Drainage Reports

Abbreveated Water & Sewer Need Reports

Water Study

Wastewater Study

Stormwater Waiver Application

Engineering

Drainage Report

118th & Jomax

(10-PP-17)

EXPIRES 12/31/18

prepared for:

Toll Brothers Inc.
8767 E. Via de Ventura, Suite 390
Scottsdale, Arizona 85258
480 951 0782

Plan # _____
Case # 10-PP-2017
Q-S # _____
☑ Accepted
☐ Corrections
N. Baronas 11-13-17
Reviewed By Date

prepared by:

ARGUS CONSULTING SEE HEC-1 STIPS
A CIVIL ENGINEERING COMPANY, PC

10115 E. Bell Road, Suite 107 - #104
Scottsdale, Arizona 85260
480 596 1131

OCTOBER 2017

10-PP-2017
10/25/17

118th & Jomax
DRAINAGE REPORT

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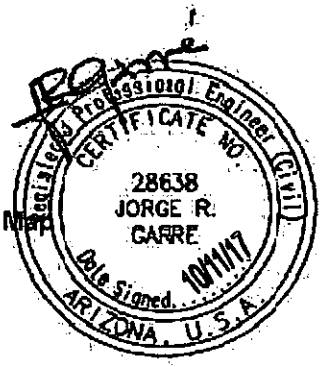

EXPIRES 12/31/18

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1.0 INTRODUCTION

The purpose of this report is to provide drainage data analyses to support the construction improvements for the **118th & Jomax** (80 acres) project currently known as Parcels 12 & 13 of Goldie Brown Pinnacle Peak Ranch, Unit 2 in Scottsdale, Arizona.

The project site is located within portions of Section 34 and 35 (T5N, R5E), of the Gila and Salt River Base and Meridian. **118th & Jomax** is bounded on the north by the Redbird Road, on the east by 122nd Street Alignment, on the south by Jomax Road, and on the west by 118th Street. Exhibit A shows a vicinity map.

The Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP) has issued on October 16, 2013, Flood Insurance Rate Maps (Map Number: 04013C1330L) indicating that the **118th & Jomax** project is within designated 'Other Flood Areas' Zones X and D (Exhibit B).

Zone X is defined as *"Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood"*.

Zone D is defined as *"Areas in which flood hazards are undetermined, but possible"*.

2.0 DESCRIPTION OF STUDY AREA

2.1 Existing Conditions

The site is currently undeveloped with the majority of the site flowing northeast and a small portion flowing east (across 122nd Street alignment) and southeast (across Jomax Road alignment). Vegetation is typical Sonoran Desert. The property is situated in a watershed divide between the Salt River and Verde River watersheds therefore excess runoff is mostly sheet flows with a few ephemeral washes traversing the property.

An offsite drainage area located to the west within Desert Summit subdivision directs stormwater runoff into 118th Street (Plate A). The identified offsite drainage area was subdivided into four subbasin (DS01/DS02/DS03/DS04) to better evaluate the impacts of offsite flows onto existing routing channels.

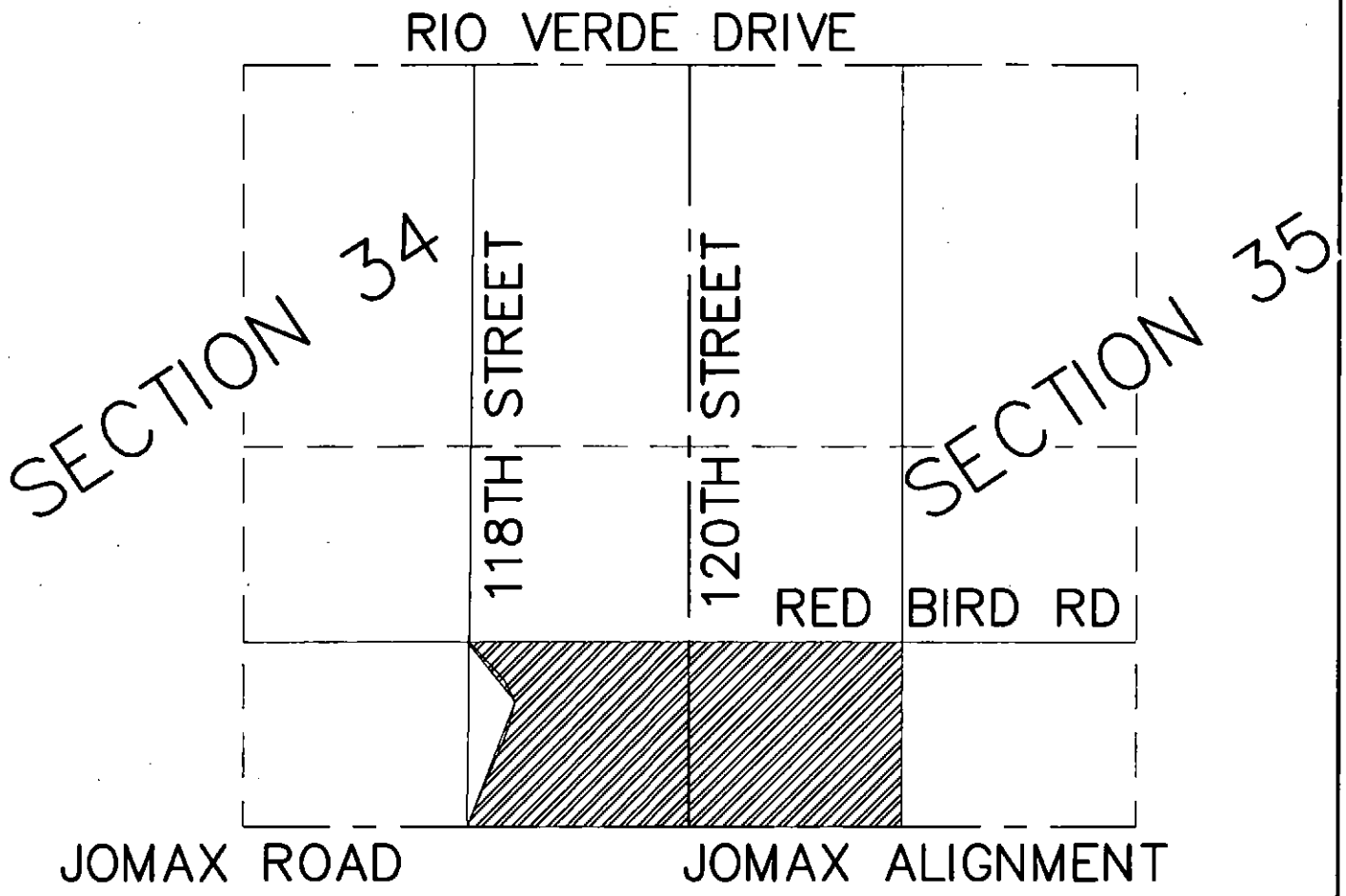
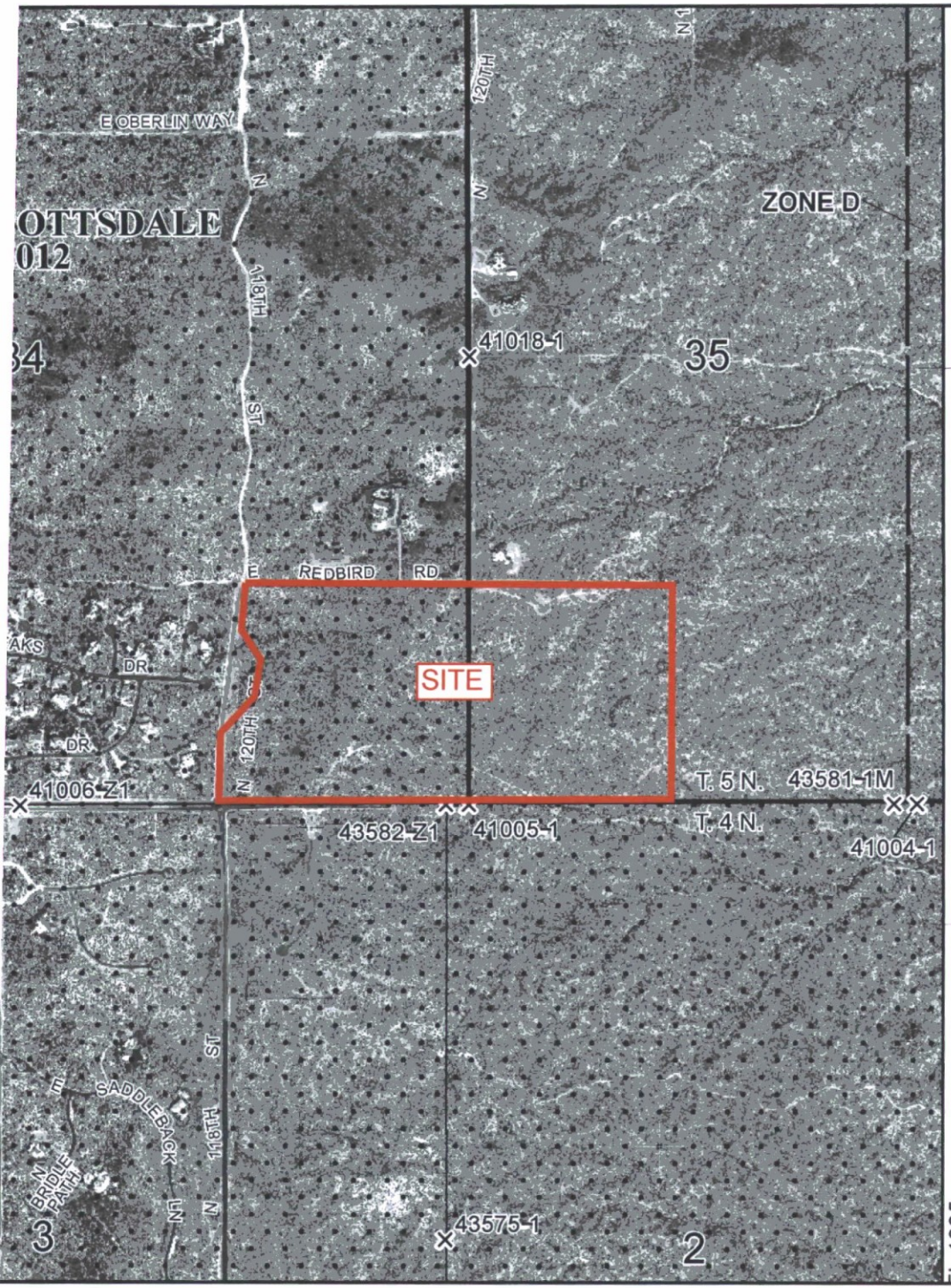


EXHIBIT A
Vicinity Map

118th & Jomax–80

Scottsdale – Arizona

FILE NAME:
MACHINE NUMBER:
DATE PLOTTED:



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET METE

NFIP

PANEL 1330L

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 1330 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SCOTTSDALE, CITY OF	045012	1330	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1330L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

EXHIBIT B

2.2 Proposed Development

The proposed project will be developed as a single family residential land use with a mix of R1-43 (38 lots), R1-70 (7 lots), R1-130 (4 lot), and R1-190 (2 lots) categories. The site is located within the City of Scottsdale's Environmentally Sensitive Lands Ordinance (ESLO), Upper Desert Landform. Land development will be limited to the right-of-way and established building envelopes for each lot.

The proposed stormwater management plan will provide storage areas (detention basins). Stormwater storage volume would be provided so that the estimated post-development peak flows would be less than or equal to the estimated pre-development peak flows for the 2-, 10-, and 100-Yr frequency event.

3.0 MAPPING AND SURVEYING INFORMATION

3.1 Mapping

The available mapping utilized in this study was as follows:

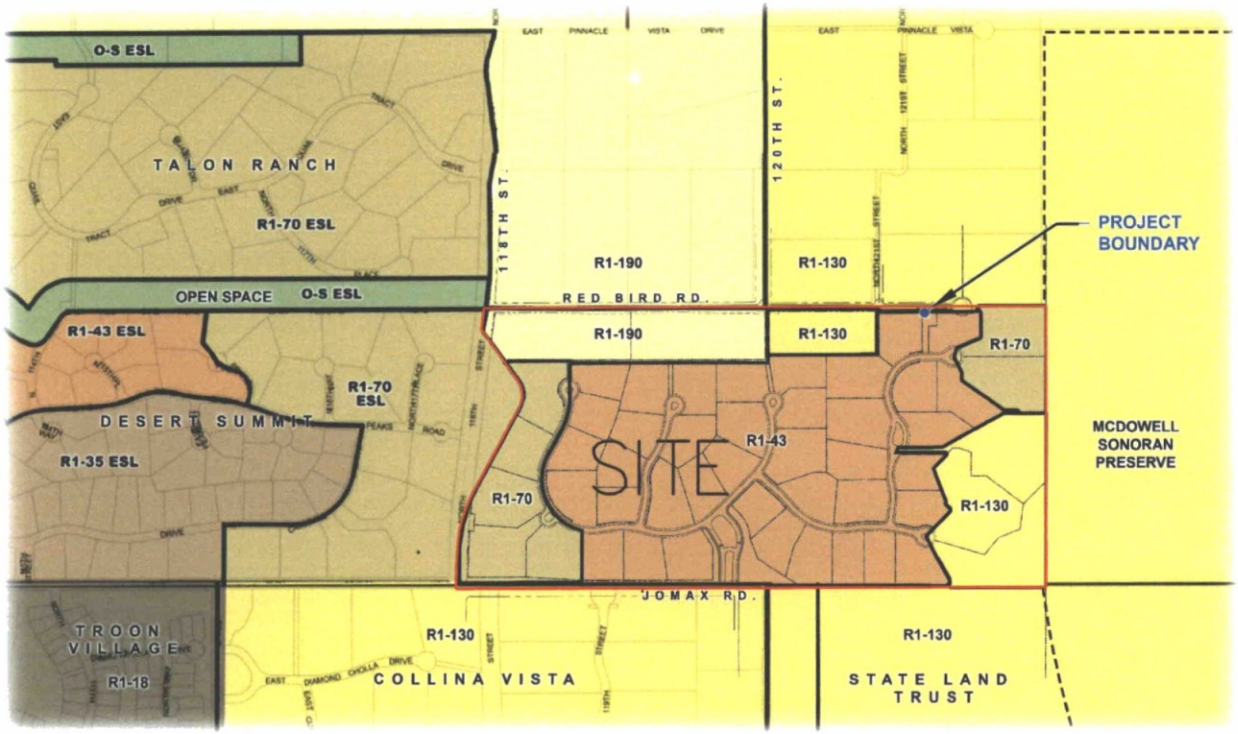
1. **Topographic Map:** A digital topographic map developed for the project site with contour interval of 1 foot was utilized for on-site drainage basin delineation and cross sections information used in the hydraulic analyses.

2. **Aerial Photos:** Aerial photograph developed for the project was used to provide vegetation cover patterns and identify existing flow path locations.

4.0 HYDROLOGIC ANALYSIS

Hydrologic calculations were prepared for *"Existing Conditions"* to establish the pre-development 100-Yr peak flow rates entering and exiting the property. Post-Development watershed conditions were evaluated to investigate the impact created by the proposed development land use and to determined stormwater runoff management measures.

NOAA Atlas 14 precipitation-frequency values were used for the hydrologic study. A rainfall depth value of 3.2 inches is recommended for the 100-year, 6-hour event (Appendix A).



SOURCE: ZONING DISTRICT MAP AMENDMENT, CITY OF SCOTTSDALE CASE 25-ZN-2016

EXHIBIT C
LAND USE MAP

118TH & JOMAX

SCOTTSDALE – ARIZONA

FILE NAME:
MACHINE NUMBER:
DATE PLOTTED:

SOURCE: SOIL SURVEY OF AGUILA-CAREFREE AREA, SOIL CONSERVATION SERVICE.

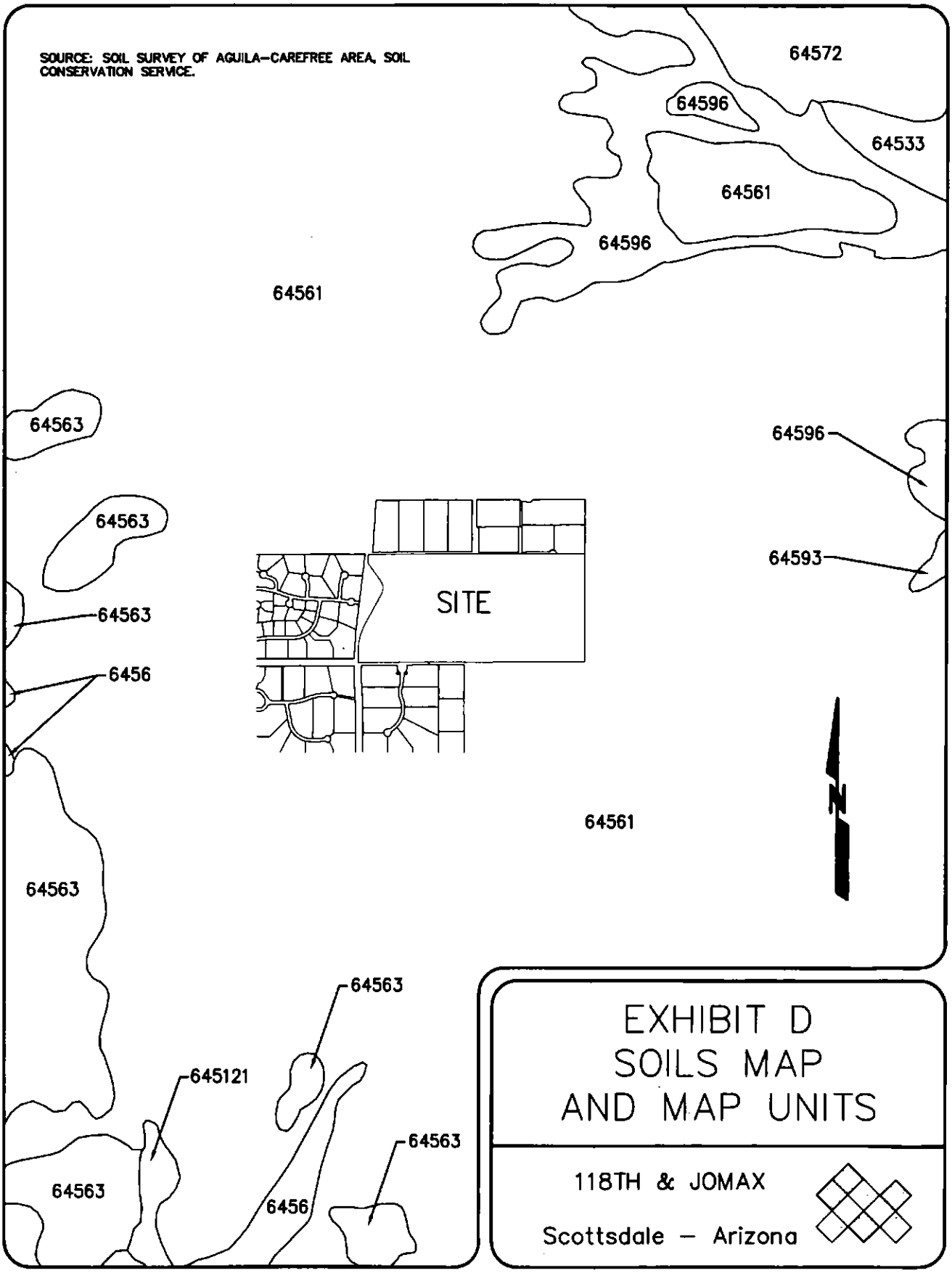


EXHIBIT D
SOILS MAP AND MAP UNITS

118TH & JOMAX

Scottsdale – Arizona

FILE NAME:
MACHINE NUMBER:
DATE PLOTTED:

Rainfall losses are generally considered to be the result of evaporation of water from the land surface, interception of rainfall by vegetal cover, depression storage on the land surface (paved or unpaved), and the infiltration of water into the soil matrix. The selection of parameters to simulate rainfall losses was performed using the *Drainage Design Management System for Windows* (DDMSW) computer program available through the FCD. Soil data were used with the DDMSW software to calculate Green and Ampt parameters. Urban development was represented by the proposed land use and adding a percentage of impervious cover to the drainage subbasin. HEC-1 computes 100% of runoff from the percent of subbasin indicated in the LG record (impervious area).

Appendix A & B contain the hydrologic parameters for rainfall, soils, and land use utilized in the HEC-1 model for *Existing* and *Proposed* conditions respectively. Drainage areas are shown in Plate A (Existing Conditions) and Plate B1 (Proposed Conditions).

Table 4.1 shows 2-, 10-, and 100-Yr/6-Hr peak flow rates under 'existing' watershed conditions at identified concentration points.

Table 4.1 – Peak Flow Rates (Existing Conditions)

HEC-1 Identifier	2-Yr Peak Flow (cfs)	10-Yr Peak Flow (cfs)	100-Yr Peak Flow (cfs)
CDS12 (offsite)	4	12	35
CDS34 (offsite)	3	9	25
C07	14	49	141
C89	1	3	10
010	-	1	3
C1314	10	34	99
015	1	2	7
016	-	1	3
017	2	6	18
018	1	5	14
019	-	1	3
020	1	3	8
021	1	3	8
022	3	9	26
023	1	3	9

Highlighted HEC-1 identifiers are for peak flows exiting the property at different locations (Plate A). These peak flows will be used in evaluating stormwater storage necessary to maintain 'proposed' peak flows at or below 'existing' conditions rates.

Locations for proposed stormwater storage were identified (STOR1-STOR6) and can be seen on Plate B1. Basins will be located within a Tracts and within a drainage easements. Facilities will have access as required by City of Scottsdale.

Table 4.2 shows 2-, 10-, and 100-Yr/6-Hr peak flow rates under 'proposed' watershed conditions at locations exiting the property.

Table 4.2 – Peak Flow Rates (Future Conditions)

HEC-1 Identifier	2-Yr Peak Flow (cfs)	10-Yr Peak Flow (cfs)	100-Yr Peak Flow (cfs)
CDS12 (offsite)	4	12	35
CDS34 (offsite)	2	9	25
C07	11	41	120
C89	1	4	10
C1314	8	34	97
STOR1	7	33	93
015	1	2	7
016	-	1	3
017	2	6	18
018	1	5	14
C20	1	2	9
021	-	1	3
C22	3	9	26
023	1	3	9

Highlighted HEC-1 identifiers are for peak flows exiting the property at different locations (Plate B1).

A comparison of 'existing' and 'future' peak flows for the 2-, 10-, and 100-Yr events is shown on Table 4.3 following.

Table 4.3 – Peak Flow Rates Comparison (Pre- vs Post)

HEC-1 Identifier	2-Yr Peak Flow (cfs)		10-Yr Peak Flow (cfs)		100-Yr Peak Flow (cfs)	
	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED
CDS12 (offsite)	4	4	12	12	35	35
CDS34 (offsite)	3	2	9	9	25	25
C07	14	11	49	41	141	120
C89	1	1	3	4	10	10
C1314	10	8	34	34	99	97
STOR1	-	7	-	33	-	93
015	1	1	2	2	7	7
016	-	-	1	1	3	3
017	2	2	6	6	18	18
018	1	1	5	5	14	14
020	1	-	3	-	8	-
C20	-	1	-	2	-	6
021	1	-	3	1	8	3
022	3	-	9	-	26	-
C22	-	3	-	9	-	26
023	1	1	3	3	9	9

- **INDICATES HEC-1 IDENTIFIER DID NOT EXIST FOR EXISTING CONDITIONS ANALYSIS.**

Highlighted HEC-1 identifiers indicate points of concentration for peak flows comparison when the identifier name has been changed on the 'future' conditions model (Plate B1). Based on the results of the hydrologic models, the stormwater storage basins would manage the estimated 2-, 10-, and 100-Yr peak flow rates under the 'future' conditions of development at or below 'existing' flow rates. However, one location showed a 1 cfs peak flow rate increase under the 10-Yr event which is discussed further following.

Concentration Point C89: The contributing drainage area for this concentration point are Subbasin 08 & 09 (see Plate B1). The drainage area split on Lots 18 and/or Lot 24 can be adjusted during the final grading and drainage plan for the selected house so that the runoff from the house is reduced by 1 cfs to comply with pre-development flow rates. A new drainage report with a revised analysis will be provided at the time of the Home submittal. Either adjustment will send runoff through the system that contributes to STOR1 basin which has room to accommodate 1 cfs without increasing the ultimate outflow.

5.0 HYDRAULIC ANALYSIS

5.1 General

The City of Scottsdale Environmentally Sensitive Lands Ordinance (ESLO) regulates the location and design of residential in the project's area. The ordinance requires that specific environmental features, such natural washes, be preserved in their native locations and conditions.

The ESLO is seeking to minimize modifications of the flow and natural features of "significant washes", which are defined as having a 100-year storm flow of 50 cfs or more. Based on the results of the hydrologic analysis presented herein, Wash A have been identified as having a 100-year storm flow of 50 cfs or more (Plate C1). A floodplain delineation was prepared (HEC-RAS Model) and results can be found in Appendix C.

Culverts are designed to pass the estimated 100-Yr/6-Hr peak flow rates underneath roadways. The minimum pipe size of culverts and storm drain laterals will be 18 inches in diameter. Culvert hydraulic calculations can be found in Appendix D. Location of proposed culverts can be seen on Plate B1.

Runoff generated within the proposed pavement areas will be removed by a curb opening (scupper) or catch basin. The locations of curb openings/catch basins can be seen on Plate B1, and the hydraulic calculations for each structure can be found in Appendix D.

6.0 STORMWATER MANAGEMENT

City Code requires that "As a minimum, all development will make provisions to store runoff from rainfall events up to and including the 100-year, two hour duration event." However, the site is located in the Upper Desert area which is covered by the City of Scottsdale Environmentally Sensitive Land Ordinance (ESLO). City of Scottsdale Code, Section 37-50 provides the stormwater management facility requirements. Since the property is being developed in an ESLO area and improvement would cause the increase of existing peak discharge rates exiting the property (Sec.37-50.d), the stormwater storage volume required for the property shall limit the post-development peak discharge rate to the pre-development peak discharge rate, based on 10- and 100-year storm event. Section 4 of this report contains detailed information regarding the management of peak flows using a 'pre' vs 'post' peak flow analysis.

The project is a low impact residential development with a mix of R1-43 (38 lots), R1-70 (7 lots), R1-130 (4 lot), and R1-190 (2 lots) categories. The project site is 80 acres, out of which Natural Area Open Space (N.A.O.S.) allocation is 29.24 acres and preliminary Open Space/Landscape Areas is 1.21 acres resulting in 30.45 acres of natural/landscaped land.

Stormwater Storage Volume (100-Yr, 2-Hr) "Required"

The stormwater storage volume is calculated using a simplified approach as follows:

$$V = \Delta C * R * A$$

where,

V = stormwater storage volume required, in cubic feet,

ΔC = increase in weighted average runoff coefficient over disturbed area (Cpost – Cpre),

R = 100-year/2-hour precipitation depth, in feet, and

A = area of disturbed ground, in square feet

Results of the calculations for the 100-Yr, 2-Hr stormwater volumes can be found in Appendix B.

City of Scottsdale is also requiring development to hold runoff from the first one-half inch of precipitation to comply with stormwater pollution prevention practices (First Flush). Results of calculations for the First flush volume can also be found in Appendix B. The estimated total 'First Flush' volume is 0.677 Ac-Ft, which is already provided in the proposed basins.

Stormwater Storage Volume "Provided"

Stormwater storage areas were identified at six locations throughout the project site. Following is each basin identifier with associate stormwater storage volume. Detail volume calculations can be found in Appendix B.

STOR1 = 0.326 Ac-Ft
STOR2 = 0.647 Ac-Ft
STOR3 = 0.198 Ac-Ft
STOR4 = 0.120 Ac-Ft
STOR5 = 1.094 Ac-Ft
STOR6 = 0.373 Ac-Ft

The total volume "provided" onsite is 2.759 Ac-Ft. The "provided" stormwater storage will maintain estimated post-development peak flows equal or less than the estimated pre-development conditions peak flows for the 2-, 10-, and 100-Year storm frequency events.

7.0 EROSION AND SCOUR

Using the Arizona Department of Water Resources (ADWR) State Standard 5-96 guidelines (Level I), Lateral Migration Setback limits were determined for washes with a 100-Yr peak discharge (proposed conditions) of more than 50 cfs. Level I procedure provides a reasonable estimate of safe setback distance under normal conditions. One wash has been identified to have a 100-Yr peak discharge of more than 50 cfs with minor curvature, therefore the setback distance was calculated as follows:

$$\text{Setback} = 1.0\ (Q_{100})^{0.5} = 1.0\ (75)^{0.5} = 8.6 \text{ ft.}$$
$$\text{Setback} = 1.0\ (Q_{100})^{0.5} = 1.0\ (119)^{0.5} = 10.9 \text{ ft.}$$
$$\text{Setback} = 1.0\ (Q_{100})^{0.5} = 1.0\ (123)^{0.5} = 11.0 \text{ ft.}$$

ADWR SSA 5-96 recommends that for Level I analysis the minimum setback shall be 20 ft, therefore. The recommended setback distance of 20 ft. is measured from the 100-Yr floodplain limit outward. Plate C1 depicts the Lateral Migration limits. It is important to note that along the identified wash there will be sections where scour protection infrastructure (rock riprap and retaining/scour walls) will be constructed therefore changing the lateral migration distance of 20 ft. to be coincident with the alignment of the proposed scour protection structure.

Erosion protection components are proposed throughout the project to prevent scour using rock riprap and slope compaction/revegetation. The soil classification for the site is Gran-Wickenburg Complex. Field investigation revealed a surface covered with pebbles, cobbles and rock outcrops, which are indicators of surface armoring (erosion hazard slight). The HEC-RAS model results on Wash A, which has the highest of peak flows on the property, shows flow velocities of 3-5 fps indicating low probability of soil erosion even for erodible soils.

Based on the physical properties of the site soils, field observations, magnitude of estimated 100-Yr peak flows, and results of Wash 'A' HEC-RAS model; erosion has very low potential of occurrence.

8.0 CONCLUSIONS

Based on the results of the study, it can be concluded that:

- The proposed land use has no conflicts with any local/regional drainage issues and follows the guidelines set forth by the City of Scottsdale.

- The proposed project complies with City Revised Code requirements for stormwater storage.

- Estimated peak flow rates for the 2-, 10-, and 100-Yr event leaving the property are maintained at or below 'existing' flow rates.

- All lots and structures within the development will be accessible from the boundary of that development during the period of peak flow of runoff from a 100-year storm event.

- Scuppers and catch basins will remove stormwater from the streets and convey it to existing washes.

- Home Owners Association (HOA) will be responsible for maintenance of drainage structures, detention basins, and drainage easements within the subdivision.

Appendix A

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.318	0.428	0.510	0.618	0.699	0.781
	NOAA14	10 MIN	0.484	0.651	0.776	0.941	1.065	1.188
	NOAA14	15 MIN	0.600	0.807	0.962	1.167	1.320	1.473
	NOAA14	30 MIN	0.807	1.087	1.296	1.570	1.777	1.984
	NOAA14	1 HOUR	0.999	1.345	1.604	1.944	2.199	2.455
	NOAA14	2 HOUR	1.136	1.506	1.787	2.166	2.453	2.746
	NOAA14	3 HOUR	1.206	1.570	1.858	2.259	2.575	2.901
	NOAA14	6 HOUR	1.438	1.822	2.129	2.550	2.878	3.218
	NOAA14	12 HOUR	1.727	2.167	2.518	2.992	3.358	3.733
	NOAA14	24 HOUR	2.124	2.765	3.287	4.026	4.624	5.258

Soil ID	Map Unit	XKSAT	Rock Percent	Description
Book Number: 645				
64559	59	0.340	0.00	Gilman-Momoli-Denure complex, low precipitation
64560	60	0.260	0.00	Glenbar loams
64561	61	0.150	0.00	Gran-Wickenburg complex, 1 to 10 percent slopes
64562	62	0.150	0.00	Gran-Wickenburg complex, low precipitation, 1 to 10 percent slopes
64563	63	0.140	25.00	Gran-Wickenburg-Rock outcrop complex, 1 to 7 percent slopes
64564	64	0.140	25.00	Gran-Wickenburg-Rock outcrop complex, low precipitation, 10 to 65
64565	65	0.190	0.00	Greyeagle-Continental-Nickel association, 1 to 40 percent slopes
64566	66	0.230	0.00	Greyeagle-Suncity Variant complex, 1 to 7 percent slopes
64567	67	0.010	0.00	Guest clay
64568	68	0.630	0.00	Gunsight-Cipriano complex, 1 to 7 percent slopes
64569	69	0.630	0.00	Gunsight-Cipriano complex, low precipitation, 1 to 7 percent slopes
64570	70	0.360	0.00	Gunsight-Rillito complex, 1 to 25 percent slopes
64571	71	0.360	0.00	Gunsight-Rillito complex, low precipitation, 1 to 40 percent slopes
64572	72	0.090	30.00	Lehmans-Rock outcrop complex, 8 to 65 percent slopes
64573	73	0.090	30.00	Lehmans-Rock outcrop complex, low precipitation, 8 to 65 percent
64574	74	0.080	0.00	Luke-Cipriano association, 1 to 15 percent slopes
64575	75	0.230	0.00	Mohall loam
64576	76	0.230	0.00	Mohall loam, calcareous solum
64577	77	0.050	0.00	Mohall clay loam
64578	78	0.050	0.00	Mohall clay loam, calcareous solum
64579	79	0.020	0.00	Mohall clay
64580	80	0.080	0.00	Mohall-Tremant complex, 1 to 8 percent slopes
64581	81	0.080	0.00	Mohall-Tremant complex, low precipitation, 1 to 8 percent slopes
64582	82	0.040	0.00	Mohave sandy loam
64583	83	0.040	0.00	Mohave loam
64584	84	0.050	0.00	Mohave loam, calcareous solum
64585	85	0.040	0.00	Mohave clay loam
64586	86	0.050	0.00	Mohave clay loam, calcareous solum
64587	87	0.040	0.00	Mohave complex
64588	88	0.020	0.00	Mohave-Guest complex
64589	89	0.060	0.00	Mohave-Tres Hermanos complex, 1 to 8 percent slopes
64590	90	0.390	0.00	Momoli gravelly sandy loam, 1 to 5 percent slopes
64591	91	0.930	0.00	Momoli-Carrizo complex
64592	92	0.930	0.00	Momoli-Carrizo complex, low precipitation
64593	93	0.330	0.00	Nickel-Cave complex, 8 to 30 percent slopes
64594	94	0.330	0.00	Nickel-Cave complex, low precipitation, 8 to 30 percent slopes
64595	95	0.040	0.00	Ohaco gravelly loam
64596	96	0.070	0.00	Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes
64597	97	0.070	0.00	Pinaleno-Tres Hermanos complex, low precipitation, 1 to 10 percent
64598	98	0.370	0.00	Pinamt-Tremant complex, 1 to 10 percent slopes
64599	99	0.370	0.00	Pinamt-Tremant complex, low precipitation, 1 to 10 percent slopes
645100	100	0.400	20.00	Quilotosa-Vaiva-Rock outcrop complex, 20 to 65 percent slopes
645101	101	0.280	0.00	Rillito loam, 0 to 3 percent slopes
645102	102	0.400	0.00	Rillito gravelly loam, 1 to 8 percent slopes
645103	103	0.100	65.00	Rock outcrop-Gachado complex, 5 to 55 percent slopes
645104	104	0.140	60.00	Rock outcrop-Lehmans complex, 15 to 65 percent slopes
645105	105	0.140	60.00	Rock outcrop-Lehmans complex, low precipitation, 15 to 65 percent
645106	106	0.180	0.00	Sal-Cipriano complex, 1 to 10 percent slopes
645107	107	0.180	0.00	Sal-Cipriano complex, low precipitation, 1 to 10 percent slopes
645108	108	0.310	30.00	Schenco-Rock outcrop complex, 3 to 25 percent slopes
645109	109	0.350	35.00	Schenco-Rock outcrop complex, 25 to 60 percent slopes
645110	110	0.130	0.00	Suncity-Cipriano complex, 1 to 7 percent slopes
645111	111	0.400	0.00	Torriorthents, 15 to 40 percent slopes
645112	112	0.390	0.00	Tremant gravelly sandy loams
645113	113	0.390	0.00	Tremant gravelly loams
645114	114	0.390	0.00	Tremant gravelly loams, low precipitation
645115	115	0.390	0.00	Tremant-Antho complex, 1 to 5 percent slopes
645116	116	0.230	0.00	Tremant-Gunsight-Rillito complex, 1 to 5 percent slopes

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
01	645	61	64561	0.017	100.00	0.150	-	100	
010	645	61	64561	0.001	100.00	0.150	-	100	
011	645	61	64561	0.018	100.00	0.150	-	100	
012	645	61	64561	0.012	100.00	0.150	-	100	
013	645	61	64561	0.010	100.00	0.150	-	100	
014	645	61	64561	0.007	100.00	0.150	-	100	
015	645	61	64561	0.002	100.00	0.150	-	100	
016	645	61	64561	0.001	100.00	0.150	-	100	
017	645	61	64561	0.006	100.00	0.150	-	100	
018	645	61	64561	0.007	100.00	0.150	-	100	
019	645	61	64561	0.001	100.00	0.150	-	100	
02	645	61	64561	0.002	100.00	0.150	-	100	
020	645	61	64561	0.003	100.00	0.150	-	100	
021	645	61	64561	0.003	100.00	0.150	-	100	
022	645	61	64561	0.009	100.00	0.150	-	100	
023	645	61	64561	0.003	100.00	0.150	-	100	
03	645	61	64561	0.003	100.00	0.150	-	100	
04	645	61	64561	0.003	100.00	0.150	-	100	
05	645	61	64561	0.003	100.00	0.150	-	100	
06	645	61	64561	0.003	100.00	0.150	-	100	
07	645	61	64561	0.002	100.00	0.150	-	100	
08	645	61	64561	0.002	100.00	0.150	-	100	
09	645	61	64561	0.002	100.00	0.150	-	100	
DS01	645	61	64561	0.009	100.00	0.150	-	100	
DS02	645	61	64561	0.003	100.00	0.150	-	100	
DS03	645	61	64561	0.006	100.00	0.150	-	100	
DS04	645	61	64561	0.003	100.00	0.150	-	100	

Code	Description	Initial Abstraction IA	Percent Impervious RTIMP	Vegetation Cover	Moisture Deficit DTHETA	Resistance Coefficient Kb
Residential						
110	Rural Residential (<= 1/5 du per acre)	0.30	5	30.0	ORMAL	MIN
120	Estate Residential (1/5 du per acre to 1 du per acre)	0.30	5	30.0	ORMAL	MIN
130	Large Lot Residential - Single Family (1 du per acre to 2 du	0.30	15	50.0	ORMAL	MIN
140	Medium Lot Residential - Single Family (2-4 du per acre)	0.25	20	50.0	ORMAL	MIN
150	Small Lot Residential - Single Family (4-6 du per acre)	0.25	30	50.0	ORMAL	MIN
160	Very Small Lot Residential - Single Family (>6 du per acre-i	0.25	40	50.0	ORMAL	MIN
170	Medium Density Residential - Muli Family (5-10 du per acre)	0.25	45	50.0	ORMAL	MIN
180	High Density Residential - Multi Family (10-15 du per acre)	0.25	45	50.0	ORMAL	MIN
190	Very High Density Residential - Multi Family (> 15 du per ac	0.25	45	50.0	ORMAL	MIN
Tourist						
510	Tourist and Visitor Accommodations (Hotels, motels and resor	0.10	80	75.0	ORMAL	MIN
Transportation						
600	General Transportation (Transportation where no detail avail	0.10	80	75.0	ORMAL	MIN
610	Transportation (Includes railroads, railyards, transit cente	0.10	80	75.0	ORMAL	MIN
620	Airports (Includes public use airports)	0.15	55	60.0	ORMAL	MIN
630	Transportation	0.10	80	75.0	ORMAL	MIN
2002	Pavement and Rooftops	0.05	95	0.0	DRY	MIN
2003	Gravel Vehicular travel lanes and shoulders	0.10	5	0.0	DRY	MIN

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX EX.COND.

Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01								
UNDEVELOPED	0.0170	100.0	0	1	30.0	NORMAL	0.034	Undeveloped Desert Land (Scottsdale)
	0.0170	**100.0**						
UNDEVELOPED	0.0010	100.0	0	1	30.0	NORMAL	0.041	Undeveloped Desert Land (Scottsdale)
	0.0010	**100.0**						
UNDEVELOPED	0.0180	100.0	0	1	30.0	NORMAL	0.033	Undeveloped Desert Land (Scottsdale)
	0.0180	**100.0**						
UNDEVELOPED	0.0120	100.0	0	1	30.0	NORMAL	0.034	Undeveloped Desert Land (Scottsdale)
	0.0120	**100.0**						
UNDEVELOPED	0.0100	100.0	0	1	30.0	NORMAL	0.035	Undeveloped Desert Land (Scottsdale)
	0.0100	**100.0**						
UNDEVELOPED	0.0070	100.0	0	1	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
	0.0070	**100.0**						
UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
	0.0020	**100.0**						
UNDEVELOPED	0.0010	100.0	0	1	30.0	NORMAL	0.041	Undeveloped Desert Land (Scottsdale)
	0.0010	**100.0**						
UNDEVELOPED	0.0060	100.0	0	1	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
	0.0060	**100.0**						
UNDEVELOPED	0.0070	100.0	0	1	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
	0.0070	**100.0**						
UNDEVELOPED	0.0010	100.0	0	1	30.0	NORMAL	0.041	Undeveloped Desert Land (Scottsdale)

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX EX.COND.

in	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0010	**100.0**						
	UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0090	100.0	0	1	30.0	NORMAL	0.035	Undeveloped Desert Land (Scottsdale)
		0.0090	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)

* Non default value

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
		0.0020	**100.0**						
	UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
	UNDEVELOPED	0.0020	100.0	0	1	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
1	120	0.0090	100.0	0	15 *	30.0	NORMAL	0.035	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0090	**100.0**						
2	120	0.0030	100.0	0	15 *	30.0	NORMAL	0.038	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0030	**100.0**						
3	120	0.0060	100.0	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0060	**100.0**						
4	UNDEVELOPED	0.0030	100.0	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						

* Non default value

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	10
Major Basin ID: 01																		
DS01	0.009	0.12	201.7	201.6	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.147	0.138	0.125	0.112	0.105	0.
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.119	0.111	0.099	0.088	0.081	0.
DS02	0.003	0.18	135.6	135.6	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.213	0.200	0.181	0.162	0.151	0.
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.462	0.431	0.386	0.341	0.316	0.
DS03	0.006	0.13	134.9	134.9	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.176	0.166	0.150	0.134	0.125	0.
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.194	0.182	0.163	0.144	0.133	0.
DS04	0.003	0.13	166.7	166.7	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183		**Tc (Hrs)**	0.180	0.168	0.150	0.133	0.123	0.
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.296	0.274	0.242	0.211	0.194	0.
01	0.017	0.26	137.4	137.4	HEC1 DEFAULT	0.034	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.255*	0.238	0.212	0.188	0.174	0.
												Vel (f/s)	2	2	2	2	2	
												R (Hrs)	0.281	0.261	0.230	0.201	0.185	0.
02	0.002	0.08	185.2	185.2	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.138	0.129	0.115	0.102	0.095	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.188	0.174	0.154	0.134	0.124	0.
03	0.002	0.09	188.2	188.2	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.146	0.136	0.122	0.108	0.100	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.220	0.204	0.180	0.157	0.144	0.
04	0.003	0.11	181.0	181.0	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.161	0.150	0.134	0.119	0.110	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.229	0.212	0.187	0.163	0.150	0.
05	0.003	0.10	195.9	195.9	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.150	0.140	0.125	0.110	0.103	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.195	0.181	0.160	0.139	0.128	0.

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100
Major Basin ID: 01																		
06	0.003	0.15	176.5	176.5	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.190	0.177	0.158	0.140	0.130	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.351	0.325	0.287	0.250	0.230	0.2
07	0.002	0.06	285.7	257.9	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.108	0.101	0.090	0.080	0.074	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.114	0.105	0.093	0.081	0.075	0.0
08	0.002	0.12	156.5	156.5	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.178	0.166	0.149	0.132	0.122	0.1
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.346	0.320	0.283	0.247	0.227	0.2
09	0.002	0.13	186.6	186.6	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.176	0.164	0.147	0.130	0.120	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.363	0.336	0.297	0.259	0.238	0.2
010	0.001	0.03	172.4	172.4	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.089	0.083	0.074	0.065	0.061	0.0
												Vel (f/s)	0	1	1	1	1	
												R (Hrs)	0.078	0.072	0.064	0.056	0.051	0.0
011	0.018	0.39	117.0	117.0	HEC1 DEFAULT	0.033	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.323*	0.301*	0.269*	0.238	0.221	0.
												Vel (f/s)	2	2	2	2	3	
												R (Hrs)	0.490	0.454	0.401	0.349	0.322	0.
012	0.012	0.32	129.6	129.6	HEC1 DEFAULT	0.034	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.288*	0.268*	0.240	0.212	0.197	0.
												Vel (f/s)	2	2	2	2	2	
												R (Hrs)	0.464	0.429	0.380	0.331	0.304	0.
013	0.010	0.19	139.9	139.9	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.220	0.205	0.183	0.162	0.150	0.
												Vel (f/s)	1	1	2	2	2	
												R (Hrs)	0.251	0.233	0.206	0.179	0.165	0
014	0.007	0.20	167.5	167.5	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.216	0.202	0.181	0.159	0.148	0
												Vel (f/s)	1	1	2	2	2	
												R (Hrs)	0.316	0.292	0.258	0.225	0.207	0

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	10
Major Basin ID: 01																		
015	0.002	0.05	296.3	262.0	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.098	0.092	0.082	0.072	0.067	0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.088	0.082	0.072	0.063	0.058	0
016	0.001	0.03	323.5	270.9	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.077	0.072	0.064	0.057	0.053	0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.067	0.062	0.055	0.048	0.044	0
017	0.006	0.13	223.1	220.8	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.160	0.149	0.134	0.118	0.110	0
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.175	0.162	0.143	0.125	0.115	0
018	0.007	0.25	122.4	122.4	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.266*	0.249	0.222	0.196	0.182	0
												Vel (f/s)	1	1	2	2	2	
												R (Hrs)	0.476	0.441	0.389	0.339	0.312	0
019	0.001	0.05	226.4	223.4	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.106	0.099	0.088	0.078	0.072	0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.143	0.132	0.117	0.102	0.094	0
020	0.003	0.12	172.1	172.1	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.171	0.159	0.143	0.126	0.117	0
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.262	0.242	0.214	0.187	0.172	0
021	0.003	0.11	166.7	166.7	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.165	0.154	0.138	0.122	0.113	0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.235	0.218	0.192	0.168	0.154	0
022	0.009	0.15	142.9	142.9	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.194	0.181	0.162	0.143	0.133	0
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.192	0.178	0.157	0.137	0.126	0
023	0.003	0.10	313.1	267.8	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.136	0.127	0.114	0.100	0.093	0
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.176	0.163	0.144	0.125	0.115	0

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
HEC-1 ROUTING DATA
Project Reference: 118TH&JOMAX EX.COND.

Route ID	Shape	Length (ft)	Slope (ft/ft)	Manning's N	Diameter (in)	Height (ft)	Width (ft)	Side Slope (h/v)
MUSKINGUM-CUNGE								
Major Basin 01								
R014	NATURAL	242.00	0.0165	0.035		-	7.00	-
RC014	NATURAL	412.00	0.0194	0.035		-	5.00	-
RC023	NATURAL	449.00	0.0178	0.035		-	4.00	-
RC056	NATURAL	195.00	0.0154	0.035		-	5.00	-
RC1112	NATURAL	645.00	0.0170	0.035		-	8.00	-
RCDS12	NATURAL	209.00	0.0143	0.035		-	4.00	-
RCDS34	NATURAL	232.00	0.0172	0.035		-	3.00	-
RDS01	NATURAL	226.00	0.0265	0.035		-	2.50	-
RDS03	NATURAL	467.00	0.0230	0.035		-	3.50	-

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*                                       *
*  RUN DATE   07SEP17  TIME  08:22:04   *
*                                       *
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*                                       *
*          (916) 756-1104               *
*                                       *
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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
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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


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

   1          ID        Flood Control District of Maricopa County
   2          ID        118TH&JOMAX SINGLE S - EXISTING CONDITIONS
   3          ID        100 YEAR
   4          ID        6 Hour  Storm
   5          ID        Unit Hydrograph: Clark
   6          ID        Storm: Single
   7          ID        08/16/2017
              *DIAGRAM
   8          IT       1  1JAN99       0    2000
   9          IO       5
  10          IN      15
              *                  2-Yr    10-Yr    100-Yr
  11          JR    FLOW      0.1     0.35      1.0
              *

  12          KK    DS01    BASIN
  13          BA   0.009
  14          PB   3.218
  15          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  16          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  17          PC   0.962   0.972   0.983   0.991   1.000
  18          LG    0.30    0.25    6.00    0.18      15
  19          UC   0.098   0.076
  20          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  21          UA     100
              *

  22          KK   RDS01    ROUTE
  23          RD     226  0.0265   0.035           TRAP   2.500   10.00
              *

  24          KK    DS02    BASIN
  25          BA   0.003
  26          LG    0.30    0.25    6.00    0.18      15
  27          UC   0.142   0.296
  28          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  29          UA     100
              *

  30          KK   CDS12 COMBINE
  31          HC       2
              *

  32          KK  RCDS12    ROUTE
  33          RD     209  0.0143   0.035           TRAP   4.000   10.00
              *

  34          KK    DS03    BASIN
  35          BA   0.006
  36          LG    0.30    0.25    6.00    0.18      15
  37          UC   0.118   0.124
  38          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  39          UA     100
              *
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  40          KK   RDS03    ROUTE
  41          RD     467  0.0230   0.035           TRAP   3.500   10.00
              *
```

```
                      UA     100
                      *

 48                   KK   CDS34 COMBINE
 49                   HC       2
                      *

 50                   KK  RCDS34   ROUTE
 51                   RD     232  0.0172   0.035             TRAP   3.000   10.00
                      *

 52                   KK      02   BASIN
 53                   BA   0.002
 54                   LG    0.30    0.25    6.00    0.18       1
 55                   UC   0.089   0.115
 56                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 57                   UA     100
                      *

 58                   KK      03   BASIN
 59                   BA   0.002
 60                   LG    0.30    0.25    6.00    0.18       1
 61                   UC   0.094   0.134
 62                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 63                   UA     100
                      *

 64                   KK    CO23 COMBINE
 65                   HC       4
                      *

 66                   KK   RCO23   ROUTE
 67                   RD     449  0.0178   0.035             TRAP   4.000   10.00
                      *

 68                   KK      01   BASIN
 69                   BA   0.017
 70                   LG    0.30    0.25    6.00    0.18       1
 71                   UC   0.163   0.172
 72                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 73                   UA     100
                      *
1                                         HEC-1 INPUT                                                   PAGE  3

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

 74                   KK      04   BASIN
 75                   BA   0.003
 76                   LG    0.30    0.25    6.00    0.18       1
 77                   UC   0.103   0.140
 78                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 79                   UA     100
                      *

 80                   KK    CO14 COMBINE
 81                   HC       3
                      *

 82                   KK   RCO14   ROUTE
 83                   RD     412  0.0194   0.035             TRAP   5.000   10.00
                      *

 84                   KK      05   BASIN
 85                   BA   0.003
 86                   LG    0.30    0.25    6.00    0.18       1
 87                   UC   0.096   0.120
 88                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 89                   UA     100
                      *

 90                   KK      06   BASIN
 91                   BA   0.003
 92                   LG    0.30    0.25    6.00    0.18       1
 93                   UC   0.122   0.215
 94                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 95                   UA     100
                      *

 96                   KK    CO56 COMBINE
 97                   HC       3
                      *

 98                   KK   RCO56   ROUTE
 99                   RD     195  0.0154   0.035             TRAP   5.000   10.00
                      *

100                   KK      07   BASIN
101                   BA   0.002
102                   LG    0.30    0.25    6.00    0.18       1
103                   UC   0.069   0.070
104                   UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
105                   UA     100
                      *
```

```
108          KK     011   BASIN
109          BA   0.018
110          LG    0.30    0.25    6.00    0.18       1
111          UC   0.207   0.300
112          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
113          UA     100
             *

114          KK     012   BASIN
115          BA   0.012
116          LG    0.30    0.25    6.00    0.18       1
117          UC   0.185   0.284
118          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
119          UA     100
             *

120          KK   C1112 COMBINE
121          HC       2
             *

122          KK  RC1112   ROUTE
123          RD     645  0.0170   0.035            TRAP   8.000   10.00
             *

124          KK     013   BASIN
125          BA   0.010
126          LG    0.30    0.25    6.00    0.18       1
127          UC   0.141   0.154
128          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
129          UA     100
             *

130          KK     014   BASIN
131          BA   0.007
132          LG    0.30    0.25    6.00    0.18       1
133          UC   0.139   0.193
134          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
135          UA     100
             *

136          KK    R014   ROUTE
137          RD     242  0.0165   0.035            TRAP   7.000   10.00
             *

138          KK   C1314 COMBINE
139          HC       3
             *

140          KK      08   BASIN
141          BA   0.002
142          LG    0.30    0.25    6.00    0.18       1
143          UC   0.115   0.212
144          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
145          UA     100
             *
```



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

146          KK      09   BASIN
147          BA   0.002
148          LG    0.30    0.25    6.00    0.18       1
149          UC   0.113   0.222
150          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
151          UA     100
             *

152          KK     C89  COMBINE
153          HC       2
             *

154          KK     010   BASIN
155          BA   0.001
156          LG    0.30    0.25    6.00    0.18       1
157          UC   0.057   0.048
158          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
159          UA     100
             *

160          KK     015   BASIN
161          BA   0.002
162          LG    0.30    0.25    6.00    0.18       1
163          UC   0.063   0.054
164          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
165          UA     100
             *

166          KK     016   BASIN
167          BA   0.001
168          LG    0.30    0.25    6.00    0.18       1
169          UC   0.050   0.041
             UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
```

```
 174          KK     017   BASIN
 175          BA   0.006
 176          LG    0.30    0.25    6.00    0.18       1
 177          UC   0.103   0.107
 178          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 179          UA     100
              *

 180          KK     018   BASIN
 181          BA   0.007
 182          LG    0.30    0.25    6.00    0.18       1
 183          UC   0.171   0.291
 184          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 185          UA     100
              *
```



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

 186          KK     019   BASIN
 187          BA   0.001
 188          LG    0.30    0.25    6.00    0.18       1
 189          UC   0.068   0.087
 190          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 191          UA     100
              *

 192          KK     020   BASIN
 193          BA   0.003
 194          LG    0.30    0.25    6.00    0.18       1
 195          UC   0.110   0.160
 196          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 197          UA     100
              *

 198          KK     021   BASIN
 199          BA   0.003
 200          LG    0.30    0.25    6.00    0.18       1
 201          UC   0.106   0.144
 202          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 203          UA     100
              *

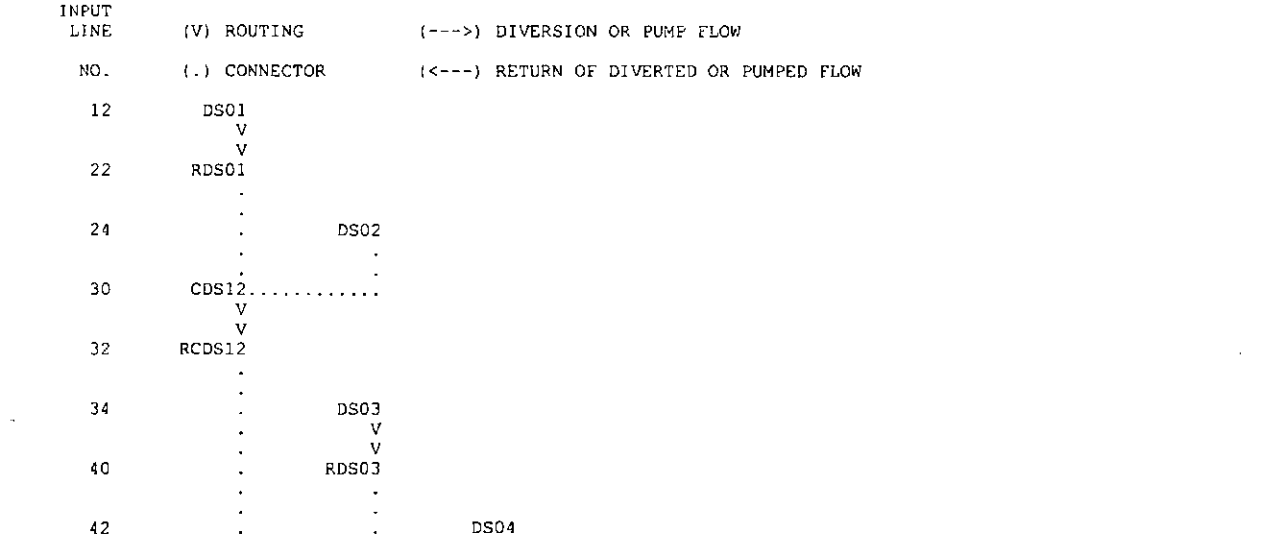
 204          KK  CDUMMY   COMBINE
 205          HC       5
              *

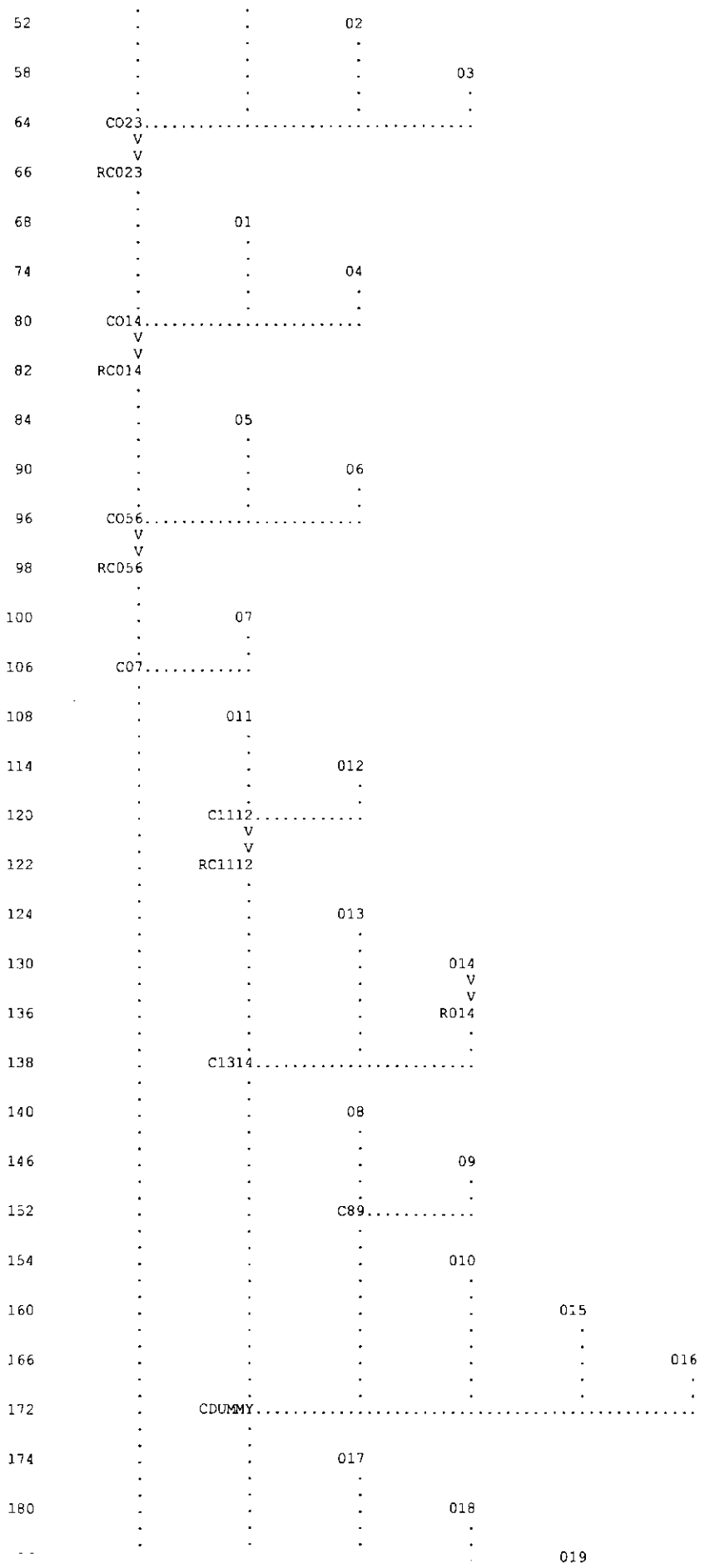
 206          KK     022   BASIN
 207          BA   0.009
 208          LG    0.30    0.25    6.00    0.18       1
 209          UC   0.125   0.118
 210          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 211          UA     100
              *

 212          KK     023   BASIN
 213          BA   0.003
 214          LG    0.30    0.25    6.00    0.18       1
 215          UC   0.087   0.107
 216          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 217          UA     100
              *
 218          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK




52
02
58
03
64
CO23
66
RC023
68
01
74
04
80
CO14
82
RC014
84
05
90
06
96
CO56
98
RC056
100
07
106
C07
108
011
114
012
120
C1112
122
RC1112
124
013
130
014
136
R014
138
C1314
140
08
146
09
152
C89
154
010
160
015
166
016
172
CDUMMY
174
017
180
018
019

```
                .          .          .          .          .          .          .
  204           .          .      CDUMMY.....................................................
                .          .          .
                .          .          .
  206           .          .          .        022
                .          .          .          .
                .          .          .          .
  212           .          .          .          .        023

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                    ************************************
*                                       *                    *                                  *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *    U.S. ARMY CORPS OF ENGINEERS  *
*               JUN  1998               *                    *    HYDROLOGIC ENGINEERING CENTER *
*            VERSION 4.1                *                    *         609 SECOND STREET        *
*                                       *                    *       DAVIS, CALIFORNIA 95616    *
*  RUN DATE   07SEP17  TIME  08:22:04   *                    *         (916) 756-1104           *
*                                       *                    *                                  *
*****************************************                    ************************************

                              Flood Control District of Maricopa County
                              118TH&JOMAX SINGLE S - EXISTING CONDITIONS
                              100 YEAR
                              6 Hour  Storm
                              Unit Hydrograph: Clark
                              Storm: Single
                              08/16/2017

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

      IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                       IDATE     1JAN99  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     2JAN99  ENDING DATE
                      NDTIME       0919  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL      .02 HOURS
                        TOTAL TIME BASE    33.32 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

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF RUNOFF
                      .10       .35      1.00
1

               PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                           FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                        TIME TO PEAK IN HOURS

                                                                  RATIOS APPLIED TO FLOWS
 OPERATION       STATION     AREA    PLAN              RATIO 1  RATIO 2  RATIO 3
                                                         .10      .35     1.00

 HYDROGRAPH AT
+                  DS01       .01     1   FLOW            3.      10.      30.
                                           TIME          4.02     4.02     4.02

 ROUTED TO
+                 RDS01       .01     1   FLOW            3.      10.      29.
                                           TIME          4.03     4.03     4.02

 HYDROGRAPH AT
+                  DS02       .00     1   FLOW            1.       2.       6.
                                           TIME          4.07     4.07     4.07

  2 COMBINED AT
+                 CDS12       .01     1   FLOW            4.      12.      35.
                                           TIME          4.03     4.03     4.03

 ROUTED TO
+                RCDS12       .01     1   FLOW            4.      12.      35.
                                           TIME          4.07     4.05     4.03
```

2-YR

10-YR

100-YR

+	ROUTED TO						
	RDS03	.01	1	FLOW	2.	6.	18.
				TIME	4.08	4.07	4.05
	HYDROGRAPH AT						
+	DS04	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
	2 COMBINED AT						
+	CDS34	.01	1	FLOW	3.	9.	25.
				TIME	4.07	4.05	4.05
	ROUTED TO						
+	RCDS34	.01	1	FLOW	3.	9.	25.
				TIME	4.10	4.08	4.07
	HYDROGRAPH AT						
+	02	.00	1	FLOW	1.	2.	6.
				TIME	4.02	4.02	4.02
	HYDROGRAPH AT						
+	03	.00	1	FLOW	1.	2.	6.
				TIME	4.02	4.02	4.02
	4 COMBINED AT						
+	CO23	.03	1	FLOW	7.	25.	71.
				TIME	4.05	4.05	4.03
	ROUTED TO						
+	RC023	.03	1	FLOW	7.	25.	72.
				TIME	4.10	4.08	4.07
	HYDROGRAPH AT						
+	01	.02	1	FLOW	4.	15.	43.
				TIME	4.05	4.05	4.05
	HYDROGRAPH AT						
+	04	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
	3 COMBINED AT						
+	CO14	.05	1	FLOW	12.	43.	123.
				TIME	4.07	4.07	4.05
	ROUTED TO						
+	RC014	.05	1	FLOW	12.	43.	123.
				TIME	4.10	4.08	4.07
	HYDROGRAPH AT						
+	05	.00	1	FLOW	1.	3.	9.
				TIME	4.02	4.02	4.02
	HYDROGRAPH AT						
+	06	.00	1	FLOW	1.	2.	7.
				TIME	4.05	4.05	4.05
	3 COMBINED AT						
+	CO56	.05	1	FLOW	13.	48.	138.
				TIME	4.10	4.08	4.07
	ROUTED TO						
+	RC056	.05	1	FLOW	13.	48.	137.
				TIME	4.12	4.08	4.08
	HYDROGRAPH AT						
+	07	.00	1	FLOW	1.	2.	7.
				TIME	4.00	4.00	4.00
	2 COMBINED AT						
+	C07	.05	1	FLOW	14.	49.	141.
				TIME	4.10	4.08	4.07
	HYDROGRAPH AT						
+	011	.02	1	FLOW	3.	12.	35.
				TIME	4.10	4.10	4.10
	HYDROGRAPH AT						
+	012	.01	1	FLOW	2.	8.	24.
				TIME	4.08	4.08	4.08
	2 COMBINED AT						
+	C1112	.03	1	FLOW	6.	21.	59.
				TIME	4.10	4.10	4.10
	ROUTED TO						
+	RC1112	.03	1	FLOW	6.	21.	59.
				TIME	4.15	4.13	4.13
	HYDROGRAPH AT						
+	013	.01	1	FLOW	3.	9.	27.
				TIME	4.05	4.05	4.05
	HYDROGRAPH AT						
+	014	.01	1	FLOW	2.	6.	17.
				TIME	4.05	4.05	4.05

				TIME	4.10	4.10	4.08
HYDROGRAPH AT							
+	08	.00	1	FLOW	0.	2.	5.
				TIME	4.03	4.05	4.05
HYDROGRAPH AT							
+	09	.00	1	FLOW	0.	2.	5.
				TIME	4.05	4.05	4.05
2 COMBINED AT							
+	C89	.00	1	FLOW	1.	3.	10.
				TIME	4.05	4.05	4.05
HYDROGRAPH AT							
+	010	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	015	.00	1	FLOW	1.	2.	7.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	016	.00	1	FLOW	0.	1.	3.
				TIME	3.98	4.00	4.00
5 COMBINED AT							
+	CDUMMY	.05	1	FLOW	11.	40.	115.
				TIME	4.08	4.07	4.05
HYDROGRAPH AT							
+	017	.01	1	FLOW	2.	6.	18.
				TIME	4.02	4.02	4.02
HYDROGRAPH AT							
+	018	.01	1	FLOW	1.	5.	14.
				TIME	4.08	4.08	4.08
HYDROGRAPH AT							
+	019	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	020	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	021	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
5 COMBINED AT							
+	CDUMMY	.02	1	FLOW	5.	18.	51.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	022	.01	1	FLOW	3.	9.	26.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	023	.00	1	FLOW	1.	3.	9.
				TIME	4.02	4.02	4.02

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RDS01	MANE	1.00	2.96	242.00	.20	1.00	2.96	242.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9525E-01 EXCESS= .0000E+00 OUTFLOW= .9523E-01 BASIN STORAGE= .1005E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RDS01	MANE	1.00	10.34	242.00	.69	1.00	10.34	242.00	.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3334E+00 EXCESS= .0000E+00 OUTFLOW= .3334E+00 BASIN STORAGE= .1048E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDS01	MANE	.86	29.55	241.41	1.98	1.00	29.49	241.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9525E+00 EXCESS= .0000E+00 OUTFLOW= .9525E+00 BASIN STORAGE= .1122E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCDS12	MANE	1.00	3.55	244.00	.20	1.00	3.55	244.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4444E+00 EXCESS= .0000E+00 OUTFLOW= .4444E+00 BASIN STORAGE= .1186E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCDS12	MANE	.96	35.34	242.15	1.98	1.00	35.28	242.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1270E+01 EXCESS= .0000E+00 OUTFLOW= .1270E+01 BASIN STORAGE= .1237E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RDS03	MANE	1.00	1.77	245.00	.20	1.00	1.77	245.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6349E-01 EXCESS= .0000E+00 OUTFLOW= .6346E-01 BASIN STORAGE= .2203E-03 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

RDS03	MANE	1.00	6.21	244.00	.69	1.00	6.21	244.00	.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2222E+00 EXCESS= .0000E+00 OUTFLOW= .2222E+00 BASIN STORAGE= .2437E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RDS03	MANE	1.00	17.70	243.00	1.98	1.00	17.70	243.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6349E+00 EXCESS= .0000E+00 OUTFLOW= .6348E+00 BASIN STORAGE= .2349E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCDS34	MANE	1.00	2.50	246.00	.19	1.00	2.50	246.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9175E-01 EXCESS= .0000E+00 OUTFLOW= .9172E-01 BASIN STORAGE= .1217E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RCDS34	MANE	1.00	8.82	245.00	.67	1.00	8.82	245.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3212E+00 EXCESS= .0000E+00 OUTFLOW= .3212E+00 BASIN STORAGE= .1279E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RCDS34	MANE	1.00	25.33	244.00	1.91	1.00	25.33	244.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9178E+00 EXCESS= .0000E+00 OUTFLOW= .9177E+00 BASIN STORAGE= .1216E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC023	MANE	1.00	7.06	246.00	.19	1.00	7.06	246.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2567E+00 EXCESS= .0000E+00 OUTFLOW= .2566E+00 BASIN STORAGE= .2503E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RC023	MANE	1.00	24.94	245.00	.67	1.00	24.94	245.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8987E+00 EXCESS= .0000E+00 OUTFLOW= .8986E+00 BASIN STORAGE= .2362E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC023	MANE	1.00	71.52	244.00	1.93	1.00	71.52	244.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2568E+01 EXCESS= .0000E+00 OUTFLOW= .2568E+01 BASIN STORAGE= .2370E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	11.99	246.00	.19	1.00	11.99	246.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4468E+00 EXCESS= .0000E+00 OUTFLOW= .4467E+00 BASIN STORAGE= .2316E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	42.70	245.00	.65	1.00	42.70	245.00	.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1564E+01 EXCESS= .0000E+00 OUTFLOW= .1564E+01 BASIN STORAGE= .2224E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	122.54	244.00	1.86	1.00	122.54	244.00	1.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4469E+01 EXCESS= .0000E+00 OUTFLOW= .4469E+01 BASIN STORAGE= .2214E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC056	MANE	.81	47.56	245.56	.65	1.00	47.50	245.00	.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1764E+01 EXCESS= .0000E+00 OUTFLOW= .1764E+01 BASIN STORAGE= .1163E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC056	MANE	.62	137.28	244.38	1.85	1.00	137.07	245.00	1.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5040E+01 EXCESS= .0000E+00 OUTFLOW= .5040E+01 BASIN STORAGE= .1143E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC1112	MANE	1.00	5.87	249.00	.18	1.00	5.87	249.00	.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2852E+00 EXCESS= .0000E+00 OUTFLOW= .2851E+00 BASIN STORAGE= .4185E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RC1112	MANE	1.00	20.57	248.00	.62	1.00	20.57	248.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9981E+00 EXCESS= .0000E+00 OUTFLOW= .9981E+00 BASIN STORAGE= .3867E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC1112	MANE	1.00	58.81	248.00	1.78	1.00	58.81	248.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2852E+01 EXCESS= .0000E+00 OUTFLOW= .2852E+01 BASIN STORAGE= .3881E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

R014	MANE	1.00	1.73	245.00	.18	1.00	1.73	245.00	.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6654E-01 EXCESS= .0000E+00 OUTFLOW= .6654E-01 BASIN STORAGE= .1415E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

R014	MANE	1.00	6.03	244.00	.62	1.00	6.03	244.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2329E+00 EXCESS= .0000E+00 OUTFLOW= .2329E+00 BASIN STORAGE= .1504E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

R014	MANE	1.00	17.26	244.00	1.78	1.00	17.26	244.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6654E+00 EXCESS= .0000E+00 OUTFLOW= .6654E+00 BASIN STORAGE= .1405E-03 PERCENT ERROR= .0

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

Appendix B

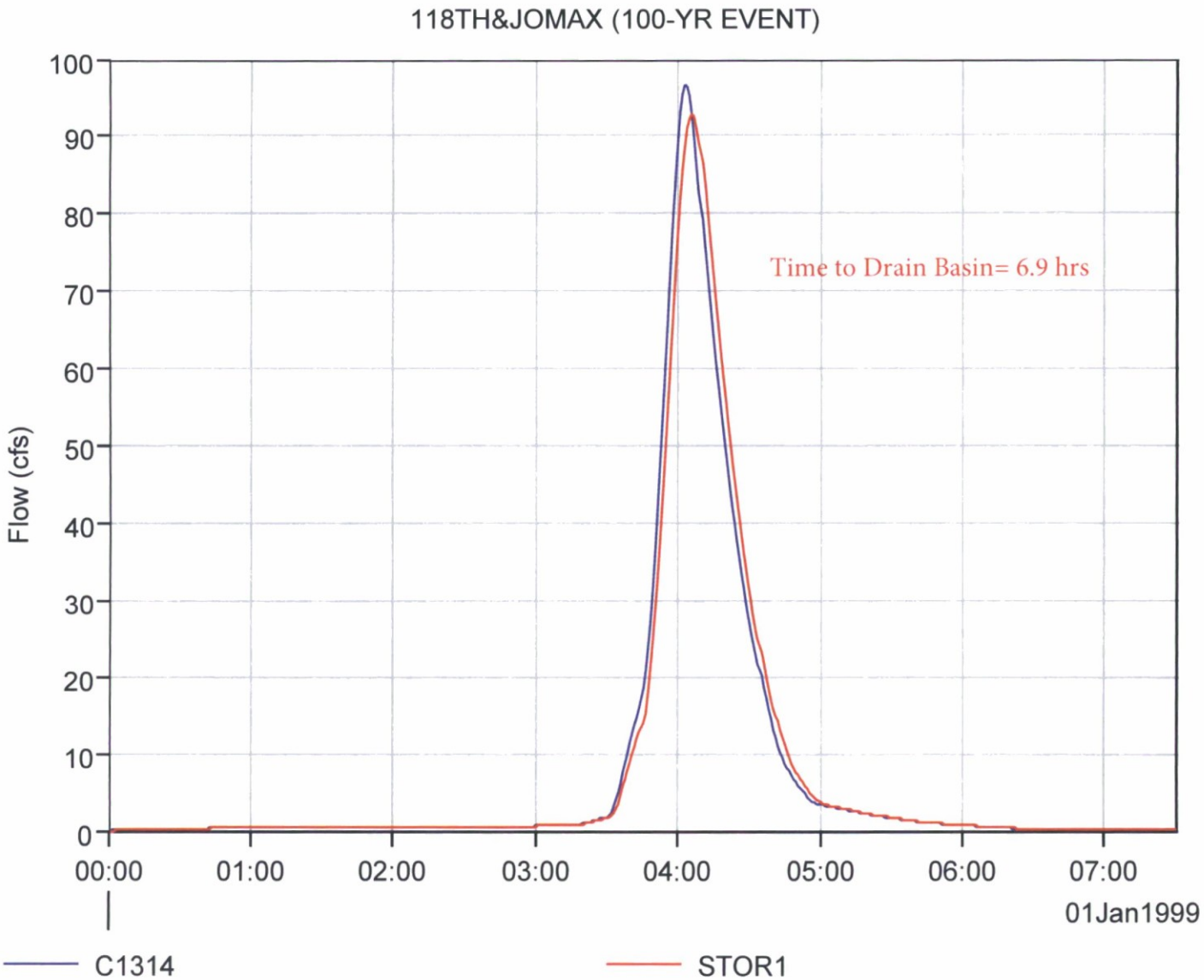
Project Name: 118TH & JOMAX
Project Location: NORTH SCOTTSDALE - ARIZONA

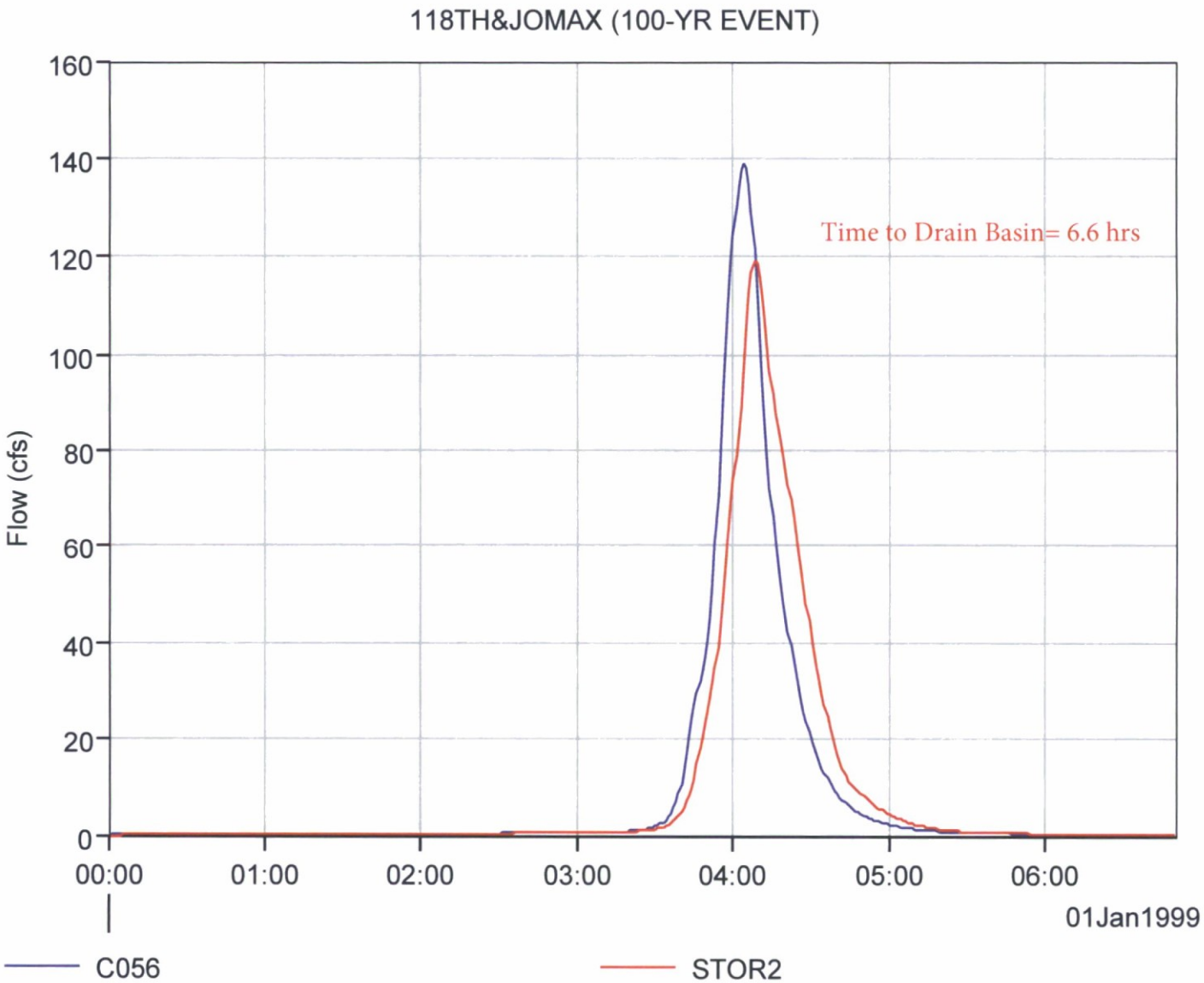
Subbasin	Area Sq.Mi.	RTIMP %	Impervious Area Acres	Pervious Disturbed Area Acres	100-Yr/2-Hr Vol. Ac-Ft	First Flush Vol. Ac-Ft
10	0.001	7	0.045	0.595	0.09	0.017
11A	0.001	15	0.096	0.544	0.10	0.019
11B	0.002	15	0.192	1.088	0.10	0.019
11C	0.001	15	0.096	0.544	0.10	0.019
11D	0.0048	15	0.461	2.611	0.10	0.019
12A	0.0034	15	0.326	1.850	0.10	0.019
12B	0.002	15	0.192	1.088	0.10	0.019
12C	0.0021	15	0.202	1.142	0.10	0.019
13A	0.001	15	0.096	0.544	0.10	0.019
13B	0.001	15	0.096	0.544	0.10	0.019
13C	0.0049	15	0.470	2.666	0.10	0.019
13D	0.0014	15	0.134	0.762	0.10	0.019
14	0.0077	15	0.739	4.189	0.10	0.019
15	0.0005	15	0.048	0.272	0.10	0.019
16	0.0005	15	0.048	0.272	0.10	0.019
17	0.0034	7	0.152	2.024	0.09	0.017
18	0.006	15	0.576	3.264	0.10	0.019
19	0.0016	15	0.154	0.870	0.10	0.019
1A	0.004	15	0.384	2.176	0.10	0.019
1B	0.004	15	0.384	2.176	0.10	0.019
1C	0.009	15	0.864	4.896	0.10	0.019
20A	0.001	15	0.096	0.544	0.10	0.019
21	0.001	15	0.096	0.544	0.10	0.019
22A	0.001	15	0.096	0.544	0.10	0.019
22B	0.0008	15	0.077	0.435	0.10	0.019
22C	0.0016	15	0.154	0.870	0.10	0.019
22D	0.0037	7	0.166	2.202	0.09	0.017
23	0.0009	7	0.040	0.536	0.09	0.017
2A	0.002	15	0.192	1.088	0.10	0.019
2B	0.001	15	0.096	0.544	0.10	0.019
3	0.0004	7	0.018	0.238	0.09	0.017
4	0.0004	7	0.018	0.238	0.09	0.017
5	0.0038	15	0.365	2.067	0.10	0.019
6	0.0012	7	0.054	0.714	0.09	0.017
7	0.002	7	0.090	1.190	0.09	0.017
8	0.0015	15	0.144	0.816	0.10	0.019
9	0.0012	7	0.054	0.714	0.09	0.017
				TOTAL =	**3.66**	**0.677**

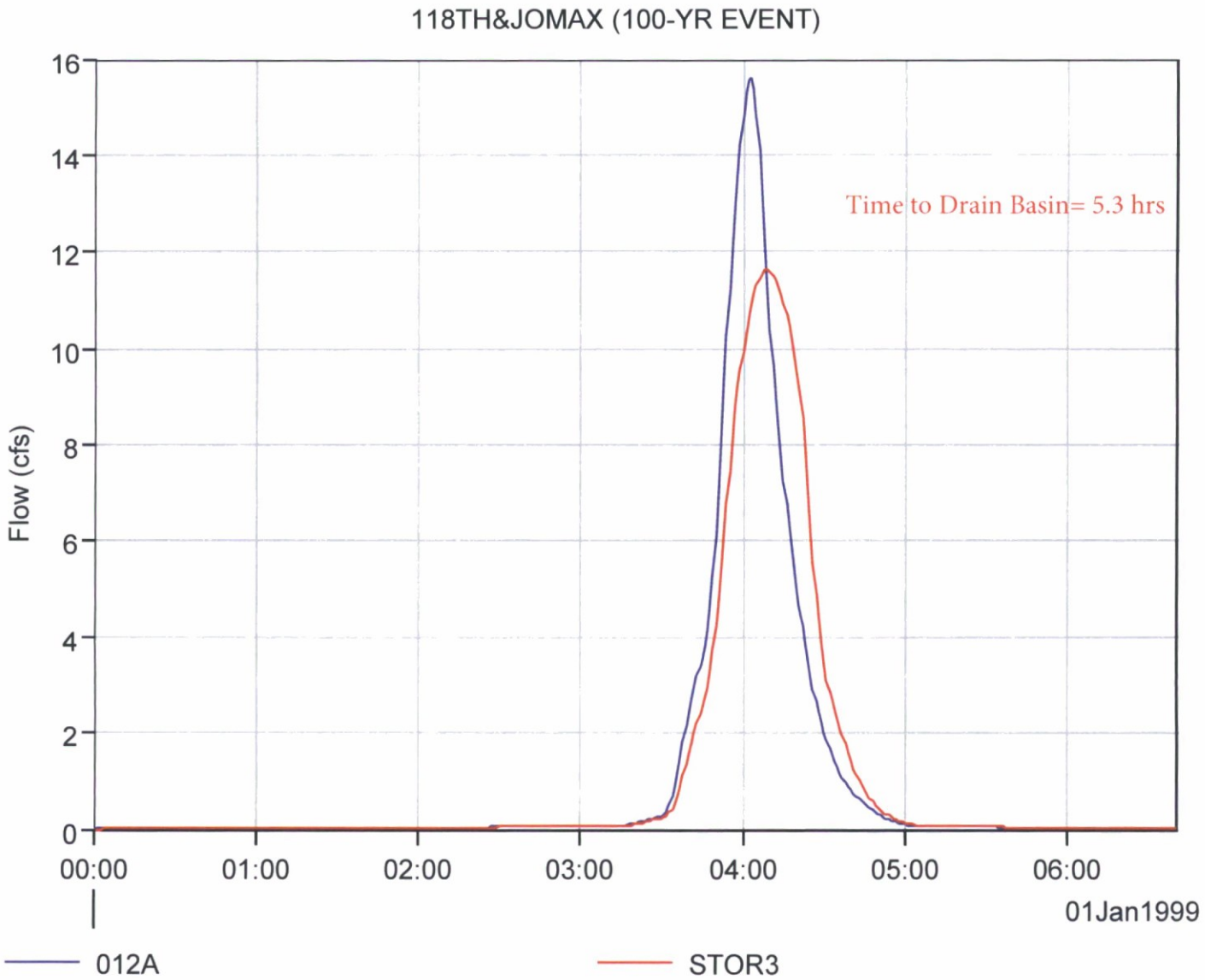
Project Name: 118TH & JOMAX
Project Location: NORTH SCOTTSDALE - ARIZONA

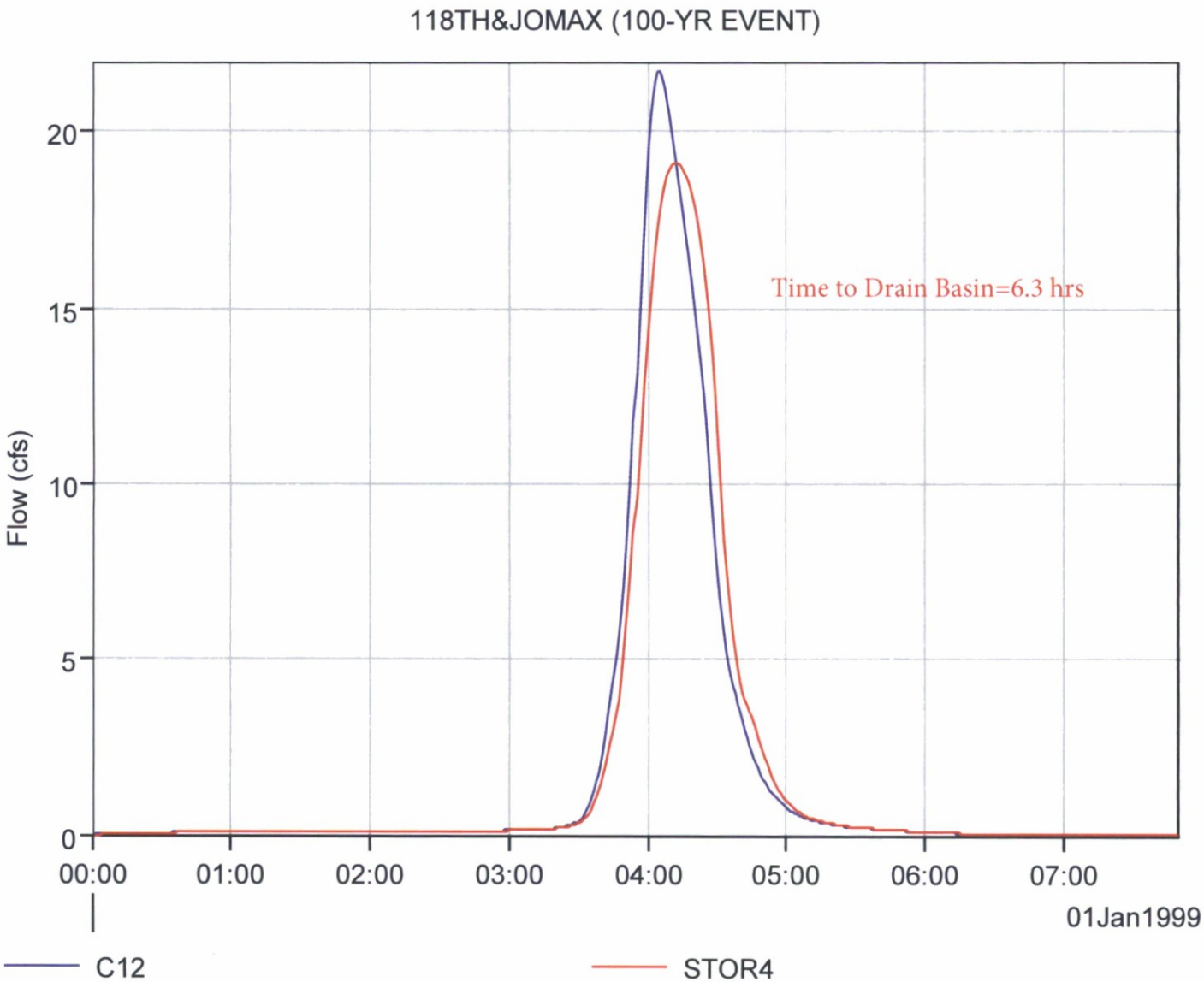
NAME	ELEVATION ft.	AREA acres	VOLUME ac-ft	TOTAL VOL. ac-ft
STOR1	2684.0	0.155	0	
	2685.0	0.080	0.115	
	2686.0	0.105	0.092	
	2687.0	0.133	0.119	**0.326**
STOR2	2711.0	0.056	0	
	2712.0	0.160	0.104	
	2713.0	0.264	0.210	
	2714.0	0.408	0.333	**0.647**
STOR3	2711.0	0.006	0	
	2712.0	0.020	0.012	
	2713.0	0.048	0.033	
	2714.0	0.084	0.065	
	2715.0	0.092	0.088	**0.198**
STOR4	2695.0	0.006	0	
	2696.0	0.024	0.014	
	2697.0	0.048	0.035	
	2698.0	0.096	0.071	**0.120**
STOR5	2711.0	0.269	0	
	2712.0	0.328	0.298	
	2713.0	0.390	0.359	
	2714.0	0.487	0.438	**1.094**
STOR6	2691.0	0.037	0	
	2692.0	0.083	0.058	
	2693.0	0.157	0.118	
	2694.0	0.239	0.197	**0.373**

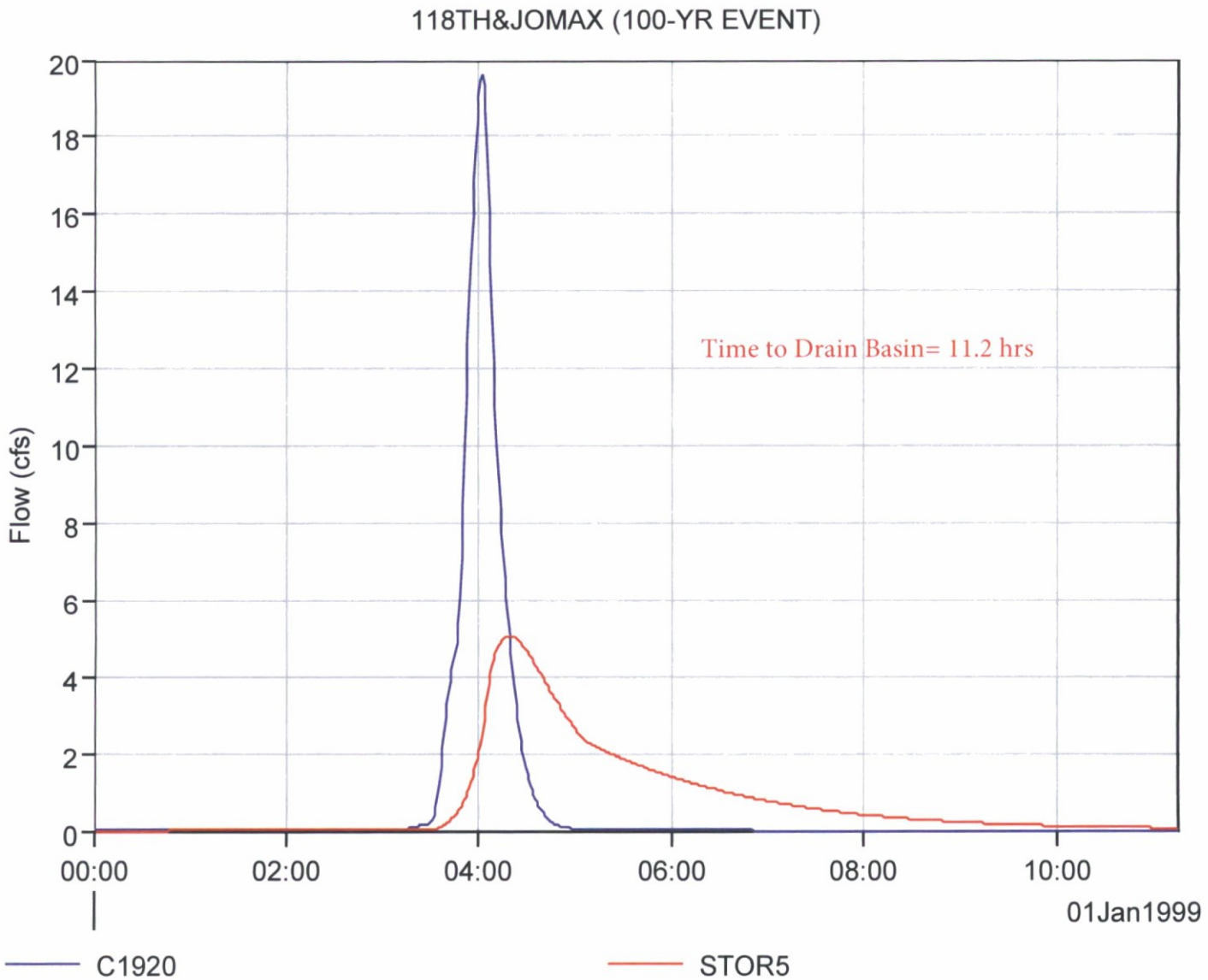
TOTAL VOLUME 'PROVIDED' ONSITE = **2.759**

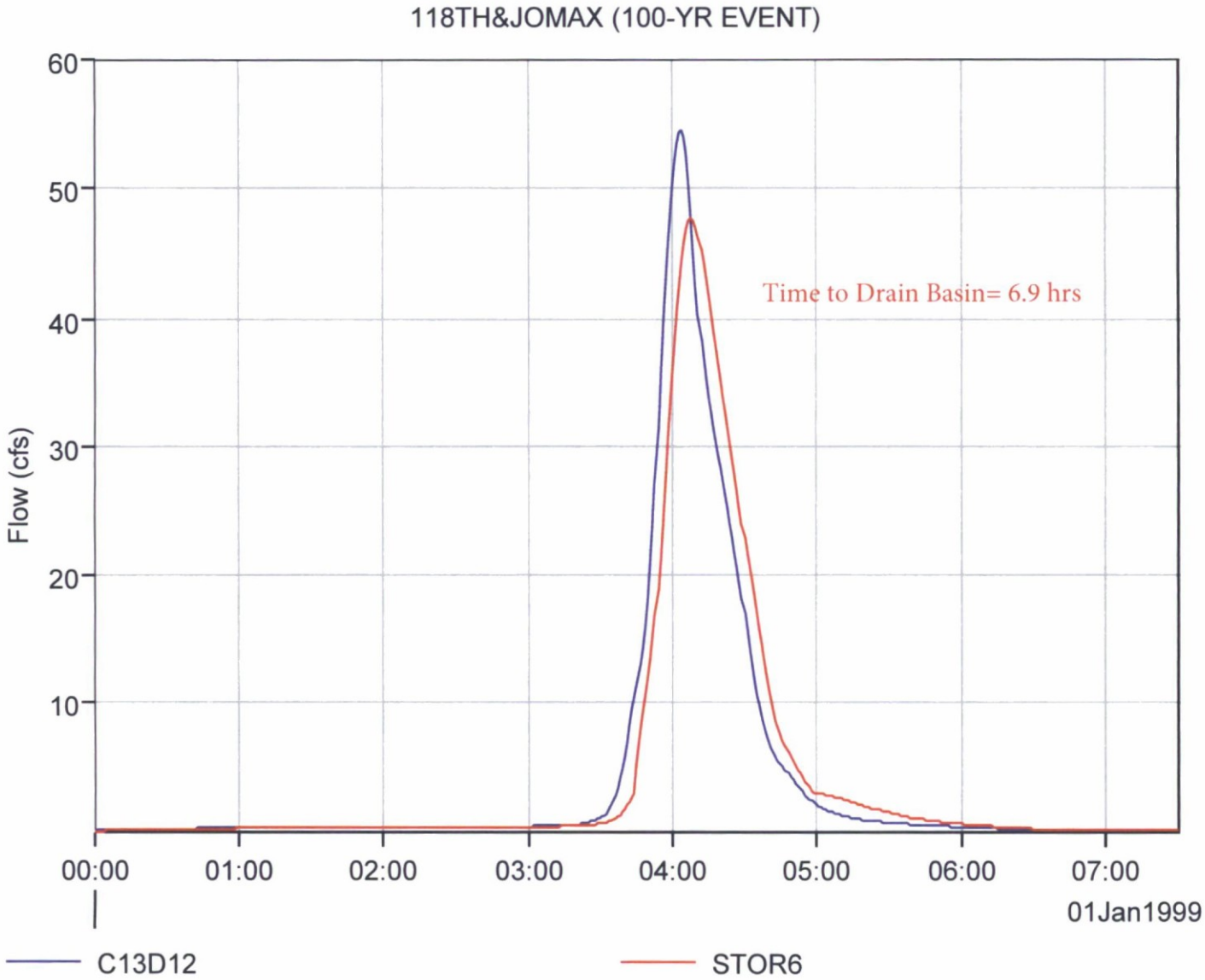

118TH&JOMAX (100-YR EVENT)
Time to Drain Basin= 6.9 hrs
Flow (cfs)
100
90
80
70
60
50
40
30
20
10
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
01Jan1999
C1314
STOR1


118TH&JOMAX (100-YR EVENT)
Time to Drain Basin= 6.6 hrs
Flow (cfs)
160
140
120
100
80
60
40
20
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan1999
C056
STOR2


118TH&JOMAX (100-YR EVENT)
Time to Drain Basin= 5.3 hrs
Flow (cfs)
16
14
12
10
8
6
4
2
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan1999
012A
STOR3


118TH&JOMAX (100-YR EVENT)
Time to Drain Basin=6.3 hrs
Flow (cfs)
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
01Jan1999
C12
STOR4


118TH&JOMAX (100-YR EVENT)
Time to Drain Basin= 11.2 hrs
Flow (cfs)
20
18
16
14
12
10
8
6
4
2
0
00:00
02:00
04:00
06:00
08:00
10:00
01Jan1999
C1920
STOR5


118TH&JOMAX (100-YR EVENT)
60
50
40
30
20
10
Flow (cfs)
Time to Drain Basin= 6.9 hrs
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
01Jan1999
C13D12
STOR6

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.318	0.428	0.510	0.618	0.699	0.781
	NOAA14	10 MIN	0.484	0.651	0.776	0.941	1.065	1.188
	NOAA14	15 MIN	0.600	0.807	0.962	1.167	1.320	1.473
	NOAA14	30 MIN	0.807	1.087	1.296	1.570	1.777	1.984
	NOAA14	1 HOUR	0.999	1.345	1.604	1.944	2.199	2.455
	NOAA14	2 HOUR	1.136	1.506	1.787	2.166	2.453	2.746
	NOAA14	3 HOUR	1.206	1.570	1.858	2.259	2.575	2.901
	NOAA14	6 HOUR	1.438	1.822	2.129	2.550	2.878	3.218
	NOAA14	12 HOUR	1.727	2.167	2.518	2.992	3.358	3.733
	NOAA14	24 HOUR	2.124	2.765	3.287	4.026	4.624	5.258

Soil ID	Map Unit	XKSAT	Rock Percent	Description
Book Number: 645				
64559	59	0.340	0.00	Gilman-Momoli-Denure complex, low precipitation
64560	60	0.260	0.00	Glenbar loams
64561	61	0.150	0.00	Gran-Wickenburg complex, 1 to 10 percent slopes
64562	62	0.150	0.00	Gran-Wickenburg complex, low precipitation, 1 to 10 percent slopes
64563	63	0.140	25.00	Gran-Wickenburg-Rock outcrop complex, 1 to 7 percent slopes
64564	64	0.140	25.00	Gran-Wickenburg-Rock outcrop complex, low precipitation, 10 to 65
64565	65	0.190	0.00	Greyeagle-Continental-Nickel association, 1 to 40 percent slopes
64566	66	0.230	0.00	Greyeagle-Suncity Variant complex, 1 to 7 percent slopes
64567	67	0.010	0.00	Guest clay
64568	68	0.630	0.00	Gunsight-Cipriano complex, 1 to 7 percent slopes
64569	69	0.630	0.00	Gunsight-Cipriano complex, low precipitation, 1 to 7 percent slopes
64570	70	0.360	0.00	Gunsight-Rillito complex, 1 to 25 percent slopes
64571	71	0.360	0.00	Gunsight-Rillito complex, low precipitation, 1 to 40 percent slopes
64572	72	0.090	30.00	Lehmans-Rock outcrop complex, 8 to 65 percent slopes
64573	73	0.090	30.00	Lehmans-Rock outcrop complex, low precipitation, 8 to 65 percent
64574	74	0.080	0.00	Luke-Cipriano association, 1 to 15 percent slopes
64575	75	0.230	0.00	Mohall loam
64576	76	0.230	0.00	Mohall loam, calcareous solum
64577	77	0.050	0.00	Mohall clay loam
64578	78	0.050	0.00	Mohall clay loam, calcareous solum
64579	79	0.020	0.00	Mohall clay
64580	80	0.080	0.00	Mohall-Tremant complex, 1 to 8 percent slopes
64581	81	0.080	0.00	Mohall-Tremant complex, low precipitation, 1 to 8 percent slopes
64582	82	0.040	0.00	Mohave sandy loam
64583	83	0.040	0.00	Mohave loam
64584	84	0.050	0.00	Mohave loam, calcareous solum
64585	85	0.040	0.00	Mohave clay loam
64586	86	0.050	0.00	Mohave clay loam, calcareous solum
64587	87	0.040	0.00	Mohave complex
64588	88	0.020	0.00	Mohave-Guest complex
64589	89	0.060	0.00	Mohave-Tres Hermanos complex, 1 to 8 percent slopes
64590	90	0.390	0.00	Momoli gravelly sandy loam, 1 to 5 percent slopes
64591	91	0.930	0.00	Momoli-Carrizo complex
64592	92	0.930	0.00	Momoli-Carrizo complex, low precipitation
64593	93	0.330	0.00	Nickel-Cave complex, 8 to 30 percent slopes
64594	94	0.330	0.00	Nickel-Cave complex, low precipitation, 8 to 30 percent slopes
64595	95	0.040	0.00	Ohaco gravelly loam
64596	96	0.070	0.00	Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes
64597	97	0.070	0.00	Pinaleno-Tres Hermanos complex, low precipitation, 1 to 10 percent
64598	98	0.370	0.00	Pinamt-Tremant complex, 1 to 10 percent slopes
64599	99	0.370	0.00	Pinamt-Tremant complex, low precipitation, 1 to 10 percent slopes
645100	100	0.400	20.00	Quilotosa-Vaiva-Rock outcrop complex, 20 to 65 percent slopes
645101	101	0.280	0.00	Rillito loam, 0 to 3 percent slopes
645102	102	0.400	0.00	Rillito gravelly loam, 1 to 8 percent slopes
645103	103	0.100	65.00	Rock outcrop-Gachado complex, 5 to 55 percent slopes
645104	104	0.140	60.00	Rock outcrop-Lehmans complex, 15 to 65 percent slopes
645105	105	0.140	60.00	Rock outcrop-Lehmans complex, low precipitation, 15 to 65 percent
645106	106	0.180	0.00	Sal-Cipriano complex, 1 to 10 percent slopes
645107	107	0.180	0.00	Sal-Cipriano complex, low precipitation, 1 to 10 percent slopes
645108	108	0.310	30.00	Schenco-Rock outcrop complex, 3 to 25 percent slopes
645109	109	0.350	35.00	Schenco-Rock outcrop complex, 25 to 60 percent slopes
645110	110	0.130	0.00	Suncity-Cipriano complex, 1 to 7 percent slopes
645111	111	0.400	0.00	Torriorthents, 15 to 40 percent slopes
645112	112	0.390	0.00	Tremant gravelly sandy loams
645113	113	0.390	0.00	Tremant gravelly loams
645114	114	0.390	0.00	Tremant gravelly loams, low precipitation
645115	115	0.390	0.00	Tremant-Antho complex, 1 to 5 percent slopes
645116	116	0.230	0.00	Tremant-Gunsight-Rillito complex, 1 to 5 percent slopes

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)	Comments
Major Basin ID: 01									
010	645	61	64561	0.001	100.00	0.150	-	100	
011A	645	61	64561	0.001	100.00	0.150	-	100	
011B	645	61	64561	0.002	100.00	0.150	-	100	
011C	645	61	64561	0.001	100.00	0.150	-	100	
011D	645	61	64561	0.007	100.00	0.150	-	100	
012A	645	61	64561	0.006	100.00	0.150	-	100	
012B	645	61	64561	0.002	100.00	0.150	-	100	
012C	645	61	64561	0.003	100.00	0.150	-	100	
013A	645	61	64561	0.001	100.00	0.150	-	100	
013B	645	61	64561	0.001	100.00	0.150	-	100	
013C	645	61	64561	0.007	100.00	0.150	-	100	
013D	645	61	64561	0.002	100.00	0.150	-	100	
014	645	61	64561	0.011	100.00	0.150	-	100	
015	645	61	64561	0.001	100.00	0.150	-	100	
016	645	61	64561	0.001	100.00	0.150	-	100	
017	645	61	64561	0.006	100.00	0.150	-	100	
018	645	61	64561	0.007	100.00	0.150	-	100	
019	645	61	64561	0.005	100.00	0.150	-	100	
01A	645	61	64561	0.004	100.00	0.150	-	100	
01B	645	61	64561	0.004	100.00	0.150	-	100	
01C	645	61	64561	0.009	100.00	0.150	-	100	
020A	645	61	64561	0.003	100.00	0.150	-	100	
020B	645	61	64561	0.002	100.00	0.150	-	100	
021	645	61	64561	0.001	100.00	0.150	-	100	
022A	645	61	64561	0.001	100.00	0.150	-	100	
022B	645	61	64561	0.001	100.00	0.150	-	100	
022C	645	61	64561	0.003	100.00	0.150	-	100	
022D	645	61	64561	0.007	100.00	0.150	-	100	
023	645	61	64561	0.003	100.00	0.150	-	100	
02A	645	61	64561	0.002	100.00	0.150	-	100	
02B	645	61	64561	0.001	100.00	0.150	-	100	
03	645	61	64561	0.003	100.00	0.150	-	100	
04	645	61	64561	0.002	100.00	0.150	-	100	
05	645	61	64561	0.006	100.00	0.150	-	100	
06	645	61	64561	0.003	100.00	0.150	-	100	
07	645	61	64561	0.002	100.00	0.150	-	100	
08	645	61	64561	0.003	100.00	0.150	-	100	
09	645	61	64561	0.002	100.00	0.150	-	100	
DS01	645	61	64561	0.009	100.00	0.150	-	100	
DS02	645	61	64561	0.003	100.00	0.150	-	100	
DS03	645	61	64561	0.006	100.00	0.150	-	100	
DS04	645	61	64561	0.003	100.00	0.150	-	100	

Code	Description	Initial Abstraction IA	Percent Impervious RTIMP	Vegetation Cover	Moisture Deficit DTHETA	Resistance Coefficient Kb
Residential						
110	Rural Residential (<= 1/5 du per acre)	0.30	5	30.0	ORMAL	MIN
120	Estate Residential (1/5 du per acre to 1 du per acre)	0.30	5	30.0	ORMAL	MIN
130	Large Lot Residential - Single Family (1 du per acre to 2 du	0.30	15	50.0	ORMAL	MIN
140	Medium Lot Residential - Single Family (2-4 du per acre)	0.25	20	50.0	ORMAL	MIN
150	Small Lot Residential - Single Family (4-6 du per acre)	0.25	30	50.0	ORMAL	MIN
160	Very Small Lot Residential - Single Family (>6 du per acre-i	0.25	40	50.0	ORMAL	MIN
170	Medium Density Residential - Muli Family (5-10 du per acre)	0.25	45	50.0	ORMAL	MIN
180	High Density Residential - Multi Family (10-15 du per acre)	0.25	45	50.0	ORMAL	MIN
190	Very High Density Residential - Multi Family (> 15 du per ac	0.25	45	50.0	ORMAL	MIN
Tourist						
510	Tourist and Visitor Accommodations (Hotels, motels and resor	0.10	80	75.0	ORMAL	MIN
Transportation						
600	General Transportation (Transportation where no detail avail	0.10	80	75.0	ORMAL	MIN
610	Transportation (Includes railroads, railyards, transit cente	0.10	80	75.0	ORMAL	MIN
620	Airports (Includes public use airports)	0.15	55	60.0	ORMAL	MIN
630	Transportation	0.10	80	75.0	ORMAL	MIN
2002	Pavement and Rooftops	0.05	95	0.0	DRY	MIN
2003	Gravel Vehicular travel lanes and shoulders	0.10	5	0.0	DRY	MIN

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX FUTCOND

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
Basin ID: 01									
	110	0.0010	100.0	0	7 *	30.0	NORMAL	0.041	Rural Residential (<= 1/5 du per acre)
		0.0010	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0010	**100.0**						
	120	0.0020	100.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0020	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0010	**100.0**						
	120	0.0048	68.6	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0022	31.4	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
		0.0070	**100.0**						
	120	0.0034	56.7	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0026	43.3	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
		0.0060	**100.0**						
	120	0.0020	100.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0020	**100.0**						
	120	0.0021	70.0	0	15 *	30.0	NORMAL	0.038	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0009	30.0	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX FUTCOND

n	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
		0.0010	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0010	**100.0**						
	120	0.0049	70.0	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0021	30.0	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
		0.0070	**100.0**						
	120	0.0014	70.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0006	30.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
	120	0.0077	70.0	0	15 *	30.0	NORMAL	0.035	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0033	30.0	0	0 *	30.0	NORMAL	0.035	Undeveloped Desert Land (Scottsdale)
		0.0110	**100.0**						
	120	0.0005	50.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0005	50.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0010	**100.0**						
	120	0.0005	50.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0005	50.0	0	0 *	30.0	NORMAL	0.041	Undeveloped Desert Land (Scottsdale)
		0.0010	**100.0**						
	110	0.0034	56.7	0	7 *	30.0	NORMAL	0.036	Rural Residential (<= 1/5 du per acre)
	UNDEVELOPED	0.0026	43.3	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)

* Non default value

	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01									
		0.0060	**100.0**						
	120	0.0056	80.0	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0014	20.0	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
		0.0070	**100.0**						
	120	0.0016	32.0	0	15 *	30.0	NORMAL	0.037	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0034	68.0	0	0 *	30.0	NORMAL	0.037	Undeveloped Desert Land (Scottsdale)
		0.0050	**100.0**						
	120	0.0040	100.0	0	15 *	30.0	NORMAL	0.037	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0040	**100.0**						
	120	0.0040	100.0	0	15 *	30.0	NORMAL	0.037	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0040	**100.0**						
	120	0.0090	100.0	0	15 *	30.0	NORMAL	0.035	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0090	**100.0**						
A	120	0.0010	33.3	0	15 *	30.0	NORMAL	0.038	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0020	66.7	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
B	UNDEVELOPED	0.0020	100.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0010	**100.0**						
A	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX FUTCOND

sin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0010	**100.0**						
B	120	0.0008	80.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0002	20.0	0	0 *	30.0	NORMAL	0.041	Undeveloped Desert Land (Scottsdale)
		0.0010	**100.0**						
C	120	0.0016	80.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
	UNDEVELOPED	0.0004	20.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
		0.0020	**100.0**						
D	110	0.0037	52.9	0	7 *	30.0	NORMAL	0.036	Rural Residential (<= 1/5 du per acre)
	UNDEVELOPED	0.0033	47.1	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
		0.0070	**100.0**						
	110	0.0009	30.0	0	7 *	30.0	NORMAL	0.038	Rural Residential (<= 1/5 du per acre)
	UNDEVELOPED	0.0021	70.0	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						
	120	0.0020	100.0	0	15 *	30.0	NORMAL	0.039	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0020	**100.0**						
	120	0.0010	100.0	0	15 *	30.0	NORMAL	0.041	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0010	**100.0**						
	110	0.0004	13.3	0	7 *	30.0	NORMAL	0.038	Rural Residential (<= 1/5 du per acre)
	UNDEVELOPED	0.0026	86.7	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						

* Non default value

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Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX FUTCOND

Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
or Basin ID: 01								
110	0.0004	20.0	0	7 *	30.0	NORMAL	0.039	Rural Residential (<= 1/5 du per acre)
UNDEVELOPED	0.0016	80.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
	0.0020	**100.0**						
120	0.0038	63.3	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
UNDEVELOPED	0.0022	36.7	0	0 *	30.0	NORMAL	0.036	Undeveloped Desert Land (Scottsdale)
	0.0060	**100.0**						
110	0.0012	40.0	0	7 *	30.0	NORMAL	0.038	Rural Residential (<= 1/5 du per acre)
UNDEVELOPED	0.0018	60.0	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
	0.0030	**100.0**						
110	0.0020	100.0	0	7 *	30.0	NORMAL	0.039	Rural Residential (<= 1/5 du per acre)
	0.0020	**100.0**						
120	0.0015	50.0	0	15 *	30.0	NORMAL	0.038	Estate Residential (1/5 du per acre to 1 du per acre)
UNDEVELOPED	0.0015	50.0	0	0 *	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
	0.0030	**100.0**						
110	0.0012	60.0	0	7 *	30.0	NORMAL	0.039	Rural Residential (<= 1/5 du per acre)
UNDEVELOPED	0.0008	40.0	0	0 *	30.0	NORMAL	0.039	Undeveloped Desert Land (Scottsdale)
	0.0020	**100.0**						
01 120	0.0090	100.0	0	15 *	30.0	NORMAL	0.035	Estate Residential (1/5 du per acre to 1 du per acre)
	0.0090	**100.0**						
02 120	0.0030	100.0	0	15 *	30.0	NORMAL	0.038	Estate Residential (1/5 du per acre to 1 du per acre)

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: 118TH&JOMAX FUTCOND

sin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb	Description
jor Basin ID: 01									
		0.0030	**100.0**						
03	120	0.0060	100.0	0	15 *	30.0	NORMAL	0.036	Estate Residential (1/5 du per acre to 1 du per acre)
		0.0060	**100.0**						
04	UNDEVELOPED	0.0030	100.0	0	1	30.0	NORMAL	0.038	Undeveloped Desert Land (Scottsdale)
		0.0030	**100.0**						

* Non default value

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
DS01	0.009	0.12	201.7	201.6	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.147	0.139	0.126	0.112	0.105	0.0
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.119	0.111	0.099	0.088	0.081	0.0
DS02	0.003	0.18	135.6	135.6	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.213	0.200	0.181	0.162	0.151	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.462	0.432	0.387	0.341	0.316	0.2
DS03	0.006	0.13	134.9	134.9	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.176	0.166	0.150	0.134	0.125	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.195	0.182	0.163	0.144	0.133	0.1
DS04	0.003	0.13	166.7	166.7	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	Tc (Hrs)	0.180	0.168	0.150	0.133	0.123	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.295	0.273	0.242	0.211	0.194	0.1
01A	0.004	0.13	152.0	152.0	HEC1 DEFAULT	0.037	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.172	0.162	0.147	0.131	0.122	0.
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.239	0.223	0.200	0.177	0.163	0.
01B	0.004	0.11	138.9	138.9	HEC1 DEFAULT	0.037	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.163	0.153	0.139	0.124	0.116	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.197	0.184	0.165	0.145	0.134	0.
01C	0.009	0.16	150.9	150.9	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.186	0.175	0.159	0.142	0.132	0.
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.194	0.181	0.162	0.143	0.132	0.
02A	0.002	0.07	130.4	130.4	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.136	0.128	0.116	0.104	0.097	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.167	0.156	0.139	0.123	0.114	0.
02B	0.001	0.08	107.1	107.1	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	Tc (Hrs)	0.159	0.149	0.135	0.121	0.113	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.327	0.305	0.273	0.241	0.223	0

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	10
Major Basin ID: 01																		
03	0.003	0.09	188.2	188.2	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.144	0.134	0.120	0.106	0.099	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.172	0.159	0.141	0.123	0.113	0.
04	0.002	0.09	197.7	197.7	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	1	**Tc (Hrs)**	0.144	0.134	0.120	0.106	0.098	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.216	0.200	0.177	0.154	0.142	0.
05	0.006	0.23	119.7	119.7	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	9	**Tc (Hrs)**	0.249	0.234	0.210	0.187	0.174	0.
												Vel (f/s)	1	1	2	2	2	
												R (Hrs)	0.451	0.420	0.374	0.328	0.303	0.
06	0.003	0.15	177.6	177.6	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	3	**Tc (Hrs)**	0.188	0.175	0.157	0.139	0.129	0.
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.347	0.322	0.285	0.249	0.229	0.
07	0.002	0.05	347.8	277.4	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	7	**Tc (Hrs)**	0.094	0.088	0.079	0.070	0.065	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.084	0.078	0.070	0.061	0.056	0.0
08	0.003	0.11	161.9	161.9	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	8	**Tc (Hrs)**	0.162	0.152	0.137	0.121	0.113	0.1
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.230	0.214	0.191	0.167	0.154	0.1
09	0.002	0.13	168.0	168.0	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	4	**Tc (Hrs)**	0.179	0.168	0.151	0.133	0.124	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.371	0.345	0.305	0.267	0.246	0.2
010	0.001	0.03	192.3	192.3	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	7	**Tc (Hrs)**	0.084	0.078	0.071	0.063	0.058	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.073	0.068	0.061	0.053	0.049	0.0
011A	0.001	0.17	128.7	128.7	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.219	0.206	0.186	0.167	0.155	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.851	0.795	0.712	0.629	0.582	0.5

* Non default value or value out of range

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: 118TH&JOMAX FUTCOND

Area ID	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100
Major Basin ID: 01																		
011B	0.002	0.05	250.0	239.9	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.095	0.090	0.081	0.073	0.068	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.086	0.080	0.072	0.063	0.059	0.0
011C	0.001	0.04	314.3	268.2	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.085	0.080	0.072	0.064	0.060	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.093	0.087	0.078	0.069	0.064	0.0
011D	0.007	0.15	125.0	125.0	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	10	**Tc (Hrs)**	0.198	0.185	0.167	0.149	0.139	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.227	0.211	0.189	0.166	0.153	0.1
012A	0.006	0.17	147.1	147.1	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	9	**Tc (Hrs)**	0.201	0.188	0.170	0.151	0.141	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.279	0.260	0.231	0.203	0.188	0.
012B	0.002	0.17	125.7	125.7	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.215	0.202	0.183	0.163	0.153	0.
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.562	0.525	0.470	0.415	0.384	0.
012C	0.003	0.12	157.0	157.0	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	11	**Tc (Hrs)**	0.169	0.158	0.143	0.127	0.119	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.258	0.241	0.215	0.189	0.175	0.
013A	0.001	0.11	53.6	53.6	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.231	0.217	0.197	0.176	0.164	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.638	0.596	0.534	0.471	0.436	0.
013B	0.001	0.08	70.4	70.4	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.181	0.170	0.154	0.138	0.129	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.377	0.352	0.316	0.279	0.258	0
013C	0.007	0.13	151.5	151.5	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	11	**Tc (Hrs)**	0.173	0.162	0.146	0.130	0.121	0
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.174	0.162	0.145	0.127	0.118	0

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr.	10
Major Basin ID: 01																		
013D	0.002	0.08	146.7	146.7	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	11	**Tc (Hrs)**	0.143	0.134	0.121	0.108	0.100	0.
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.195	0.182	0.162	0.143	0.132	0.
014	0.011	0.21	128.0	128.0	HEC1 DEFAULT	0.035	0.30	0.25	6.00	0.183	11	**Tc (Hrs)**	0.228	0.214	0.193	0.172	0.160	0.
												Vel (f/s)	1	1	2	2	2	
												R (Hrs)	0.269	0.251	0.224	0.197	0.182	0.
015	0.002	0.05	296.3	262.0	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	8	**Tc (Hrs)**	0.095	0.089	0.080	0.072	0.067	0.(
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.086	0.080	0.071	0.062	0.057	0.(
016	0.001	0.03	323.5	270.9	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	8	**Tc (Hrs)**	0.075	0.070	0.063	0.056	0.052	0.(
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.065	0.060	0.054	0.047	0.043	0.(
017	0.006	0.13	223.1	220.8	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	4	**Tc (Hrs)**	0.158	0.148	0.133	0.117	0.109	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.172	0.160	0.142	0.124	0.114	0.1
018	0.007	0.25	122.4	122.4	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	12	**Tc (Hrs)**	0.255*	0.239	0.216	0.193	0.180	0.1
												Vel (f/s)	1	2	2	2	2	
												R (Hrs)	0.453	0.422	0.377	0.332	0.307	0.2
019	0.005	0.13	121.2	121.2	HEC1 DEFAULT	0.037	0.30	0.25	6.00	0.183	5	**Tc (Hrs)**	0.192	0.180	0.162	0.143	0.133	0.1
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.238	0.221	0.196	0.171	0.158	0.1
020A	0.003	0.10	135.9	135.9	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	5	**Tc (Hrs)**	0.165	0.154	0.139	0.123	0.114	0.1(
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.218	0.202	0.179	0.157	0.145	0.1
020B	0.002	0.08	180.7	180.7	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183		**Tc (Hrs)**	0.140	0.131	0.117	0.103	0.096	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.191	0.177	0.156	0.136	0.125	0.1

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100
Major Basin ID: 01																		
021	0.001	0.04	210.5	209.9	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.091	0.086	0.078	0.069	0.065	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.101	0.095	0.085	0.075	0.069	0.0
022A	0.001	0.16	97.6	97.6	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	15	**Tc (Hrs)**	0.231	0.218	0.197	0.176	0.164	0.1
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.862	0.806	0.722	0.637	0.590	0.5
022B	0.001	0.04	257.1	244.0	HEC1 DEFAULT	0.041	0.30	0.25	6.00	0.183	12	**Tc (Hrs)**	0.088	0.083	0.075	0.067	0.062	0.0
												Vel (f/s)	1	1	1	1	1	
												R (Hrs)	0.097	0.091	0.081	0.071	0.066	0.0
022C	0.002	0.16	152.4	152.4	HEC1 DEFAULT	0.039	0.30	0.25	6.00	0.183	12	**Tc (Hrs)**	0.199	0.186	0.168	0.150	0.140	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.490	0.457	0.409	0.360	0.333	0.3
022D	0.007	0.13	200.0	199.9	HEC1 DEFAULT	0.036	0.30	0.25	6.00	0.183	4	**Tc (Hrs)**	0.163	0.152	0.137	0.121	0.113	0.1
												Vel (f/s)	1	1	1	2	2	
												R (Hrs)	0.163	0.152	0.135	0.118	0.108	0.
023	0.003	0.10	313.1	267.8	HEC1 DEFAULT	0.038	0.30	0.25	6.00	0.183	2	**Tc (Hrs)**	0.136	0.127	0.113	0.100	0.093	0.1
												Vel (f/s)	1	1	1	1	2	
												R (Hrs)	0.175	0.162	0.143	0.125	0.115	0.

Route ID	Shape	Length (ft)	Slope (ft/ft)	Manning's N	Diameter (in)	Height (ft)	Width (ft)	Side Slope (h/v)
MUSKINGUM-CUNGE								
Major Basin 01								
R2B	NATURAL	389.00	0.0178	0.035		-	4.00	10
RC014	NATURAL	412.00	0.0194	0.035		-	5.00	10
RC023	NATURAL	449.00	0.0178	0.035		-	4.00	10
RC056	NATURAL	195.00	0.0154	0.035		-	5.00	10
RC1112	NATURAL	212.00	0.0141	0.035		-	8.00	10
RC11AB	NATURAL	784.00	0.0178	0.035		-	5.00	10
RC12AB	NATURAL	595.00	0.0200	0.035		-	5.00	10
RC1AB	NATURAL	716.00	0.0237	0.035		-	5.00	10
RCDS12	NATURAL	209.00	0.0143	0.035		-	4.00	10
RCDS34	NATURAL	232.00	0.0172	0.035		-	3.00	10
RDS01	NATURAL	226.00	0.0265	0.035		-	3.00	10
RDS03	NATURAL	467.00	0.0230	0.035		-	4.00	10

```
*                                       *
*  RUN DATE   24OCT17  TIME  12:01:21    *
*                                       *
*****************************************
```

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*                                       *
*          DAVIS, CALIFORNIA 95616      *
*              (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


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

   1          ID        Flood Control District of Maricopa County
   2          ID        118TH&JOMAX SINGLE S - FUTURE CONDITIONS
   3          ID        100 YEAR
   4          ID        6 Hour  Storm
   5          ID        Unit Hydrograph: Clark
   6          ID        Storm: Single
   7          ID        08/16/2017
              *DIAGRAM
   8          IT       1  1JAN99       0    2000
   9          IO       5
  10          IN      15
              *                2-Yr  10-Yr  100-Yr
  11          JR    FLOW      0.1    0.35     1.0
              *

  12          KK     DS01   BASIN
  13          BA    0.009
  14          PB    3.212
  15          PC    0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
  16          PC    0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  17          PC    0.962   0.972   0.983   0.991   1.000
  18          LG     0.30    0.25    6.00    0.18      15
  19          UC    0.098   0.076
  20          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  21          UA      100
              *

  22          KK    RDS01   ROUTE
  23          RD      226  0.0265   0.035           TRAP   3.000   10.00
              *

  24          KK     DS02   BASIN
  25          BA    0.003
  26          LG     0.30    0.25    6.00    0.18      15
  27          UC    0.142   0.296
  28          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  29          UA      100
              *

  30          KK    CDS12 COMBINE
  31          HC        2
              *

  32          KK   RCDS12   ROUTE
  33          RD      209  0.0143   0.035           TRAP   4.000   10.00
              *

  34          KK     DS03   BASIN
  35          BA    0.006
  36          LG     0.30    0.25    6.00    0.18      15
  37          UC    0.118   0.124
  38          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
  39          UA      100
              *
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  40          KK    RDS03   ROUTE
  41          RD      467  0.0230   0.035           TRAP   4.000   10.00
              *
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```
 47          UA     100
             *

 48          KK   CDS34 COMBINE
 49          HC       2
             *

 50          KK  RCDS34   ROUTE
 51          RD     232  0.0172   0.035           TRAP   3.000   10.00
             *

 52          KK     02A   BASIN
 53          BA   0.002
 54          LG    0.30    0.25    6.00    0.18      15
 55          UC   0.091   0.107
 56          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 57          UA     100
             *

 58          KK      03   BASIN
 59          BA   0.003
 60          LG    0.30    0.25    6.00    0.18       1
 61          UC   0.092   0.105
 62          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 63          UA     100
             *

 64          KK    CO23 COMBINE
 65          HC       4
             *

 66          KK   RCO23   ROUTE
 67          RD     449  0.0178   0.035           TRAP   4.000   10.00
             *

 68          KK     01A   BASIN
 69          BA   0.003
 70          LG    0.30    0.25    6.00    0.18      15
 71          UC   0.115   0.153
 72          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 73          UA     100
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 74          KK     01B   BASIN
 75          BA   0.003
 76          LG    0.30    0.25    6.00    0.18      15
 77          UC   0.109   0.126
 78          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 79          UA     100
             *

 80          KK    C1AB COMBINE
 81          HC       2
             *

 82          KK   RC1AB   ROUTE
 83          RD     716  0.0237   0.035           TRAP   5.000   10.00
             *

 84          KK     01C   BASIN
 85          BA   0.007
 86          LG    0.30    0.25    6.00    0.18      15
 87          UC   0.124   0.124
 88          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 89          UA     100
             *

 90          KK      04   BASIN
 91          BA   0.002
 92          LG    0.30    0.25    6.00    0.18       1
 93          UC   0.092   0.132
 94          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
 95          UA     100
             *

 96          KK     02B   BASIN
 97          BA   0.001
 98          LG    0.30    0.25    6.00    0.18      15
 99          UC   0.106   0.209
100          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
101          UA     100
             *

102          KK     R2B   ROUTE
103          RD     389  0.0178   0.035           TRAP   4.000   10.00
             *

104          KK    CO14 COMBINE
105          HC       5
             *
```

```
108          KK      05   BASIN
109          BA   0.006
110          LG    0.30    0.25    6.00    0.18       9
111          UC   0.164   0.283
112          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
113          UA     100
             *

114          KK      06   BASIN
115          BA   0.003
116          LG    0.30    0.25    6.00    0.18       3
117          UC   0.121   0.214
118          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
119          UA     100
             *

120          KK    CO56 COMBINE
121          HC       3
122          ZW            A=FUTCOND           B=C056           C=FLOW
             *

123          KK   STOR2 STORAGE
124          RS       1     STOR      -1
125          SA   0.056     0.16   0.264   0.408
126          SQ       0     11.0    38.0    71.0
127          SE  2711.0  2712.0  2713.0  2714.0
128          ST  2714.5       30     2.7     1.5
129          ZW            A=FUTCOND           B=STOR2          C=FLOW
             *

130          KK   RC056   ROUTE
131          RD     195  0.0154   0.035            TRAP   5.000   10.00
             *

132          KK      07   BASIN
133          BA   0.002
134          LG    0.30    0.25    6.00    0.18       7
135          UC   0.061   0.053
136          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
137          UA     100
             *

138          KK     C07 COMBINE
139          HC       2
             *

140          KK    011A   BASIN
141          BA   0.001
142          LG    0.30    0.25    6.00    0.18      15
143          UC   0.146   0.544
144          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
145          UA     100
             *
```



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

146          KK    011B   BASIN
147          BA   0.002
148          LG    0.30    0.25    6.00    0.18      15
149          UC   0.064   0.055
150          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
151          UA     100
             *

152          KK    011C   BASIN
153          BA   0.001
154          LG    0.30    0.25    6.00    0.18      15
155          UC   0.057   0.060
156          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
157          UA     100
             *

158          KK  C11ABC COMBINE
159          HC       3
             *

160          KK  RC11AB   ROUTE
161          RD     784  0.0178   0.035            TRAP   5.000   10.00
             *

162          KK    011D   BASIN
163          BA   0.007
164          LG    0.30    0.25    6.00    0.18      10
165          UC   0.130   0.143
166          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
167          UA     100
             *

168          KK     C11 COMBINE
169          HC       2
```

```
175          UA      100
176          ZW          A=FUTCOND          B=012A          C=FLOW
             *

177          KK    STOR3 STORAGE
178          RS        1     STOR       -1
179          SA    0.006    0.02   0.048   0.084   0.092
180          SQ        0     3.0     9.0    12.0    15.0
181          SE   2711.0  2712.0  2713.0  2714.0  2715.0
182          ST   2715.0      50     2.7     1.5
183          ZW          A=FUTCOND          B=STOR3          C=FLOW
             *
```



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

184          KK     012B   BASIN
185          BA    0.002
186          LG     0.30     0.25     6.00     0.18       15
187          UC    0.144    0.359
188          UA        0      4.5     12.6     23.2     35.8     50.0     64.2     76.8     87.4     95.5
189          UA      100
             *

190          KK     C12AB COMBINE
191          HC        2
             *

192          KK   RC12AB   ROUTE
193          RD      595  0.0200    0.035             TRAP    5.000    10.00
             *

194          KK     012C   BASIN
195          BA    0.003
196          LG     0.30     0.25     6.00     0.18       11
197          UC    0.112    0.163
198          UA        0      4.5     12.6     23.2     35.8     50.0     64.2     76.8     87.4     95.5
199          UA      100
             *

200          KK      C12 COMBINE
201          HC        2
202          ZW          A=FUTCOND          B=C12          C=FLOW
             *

203          KK    STOR4 STORAGE
204          RS        1     STOR       -1
205          SA    0.006    0.024   0.048   0.096
206          SQ        0      4.0    13.0    20.0
207          SE   2695.0  2696.0  2697.0  2698.0
208          ST   2699.0      50     2.7     1.5
209          ZW          A=FUTCOND          B=STOR4          C=FLOW
             *

210          KK     013A   BASIN
211          BA    0.001
212          LG     0.30     0.25     6.00     0.18       15
213          UC    0.154    0.408
214          UA        0      4.5     12.6     23.2     35.8     50.0     64.2     76.8     87.4     95.5
215          UA      100
             *

216          KK    C1112 COMBINE
217          HC        3
             *
```



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

218          KK   RC1112   ROUTE
219          RD      212  0.0141    0.035             TRAP    8.000    10.00
             *

220          KK     013D   BASIN
221          BA    0.002
222          LG     0.30     0.25     6.00     0.18       11
223          UC    0.094    0.123
224          UA        0      4.5     12.6     23.2     35.8     50.0     64.2     76.8     87.4     95.5
225          UA      100
             *

226          KK   C13D12 COMBINE
227          HC        2
228          ZW          A=FUTCOND          B=C13D12          C=FLOW
             *

229          KK    STOR6 STORAGE
230          RS        1     STOR       -1
231          SA    0.037    0.083   0.157   0.239
232          SQ        0      3.0    22.0    48.0
233          SE   2691.0  2692.0  2693.0  2694.0
234          ST   2695.0      50     2.7     1.5
235          ZW          A=FUTCOND          B=STOR6          C=FLOW
```

```
240          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
241          UA      100
             *

242          KK     013B   BASIN
243          BA    0.001
244          LG     0.30     0.25    6.00    0.18      15
245          UC    0.121    0.241
246          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
247          UA      100
             *

248          KK     013C   BASIN
249          BA    0.007
250          LG     0.30     0.25    6.00    0.18      11
251          UC    0.114    0.110
252          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
253          UA      100
             *
```



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

254          KK      010   BASIN
255          BA    0.001
256          LG     0.30     0.25    6.00    0.18       7
257          UC    0.055    0.046
258          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
259          UA      100
             *

260          KK    C1314 COMBINE
261          HC        5
262          ZW              A=FUTCOND           B=C1314           C=FLOW
             *

263          KK    STOR1 STORAGE
264          RS        1      STOR       -1
265          SA    .0155    0.080    0.105    0.133
266          SQ        0     15.5       50     86.0
267          SE   2684.0  2685.00  2686.00  2687.00
268          ST   2687.5       50      2.7      1.5
269          ZW              A=FUTCOND           B=STOR1           C=FLOW
             *

270          KK       08   BASIN
271          BA    0.002
272          LG     0.30     0.25    6.00    0.18       8
273          UC    0.106    0.144
274          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
275          UA      100
             *

276          KK       09   BASIN
277          BA    0.002
278          LG     0.30     0.25    6.00    0.18       4
279          UC    0.116    0.229
280          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
281          UA      100
             *

282          KK      C89 COMBINE
283          HC        2
             *

284          KK      015   BASIN
285          BA    0.002
286          LG     0.30     0.25    6.00    0.18       8
287          UC    0.063    0.054
288          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
289          UA      100
             *
```



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

290          KK      016   BASIN
291          BA    0.001
292          LG     0.30     0.25    6.00    0.18       8
293          UC    0.049    0.041
294          UA        0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
295          UA      100
             *

296          KK   CDUMMY   COMBINE
297          HC        5
             *

298          KK      019   BASIN
299          BA    0.004
300          LG     0.30     0.25    6.00    0.18       5
301          UC    0.125    0.147
```

```
307          UC   0.107   0.135
308          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
309          UA     100
             *

310          KK   C1920   COMBINE
311          HC       2
312          ZW           A=FUTCOND           B=C1920           C=FLOW
             *

313          KK   STOR5   STORAGE
314          RS       1     STOR      -1
315          SA   0.269   0.328   0.390   0.487
316          SQ       0     2.3     7.7    11.0
317          SE  2711.0  2712.0  2713.0  2714.0
318          ST  2714.0      50     2.7     1.5
319          ZW           A=FUTCOND           B=STOR5           C=FLOW
             *

320          KK    020B   BASIN
321          BA    .002
322          LG    0.30    0.25    6.00    0.18
323          UC   0.090   0.116
324          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
325          UA     100
             *

1                                        HEC-1 INPUT                                        PAGE 10

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

326          KK     C20   COMBINE
327          HC       2
             *

328          KK    022A   BASIN
329          BA   .0009
330          LG    0.30    0.25    6.00    0.18      15
331          UC   0.155   0.552
332          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
333          UA     100
             *

334          KK    022B   BASIN
335          BA   .0008
336          LG    0.30    0.25    6.00    0.18      12
337          UC   0.058   0.062
338          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
339          UA     100
             *

340          KK    022C   BASIN
341          BA   0.002
342          LG    0.30    0.25    6.00    0.18      12
343          UC   0.132   0.311
344          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
345          UA     100
             *

346          KK    022D   BASIN
347          BA   0.006
348          LG    0.30    0.25    6.00    0.18       4
349          UC   0.106   0.101
350          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
351          UA     100
             *

352          KK     C22   COMBINE
353          HC       4
             *

354          KK     017   BASIN
355          BA   0.006
356          LG    0.30    0.25    6.00    0.18       4
357          UC   0.102   0.107
358          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
359          UA     100
             *

360          KK     018   BASIN
361          BA   0.007
362          LG    0.30    0.25    6.00    0.18      12
363          UC   0.169   0.287
364          UA       0     4.5    12.6    23.2    35.8    50.0    64.2    76.8    87.4    95.5
365          UA     100
             *

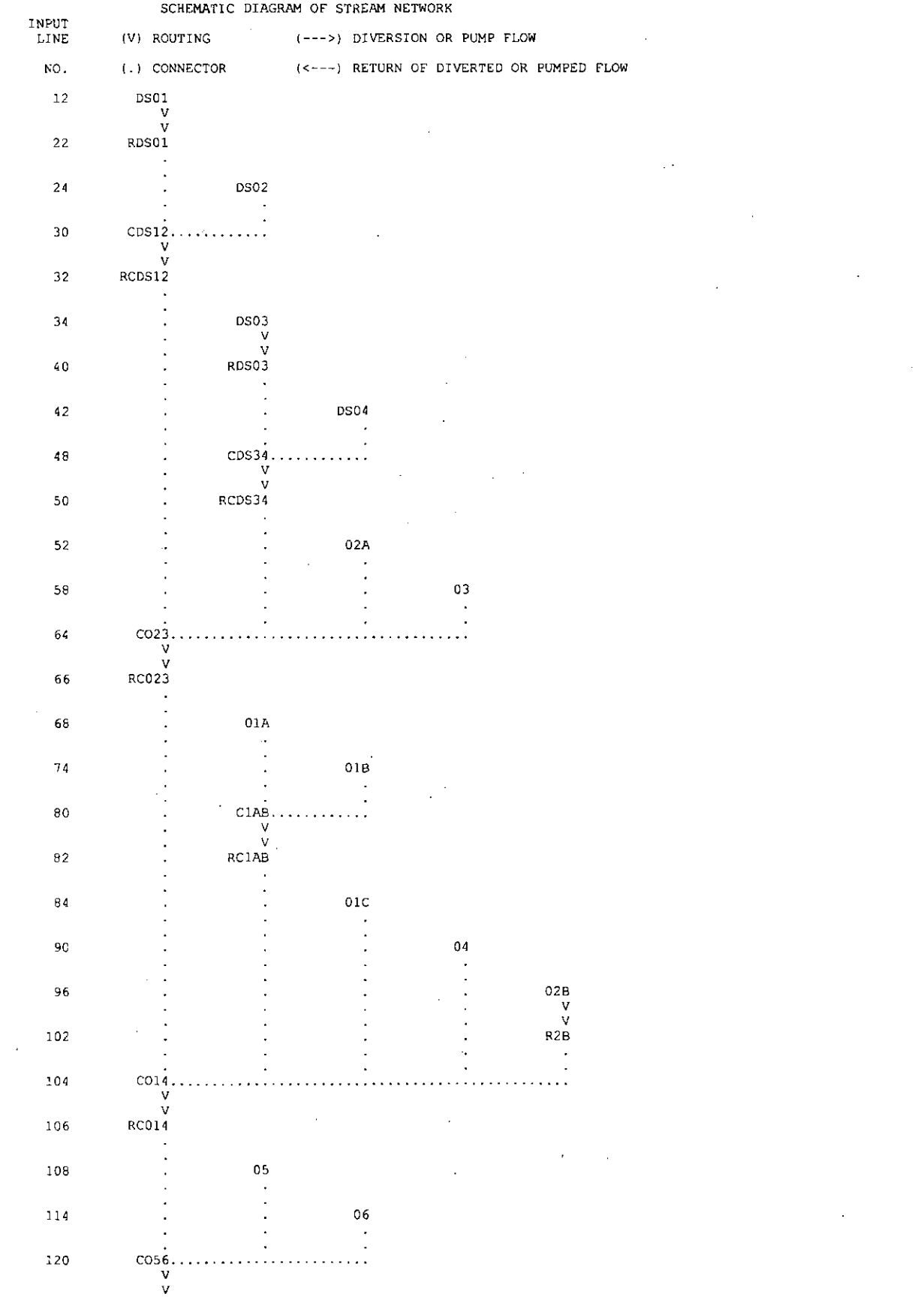
1                                        HEC-1 INPUT                                        PAGE 11

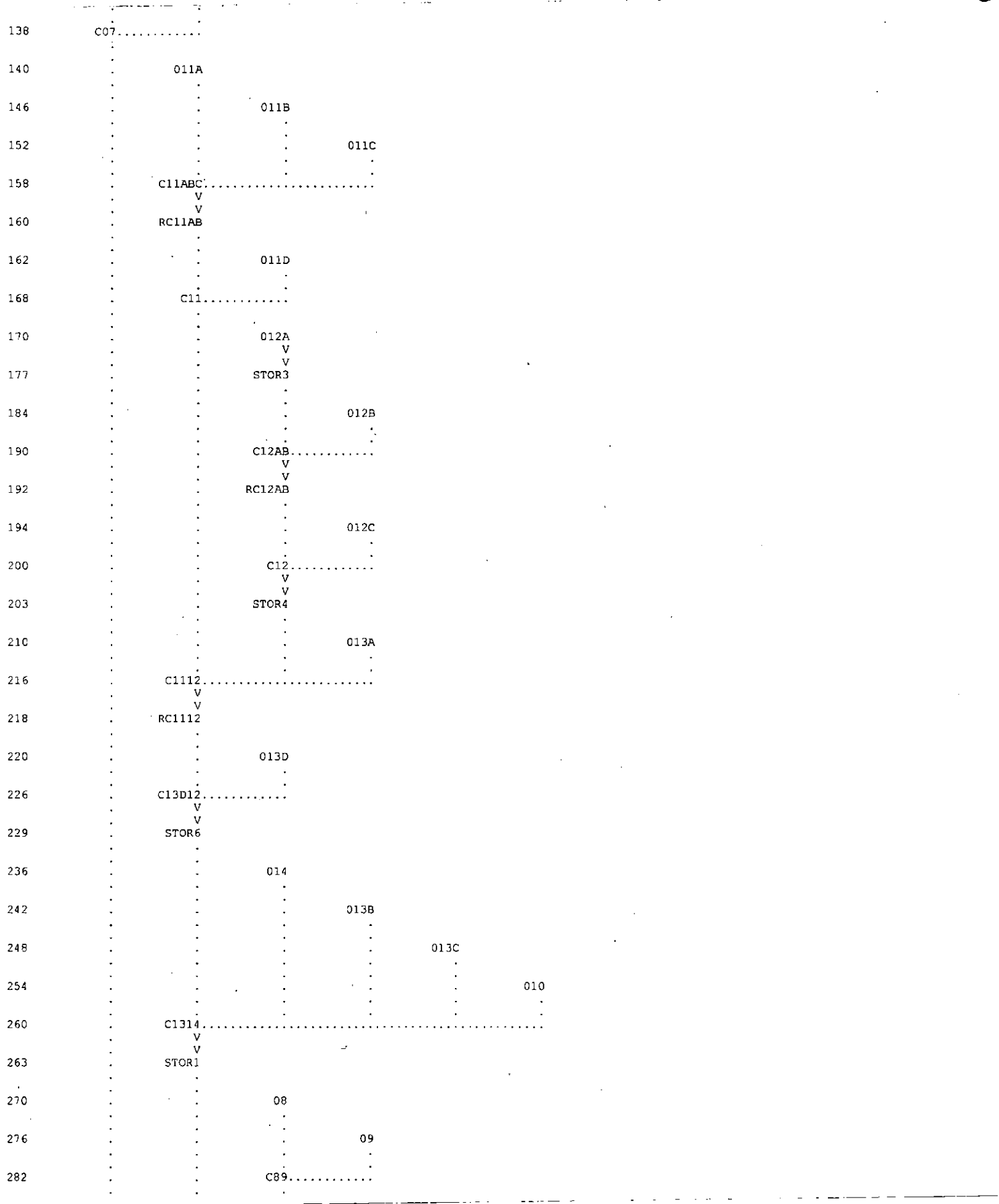
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

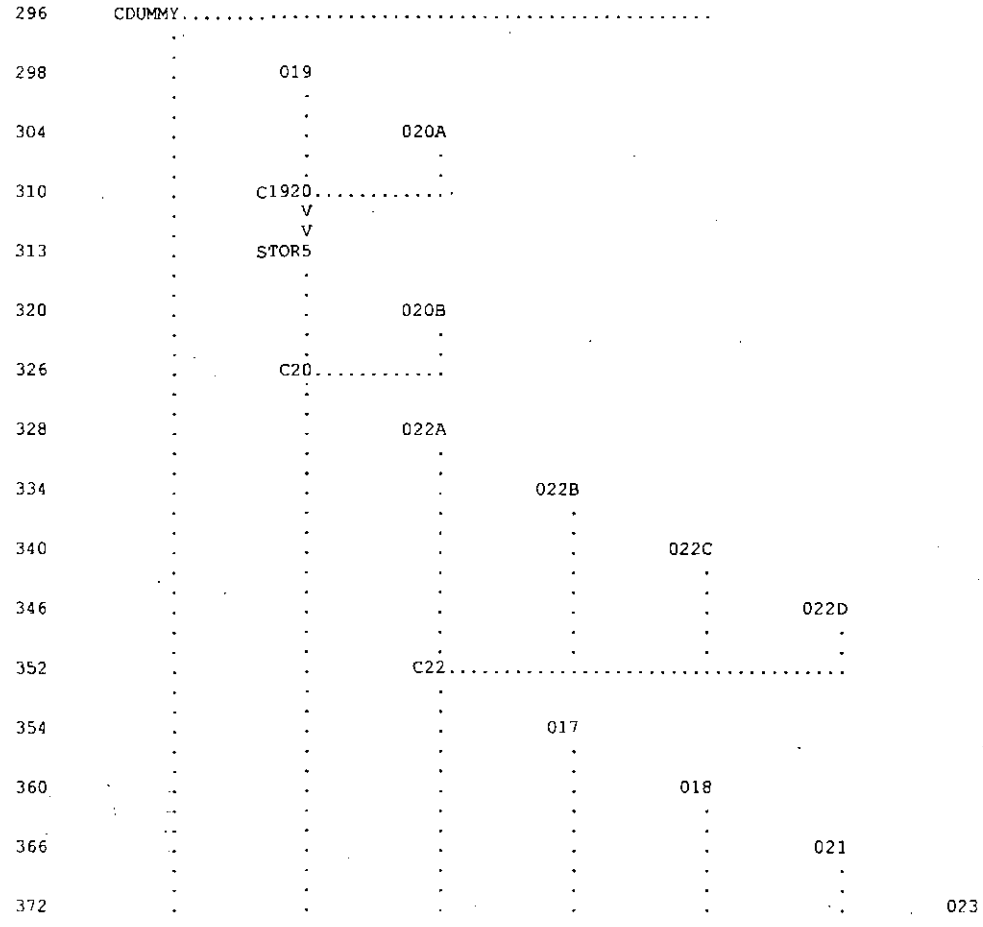
366          KK     021   BASIN
367          BA   0.001
368          LG    0.30    0.25    6.00    0.18      15
```

```
374           LG    0.30     0.25     6.00     0.18        2
375           UC   0.087    0.107
376           UA       0      4.5     12.6     23.2     35.8     50.0     64.2     76.8     87.4     95.5
377           UA     100
              *
378           ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK




138 C07
140 011A
146 011B
152 011C
158 C11ABC
160 RC11AB
162 011D
168 C11
170 012A
177 STOR3
184 012B
190 C12AB
192 RC12AB
194 012C
200 C12
203 STOR4
210 013A
216 C1112
218 RC1112
220 013D
226 C13D12
229 STOR6
236 014
242 013B
248 013C
254 010
260 C1314
263 STOR1
270 08
276 09
282 C89



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1

RUN DATE 24OCT17 TIME 12:01:21

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

Flood Control District of Maricopa County
118TH&JOMAX SINGLE S - FUTURE CONDITIONS
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Single
08/16/2017

9 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	1	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN99	STARTING DATE
ITIME	0000	STARTING TIME
NQ	2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2JAN99	ENDING DATE
NDTIME	0919	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .02 HOURS
TOTAL TIME BASE 33.32 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

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PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO FLOWS RATIO 1 .10	 RATIO 2 .35	 RATIO 3 1.00
HYDROGRAPH AT							
+	DS01	.01	1	FLOW	3.	10.	30.
				TIME	4.02	4.02	4.02
ROUTED TO							
+	RDS01	.01	1	FLOW	3.	10.	29.
				TIME	4.03	4.03	4.02
HYDROGRAPH AT							
+	DS02	.00	1	FLOW	1.	2.	6.
				TIME	4.07	4.07	4.07
2 COMBINED AT							
+	CDS12	.01	1	FLOW	4.	12.	35.
				TIME	4.03	4.03	4.03
ROUTED TO							
+	RCDS12	.01	1	FLOW	4.	12.	35.
				TIME	4.07	4.05	4.03
HYDROGRAPH AT							
+	DS03	.01	1	FLOW	2.	6.	18.
				TIME	4.03	4.03	4.03
ROUTED TO							
+	RDS03	.01	1	FLOW	2.	6.	18.
				TIME	4.08	4.07	4.05
HYDROGRAPH AT							
+	DS04	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
2 COMBINED AT							
+	CDS34	.01	1	FLOW	2.	9.	25.
				TIME	4.07	4.05	4.05
ROUTED TO							
+	RCDS34	.01	1	FLOW	2.	9.	25.
				TIME	4.10	4.08	4.07
HYDROGRAPH AT							
+	02A	.00	1	FLOW	1.	2.	6.
				TIME	4.02	4.02	4.02
HYDROGRAPH AT							
+	03	.00	1	FLOW	1.	3.	9.
				TIME	4.02	4.02	4.02
4 COMBINED AT							
+	CO23	.03	1	FLOW	7.	26.	75.
				TIME	4.05	4.05	4.03
ROUTED TO							
+	RCO23	.03	1	FLOW	7.	26.	75.
				TIME	4.08	4.07	4.07
HYDROGRAPH AT							
+	01A	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	01B	.00	1	FLOW	1.	3.	9.
				TIME	4.02	4.03	4.03
2 COMBINED AT							
+	C1AB	.01	1	FLOW	2.	6.	17.
				TIME	4.03	4.03	4.03
ROUTED TO							
+	RC1AB	.01	1	FLOW	2.	6.	17.
				TIME	4.12	4.08	4.08
HYDROGRAPH AT							
+	[illegible]	.01	1	FLOW	2.	7.	21.

+	02B	.00	1	FLOW	0.	1.	2.
				TIME	4.03	4.03	4.03
ROUTED TO							
+	R2B	.00	1	FLOW	0.	1.	2.
				TIME	4.12	4.10	4.08
5 COMBINED AT							
+	CO14	.04	1	FLOW	12.	41.	120.
				TIME	4.08	4.07	4.05
ROUTED TO							
+	RC014	.04	1	FLOW	12.	41.	119.
				TIME	4.10	4.08	4.07
HYDROGRAPH AT							
+	05	.01	1	FLOW	1.	4.	12.
				TIME	4.07	4.08	4.08
HYDROGRAPH AT							
+	06	.00	1	FLOW	1.	3.	7.
				TIME	4.05	4.05	4.05
3 COMBINED AT							
+	CO56	.05	1	FLOW	13.	48.	139.
				TIME	4.10	4.08	4.07
ROUTED TO							
+	STOR2	.05	1	FLOW	11.	41.	119.
				TIME	4.20	4.15	4.13
			** PEAK STAGES IN FEET **				
			1	STAGE	2711.96	2713.09	2714.88
				TIME	4.20	4.15	4.13
ROUTED TO							
+	RC056	.05	1	FLOW	11.	41.	119.
				TIME	4.22	4.17	4.15
HYDROGRAPH AT							
+	07	.00	1	FLOW	1.	2.	7.
				TIME	4.00	4.00	4.00
2 COMBINED AT							
+	C07	.05	1	FLOW	11.	41.	120.
				TIME	4.22	4.17	4.15
HYDROGRAPH AT							
+	011A	.00	1	FLOW	0.	1.	1.
				TIME	4.08	4.08	4.08
HYDROGRAPH AT							
+	011B	.00	1	FLOW	1.	2.	7.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	011C	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
3 COMBINED AT							
+	C11ABC	.00	1	FLOW	1.	4.	11.
				TIME	4.00	4.00	4.00
ROUTED TO							
+	RC11AB	.00	1	FLOW	1.	4.	11.
				TIME	4.10	4.08	4.07
HYDROGRAPH AT							
+	011D	.01	1	FLOW	2.	7.	20.
				TIME	4.03	4.03	4.03
2 COMBINED AT							
+	C11	.01	1	FLOW	3.	11.	31.
				TIME	4.05	4.05	4.05
HYDROGRAPH AT							
+	012A	.01	1	FLOW	2.	5.	16.
				TIME	4.05	4.05	4.05
ROUTED TO							
+	STOR3	.01	1	FLOW	1.	5.	12.
				TIME	4.08	4.10	4.15
			** PEAK STAGES IN FEET **				
			1	STAGE	2711.49	2712.34	2713.87
				TIME	4.08	4.10	4.15
HYDROGRAPH AT							
+	012B	.00	1	FLOW	0.	1.	4.
				TIME	4.07	4.07	4.07
2 COMBINED AT							
+	C12AB	.01	1	FLOW	2.	6.	15.
				TIME	4.08	4.08	4.12

+	012C	.00	1	FLOW	1.	3.	8.
				TIME	4.03	4.03	4.03
2 COMBINED AT							
+	C12	.01	1	FLOW	2.	8.	22.
				TIME	4.12	4.10	4.08
ROUTED TO							
+	STOR4	.01	1	FLOW	2.	8.	19.
				TIME	4.17	4.15	4.20
			** PEAK STAGES IN FEET **				
			1	STAGE	2695.57	2696.46	2697.88
				TIME	4.17	4.15	4.20
HYDROGRAPH AT							
+	013A	.00	1	FLOW	0.	1.	2.
				TIME	4.08	4.08	4.08
3 COMBINED AT							
+	C1112	.02	1	FLOW	5.	18.	49.
				TIME	4.08	4.08	4.07
ROUTED TO							
+	RC1112	.02	1	FLOW	5.	18.	49.
				TIME	4.10	4.10	4.07
HYDROGRAPH AT							
+	013D	.00	1	FLOW	1.	2.	6.
				TIME	4.02	4.02	4.02
2 COMBINED AT							
+	C13D12	.03	1	FLOW	6.	20.	54.
				TIME	4.08	4.08	4.07
ROUTED TO							
+	STOR6	.03	1	FLOW	4.	18.	48.
				TIME	4.22	4.15	4.13
			** PEAK STAGES IN FEET **				
			1	STAGE	2692.08	2692.78	2693.99
				TIME	4.22	4.15	4.13
HYDROGRAPH AT							
+	014	.01	1	FLOW	3.	10.	29.
				TIME	4.05	4.05	4.05
HYDROGRAPH AT							
+	013B	.00	1	FLOW	0.	1.	2.
				TIME	4.05	4.05	4.05
HYDROGRAPH AT							
+	013C	.01	1	FLOW	2.	7.	21.
				TIME	4.02	4.02	4.02
HYDROGRAPH AT							
+	010	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
5 COMBINED AT							
+	C1314	.05	1	FLOW	8.	34.	97.
				TIME	4.05	4.07	4.05
ROUTED TO							
+	STOR1	.05	1	FLOW	7.	33.	93.
				TIME	4.10	4.10	4.10
			** PEAK STAGES IN FEET **				
			1	STAGE	2684.48	2685.52	2687.19
				TIME	4.10	4.10	4.10
HYDROGRAPH AT							
+	08	.00	1	FLOW	1.	2.	6.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	09	.00	1	FLOW	0.	2.	5.
				TIME	4.05	4.05	4.05
2 COMBINED AT							
	C89	.00	1	FLOW	1.	4.	10.
				TIME	4.03	4.03	4.03
HYDROGRAPH AT							
+	015	.00	1	FLOW	1.	2.	7.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	016	.00	1	FLOW	0.	1.	3.
				TIME	3.98	4.00	4.00
5 COMBINED AT							
	CDUMMY	.11	1	FLOW	19.	77.	220.
				TIME	4.18	4.13	4.13

				TIME	4.03	4.03	4.03
2 COMBINED AT							
+	C1920	.01	1	FLOW	2.	7.	20.
				TIME	4.03	4.03	4.03
ROUTED TO							
+	STOR5	.01	1	FLOW	0.	1.	5.
				TIME	4.33	4.35	4.32
				** PEAK STAGES IN FEET **			
			1	STAGE	2711.17	2711.59	2712.51
				TIME	4.35	4.35	4.32
HYDROGRAPH AT							
+	020B	.00	1	FLOW	1.	2.	6.
				TIME	4.02	4.02	4.02
2 COMBINED AT							
+	C20	.01	1	FLOW	1.	3.	9.
				TIME	4.03	4.03	4.05
HYDROGRAPH AT							
+	022A	.00	1	FLOW	0.	0.	1.
				TIME	4.08	4.08	4.10
HYDROGRAPH AT							
+	022B	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	022C	.00	1	FLOW	0.	1.	4.
				TIME	4.07	4.07	4.07
HYDROGRAPH AT							
+	022D	.01	1	FLOW	2.	6.	18.
				TIME	4.02	4.02	4.02
4 COMBINED AT							
+	C22	.01	1	FLOW	3.	9.	26.
				TIME	4.02	4.02	4.02
HYDROGRAPH AT							
+	017	.01	1	FLOW	2.	6.	18.
				TIME	4.02	4.02	4.02
HYDROGRAPH AT							
+	018	.01	1	FLOW	1.	5.	14.
				TIME	4.08	4.08	4.08
HYDROGRAPH AT							
+	021	.00	1	FLOW	0.	1.	3.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	023	.00	1	FLOW	1.	3.	9.
				TIME	4.02	4.02	4.02

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RDS01	MANE	1.00	2.95	242.00	.20	1.00	2.95	242.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9501E-01 EXCESS= .0000E+00 OUTFLOW= .9498E-01 BASIN STORAGE= .1012E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RDS01	MANE	1.00	10.32	242.00	.69	1.00	10.32	242.00	.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3325E+00 EXCESS= .0000E+00 OUTFLOW= .3325E+00 BASIN STORAGE= .1055E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RDS01	MANE	.86	29.49	241.32	1.98	1.00	29.43	241.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9502E+00 EXCESS= .0000E+00 OUTFLOW= .9501E+00 BASIN STORAGE= .1072E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00									
RCDS12	MANE	1.00	3.54	244.00	.20	1.00	3.54	244.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1266E+00 EXCESS= .0000E+00 OUTFLOW= .1266E+00 BASIN STORAGE= .1247E-03 PERCENT ERROR= -.1

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      FOR PLAN = 1  RATIO=  .00
        RCDS12  MANE          .96      35.26     242.24       1.98       1.00      35.19     242.00         1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1267E+01 EXCESS= .0000E+00 OUTFLOW= .1267E+01 BASIN STORAGE= .1226E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RDS03  MANE          1.00       1.77     245.00        .20       1.00       1.77     245.00          .20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6333E-01 EXCESS= .0000E+00 OUTFLOW= .6329E-01 BASIN STORAGE= .2215E-03 PERCENT ERROR=    -.3

      FOR PLAN = 1  RATIO=  .00
        RDS03  MANE          1.00       6.20     244.00        .69       1.00       6.20     244.00          .69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2216E+00 EXCESS= .0000E+00 OUTFLOW= .2216E+00 BASIN STORAGE= .2459E-03 PERCENT ERROR=    -.1

      FOR PLAN = 1  RATIO=  .00
        RDS03  MANE          1.00      17.66     243.00       1.98       1.00      17.66     243.00         1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6333E+00 EXCESS= .0000E+00 OUTFLOW= .6332E+00 BASIN STORAGE= .2370E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RCDS34  MANE          1.00       2.49     246.00        .19       1.00       2.49     246.00          .19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9150E-01 EXCESS= .0000E+00 OUTFLOW= .9148E-01 BASIN STORAGE= .1205E-03 PERCENT ERROR=    -.1

      FOR PLAN = 1  RATIO=  .00
        RCDS34  MANE          1.00       8.80     245.00        .67       1.00       8.80     245.00          .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3204E+00 EXCESS= .0000E+00 OUTFLOW= .3203E+00 BASIN STORAGE= .1279E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RCDS34  MANE          1.00      25.28     244.00       1.91       1.00      25.28     244.00         1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9154E+00 EXCESS= .0000E+00 OUTFLOW= .9154E+00 BASIN STORAGE= .1215E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RC023  MANE          1.00       7.35     245.00        .19       1.00       7.35     245.00          .19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2676E+00 EXCESS= .0000E+00 OUTFLOW= .2676E+00 BASIN STORAGE= .2395E-03 PERCENT ERROR=    -.1

      FOR PLAN = 1  RATIO=  .00
        RC023  MANE          1.00      26.05     244.00        .68       1.00      26.05     244.00          .68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9370E+00 EXCESS= .0000E+00 OUTFLOW= .9370E+00 BASIN STORAGE= .2396E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RC023  MANE          1.00      74.70     244.00       1.93       1.00      74.70     244.00         1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2677E+01 EXCESS= .0000E+00 OUTFLOW= .2677E+01 BASIN STORAGE= .2378E-03 PERCENT ERROR=     .0

      FOR PLAN = 1  RATIO=  .00
        RC1AB  MANE          1.00       1.71     247.00        .20       1.00       1.71     247.00          .20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6331E-01 EXCESS= .0000E+00 OUTFLOW= .6326E-01 BASIN STORAGE= .3448E-03 PERCENT ERROR=    -.5

      FOR PLAN = 1  RATIO=  .00
        RC1AB  MANE          1.00       5.99     245.00        .69       1.00       5.99     245.00          .69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2216E+00 EXCESS= .0000E+00 OUTFLOW= .2216E+00 BASIN STORAGE= .3787E-03 PERCENT ERROR=    -.2

      FOR PLAN = 1  RATIO=  .00
        RC1AB  MANE          1.00      17.13     245.00       1.98       1.00      17.13     245.00         1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6331E+00 EXCESS= .0000E+00 OUTFLOW= .6331E+00 BASIN STORAGE= .3663E-03 PERCENT ERROR=    -.1

      FOR PLAN = 1  RATIO=  .00
          R2B  MANE          1.00        .25     247.00        .20       1.00        .25     247.00          .20
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CONTINUITY SUMMARY (AC-FT) - INFLOW= .3692E-01 EXCESS= .0000E+00 OUTFLOW= .3692E-01 BASIN STORAGE= .2082E-03 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= .00

R2B	MANE	1.00	2.48	245.00	1.98	1.00	2.48	245.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1055E+00 EXCESS= .0000E+00 OUTFLOW= .1055E+00 BASIN STORAGE= .2077E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	11.55	246.00	.19	1.00	11.55	246.00	.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4342E+00 EXCESS= .0000E+00 OUTFLOW= .4342E+00 BASIN STORAGE= .2135E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	41.42	245.00	.68	1.00	41.42	245.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1520E+01 EXCESS= .0000E+00 OUTFLOW= .1520E+01 BASIN STORAGE= .2126E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC014	MANE	1.00	119.45	244.00	1.94	1.00	119.45	244.00	1.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4344E+01 EXCESS= .0000E+00 OUTFLOW= .4344E+01 BASIN STORAGE= .2307E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC056	MANE	1.00	10.60	253.00	.20	1.00	10.60	253.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5370E+00 EXCESS= .0000E+00 OUTFLOW= .5370E+00 BASIN STORAGE= .1131E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC056	MANE	.84	41.03	249.99	.68	1.00	41.02	250.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1846E+01 EXCESS= .0000E+00 OUTFLOW= .1846E+01 BASIN STORAGE= .1119E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC056	MANE	.64	118.69	249.10	1.93	1.00	118.68	249.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5249E+01 EXCESS= .0000E+00 OUTFLOW= .5249E+01 BASIN STORAGE= .1126E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC11AB	MANE	1.00	1.13	246.00	.20	1.00	1.13	246.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4221E-01 EXCESS= .0000E+00 OUTFLOW= .4215E-01 BASIN STORAGE= .4223E-03 PERCENT ERROR= -.9

FOR PLAN = 1 RATIO= .00

RC11AB	MANE	1.00	3.97	245.00	.69	1.00	3.97	245.00	.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1477E+00 EXCESS= .0000E+00 OUTFLOW= .1477E+00 BASIN STORAGE= .4216E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00

RC11AB	MANE	1.00	11.36	244.00	1.98	1.00	11.36	244.00	1.98

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4221E+00 EXCESS= .0000E+00 OUTFLOW= .4220E+00 BASIN STORAGE= .4269E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RC12AB	MANE	1.00	1.83	249.00	.20	1.00	1.83	249.00	.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8327E-01 EXCESS= .0000E+00 OUTFLOW= .8322E-01 BASIN STORAGE= .3117E-03 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .00

RC12AB	MANE	1.00	6.32	249.00	.68	1.00	6.32	249.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2887E+00 EXCESS= .0000E+00 OUTFLOW= .2886E+00 BASIN STORAGE= .3109E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00

RC12AB	MANE	1.00	15.14	249.00	1.91	1.00	15.14	249.00	1.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8157E+00 EXCESS= .0000E+00 OUTFLOW= .8157E+00 BASIN STORAGE= .3150E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC1112	MANE	1.00	18.36	246.00	.68	1.00	18.36	246.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8320E+00 EXCESS= .0000E+00 OUTFLOW= .8320E+00 BASIN STORAGE= .1335E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .00

RC1112	MANE	.92	49.26	244.29	1.93	1.00	49.15	244.00	1.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2364E+01 EXCESS= .0000E+00 OUTFLOW= .2364E+01 BASIN STORAGE= .1392E-03 PERCENT ERROR= .0

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR2
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2711.00	2714.50	2714.50
STORAGE	0.	1.	1.
OUTFLOW	0.	88.	88.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2711.96	.00	0.	11.	.00	4.20	.00
.35	2713.09	.00	0.	41.	.00	4.15	.00
1.00	2714.88	.38	1.	119.	.23	4.13	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR3
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2711.00	2715.00	2715.00
STORAGE	0.	0.	0.
OUTFLOW	0.	15.	15.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2711.49	.00	0.	1.	.00	4.08	.00
.35	2712.34	.00	0.	5.	.00	4.10	.00
1.00	2713.87	.00	0.	12.	.00	4.15	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR4
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2695.00	2699.00	2699.00
STORAGE	0.	0.	0.
OUTFLOW	0.	27.	27.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2695.57	.00	0.	2.	.00	4.17	.00
.35	2696.46	.00	0.	8.	.00	4.15	.00
1.00	2697.88	.00	0.	19.	.00	4.20	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR6
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2691.00	2695.00	2695.00
STORAGE	0.	1.	1.
OUTFLOW	0.	74.	74.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2692.08	.00	0.	4.	.00	4.22	.00
.35	2692.78	.00	0.	18.	.00	4.15	.00
1.00	2693.99	.00	0.	48.	.00	4.13	.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR1
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2684.00	2687.50	2687.50
STORAGE	0.	0.	0.
OUTFLOW	0.	104.	104.

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION STOR5
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2711.00	2714.00	2714.00
STORAGE	0.	1.	1.
OUTFLOW	0.	11.	11.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2711.17	.00	0.	0.	.00	4.35	.00
.35	2711.59	.00	0.	1.	.00	4.35	.00
1.00	2712.51	.00	0.	5.	.00	4.32	.00

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

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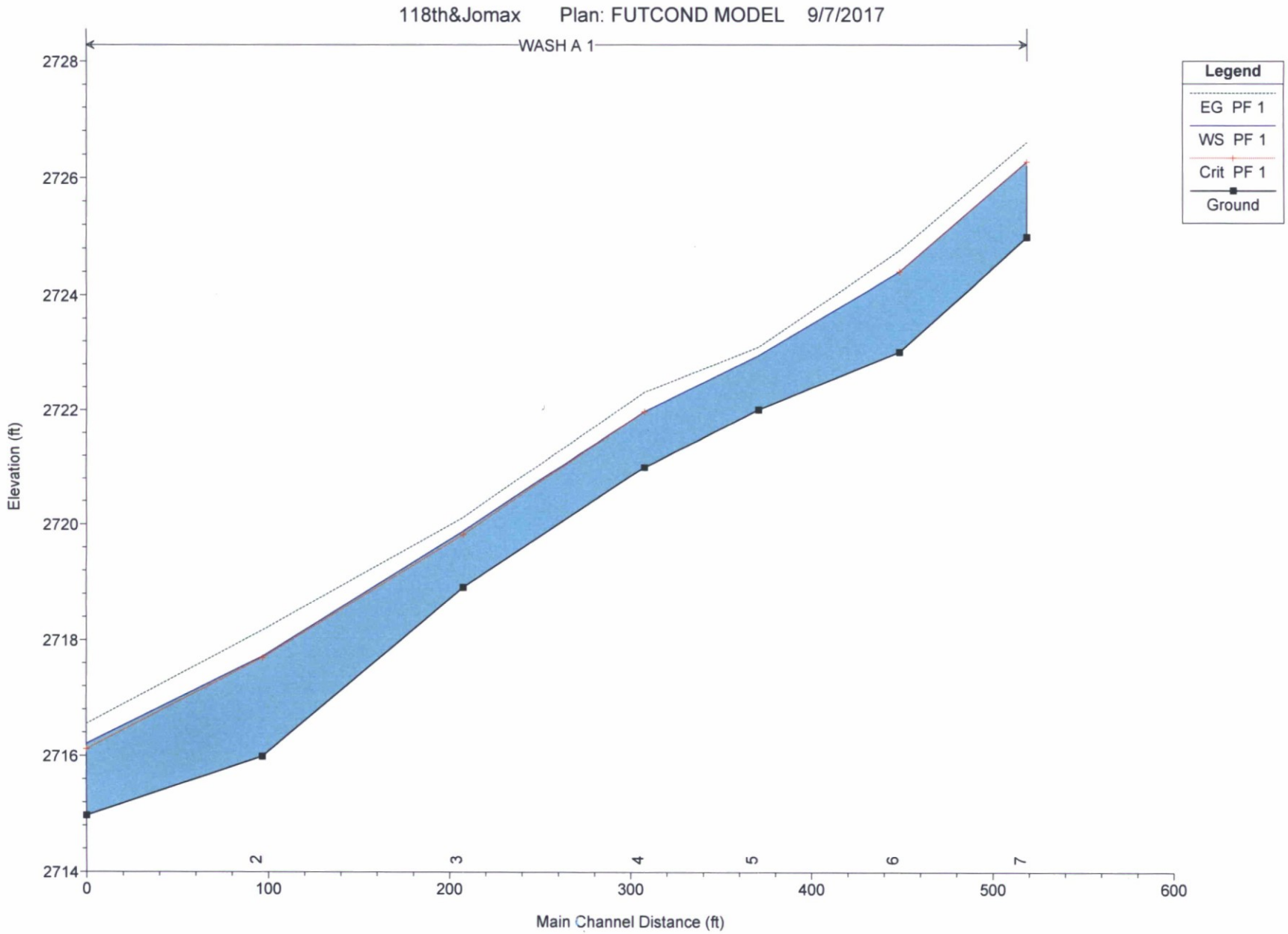
Pointer Utilization: .28
Number of Records: 108
File Size: 707.8 Kbytes
Percent Inactive: .0

Appendix C

HEC-RAS Plan: WASH A River: WASH A Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	7	PF 1	75.00	2724.99	2726.27	2726.27	2726.60	0.021428	4.61	16.28	25.33	1.01
1	6	PF 1	75.00	2723.01	2724.40	2724.40	2724.76	0.020918	4.81	15.59	22.28	1.01
1	5	PF 1	75.00	2722.00	2722.95		2723.09	0.007895	3.09	24.27	32.60	0.63
1	4	PF 1	75.00	2720.99	2721.97	2721.97	2722.31	0.021416	4.65	16.13	24.61	1.01
1	3	PF 1	75.00	2718.91	2719.88	2719.83	2720.12	0.016594	3.87	19.40	32.44	0.88
1	2	PF 1	120.00	2715.99	2717.72	2717.69	2718.17	0.017967	5.41	22.19	23.40	0.98
1	1	PF 1	120.00	2714.97	2716.20	2716.12	2716.55	0.015111	4.70	25.56	29.60	0.89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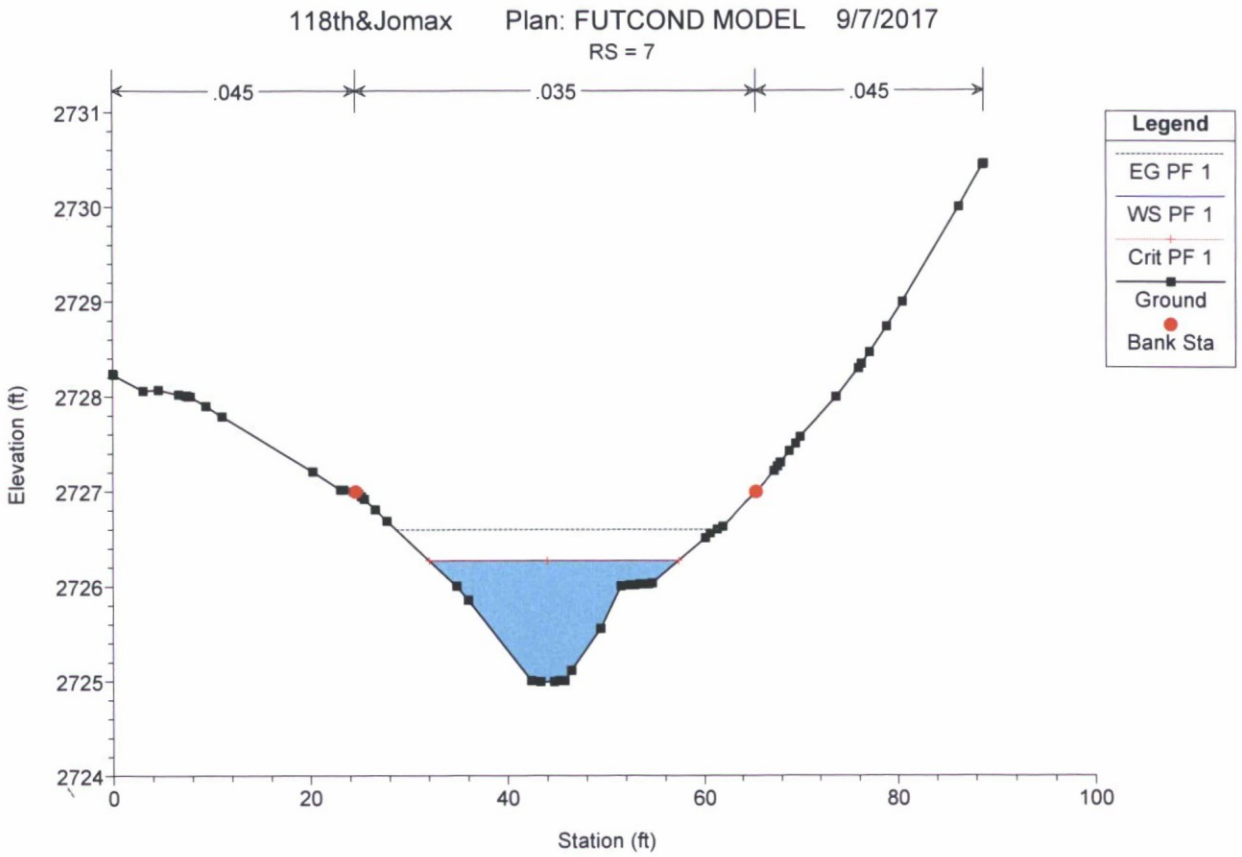
WASH A 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2728
2726
2724
2722
2720
2718
2716
2714
0
100
200
300
400
500
600
Main Channel Distance (ft)
2
3
4
5
6
7


118th&Jomax Plan: FUTCOND MODEL 9/7/2017
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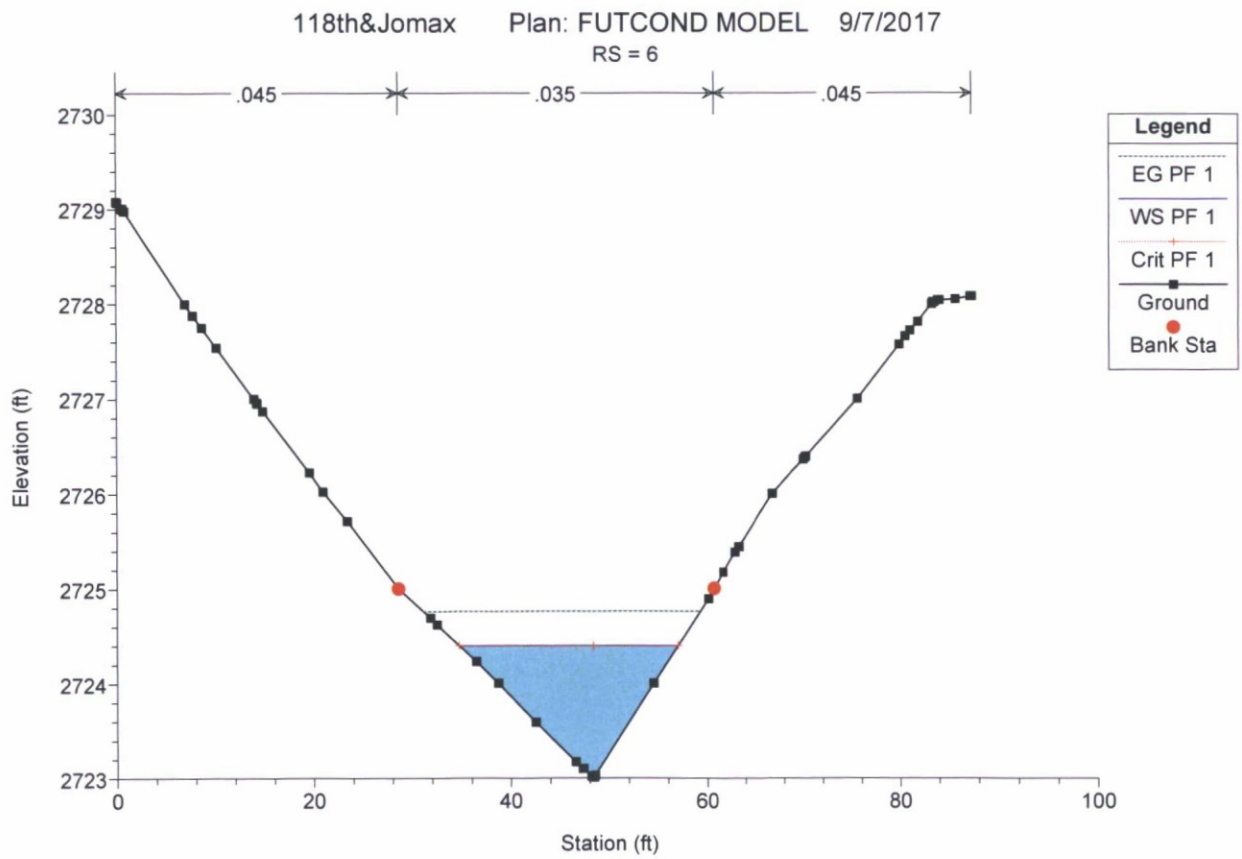
.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2731
2730
2729
2728
2727
2726
2725
2724
0
20
40
60
80
100
Station (ft)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.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
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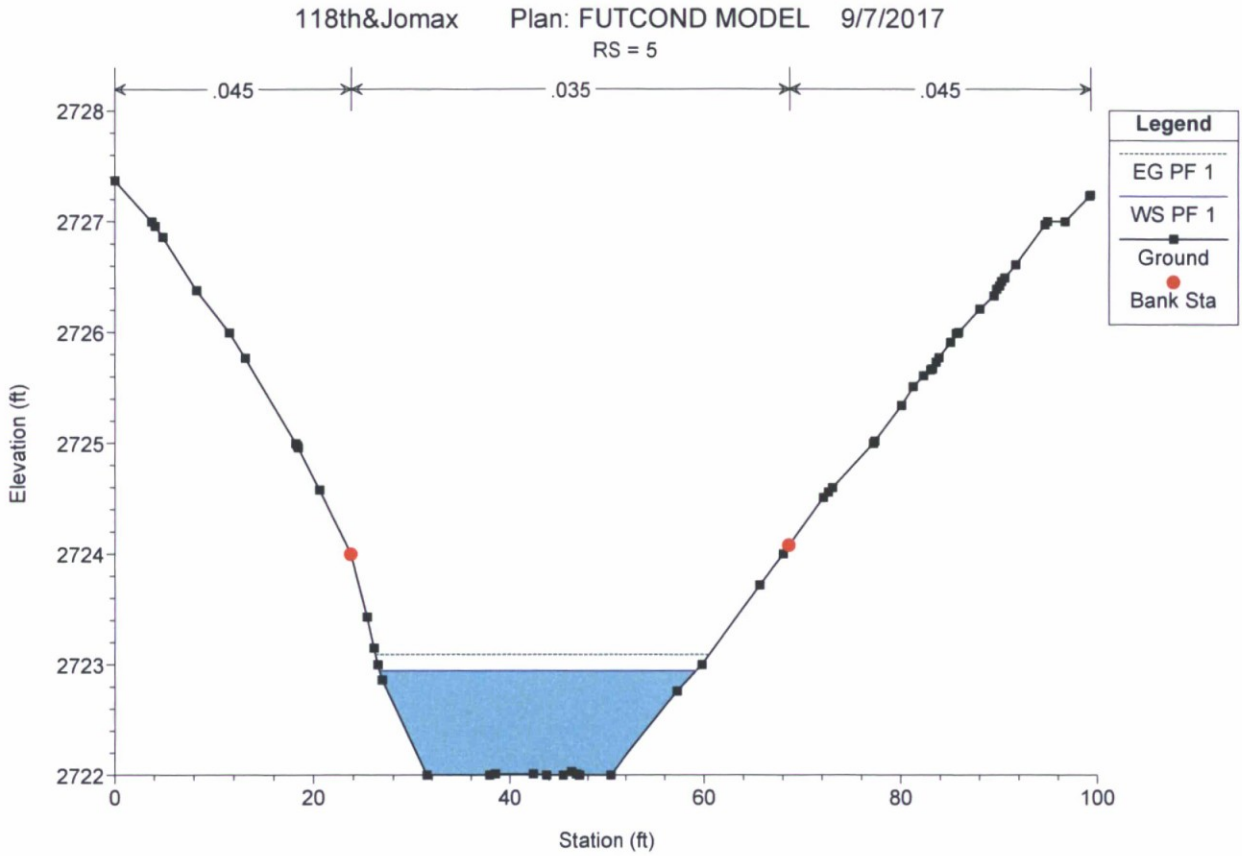
2729
2728
2727
2726
2725
2724
2723
0
20
40
60
80
100
Station (ft)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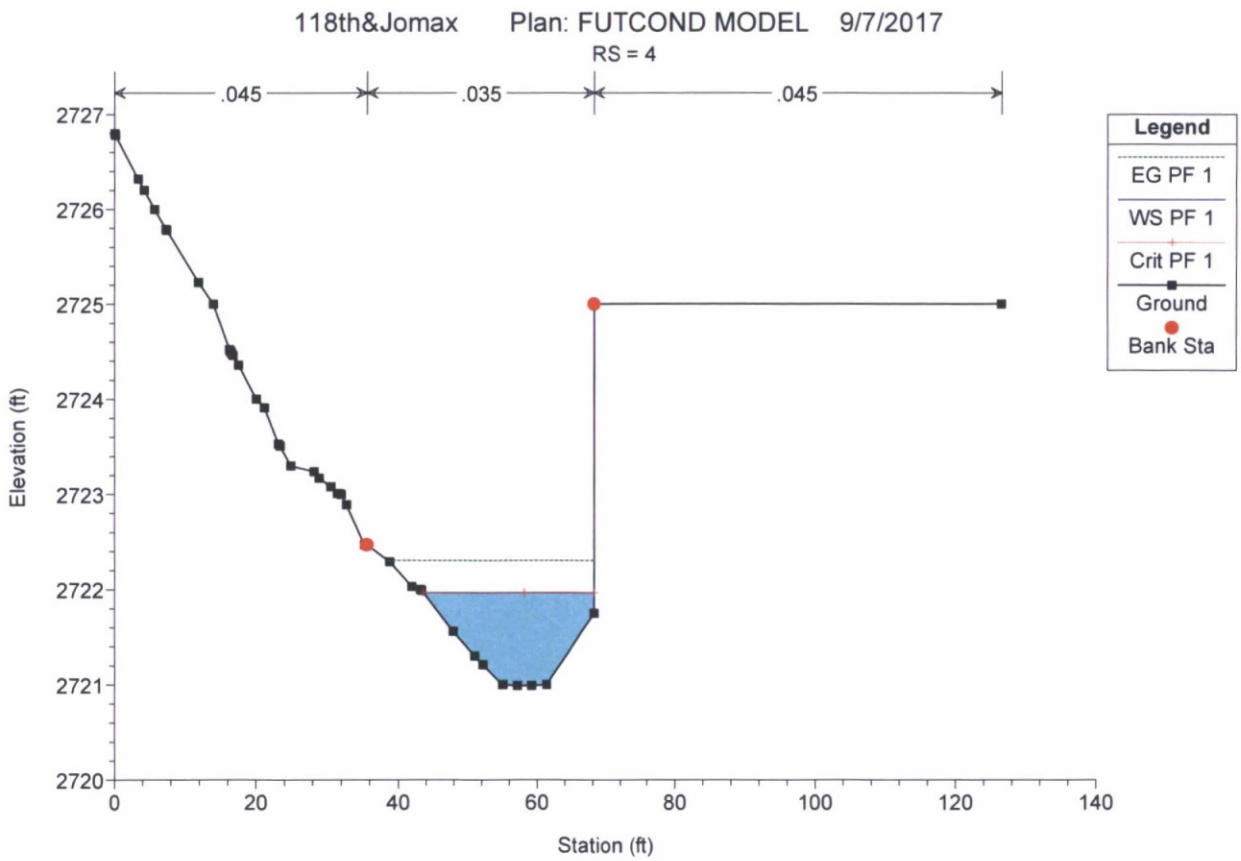
.035
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2728
2727
2726
2725
2724
2723
2722
0
20
40
60
80
100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.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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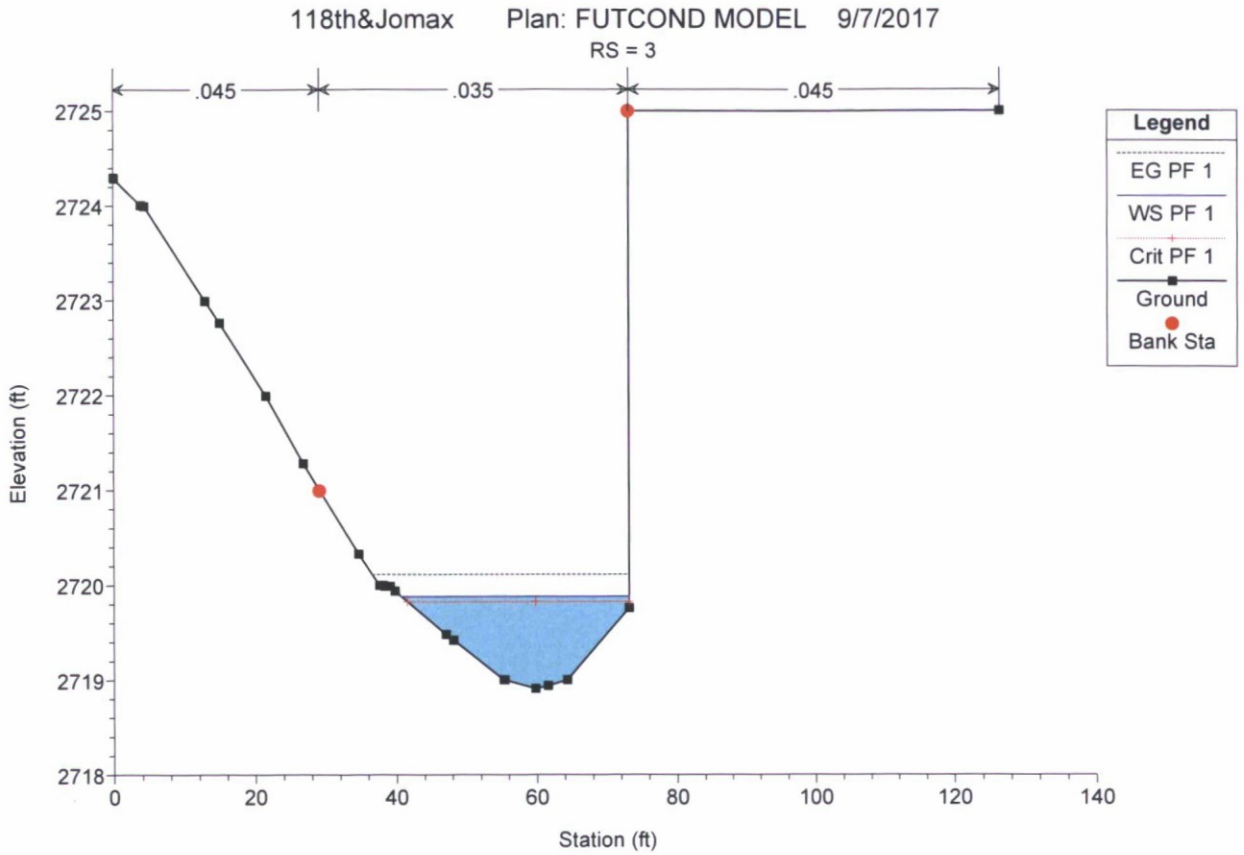
2726
2725
2724
2723
2722
2721
2720
0
20
40
60
80
100
120
140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.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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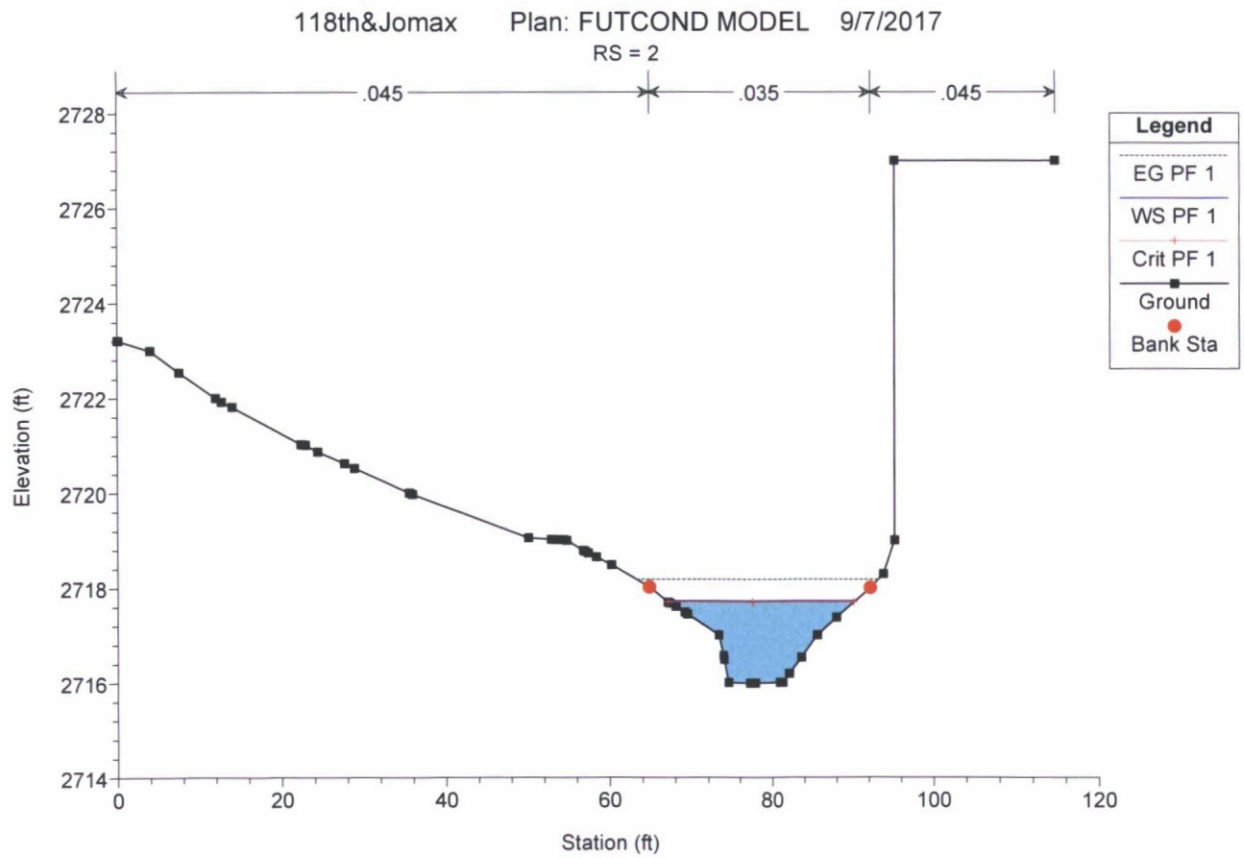
2724
2723
2722
2721
2720
2719
2718
0
20
40
60
80
100
120
140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.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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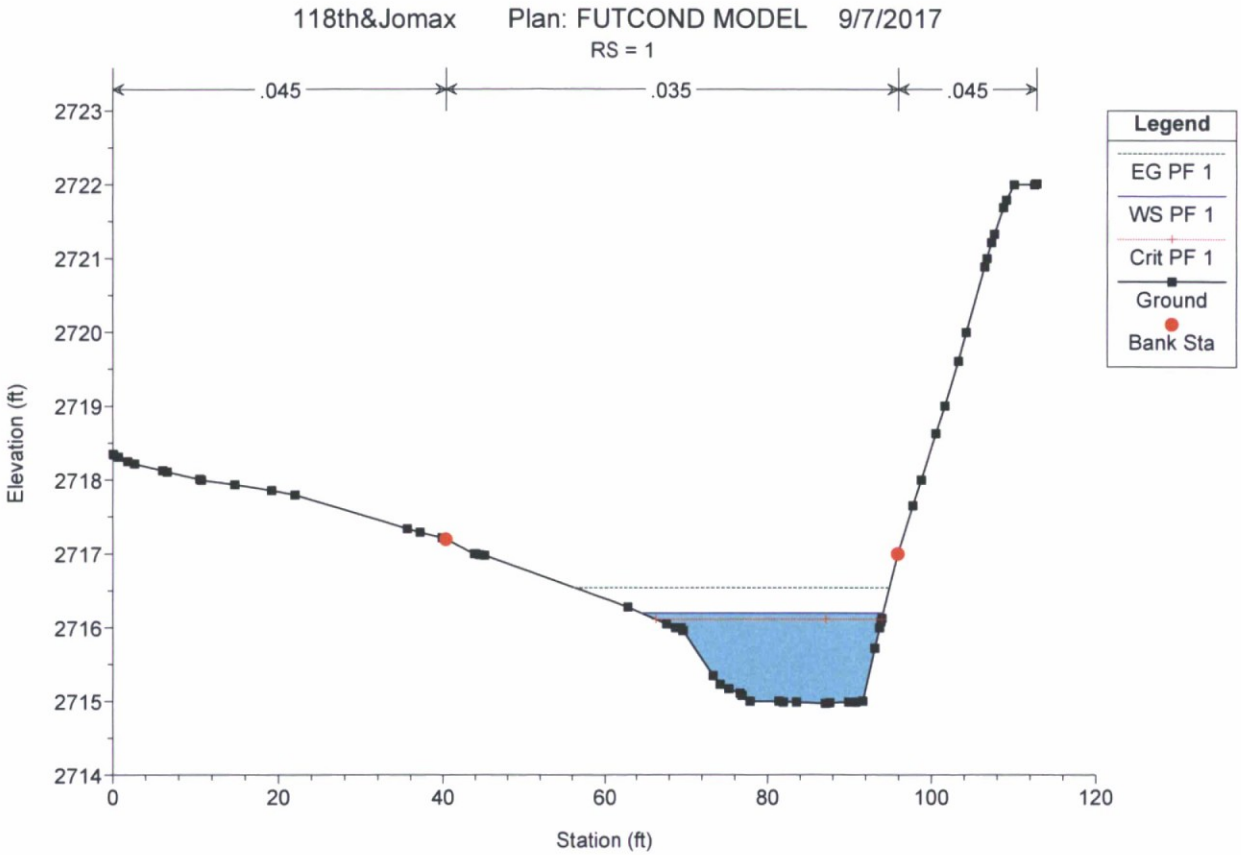
2726
2724
2722
2720
2718
2716
2714
0
20
40
60
80
100
120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.045
.035
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2723
2722
2721
2720
2719
2718
2717
2716
2715
2714
0
20
40
60
80
100
120

Appendix D

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

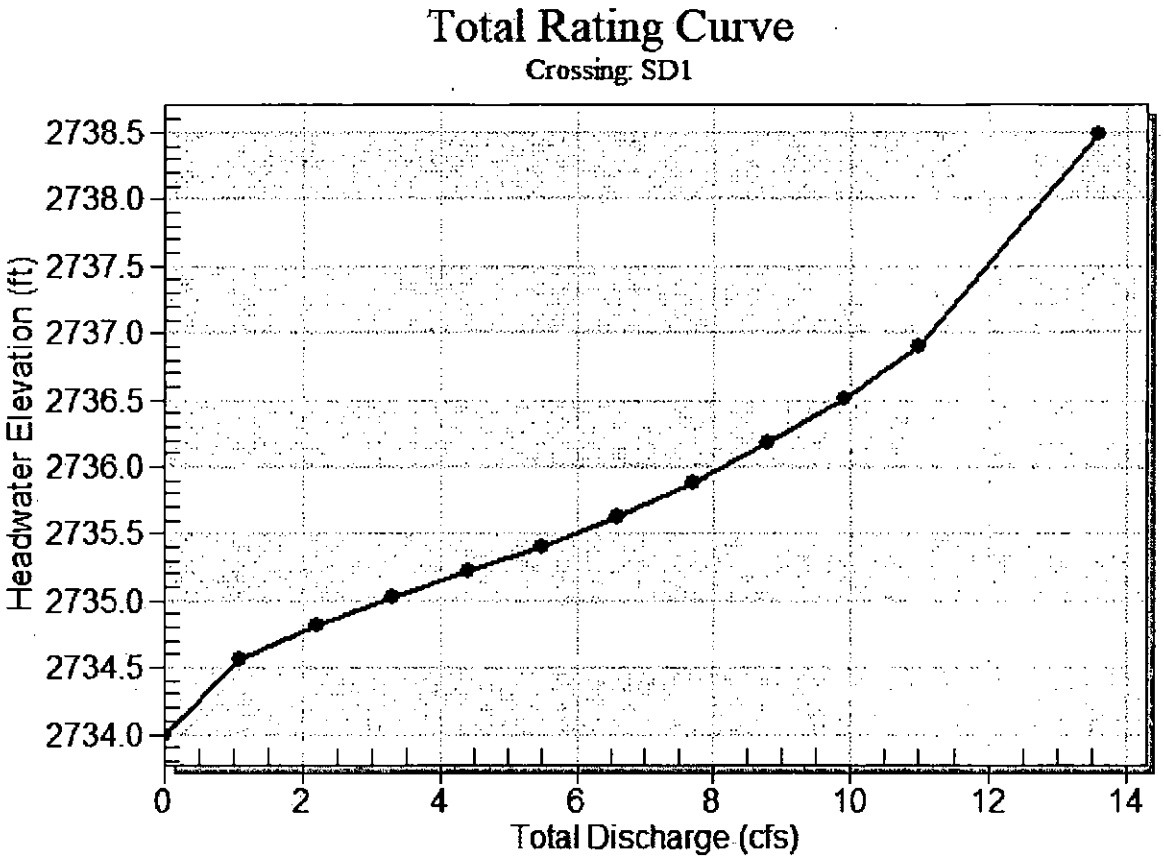
Minimum Flow: 0 cfs

Design Flow: 11 cfs

Maximum Flow: 11 cfs

Table 1 - Summary of Culvert Flows at Crossing

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2734.00	0.00	0.00	0.00	1
2734.56	1.10	1.10	0.00	1
2734.82	2.20	2.20	0.00	1
2735.03	3.30	3.30	0.00	1
2735.21	4.40	4.40	0.00	1
2735.41	5.50	5.50	0.00	1
2735.63	6.60	6.60	0.00	1
2735.88	7.70	7.70	0.00	1
2736.18	8.80	8.80	0.00	1
2736.52	9.90	9.90	0.00	1
2736.89	11.00	11.00	0.00	1
2737.90	13.60	13.60	0.00	Overtopping


Total Rating Curve
Crossing: SD1
Headwater Elevation (ft)
2738.5
2738.0
2737.5
2737.0
2736.5
2736.0
2735.5
2735.0
2734.5
2734.0
0
2
4
6
8
10
12
14
Total Discharge (cfs)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2734.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.10	1.10	2734.56	0.563	0.0*	1-S2n	0.300	0.388	0.307	0.112	4.327	1.601
2.20	2.20	2734.82	0.819	0.112	1-S2n	0.430	0.555	0.437	0.165	5.175	2.001
3.30	3.30	2735.03	1.027	0.321	1-S2n	0.533	0.692	0.543	0.206	5.722	2.266
4.40	4.40	2735.21	1.214	0.532	1-S2n	0.622	0.803	0.637	0.241	6.154	2.469
5.50	5.50	2735.41	1.407	0.759	1-S2n	0.707	0.901	0.724	0.271	6.522	2.636
6.60	6.60	2735.63	1.626	1.007	5-S2n	0.787	0.991	0.808	0.298	6.805	2.779
7.70	7.70	2735.88	1.881	1.273	5-S2n	0.867	1.071	0.889	0.322	7.069	2.903
8.80	8.80	2736.18	2.177	1.738	5-S2n	0.946	1.144	0.968	0.345	7.291	3.014
9.90	9.90	2736.52	2.516	2.016	5-S2n	1.030	1.212	1.050	0.367	7.505	3.117
11.00	11.00	2736.89	2.892	2.316	5-S2n	1.121	1.269	1.135	0.387	7.648	3.209

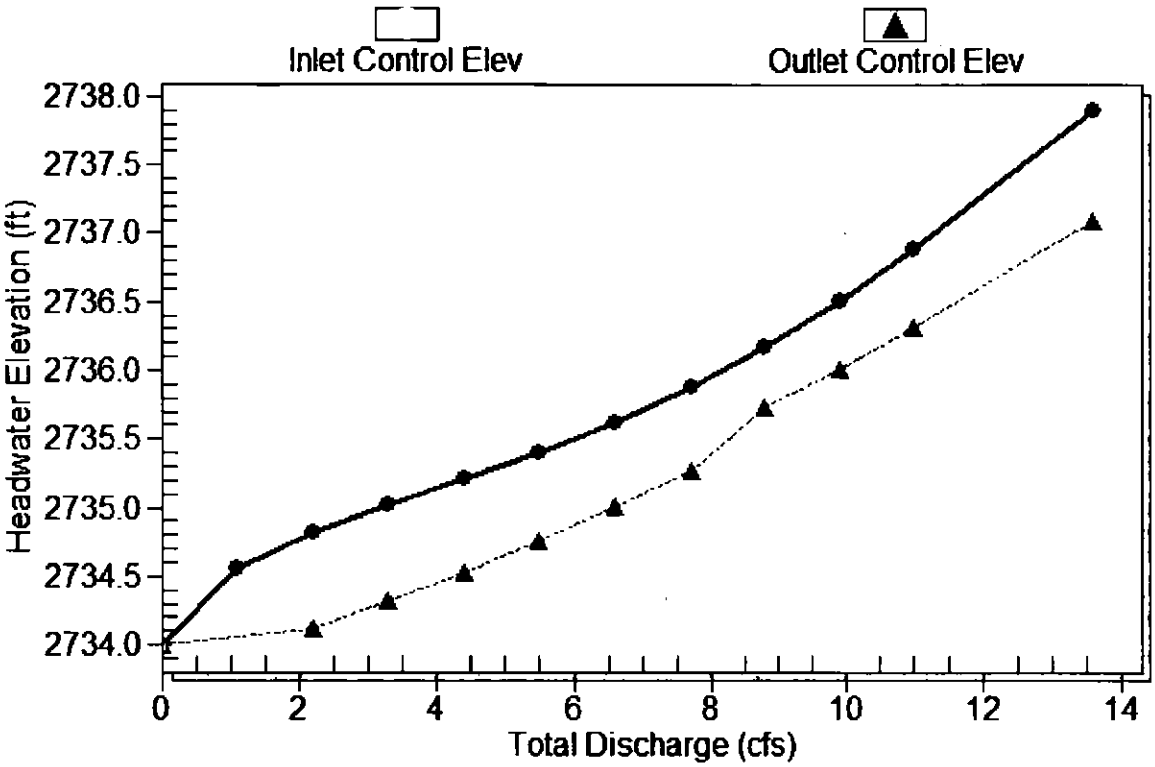
Straight Culvert

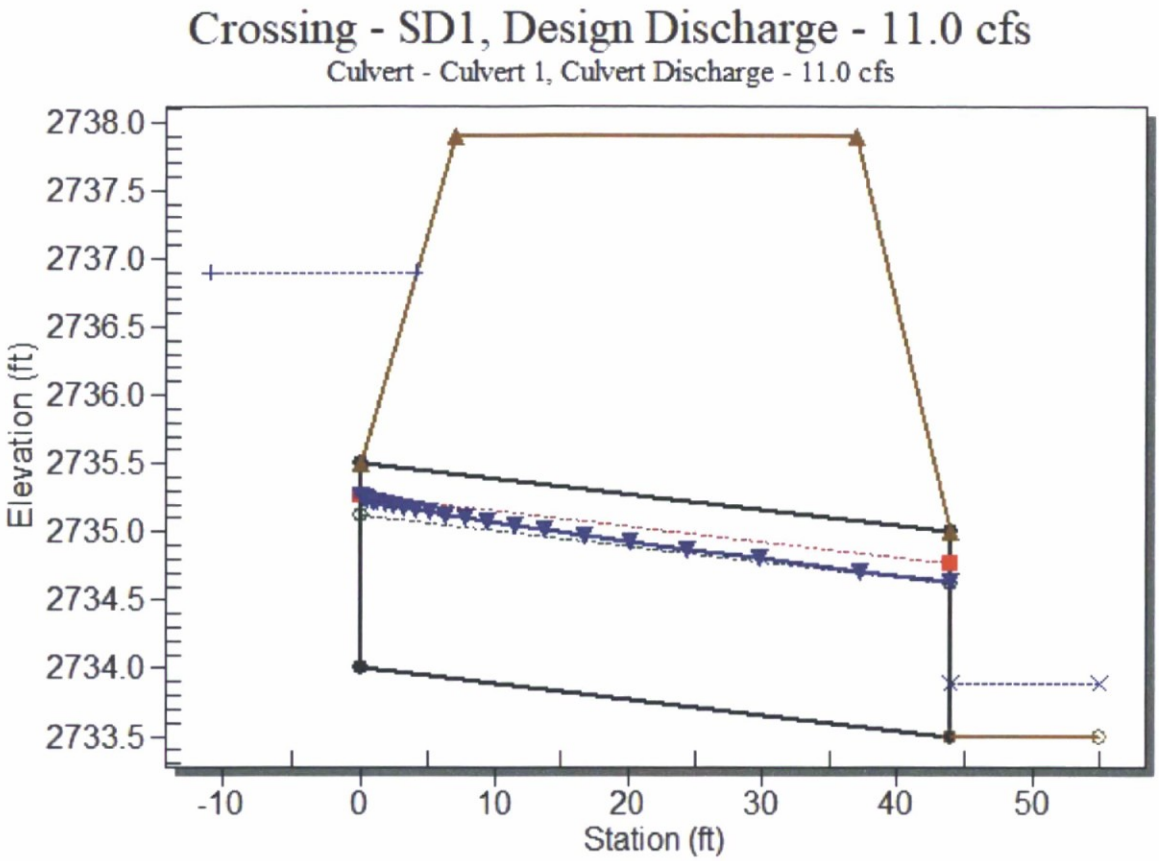
Inlet Elevation (invert): 2734.00 ft, Outlet Elevation (invert): 2733.50 ft

Culvert Length: 44.00 ft, Culvert Slope: 0.0114

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2734.00 ft

Outlet Station: 44.00 ft

Outlet Elevation: 2733.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2733.50	0.00	0.00	0.00	0.00
1.10	2733.61	0.11	1.60	0.23	0.92
2.20	2733.67	0.17	2.00	0.34	0.97
3.30	2733.71	0.21	2.27	0.42	1.00
4.40	2733.74	0.24	2.47	0.50	1.02
5.50	2733.77	0.27	2.64	0.56	1.04
6.60	2733.80	0.30	2.78	0.61	1.05
7.70	2733.82	0.32	2.90	0.66	1.06
8.80	2733.85	0.35	3.01	0.71	1.07
9.90	2733.87	0.37	3.12	0.75	1.08
11.00	2733.89	0.39	3.21	0.80	1.09

Tailwater Channel Data - SD1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0330

Channel Manning's n: 0.0350

Channel Invert Elevation: 2733.50 ft

Roadway Data for Crossing: SD1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2737.90 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

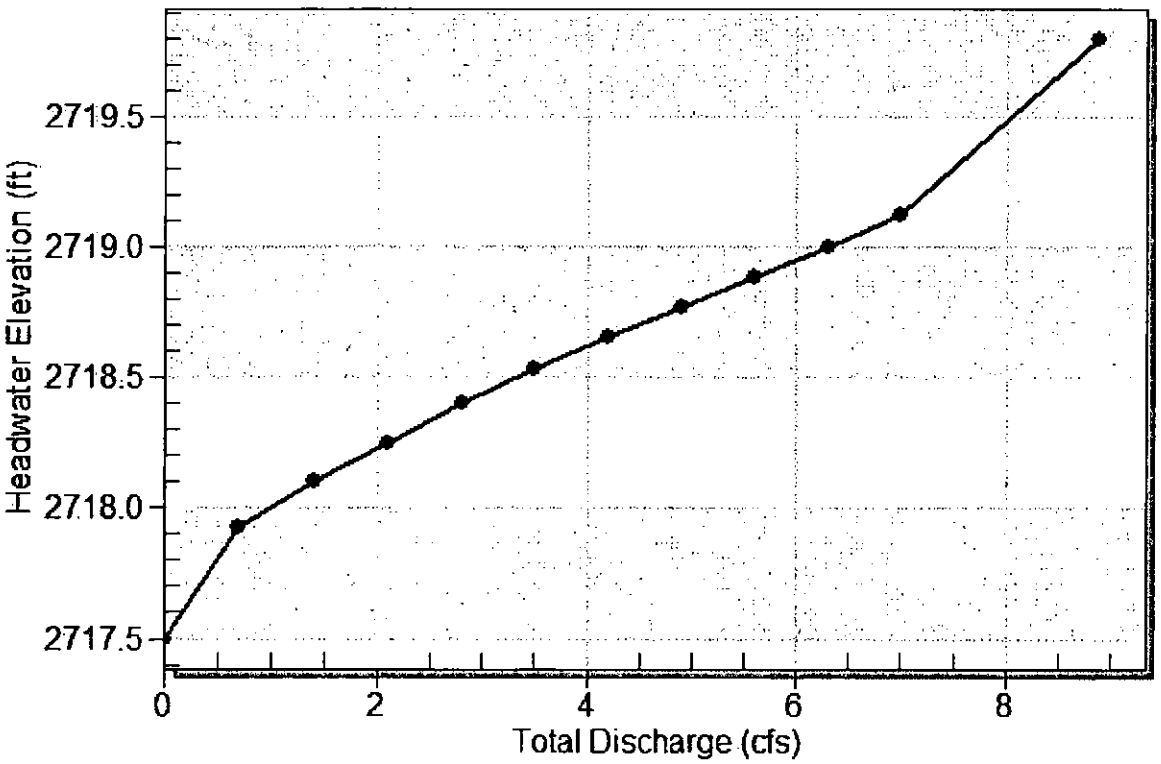
Design Flow: 7 cfs

Maximum Flow: 7 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2717.50	0.00	0.00	0.00	1
2717.92	0.70	0.70	0.00	1
2718.10	1.40	1.40	0.00	1
2718.25	2.10	2.10	0.00	1
2718.40	2.80	2.80	0.00	1
2718.53	3.50	3.50	0.00	1
2718.66	4.20	4.20	0.00	1
2718.77	4.90	4.90	0.00	1
2718.89	5.60	5.60	0.00	1
2719.00	6.30	6.30	0.00	1
2719.13	7.00	7.00	0.00	1
2719.50	8.89	8.89	0.00	Overtopping

Total Rating Curve

Crossing: SD2



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2717.50	0.000	0.000	0-NF	0.000	0.000	0.000	-1.500	0.000	0.000
0.70	0.70	2717.92	0.424	0.0*	1-S2n	0.215	0.308	0.215	-1.500	4.356	2.905
1.40	1.40	2718.10	0.605	0.0*	1-S2n	0.312	0.441	0.317	-1.500	5.290	4.454
2.10	2.10	2718.25	0.748	0.0*	1-S2n	0.385	0.544	0.385	-1.500	5.823	4.962
2.80	2.80	2718.40	0.899	0.0*	1-S2n	0.447	0.634	0.447	-1.500	6.396	5.326
3.50	3.50	2718.53	1.033	0.0*	1-S2n	0.503	0.714	0.503	-1.500	6.721	5.645
4.20	4.20	2718.66	1.156	0.0*	1-S2n	0.556	0.784	0.556	-1.500	7.050	5.930
4.90	4.90	2718.77	1.273	0.0*	1-S2n	0.603	0.847	0.603	-1.500	7.357	6.175
5.60	5.60	2718.89	1.388	0.0*	1-S2n	0.651	0.909	0.651	-1.500	7.613	6.384
6.30	6.30	2719.00	1.505	0.0*	5-S2n	0.697	0.965	0.697	-1.500	7.844	6.572
7.00	7.00	2719.13	1.627	0.0*	5-S2n	0.740	1.021	0.740	-1.500	8.060	6.740

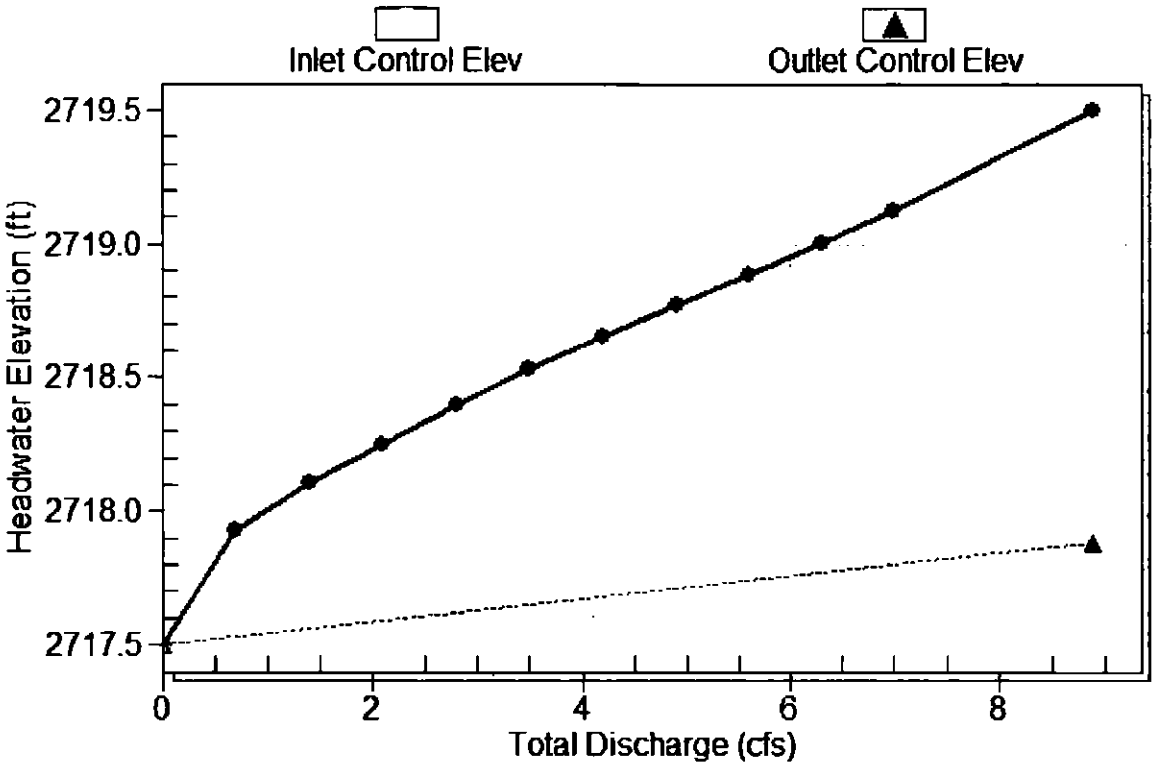
Straight Culvert

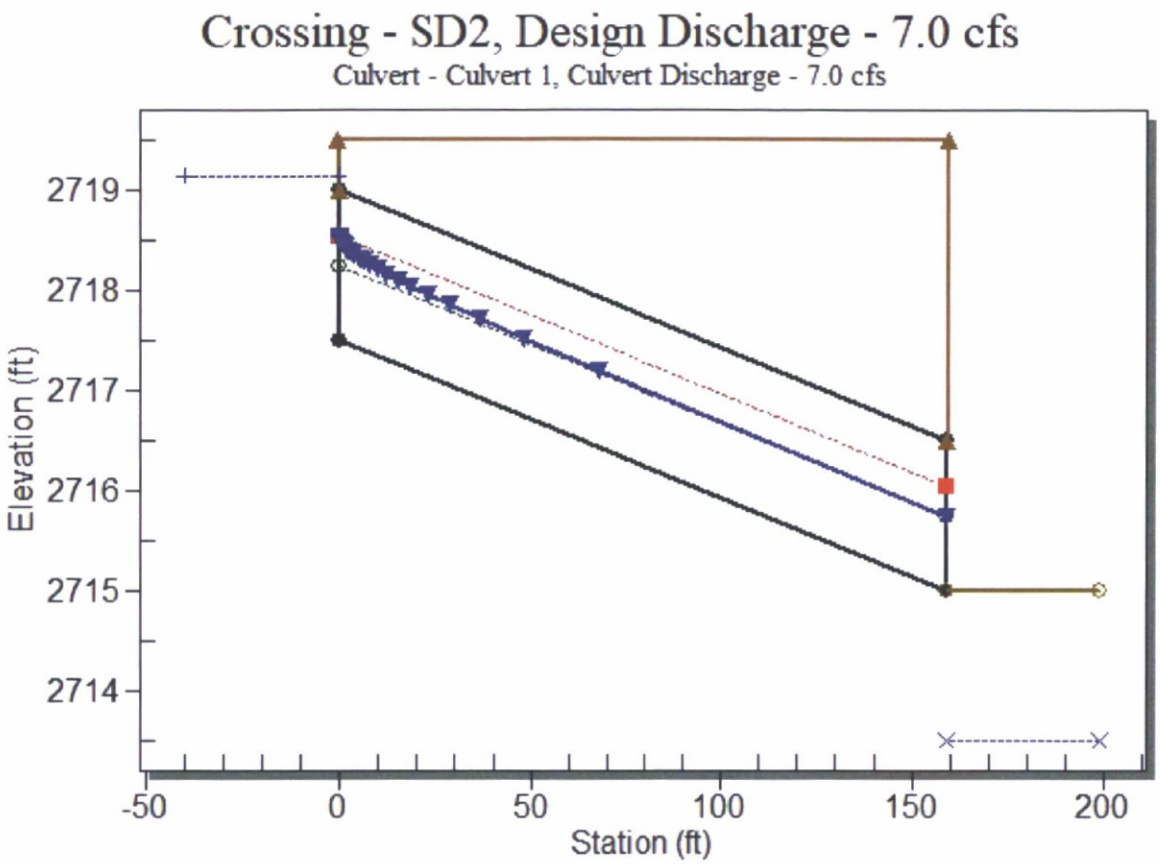
Inlet Elevation (invert): 2717.50 ft, Outlet Elevation (invert): 2715.00 ft

Culvert Length: 159.02 ft, Culvert Slope: 0.0157

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2717.50 ft

Outlet Station: 159.00 ft

Outlet Elevation: 2715.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
0.00	2713.50	2713.50	0.00
1.00	2713.50	2713.50	4.15
2.00	2713.50	2713.50	4.91
3.00	2713.50	2713.50	5.43
4.00	2713.50	2713.50	5.86
5.00	2713.50	2713.50	6.21
6.00	2713.50	2713.50	6.50
7.00	2713.50	2713.50	6.74
8.00	2713.50	2713.50	6.96
9.00	2713.50	2713.50	7.16
10.00	2713.50	2713.50	7.31

Tailwater Channel Data - SD2

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 2715.00 ft

Roadway Data for Crossing: SD2

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2719.50 ft

Roadway Surface: Paved

Roadway Top Width: 160.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

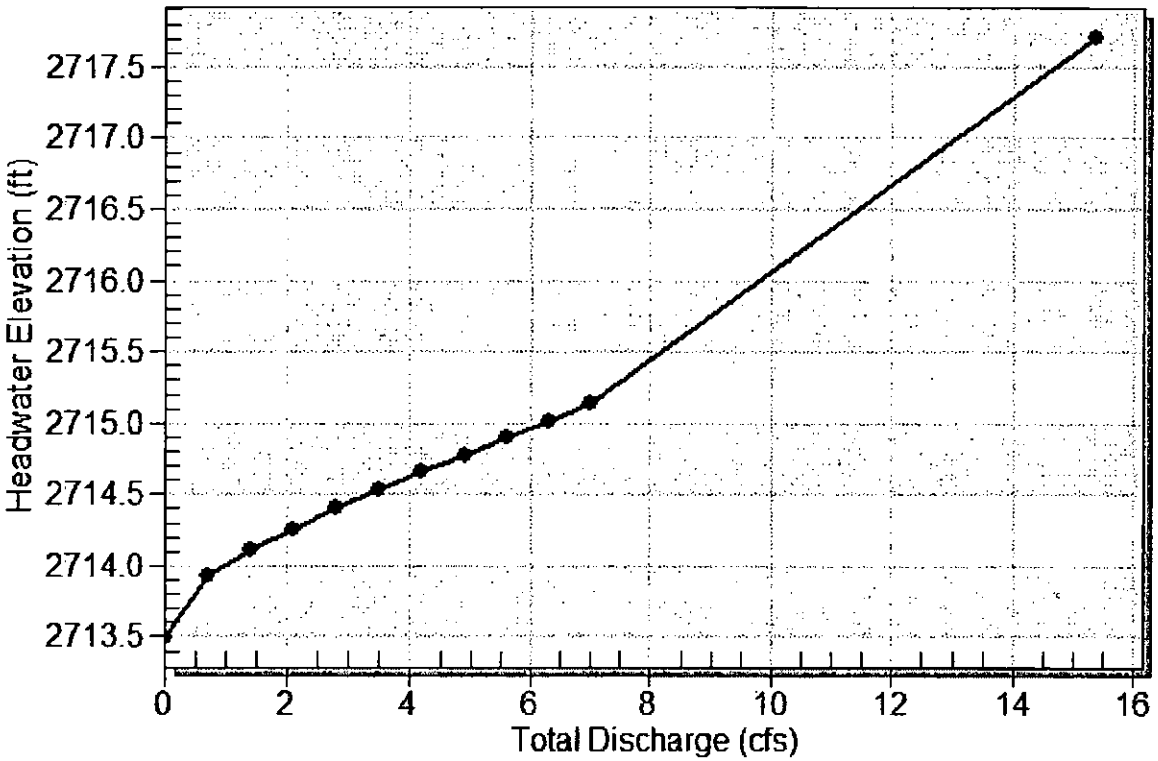
Design Flow: 7 cfs

Maximum Flow: 7 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2713.50	0.00	0.00	0.00	1
2713.93	0.70	0.70	0.00	1
2714.11	1.40	1.40	0.00	1
2714.25	2.10	2.10	0.00	1
2714.40	2.80	2.80	0.00	1
2714.54	3.50	3.50	0.00	1
2714.66	4.20	4.20	0.00	1
2714.78	4.90	4.90	0.00	1
2714.89	5.60	5.60	0.00	1
2715.01	6.30	6.30	0.00	1
2715.13	7.00	7.00	0.00	1
2717.50	15.37	15.37	0.00	Overtopping

Total Rating Curve

Crossing: SD3



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2713.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.70	0.70	2713.93	0.426	0.0*	1-S2n	0.243	0.308	0.243	0.078	3.703	0.829
1.40	1.40	2714.11	0.607	0.0*	1-S2n	0.345	0.441	0.354	0.118	4.359	1.065
2.10	2.10	2714.25	0.751	0.094	1-S2n	0.429	0.544	0.434	0.149	4.973	1.228
2.80	2.80	2714.40	0.903	0.221	1-S2n	0.498	0.634	0.506	0.176	5.332	1.356
3.50	3.50	2714.54	1.037	0.350	1-S2n	0.563	0.714	0.571	0.200	5.684	1.461
4.20	4.20	2714.66	1.160	0.481	1-S2n	0.621	0.784	0.632	0.221	5.932	1.553
4.90	4.90	2714.78	1.277	0.615	1-S2n	0.679	0.847	0.690	0.242	6.175	1.634
5.60	5.60	2714.89	1.392	0.759	1-S2n	0.733	0.909	0.745	0.260	6.388	1.706
6.30	6.30	2715.01	1.509	0.907	5-S2n	0.786	0.965	0.800	0.278	6.569	1.772
7.00	7.00	2715.13	1.631	1.068	5-S2n	0.839	1.021	0.854	0.295	6.737	1.832

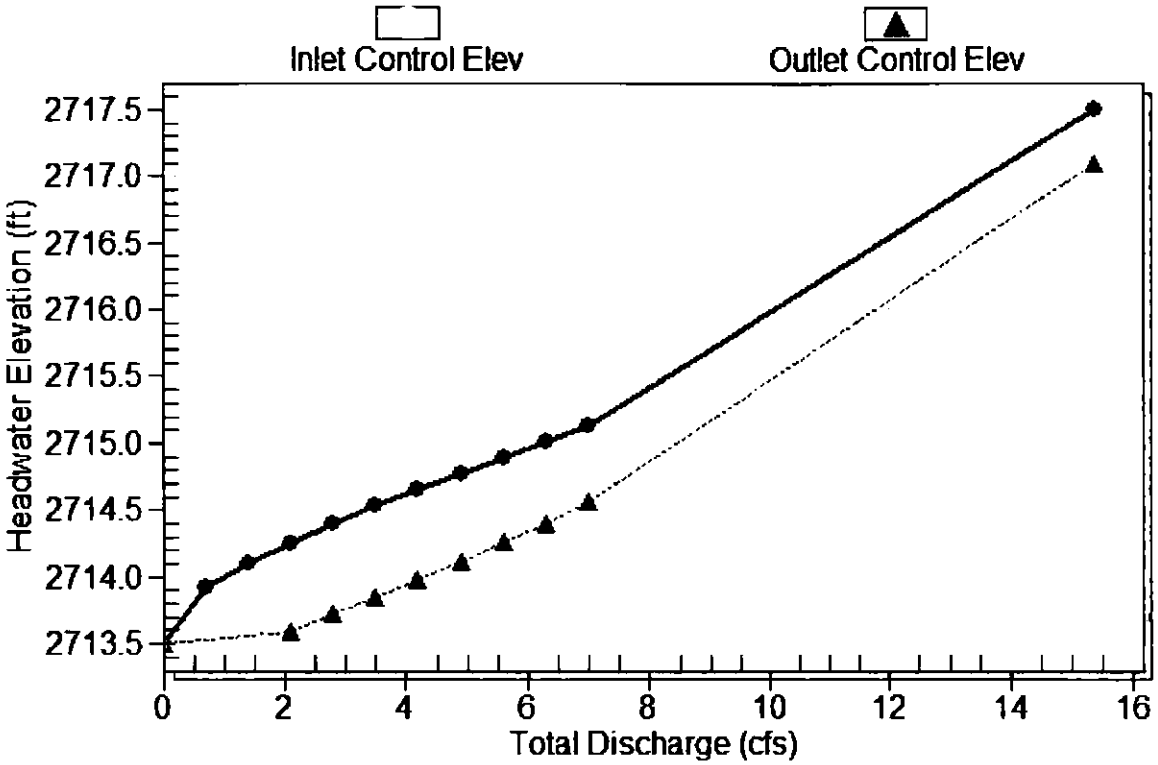
Straight Culvert

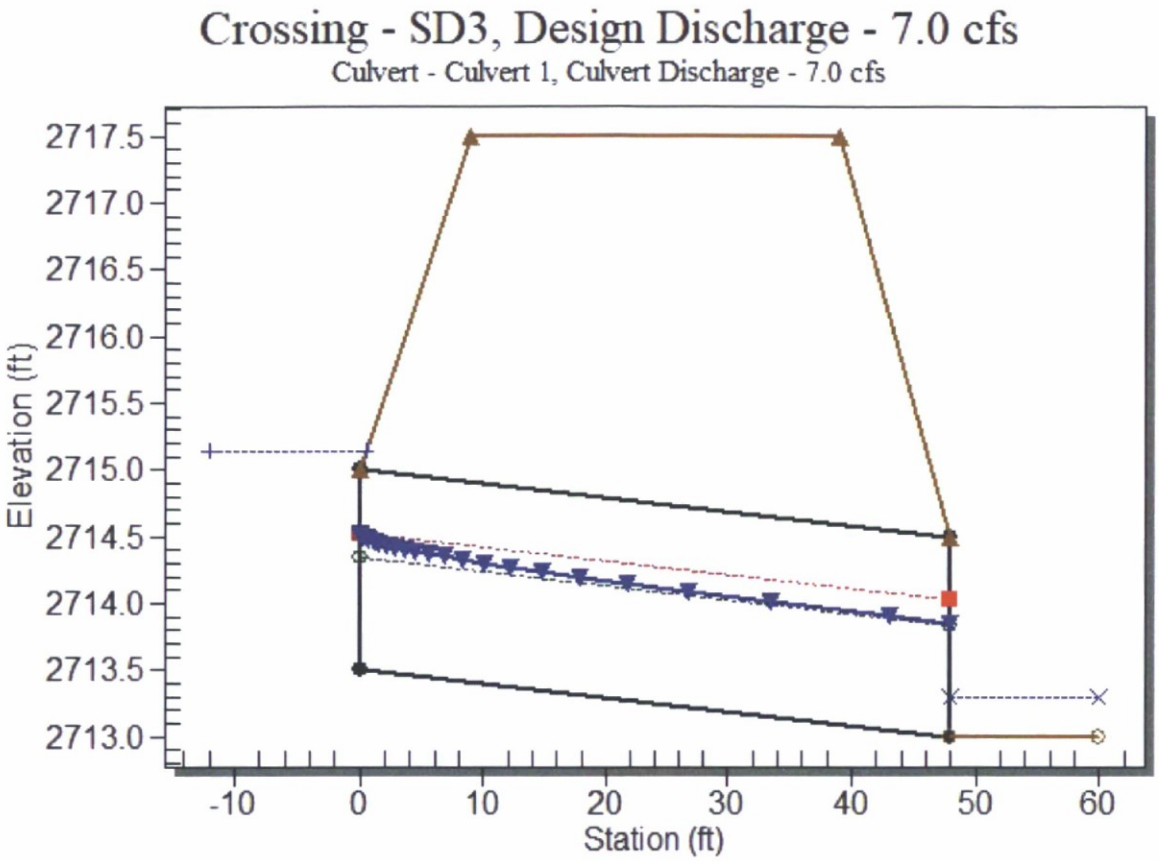
Inlet Elevation (invert): 2713.50 ft, Outlet Elevation (invert): 2713.00 ft

Culvert Length: 48.00 ft, Culvert Slope: 0.0104

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2713.50 ft

Outlet Station: 48.00 ft

Outlet Elevation: 2713.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2713.00	0.00	0.00	0.00	0.00
0.70	2713.08	0.08	0.83	0.06	0.54
1.40	2713.12	0.12	1.07	0.09	0.58
2.10	2713.15	0.15	1.23	0.12	0.60
2.80	2713.18	0.18	1.36	0.14	0.61
3.50	2713.20	0.20	1.46	0.16	0.62
4.20	2713.22	0.22	1.55	0.17	0.63
4.90	2713.24	0.24	1.63	0.19	0.64
5.60	2713.26	0.26	1.71	0.20	0.65
6.30	2713.28	0.28	1.77	0.22	0.65
7.00	2713.29	0.29	1.83	0.23	0.66

Tailwater Channel Data - SD3

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0125

Channel Manning's n: 0.0350

Channel Invert Elevation: 2713.00 ft

Roadway Data for Crossing: SD3

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2717.50 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

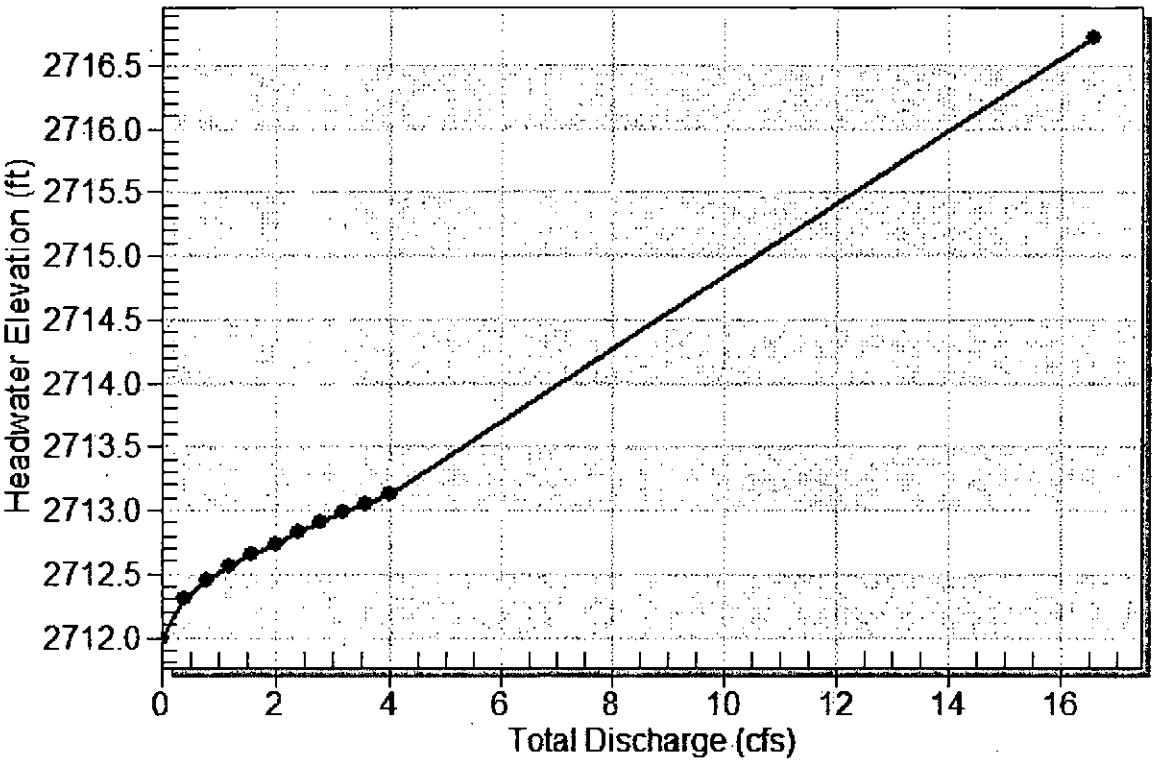
Design Flow: 4 cfs

Maximum Flow: 4 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2712.00	0.00	0.00	0.00	1
2712.31	0.40	0.40	0.00	1
2712.45	0.80	0.80	0.00	1
2712.56	1.20	1.20	0.00	1
2712.65	1.60	1.60	0.00	1
2712.73	2.00	2.00	0.00	1
2712.82	2.40	2.40	0.00	1
2712.90	2.80	2.80	0.00	1
2712.98	3.20	3.20	0.00	1
2713.06	3.60	3.60	0.00	1
2713.13	4.00	4.00	0.00	1
2716.50	16.59	16.59	0.00	Overtopping

Total Rating Curve

Crossing: SD4



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2712.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.40	0.40	2712.31	0.312	0.0*	1-S2n	0.184	0.230	0.196	0.073	2.840	0.955
0.80	0.80	2712.45	0.449	0.0*	1-S2n	0.274	0.327	0.274	0.109	3.626	1.210
1.20	1.20	2712.56	0.558	0.0*	1-S2n	0.329	0.406	0.335	0.137	4.030	1.381
1.60	1.60	2712.65	0.649	0.0*	1-S2n	0.384	0.470	0.388	0.160	4.396	1.512
2.00	2.00	2712.73	0.732	0.077	1-S2n	0.431	0.530	0.435	0.181	4.726	1.622
2.40	2.40	2712.82	0.820	0.149	1-S2n	0.473	0.582	0.480	0.200	4.908	1.714
2.80	2.80	2712.90	0.904	0.225	1-S2n	0.514	0.634	0.520	0.217	5.135	1.795
3.20	3.20	2712.98	0.982	0.300	1-S2n	0.554	0.681	0.558	0.234	5.349	1.868
3.60	3.60	2713.06	1.056	0.375	1-S2n	0.589	0.725	0.595	0.249	5.536	1.934
4.00	4.00	2713.13	1.127	0.451	1-S2n	0.625	0.765	0.632	0.263	5.649	1.996

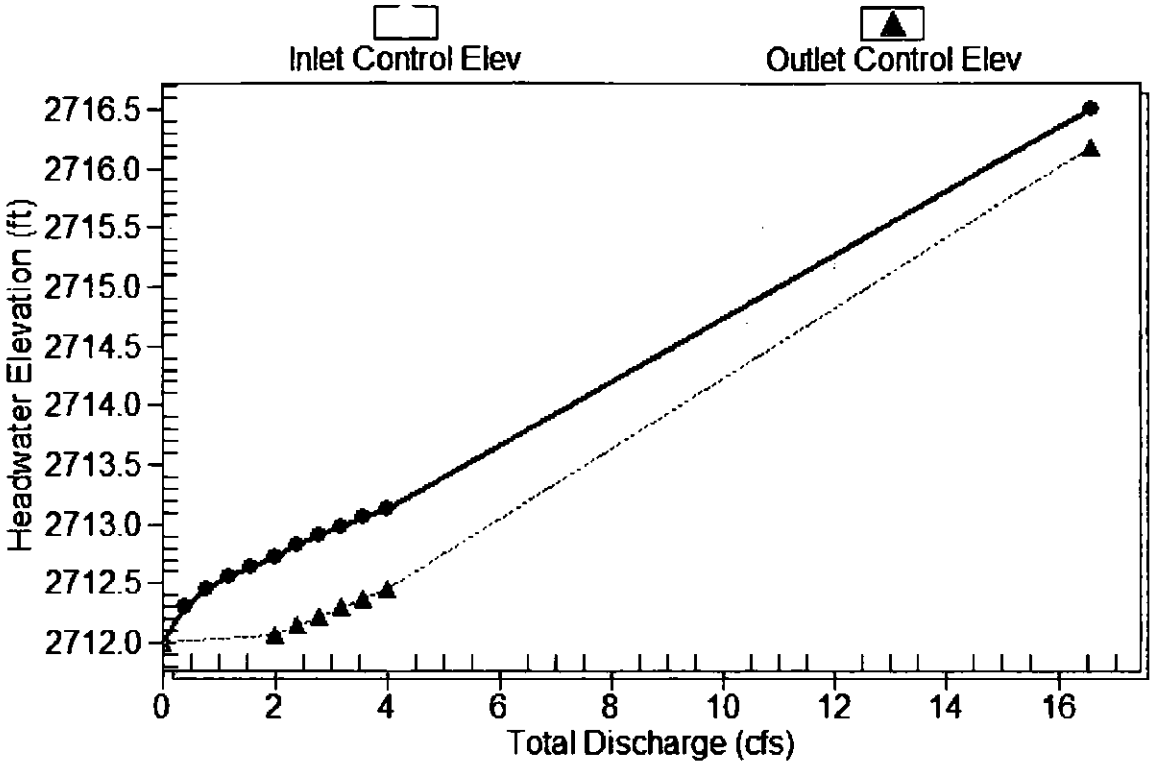
Straight Culvert

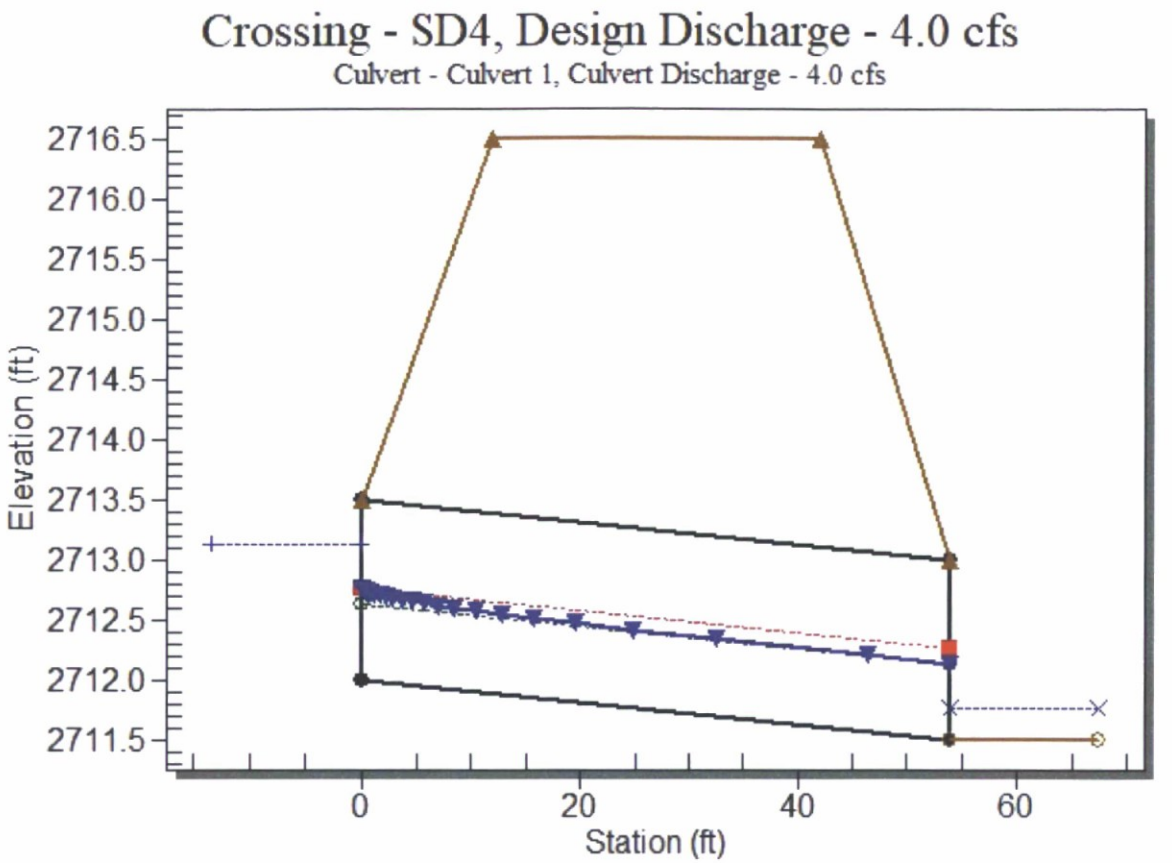
Inlet Elevation (invert): 2712.00 ft, Outlet Elevation (invert): 2711.50 ft

Culvert Length: 54.00 ft, Culvert Slope: 0.0093

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2712.00 ft

Outlet Station: 54.00 ft

Outlet Elevation: 2711.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2711.50	0.00	0.00	0.00	0.00
0.40	2711.57	0.07	0.96	0.06	0.66
0.80	2711.61	0.11	1.21	0.08	0.70
1.20	2711.64	0.14	1.38	0.11	0.73
1.60	2711.66	0.16	1.51	0.12	0.74
2.00	2711.68	0.18	1.62	0.14	0.76
2.40	2711.70	0.20	1.71	0.16	0.77
2.80	2711.72	0.22	1.80	0.17	0.77
3.20	2711.73	0.23	1.87	0.18	0.78
3.60	2711.75	0.25	1.93	0.19	0.79
4.00	2711.76	0.26	2.00	0.20	0.80

Tailwater Channel Data - SD4

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0125

Channel Manning's n: 0.0280

Channel Invert Elevation: 2711.50 ft

Roadway Data for Crossing: SD4

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2716.50 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

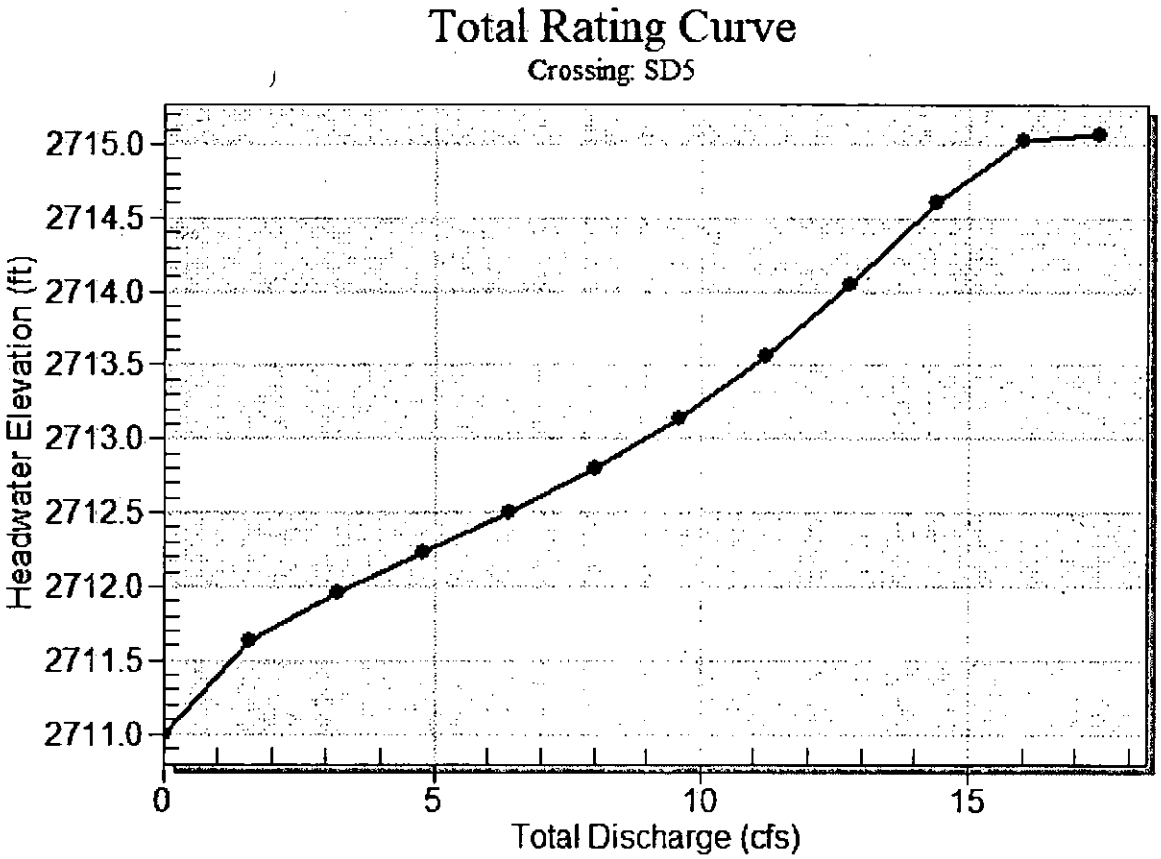
Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 16 cfs

Maximum Flow: 16 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2711.00	0.00	0.00	0.00	1
2711.63	1.60	1.60	0.00	1
2711.96	3.20	3.20	0.00	1
2712.24	4.80	4.80	0.00	1
2712.50	6.40	6.40	0.00	1
2712.79	8.00	8.00	0.00	1
2713.14	9.60	9.60	0.00	1
2713.56	11.20	11.20	0.00	1
2714.04	12.80	12.80	0.00	1
2714.60	14.40	14.40	0.00	1
2715.03	16.00	15.51	0.45	21
2715.00	15.43	15.43	0.00	Overtopping


Total Rating Curve
Crossing: SD5
Headwater Elevation (ft)
2715.0
2714.5
2714.0
2713.5
2713.0
2712.5
2712.0
2711.5
2711.0
0
5
10
15
Total Discharge (cfs)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2711.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.60	1.60	2711.63	0.631	0.0*	1-S2n	0.261	0.470	0.261	0.145	7.724	1.930
3.20	3.20	2711.96	0.956	0.0*	1-S2n	0.367	0.681	0.384	0.216	8.914	2.440
4.80	4.80	2712.24	1.235	0.0*	1-S2n	0.454	0.839	0.478	0.271	9.858	2.784
6.40	6.40	2712.50	1.501	0.0*	5-S2n	0.530	0.972	0.570	0.318	10.419	3.050
8.00	8.00	2712.79	1.794	0.0*	5-S2n	0.597	1.092	0.645	0.360	11.008	3.268
9.60	9.60	2713.14	2.141	0.361	5-S2n	0.662	1.195	0.726	0.398	11.341	3.455
11.20	11.20	2713.56	2.556	0.769	5-S2n	0.724	1.279	0.797	0.432	11.746	3.619
12.80	12.80	2714.04	3.044	1.223	5-S2n	0.783	1.344	0.867	0.464	12.089	3.766
14.40	14.40	2714.60	3.603	1.725	5-S2n	0.843	1.390	0.933	0.494	12.466	3.899
16.00	15.51	2715.03	4.030	2.101	5-S2n	0.883	1.413	0.980	0.523	12.677	4.021

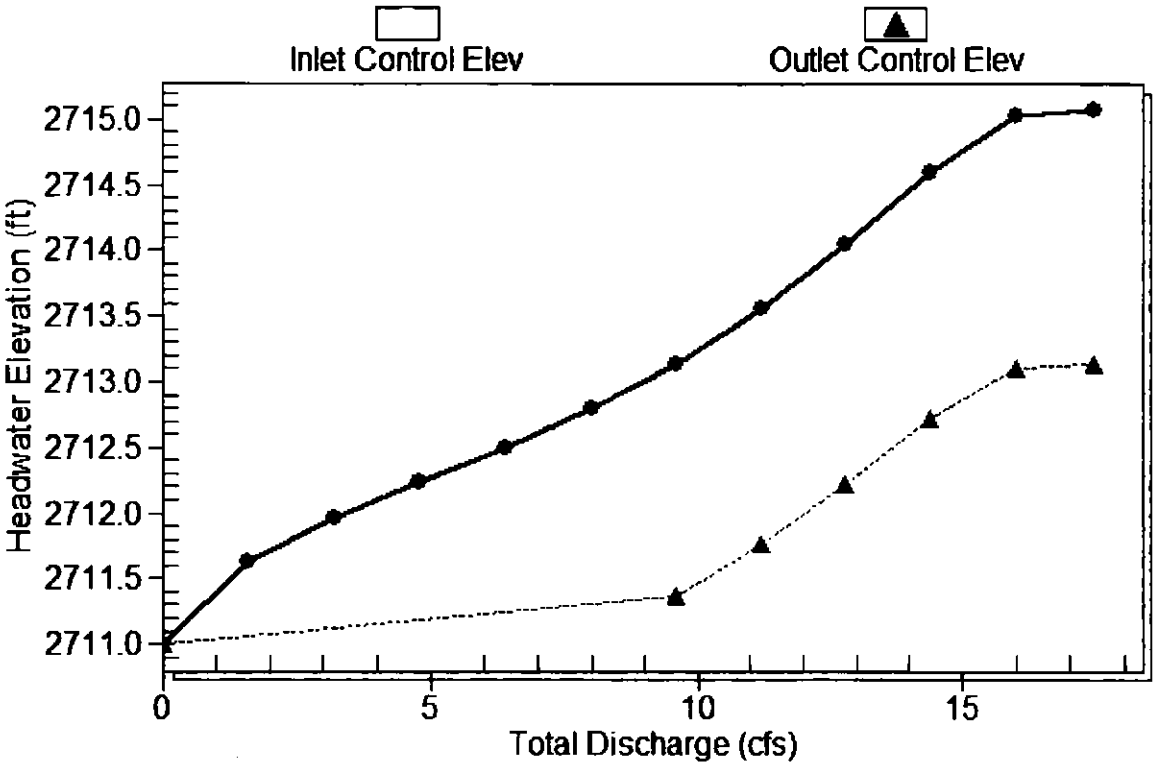
Straight Culvert

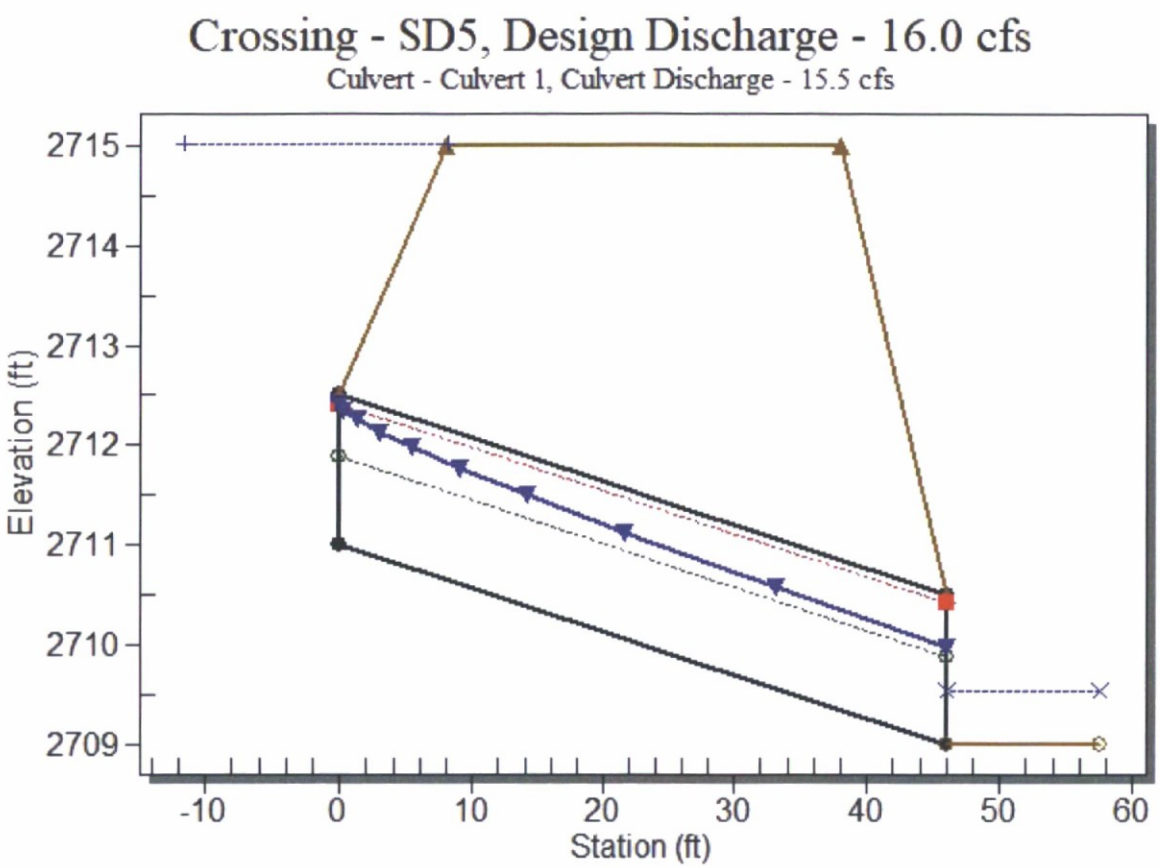
Inlet Elevation (invert): 2711.00 ft, Outlet Elevation (invert): 2709.00 ft

Culvert Length: 46.04 ft, Culvert Slope: 0.0435

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2711.00 ft

Outlet Station: 46.00 ft

Outlet Elevation: 2709.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2709.00	0.00	0.00	0.00	0.00
1.60	2709.14	0.14	1.93	0.29	0.95
3.20	2709.22	0.22	2.44	0.43	1.00
4.80	2709.27	0.27	2.78	0.54	1.04
6.40	2709.32	0.32	3.05	0.64	1.06
8.00	2709.36	0.36	3.27	0.72	1.08
9.60	2709.40	0.40	3.46	0.79	1.09
11.20	2709.43	0.43	3.62	0.86	1.11
12.80	2709.46	0.46	3.77	0.93	1.12
14.40	2709.49	0.49	3.90	0.99	1.13
16.00	2709.52	0.52	4.02	1.04	1.14

Tailwater Channel Data - SD5

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 5.00 (_:1)

Channel Slope: 0.0320

Channel Manning's n: 0.0350

Channel Invert Elevation: 2709.00 ft

Roadway Data for Crossing: SD5

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2715.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 3 cfs

Maximum Flow: 3 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2702.44	0.00	0.00	0.00	1
2702.71	0.30	0.30	0.00	1
2702.83	0.60	0.60	0.00	1
2702.92	0.90	0.90	0.00	1
2703.00	1.20	1.20	0.00	1
2703.07	1.50	1.50	0.00	1
2703.13	1.80	1.80	0.00	1
2703.19	2.10	2.10	0.00	1
2703.26	2.40	2.40	0.00	1
2703.32	2.70	2.70	0.00	1
2703.38	3.00	3.00	0.00	1
2706.00	14.22	14.22	0.00	Overtopping

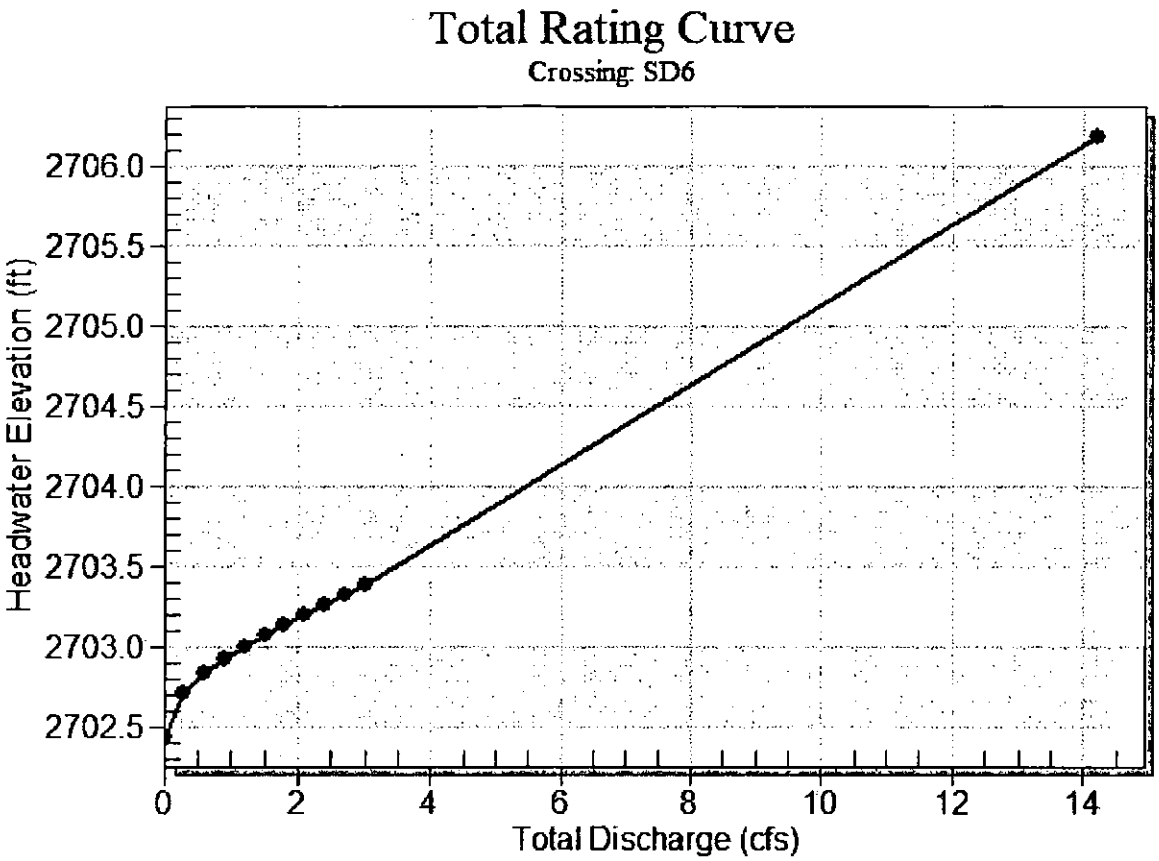

Total Rating Curve
Crossing: SD6
Headwater Elevation (ft)
2706.0
2705.5
2705.0
2704.5
2704.0
2703.5
2703.0
2702.5
0
2
4
6
8
10
12
14
Total Discharge (cfs)

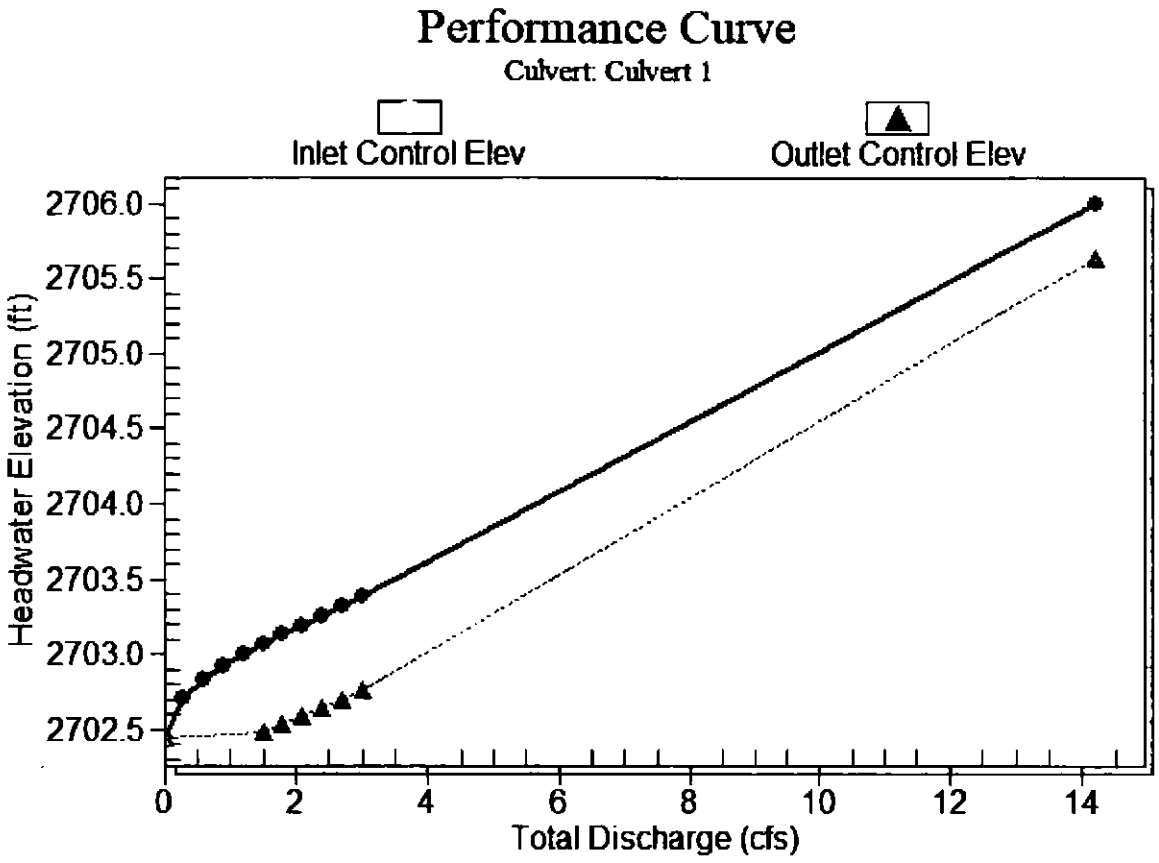
Table 17 - Culvert Summary Table: Culvert

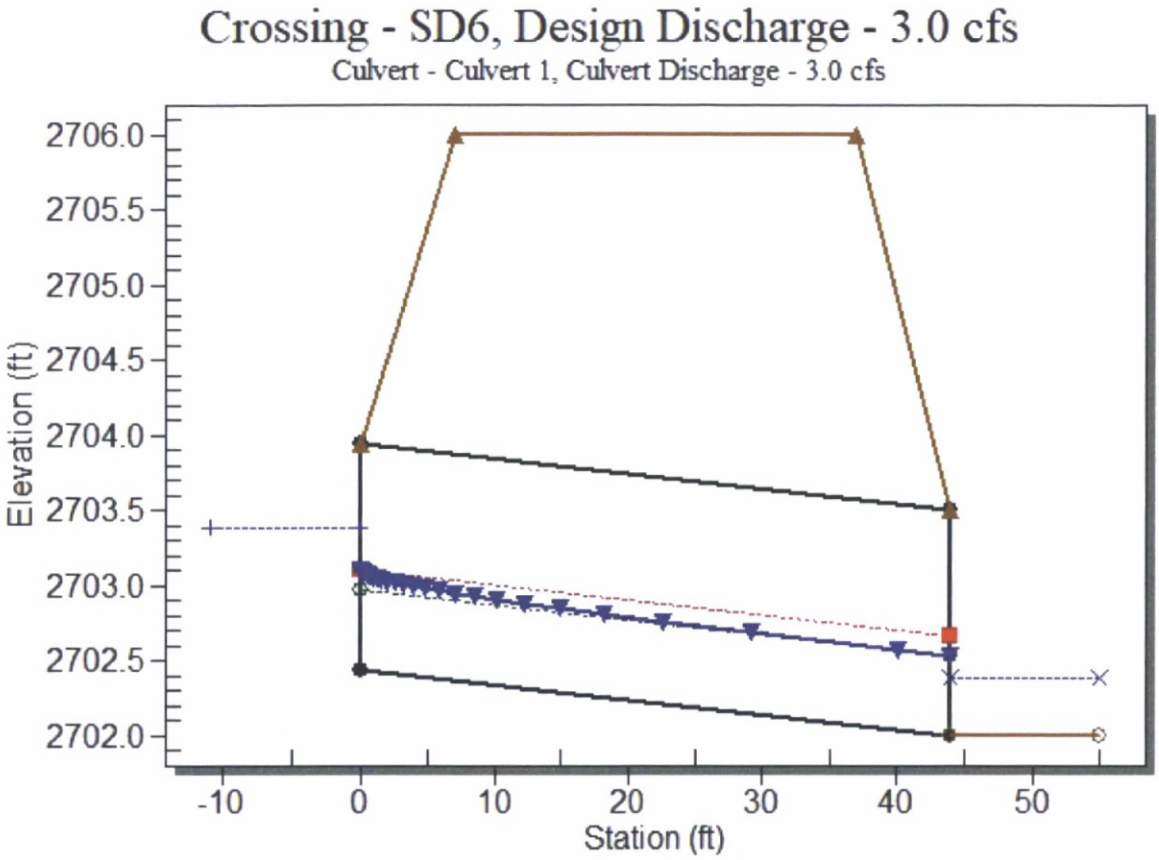
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2702.44	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.30	0.30	2702.71	0.267	0.0*	1-S2n	0.159	0.197	0.159	0.104	3.861	0.876
0.60	0.60	2702.83	0.390	0.0*	1-S2n	0.224	0.284	0.224	0.155	3.530	1.117
0.90	0.90	2702.92	0.478	0.0*	1-S2n	0.283	0.349	0.286	0.196	3.868	1.281
1.20	1.20	2703.00	0.558	0.0*	1-S2n	0.323	0.406	0.329	0.231	4.134	1.408
1.50	1.50	2703.07	0.632	0.038	1-S2n	0.362	0.454	0.370	0.262	4.399	1.513
1.80	1.80	2703.13	0.691	0.096	1-S2n	0.402	0.501	0.405	0.290	4.673	1.604
2.10	2.10	2703.19	0.752	0.152	1-S2n	0.434	0.544	0.440	0.316	4.898	1.683
2.40	2.40	2703.26	0.819	0.205	1-S2n	0.464	0.582	0.472	0.340	5.026	1.754
2.70	2.70	2703.32	0.883	0.261	1-S2n	0.493	0.622	0.502	0.363	5.192	1.819
3.00	3.00	2703.38	0.943	0.315	1-S2n	0.523	0.658	0.531	0.385	5.352	1.877

Straight Culvert

Inlet Elevation (invert): 2702.44 ft, Outlet Elevation (invert): 2702.00 ft

Culvert Length: 44.00 ft, Culvert Slope: 0.0100


Performance Curve
Culvert: Culvert 1
Inlet Control Elev
Outlet Control Elev
Headwater Elevation (ft)
2706.0
2705.5
2705.0
2704.5
2704.0
2703.5
2703.0
2702.5
0
2
4
6
8
10
12
14
Total Discharge (cfs)



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2702.44 ft

Outlet Station: 44.00 ft

Outlet Elevation: 2702.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 18 - Downstream Channel Rating Curve (Tailwater Data)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2702.00	0.00	0.00	0.00	0.00
0.30	2702.10	0.10	0.88	0.06	0.50
0.60	2702.15	0.15	1.12	0.10	0.53
0.90	2702.20	0.20	1.28	0.12	0.55
1.20	2702.23	0.23	1.41	0.14	0.56
1.50	2702.26	0.26	1.51	0.16	0.57
1.80	2702.29	0.29	1.60	0.18	0.58
2.10	2702.32	0.32	1.68	0.20	0.59
2.40	2702.34	0.34	1.75	0.21	0.59
2.70	2702.36	0.36	1.82	0.23	0.60
3.00	2702.38	0.38	1.88	0.24	0.60

Tailwater Channel Data - SD6

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0350

Channel Invert Elevation: 2702.00 ft

Roadway Data for Crossing: SD6

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2706.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10 cfs

Maximum Flow: 10 cfs

Table 15 Summary of Culvert

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2696.00	0.00	0.00	0.00	1
2696.46	1.00	1.00	0.00	1
2696.66	2.00	2.00	0.00	1
2696.82	3.00	3.00	0.00	1
2696.96	4.00	4.00	0.00	1
2697.10	5.00	5.00	0.00	1
2697.23	6.00	6.00	0.00	1
2697.36	7.00	7.00	0.00	1
2697.47	8.00	8.00	0.00	1
2697.58	9.00	9.00	0.00	1
2697.69	10.00	10.00	0.00	1
2700.00	25.86	25.86	0.00	Overtopping

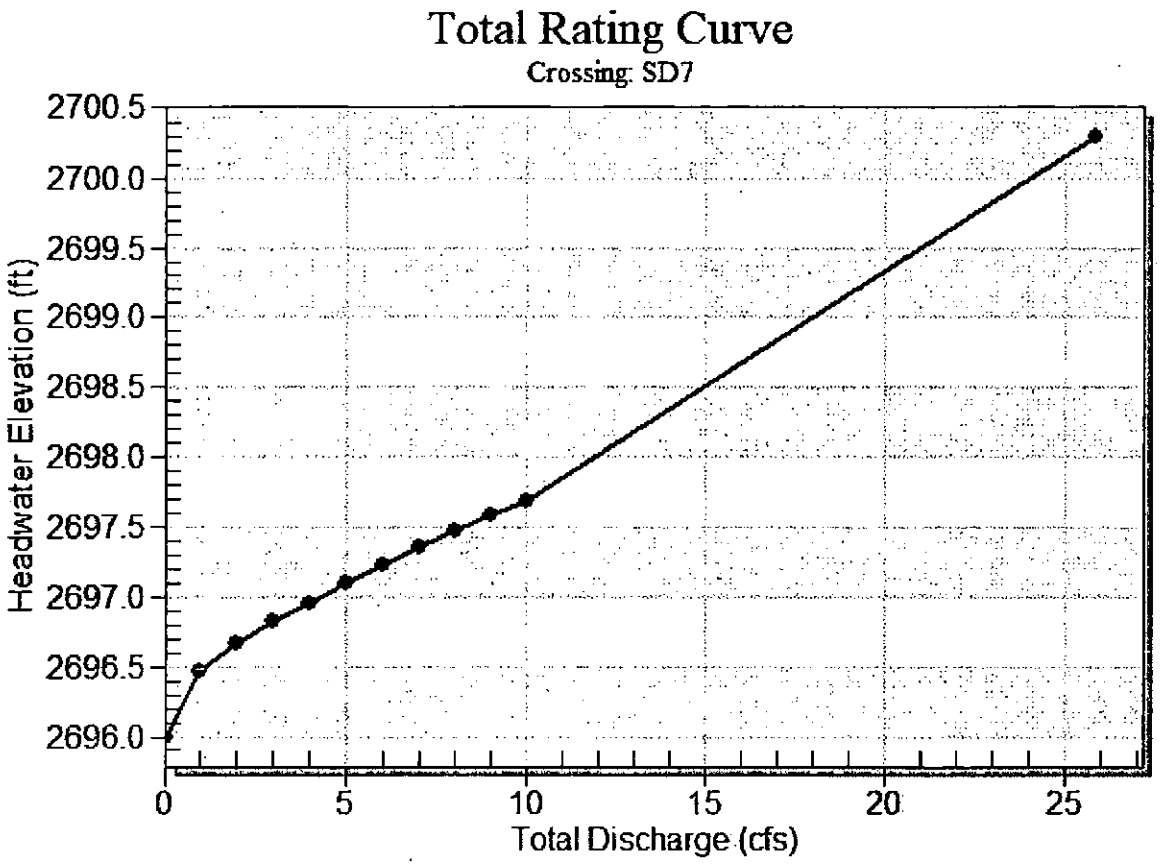

Total Rating Curve
Crossing: SD7
Headwater Elevation (ft)
2700.5
2700.0
2699.5
2699.0
2698.5
2698.0
2697.5
2697.0
2696.5
2696.0
0
5
10
15
20
25
Total Discharge (cfs)

Table 20 - Culvert Summary Table: Culvert

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2696.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.00	1.00	2696.46	0.461	0.0*	1-S2n	0.238	0.340	0.238	0.177	4.574	1.524
2.00	2.00	2696.66	0.662	0.0*	1-S2n	0.350	0.485	0.355	0.261	5.279	1.899
3.00	3.00	2696.82	0.821	0.0*	1-S2n	0.424	0.601	0.436	0.325	5.878	2.148
4.00	4.00	2696.96	0.958	0.0*	1-S2n	0.493	0.697	0.493	0.379	6.605	2.338
5.00	5.00	2697.10	1.098	0.0*	1-S2n	0.557	0.783	0.557	0.426	7.006	2.494
6.00	6.00	2697.23	1.233	0.0*	1-S2n	0.609	0.865	0.609	0.469	7.390	2.627
7.00	7.00	2697.36	1.357	0.0*	1-S2n	0.661	0.939	0.661	0.507	7.709	2.743
8.00	8.00	2697.47	1.473	0.0*	1-S2n	0.712	1.006	0.712	0.543	7.967	2.848
9.00	9.00	2697.58	1.584	0.0*	1-S2n	0.758	1.069	0.758	0.577	8.258	2.942
10.00	10.00	2697.69	1.692	0.0*	1-S2n	0.802	1.126	0.802	0.608	8.481	3.029

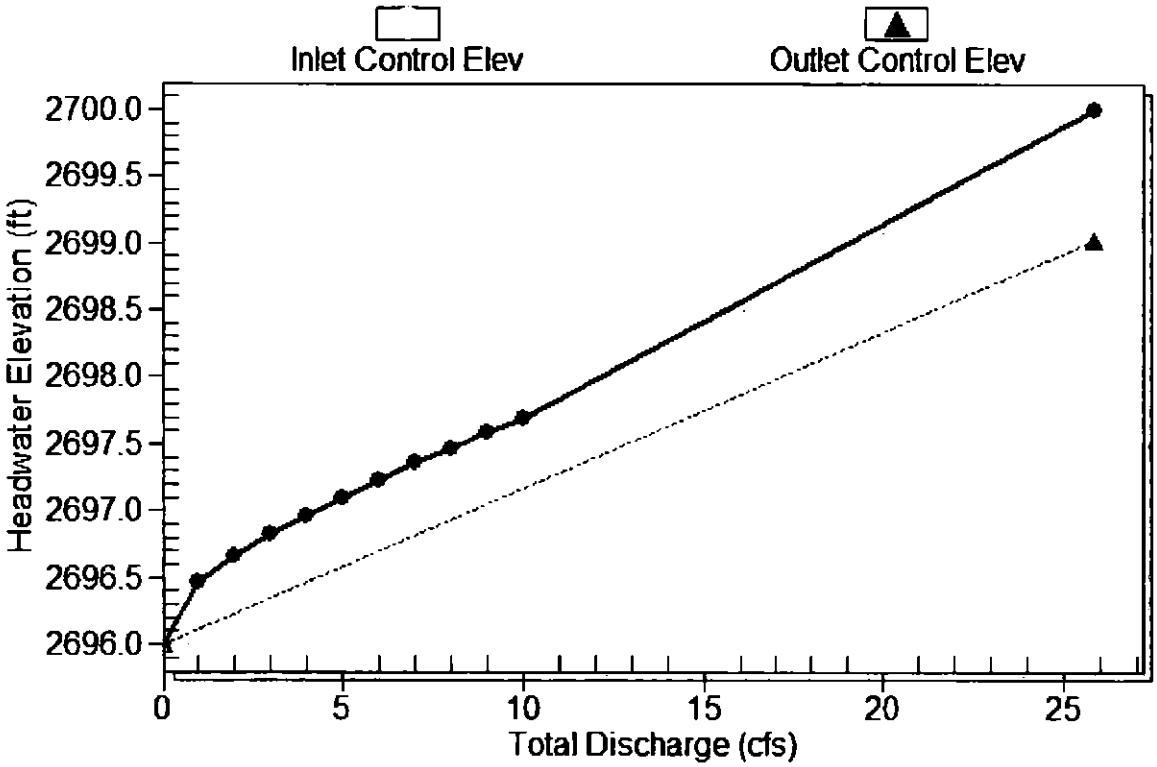
Straight Culvert

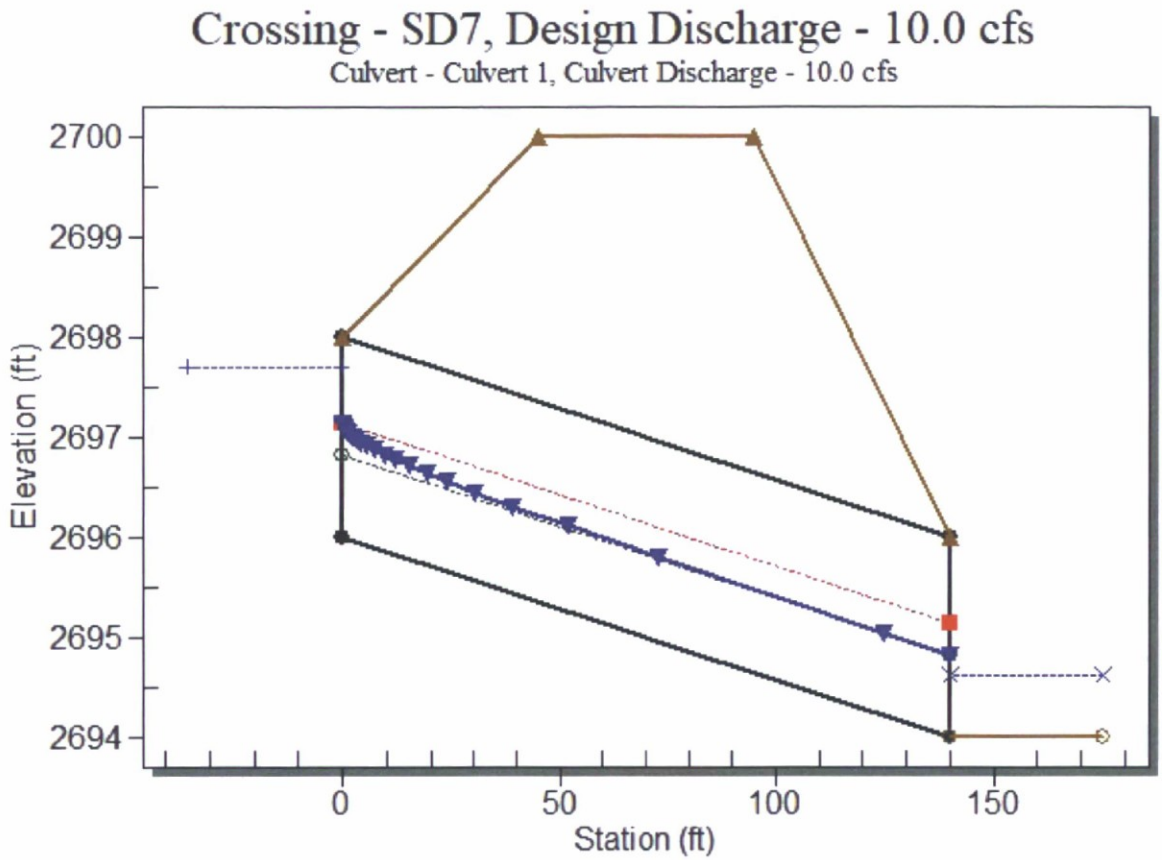
Inlet Elevation (invert): 2696.00 ft, Outlet Elevation (invert): 2694.00 ft

Culvert Length: 140.01 ft, Culvert Slope: 0.0143

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2696.00 ft

Outlet Station: 140.00 ft

Outlet Elevation: 2694.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 21 - Downstream Channel Rating [illegible]

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2694.00	0.00	0.00	0.00	0.00
1.00	2694.18	0.18	1.52	0.18	0.70
2.00	2694.26	0.26	1.90	0.27	0.74
3.00	2694.32	0.32	2.15	0.34	0.76
4.00	2694.38	0.38	2.34	0.39	0.77
5.00	2694.43	0.43	2.49	0.44	0.79
6.00	2694.47	0.47	2.63	0.49	0.80
7.00	2694.51	0.51	2.74	0.53	0.80
8.00	2694.54	0.54	2.85	0.56	0.81
9.00	2694.58	0.58	2.94	0.60	0.82
10.00	2694.61	0.61	3.03	0.63	0.82

Tailwater Channel Data - SD7

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0166

Channel Manning's n: 0.0350

Channel Invert Elevation: 2694.00 ft

Roadway Data for Crossing: SD7

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2700.00 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

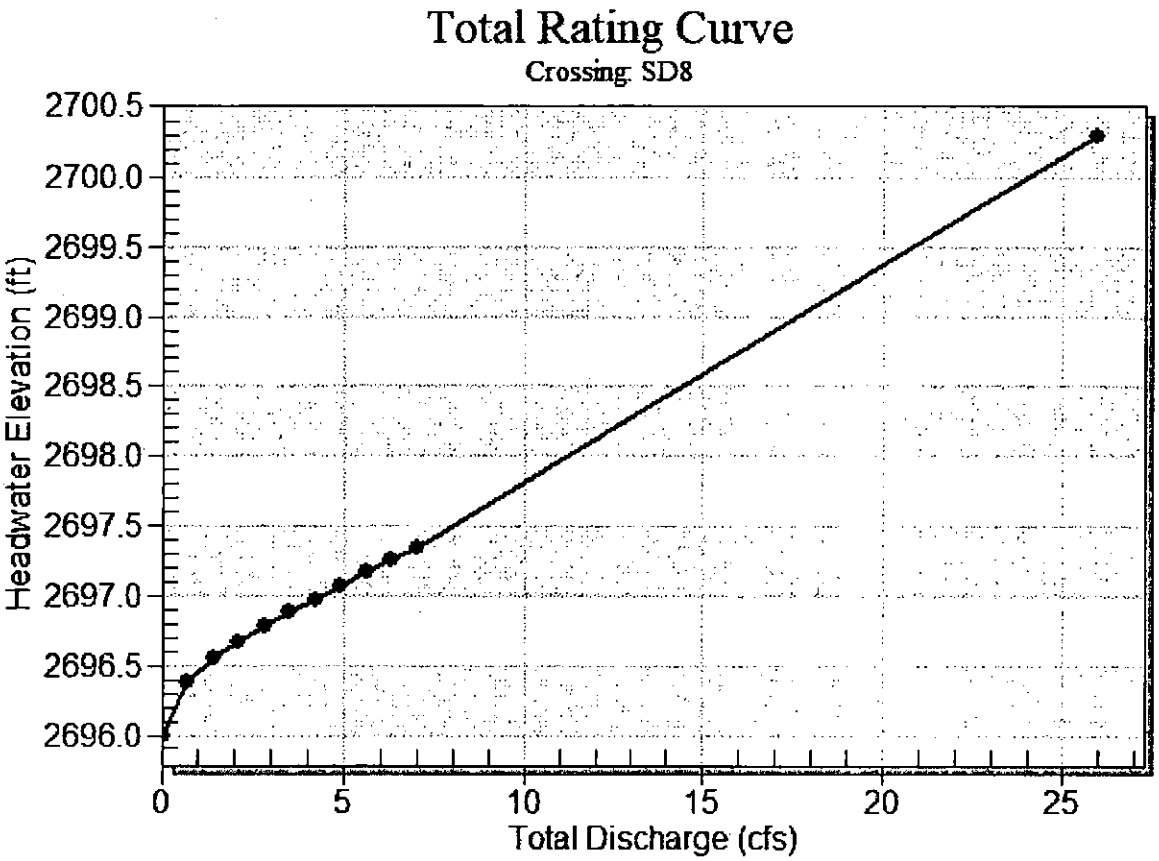
Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 7 cfs

Maximum Flow: 7 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2696.00	0.00	0.00	0.00	1
2696.38	0.70	0.70	0.00	1
2696.55	1.40	1.40	0.00	1
2696.67	2.10	2.10	0.00	1
2696.79	2.80	2.80	0.00	1
2696.88	3.50	3.50	0.00	1
2696.97	4.20	4.20	0.00	1
2697.07	4.90	4.90	0.00	1
2697.16	5.60	5.60	0.00	1
2697.26	6.30	6.30	0.00	1
2697.34	7.00	7.00	0.00	1
2700.00	25.94	25.94	0.00	Overtopping

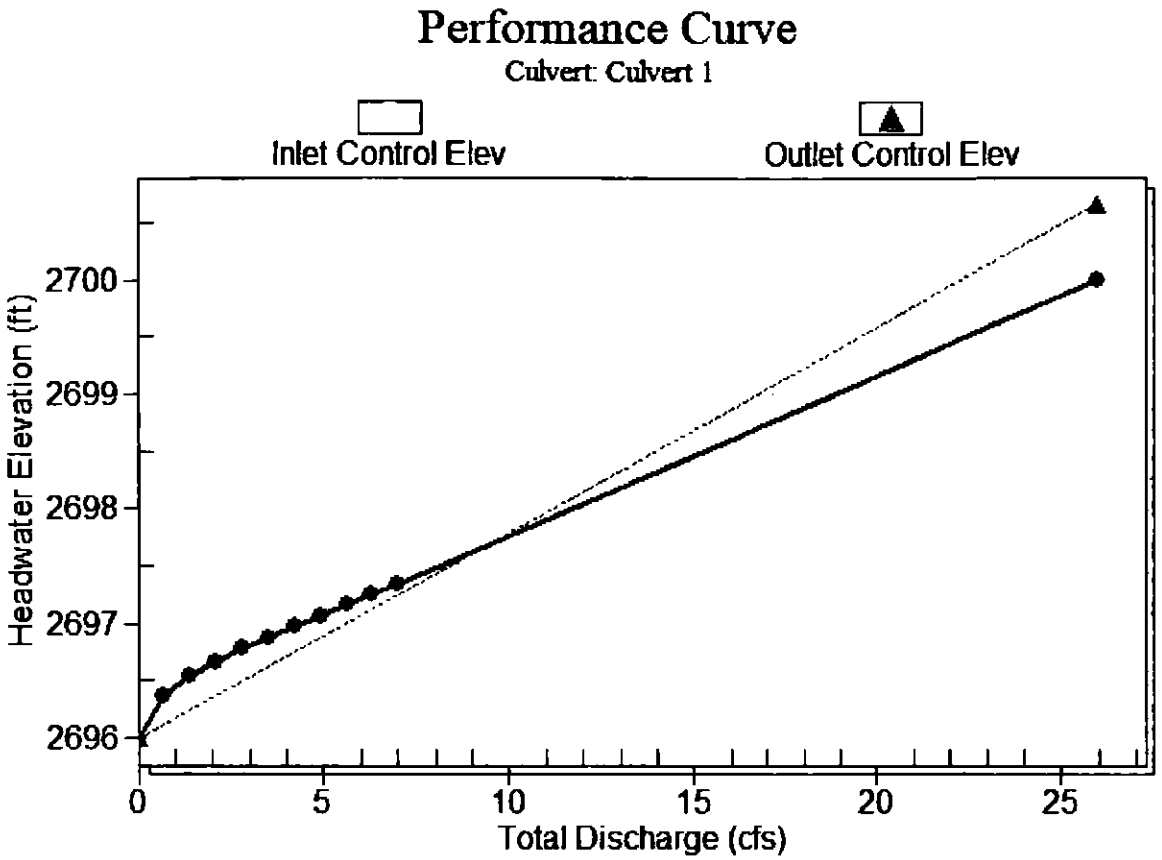

Total Rating Curve
Crossing: SD8
Headwater Elevation (ft)
2700.5
2700.0
2699.5
2699.0
2698.5
2698.0
2697.5
2697.0
2696.5
2696.0
0
5
10
15
20
25
Total Discharge (cfs)

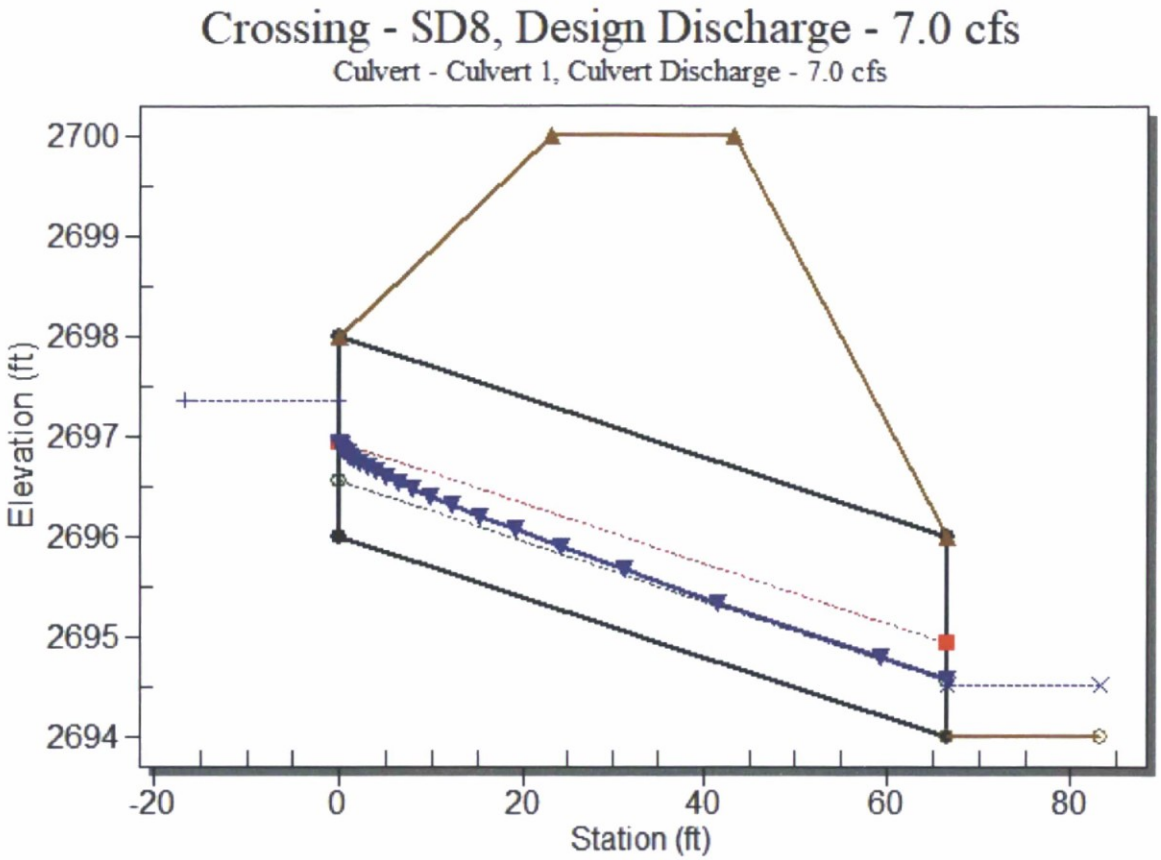
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2696.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.70	0.70	2696.38	0.376	0.0*	1-S2n	0.175	0.285	0.175	0.126	4.932	3.199
1.40	1.40	2696.55	0.550	0.0*	1-S2n	0.234	0.406	0.249	0.212	6.004	4.854
2.10	2.10	2696.67	0.671	0.0*	1-S2n	0.288	0.498	0.288	0.266	7.310	5.340
2.80	2.80	2696.79	0.785	0.0*	1-S2n	0.343	0.580	0.351	0.308	7.522	5.760
3.50	3.50	2696.88	0.879	0.0*	1-S2n	0.384	0.649	0.391	0.350	8.182	5.745
4.20	4.20	2696.97	0.971	0.0*	1-S2n	0.417	0.716	0.433	0.390	8.306	5.890
4.90	4.90	2697.07	1.068	0.0*	1-S2n	0.450	0.774	0.469	0.425	8.647	6.870
5.60	5.60	2697.16	1.165	0.0*	1-S2n	0.483	0.833	0.503	0.454	8.996	7.238
6.30	6.30	2697.26	1.255	0.0*	1-S2n	0.516	0.888	0.536	0.482	9.289	7.486
7.00	7.00	2697.34	1.341	0.0*	1-S2n	0.548	0.939	0.567	0.510	9.594	7.710

Straight Culvert

Inlet Elevation (invert): 2696.00 ft, Outlet Elevation (invert): 2694.00 ft

Culvert Length: 66.53 ft, Culvert Slope: 0.0301


Performance Curve
Culvert: Culvert 1
Inlet Control Elev
Outlet Control Elev
Headwater Elevation (ft)
2700
2699
2698
2697
2696
0
5
10
15
20
25
Total Discharge (cfs)



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2696.00 ft

Outlet Station: 66.50 ft

Outlet Elevation: 2694.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 24 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)
0.00	2694.00	2694.00	0.00
1.00	2694.18	2694.18	4.57
2.00	2694.26	2694.26	5.28
3.00	2694.32	2694.32	5.88
4.00	2694.38	2694.38	5.61
5.00	2694.43	2694.43	7.01
6.00	2694.47	2694.47	7.39
7.00	2694.51	2694.51	7.71
8.00	2694.54	2694.54	7.97
9.00	2694.58	2694.58	8.26
10.00	2694.61	2694.61	8.48

Tailwater Channel Data - SD8

Tailwater Channel Option: Enter Rating Curve

Channel Invert Elevation: 2694.00 ft

Roadway Data for Crossing: SD8

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2700.00 ft

Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 31 cfs

Maximum Flow: 40 cfs

Table 25 - Summary of Culvert Flows at Crossing

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2695.70	0.00	0.00	0.00	1
2696.59	4.00	4.00	0.00	1
2697.00	8.00	8.00	0.00	1
2697.38	12.00	12.00	0.00	1
2697.71	16.00	16.00	0.00	1
2698.02	20.00	20.00	0.00	1
2698.33	24.00	24.00	0.00	1
2698.67	28.00	28.00	0.00	1
2698.95	31.00	31.00	0.00	1
2699.49	36.00	36.00	0.00	1
2699.98	40.00	40.00	0.00	1
2700.00	40.14	40.14	0.00	Overtopping

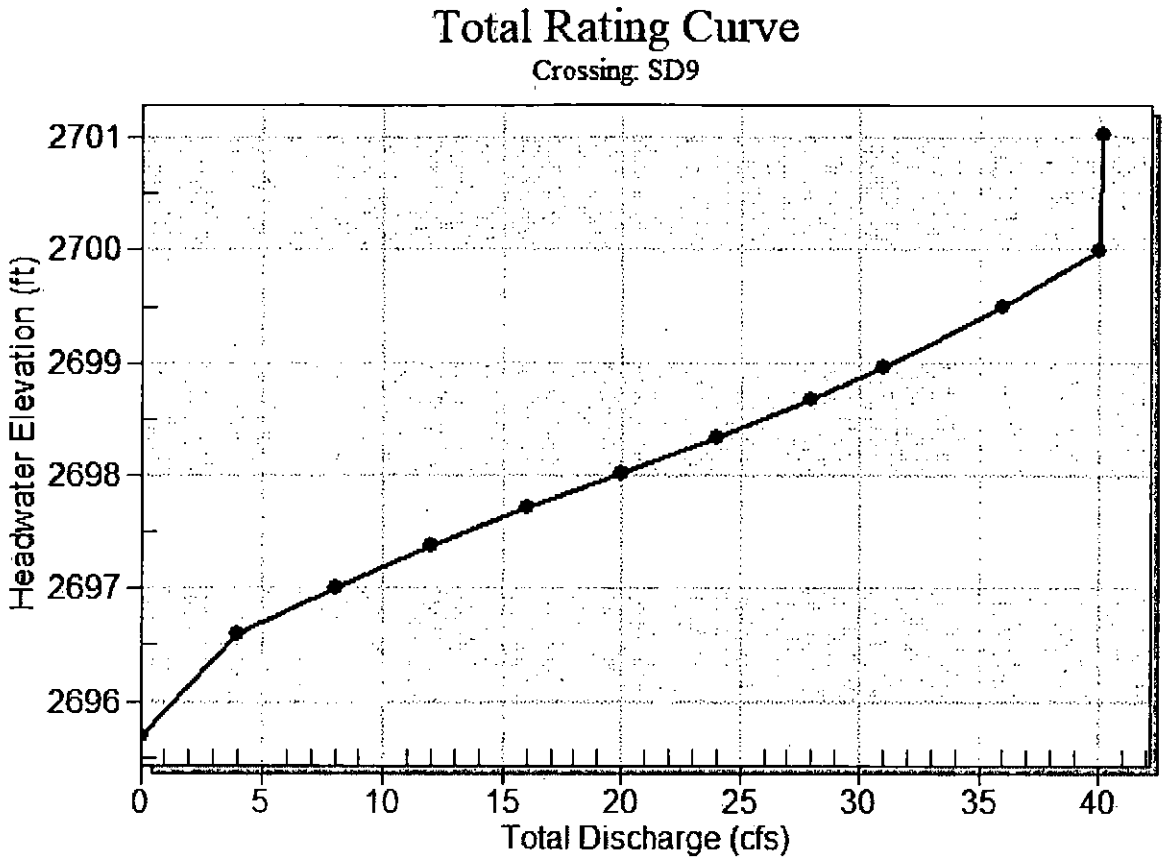

Total Rating Curve
Crossing: SD9
Headwater Elevation (ft)
2701
2700
2699
2698
2697
2696
0
5
10
15
20
25
30
35
40
Total Discharge (cfs)

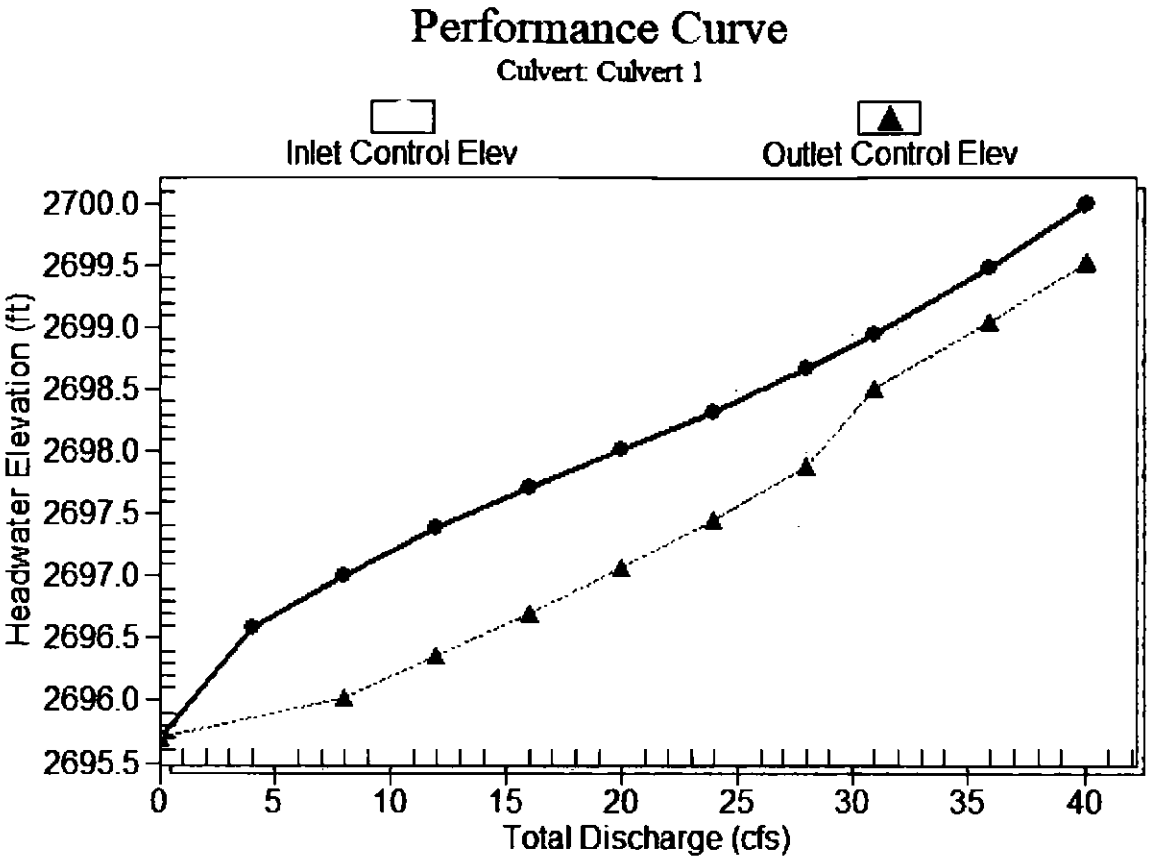
Table 20 - Culvert Summary Table: Culvert

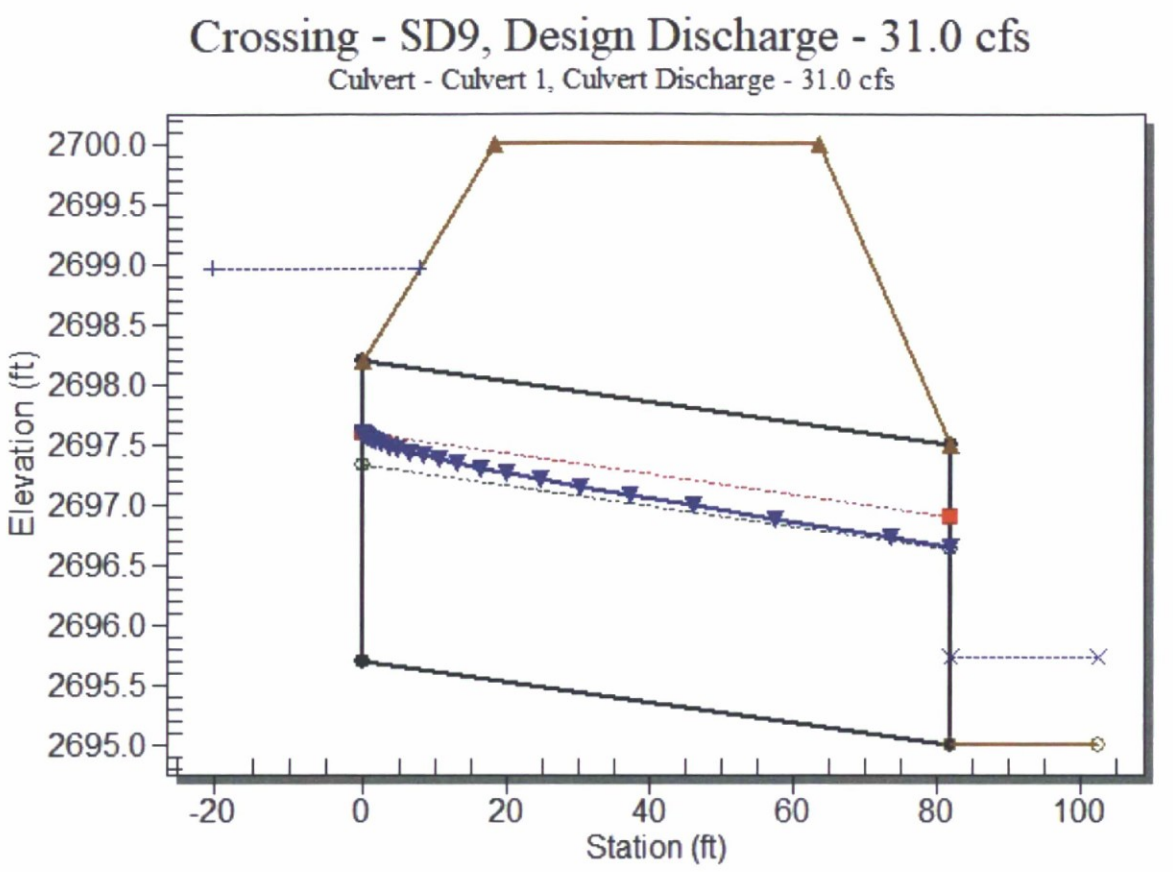
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2695.70	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
4.00	4.00	2696.59	0.894	0.0*	1-S2n	0.518	0.655	0.518	0.261	5.396	2.012
8.00	8.00	2697.00	1.305	0.326	1-S2n	0.742	0.937	0.754	0.374	6.384	2.451
12.00	12.00	2697.38	1.684	0.661	1-S2n	0.924	1.162	0.938	0.457	7.145	2.741
16.00	16.00	2697.71	2.009	1.001	1-S2n	1.080	1.348	1.102	0.526	7.667	2.963
20.00	20.00	2698.02	2.315	1.364	1-S2n	1.228	1.513	1.254	0.586	8.115	3.145
24.00	24.00	2698.33	2.629	1.759	5-S2n	1.372	1.664	1.400	0.639	8.484	3.301
28.00	28.00	2698.67	2.971	2.184	5-S2n	1.514	1.802	1.542	0.686	8.815	3.438
31.00	31.00	2698.95	3.254	2.823	5-S2n	1.622	1.895	1.650	0.720	9.030	3.531
36.00	36.00	2699.49	3.790	3.354	5-S2n	1.812	2.033	1.835	0.771	9.321	3.672
40.00	40.00	2699.98	4.282	3.821	5-S2n	1.996	2.128	2.001	0.809	9.509	3.774

Straight Culvert

Inlet Elevation (invert): 2695.70 ft, Outlet Elevation (invert): 2695.00 ft

Culvert Length: 82.00 ft, Culvert Slope: 0.0085


Performance Curve
Culvert: Culvert 1
Inlet Control Elev
Outlet Control Elev
Headwater Elevation (ft)
2700.0
2699.5
2699.0
2698.5
2698.0
2697.5
2697.0
2696.5
2696.0
2695.5
0
5
10
15
20
25
30
35
40
Total Discharge (cfs)



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2695.70 ft

Outlet Station: 82.00 ft

Outlet Elevation: 2695.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 27 - Downstream Channel Rating Curve (

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2695.00	0.00	0.00	0.00	0.00
4.00	2695.26	0.26	2.01	0.33	0.80
8.00	2695.37	0.37	2.45	0.47	0.84
12.00	2695.46	0.46	2.74	0.57	0.87
16.00	2695.53	0.53	2.96	0.66	0.89
20.00	2695.59	0.59	3.15	0.73	0.90
24.00	2695.64	0.64	3.30	0.80	0.91
28.00	2695.69	0.69	3.44	0.86	0.92
31.00	2695.72	0.72	3.53	0.90	0.92
36.00	2695.77	0.77	3.67	0.96	0.93
40.00	2695.81	0.81	3.77	1.01	0.94

Tailwater Channel Data - SD9

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0350

Channel Invert Elevation: 2695.00 ft

Roadway Data for Crossing: SD9

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2700.00 ft

Roadway Surface: Paved

Roadway Top Width: 45.00 ft

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 25 cfs

Maximum Flow: 25 cfs

Table 28 - Summary of Culvert Flows at Crossing

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2695.00	0.00	0.00	0.00	1
2695.75	2.50	2.50	0.00	1
2696.10	5.00	5.00	0.00	1
2696.42	7.50	7.50	0.00	1
2696.70	10.00	10.00	0.00	1
2696.96	12.50	12.50	0.00	1
2697.25	15.00	15.00	0.00	1
2697.57	17.50	17.50	0.00	1
2697.93	20.00	20.00	0.00	1
2698.35	22.50	22.50	0.00	1
2698.83	25.00	25.00	0.00	1
2699.00	25.84	25.84	0.00	Overtopping

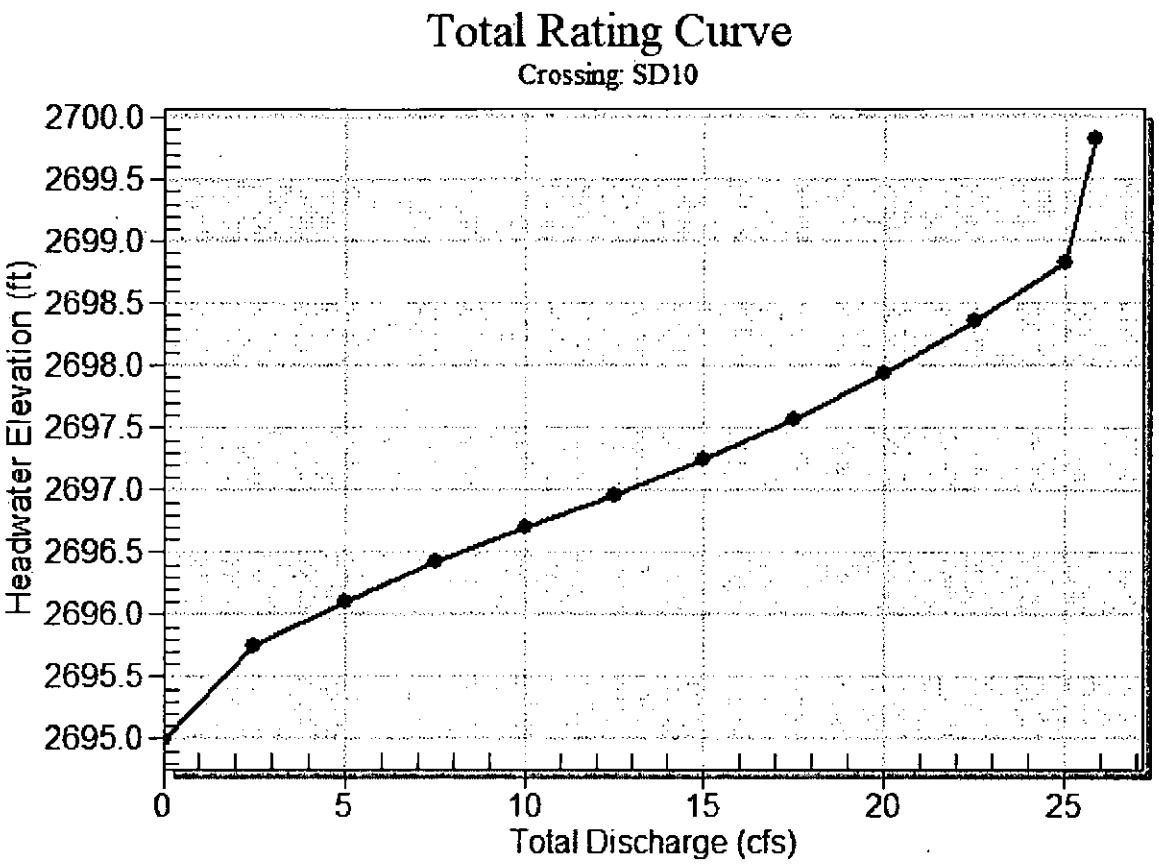

Total Rating Curve
Crossing: SD10
Headwater Elevation (ft)
2700.0
2699.5
2699.0
2698.5
2698.0
2697.5
2697.0
2696.5
2696.0
2695.5
2695.0
0
5
10
15
20
25
Total Discharge (cfs)

Table 29 - Culvert Summary

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2695.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.50	2.50	2695.75	0.749	0.066	1-S2n	0.413	0.546	0.424	0.152	5.089	1.431
5.00	5.00	2696.10	1.101	0.361	1-S2n	0.592	0.783	0.610	0.226	6.137	1.809
7.50	7.50	2696.42	1.419	0.648	1-S2n	0.737	0.974	0.763	0.283	6.829	2.063
10.00	10.00	2696.70	1.695	0.937	1-S2n	0.861	1.126	0.898	0.332	7.309	2.259
12.50	12.50	2696.96	1.963	1.254	1-S2n	0.979	1.269	1.024	0.375	7.718	2.420
15.00	15.00	2697.25	2.248	1.590	5-S2n	1.093	1.392	1.144	0.415	8.080	2.558
17.50	17.50	2697.57	2.567	2.204	5-S2n	1.206	1.506	1.260	0.450	8.398	2.679
20.00	20.00	2697.93	2.932	2.544	5-S2n	1.322	1.604	1.374	0.484	8.706	2.788
22.50	22.50	2698.35	3.351	2.917	5-S2n	1.442	1.690	1.490	0.515	8.950	2.886
25.00	25.00	2698.83	3.827	3.321	5-S2n	1.587	1.761	1.615	0.544	9.203	2.976

****

Straight Culvert

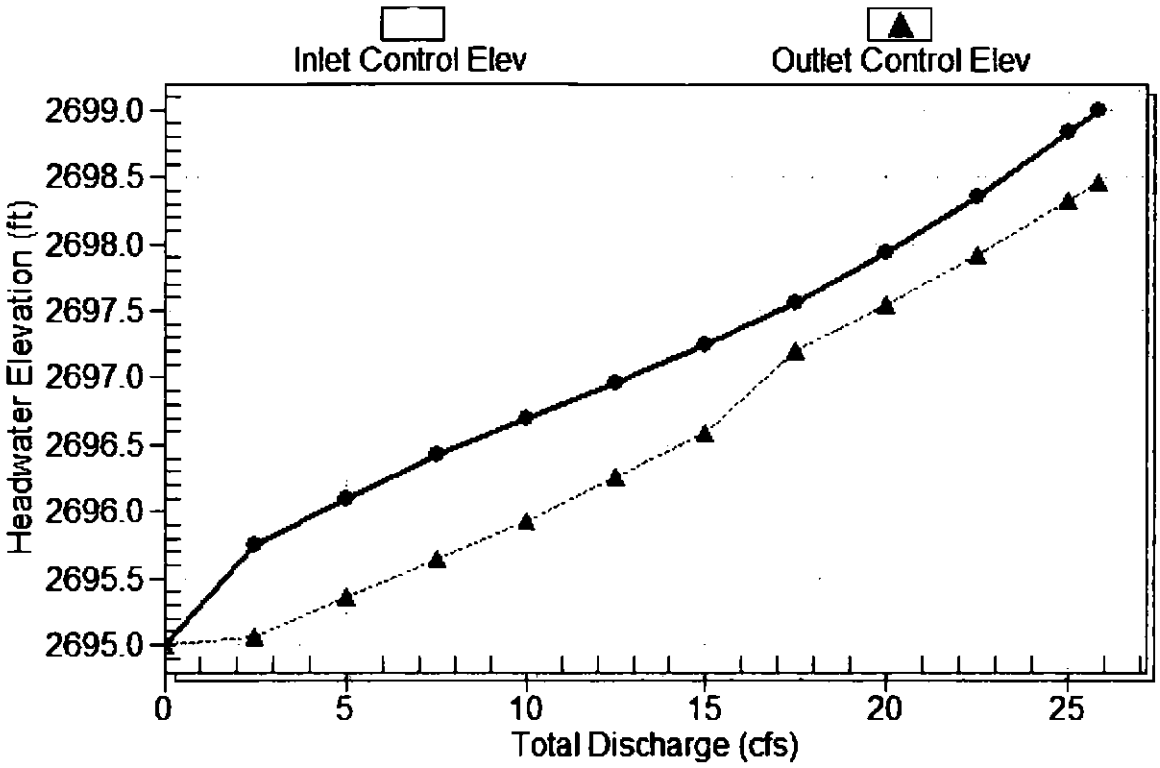
Inlet Elevation (invert): 2695.00 ft, Outlet Elevation (invert): 2694.50 ft

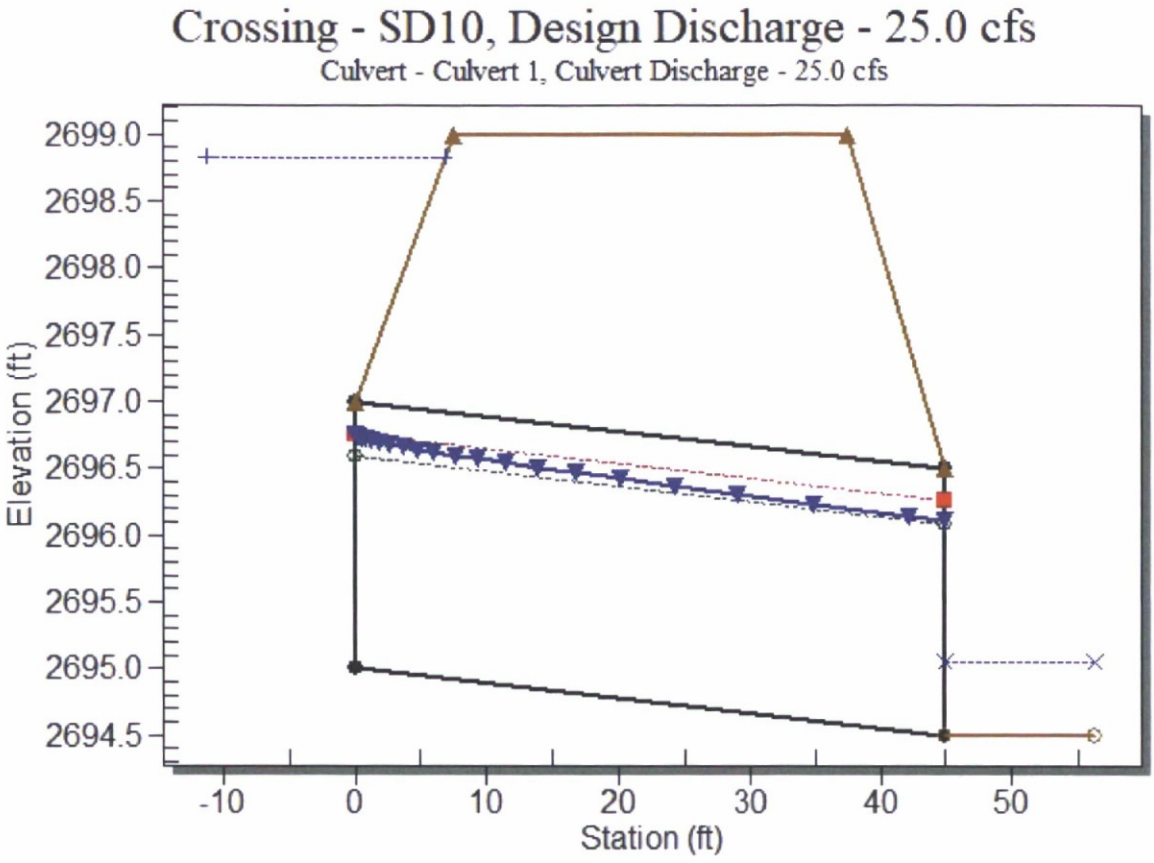
Culvert Length: 45.00 ft, Culvert Slope: 0.0111

****

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2695.00 ft

Outlet Station: 45.00 ft

Outlet Elevation: 2694.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2694.50	0.00	0.00	0.00	0.00
2.50	2694.65	0.15	1.43	0.16	0.69
5.00	2694.73	0.23	1.81	0.23	0.73
7.50	2694.78	0.28	2.06	0.29	0.75
10.00	2694.83	0.33	2.26	0.34	0.77
12.50	2694.88	0.38	2.42	0.39	0.79
15.00	2694.91	0.41	2.56	0.43	0.80
17.50	2694.95	0.45	2.68	0.47	0.81
20.00	2694.98	0.48	2.79	0.50	0.81
22.50	2695.01	0.51	2.89	0.53	0.82
25.00	2695.04	0.54	2.98	0.56	0.83

Tailwater Channel Data - SD10

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0166

Channel Manning's n: 0.0350

Channel Invert Elevation: 2694.50 ft

Roadway Data for Crossing: SD10

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2699.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

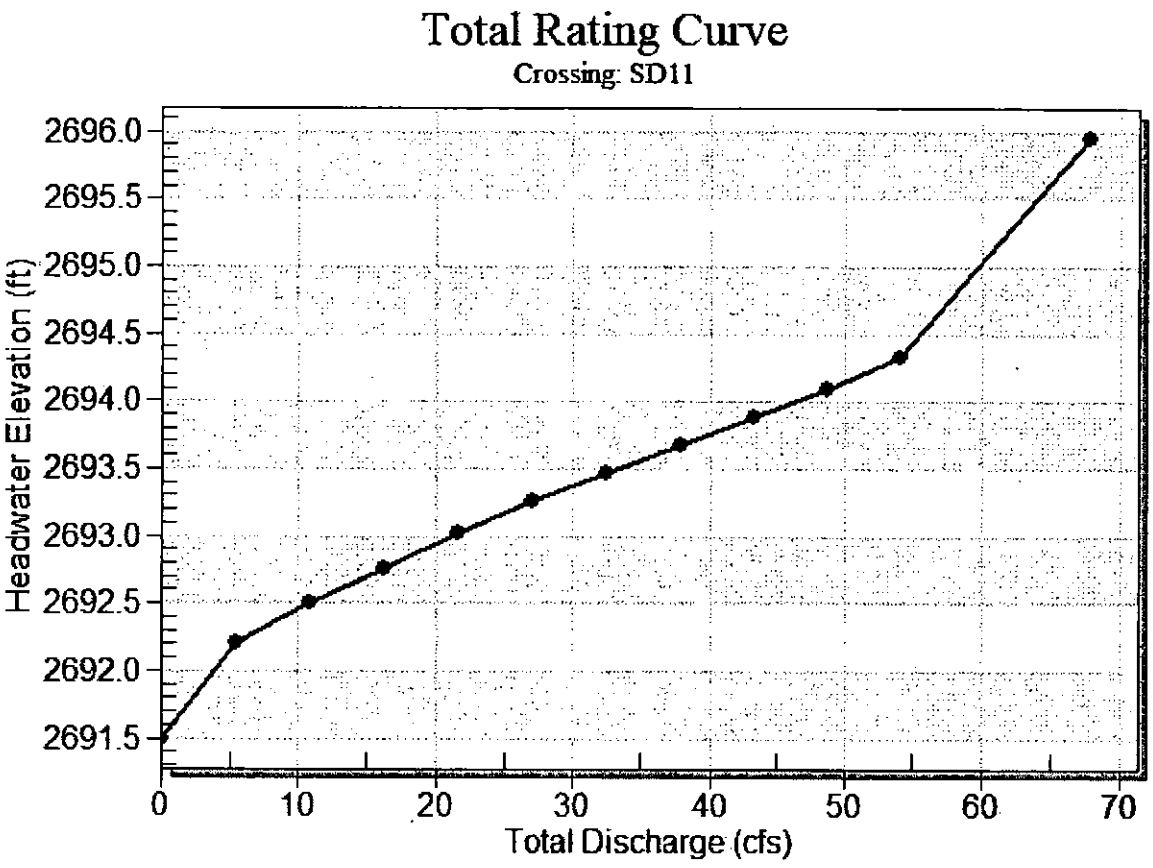
Minimum Flow: 0 cfs

Design Flow: 54 cfs

Maximum Flow: 54 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2691.50	0.00	0.00	0.00	1
2692.20	5.40	5.40	0.00	1
2692.51	10.80	10.80	0.00	1
2692.76	16.20	16.20	0.00	1
2693.02	21.60	21.60	0.00	1
2693.26	27.00	27.00	0.00	1
2693.47	32.40	32.40	0.00	1
2693.68	37.80	37.80	0.00	1
2693.88	43.20	43.20	0.00	1
2694.10	48.60	48.60	0.00	1
2694.33	54.00	54.00	0.00	1
2695.00	67.81	67.81	0.00	Overtopping

Rating Curve Plot for Crossing: SD11



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2691.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.40	5.40	2692.20	0.701	0.0*	1-S2n	0.266	0.534	0.266	0.201	12.523	2.236
10.80	10.80	2692.51	1.010	0.0*	1-S2n	0.375	0.764	0.396	0.297	10.590	2.803
16.20	16.20	2692.76	1.260	0.0*	1-S2n	0.473	0.944	0.473	0.371	12.639	3.180
21.60	21.60	2693.02	1.522	0.0*	1-S2n	0.539	1.099	0.539	0.434	13.724	3.470
27.00	27.00	2693.26	1.755	0.0*	1-S2n	0.606	1.236	0.606	0.489	14.579	3.708
32.40	32.40	2693.47	1.970	0.0*	1-S2n	0.672	1.356	0.702	0.538	14.374	3.911
37.80	37.80	2693.68	2.177	0.0*	1-S2n	0.725	1.470	0.759	0.584	14.946	4.089
43.20	43.20	2693.88	2.384	0.0*	1-S2n	0.775	1.577	0.815	0.625	15.496	4.249
48.60	48.60	2694.10	2.599	0.0*	5-S2n	0.825	1.675	0.868	0.665	16.014	4.394
54.00	54.00	2694.33	2.827	0.0*	5-S2n	0.876	1.770	0.917	0.701	16.545	4.525

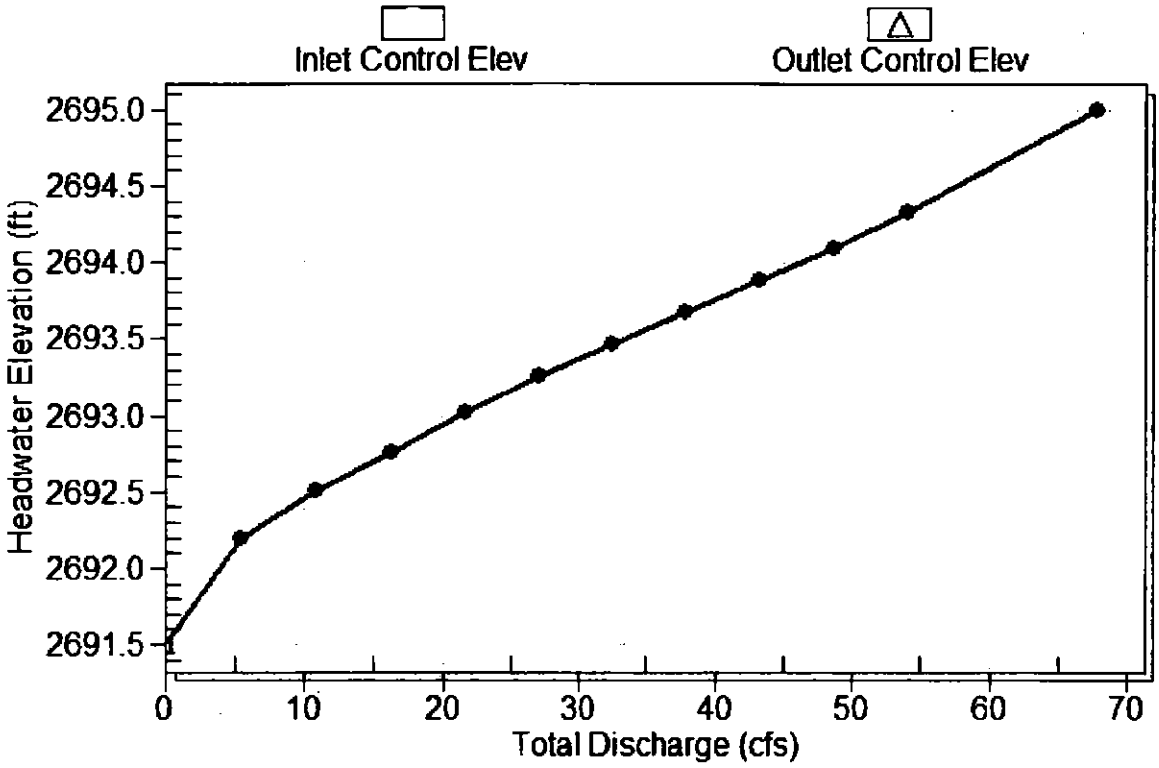
Straight Culvert

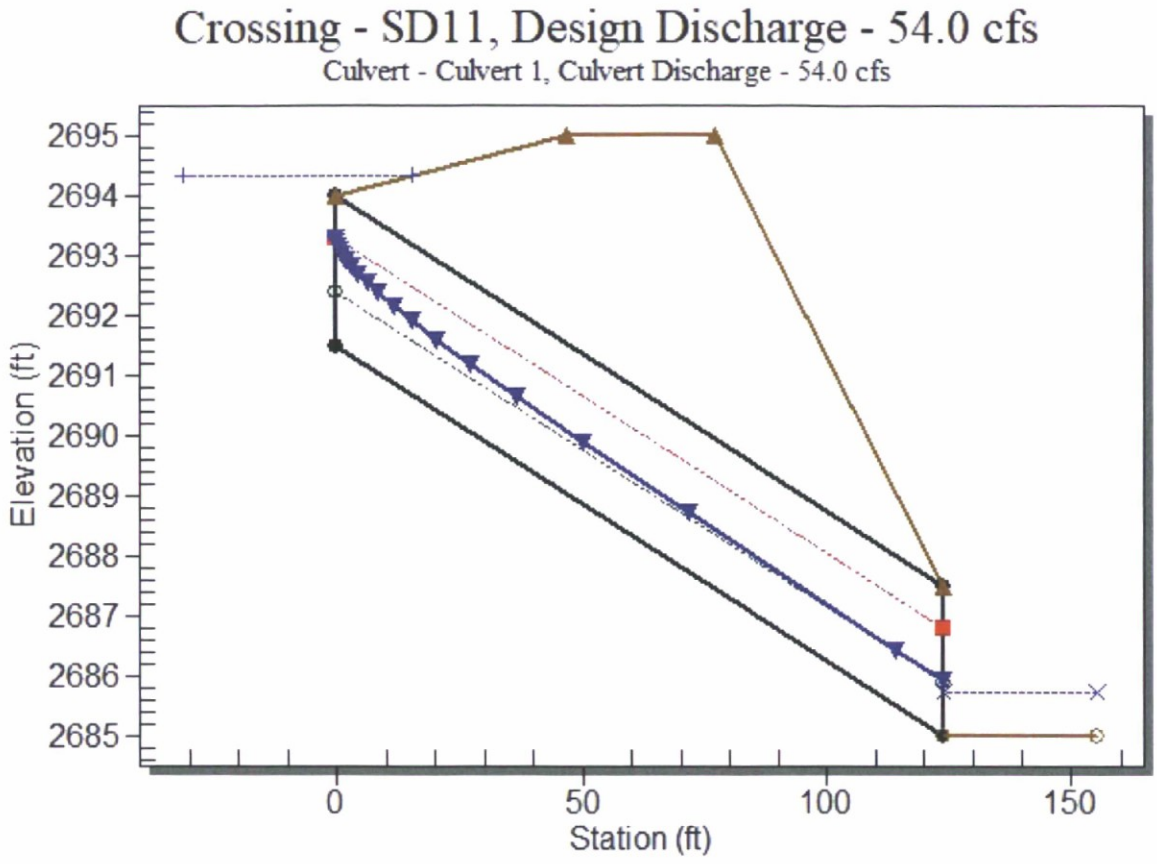
Inlet Elevation (invert): 2691.50 ft, Outlet Elevation (invert): 2685.00 ft

Culvert Length: 124.17 ft, Culvert Slope: 0.0524

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2691.50 ft

Outlet Station: 124.00 ft

Outlet Elevation: 2685.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2685.00	0.00	0.00	0.00	0.00
5.40	2685.20	0.20	2.24	0.36	0.95
10.80	2685.30	0.30	2.80	0.54	1.00
16.20	2685.37	0.37	3.18	0.67	1.04
21.60	2685.43	0.43	3.47	0.79	1.06
27.00	2685.49	0.49	3.71	0.88	1.08
32.40	2685.54	0.54	3.91	0.97	1.09
37.80	2685.58	0.58	4.09	1.06	1.10
43.20	2685.63	0.63	4.25	1.13	1.11
48.60	2685.66	0.66	4.39	1.20	1.12
54.00	2685.70	0.70	4.53	1.27	1.13

Tailwater Channel Data - SD11

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0290

Channel Manning's n: 0.0350

Channel Invert Elevation: 2685.00 ft

Roadway Data for Crossing: SD11

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2695.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

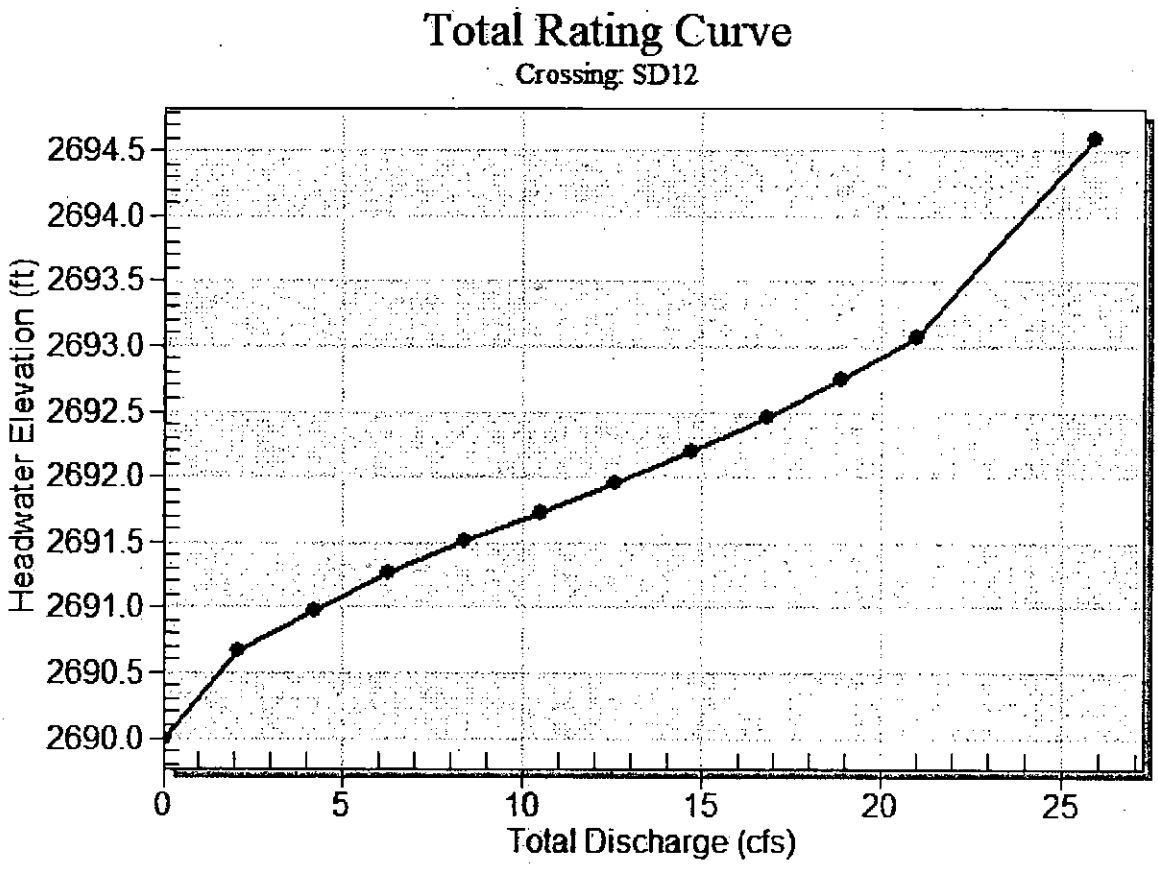
Minimum Flow: 0 cfs

Design Flow: 21 cfs

Maximum Flow: 21 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2690.00	0.00	0.00	0.00	1
2690.67	2.10	2.10	0.00	1
2690.97	4.20	4.20	0.00	1
2691.26	6.30	6.30	0.00	1
2691.51	8.40	8.40	0.00	1
2691.73	10.50	10.50	0.00	1
2691.96	12.60	12.60	0.00	1
2692.20	14.70	14.70	0.00	1
2692.46	16.80	16.80	0.00	1
2692.75	18.90	18.90	0.00	1
2693.08	21.00	21.00	0.00	1
2694.00	25.92	25.92	0.00	Overtopping

Rating Curve Plot for Crossing: SD12



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2690.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
2.10	2.10	2690.67	0.672	0.0*	1-S2n	0.298	0.498	0.298	0.095	6.988	2.015
4.20	4.20	2690.97	0.974	0.0*	1-S2n	0.429	0.716	0.439	0.143	8.147	2.578
6.30	6.30	2691.26	1.258	0.0*	1-S2n	0.534	0.888	0.534	0.180	9.343	2.963
8.40	8.40	2691.51	1.506	0.0*	1-S2n	0.616	1.032	0.616	0.212	10.184	3.263
10.50	10.50	2691.73	1.733	0.0*	1-S2n	0.695	1.158	0.695	0.241	10.800	3.514
12.60	12.60	2691.96	1.958	0.0*	1-S2n	0.767	1.274	0.789	0.267	10.933	3.728
14.70	14.70	2692.20	2.196	0.0*	5-S2n	0.834	1.378	0.868	0.291	11.229	3.916
16.80	16.80	2692.46	2.458	0.0*	5-S2n	0.901	1.476	0.901	0.313	12.226	4.084
18.90	18.90	2692.75	2.750	0.287	5-S2n	0.964	1.562	1.003	0.334	11.979	4.237
21.00	21.00	2693.08	3.078	0.679	5-S2n	1.025	1.640	1.069	0.354	12.287	4.378

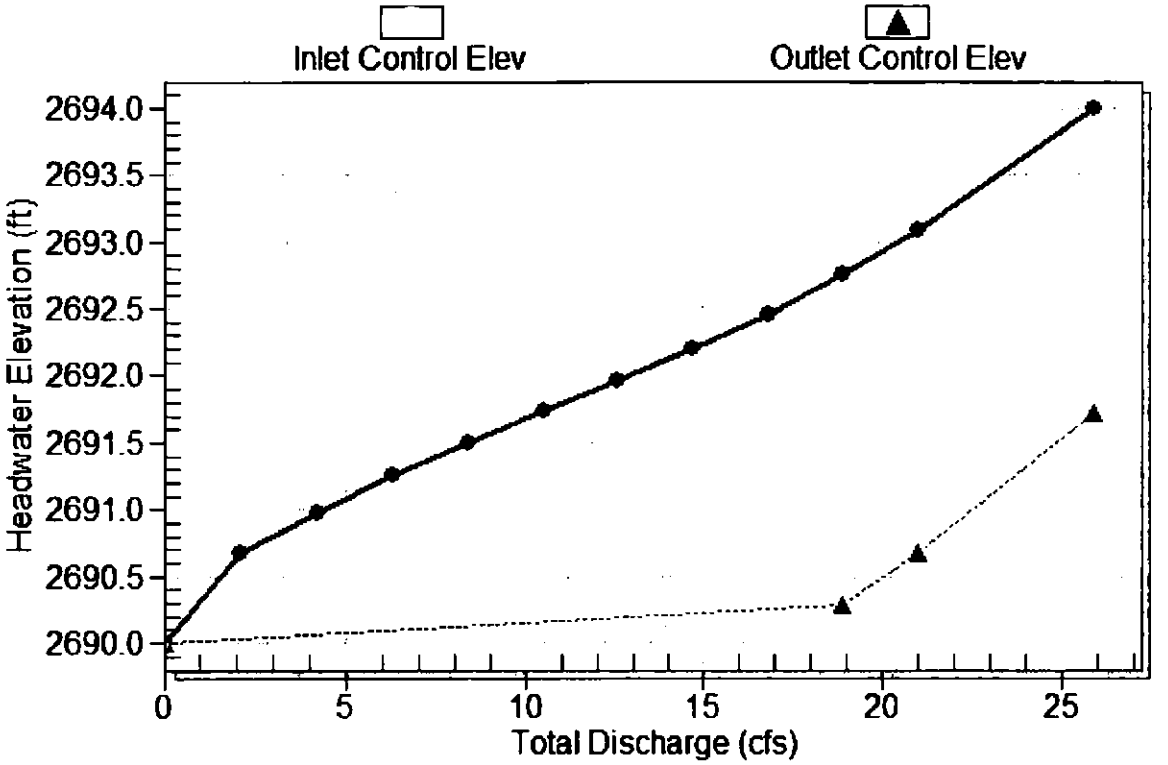
Straight Culvert

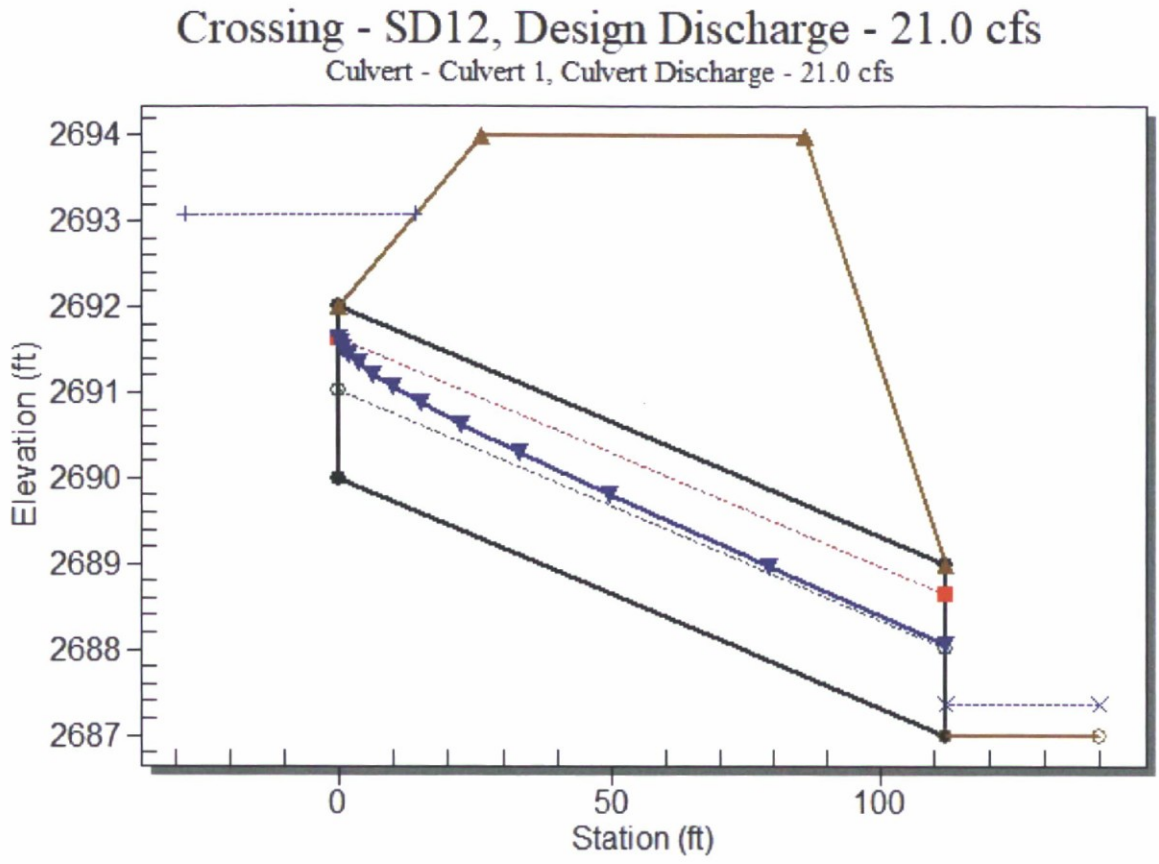
Inlet Elevation (invert): 2690.00 ft, Outlet Elevation (invert): 2687.00 ft

Culvert Length: 112.04 ft, Culvert Slope: 0.0268

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2690.00 ft

Outlet Station: 112.00 ft

Outlet Elevation: 2687.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2687.00	0.00	0.00	0.00	0.00
2.10	2687.10	0.10	2.02	0.34	1.20
4.20	2687.14	0.14	2.58	0.52	1.28
6.30	2687.18	0.18	2.96	0.65	1.32
8.40	2687.21	0.21	3.26	0.77	1.35
10.50	2687.24	0.24	3.51	0.87	1.38
12.60	2687.27	0.27	3.73	0.97	1.40
14.70	2687.29	0.29	3.92	1.05	1.42
16.80	2687.31	0.31	4.08	1.13	1.43
18.90	2687.33	0.33	4.24	1.21	1.44
21.00	2687.35	0.35	4.38	1.28	1.46

Tailwater Channel Data - SD12

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0580

Channel Manning's n: 0.0350

Channel Invert Elevation: 2687.00 ft

Roadway Data for Crossing: SD12

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2694.00 ft

Roadway Surface: Paved

Roadway Top Width: 60.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

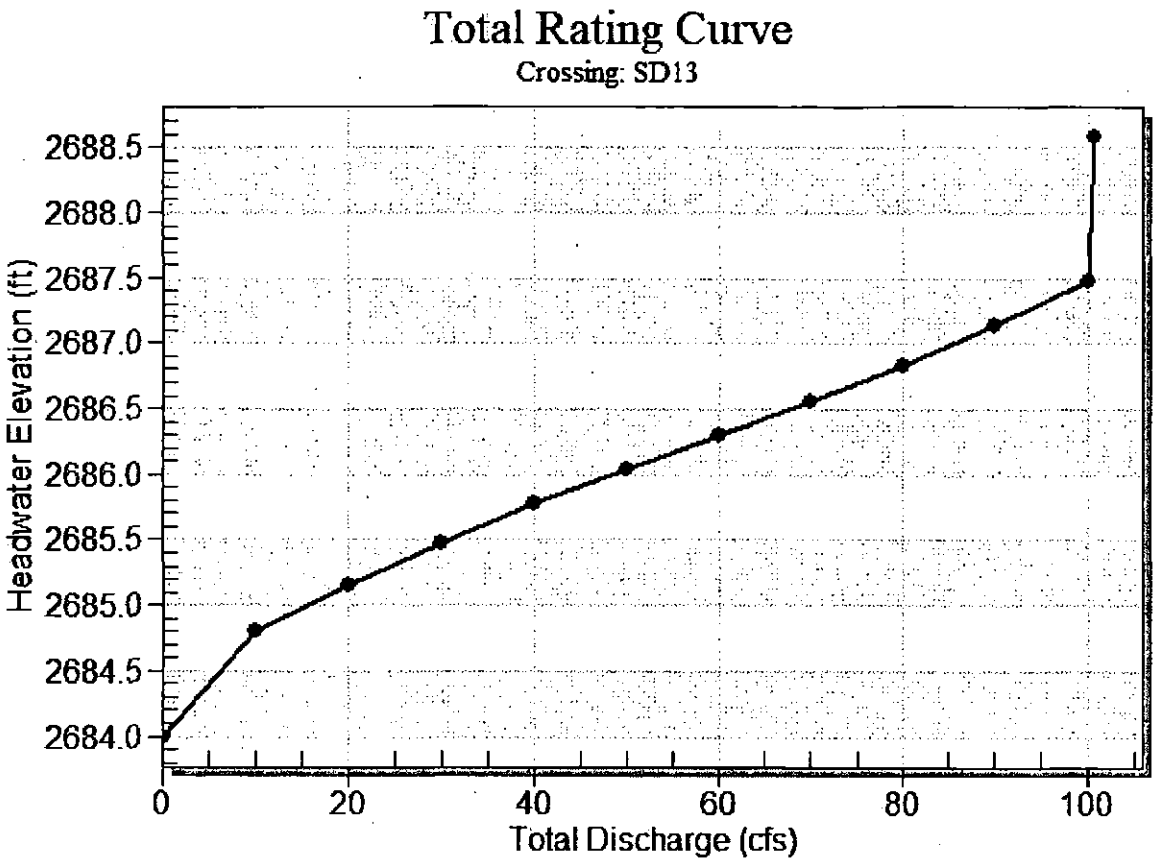
Minimum Flow: 0 cfs

Design Flow: 100 cfs

Maximum Flow: 100 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2684.00	0.00	0.00	0.00	1
2684.80	10.00	10.00	0.00	1
2685.16	20.00	20.00	0.00	1
2685.48	30.00	30.00	0.00	1
2685.78	40.00	40.00	0.00	1
2686.04	50.00	50.00	0.00	1
2686.30	60.00	60.00	0.00	1
2686.56	70.00	70.00	0.00	1
2686.83	80.00	80.00	0.00	1
2687.14	90.00	90.00	0.00	1
2687.47	100.00	100.00	0.00	1
2687.50	100.73	100.73	0.00	Overtopping

Rating Curve Plot for Crossing: SD13



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2684.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	2684.80	0.800	0.0*	1-S2n	0.354	0.596	0.354	0.324	7.604	2.733
20.00	20.00	2685.16	1.157	0.0*	1-S2n	0.514	0.850	0.529	0.483	8.722	3.466
30.00	30.00	2685.48	1.483	0.0*	1-S2n	0.634	1.054	0.653	0.609	9.768	3.962
40.00	40.00	2685.78	1.776	0.0*	1-S2n	0.736	1.228	0.772	0.716	10.312	4.345
50.00	50.00	2686.04	2.041	0.0*	1-S2n	0.827	1.375	0.868	0.810	10.980	4.660
60.00	60.00	2686.30	2.295	0.0*	1-S2n	0.916	1.513	0.959	0.896	11.576	4.930
70.00	70.00	2686.56	2.555	0.0*	5-S2n	0.993	1.641	1.044	0.975	12.010	5.167
80.00	80.00	2686.83	2.833	0.311	5-S2n	1.070	1.758	1.134	1.048	12.311	5.380
90.00	90.00	2687.14	3.137	0.697	5-S2n	1.146	1.865	1.213	1.117	12.696	5.572
100.00	100.00	2687.47	3.473	1.376	5-S2n	1.216	1.962	1.298	1.181	12.949	5.749

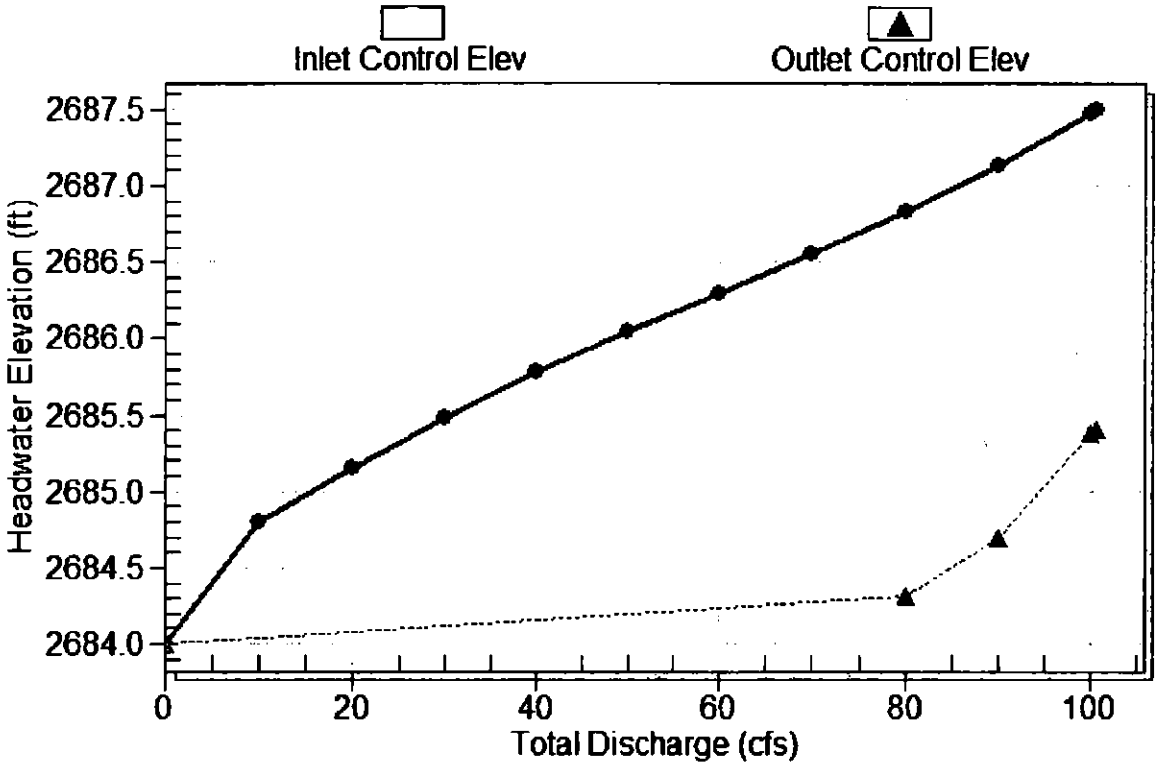
Straight Culvert

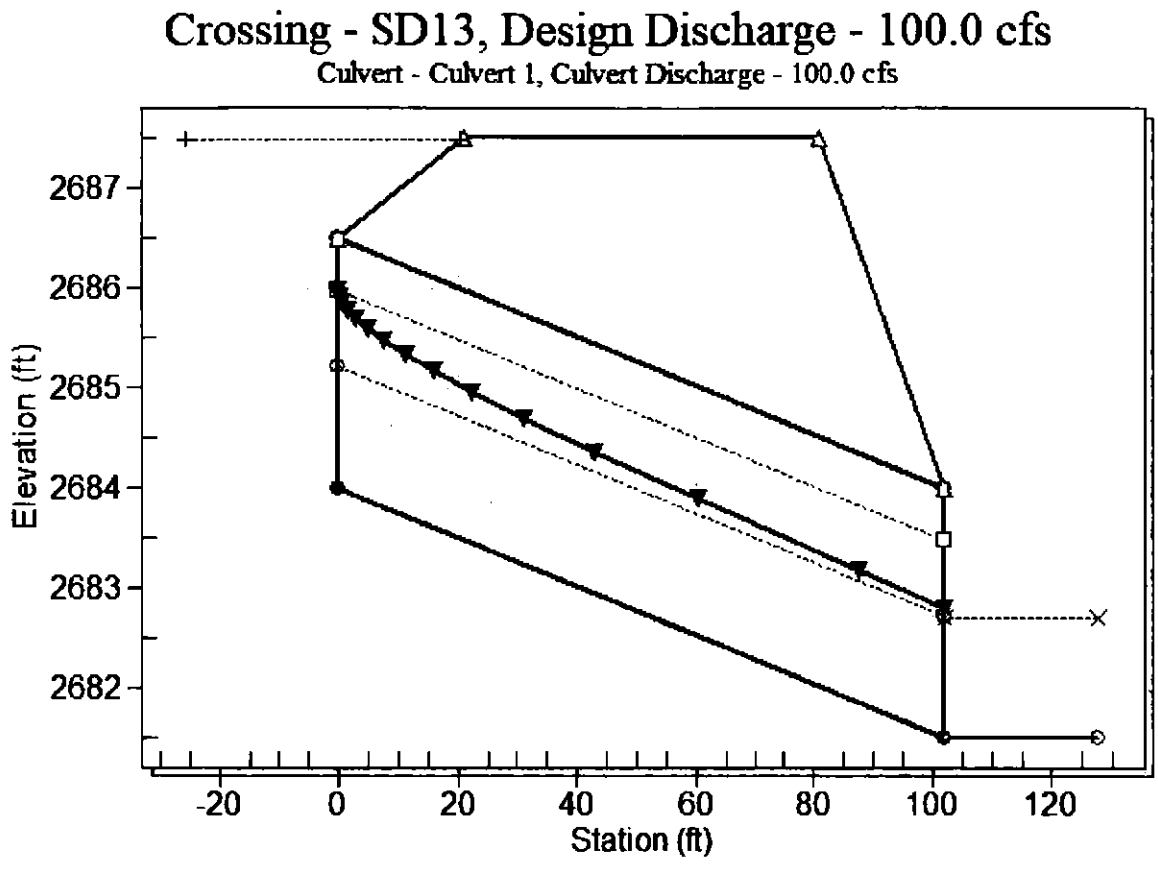
Inlet Elevation (invert): 2684.00 ft, Outlet Elevation (invert): 2681.50 ft

Culvert Length: 102.03 ft, Culvert Slope: 0.0245

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2684.00 ft

Outlet Station: 102.00 ft

Outlet Elevation: 2681.50 ft

Number of Barrels: 3

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2681.50	0.00	0.00	0.00	0.00
10.00	2681.82	0.32	2.73	0.44	0.89
20.00	2681.98	0.48	3.47	0.65	0.95
30.00	2682.11	0.61	3.96	0.82	0.98
40.00	2682.22	0.72	4.34	0.97	1.00
50.00	2682.31	0.81	4.66	1.10	1.02
60.00	2682.40	0.90	4.93	1.21	1.03
70.00	2682.47	0.97	5.17	1.32	1.04
80.00	2682.55	1.05	5.38	1.42	1.05
90.00	2682.62	1.12	5.57	1.51	1.06
100.00	2682.68	1.18	5.75	1.60	1.07

Tailwater Channel Data - SD13

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0217

Channel Manning's n: 0.0350

Channel Invert Elevation: 2681.50 ft

Roadway Data for Crossing: SD13

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2687.50 ft

Roadway Surface: Paved

Roadway Top Width: 60.00 ft

Crossing Discharge Data

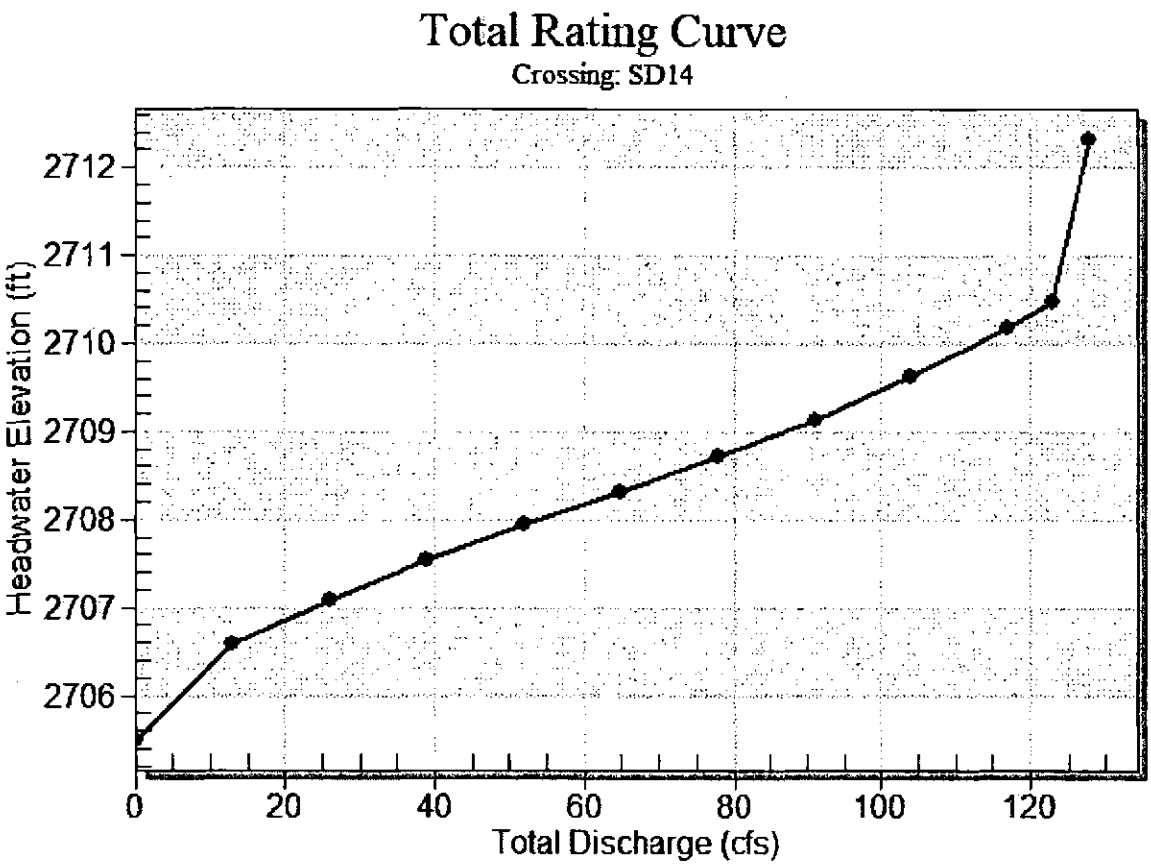
Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 123 cfs

Maximum Flow: 130 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2705.50	0.00	0.00	0.00	1
2706.58	13.00	13.00	0.00	1
2707.08	26.00	26.00	0.00	1
2707.55	39.00	39.00	0.00	1
2707.94	52.00	52.00	0.00	1
2708.32	65.00	65.00	0.00	1
2708.71	78.00	78.00	0.00	1
2709.15	91.00	91.00	0.00	1
2709.63	104.00	104.00	0.00	1
2710.19	117.00	117.00	0.00	1
2710.47	123.00	123.00	0.00	1
2710.70	127.66	127.66	0.00	Overtopping


Total Rating Curve
Crossing: SD14
Headwater Elevation (ft)
2712
2711
2710
2709
2708
2707
2706
0
20
40
60
80
100
120
Total Discharge (cfs)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2705.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
13.00	13.00	2706.58	1.083	0.0*	1-S2n	0.533	0.799	0.550	0.351	7.327	2.742
26.00	26.00	2707.08	1.583	0.241	1-S2n	0.747	1.143	0.797	0.510	8.616	3.378
39.00	39.00	2707.55	2.045	0.637	1-S2n	0.923	1.417	1.004	0.630	9.381	3.798
52.00	52.00	2707.94	2.444	1.034	1-S2n	1.081	1.641	1.182	0.730	10.037	4.119
65.00	65.00	2708.32	2.822	1.460	1-S2n	1.217	1.847	1.345	0.816	10.583	4.383
78.00	78.00	2708.71	3.214	1.910	5-S2n	1.351	2.027	1.502	0.894	11.016	4.608
91.00	91.00	2709.15	3.645	2.396	5-S2n	1.475	2.195	1.647	0.964	11.451	4.804
104.00	104.00	2709.63	4.133	3.241	5-S2n	1.598	2.342	1.788	1.029	11.846	4.981
117.00	117.00	2710.19	4.689	3.723	5-S2n	1.720	2.472	1.923	1.089	12.218	5.141
123.00	123.00	2710.47	4.970	3.959	5-S2n	1.777	2.526	1.985	1.116	12.401	5.211

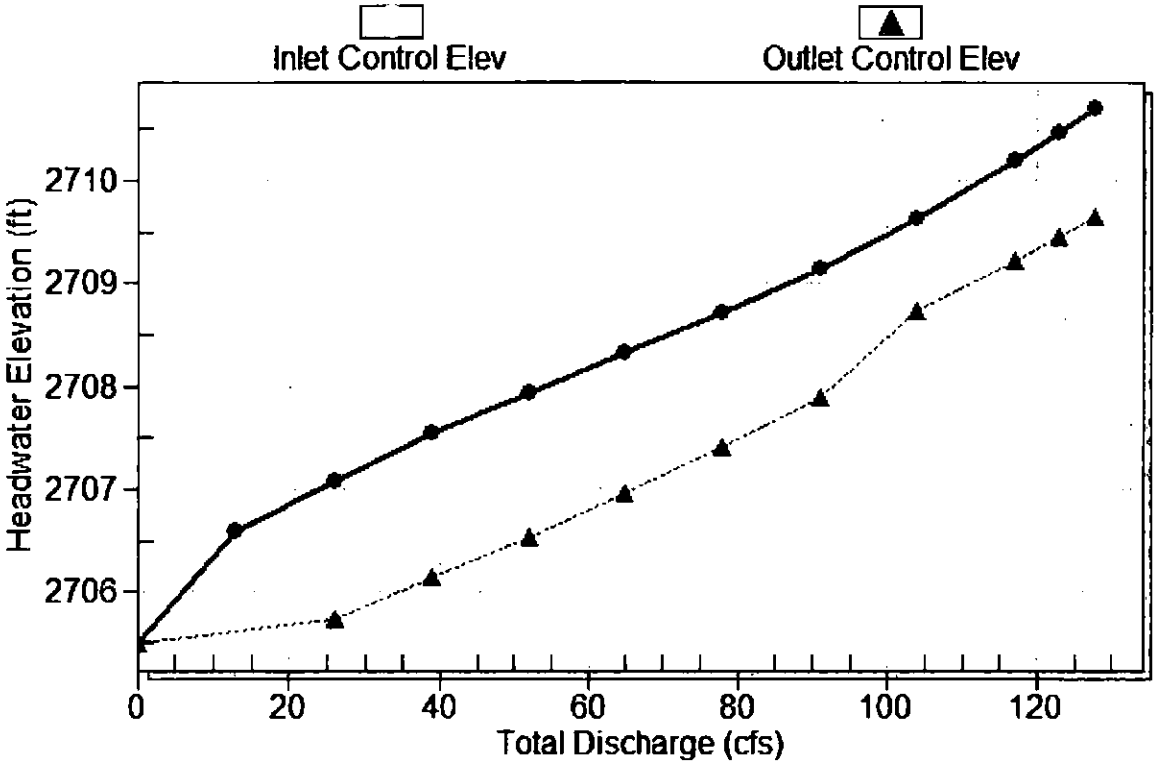
Straight Culvert

Inlet Elevation (invert): 2705.50 ft, Outlet Elevation (invert): 2704.50 ft

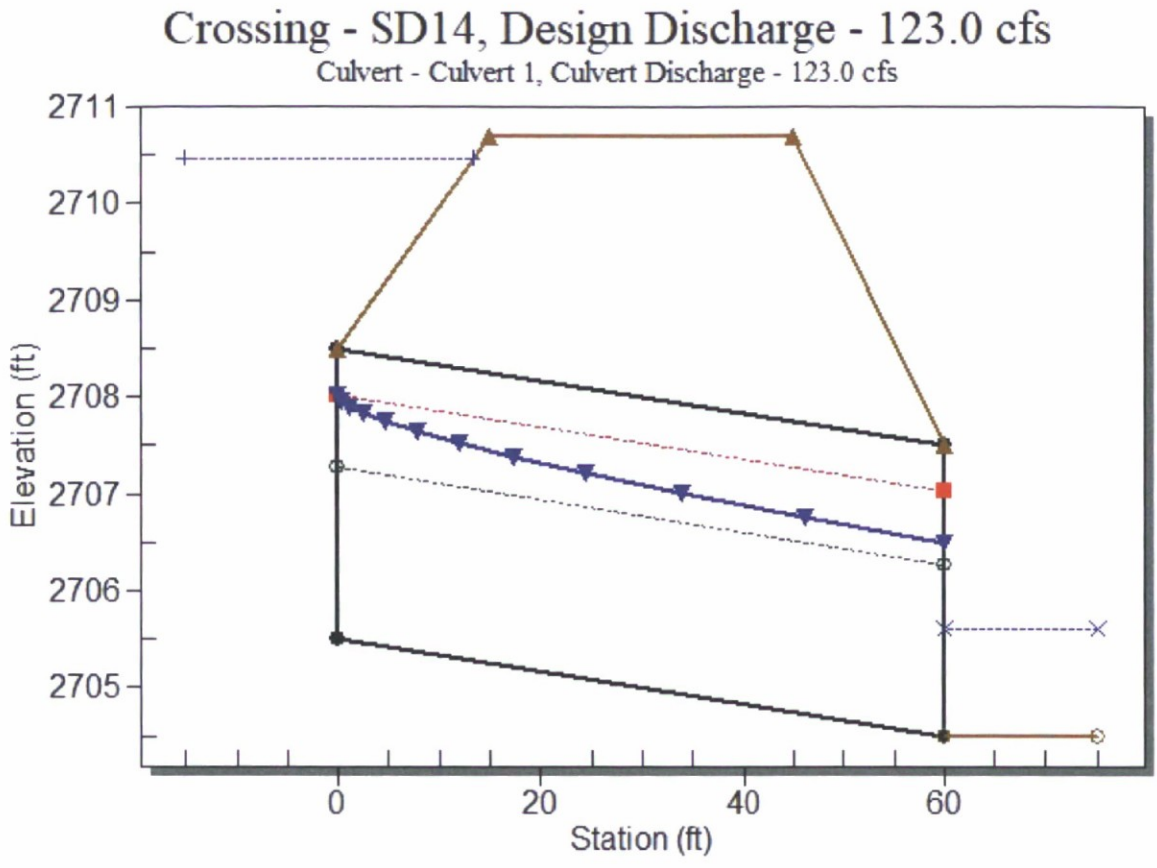
Culvert Length: 60.01 ft, Culvert Slope: 0.0167

Performance Curve

Culvert: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2705.50 ft

Outlet Station: 60.00 ft

Outlet Elevation: 2704.50 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2704.50	0.00	0.00	0.00	0.00
13.00	2704.85	0.35	2.74	0.50	0.92
26.00	2705.01	0.51	3.38	0.73	0.96
39.00	2705.13	0.63	3.80	0.90	0.99
52.00	2705.23	0.73	4.12	1.05	1.01
65.00	2705.32	0.82	4.38	1.17	1.03
78.00	2705.39	0.89	4.61	1.28	1.04
91.00	2705.46	0.96	4.80	1.38	1.05
104.00	2705.53	1.03	4.98	1.48	1.06
117.00	2705.59	1.09	5.14	1.56	1.07
123.00	2705.62	1.12	5.21	1.60	1.07

Tailwater Channel Data - SD14

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0230

Channel Manning's n: 0.0350

Channel Invert Elevation: 2704.50 ft

Roadway Data for Crossing: SD14

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2710.70 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

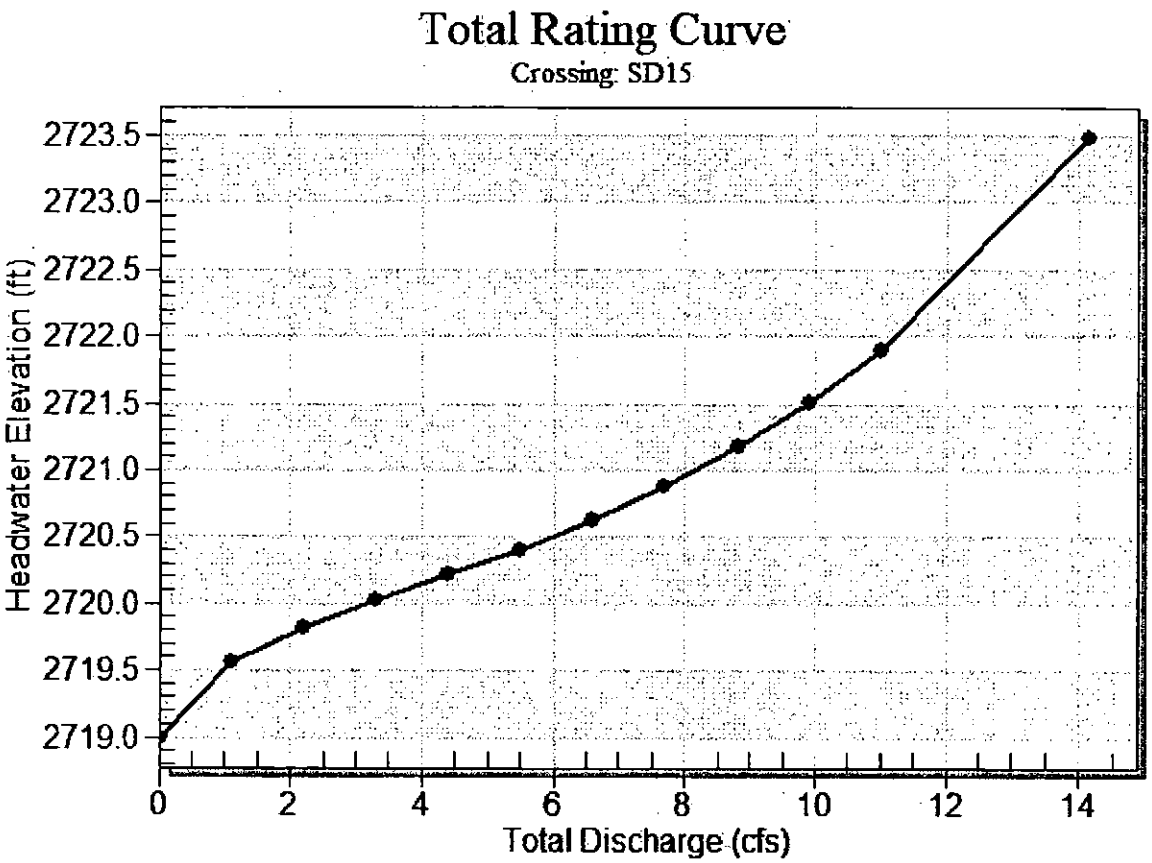
Minimum Flow: 0 cfs

Design Flow: 11 cfs

Maximum Flow: 11 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2719.00	0.00	0.00	0.00	1
2719.56	1.10	1.10	0.00	1
2719.82	2.20	2.20	0.00	1
2720.03	3.30	3.30	0.00	1
2720.21	4.40	4.40	0.00	1
2720.41	5.50	5.50	0.00	1
2720.63	6.60	6.60	0.00	1
2720.88	7.70	7.70	0.00	1
2721.18	8.80	8.80	0.00	1
2721.52	9.90	9.90	0.00	1
2721.89	11.00	11.00	0.00	1
2723.13	14.15	14.15	0.00	Overtopping

Rating Curve Plot for Crossing: SD15



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2719.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.10	1.10	2719.56	0.563	0.0*	1-S2n	0.302	0.388	0.302	0.170	4.419	1.756
2.20	2.20	2719.82	0.819	0.0*	1-S2n	0.432	0.555	0.432	0.251	5.253	2.188
3.30	3.30	2720.03	1.027	0.0*	1-S2n	0.536	0.692	0.536	0.313	5.822	2.477
4.40	4.40	2720.21	1.214	0.0*	1-S2n	0.625	0.803	0.625	0.366	6.306	2.698
5.50	5.50	2720.41	1.407	0.0*	1-S2n	0.710	0.901	0.710	0.411	6.678	2.878
6.60	6.60	2720.63	1.625	0.0*	5-S2n	0.791	0.991	0.791	0.452	6.980	3.033
7.70	7.70	2720.88	1.880	0.388	5-S2n	0.872	1.071	0.872	0.490	7.235	3.169
8.80	8.80	2721.18	2.177	1.041	5-S2n	0.951	1.144	0.951	0.525	7.445	3.289
9.90	9.90	2721.52	2.515	1.532	5-S2n	1.037	1.212	1.040	0.557	7.583	3.399
11.00	11.00	2721.89	2.892	2.071	5-S2n	1.129	1.269	1.127	0.587	7.709	3.500

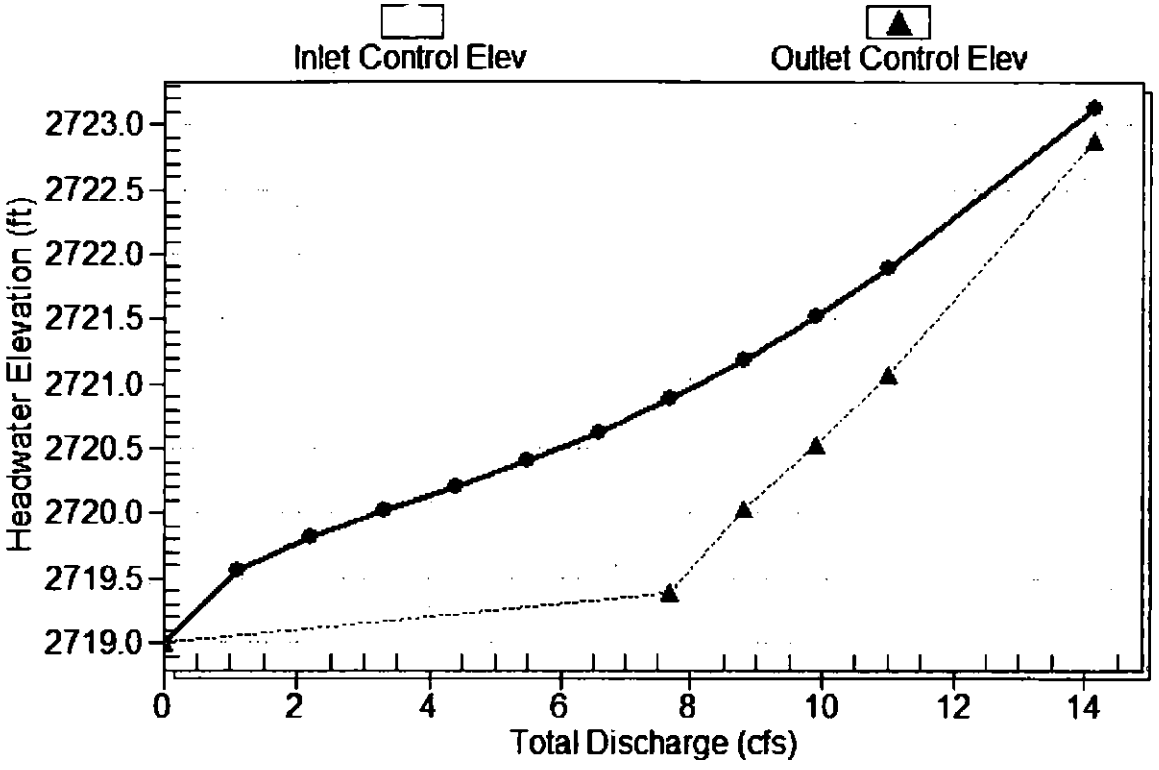
Straight Culvert

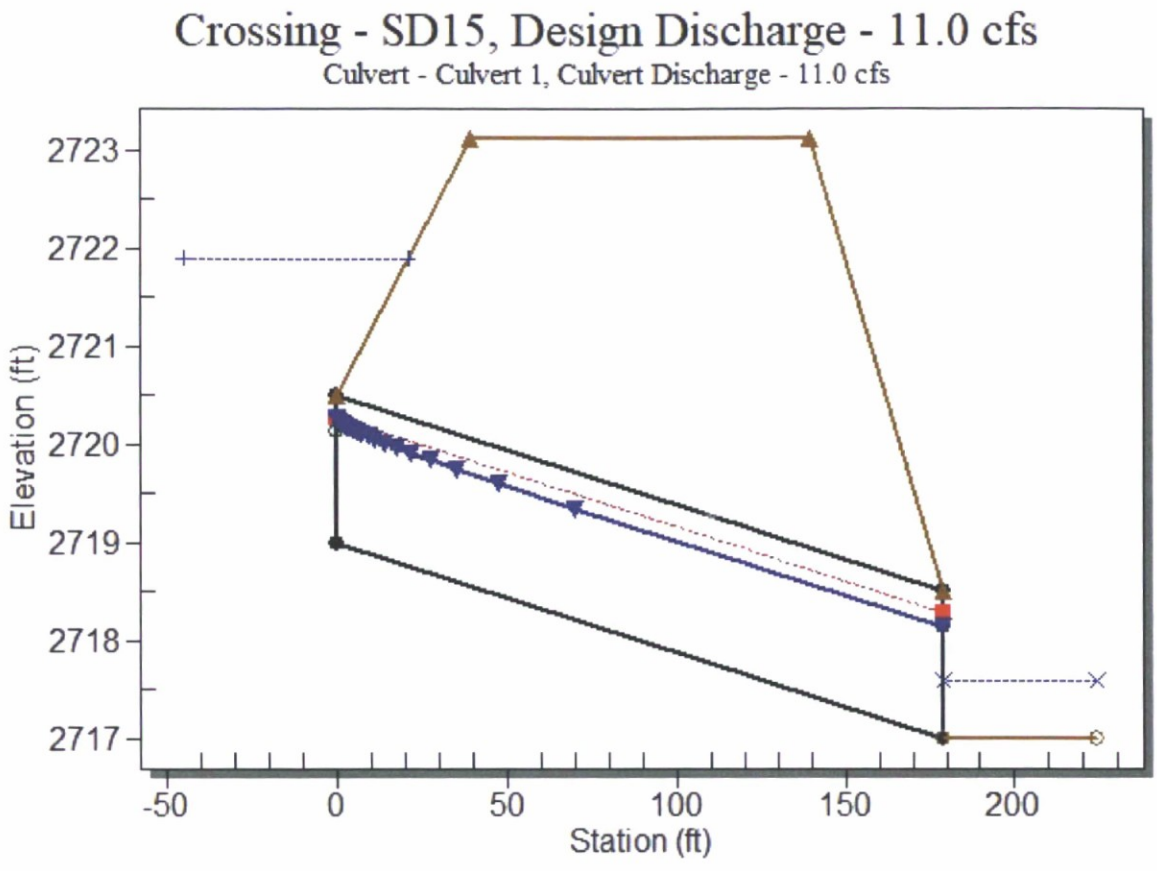
Inlet Elevation (invert): 2719.00 ft, Outlet Elevation (invert): 2717.00 ft

Culvert Length: 179.01 ft, Culvert Slope: 0.0112

Performance Curve

Culvert: Culvert 1





Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2719.00 ft

Outlet Station: 179.00 ft

Outlet Elevation: 2717.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: NONE

Tailwater Rating Curve (Crossing: SD15)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2717.00	0.00	0.00	0.00	0.00
1.10	2717.17	0.17	1.76	0.24	0.82
2.20	2717.25	0.25	2.19	0.36	0.86
3.30	2717.31	0.31	2.48	0.45	0.89
4.40	2717.37	0.37	2.70	0.52	0.91
5.50	2717.41	0.41	2.88	0.59	0.92
6.60	2717.45	0.45	3.03	0.65	0.93
7.70	2717.49	0.49	3.17	0.70	0.94
8.80	2717.52	0.52	3.29	0.75	0.95
9.90	2717.56	0.56	3.40	0.80	0.96
11.00	2717.59	0.59	3.50	0.84	0.97

Tailwater Channel Data - SD15

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0230

Channel Manning's n: 0.0350

Channel Invert Elevation: 2717.00 ft

Roadway Data for Crossing: SD15

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 ft

Crest Elevation: 2723.13 ft

Roadway Surface: Paved

Roadway Top Width: 100.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

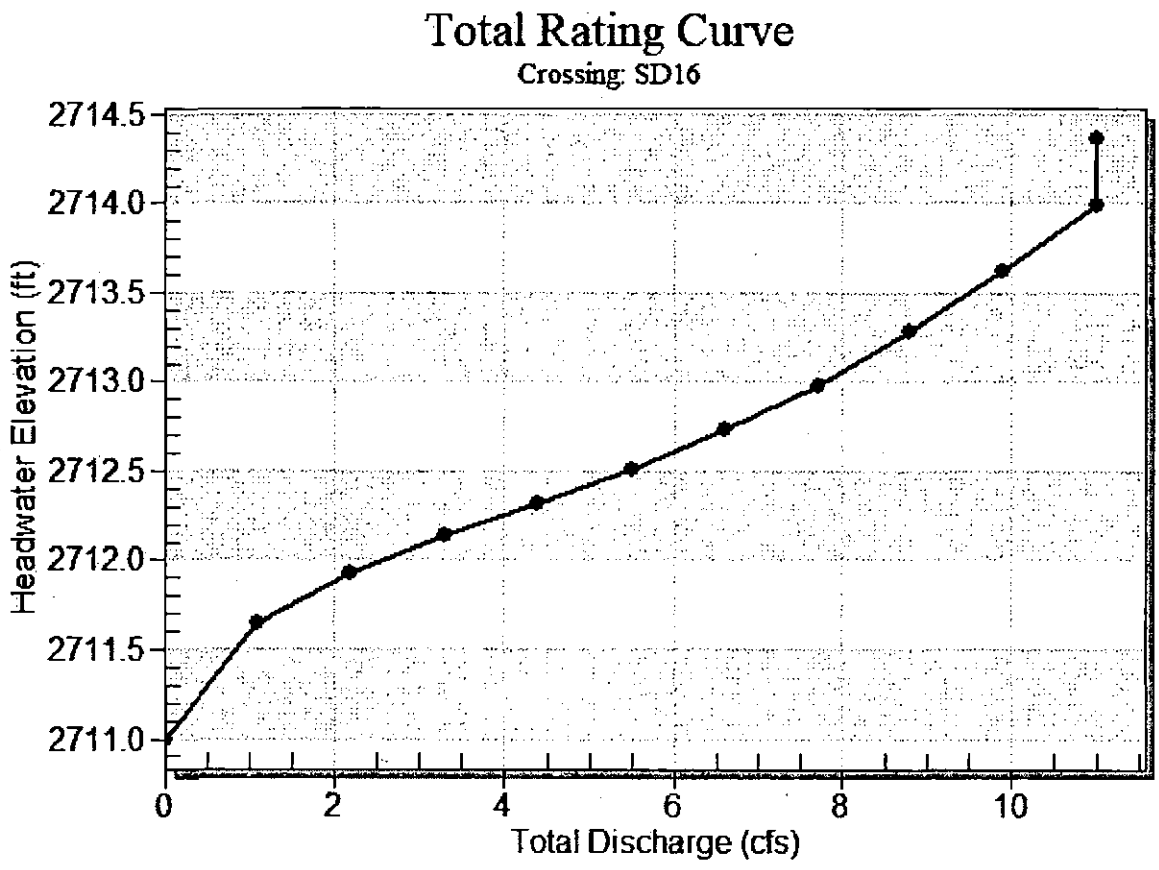
Minimum Flow: 0 cfs

Design Flow: 11 cfs

Maximum Flow: 11 cfs

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2711.00	0.00	0.00	0.00	1
2711.64	1.10	1.10	0.00	1
2711.93	2.20	2.20	0.00	1
2712.13	3.30	3.30	0.00	1
2712.32	4.40	4.40	0.00	1
2712.51	5.50	5.50	0.00	1
2712.73	6.60	6.60	0.00	1
2712.99	7.70	7.70	0.00	1
2713.28	8.80	8.80	0.00	1
2713.62	9.90	9.90	0.00	1
2714.00	11.00	11.00	0.00	1
2714.00	11.00	11.00	0.00	Overtopping

Rating Curve Plot for Crossing: SD16



Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2711.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.10	1.10	2711.64	0.645	0.0*	1-S2n	0.165	0.388	0.181	0.165	15.395	1.902
2.20	2.20	2711.93	0.927	0.0*	1-S2n	0.236	0.555	0.261	0.255	10.623	2.466
3.30	3.30	2712.13	1.135	0.0*	1-S2n	0.293	0.692	0.327	0.330	11.487	2.857
4.40	4.40	2712.32	1.321	0.0*	1-S2n	0.337	0.803	0.394	0.397	11.855	3.165
5.50	5.50	2712.51	1.515	0.0*	5-S2n	0.380	0.901	0.446	0.459	12.598	3.421
6.60	6.60	2712.73	1.733	0.0*	5-S2n	0.419	0.991	0.495	0.518	12.932	3.642
7.70	7.70	2712.99	1.988	0.0*	5-S2n	0.452	1.071	0.548	0.574	13.180	3.836
8.80	8.80	2713.28	2.285	0.0*	5-S2n	0.485	1.144	0.592	0.627	13.640	4.010
9.90	9.90	2713.62	2.623	0.0*	5-S2n	0.517	1.212	0.640	0.679	13.757	4.167
11.00	11.00	2714.00	2.999	0.113	5-S2n	0.549	1.269	0.682	0.729	14.067	4.311

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Straight Culvert

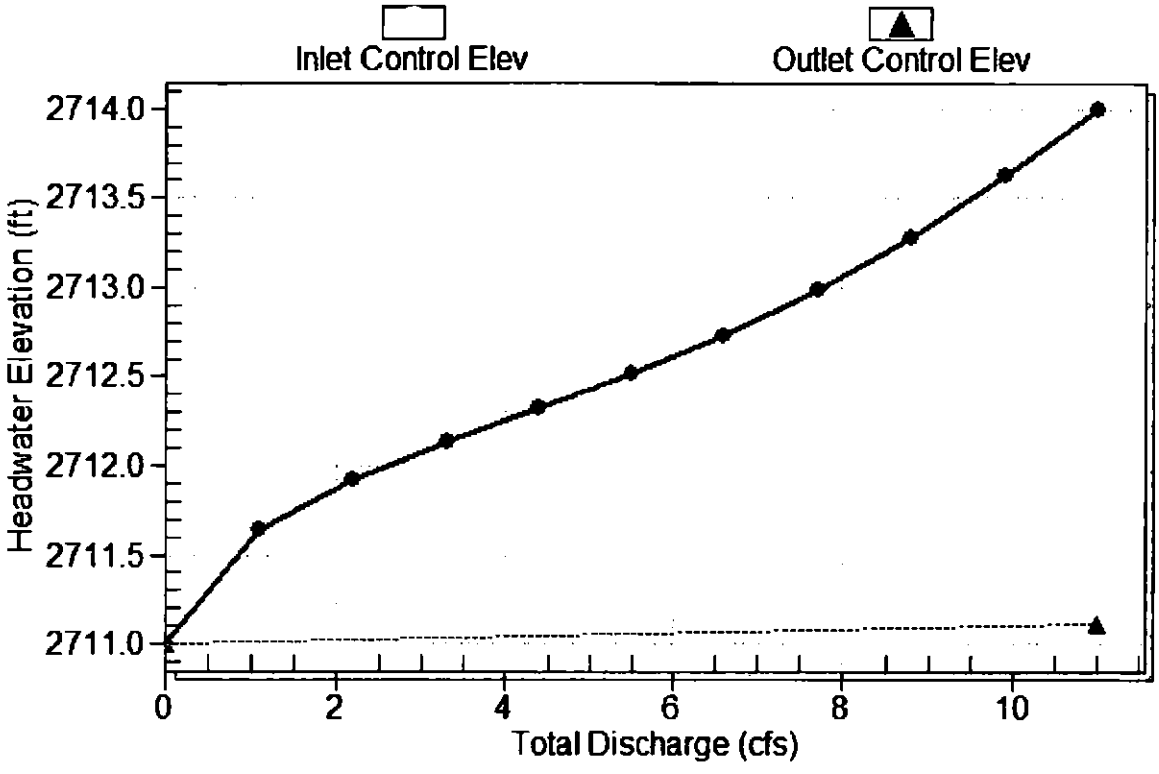
Inlet Elevation (invert): 2711.00 ft, Outlet Elevation (invert): 2708.50 ft

Culvert Length: 22.14 ft, Culvert Slope: 0.1136

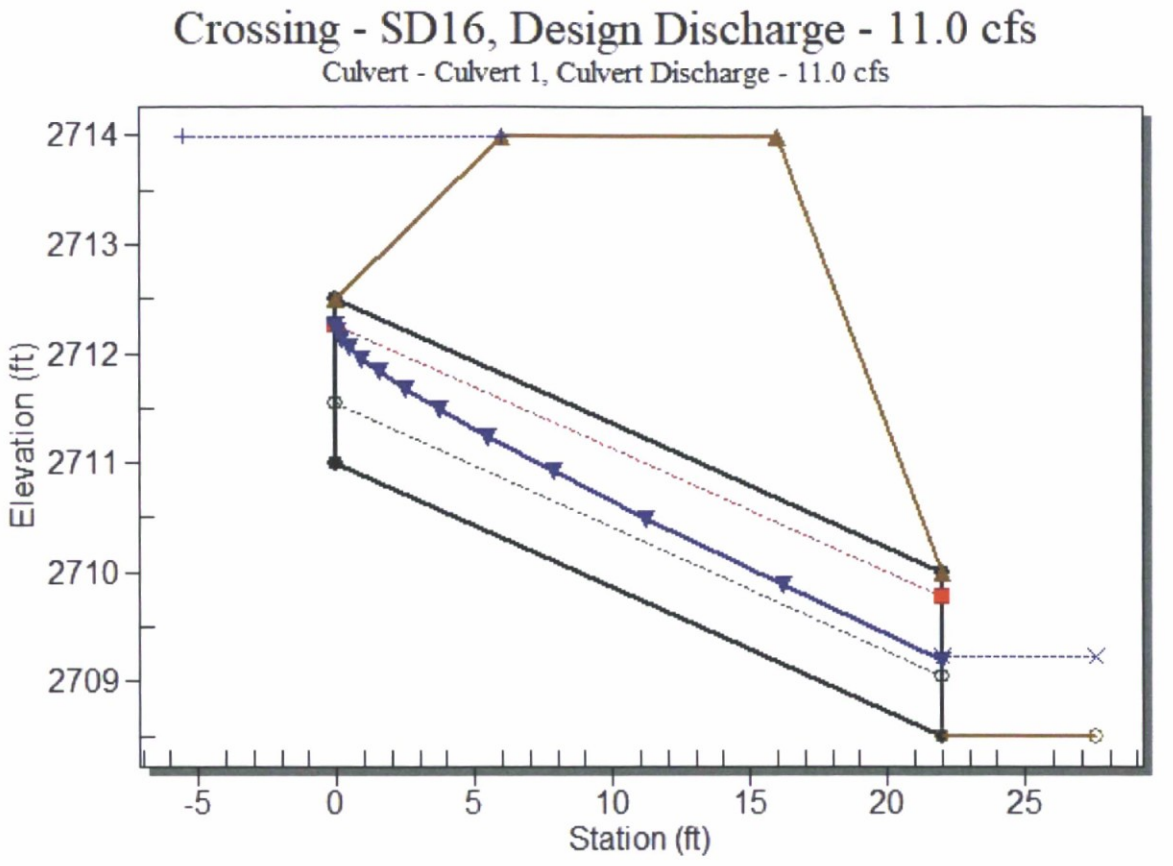
****

Performance Curve

Culvert: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2711.00 ft

Outlet Station: 22.00 ft

Outlet Elevation: 2708.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: NONE

Channel Rating Curve (Crossing: SD16)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2708.50	0.00	0.00	0.00	0.00
1.10	2708.67	0.17	1.90	0.26	0.82
2.20	2708.75	0.25	2.47	0.40	0.86
3.30	2708.83	0.33	2.86	0.51	0.88
4.40	2708.90	0.40	3.17	0.62	0.89
5.50	2708.96	0.46	3.42	0.72	0.89
6.60	2709.02	0.52	3.64	0.81	0.89
7.70	2709.07	0.57	3.84	0.89	0.89
8.80	2709.13	0.63	4.01	0.98	0.89
9.90	2709.18	0.68	4.17	1.06	0.89
11.00	2709.23	0.73	4.31	1.14	0.89

Tailwater Channel Data - SD16

Tailwater Channel Option: Rectangular Channel

Bottom Width: 3.50 ft

Channel Slope: 0.0250

Channel Manning's n: 0.0350

Channel Invert Elevation: 2708.50 ft

Roadway Data for Crossing: SD16

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 ft

Crest Elevation: 2714.00 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

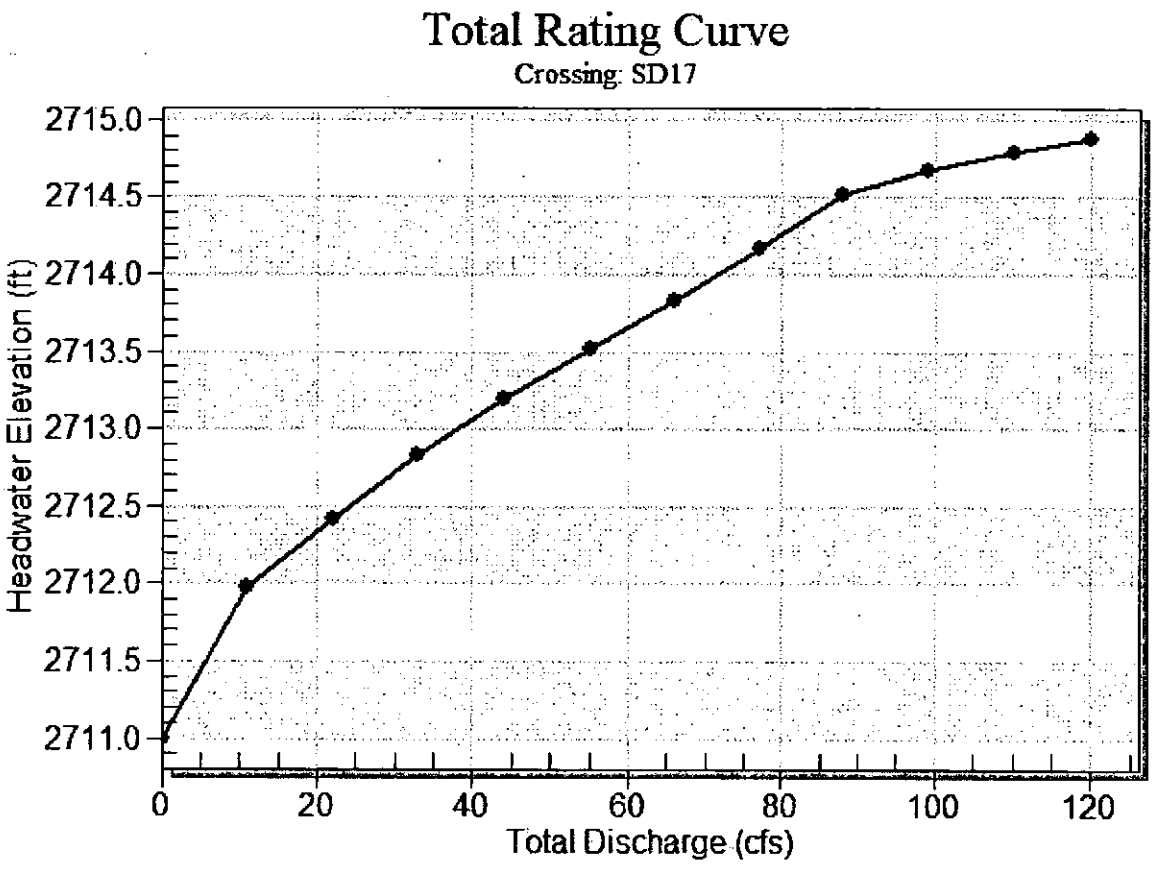
Design Flow: 110 cfs

Maximum Flow: 110 cfs

Table 5: Summary of Culvert Flows at Crossing: SD17

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2711.00	0.00	0.00	0.00	1
2711.98	11.00	11.00	0.00	1
2712.42	22.00	22.00	0.00	1
2712.83	33.00	33.00	0.00	1
2713.19	44.00	44.00	0.00	1
2713.52	55.00	55.00	0.00	1
2713.84	66.00	66.00	0.00	1
2714.17	77.00	77.00	0.00	1
2714.52	88.00	87.71	0.23	12
2714.68	99.00	92.27	6.65	6
2714.80	110.00	95.53	14.40	5
2714.50	87.16	87.16	0.00	Overtopping

Rating Curve Plot for Crossing: SD17



Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2711.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
11.00	11.00	2711.98	0.983	0.0*	1-S2n	0.426	0.732	0.470	0.158	7.595	23.219
22.00	22.00	2712.42	1.423	0.114	1-S2n	0.618	1.049	0.688	0.244	8.906	30.017
33.00	33.00	2712.83	1.831	0.444	1-S2n	0.762	1.296	0.870	0.317	9.677	34.718
44.00	44.00	2713.19	2.191	0.770	1-S2n	0.885	1.508	1.026	0.382	10.271	38.424
55.00	55.00	2713.52	2.519	1.103	1-S2n	0.995	1.692	1.170	0.442	10.759	41.474
66.00	66.00	2713.84	2.839	1.452	1-S2n	1.102	1.862	1.303	0.499	11.194	44.097
77.00	77.00	2714.17	3.170	1.818	5-S2n	1.195	2.014	1.430	0.553	11.580	46.417
88.00	87.71	2714.52	3.519	2.198	5-S2n	1.285	2.155	1.547	0.605	11.936	48.463
99.00	92.27	2714.68	3.678	2.364	5-S2n	1.323	2.210	1.595	0.656	12.076	50.330
110.00	95.53	2714.80	3.796	2.485	5-S2n	1.351	2.248	1.630	0.705	12.177	52.021

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Straight Culvert

Inlet Elevation (invert): 2711.00 ft, Outlet Elevation (invert): 2710.00 ft

Culvert Length: 40.01 ft, Culvert Slope: 0.0250

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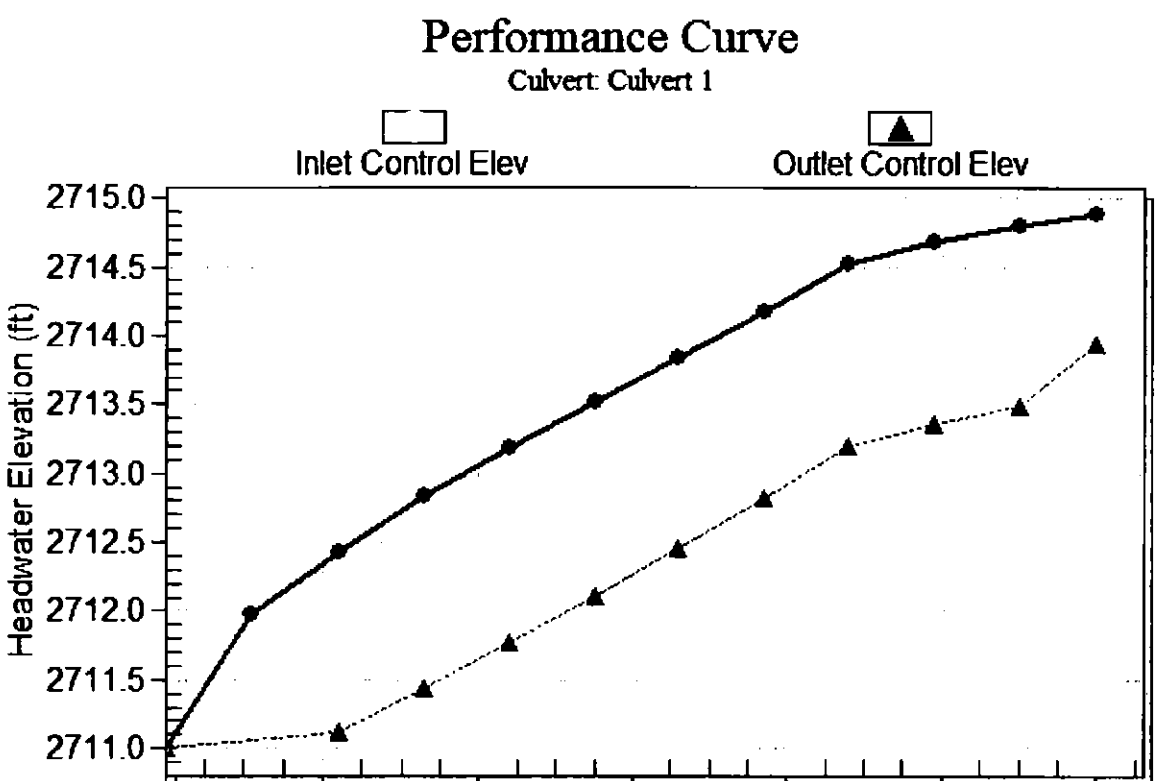
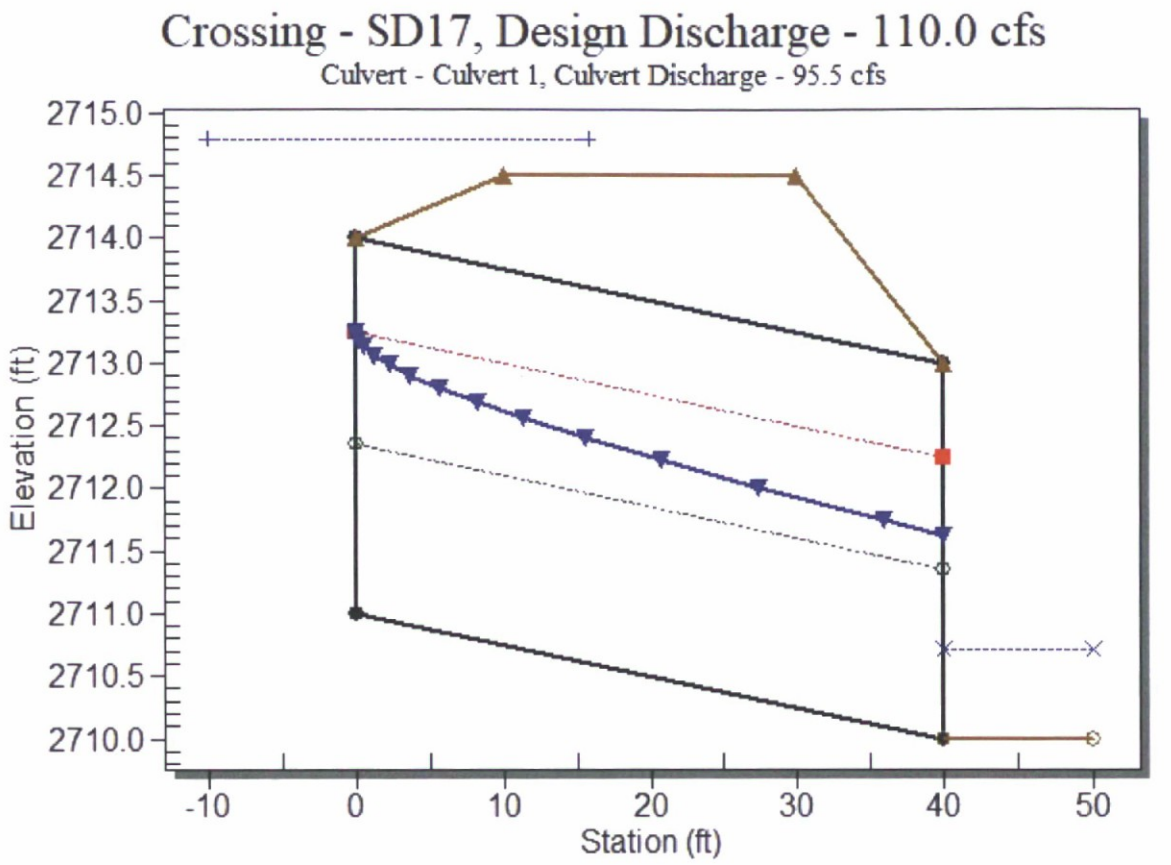

Performance Curve
Culvert: Culvert 1
Inlet Control Elev
Outlet Control Elev
Headwater Elevation (ft)
2715.0
2714.5
2714.0
2713.5
2713.0
2712.5
2712.0
2711.5
2711.0
0
20
40
60
80
100
120
Total Discharge (cfs)

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2711.00 ft

Outlet Station: 40.00 ft

Outlet Elevation: 2710.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 37 - Downstream Channel Rating Curve (Crossing: SD17)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2710.00	0.00	0.00	0.00	0.00
11.00	2710.16	0.16	23.22	39.42	10.30
22.00	2710.24	0.24	30.02	60.98	10.70
33.00	2710.32	0.32	34.72	79.08	10.87
44.00	2710.38	0.38	38.42	95.28	10.96
55.00	2710.44	0.44	41.47	110.34	10.99
66.00	2710.50	0.50	44.10	124.52	11.00
77.00	2710.55	0.55	46.42	138.02	11.00
88.00	2710.61	0.61	48.46	151.08	10.98
99.00	2710.66	0.66	50.33	163.65	10.95
110.00	2710.70	0.70	52.02	175.93	10.92

Tailwater Channel Data - SD17

Tailwater Channel Option: Rectangular Channel

Bottom Width: 3.00 ft

Channel Slope: 4.0000

Channel Manning's n: 0.0350

Channel Invert Elevation: 2710.00 ft

Roadway Data for Crossing: SD17

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2714.50 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Crossing Discharge Data

- Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

  Minimum Flow: 0 cfs

  Design Flow: 10 cfs

  Maximum Flow: 10 cfs

Table 32 - Summary of Culvert Flows at Crossing: SD18

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2695.00	0.00	0.00	0.00	1
2695.54	1.00	1.00	0.00	1
2695.79	2.00	2.00	0.00	1
2695.99	3.00	3.00	0.00	1
2696.16	4.00	4.00	0.00	1
2696.33	5.00	5.00	0.00	1
2696.51	6.00	6.00	0.00	1
2696.73	7.00	7.00	0.00	1
2696.97	8.00	8.00	0.00	1
2697.25	9.00	9.00	0.00	1
2697.56	10.00	10.00	0.00	1
2698.00	11.27	11.27	0.00	Overtopping

Rating Curve Plot for Crossing: SD18

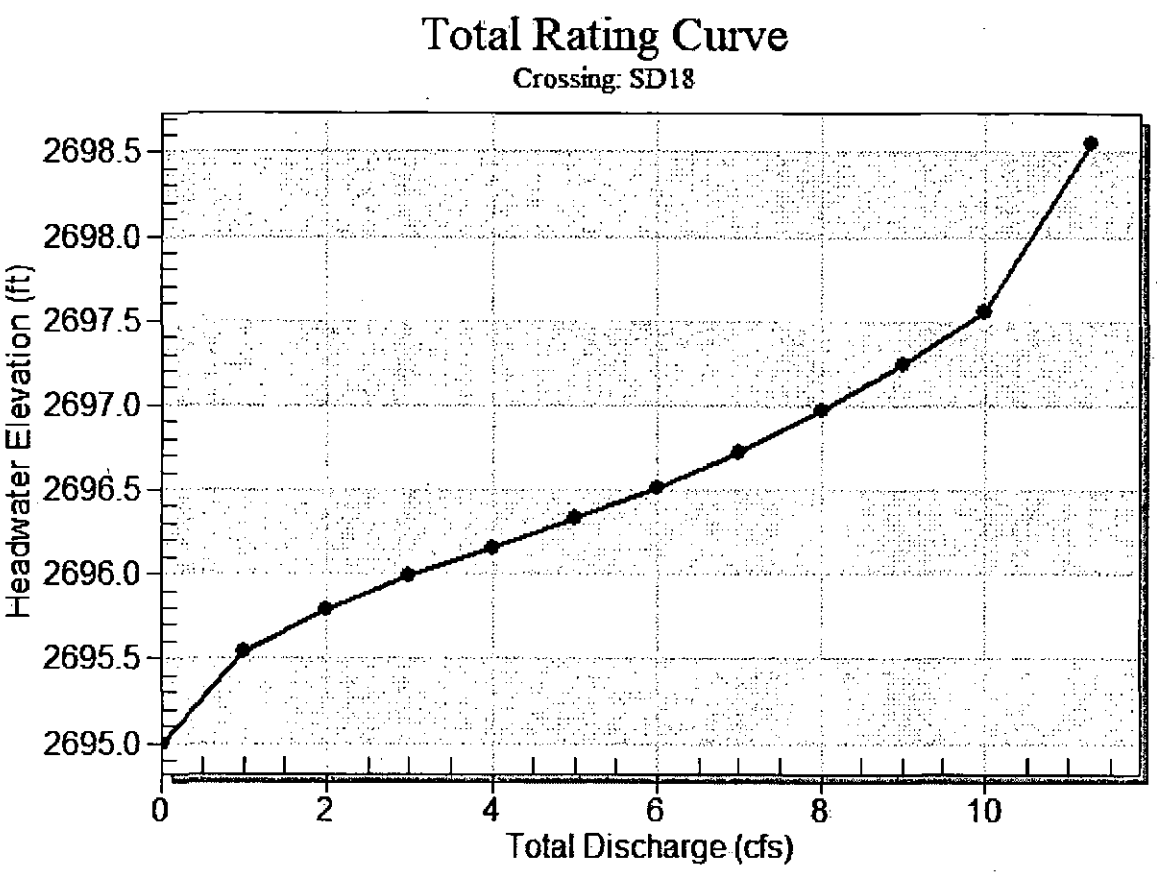


Table 53 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2695.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
1.00	1.00	2695.54	0.543	0.0*	1-S2n	0.238	0.369	0.238	0.164	5.433	1.314
2.00	2.00	2695.79	0.788	0.0*	1-S2n	0.339	0.530	0.350	0.234	6.311	1.598
3.00	3.00	2695.99	0.986	0.0*	1-S2n	0.423	0.658	0.436	0.286	7.082	1.787
4.00	4.00	2696.16	1.159	0.0*	1-S2n	0.489	0.765	0.509	0.329	7.542	1.931
5.00	5.00	2696.33	1.329	0.151	1-S2n	0.554	0.856	0.579	0.366	7.969	2.049
6.00	6.00	2696.51	1.514	0.368	5-S2n	0.610	0.942	0.644	0.399	8.269	2.150
7.00	7.00	2696.73	1.726	0.601	5-S2n	0.666	1.021	0.705	0.429	8.586	2.239
8.00	8.00	2696.97	1.969	0.849	5-S2n	0.719	1.092	0.764	0.456	8.838	2.318
9.00	9.00	2697.25	2.248	1.287	5-S2n	0.770	1.156	0.822	0.482	9.074	2.390
10.00	10.00	2697.56	2.560	1.542	5-S2n	0.822	1.218	0.879	0.505	9.303	2.456

****

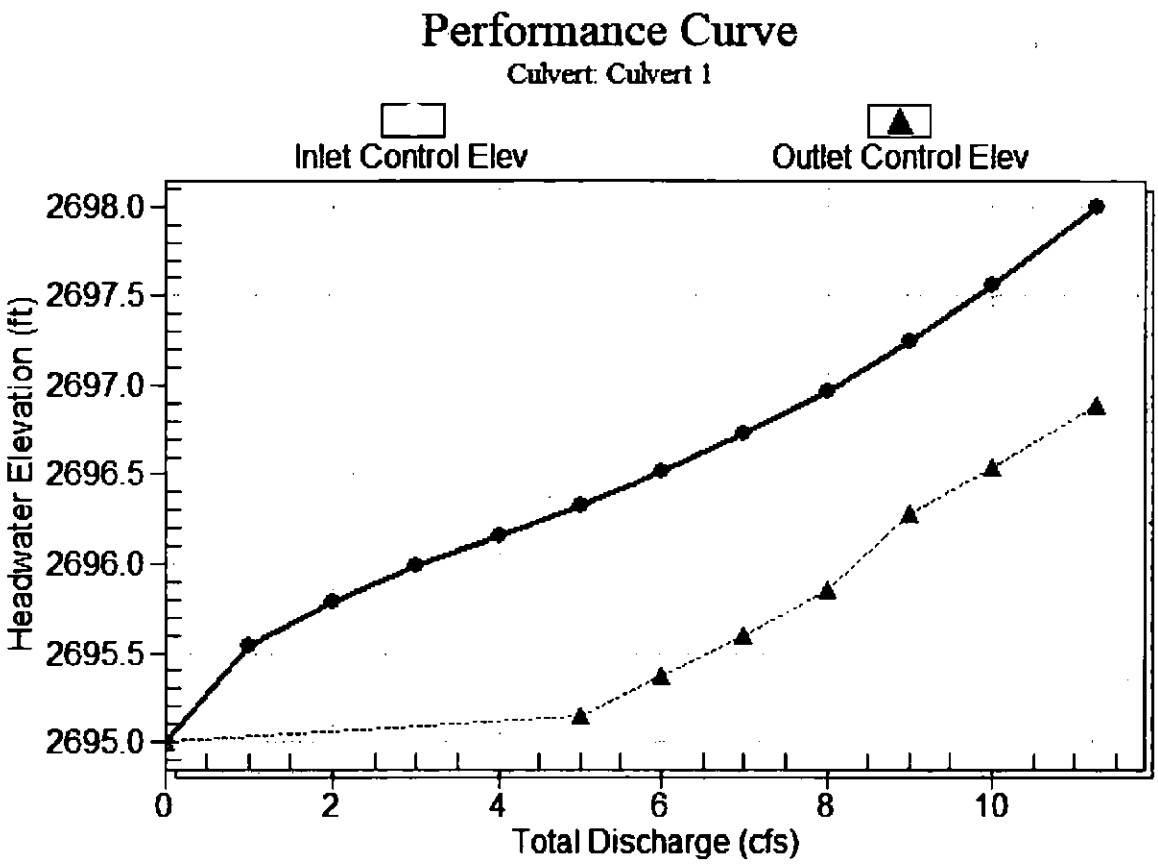
Straight Culvert

Inlet Elevation (invert): 2695.00 ft, Outlet Elevation (invert): 2694.00 ft

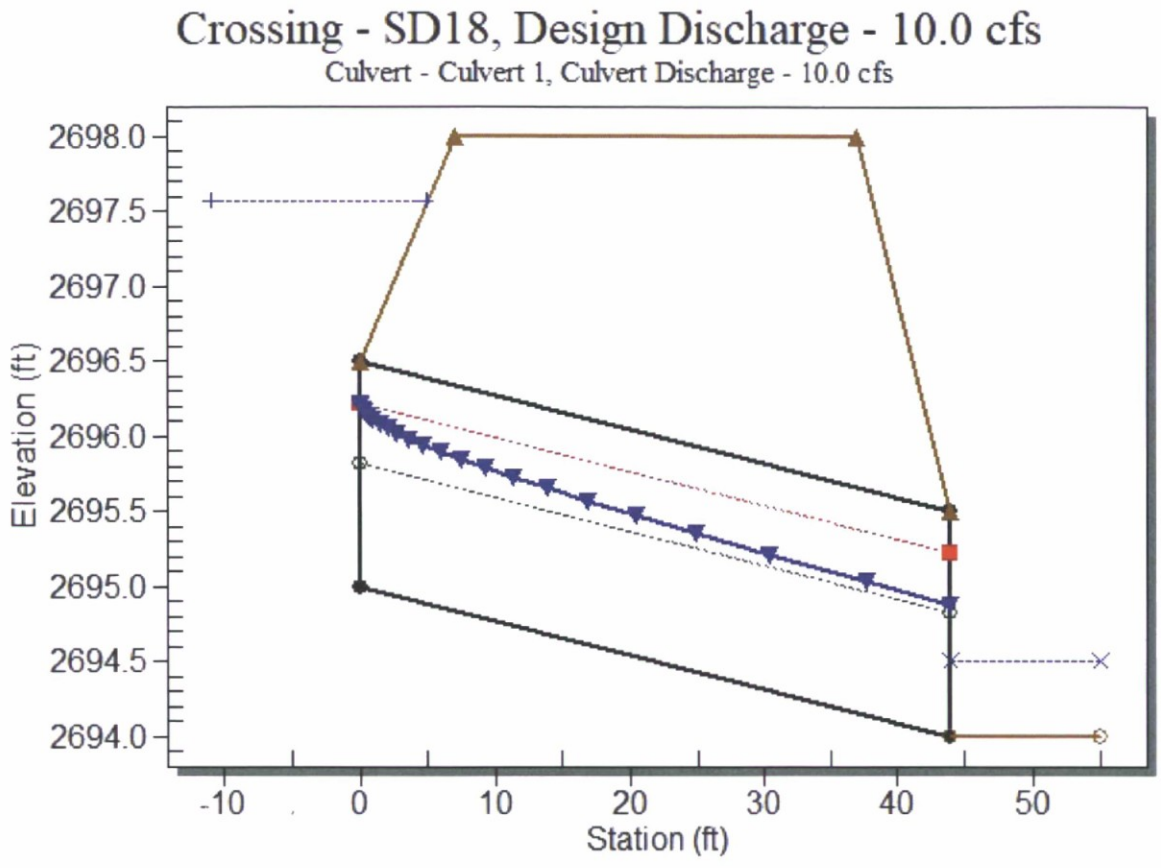
Culvert Length: 44.01 ft, Culvert Slope: 0.0227

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2695.00 ft

Outlet Station: 44.00 ft

Outlet Elevation: 2694.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: NONE

Table 54 - Downstream Channel Rating Curve (Crossing: SD18)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2694.00	0.00	0.00	0.00	0.00
1.00	2694.16	0.16	1.31	0.16	0.67
2.00	2694.23	0.23	1.60	0.23	0.70
3.00	2694.29	0.29	1.79	0.29	0.72
4.00	2694.33	0.33	1.93	0.33	0.73
5.00	2694.37	0.37	2.05	0.37	0.74
6.00	2694.40	0.40	2.15	0.40	0.75
7.00	2694.43	0.43	2.24	0.43	0.76
8.00	2694.46	0.46	2.32	0.46	0.77
9.00	2694.48	0.48	2.39	0.48	0.77
10.00	2694.51	0.51	2.46	0.50	0.78

Tailwater Channel Data - SD18

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 3.00 ft

Side Slope (H:V): 10.00 (_:1)

Channel Slope: 0.0160

Channel Manning's n: 0.0350

Channel Invert Elevation: 2694.00 ft

Roadway Data for Crossing: SD18

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2698.00 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

Worksheet for CB 1

Project Description

Solve For	Efficiency

Input Data

Discharge	1.00	ft^3/s
Slope	0.01170	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.055	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.014	
Curb Opening Length	9.00	ft
Local Depression	2.00	in
Local Depression Width	8.00	ft

Results

Efficiency	75.50	%
Intercepted Flow	0.75	ft^3/s
Bypass Flow	0.25	ft^3/s
Spread	6.45	ft
Depth	0.16	ft
Flow Area	0.43	ft^2
Gutter Depression	0.04	ft
Total Depression	0.20	ft
Velocity	2.31	ft/s
Equivalent Cross Slope	0.03053	ft/ft
Length Factor	0.54	
Total Interception Length	16.60	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6')

Worksheet for CB 2

Project Description

Solve For	Spread

Input Data

Discharge		2.00	ft³/s
Gutter Width		1.00	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		9.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		8.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	4.13	ft
Depth	0.15	ft
Gutter Depression	0.04	ft
Total Depression	0.20	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6')

Worksheet for CB 3

Project Description

Solve For	Spread

Input Data

Discharge		2.00	ft³/s
Gutter Width		1.00	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		9.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		8.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	4.13	ft
Depth	0.15	ft
Gutter Depression	0.04	ft
Total Depression	0.20	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6')

Worksheet for CB 4

Project Description

Solve For	Spread

Input Data

Discharge		1.25	ft³/s
Gutter Width		1.00	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		9.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		8.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	3.73	ft
Depth	0.12	ft
Gutter Depression	0.04	ft
Total Depression	0.20	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6'), Bypassing flow from CB 1 (0.25 cfs) was added to incoming flow.

Worksheet for CB 5

Project Description

Solve For	Efficiency

Input Data

Discharge	1.00	ft³/s
Slope	0.00940	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.055	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.014	
Curb Opening Length	9.00	ft
Local Depression	2.00	in
Local Depression Width	8.00	ft

Results

Efficiency	78.49	%
Intercepted Flow	0.78	ft³/s
Bypass Flow	0.22	ft³/s
Spread	6.74	ft
Depth	0.17	ft
Flow Area	0.47	ft²
Gutter Depression	0.04	ft
Total Depression	0.20	ft
Velocity	2.12	ft/s
Equivalent Cross Slope	0.03011	ft/ft
Length Factor	0.57	
Total Interception Length	15.67	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6')

Worksheet for CB 6

Project Description

Solve For	Efficiency

Input Data

Discharge	1.00	ft³/s
Slope	0.00940	ft/ft
Gutter Width	1.00	ft
Gutter Cross Slope	0.055	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.014	
Curb Opening Length	9.00	ft
Local Depression	2.00	in
Local Depression Width	8.00	ft

Results

Efficiency	78.49	%
Intercepted Flow	0.78	ft³/s
Bypass Flow	0.22	ft³/s
Spread	6.74	ft
Depth	0.17	ft
Flow Area	0.47	ft²
Gutter Depression	0.04	ft
Total Depression	0.20	ft
Velocity	2.12	ft/s
Equivalent Cross Slope	0.03011	ft/ft
Length Factor	0.57	
Total Interception Length	15.67	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6')

Worksheet for CB 7

Project Description

Solve For	Spread

Input Data

Discharge		2.44	ft³/s
Gutter Width		1.00	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		9.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		8.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	4.34	ft
Depth	0.16	ft
Gutter Depression	0.04	ft
Total Depression	0.20	ft

Messages

Notes	COP Catch Basin Type "M1" (L=6'). Bypassing flow from CB 5 & CB 6 (0.44 cfs) was added to incoming flow.

Worksheet for SP 1

Project Description

Solve For	Spread

Input Data

Discharge		2.00	ft³/s
Gutter Width		1.50	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		6.00	ft
Opening Height		0.33	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		6.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	4.75	ft
Depth	0.19	ft
Gutter Depression	0.05	ft
Total Depression	0.39	ft

Worksheet for SP 2

Project Description

Solve For	Spread

Input Data

Discharge		4.00	ft³/s
Gutter Width		1.50	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		6.00	ft
Opening Height		0.33	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		6.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	5.48	ft
Depth	0.27	ft
Gutter Depression	0.05	ft
Total Depression	0.39	ft

Worksheet for SP 3

Project Description

Solve For	Spread

Input Data

Discharge		9.00	ft^3/s
Gutter Width		1.50	ft
Gutter Cross Slope		0.055	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		8.00	ft
Opening Height		0.33	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		8.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	7.22	ft
Depth	0.36	ft
Gutter Depression	0.05	ft
Total Depression	0.39	ft

Worksheet for CH 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	8.00	ft^3/s

Results

Normal Depth	1.01	ft
Flow Area	3.07	ft^2
Wetted Perimeter	6.40	ft
Top Width	6.07	ft
Critical Depth	0.85	ft
Critical Slope	0.02548	ft/ft
Velocity	2.60	ft/s
Velocity Head	0.11	ft
Specific Energy	1.12	ft
Froude Number	0.65	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.01	ft
Critical Depth	0.85	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.02548	ft/ft

Worksheet for CH 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Discharge	3.00	ft^3/s

Results

Normal Depth	0.70	ft
Flow Area	1.47	ft^2
Wetted Perimeter	4.43	ft
Top Width	4.20	ft
Critical Depth	0.57	ft
Critical Slope	0.02903	ft/ft
Velocity	2.04	ft/s
Velocity Head	0.06	ft
Specific Energy	0.77	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.70	ft
Critical Depth	0.57	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.02903	ft/ft