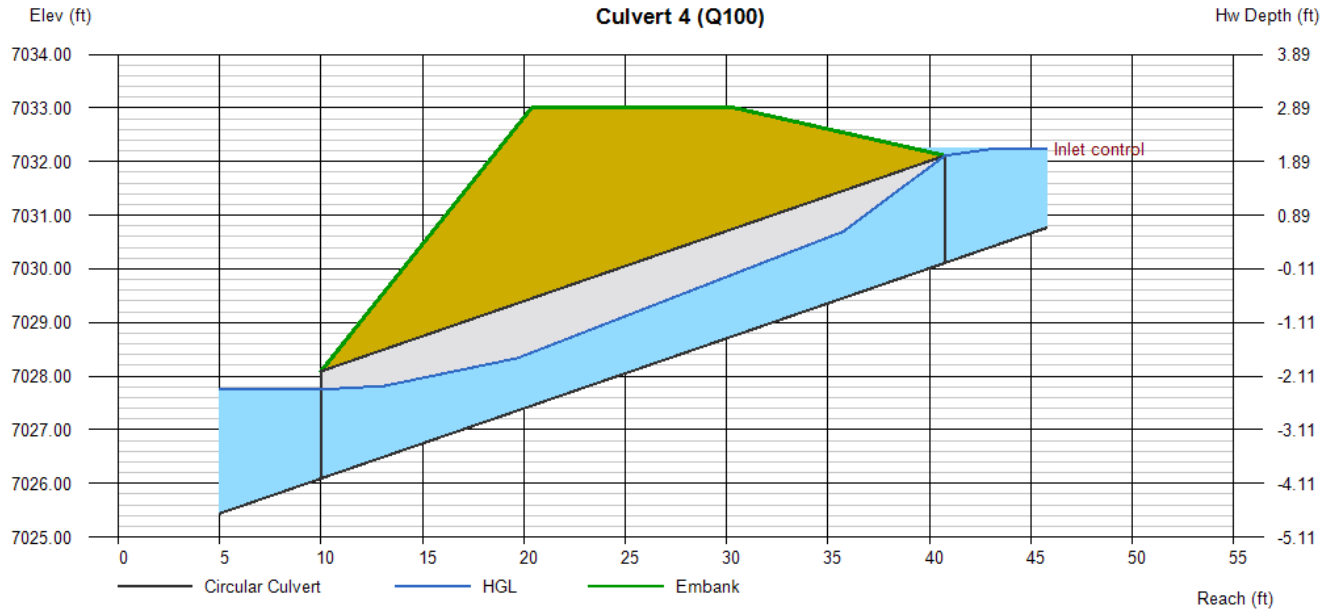
Top Elevation (ft)	=	7033.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	20.00
Qmax (cfs)	=	28.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	27.00
Qpipe (cfs)	=	27.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.84
Veloc Up (ft/s)	=	6.13
HGL Dn (ft)	=	7027.75
HGL Up (ft)	=	7031.43
Hw Elev (ft)	=	7032.25
Hw/D (ft)	=	1.07
Flow Regime	=	Inlet Control



Culvert Report

Culvert 5 (Q25)

Invert Elev Dn (ft)	=	7038.65
Pipe Length (ft)	=	40.83
Slope (%)	=	3.31
Invert Elev Up (ft)	=	7040.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

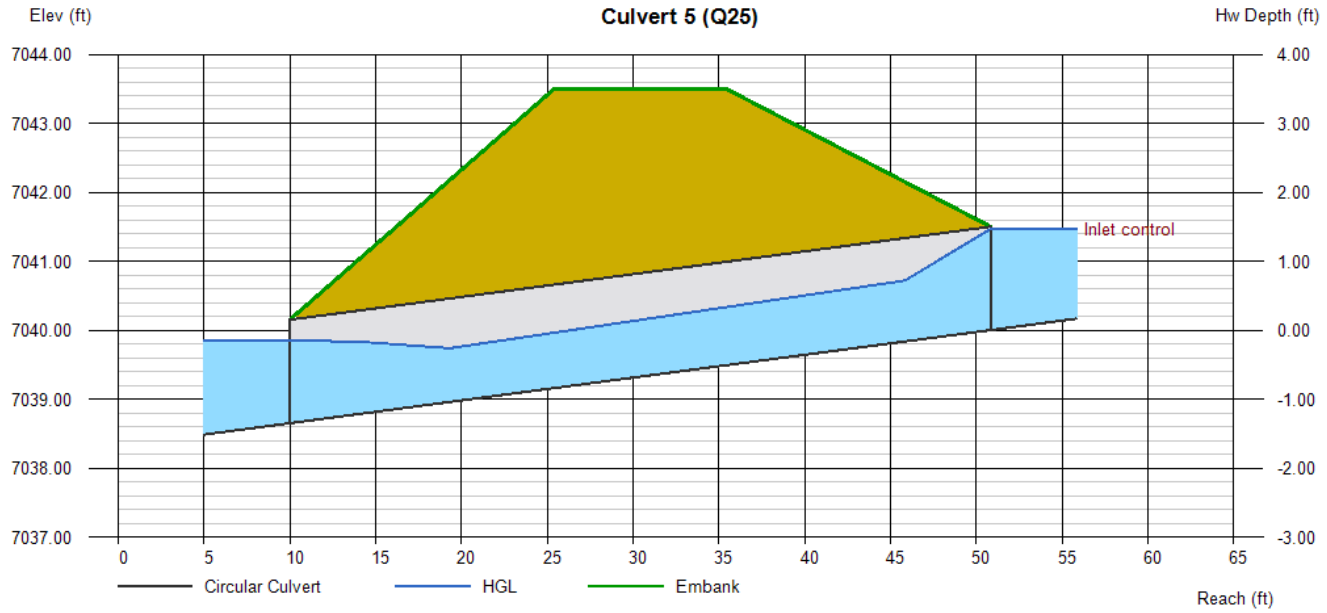
Top Elevation (ft)	=	7043.50
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	11.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	11.00
Qpipe (cfs)	=	11.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.62
Veloc Up (ft/s)	=	4.94
HGL Dn (ft)	=	7039.85
HGL Up (ft)	=	7040.90
Hw Elev (ft)	=	7041.47
Hw/D (ft)	=	0.98
Flow Regime	=	Inlet Control



Culvert Report

Culvert 5 (Q100)

Invert Elev Dn (ft)	=	7038.65
Pipe Length (ft)	=	40.83
Slope (%)	=	3.31
Invert Elev Up (ft)	=	7040.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

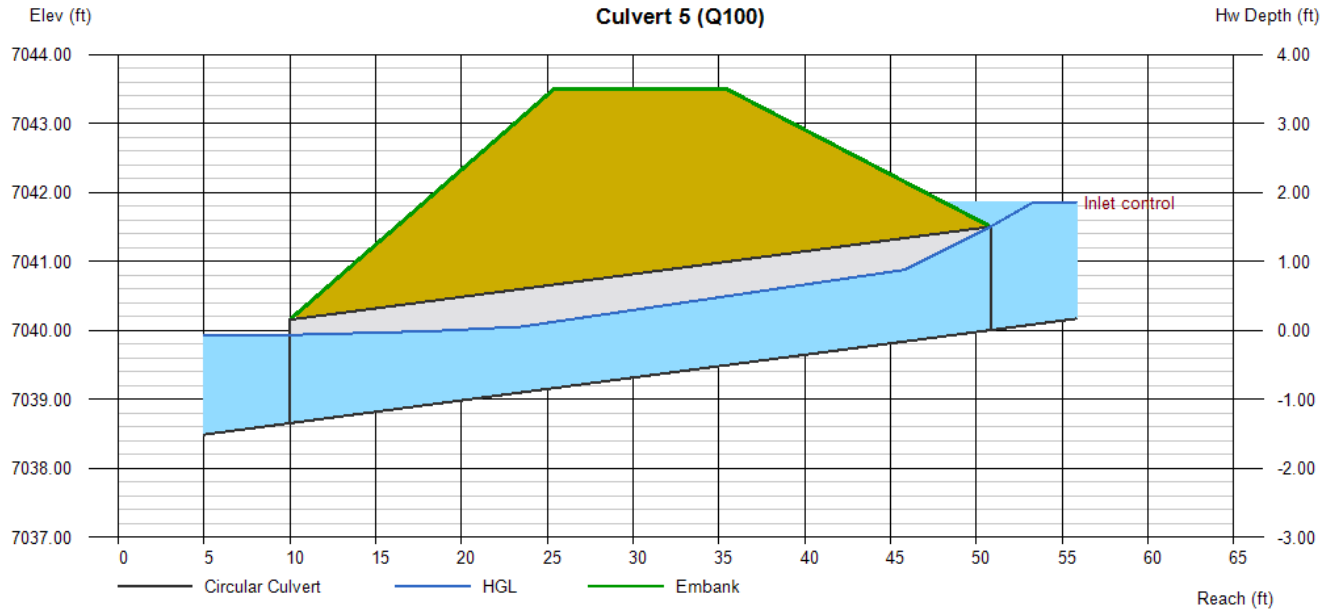
Top Elevation (ft)	=	7043.50
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	11.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	15.00
Qpipe (cfs)	=	15.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.67
Veloc Up (ft/s)	=	5.62
HGL Dn (ft)	=	7039.93
HGL Up (ft)	=	7041.06
Hw Elev (ft)	=	7041.86
Hw/D (ft)	=	1.24
Flow Regime	=	Inlet Control



Culvert Report

Culvert 6 (Q25)

Invert Elev Dn (ft)	=	7020.50
Pipe Length (ft)	=	83.06
Slope (%)	=	16.39
Invert Elev Up (ft)	=	7034.11
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

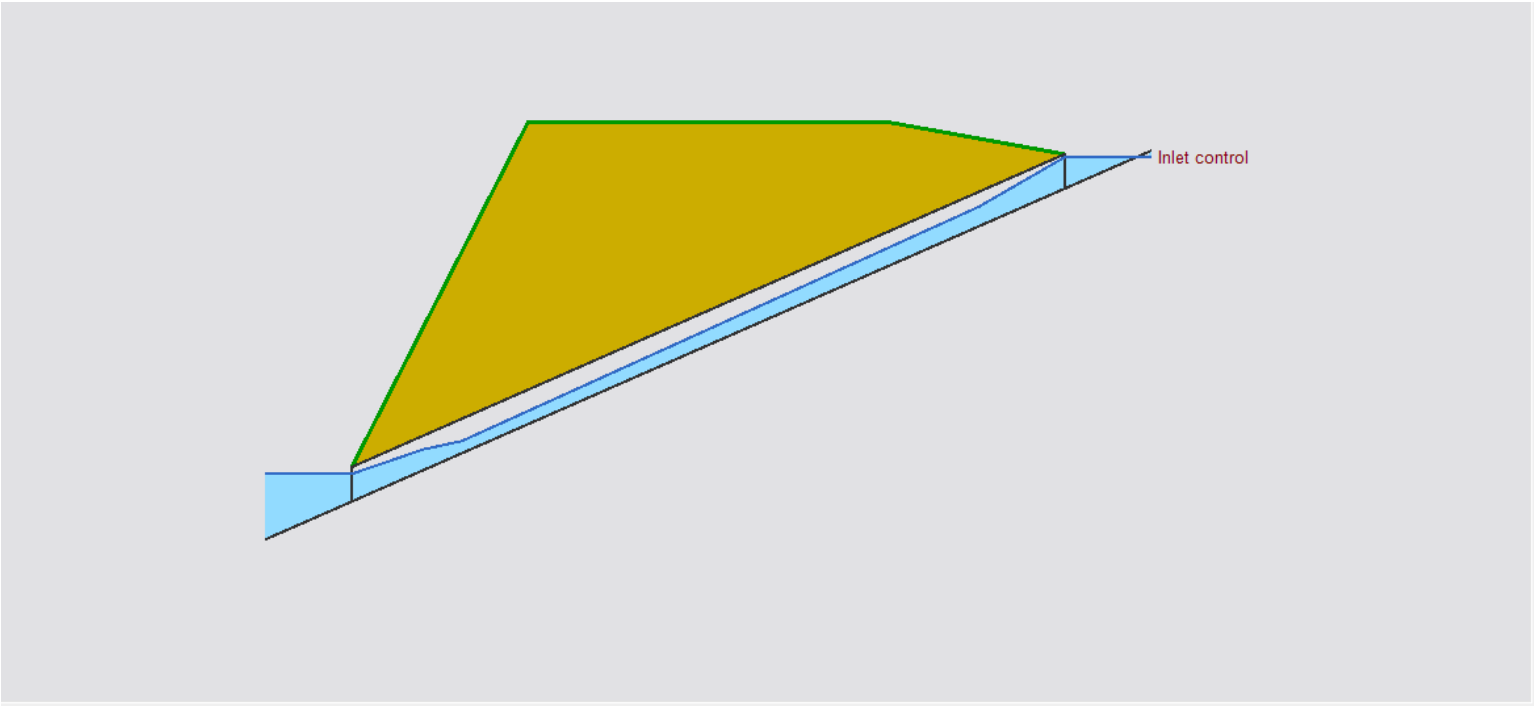
Top Elevation (ft)	=	7037.00
Top Width (ft)	=	42.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	11.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	11.00
Qpipe (cfs)	=	11.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.62
Veloc Up (ft/s)	=	4.94
HGL Dn (ft)	=	7021.70
HGL Up (ft)	=	7035.01
Hw Elev (ft)	=	7035.48
Hw/D (ft)	=	0.91
Flow Regime	=	Inlet Control



Culvert Report

Culvert 6 (Q100)

Invert Elev Dn (ft)	=	7020.50
Pipe Length (ft)	=	83.06
Slope (%)	=	16.39
Invert Elev Up (ft)	=	7034.11
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	2
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

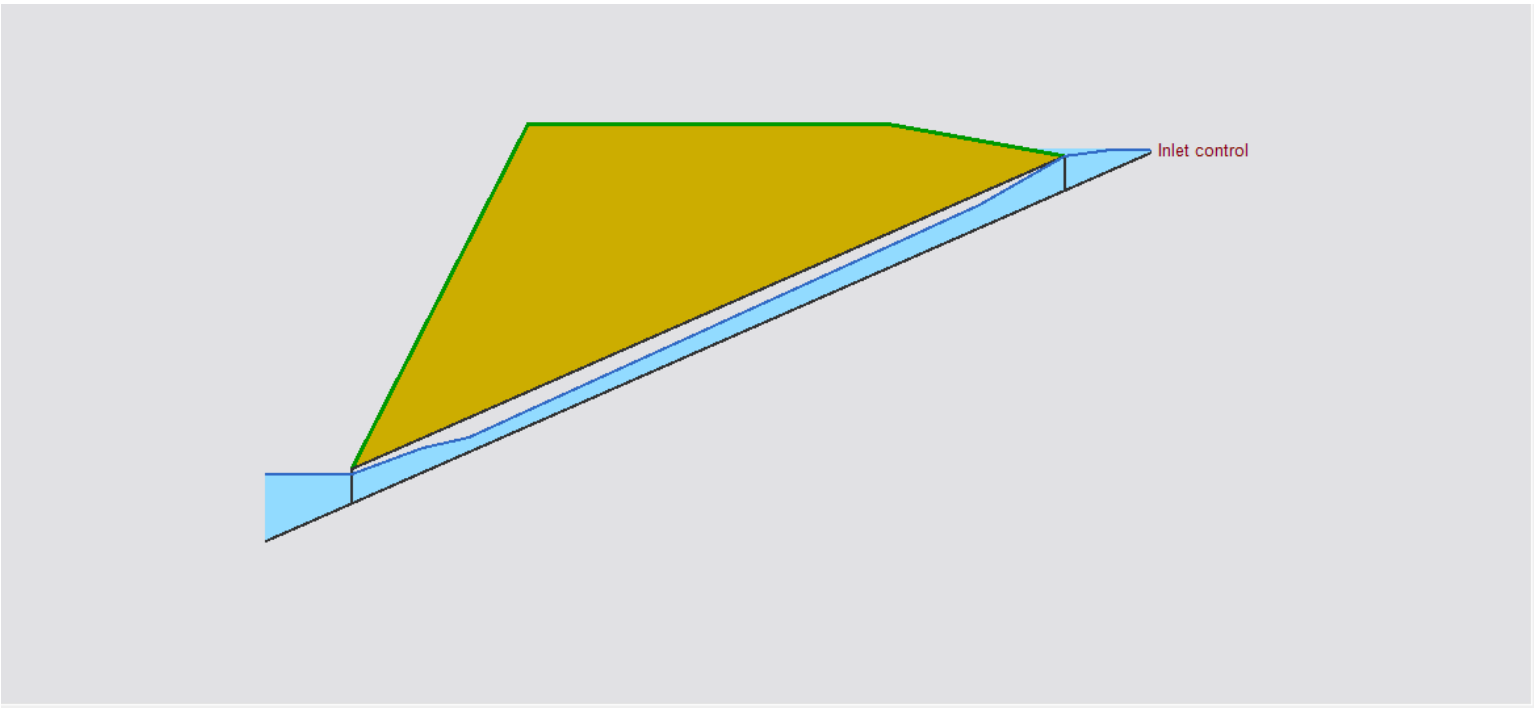
Top Elevation (ft)	=	7037.00
Top Width (ft)	=	42.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	7.00
Qmax (cfs)	=	15.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	15.00
Qpipe (cfs)	=	15.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.67
Veloc Up (ft/s)	=	5.62
HGL Dn (ft)	=	7021.78
HGL Up (ft)	=	7035.17
Hw Elev (ft)	=	7035.87
Hw/D (ft)	=	1.17
Flow Regime	=	Inlet Control



Weir Report

Detention Basin Emergency Spillway Weir-1 (Q100)

Trapezoidal Weir

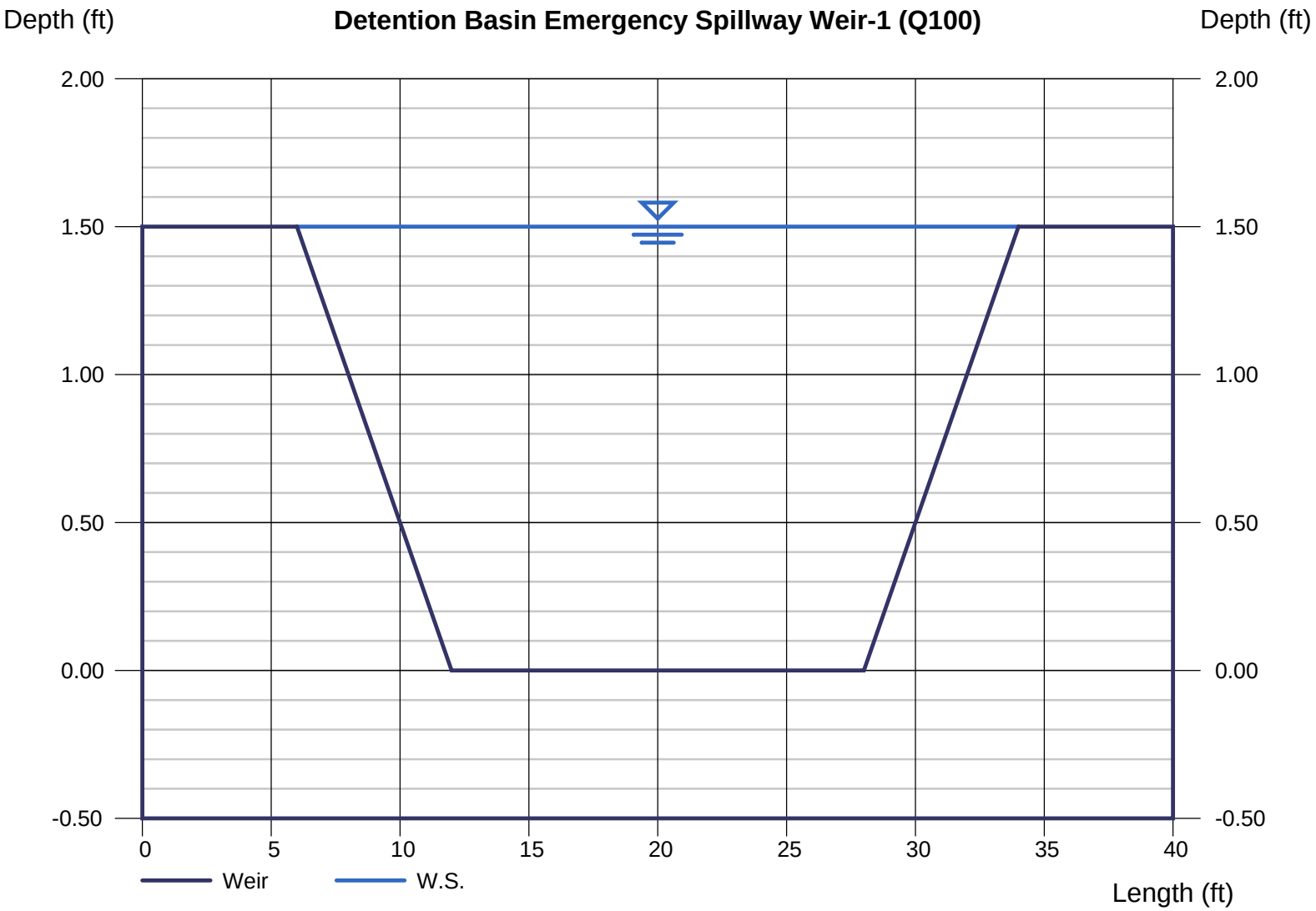
Crest	= Sharp
Bottom Length (ft)	= 16.00
Total Depth (ft)	= 1.50
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 118.00

Highlighted

Depth (ft)	= 1.50
Q (cfs)	= 118.00
Area (sqft)	= 33.00
Velocity (ft/s)	= 3.58
Top Width (ft)	= 28.00



Weir Report

Detention Basin Emergency Spillway Weir-2 (Q100)

Trapezoidal Weir

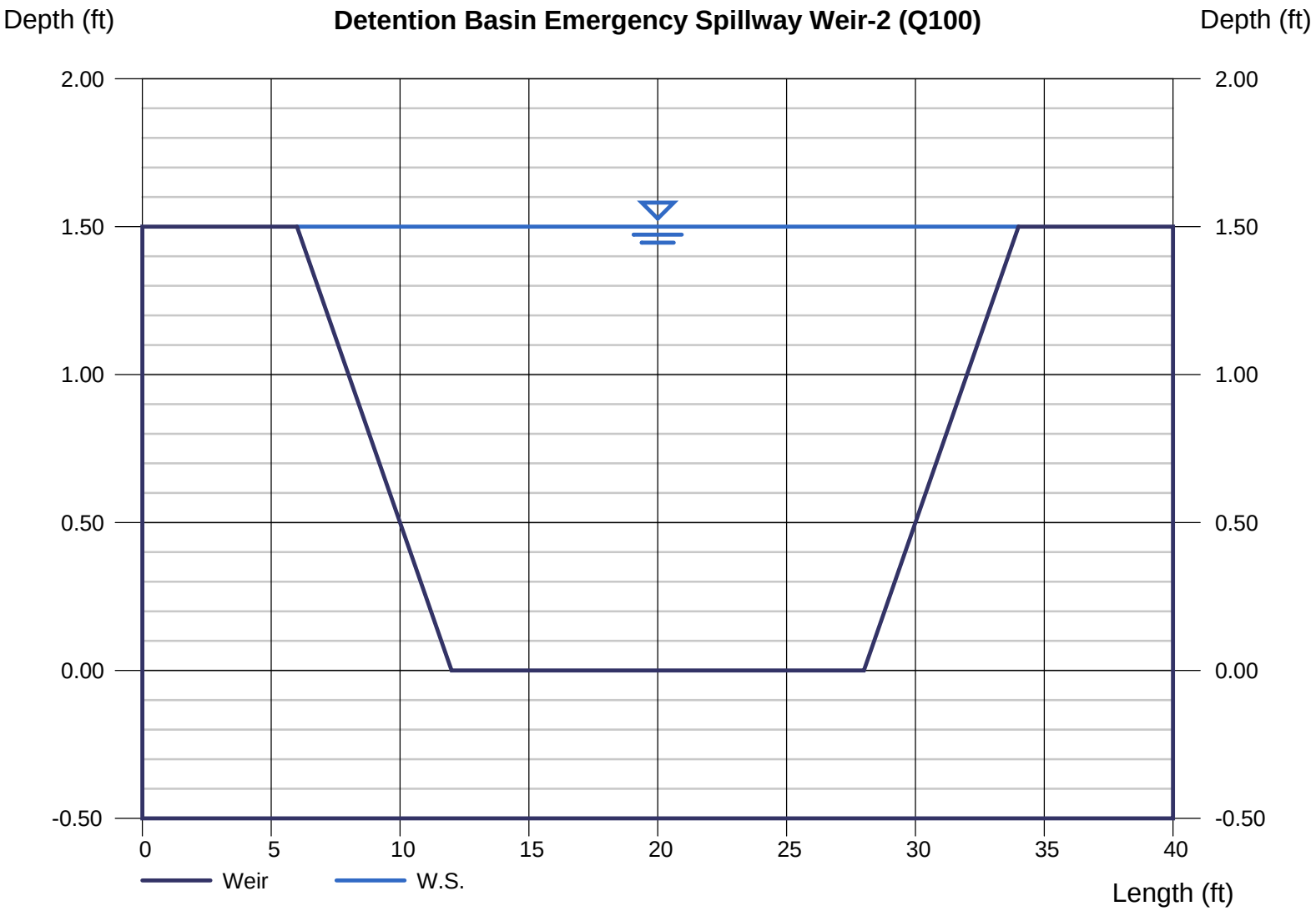
Crest	= Sharp
Bottom Length (ft)	= 16.00
Total Depth (ft)	= 1.50
Side Slope (z:1)	= 4.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 118.00

Highlighted

Depth (ft)	= 1.50
Q (cfs)	= 118.00
Area (sqft)	= 33.00
Velocity (ft/s)	= 3.58
Top Width (ft)	= 28.00



Channel Report

Emergency Spillway Outlet Channel-2 (Q100)

Rectangular

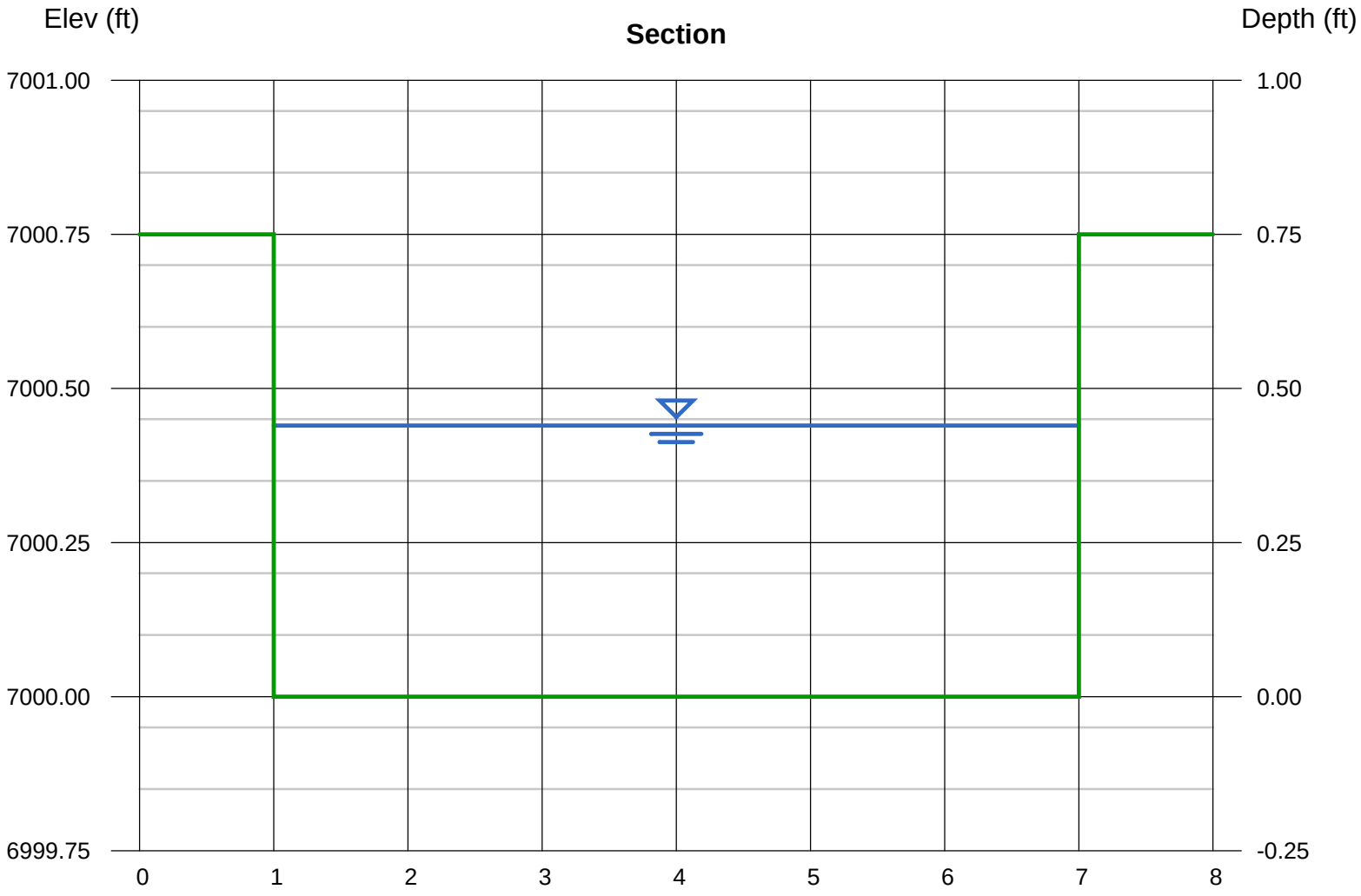
Bottom Width (ft)	= 6.00
Total Depth (ft)	= 0.75
Invert Elev (ft)	= 7000.00
Slope (%)	= 50.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 118.00

Highlighted

Depth (ft)	= 0.44
Q (cfs)	= 118.00
Area (sqft)	= 2.64
Velocity (ft/s)	= 44.70
Wetted Perim (ft)	= 6.88
Crit Depth, Yc (ft)	= 0.75
Top Width (ft)	= 6.00
EGL (ft)	= 31.50



Channel Report

Emergency Spillway Outlet Channel-1 (Q100)

Rectangular

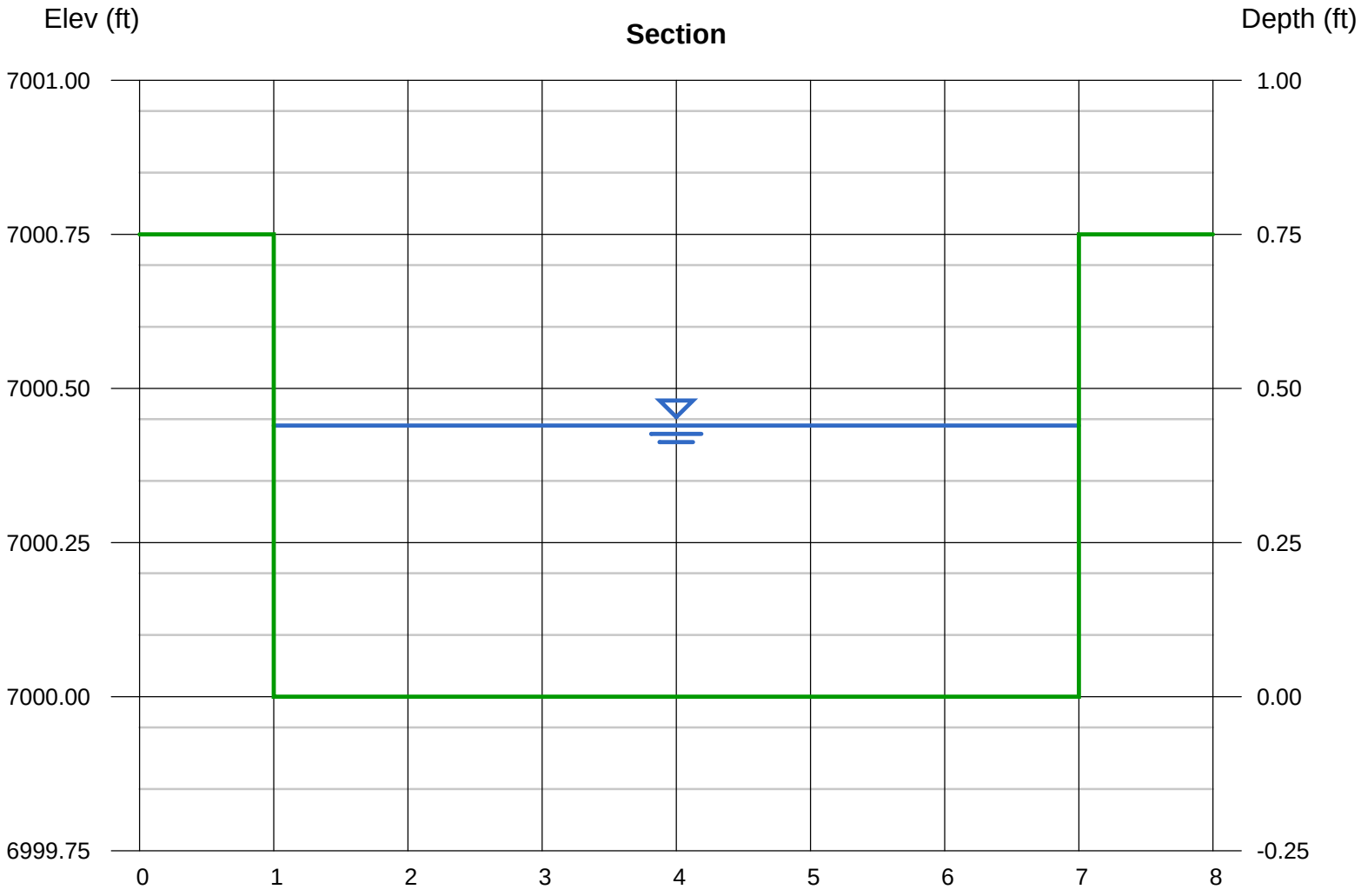
Bottom Width (ft)	= 6.00
Total Depth (ft)	= 0.75
Invert Elev (ft)	= 7000.00
Slope (%)	= 50.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 118.00

Highlighted

Depth (ft)	= 0.44
Q (cfs)	= 118.00
Area (sqft)	= 2.64
Velocity (ft/s)	= 44.70
Wetted Perim (ft)	= 6.88
Crit Depth, Yc (ft)	= 0.75
Top Width (ft)	= 6.00
EGL (ft)	= 31.50



Weir Report

Weir LID-1 (Q100)

Trapezoidal Weir

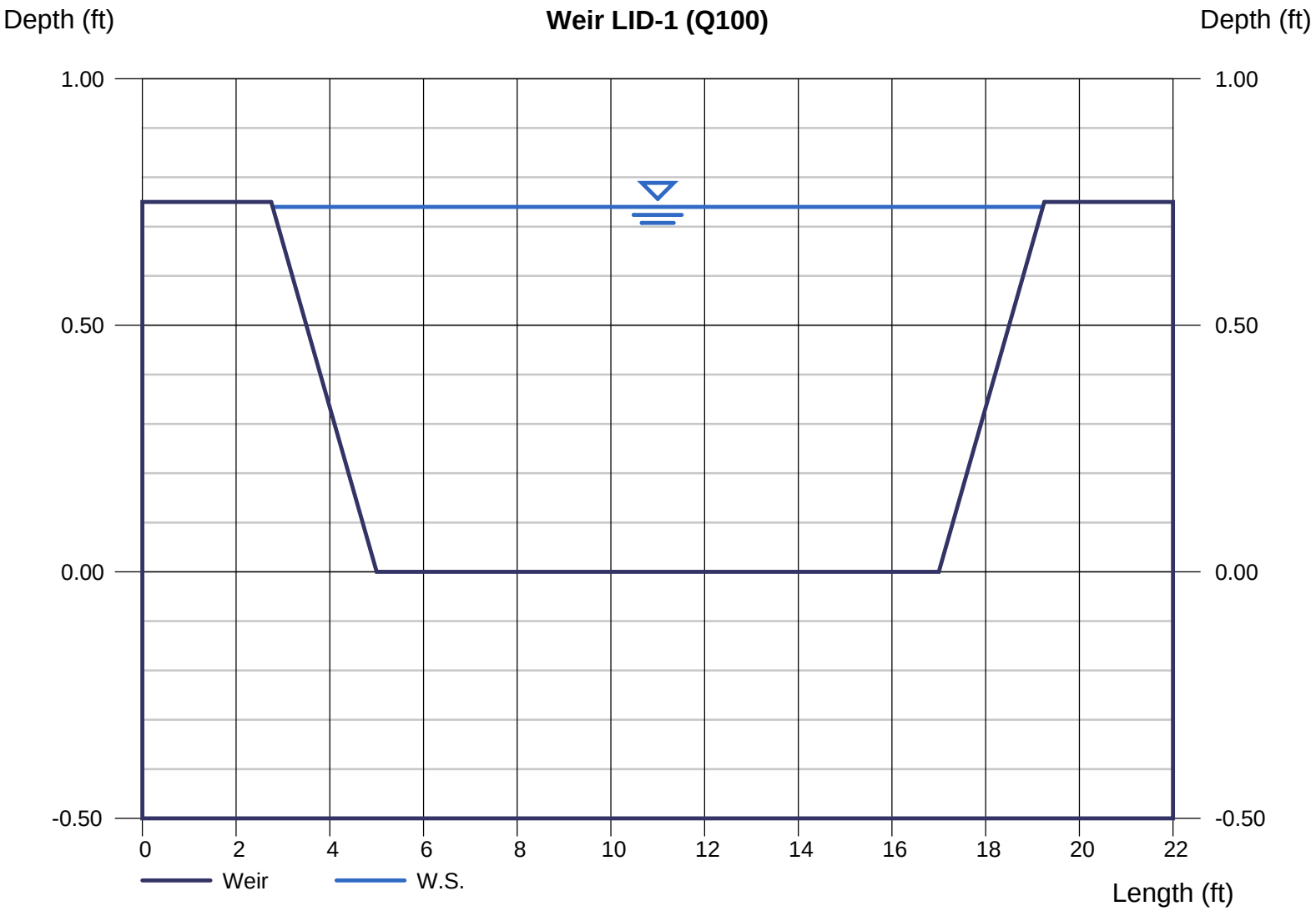
Crest	= Sharp
Bottom Length (ft)	= 12.00
Total Depth (ft)	= 0.75
Side Slope (z:1)	= 3.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 27.00

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 27.00
Area (sqft)	= 10.52
Velocity (ft/s)	= 2.57
Top Width (ft)	= 16.44



Weir Report

Weir LID-2 (Q100)

Trapezoidal Weir

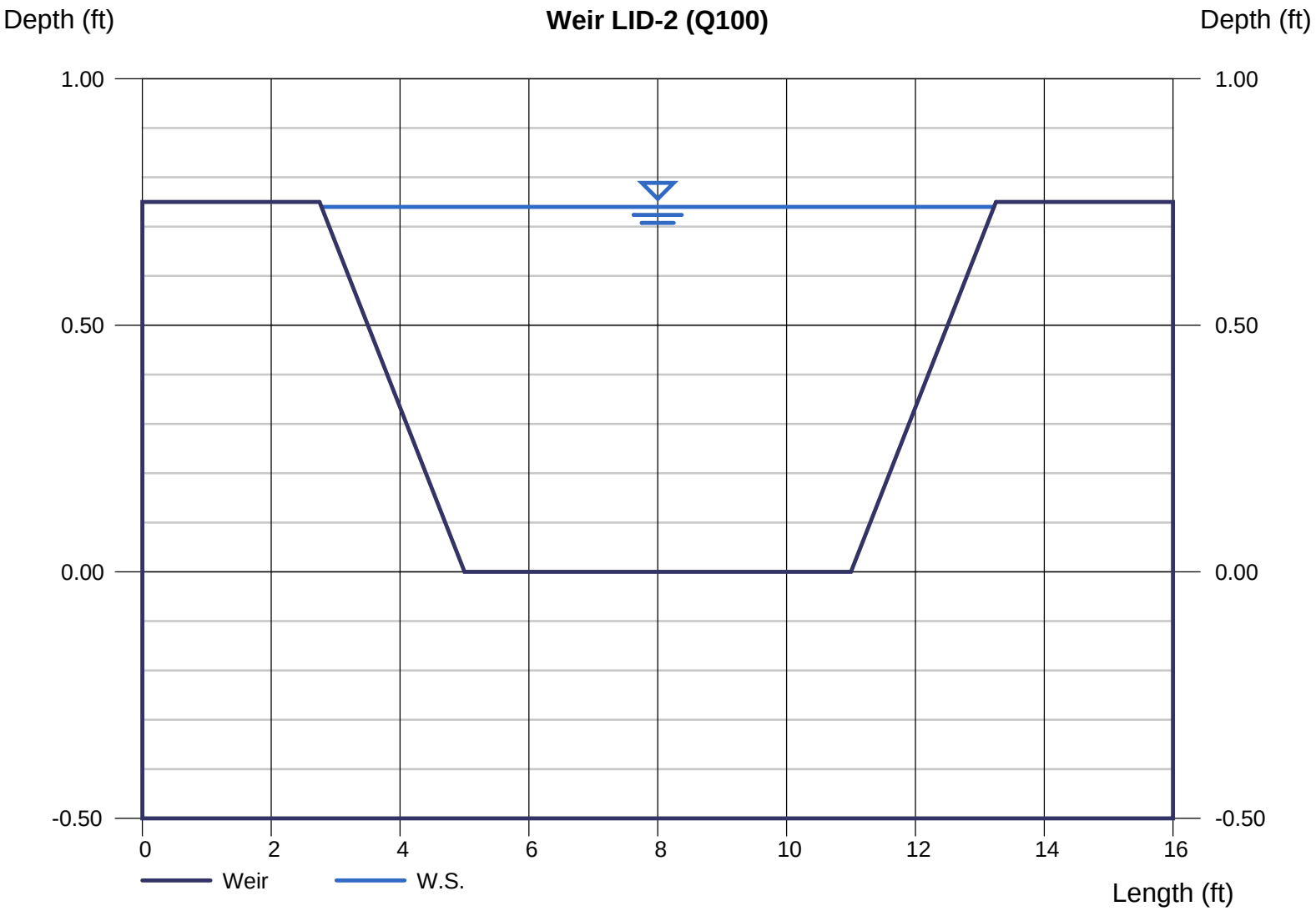
Crest	= Sharp
Bottom Length (ft)	= 6.00
Total Depth (ft)	= 0.75
Side Slope (z:1)	= 3.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 15.00

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 15.00
Area (sqft)	= 6.08
Velocity (ft/s)	= 2.47
Top Width (ft)	= 10.44



Weir Report

Weir LID-3 (Q100)

Trapezoidal Weir

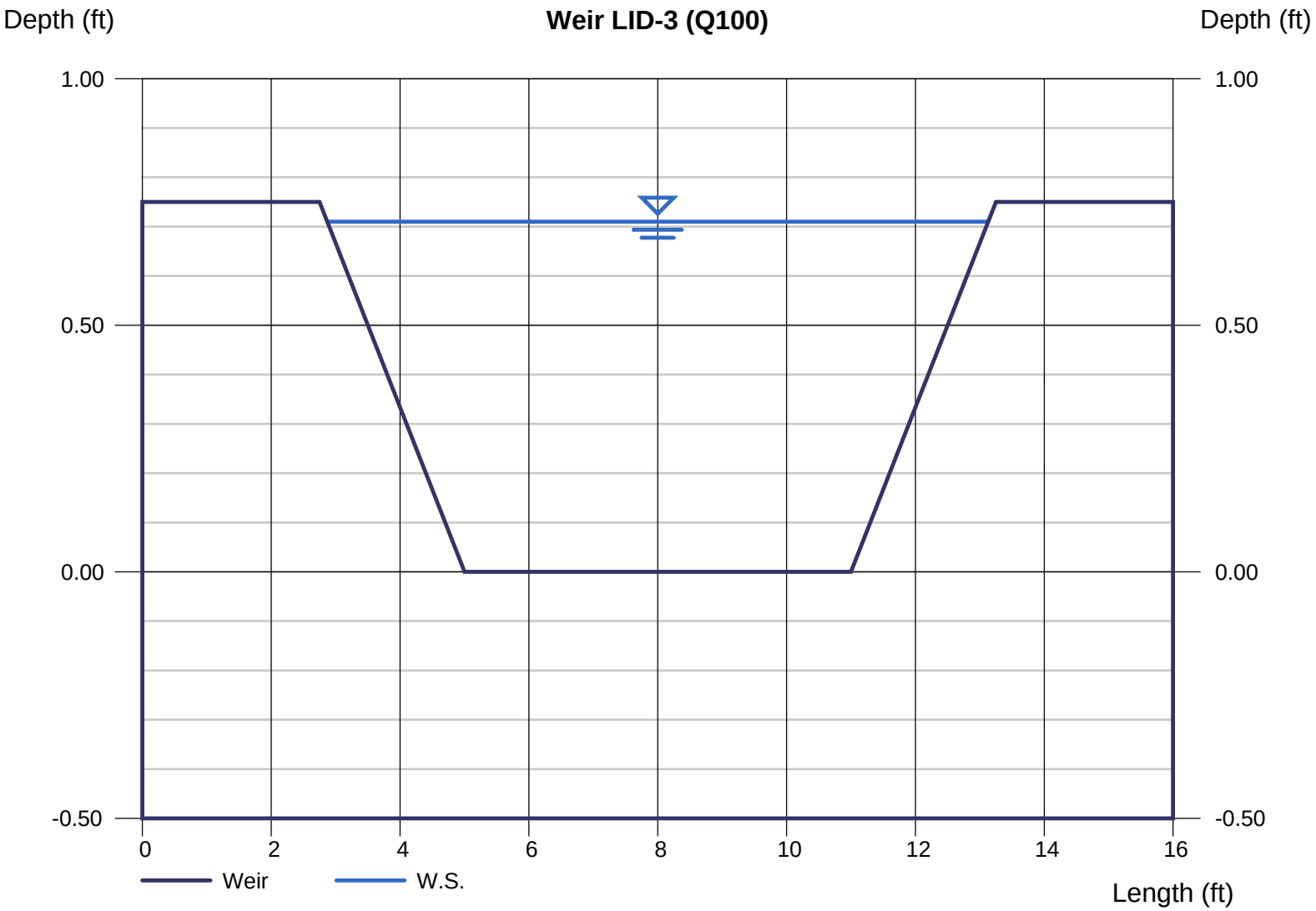
Crest	= Sharp
Bottom Length (ft)	= 6.00
Total Depth (ft)	= 0.75
Side Slope (z:1)	= 3.00

Calculations

Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 14.00

Highlighted

Depth (ft)	= 0.71
Q (cfs)	= 14.00
Area (sqft)	= 5.77
Velocity (ft/s)	= 2.43
Top Width (ft)	= 10.26



Channel Report

CHANNEL A (Q100)-Earthen

Trapezoidal

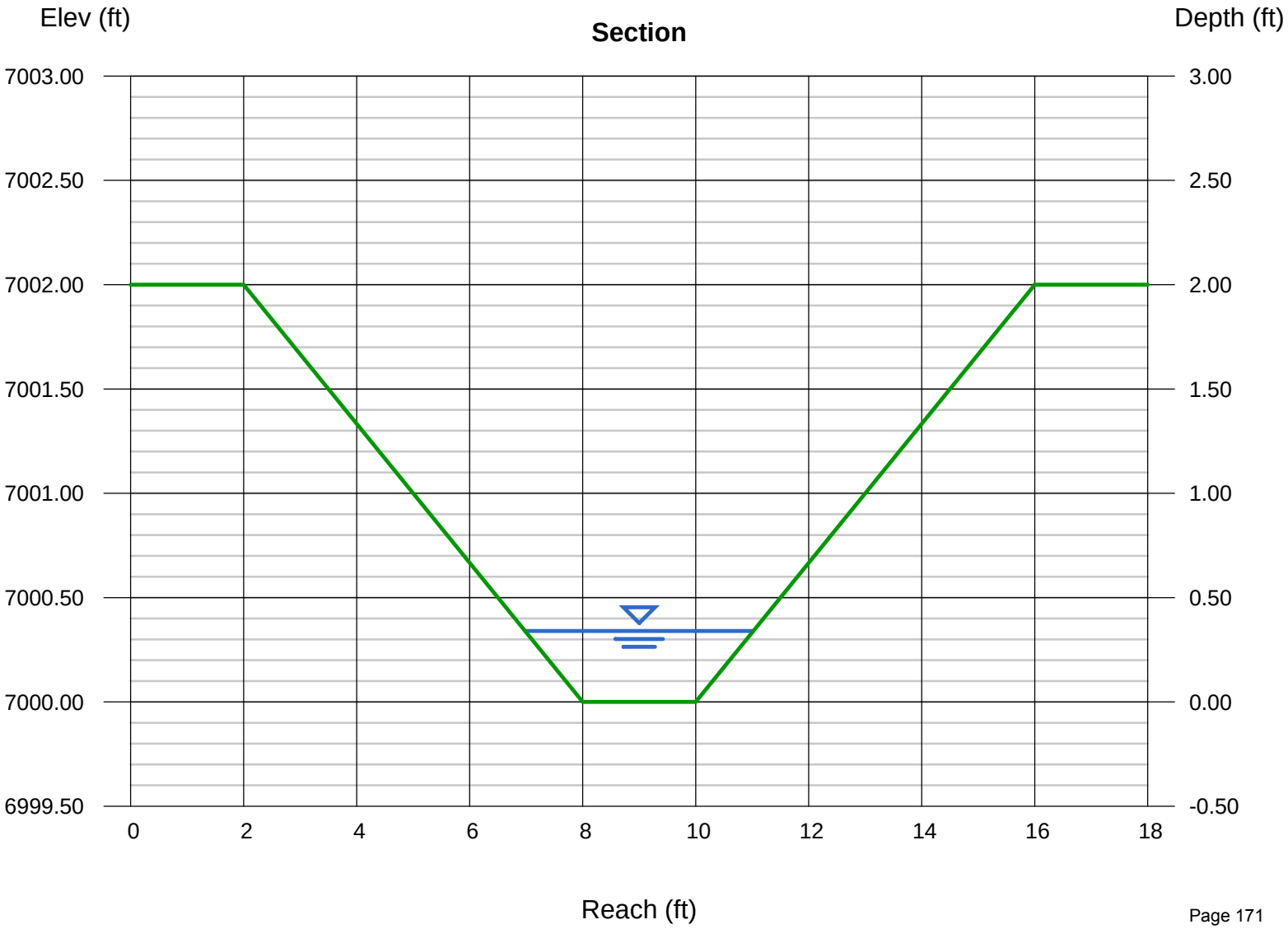
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 16.67
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.00

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 12.00
Area (sqft)	= 1.03
Velocity (ft/s)	= 11.69
Wetted Perim (ft)	= 4.15
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 4.04
EGL (ft)	= 2.46



Channel Report

CHANNEL A (Q100)-Rock Lined

Trapezoidal

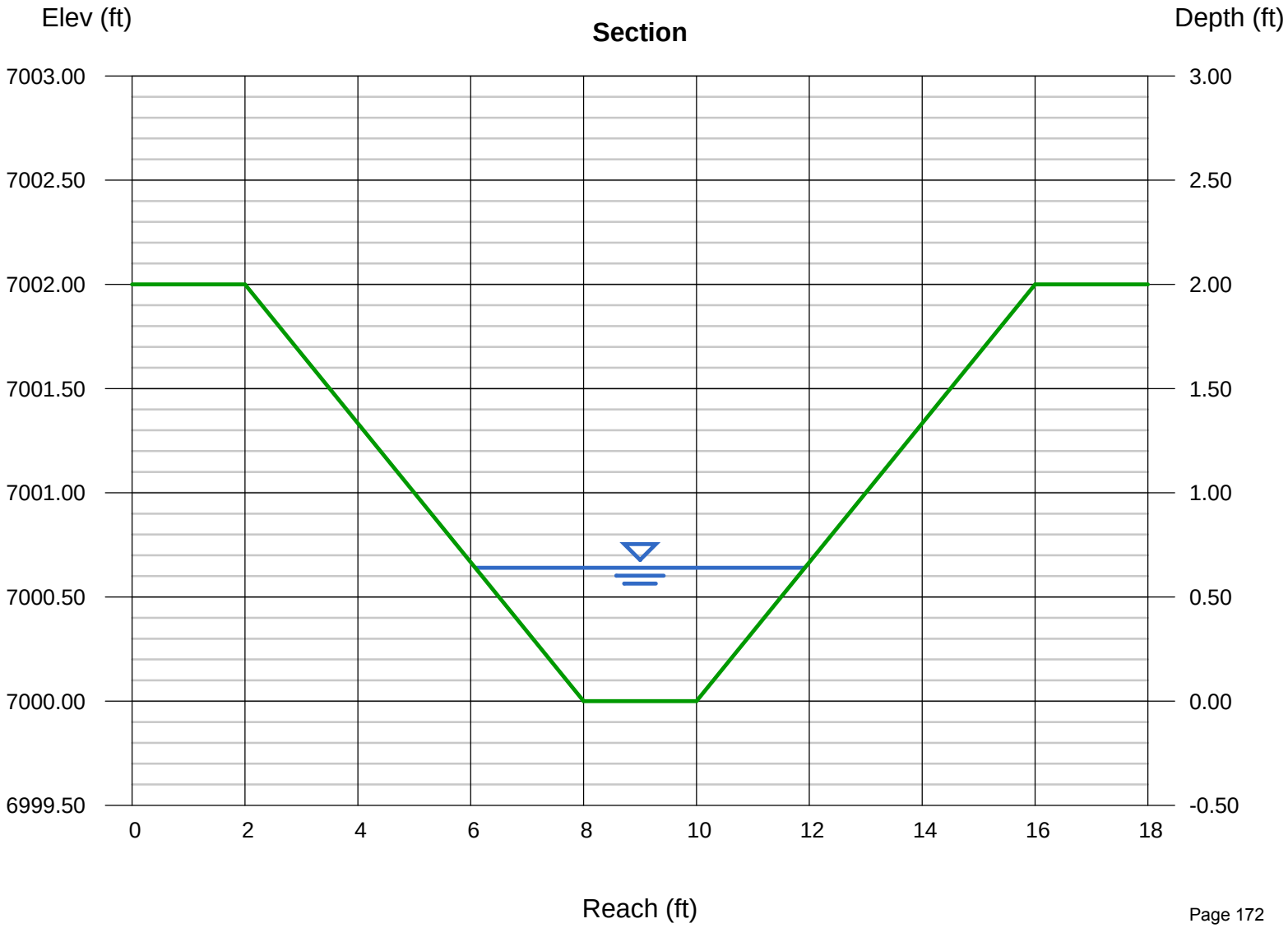
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 16.67
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.00

Highlighted

Depth (ft)	= 0.64
Q (cfs)	= 12.00
Area (sqft)	= 2.51
Velocity (ft/s)	= 4.78
Wetted Perim (ft)	= 6.05
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 5.84
EGL (ft)	= 1.00



Channel Report

CHANNEL B (Q100)-Earthen

Trapezoidal

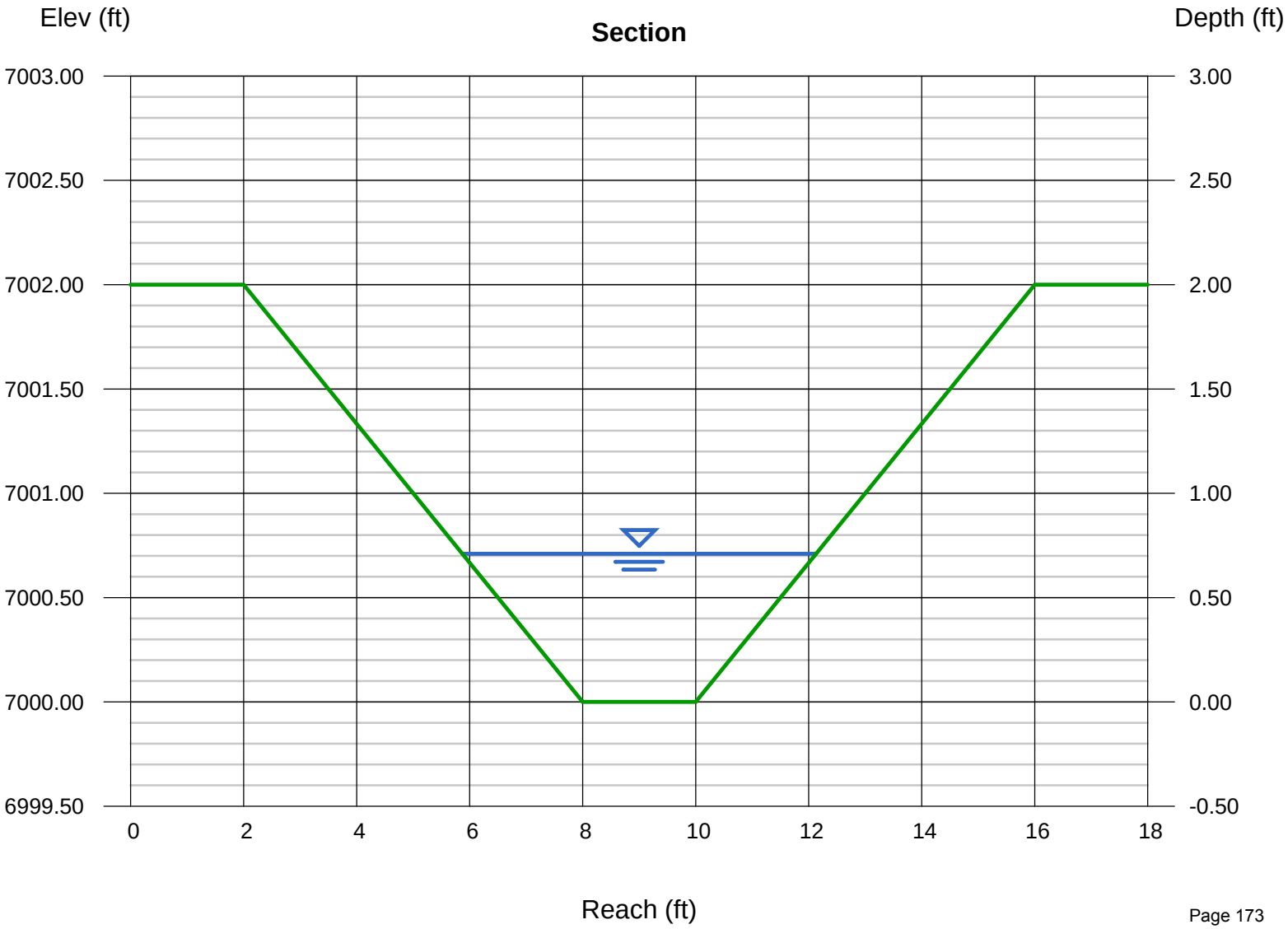
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 14.20
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 48.00

Highlighted

Depth (ft)	= 0.71
Q (cfs)	= 48.00
Area (sqft)	= 2.93
Velocity (ft/s)	= 16.37
Wetted Perim (ft)	= 6.49
Crit Depth, Yc (ft)	= 1.45
Top Width (ft)	= 6.26
EGL (ft)	= 4.88



Channel Report

CHANNEL B (Q100)-Rock Lined

Trapezoidal

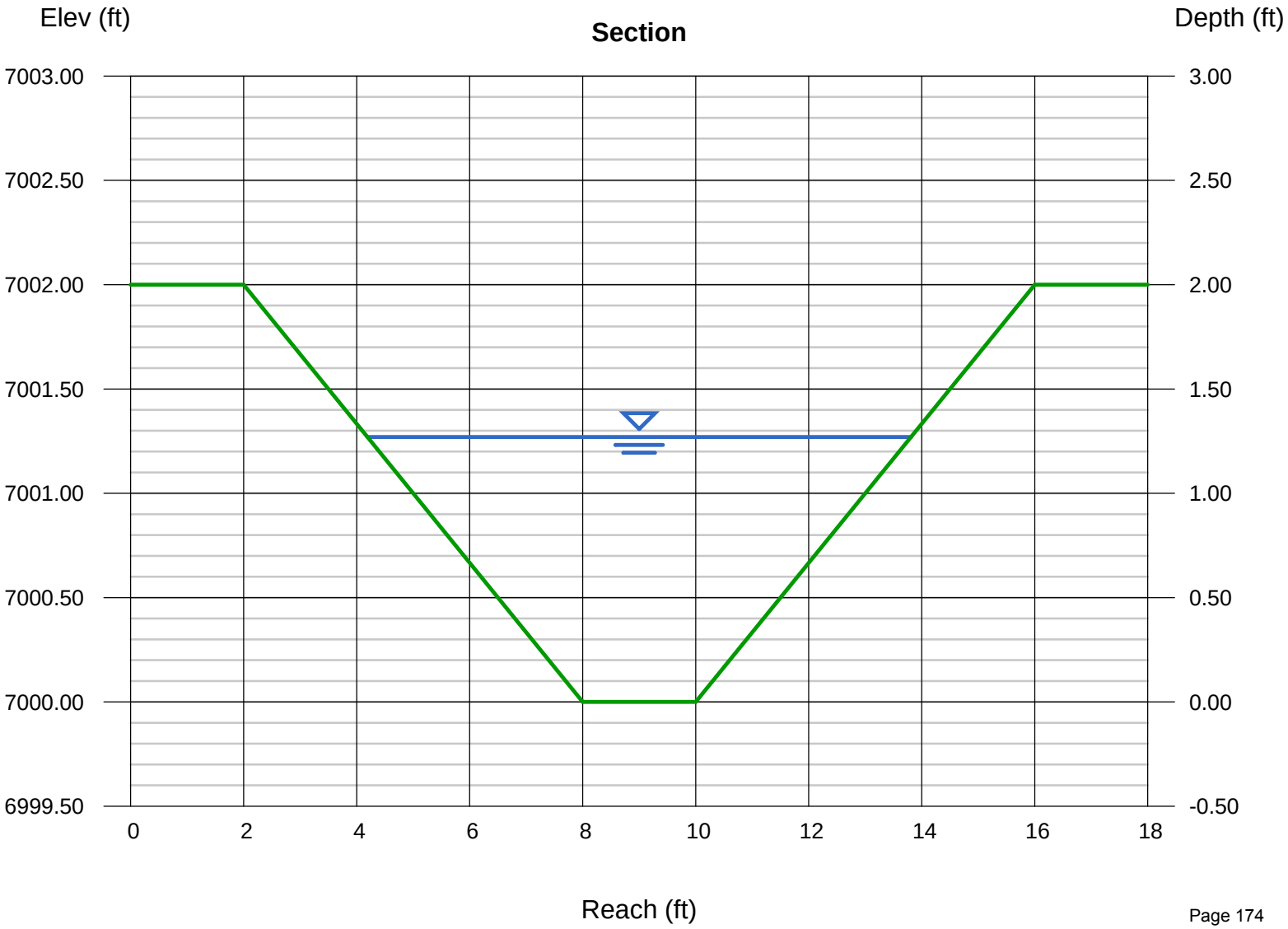
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 14.20
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 48.00

Highlighted

Depth (ft)	= 1.27
Q (cfs)	= 48.00
Area (sqft)	= 7.38
Velocity (ft/s)	= 6.51
Wetted Perim (ft)	= 10.03
Crit Depth, Yc (ft)	= 1.45
Top Width (ft)	= 9.62
EGL (ft)	= 1.93



Channel Report

CHANNEL C (Q100)-Earthen

Trapezoidal

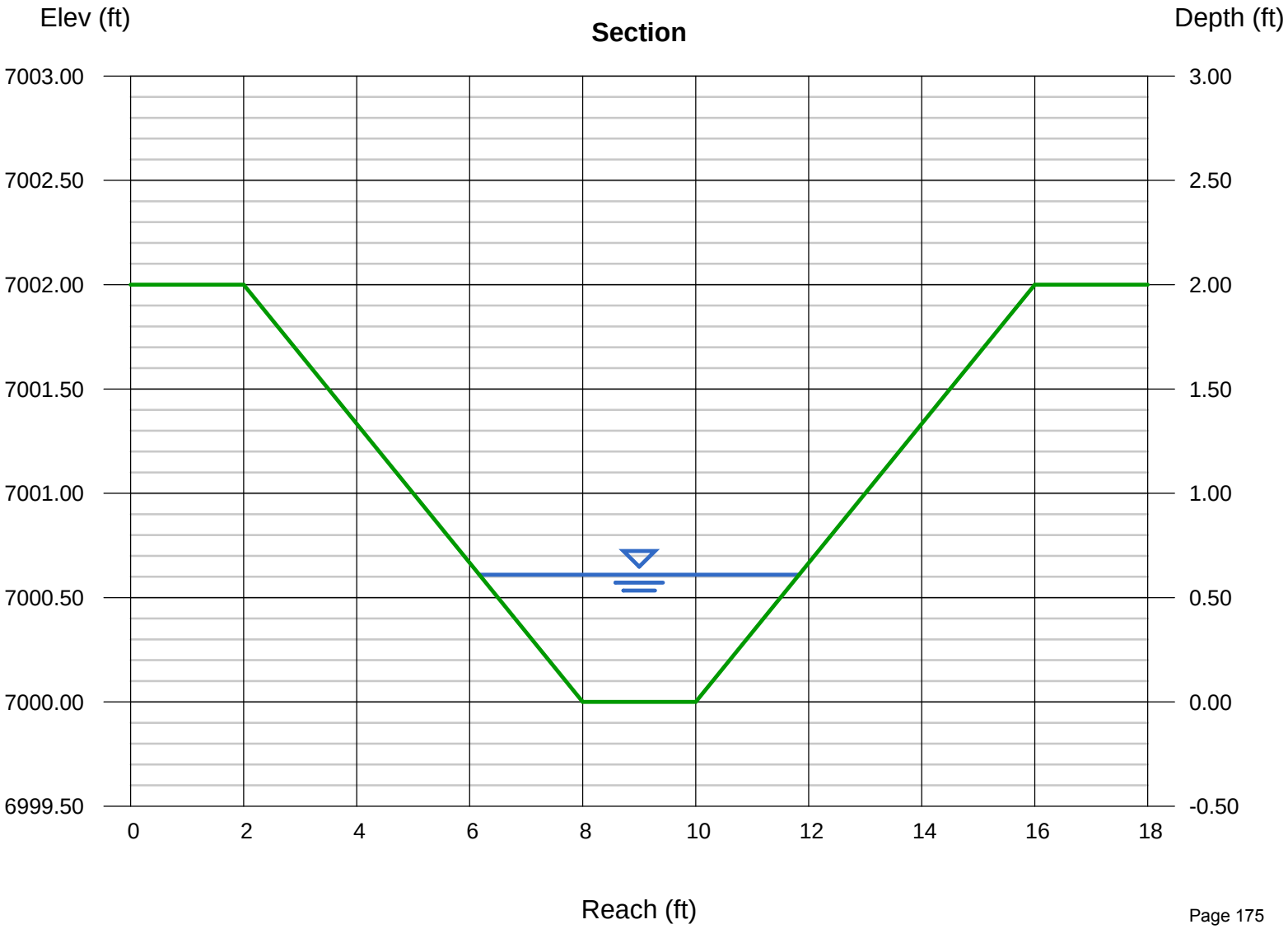
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 42.00

Highlighted

Depth (ft)	= 0.61
Q (cfs)	= 42.00
Area (sqft)	= 2.34
Velocity (ft/s)	= 17.98
Wetted Perim (ft)	= 5.86
Crit Depth, Yc (ft)	= 1.36
Top Width (ft)	= 5.66
EGL (ft)	= 5.63



Channel Report

CHANNEL C (Q100)-Rock Lined

Trapezoidal

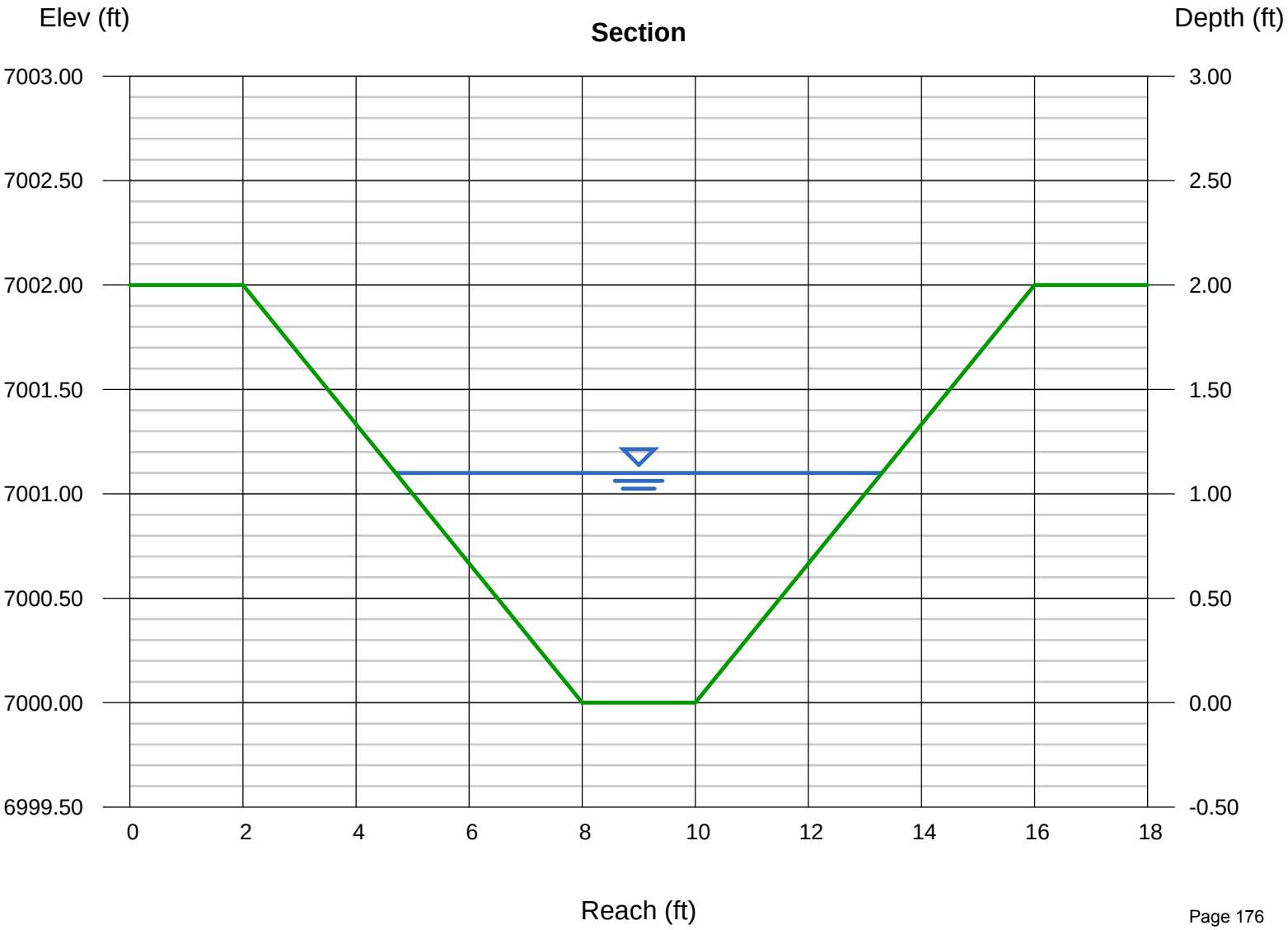
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 42.00

Highlighted

Depth (ft)	= 1.10
Q (cfs)	= 42.00
Area (sqft)	= 5.83
Velocity (ft/s)	= 7.20
Wetted Perim (ft)	= 8.96
Crit Depth, Yc (ft)	= 1.36
Top Width (ft)	= 8.60
EGL (ft)	= 1.91



Channel Report

CHANNEL D (Q100)-Earthen

Trapezoidal

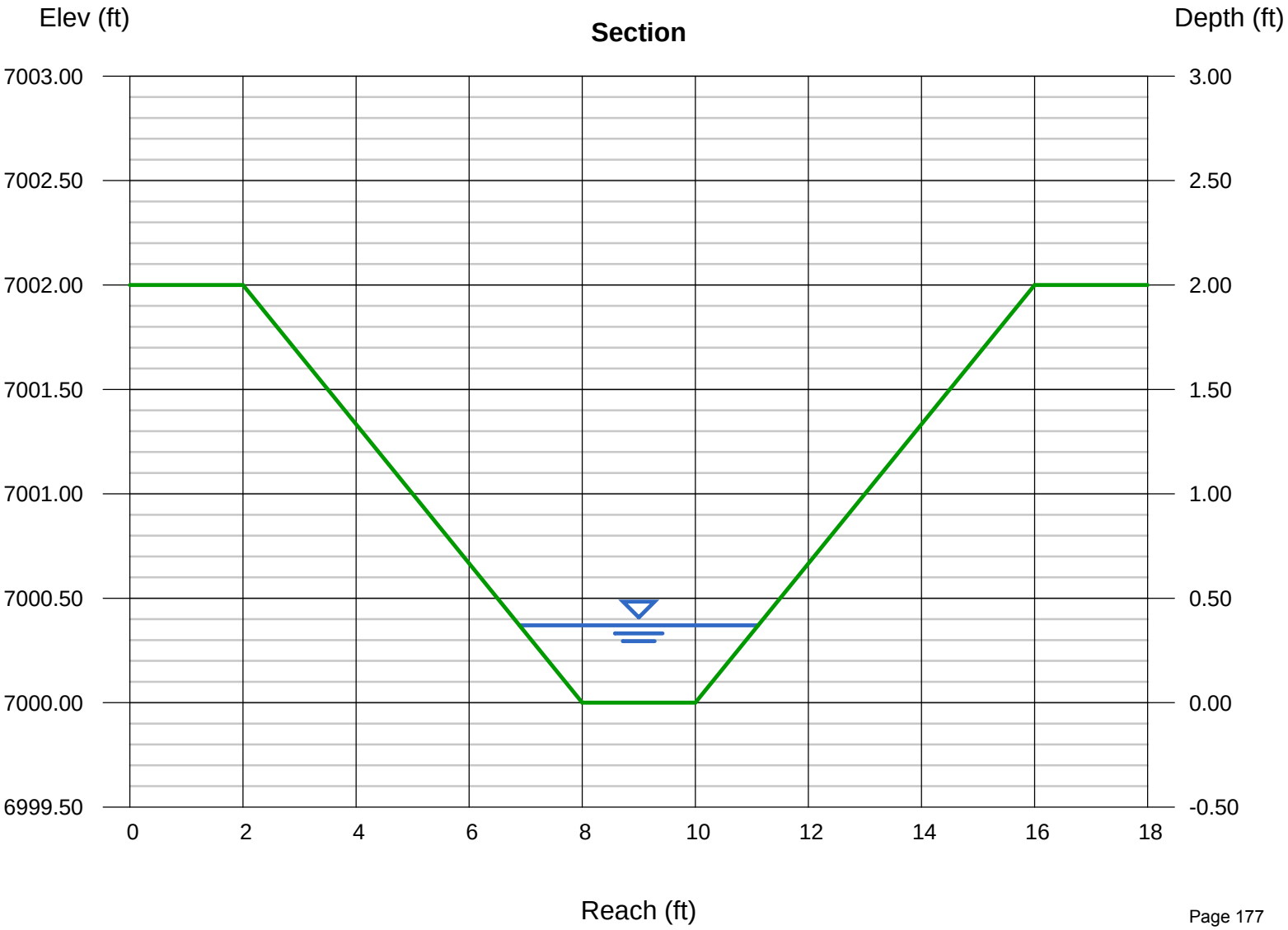
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 15.00

Highlighted

Depth (ft)	= 0.37
Q (cfs)	= 15.00
Area (sqft)	= 1.15
Velocity (ft/s)	= 13.04
Wetted Perim (ft)	= 4.34
Crit Depth, Yc (ft)	= 0.82
Top Width (ft)	= 4.22
EGL (ft)	= 3.01



Channel Report

CHANNEL D (Q100)-Rock Lined

Trapezoidal

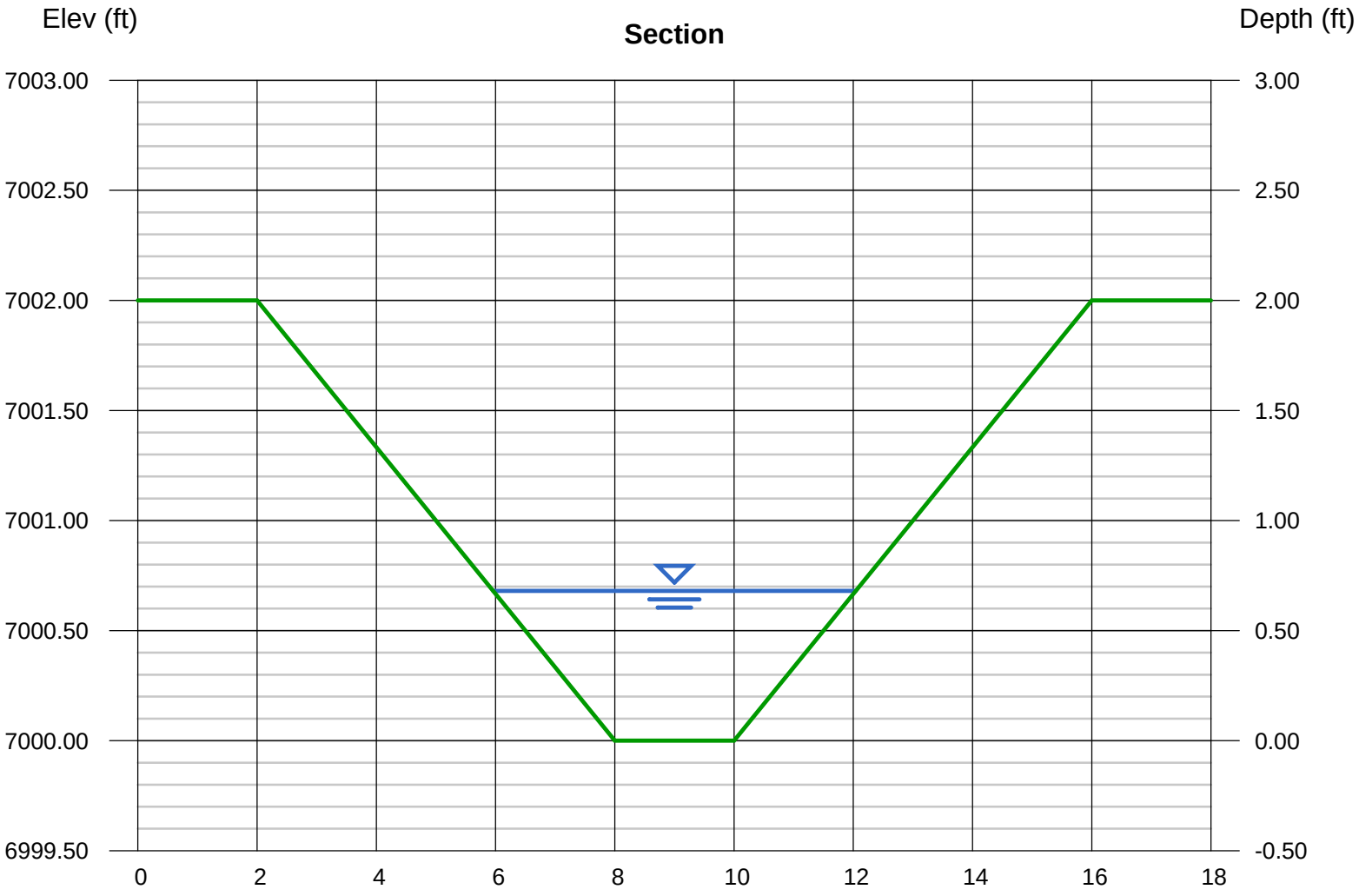
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 15.00

Highlighted

Depth (ft)	= 0.68
Q (cfs)	= 15.00
Area (sqft)	= 2.75
Velocity (ft/s)	= 5.46
Wetted Perim (ft)	= 6.30
Crit Depth, Yc (ft)	= 0.82
Top Width (ft)	= 6.08
EGL (ft)	= 1.14



Channel Report

CHANNEL E (Q100)-Earthen

Trapezoidal

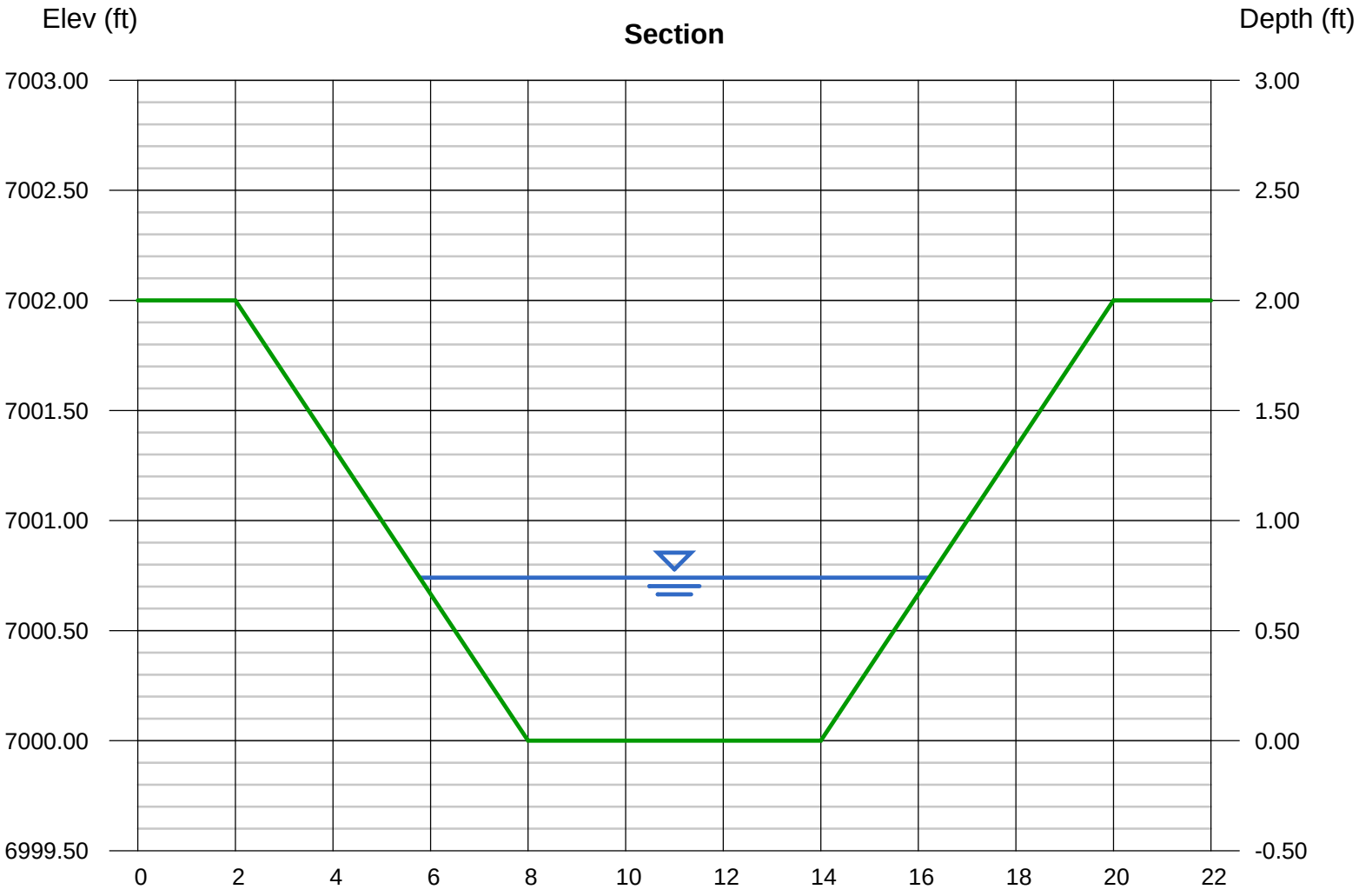
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 137.00

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 137.00
Area (sqft)	= 6.08
Velocity (ft/s)	= 22.52
Wetted Perim (ft)	= 10.68
Crit Depth, Yc (ft)	= 1.87
Top Width (ft)	= 10.44
EGL (ft)	= 8.63



Channel Report

CHANNEL E (Q100)-Rock Lined

Trapezoidal

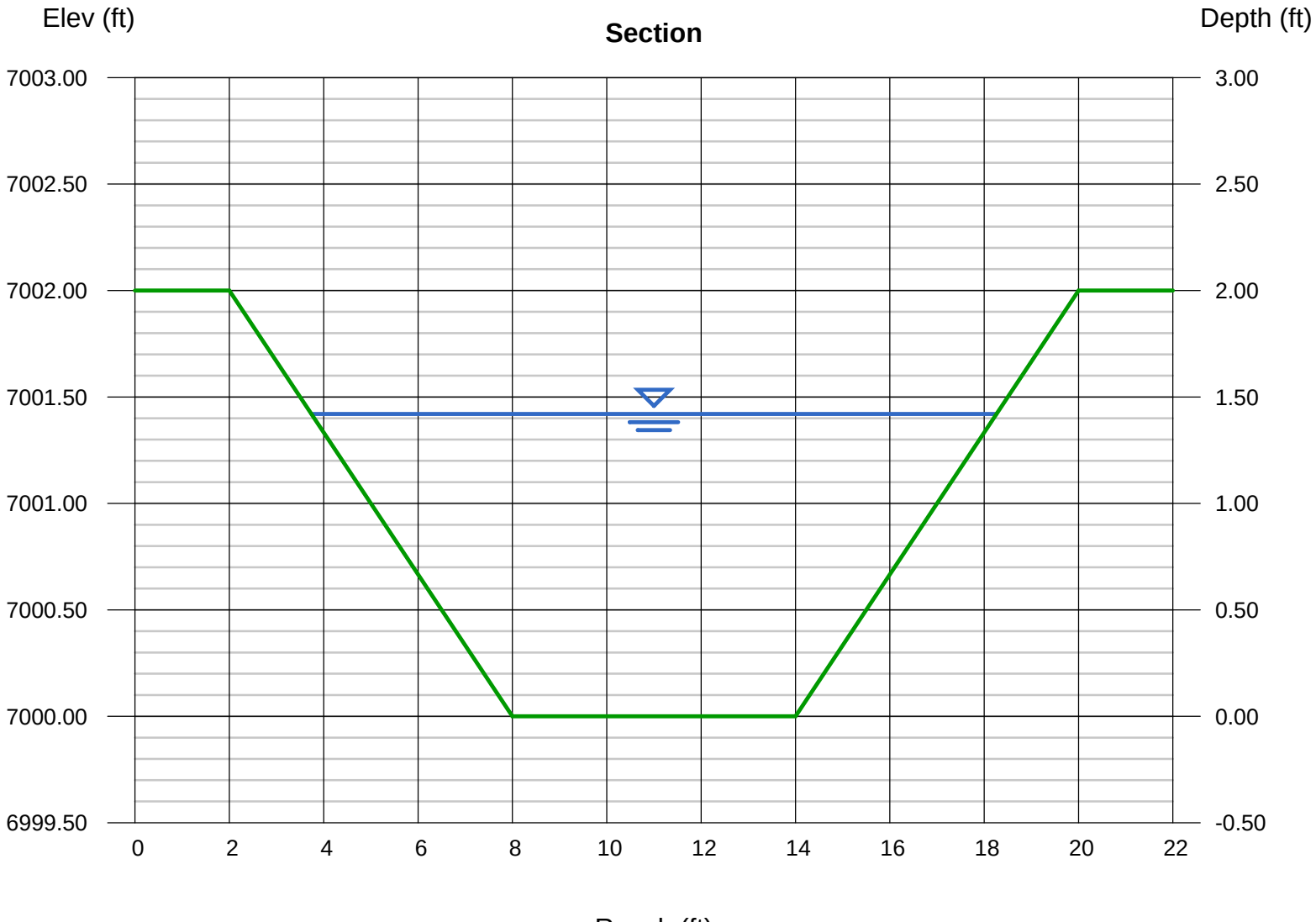
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 7000.00
Slope (%)	= 20.00
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 137.00

Highlighted

Depth (ft)	= 1.42
Q (cfs)	= 137.00
Area (sqft)	= 14.57
Velocity (ft/s)	= 9.40
Wetted Perim (ft)	= 14.98
Crit Depth, Yc (ft)	= 1.87
Top Width (ft)	= 14.52
EGL (ft)	= 2.79



Channel Report

CHANNEL F (Q100)-Earthen

Trapezoidal

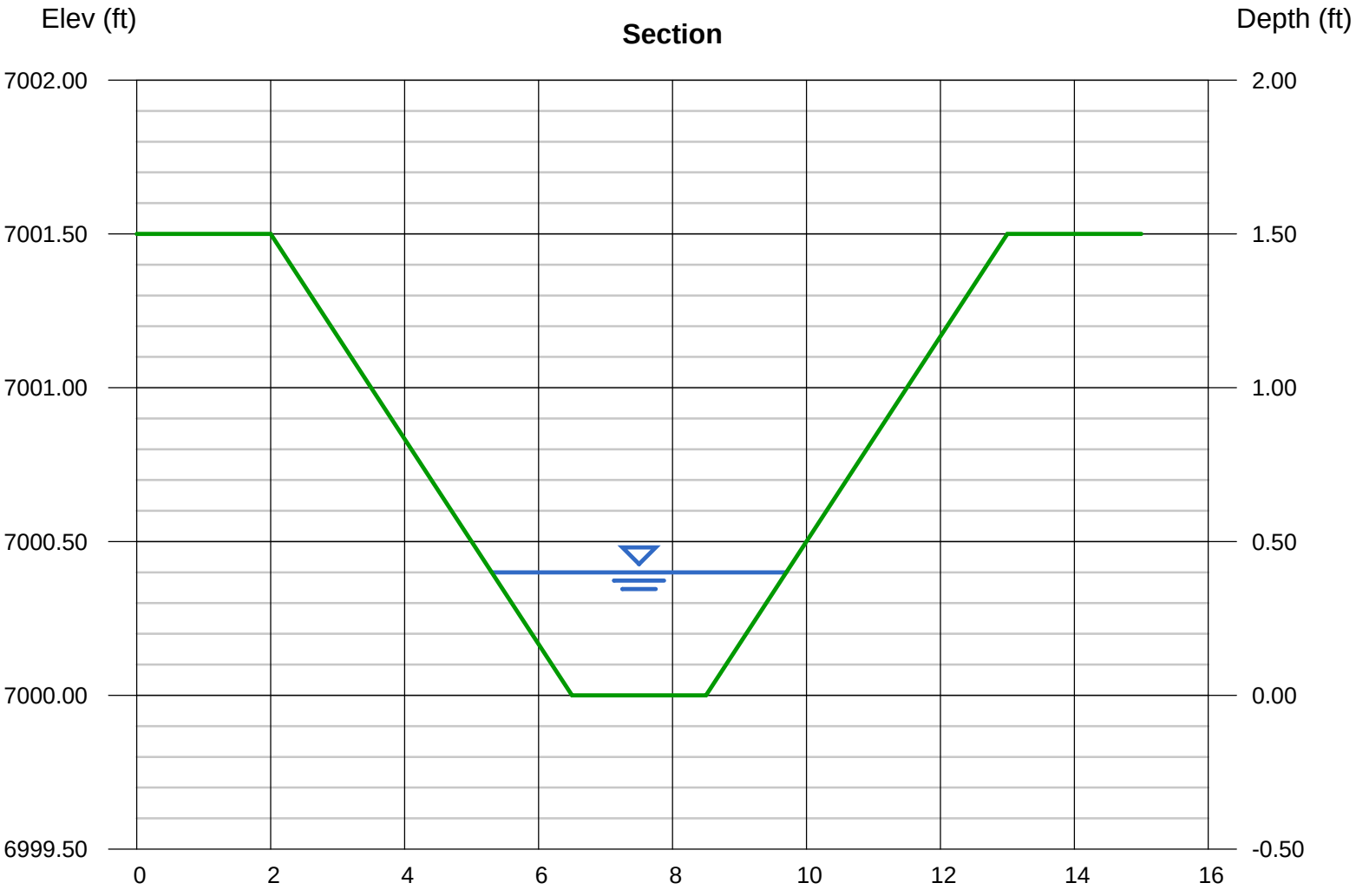
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7000.00
Slope (%)	= 12.50
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 14.00

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 14.00
Area (sqft)	= 1.28
Velocity (ft/s)	= 10.94
Wetted Perim (ft)	= 4.53
Crit Depth, Yc (ft)	= 0.79
Top Width (ft)	= 4.40
EGL (ft)	= 2.26



Channel Report

CHANNEL F (Q100)-Rock Lined

Trapezoidal

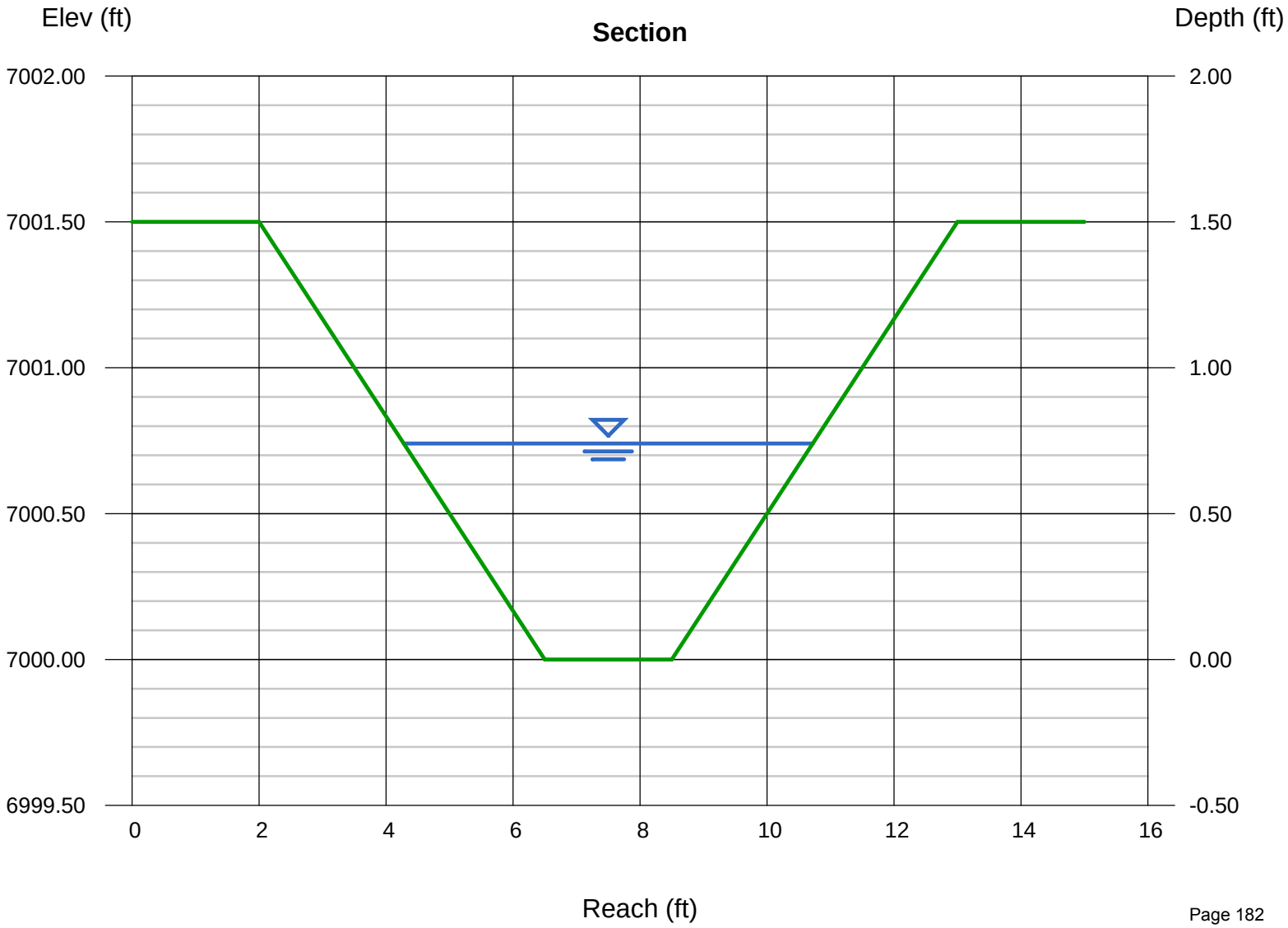
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 7000.00
Slope (%)	= 12.50
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 14.00

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 14.00
Area (sqft)	= 3.12
Velocity (ft/s)	= 4.48
Wetted Perim (ft)	= 6.68
Crit Depth, Yc (ft)	= 0.79
Top Width (ft)	= 6.44
EGL (ft)	= 1.05



APPENDIX D

Geotechnical Report by Western Technologies
Excerpts from Presidio in Pines Drainage Report

Western Technologies Inc.
The Quality People
Since 1955

2400 East Huntington Drive
Flagstaff, Arizona 86004-8934
(928) 774-8700 • fax 774-6469

September 26, 2018

Woodson Engineering
124 North Elden Street, Suite 100
Flagstaff, Arizona 86001

Attn: Ms. Sirisha Kalluri, PE, CFM

Re: COF WWH Detention Basin
West Route 66 and Northwestern Street
Flagstaff, Arizona

Job No. 2528JW053

In accordance with our Proposal No. 2527PW137 dated August 9, 2017, we have completed some field exploration, laboratory testing, and field infiltration testing services for the above referenced project. Attached are the test pit location diagram, test pit logs and laboratory test results. Field infiltration testing was performed in each test pit. The following results were obtained:

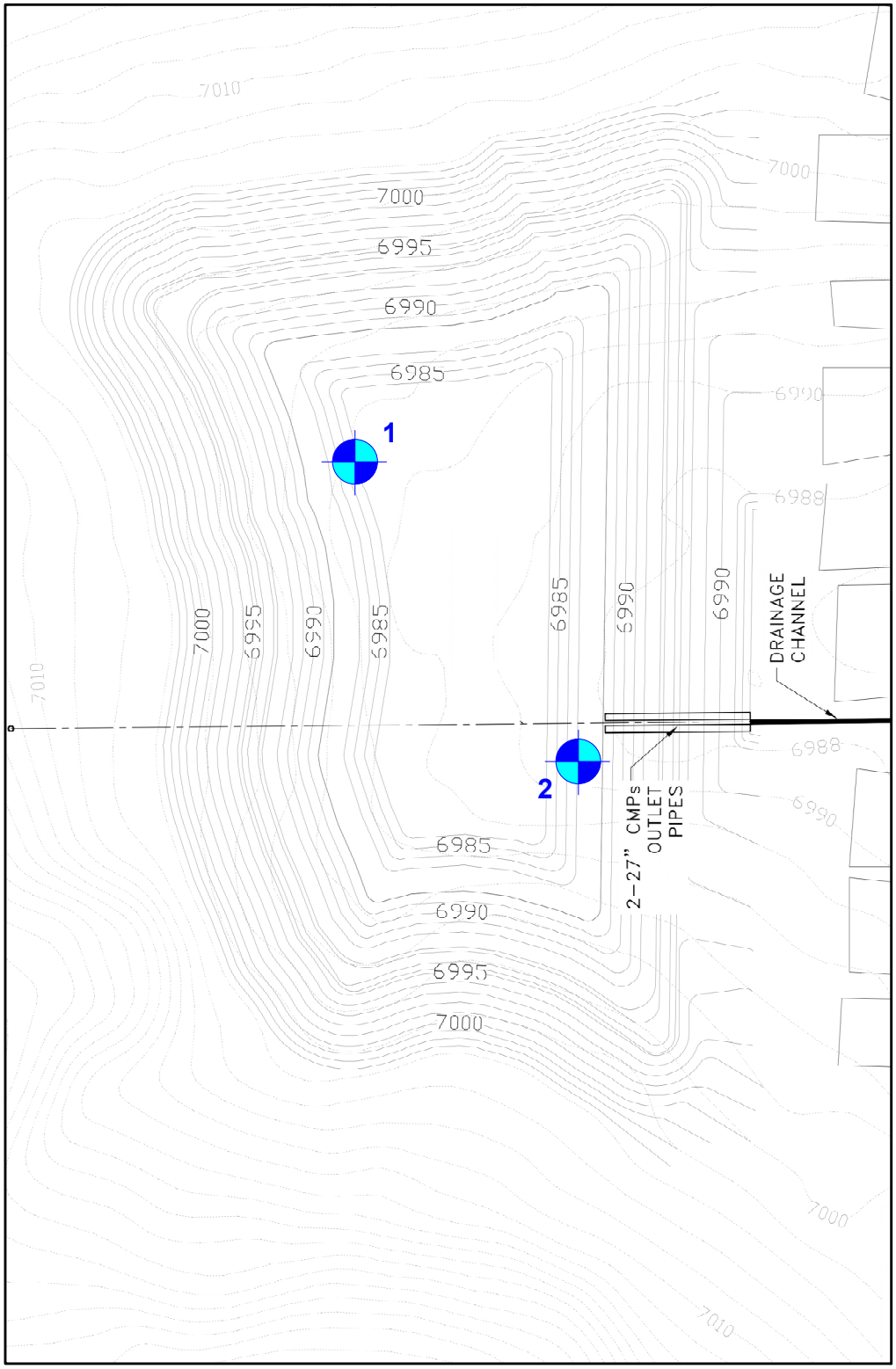
Test Location	Test Depth (ft.)	Infiltration Rate (minutes/inch)
Test Pit 1	4.0	20
Test Pit 2	4.0	15

This completes our current services on this project. If you have any questions concerning this information, or require additional consultation, design, observation, or testing services, please contact us. We look forward to working with you on future projects.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Engineering Services

Craig P. Wiedeman, P.E.
Senior Geotechnical Engineer

Copies to: Addressee (emailed)



Not to Scale

Approximate Test Pit Location

COF WWH DETENTION BASIN

Test Pit Location Diagram

Geotechnical Environmental Inspections Materials

Western Technologies Inc. The Quality People Since 1955

Western Technologies Inc.

Job No.: 2528JW053

Plate: 1

COARSE-GRAINED SOILS

LESS THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVEL OR WELL-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE
GP	POORLY-GRADED GRAVEL OR POORLY-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	
GM	SILTY GRAVEL OR SILTY GRAVEL WITH SAND, MORE THAN 12% FINES	
GC	CLAYEY GRAVEL OR CLAYEY GRAVEL WITH SAND, MORE THAN 12% FINES	
SW	WELL-GRADED SAND OR WELL-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE
SP	POORLY-GRADED SAND OR POORLY-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	
SM	SILTY SAND OR SILTY SAND WITH GRAVEL, MORE THAN 12% FINES	
SC	CLAYEY SAND OR CLAYEY SAND WITH GRAVEL, MORE THAN 12% FINES	

NOTE: Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

FINE-GRAINED SOILS

MORE THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	SILT, SILT WITH SAND OR GRAVEL, SANDY SILT, OR GRAVELLY SILT	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50
CL	LEAN CLAY OF LOW TO MEDIUM PLASTICITY, SANDY CLAY, OR GRAVELLY CLAY	
OL	ORGANIC SILT OR ORGANIC CLAY OF LOW TO MEDIUM PLASTICITY	
MH	ELASTIC SILT, SANDY ELASTIC SILT, OR GRAVELLY ELASTIC SILT	SILTS AND CLAYS LIQUID LIMIT MORE THAN 50
CH	FAT CLAY OF HIGH PLASTICITY, SANDY FAT CLAY, OR GRAVELLY FAT CLAY	
OH	ORGANIC SILT OR ORGANIC CLAY OF HIGH PLASTICITY	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

NOTE: Fine-grained soils may receive dual classification based upon plasticity characteristics (e.g. CL-ML).

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in.
COBBLES	3 in. – 12 in.
GRAVEL	No. 4 – 3 in.
Coarse	¾ in. – 3 in.
Fine	No. 4 – ¾ in.
SAND	No. 200 – No. 4
Coarse	No. 10 – No. 4
Medium	No. 40 – No. 10
Fine	No. 200 – No. 40
Fines (Silt or Clay)	Below No. 200

NOTE: Only sizes smaller than three inches are used to classify soils

CONSISTENCY

CLAYS & SILTS	BLOWS PER FOOT
VERY SOFT	0 – 2
SOFT	3 – 4
FIRM	5 – 8
STIFF	9 – 15
VERY STIFF	16 – 30
HARD	OVER 30

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS PER FOOT
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

NOTE: Number of blows using 140-pound hammer falling 30 inches to drive a 2-inch-OD (1⅜-inch ID) split-barrel sampler (ASTM D1586).

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	TERM
0	NON-PLASTIC
1 – 7	LOW
8 – 20	MEDIUM
Over 20	HIGH

DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED

The number shown in **"TEST PIT"** refers to the approximate location of the same number indicated on the "Test Pit Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features.

"EQUIPMENT TYPE" refers to the equipment used in the excavation of the test pit, and may include the width of the bucket on the excavator and the use of “rock” teeth or attachments.

"SAMPLE TYPE" refers to the form of sample recovery, in which **R** = Ring sample and **G** = Grab Sample.

"DRY DENSITY (LBS/CU FT)" refers to the laboratory-determined dry density in pounds per cubic foot.

"WATER (MOISTURE) CONTENT” (% of Dry Wt.) refers to the laboratory-determined water content in percent using the standard test method ASTM D2216.

"USCS" refers to the “Unified Soil Classification System” Group Symbol for the soil type as defined by ASTM D2487 and D2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and test pit logs are intended for use in conjunction with the purposes of our services defined in the text. Test pit log data should not be construed as part of the construction plans nor as defining construction conditions.

The test pit logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between test pits. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the test pit logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the test pit location. The transition between materials is approximate and may be more or less gradual than indicated.

DATE EXCAVATED: **8-29-18**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

TEST PIT NO. 1

EQUIPMENT: **DEERE 310K**
EXCAVATION TYPE: **24'' bucket**
FIELD ENGINEER: **G. Burr**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				CH		Fat CLAY; with sand, trace gravel, brown/red, wet
34.1	84	R		push				
					5			color change to light brown at 8 feet
					10			**Backhoe Refusal at 10 Feet on Severly Weathered Limestone**
					15			

N- **STANDARD PENETRATION TEST**
R- **RING SAMPLE**
C- **CORE: %RECOVERY/RQD**
G- **GRAB SAMPLE**
B- **BUCKET SAMPLE**

NOTES: **Groundwater Not Encountered**

WESTERN TECHNOLOGIES INC.
2400 Huntington Drive
Flagstaff, AZ 86004-8934

PROJECT: **COF WWH DETENTION BASIN**
PROJECT NO.: **2528JW053**

PLATE **A-3**

TEST PIT LOG

DATE EXCAVATED: **8-29-18**
LOCATION: **See Location Diagram**
ELEVATION: **Not Determined**

TEST PIT NO. 2

EQUIPMENT: **DEERE 310K**
EXCAVATION TYPE: **24'' bucket**
FIELD ENGINEER: **G. Burr**

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				GC		Clayey GRAVEL; with cobbles and boulders, some sand, brown, moist
21.2		R	○	push				
					5			color change to light brown at 6 feet
					10			
					15			**Backhoe Stopped at 12 Feet**

N- **STANDARD PENETRATION TEST**
R- **RING SAMPLE**
C- **CORE: %RECOVERY/RQD**
G- **GRAB SAMPLE**
B- **BUCKET SAMPLE**

NOTES: **Groundwater Not Encountered**

WESTERN TECHNOLOGIES INC.
2400 Huntington Drive
Flagstaff, AZ 86004-8934

PROJECT: **COF WWH DETENTION BASIN**
PROJECT NO.: **2528JW053**

PLATE **A-4**

TEST PIT LOG

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

Test Pit No.	Depth (ft)	USCS Class.	Particle Size Distribution (%) Passing by Weight							Atterberg Limits		Laboratory Compaction Characteristics			Remarks
			3"	¾"	#4	#10	#40	#200	2μ	LL	PI	Dry Density (pcf)	Optimum Moisture (%)	Method	
1	0-5	CH	100	98	98	95	91	81.7		51	26				2
2	0-5	GC	82	61	56	55	50	44.9		52	35				2

NOTE: NP = Non-plastic
μ = microns (2μ = 0.002mm)

REMARKS

Classification / Particle Size / Moisture-Density Relationship
1. Visual
2. Laboratory Tested
3. Minus #200 Only
4. Test Method ASTM D698/AASHTO T99
5. Test Method ASTM D1557/AASHTO T180
6. From the ADOT Family of Curves

Geotechnical Environmental Inspections Materials
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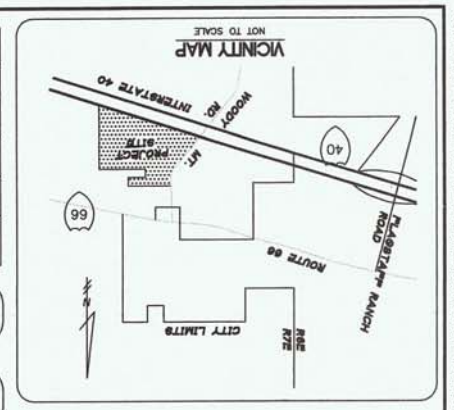
PROJECT: COF WWH DETENTION BASIN
JOB NO.: 2528JW053

PLATE
B-1

SOIL PROPERTIES

VICINITY MAP
NOT TO SCALE



LEGEND

(XX)	BASIN
XX	DETENTION BASIN 1
XX	WASH 1
XX	AMPHITHEATER 1
	WATERS OF THE US

NOTE: THIS INDEX IS PROVIDED ONLY TO SHOW FLOW PATTERNS AND FLOW VALUES

NOTE: SEE FIGURE 11 FOR DETAILED ON-SITE FLOW PATTERNS

NOTE
FLOWS SHOWN DO NOT REFLECT STORM DRAIN DEDUCTIONS

DEVELOPED CONDITION BASINS

HEC-1 STORM FLOW SUMMARY			HEC-1 STORM FLOW SUMMARY		
BASIN	ACRES	Q100 (CFS)	BASIN	ACRES	Q100 (CFS)
B1	0.97	4	CP1	----	16
B1A	0.65	4	CP2	----	28
B2	2.63	12	CP28	----	37
B3	1.31	6	CP2D	----	36
B4	1.48	4	CP3	----	39
B4A	1.08	4	CP4	----	53
B4B	1.41	5	CP5	----	68
B4C	1.38	4	CP6	----	68
B5	0.93	3	CP7	----	69
B6	1.67	9	CP8	----	7
B7	2.91	12	CP9	----	NOT USED
B8	1.75	8	CP10	----	82
B9	1.71	9	CP11	----	399
B10	2.63	11	CP12	----	11
B11	2.94	15	CP13	----	19
B12	NOT USED		CP14	----	28
B13	1.14	6	CP15	----	NOT USED
B14	0.83	3	CP16	----	39
B15	0.56	3	CP17	----	47
B16	1.62	9	CP18	----	60
B17	0.90	4	CP19	----	56
B17A	0.49	4	CP20	----	347
B18	1.29	7	CP21	----	125
B18A	0.52	3	CP22	----	17
B19	2.53	12	CP23	----	366
B20	1.27	6	CP24	----	370
B21	1.67	9	CP25	----	15
B22	1.12	6	CP26	----	NOT USED
B23	0.65	3	CP27	----	9
B24	0.54	4	CP28	----	11
B25	1.26	5	CP29	----	18
B25A	0.32	3	CP30	----	93
B26	1.26	6	CP31	----	127
B27	2.29	10	CP32	----	4
B28	0.69	3	CP33	----	318
B28A	0.31	4			
B29	0.43	4			
B30	2.82	14			
B31	0.59	4			
B32	2.66	13			
B33	3.87	21			
B34	3.28	16			
B35	2.87	9			
B36	7.59	34			
B37	2.10	6			
B38	3.15	8			
B39	0.27	4			
B40	1.02	7			
B41	3.34	9			
WI	0.65	2			
W2	3.02	8			
W3	0.71	2			
A1	2.75	7			
ROFF1	270.88	300			
ROFF2A	13.90	32			
ROFF2B	0.94	31			
ROFF2C	3.04	9			
ROFF2D	3.78	13			
ROFF2E	13.30	28			
ROFF2F	8.12	22			
ROFF2G	4.36	12			
ROFF3	37.43	85			

GRAPHIC SCALE
1"=300'
(IN FEET)
1 inch = 300 ft.

NORTH

PROJECT ID	601.006N
SHEET	FIG 12
	1 OF 1 SHTS

PREMIERE ACQUISITIONS LLC

PRESIDIO IN THE PINES

DEVELOPED CONDITION BASIN MAP (OVERALL)

TRC
Customer-Focused Solutions
BV Engineering Nevada

8360 W. SUNSET ROAD
Suite 190
Las Vegas, NV 89113
Tel: 702-650-0572
Fax: 702-307-4222
Web: trcsolutions.com

STAMP DATE	
DR. DATE	
CADFILE	BASINS.dwg
SCALE	AS SHOWN
DATE	12/21/04
DESIGN	RCW
PROJ. NO.	

REV	DESCRIPTION	BY	DATE	APPR.	APP.	DATE