GRADING PERMIT #2400614

FINAL DRAINAGE REPORT
for
NWC OF LA CANADA / NARANJA

SECTION 3, T12S, R13E
ORO VALLEY, PIMA COUNTY, ARIZONA
PC TAX ID: 224-10-002B
NAVD88 VERTICAL DATUM

Prepared for:

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CSP Case Number - 2302577
CMG Project No. 22-010
March 11, 2024

PLANS REVIEWED AND ACCEPTED FOR CODE COMPLIANCE

Stormwater: droberts 09/04/2024

The issuance of a permit shall not be construed to be a permit or approval of any violation of the codes or ordinances of the Town of Oro Valley

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1.0 INTRODUCTION

1.1. Site Location

The NWC of La Canada / Naranja site (herein referred to as the project site) is located within Section 3, Township 12 South, Range 13 East, Gila and Salt River Meridian, Oro Valley, Pima County, Arizona. A location map (Figure 1) is located in Appendix A.

1.2. Site Description

The project site within the project boundary has an area of approximately 2.8-acres. As depicted on the aerial photo (Figure 2), the site consists of undeveloped land, covered with desert brush with an average cover density of 20%, and a mixed soils group of 41% Type A, 41% Type C and 18% Type D (see Figure 4). Note, for the purpose of this report and the use of PC-Hydro for hydrologic analysis, Type A soils will be treated as Type B soils. The site is bound to the north and west by a regulatory wash (herein referred to as Wash 1), Naranja Drive to the south, and La Canada Drive to the east. The developable area of the site outside of the regulatory wash is approximately 2.2 acres in size. The parcel is part of the El Conquistador Country Club Planned Area Development (PAD), the underlying zoning is C-2.

1.3. Purpose and Objectives

The purpose and objectives of this Drainage Report are to:

1. Provide supporting information required for the Site Plan drainage scheme, which meets or exceeds the Town or Oro Valley drainage design criteria.
2. Provide the onsite Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas (SFHA), if applicable.
3. Determine the offsite and onsite peak discharges. The 100-year storm-event was calculated for design purposes.
4. Comply with the Town or Oro Valley Detention, First Flush Water Quality, Water Harvesting, Stormwater Pollution Prevention Plan (SWPPP), and avoidance of the Waters of the US (WUS) requirements.
5. Provide the existing and proposed regulatory floodplain limits, together with the associated Building Erosion Hazard Setback (BEHS), if applicable.
6. Determine the required onsite drainage improvements to convey the runoff through the project site.
7. Identify easements or right-of-way requirements needed for drainage.

1.4. Previous Studies

- *Oro Valley Town Wide Drainage Study Hydrologic Model* using HEC-1
- Published grading plan produced by T and T Engineering LLC dated 10/01/2012
- La Canada Drive construction plans produced by Kittelson & Associates, Inc. dated 3/17/09.
- *Preliminary Hydrology Report for NWC La Canada & Naranja*, prepared by Cypress Civil, dated April 16, 2021, was previously submitted to the Town of Oro Valley. The report was not approved by the Town, but first review comments were provided. Those comments have been reviewed and addressed in this report.

1.5. Long-Term Maintenance Responsibilities

The proper functioning of the drainage systems described in this report are dependent on the owner providing, annual and continuous maintenance to the drainage improvements. The firm responsible, at the time of this report, for the ownership, operation, scheduled and unscheduled maintenance and liability of drainage improvements and common areas detailed on this report is:

LA CANADA / NARANJA LLC
Attn: c/o Bob Schwartz
PO Box 57037
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Maintenance guidelines and checklist are provided within Appendix F. Additional recommended maintenance for Wash 1 is described within Section 4.0.

1.6. Methodologies and Procedures

The drainage scheme for this project was determined in accordance with the existing topographic and drainage features. The drainage analyses were completed using the following methodologies and procedures:

1. The Federal Emergency Management Agency (FEMA) floodplain limits and Special Flood Hazard Areas (SFHA) were obtained from the Flood Insurance Rate Map (FIRM) Panel 04019C1090L effective June 16, 2011(See Figure 3).
2. The offsite topographic information, offsite and onsite hydrologic soil types, and cover density were obtained from the Pima County GIS PimaMaps site.
3. The onsite topographic information was taken from a field survey dated December 9, 2020.

4. The offsite and onsite peak flows for the existing and proposed conditions were calculated utilizing the Pima County Regional Flood Control District (PCRFCD) PC-Hydro program, version 7.1.
5. The proposed non-regulatory channels were modeled using the Federal Highway Administration Hydraulic Toolbox program, version 4.4.
6. The proposed sidewalk concrete scuppers were modeled using Equation 10.16b of the SMDD manual.
7. Proposed detention basin routing was performed using the U.S. Army Corps of Engineers HEC-HMS software.
8. The proposed building stormdrain were modeled using the Federal Highway Administration HY-8 program version 7.70.1.
9. The project is more than 1 acre in size and will require preparation of a SWPPP.

2.0 HYDROLOGY

2.1. Offsite Conditions

Several sources were used to analyze offsite flows impacting the project site. Quantified flows from previous studies came from 4 different sources which include the *Oro Valley Town Wide Drainage Study Hydrologic Model* using HEC-1, a published grading plan produced by T and T Engineering LLC dated 10/01/2012, La Canada Drive construction plans produced by Kittelson & Associates, Inc. dated 3/17/09, and Cypress Civil.

100-YEAR PEAK DISCHARGE COMPARISONS

CP	OV HEC-1 [cfs]	T and T Engineering [cfs]	La Canada Plans [cfs]	Cypress [cfs]
CP-1	354	709	N/A	696
CP-2	121	291	178	121

Due to discrepancies between these evaluations, CMG Drainage evaluated our own discharges as summarized below. It is our recommendation that the values below be utilized for this site analysis.

Two offsite watersheds impact this project site and make up the flows within Wash 1 located in the north and west side of the property. Offsite watersheds OS1 and OS2 convey southwesterly towards the site as shown in *Offsite Drainage Map - Figure 5*. The Wash 1 channel is entirely rock lined in the north, the bottom is natural in the west. Minimal local scour has occurred where the channel bottom goes from rock lined to natural. The downstream culvert under Naranja Drive serves as a grade control structure which decreases scour potential, however

scour protection is provided in the channel where the bottom is natural. No historical changes in channel alignment have occurred within this lined channel or within the offsite watershed watercourse areas as the offsite watersheds are entirely built out.

Offsite watershed OS1 is primarily made up of existing residential properties and roadways; however, golf course greens make up a portion of the watershed west of La Canada. The watershed conveys southwesterly to the northwest corner of the site at approximately 1.9% slope. Offsite watershed OS2 is made up of existing residential properties and roadways. The watershed conveys southwesterly to the northeast corner of the site at approximately 2.1% slope.

The offsite turn lane improvements have a negligible effect on flows within La Canada Drive and Naranja Drive. The turn lane within Naranja Drive increases impervious area by 0.07 acres and results in additional peak flow of 0.8 cfs. The turn lane proposed in La Canada Drive results in an increase in impervious area of 0.04 acres and an increase in peak for flow 0.4 cfs. Increases in peak flow rates resulting from the proposed turn lanes will have no effect on roadway capacities.

The hydrologic data sheets are included within Appendix B. Hydrologic summaries of Offsite Watersheds OS1 and OS2, and Concentration Point CP-1 (which includes existing onsite watershed A, OS1 and OS2) are located below. See Section 2.2 for more information about existing onsite watershed A. The Offsite Drainage Map (Figure 5) depicts the associated watershed delineations and concentration points (CPs).

OFFSITE WATERSHED PEAK FLOWS

Watershed	Area [Ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
OS1	53.2	55.6	121.2	161.1	235.8
OS2	40.7	79.9	143	181.9	254.2

COMBINED OFFSITE AND EXISTING ONSITE WATERSHED PEAK FLOWS

CP	Area [Ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
CP-1*	96.7	126.5	259.9	341.8	488.6

*CP-1= OS1+OS2+Exist. A. Utilized for Wash 1 HEC-RAS analysis

2.2. Existing Onsite Conditions

The existing site drains from east to west with an average slope of 1%. A majority of the site runoff enters Wash 1 along the west site boundary. The existing site appears to have been cleared of vegetation sometime between 2012 and 2013.

Dense vegetation remains within the banks of the regulatory wash along the north and west site boundaries. Offsite regulatory flows that convey to Wash 1 are contained within the channel banks and no breakout flow occurs onto the site. See Section 4.0 for additional regulatory floodplain information.

Existing onsite watersheds 1E and 2E are delineated within the developable area and do not include areas within the site associated with Wash 1. Watershed 1E and 2E peak flow rates will be used for comparison to the proposed condition peak flow rates and detention basin design. A summary of existing onsite peak flow rates associated with 1E and 2E, and combined Concentration Point CP-A is included in the table below. Concentration Point CP-A is based on the overall property area, including areas of Wash 1 not included in watersheds 1E and 2E. See *Existing Drainage Map - Figure 6* for existing watershed delineation and the location of the concentration points. Concentration point CP-A can be found on Figure 5. Hydrologic data sheets are included in Appendix B.

EXISTING ONSITE WATERSHED PEAK FLOWS

Watershed	Area [Ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
1E	0.4	0.6	1.2	1.6	2.2
2E	1.8	2.9	5.6	7.2	10.1

COMBINED OFFSITE WATERSHED PEAK FLOWS

CP	Area [Ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
CP-A*	2.8	3.8	8.3	11.2	15.7

*CP-A = Area within Property Boundary. Utilized for Wash 1 HEC-RAS analysis

2.3. Proposed Onsite Conditions

The proposed project consists of the development of (3) office buildings, (1) drive-thru restaurant, the associated parking, PAALs, landscape improvements, and drainage improvements. In the proposed condition, the existing Wash 1 will remain unchanged. A proposed drainage easement for Wash 1 is located on the site as shown on Figure 7.

The project site was divided into 6 proposed watersheds. Watersheds 1 through 4 convey to proposed detention/retention basins which detain flows to critical basin values in the 2-, 10-, 25- and 100-year storms. The hydrologic data sheets are included within Appendix B and Figure 7 depicts the associated concentration points. The following table includes the proposed onsite peak flow rates as well as the cumulative peak flow rates. The cumulative peak flows rates include the

detained values associated with each proposed detention basins. See Section 3.2 for more information on proposed detention on the site.

PROPOSED WATERSHED DESIGN FLOWS

CP	Area [Ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]	Associated Basin	Detained Q2 [cfs]	Detained Q10 [cfs]	Detained Q25 [cfs]	Detained Q100 [cfs]
1P	0.2	0.6	1.0	1.2	1.7	BAS 1	0.5	0.5	0.6	0.7
2P	1.4	4.5	7.7	9.6	12.7	BAS 2	1.1	2.4	2.6	4.7
3P	0.20	0.5	0.9	1.2	1.5	BAS 3	0.3	0.6	0.8	1.0
4P	0.4	1.7	2.4	2.9	3.6	BAS 4	1.5	2.1	2.6	3.3
5P	0.1	0.2	0.4	0.5	0.6	-	-	-	-	-
6P	0.1	0.1	0.1	0.2	0.3	-	-	-	-	-

3.0 STORMWATER DETENTION AND RETENTION REQUIREMENTS

Per the Town of Oro Valley Department of Public Works Drainage Criteria Manual, dated February 1, 2010, all basins within the Town of Oro Valley shall be considered Critical Basins. Detention must be provided for all qualifying developments for the 2-, 10-, 25- and 100-year storm events.

First Flush collection systems are required on the site to capture and isolate the most polluted portions of runoff. First Flush retention is provided within the bottom 4-inches of 4 proposed basins to treat the first ½-inch of runoff over the proposed parking lots and PAALs. A majority of the site is made up of equal parts of Hydrologic Soils Types A and C and is expected to infiltrate within 12- hours after a rainfall as required.

3.1. First Flush

The First Flush volume is summarized below for asphalt areas within Local Watersheds 2P.1 and 4P.2. The runoff volume associated with the first ½-inch of runoff will be retained within the first 4-inches of Basins 2 and 4 respectively. Appendix D for the required First Flush retention volumes.

FIRST FLUSH REQUIRED VOLUMES

Basin	Area of Asphalt [ac.]	Required Volume [cf]	Required Volume [af]
2P.1	0.66	1138	0.026
4P.2	0.11	190	0.004

First flush volumes provided in each basin are summarized below.

FIRST FLUSH VOLUME PROVIDED

Basin	Volume* [Ac.Ft.]
BAS 1	0.004
BAS 2	0.032
BAS 3	0.004
BAS 4	0.004

*@ 4-inches of depth

Paved surfaces do not drain to Basins 1 and 3; however additional First Flush Water Harvesting volume is provided within Basins 1 and 3 and will provide additional first flush applications to rainfall on associated building rooftops.

3.2. Detention/Retention Basins

Four basins (Detention/Retention Basins 1 through 4) are proposed to meet the Town of Oro Valley Critical Basin requirement. The outlets for Basins 1 and 3 consist of a 12-inch bleeder pipe with a 6-inch orifice plate at the upstream end of the pipe. The Flowline of the orifice opening is set to 4-inches above the bottom of the basin. The Basin 2 outlet consists of an 18-inch pipe with no orifice plate. The flowline is set 4-inches above the basin bottom. The Basin 4 outlet consists of (2) 12-inch pipes with flowlines set to 4-inches above the basin bottom. The orifice pipes will outlet through the bank protection of Wash 1, repair around the excavation will be required. Figure 7 depicts the location of the basins. Appendix D contains the HEC-HMS calculations.

EXISTING VS. PROPOSED PEAK FLOWS EXITING PROJECT SITE

Watershed/CP		Q 2 Year [cfs]		Q 10 Year [cfs]		Q 25 Year [cfs]		Q 100 Year [cfs]	
Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1E	**BAS1+5P**	0.6	0.6	1.2	0.7	1.6	0.8	2.2	1.1
2E	**BAS2+BAS3+BAS4+6P**	2.9	2.4	5.6	4.4	7.2	4.8	10.1	7.8

The following table summarizes the basin parameters.

DETENTION BASIN SUMMARY TABLE

BASIN	Q100 In [cfs]	Q100 Out [cfs]	Volume Detained [ac-ft]	Total Basin Volume [ac-ft]	WSEL [ft]	Basin Top [Elev.]	Basin Bottom [Elev.]	Pipe Outlet FL (Elev.)	Outlet Type
1	1.7	0.7	0.019	0.037	10.15	11.00	9.00	9.3	6-in ORIFICE
2	12.7	4.7	0.203	0.215	9.91	10.00	8.17	8.5	18-in PIPE
3	1.5	1.0	0.012	0.042	8.14	10.00	7.00	7.33	6-in ORIFICE
4	3.6	3.3	0.013	0.023	8.49	9.24	7.24	7.6	(2) 12-in PIPE

4.0 REGULATORY FLOODPLAINS

4.1. Existing Conditions

Per the FEMA FIRM panel 04019C1090L, the project site is located within a Zone X (areas outside the 500-year floodplain). Figure 3 in Appendix A contains a portion of the FIRM map.

The project site contains 1 regulatory existing floodplain (Wash 1), portions of which are channelized along the north and west project boundaries. Per the La Canada Drive roadway plans, the existing (4) 36-inch RCPs convey flows westerly

under La Canada Drive to the upstream end of the onsite channel, at the northeast corner of the site. The downstream end of the onsite channel is an existing 1-cell 16-x12-ft Concrete Box Culvert (CBC) with 12-ft wide raised cart path. A cross section of the CBC is included in Appendix F. The starting water surface elevation for the model is set to the headwater elevation of the CBC, calculated using FHA Hydraulic Toolbox. The unusual shape of the CBC is modeled as a double culvert, a 4-ft x 12-ft and a 12-ft x 9-ft. The starting water surface elevation is 2706.25. Flows break out to the existing basin west of the channel but are contained within the basin. The channel is fully lined along the north and northwest project boundary. After the curve in the northwest corner of the site, the channel is bank protected with a natural bottom and 3-ft scour protection. The existing floodplain was modeled using HEC-RAS Version 6.1 as a subcritical model. The following table summarizes the HEC-RAS results. HEC-RAS and Hydraulic Toolbox output is included in Appendix E.

The existing Wash 1 was modeled under its current vegetated state without any maintenance. Manning's roughness values were assessed in the field and applied based on densely vegetated channel conditions. See Figure 6, for existing locally regulated floodplain limits and HEC-RAS cross sections.

Although the Wash 1 hydraulic analysis was performed based on the current vegetated state, it is our recommendation that brush and trees less than 3-inches in diameter within the channel should be cleared every two years, and branches should be trimmed up to 48-inches off the ground.

WASH 1 EXISTING HEC-RAS SUMMARY TABLE

River Station	Q100 [cfs]	WSEL [ft]	Max Chl Flow Depth [ft]	Velocity [ft/s]
711	254.2	2710.39	2.9	1.9
636	254.2	2710.15	3.9	1.9
561	254.2	2709.88	4.2	2.2
487	254.2	2709.69	4.3	1.7
410	254.2	2709.54	4.5	1.7
368	254.2	2709.35	4.5	2.5
311	488.6	2707.86	3.6	6.3
237	488.6	2706.65	4.6	6.2
162	488.6	2706.36	5.7	4.7
87	488.6	2706.27	6.2	3.5
16	488.6	2706.25	7.0	2.1

4.2. Building Erosion Hazard Setback (BEHS)

Per the Improvement Plans for Canada Hills, Village 15, Lots 1-112 As-Built Drawing, dated January 27, 1992, prepared by Cella Barr and Associates, Wash 1 is fully lined along the north property boundary and the northwest bend, but becomes bank lined and a natural bottom with scour protection to a depth of 3-ft along the western property boundary. See Appendix F for a copy of the As-Built Plans. A BEHS is not necessary for Wash 1.

4.3. Proposed Conditions and Encroachment

Proposed Building 1 currently encroaches into the Wash 1 floodplain. A proposed condition encroachment analysis was performed to raise the southern bank of the floodplain to an elevation equal to the water surface elevation and required freeboard. Like the existing condition, the starting water surface elevation is 2706.25. Flows break out to the existing basin west of the channel but are contained within the basin. The encroachment resulted in a 0.1-ft rise in HEC-RAS cross sections 311 through 487. Velocity increases are below 10% from the existing condition. The entire channel will be part of an additional public drainage easement proposed with this site. A summary table of the Proposed Condition HEC-RAS results can be found below, followed by an encroachment summary table. See Figure 7 for the proposed floodplain limits and HEC-RAS Cross Sections.

WASH 1 PROPOSED HEC-RAS SUMMARY TABLE

River Station	Q100 [cfs]	WSEL [ft]	Max Chl Flow Depth [ft]	Velocity [ft/s]	Freeboard [ft]	Min. Channel Depth [ft]
711	254.2	2710.42	2.9	1.9	0.5	3.4
636	254.2	2710.20	4.0	1.9	0.7	4.7
561	254.2	2709.94	4.2	2.2	0.7	5.0
487	254.2	2709.76	4.4	1.7	0.7	5.2
410	254.2	2709.61	4.6	1.7	0.8	5.4
368	254.2	2709.43	4.6	2.5	0.8	5.4
311	488.6	2707.96	3.7	6.1	0.7	4.4
237	488.6	2706.65	4.6	6.2	0.9	5.4
162	488.6	2706.36	5.7	4.7	1.0	6.7
87	488.6	2706.27	6.2	3.5	1.1	7.2
16	488.6	2706.25	7.0	2.1	1.2	8.2

ENCROACHMENT ANALYSIS

River Station	Existing WSEL [ft]	Proposed WSEL [ft]	Change in Elevation [ft]
711	2710.39	2710.42	+0.03
636	2710.15	2710.20	+0.05
561	2709.88	2709.94	+0.06
487	2709.69	2709.76	+0.07
410	2709.54	2709.61	+0.07
368	2709.35	2709.43	+0.08
311	2707.86	2707.96	+0.10
237	2706.65	2706.65	+0.00
162	2706.36	2706.36	+0.00
87	2706.27	2706.27	+0.00
16	2706.25	2706.25	+0.00

5.0 LOCAL HYDROLOGY AND HYDRAULICS

Several drainage structures will be required to convey the onsite flows through the project site. These structures consist of sidewalk scuppers, curb openings, and storm drain. Figure 8 depicts the local drainage structures together with the associated local contributing watersheds. Local watersheds made up solely of building rooftops were calculated based on a 10 cfs/acre unit peak flow values. All other local watershed peak flows are based on unit peak flow value of the associated proposed watershed. The following table summarizes the local watershed design peak flows for the 100-year storm event.

LOCAL WATERSHED DESIGN FLOWS

Watershed CP	Area [Ac]	Q100 [cfs]
1P.1	0.12	1.2
2P.1	1.16	10.4
3P.1	0.12	1.2
4P.1	0.16	1.6
4P.2	0.17	1.5

5.1. Scuppers

Scuppers were calculated for the following concentration points (CPs). The 10-year peak flow values with clogging factor were compared to the 100-year peak

flow value without clogging factor to ensure both requirements are met. Appendix C contains the hydraulic models and Figure 8 depicts the CPs.

SCUPPERS

CP	Q100 [cfs]	Scupper Type	Cells Required [#]
4P.2	2	2	1

5.2. Curb Opening

The curb opening location is depicted on Figure 8 and Appendix C contains the hydraulic models. Curb openings larger than 10-ft will be split according to the information below.

CURB OPENING

CP	Q100 [cfs]	Flow Depth [ft]	Length Provided [ft]
2P.1	10.4	0.5	13*

*Will be split into (1) 8-ft opening and (1) 5-ft opening

5.3. Storm Drain

Stormdrain is proposed for building rooftops to convey flows to the associated detention basin. The table below summarizes the minimum pipe size for the associated local watershed. Pipe calculations were performed with HY-8 and outlet information was used to size rip rap pads at the pipe outlet into each basin. Refer to Figure 8 for the locations of the stormdrain and Appendix C for the calculations.

STORM DRAIN

CP	Q100 [cfs]	# of Pipes	Diameter [in]
1P.1	1.2	1	6
3P.1	1.2	1	6
4P.1	1.6	1	6

5.4. Rip Rap Aprons

Riprap aprons are proposed where pipes outlet to detention basins. Rip rap aprons are proposed at the outlets of pipes listed in section 5.3 and at all roof drains. A 3-ft rip rap pad will be placed at the outlet of all roof drains. Appendix C contains the hydraulic calculations, and the following table depicts the results. Five rip rap pads will extend beyond the toe of slope for all scuppers and curb openings conveying to the basin to prevent future scour.

RIP RAP APRONS

CP	D50 Minimum [in]	Apron Length [ft]
1P.1 Outlet	6	4
3P.1 Outlet	6	4
4P.1 Outlet	6	4

5.5. Street Flow

PAAL capacity was analyzed at the most conservative location on the site (Cross Section 1). The largest peak flow to convey through the proposed PAAL is within watershed 2P.1 with 10.4 cfs. PAAL capacity was analyzed across Cross Section 1. Depths within the PAAL between the two pinch points are less than 0.2-ft and do not overtop the curb. Appendix C contains the hydraulic models.

6.0 SUMMARY

The supporting information required for the Site Plan drainage scheme is being provided within the report.

- All building FFEs are set to the minimum required to be above the adjacent regulatory flood elevations
- The offsite and onsite peak discharges for the 100-year storm-event have been calculated.
- Town of Oro Valley Detention and First Flush requirements have been met.
- The required onsite drainage improvements to convey the runoff through the project site have been calculated and are shown in the figures of the report.

WORKS CITED

- Simons, Li, & Associates and City of Tucson Department of Transportation, Standards Manual for Drainage Design and Floodplain Management in Tucson Arizona. December 1989 (Revised July 1998).
- Pima County Regional Flood Control District Design Standards for Stormwater Detention and Retention, November 2015.
- Town of Oro Valley Department of Public Works Drainage Criteria Manual, dated February 1, 2010
- Pima County Department of Transportation and Flood Control District, Drainage and Channel Design Standards for Local Drainage. May 1984.
- Pima County, PimaMaps. < https://pimamaps.pima.gov/>
- Federal Emergency Management Agency (FEMA), National Flood Insurance Program (NFIP); Flood Insurance Rate Map (FIRM) 04019C1090L.
- A *Preliminary Hydrology Report for NWC La Canada & Naranja*, prepared by Cypress Civil, dated April 16, 2021, was previously submitted to the Town of Oro Valley
- *Oro Valley Town Wide Drainage Study Hydrologic Model* using HEC-1
- *P*ublished grading plan produced by T and T Engineering LLC, dated 10/01/2012
- La Canada Drive construction plans produced by Kittelson & Associates, Inc. dated 3/17/09

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APPENDIX A - FIGURES AND EXHIBITS

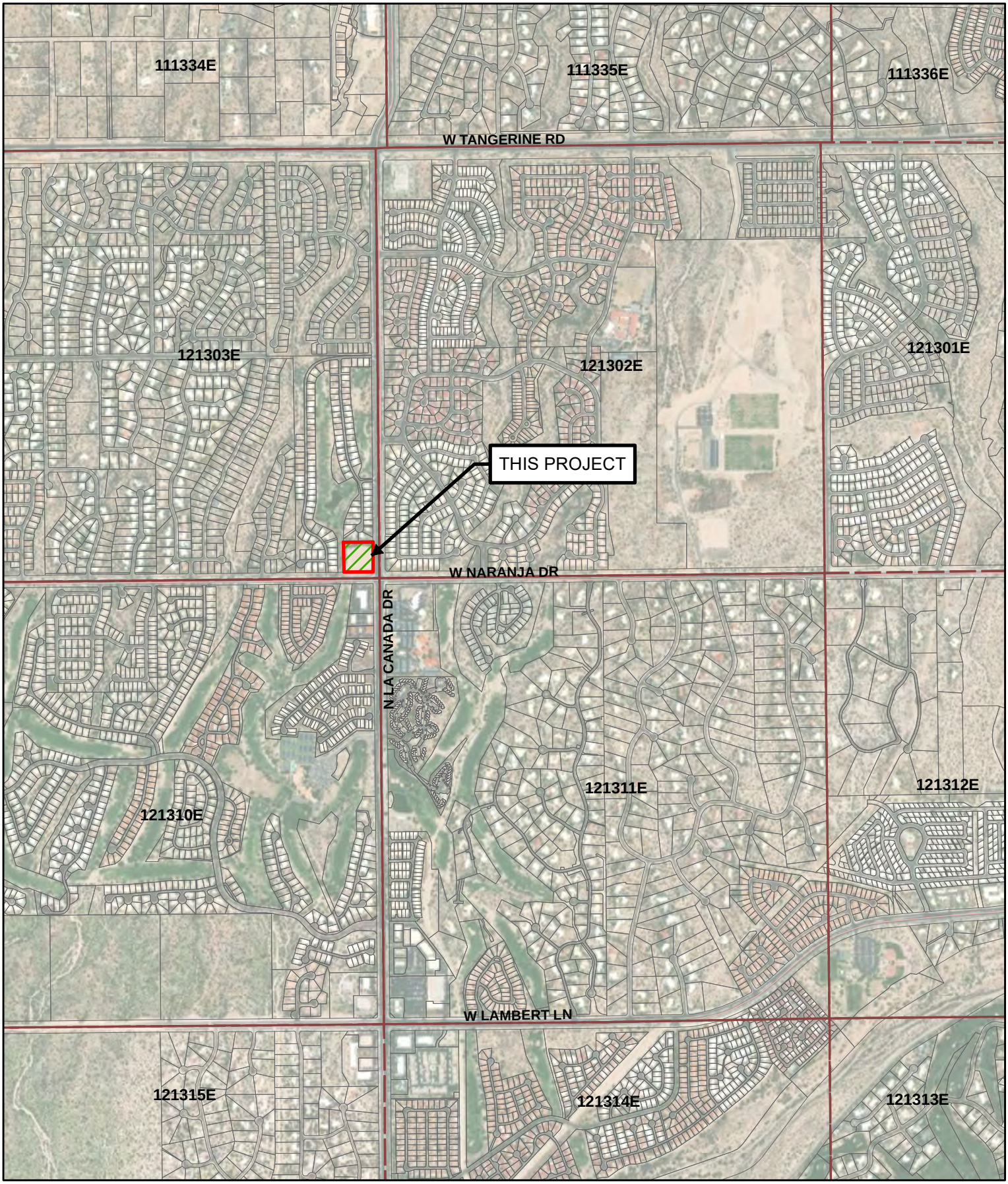

FIGURE 1 - LOCATION MAP

NARANJA DR. & LA CANADA DR.

1,500 750 0 1,500 Feet

SCALE: 1 inch = 1,500 feet

CMG DRAINAGE ENGINEERING, INC.

PROJECT NO. 22-010
DATE: MAY 16, 2022

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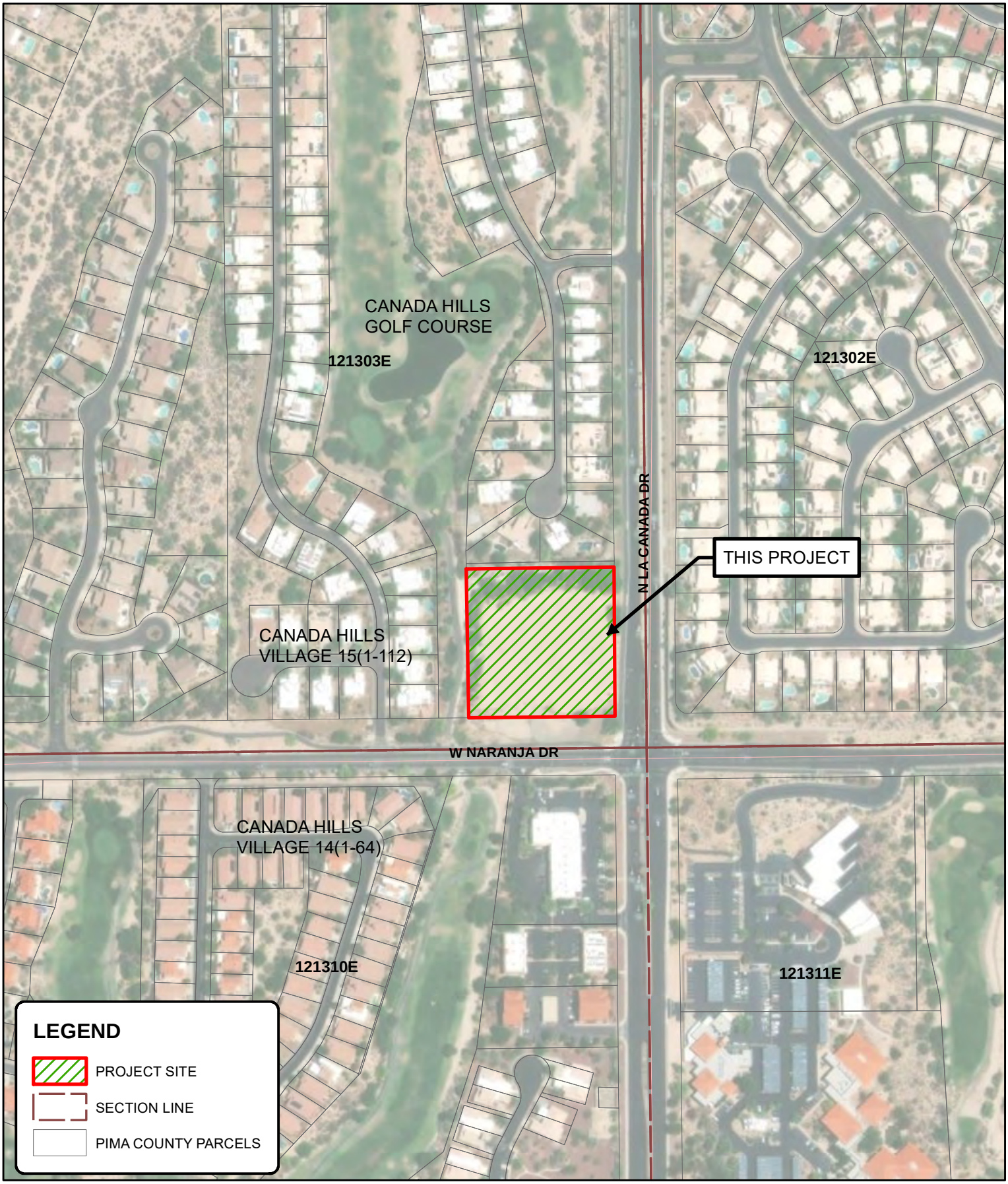

FIGURE 2 - AERIAL MAP

NARANJA DR. & LA CANADA DR.

325 162.5 0 325 Feet

SCALE: 1 inch = 300 feet

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DATE: MAY 16, 2022

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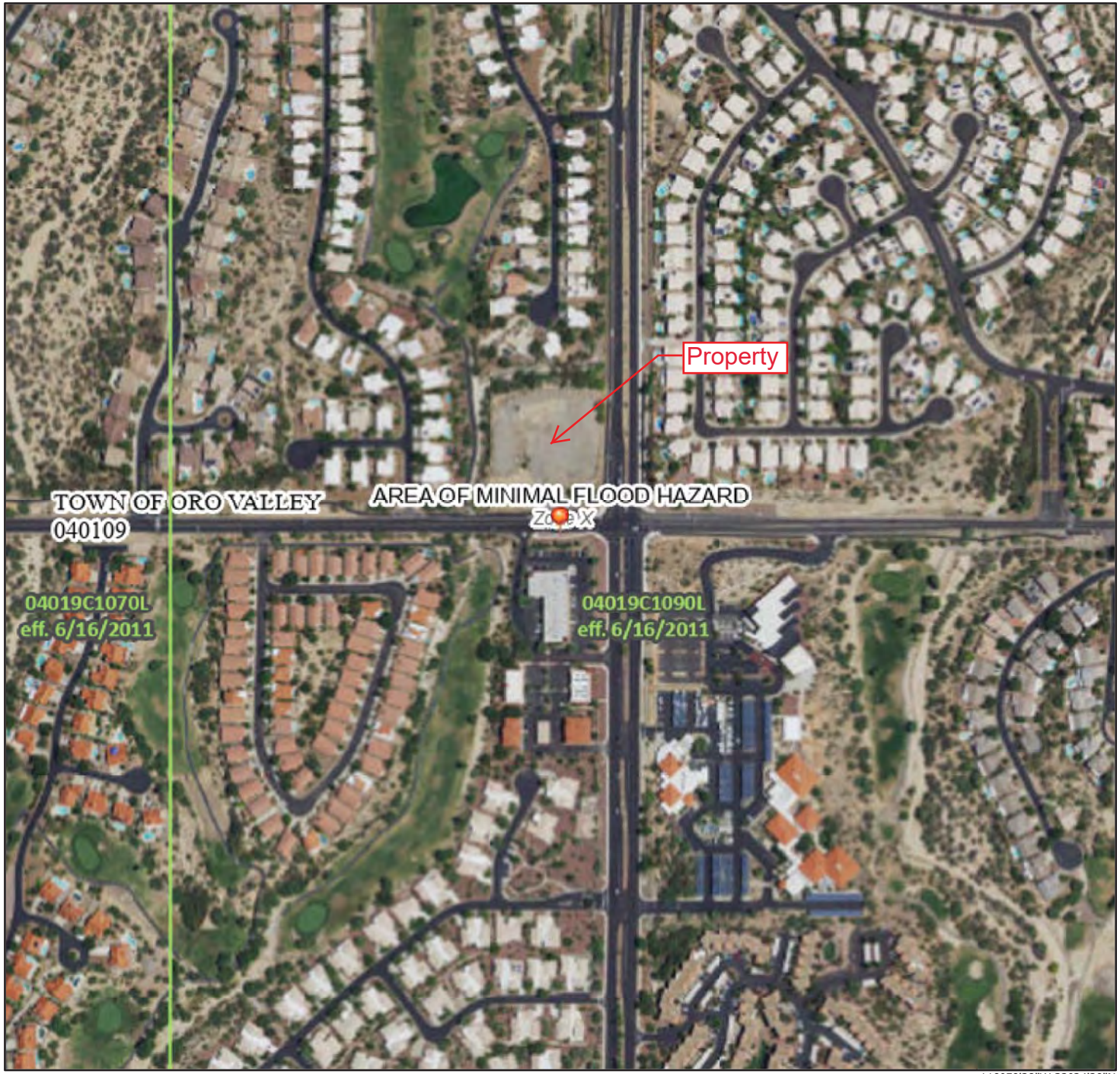
National Flood Hazard Layer FIRMette

FEMA

111°0'6"W 32°24'50"N



110°59'28"W 32°24'20"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/31/2022 at 2:24 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 3 - EFFECTIVE FIRM

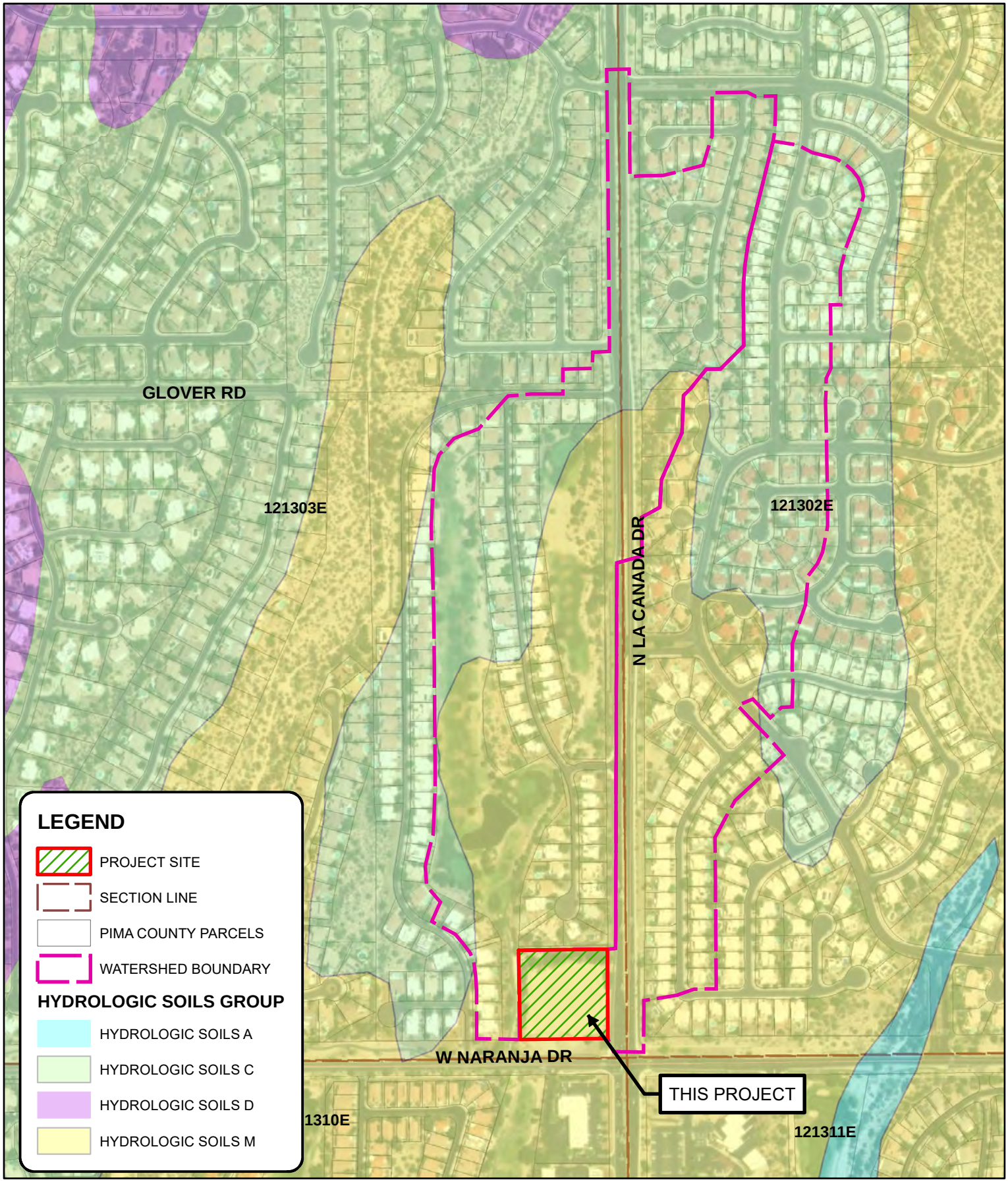


FIGURE 4 - SOILS MAP

NARANJA DR. & LA CANADA DR.

540 270 0 540 Feet

SCALE: 1 inch = 500 feet

CMG DRAINAGE ENGINEERING, INC.

PROJECT NO. 22-010
DATE: MAY 16, 2022

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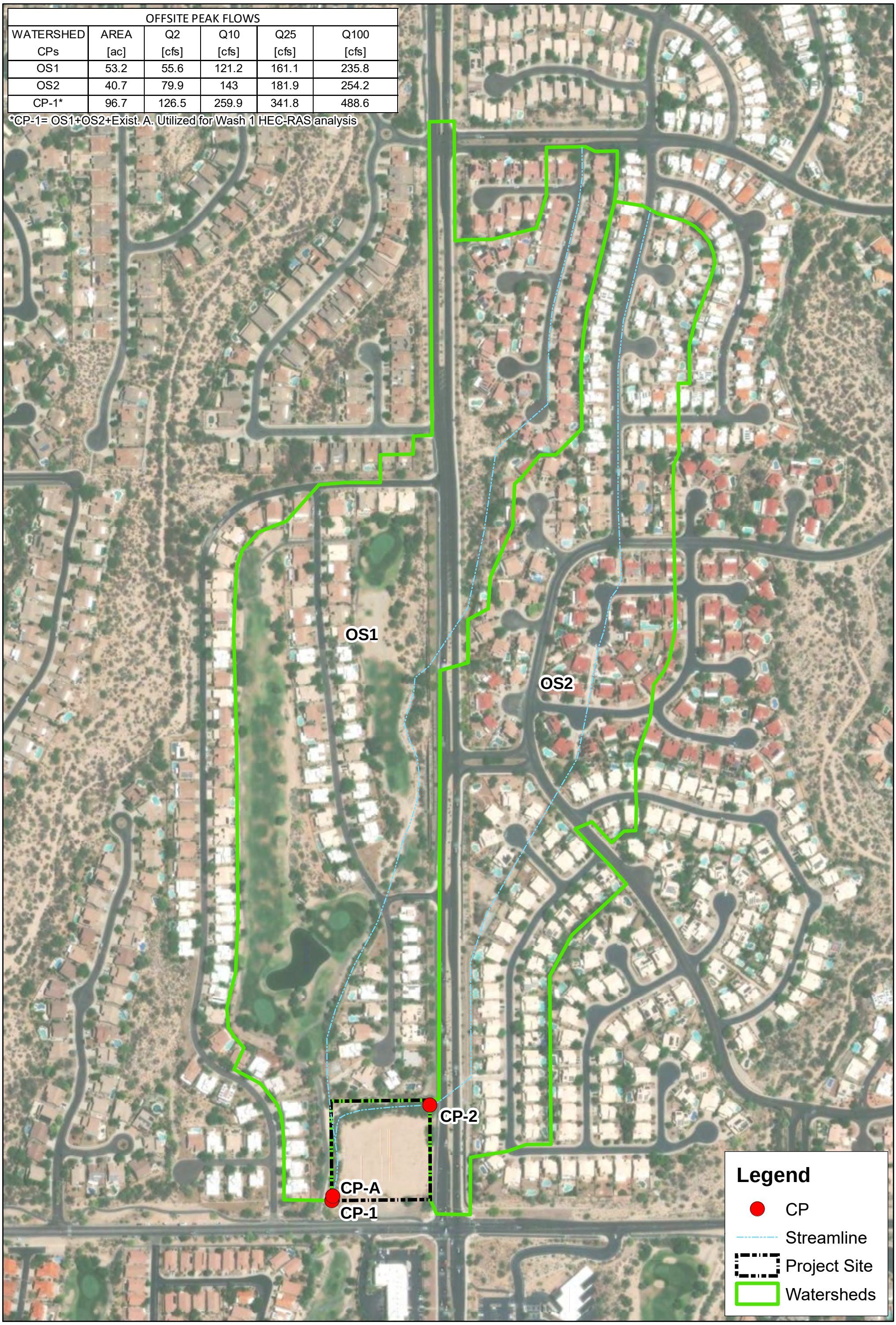
OFFSITE PEAK FLOWS					
WATERSHED CPs	AREA [ac]	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
OS1	53.2	55.6	121.2	161.1	235.8
OS2	40.7	79.9	143	181.9	254.2
CP-1*	96.7	126.5	259.9	341.8	488.6

*CP-1= OS1+OS2+Exist. A. Utilized for Wash 1 HEC-RAS analysis

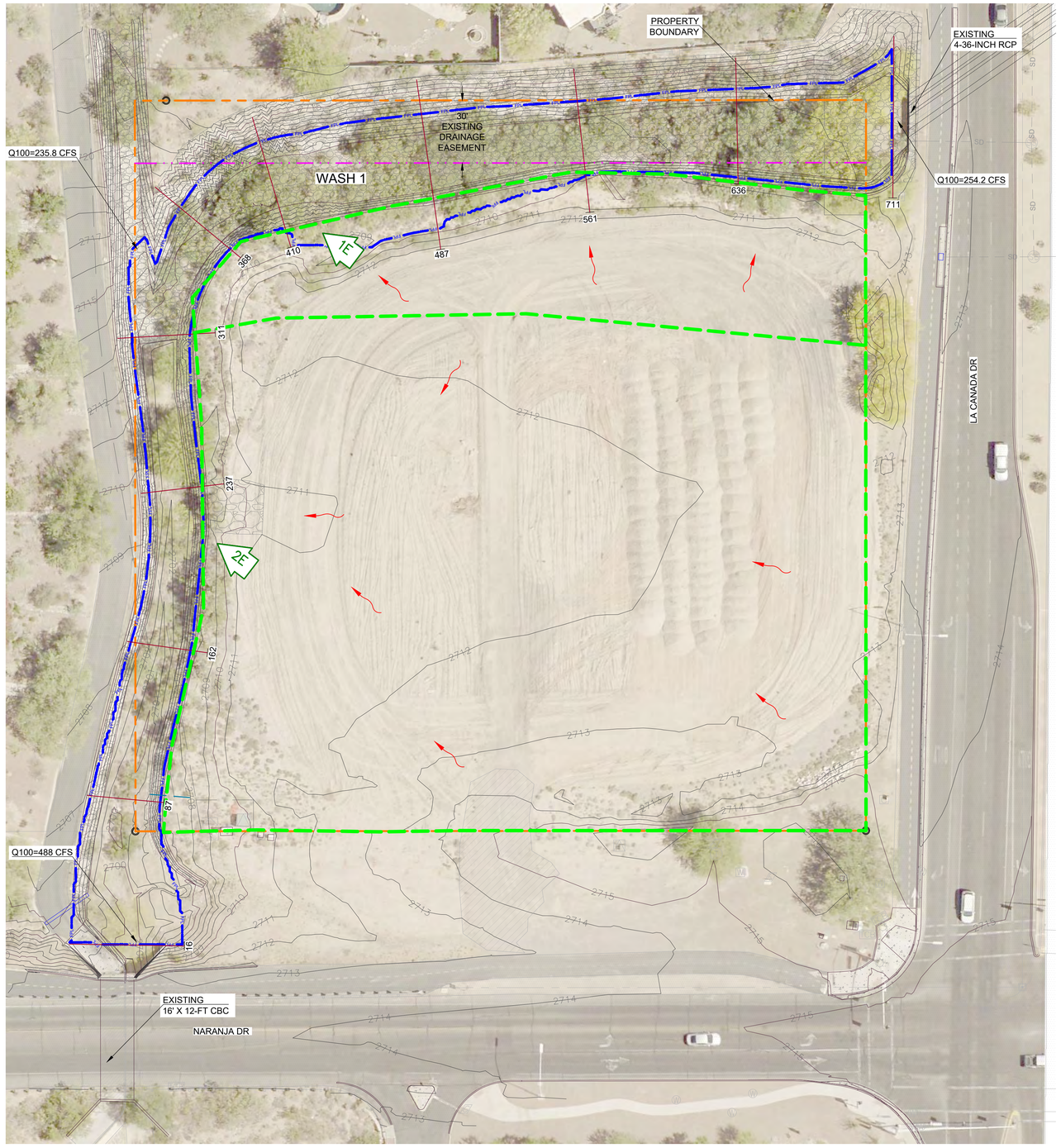


PROJECT NO.: 22-010
DATE: 06/03/2022

CMG DRAINAGE ENGINEERING, INC.

FIGURE 5
OFFSITE WATERSHED MAP
NWC LA CANADA & NARANJA

N
0 150 300 Feet
1 Inch = 300 Feet



0' 30' 60'

SCALE: 1" = 30'

EXISTING PEAK FLOWS					
WATERSHED	AREA	Q2	Q10	Q25	Q100
CPs	[ac]	[cfs]	[cfs]	[cfs]	[cfs]
1E	0.4	0.6	1.2	1.6	2.2
2E	1.8	2.9	5.6	7.2	10.1
CP-A*	2.8	3.8	8.3	11.2	15.7
*CP-A = Area within property boundary. Utilized for Wash 1 HEC-RAS analysis					

EXISTING HEC-RAS SUMMARY TABLE				
RIVER STATION	Q TOTAL [cfs]	W.S. Elev.	MAX CHL. DPTH. [ft]	VEL. CHNL. [ft/s]
711	254.2	2710.39	2.9	1.9
636	254.2	2710.15	3.9	1.9
561	254.2	2709.88	4.2	2.2
487	254.2	2709.69	4.3	1.7
410	254.2	2709.54	4.5	1.7
368	254.2	2709.35	4.5	2.5
311	488.6	2707.86	3.6	6.3
237	488.6	2706.65	4.6	6.2
162	488.6	2706.36	5.7	4.7
87	488.6	2706.27	6.2	3.5
16	488.6	2706.25	7.0	2.1

LEGEND

- PROPERTY BOUNDARY
- CMG 100-YR FLOODPLAIN LIMITS
- WATERSHED BOUNDARY
- EXISTING DRAINAGE EASEMENT
- 636 HEC -RAS CROSS-SECTION LOCATION & ID
- 1E CONCENTRATION LOCATION & ID
- FLOW ARROW

NOTES:

1. VERTICAL DATUM = NAVD88
2. TOPOGRAPHY PROVIDED DATED DECEMBER 9, 2022, CONTOUR INTERVAL= 1- FT.

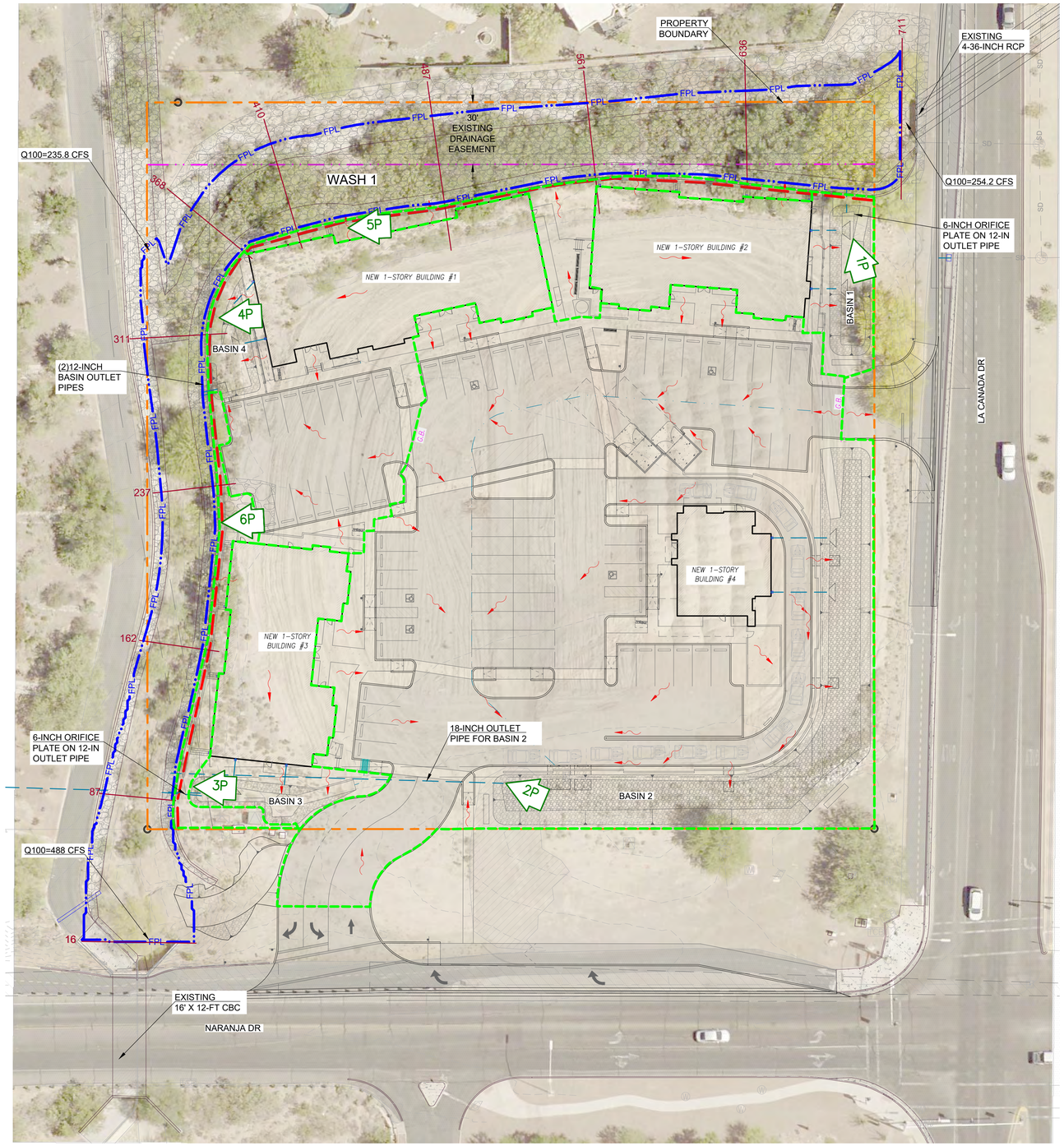
SEAL:

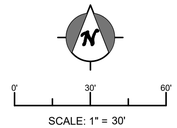
CMG DRAINAGE ENGINEERING, INC.
3555 N. Mountain Ave. Tucson, Arizona 85719
Phone (520) 882-4244 Fax (520) 888-1421

PROJECT NO.:	22-010
DESIGN:	LAV
CHECKED:	LAV
DRAWN:	BJK
DATE:	09/30/2022
REV. DATE:	01/24/2024
REV. DATE:	
REV. DATE:	

FIGURE 6: EXISTING DRAINAGE MAP

NWC LA CANADA DR/NARANJA DR





PROPOSED PEAK FLOWS										
WATERSHED	AREA	Q2	Q10	Q25	Q100	CUMULATIVE	CUMULATIVE	CUMULATIVE	CUMULATIVE	CUMULATIVE
CPs	[ac]	[cfs]	[cfs]	[cfs]	[cfs]	CPs	Q2 [cfs]	Q10 [cfs]	Q25 [cfs]	Q100 [cfs]
1P	0.2	0.7	1.0	1.2	1.6	BAS 1	0.5	0.5	0.6	0.7
2P	1.4	4.5	7.7	9.6	12.7	BAS 2	1.1	2.4	2.6	4.7
3P	0.2	0.5	0.9	1.2	1.5	BAS 3	0.3	0.6	0.8	1.0
4P	0.4	1.7	2.4	2.9	3.6	BAS 4	1.5	2.1	2.6	3.3
5P	0.1	0.2	0.4	0.5	0.6	-	-	-	-	-
6P	0.1	0.1	0.1	0.2	0.3	-	-	-	-	-

EXISTING VS. PROPOSED RUNOFF EXITING PROJECT SITE									
WATERSHED		2-YEAR DISCHARGE		10-YEAR DISCHARGE		25-YEAR DISCHARGE		100-YEAR DISCHARGE	
CPs		[cfs]		[cfs]		[cfs]		[cfs]	
EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED
1E	BAS1+5P	0.6	0.6	1.2	0.7	1.6	0.8	2.2	1.1
2E	BAS2+BAS3+ BAS4+6P	2.9	2.4	5.6	4.4	7.2	4.8	10.1	7.8

DETENTION/RETENTION BASIN SUMMARY									
BASIN	Q100 IN	Q100 OUT	V100	TOTAL BASIN VOL.	WSEL	BASIN TOP	BASIN BOTTOM	PIPE OUTLET	OUTLET TYPE
	[cfs]	[cfs]	[ac-ft]	[ac-ft]	Elev.	Elev. (ft)	Elev. (ft)	FL (Elev.)	
1	1.7	0.7	0.019	0.037	10.15	11.0	9.0	9.3	6-in ORIFICE
2	12.7	4.7	0.203	0.215	9.91	10.0	8.17	8.5	18-in PIPE
3	1.5	1.0	0.012	0.042	8.14	10.0	7.0	7.33	6-in ORIFICE
4	3.6	3.3	0.013	0.023	8.49	9.24	7.24	7.6	(2) 12-in PIPE

LEGEND

- PROPERTY BOUNDARY
- CMG 100-YR FLOODPLAIN LIMITS
- WATERSHED BOUNDARY
- EXISTING DRAINAGE EASEMENT
- PROPOSED DRAINAGE EASEMENT
- HEC-RAS CROSS-SECTION
- CONCENTRATION LOCATION & ID
- FLOW ARROW

NOTES:

1. VERTICAL DATUM = NAVD88
2. TOPOGRAPHY PROVIDED DATED DECEMBER 9, 2022, CONTOUR INTERVAL= 1- FT.

SEAL:

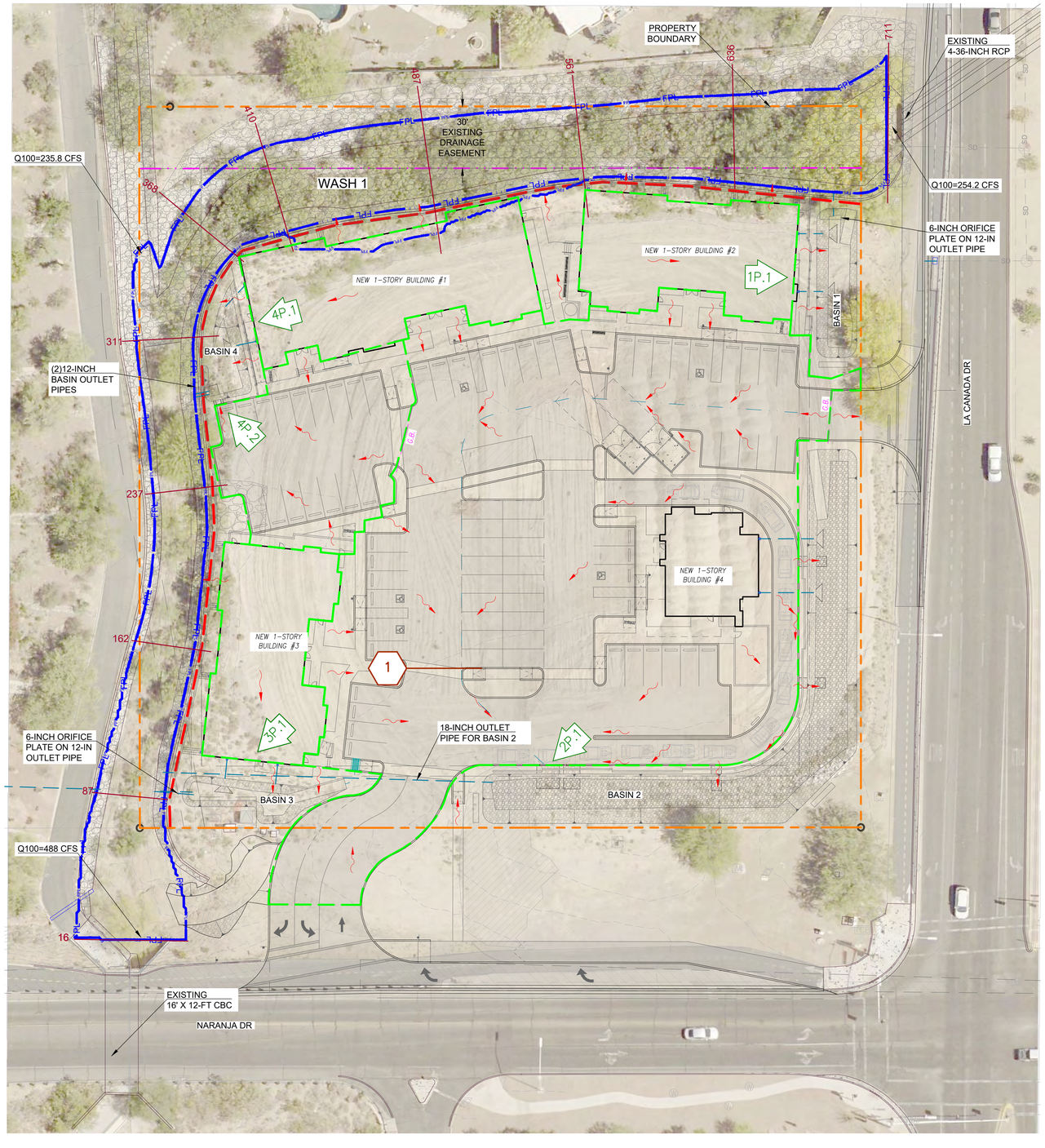
CMG DRAINAGE ENGINEERING, INC.
3555 N. Mountain Ave. Tucson, Arizona 85719
Phone (520) 882-4244 Fax (520) 888-1421

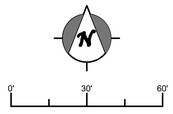
PROJECT NO.:	22-010
DESIGN:	LAV
CHECKED:	LAV
DRAWN:	BJK
DATE:	09/30/2022
REV. DATE:	10/31/2023
REV. DATE:	11/07/2023
REV. DATE:	01/24/2024

FIGURE 7: PROPOSED DRAINAGE MAP

NWC LA CANADA DR/NARANJA DR

SHEET 1 OF 1





SIDEWALK SCUPPERS SUMMARY			
LOCATION	Q100	# OF CELLS	TYPE
CPs	[cfs]		
4P.2	2	1	2

LOCALIZED PEAK FLOWS		
WATERSHED	AREA	Q100
SUB BASIN	[ac]	[cfs]
1P.1	0.12	1.2
2P.1	1.16	10.4
3P.1	0.12	1.2
4P.1	0.16	1.6
4P.2	0.17	1.5

CURB OPENINGS SUMMARY			
CPs	Q100	FLOW DEPTH	OPENING
	[cfs]	[ft]	LENGTH [ft]
2P.1	10.4	0.5	13*

*OPENING SPLIT INTO 8-FT AND 5-FT CURB OPENING

LEGEND

- PROPERTY BOUNDARY
- CMG 100-YR FLOODPLAIN LIMITS
- WATERSHED BOUNDARY
- HEC-RAS CROSS-SECTION
- EXISTING DRAINAGE EASEMENT
- PROPOSED DRAINAGE EASEMENT
- 1P — CONCENTRATION LOCATION & ID
- FLOW ARROW
- 1 — LOCAL CROSS-SECTION

NOTES:

1. VERTICAL DATUM = NAVD88
2. TOPOGRAPHY PROVIDED DATED DECEMBER 9, 2022, CONTOUR INTERVAL= 1- FT.

SEAL:

CMG DRAINAGE ENGINEERING, INC.
3555 N. Mountain Ave. Tucson, Arizona 85719
Phone (520) 882-4244 Fax (520) 888-1421

FIGURE 8: LOCAL DRAINAGE MAP

NWC LA CANADA DR/NARANJA DR

PROJECT NO.:	22-010
DESIGN:	LAV
CHECKED:	LAV
DRAWN:	BJK
DATE:	09/30/2022
REV. DATE:	10/31/2023
REV. DATE:	11/07/2023
REV. DATE:	01/24/2024

SHEET 1 OF 1

APPENDIX B - HYDROLOGIC DATA SHEETS

3.3 Rational Equation

The rational equation has long been used by engineers as a simplified method to develop an estimate for flood peaks. The method itself continues to be widely used for roadway drainage and flow peaks from small watersheds. The Town of Oro Valley limits the use of the rational equation to areas no larger than 100 acres in size. The basic rational equation is in the form of:

$$Q = CiA$$

Where:

Q = Flow rate in cubic feet per second
C = Runoff Coefficient; see Table 3-3.
i = Rainfall intensity at Time of Concentration, see Figure 3-3: Town of Oro Valley Generalized I-D-F Curves
and use T_c = total Rainfall Duration in the I-D-F curve. Minimum T_c shall be 5 minutes or greater.
A = Drainage area in acres

The weighted runoff coefficient will be estimated by:

$$Cw = \frac{\sum_1^n A_n C_n}{\sum_1^n A_n}$$

Where:

C_w = Weighted C

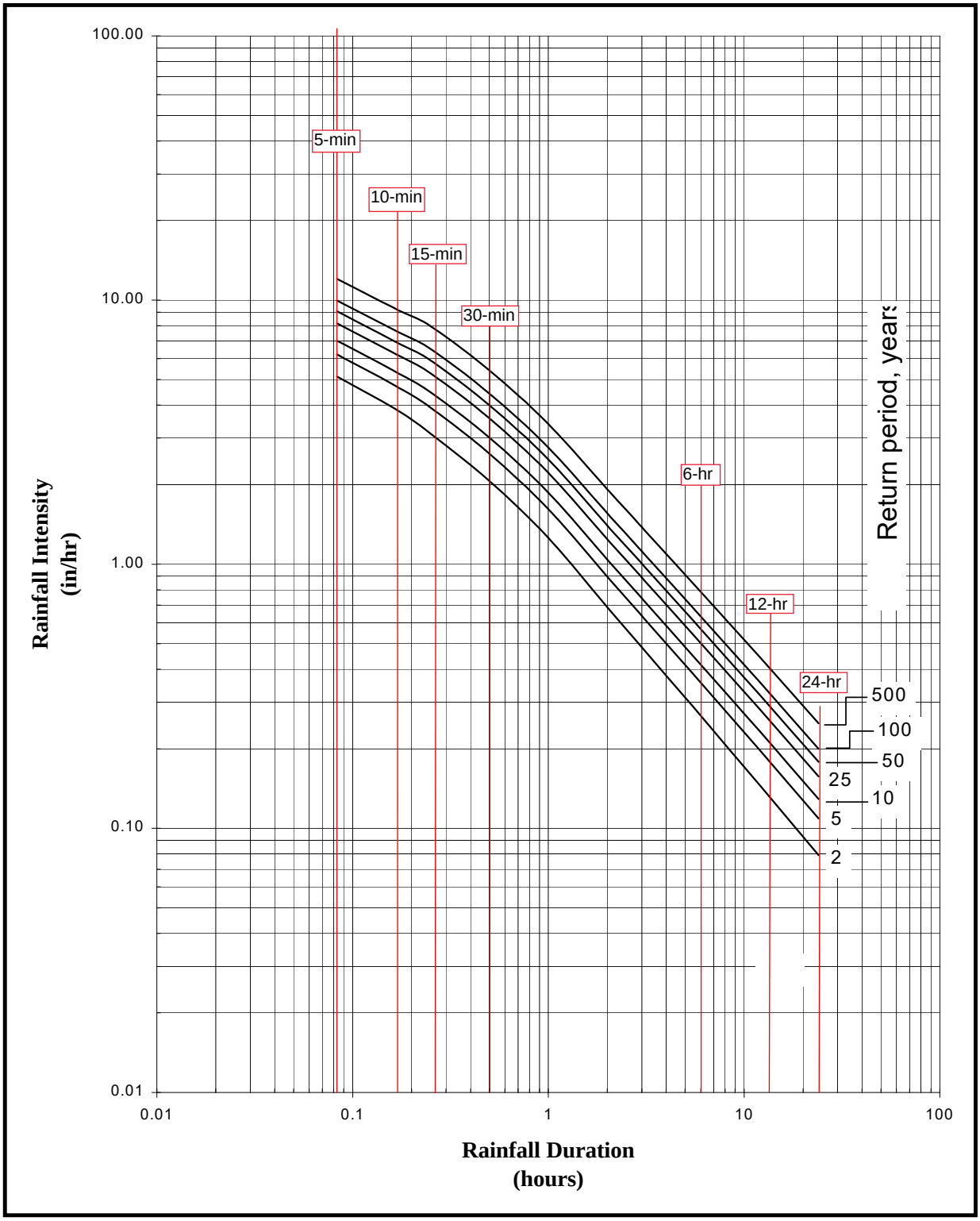
C_n = Runoff coefficient for sub-area "n", see Table 3-3

A = Area for sub-area "n"

Table 3-2: Rainfall Depths of Various Return Periods for Oro Valley Site-Specific I-D-F Curves

Return Period (Years)	*Rainfall Depths (inches)*		
	1-Hour (P_1)	*2-Hour*	*3-Hour*
2	1.26	1.37	1.45
5	1.62	1.79	1.91
10	1.87	2.08	2.23
25	2.22	2.49	2.67
50	2.49	2.80	3.01
100	2.77	3.12	3.35
500	3.39	3.84	4.14

Figure 3-3: Town of Oro Valley Generalized I-D-F Curves



Return Period	5 min	10 Min	15 Min	30 Min	6 Hr	12 Hr	24 Hr	
Yr	0.0833	0.167	0.25	0.5	6	12	24	
2	5.1	3.8	3	2.1	0.27	0.14	0.079	in/hr
	0.42	0.63	0.75	1.05	1.62	1.68	1.90	in
10	7	5.35	4.4	3	0.42	0.22	0.13	in/hr
	0.58	0.89	1.10	1.50	2.52	2.64	3.12	in
25	8.1	6.2	5.1	3.6	0.5	0.26	0.16	in/hr
	0.67	1.04	1.28	1.80	3.00	3.12	3.84	in
100	10	7.6	6.4	4.5	0.64	0.33	0.2	in/hr
	0.83	1.27	1.60	2.25	3.84	3.96	4.80	in

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS1	Job #	22-010
Watershed Area:	53.2 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	79	3996	0.0198	0.03

Length of Watercourse (Lc):	3995.8	feet	Mean Slope:	0.0198	
Length to Cen. of Gravity (Lca):	1997.9	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	50	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21	80.5	0.141
C	70	85.5	0.244
D	9	88.5	0.329
Imp.	26	99	0.91

Weighted Runoff Coef. (Cw):	0.41	
Time of Concentration:	20.1	min
Rainfall Intensity (i) @ Tc:	2.55	in/hr
Runoff Supply Rate (q) @ Tc:	1.04	in/hr
PEAK DISCHARGE:	55.6	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS1	Job #	22-010
Watershed Area:	53.2 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	79	3996	0.0198	0.03

Length of Watercourse (Lc):	3995.8	feet	Mean Slope:	0.0198	
Length to Cen. of Gravity (Lca):	1997.9	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	50	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21	80.5	0.259
C	70	85.5	0.375
D	9	88.5	0.461
Imp.	26	99	0.938

Weighted Runoff Coef. (Cw):	0.51	
Time of Concentration:	14.7	min
Rainfall Intensity (i) @ Tc:	4.44	in/hr
Runoff Supply Rate (q) @ Tc:	2.26	in/hr
PEAK DISCHARGE:	121.2	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS1	Job #	22-010
Watershed Area:	53.2 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	79	3996	0.0198	0.03

Length of Watercourse (Lc):	3995.8	feet	Mean Slope:	0.0198	
Length to Cen. of Gravity (Lca):	1997.9	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	50	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21	80.5	0.316
C	70	85.5	0.432
D	9	88.5	0.516
Imp.	26	99	0.947

Weighted Runoff Coef. (Cw):	0.55	
Time of Concentration:	13.1	min
Rainfall Intensity (i) @ Tc:	5.43	in/hr
Runoff Supply Rate (q) @ Tc:	3	in/hr
PEAK DISCHARGE:	161.1	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS1	Job #	22-010
Watershed Area:	53.2 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	79	3996	0.0198	0.03

Length of Watercourse (Lc):	3995.8 feet		Mean Slope:	0.0198
Length to Cen. of Gravity (Lca):	1997.9 feet		Weighted Basin Fac:	0.03
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	50

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21	80.5	0.39
C	70	85.5	0.504
D	9	88.5	0.583
Imp.	26	99	0.958

Weighted Runoff Coef. (Cw):	0.61	
Time of Concentration:	11.2	min
Rainfall Intensity (i) @ Tc:	7.21	in/hr
Runoff Supply Rate (q) @ Tc:	4.4	in/hr
PEAK DISCHARGE:	235.8	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS2	Job #	22-010
Watershed Area:	40.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	72.6	3393	0.0214	0.022

Length of Watercourse (Lc):	3393.3 feet		Mean Slope:	0.0214
Length to Cen. of Gravity (Lca):	1696.7 feet		Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	35

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.9	81.6	0.158
C	68.5	86.9	0.27
D	9.6	89.9	0.362
Imp.	40	99	0.91

Weighted Runoff Coef. (Cw):	0.52	
Time of Concentration:	10	min
Rainfall Intensity (i) @ Tc:	3.77	in/hr
Runoff Supply Rate (q) @ Tc:	1.95	in/hr
PEAK DISCHARGE:	79.9	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS2	Job #	22-010
Watershed Area:	40.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	72.6	3393	0.0214	0.022

Length of Watercourse (Lc):	3393.3 feet		Mean Slope:	0.0214
Length to Cen. of Gravity (Lca):	1696.7 feet		Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	35

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.9	81.6	0.28
C	68.5	86.9	0.402
D	9.6	89.9	0.493
Imp.	40	99	0.938

Weighted Runoff Coef. (Cw):	0.61	
Time of Concentration:	8	min
Rainfall Intensity (i) @ Tc:	5.76	in/hr
Runoff Supply Rate (q) @ Tc:	3.49	in/hr
PEAK DISCHARGE:	143	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS2	Job #	22-010
Watershed Area:	40.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	72.6	3393	0.0214	0.022

Length of Watercourse (Lc):	3393.3 feet		Mean Slope:	0.0214
Length to Cen. of Gravity (Lca):	1696.7 feet		Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	35

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.9	81.6	0.337
C	68.5	86.9	0.459
D	9.6	89.9	0.546
Imp.	40	99	0.947

Weighted Runoff Coef. (Cw):	0.64	
Time of Concentration:	7.2	min
Rainfall Intensity (i) @ Tc:	6.89	in/hr
Runoff Supply Rate (q) @ Tc:	4.43	in/hr
PEAK DISCHARGE:	181.9	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	OS2	Job #	22-010
Watershed Area:	40.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	72.6	3393	0.0214	0.022

Length of Watercourse (Lc):	3393.3 feet		Mean Slope:	0.0214
Length to Cen. of Gravity (Lca):	1696.7 feet		Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	35

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.9	81.6	0.411
C	68.5	86.9	0.53
D	9.6	89.9	0.611
Imp.	40	99	0.958

Weighted Runoff Coef. (Cw):	0.69	
Time of Concentration:	6.3	min
Rainfall Intensity (i) @ Tc:	8.98	in/hr
Runoff Supply Rate (q) @ Tc:	6.2	in/hr
PEAK DISCHARGE:	254.2	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	Exist A	Job #	22-010
Watershed Area:	2.8 Acres	Watershed Type	Shallow Streetflow-Natural

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	624	0.0112	0.03

Length of Watercourse (Lc):	624.1	feet	Mean Slope:	0.0112	
Length to Cen. of Gravity (Lca):	312	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.177
C	41	88.2	0.329
D	18	91.2	0.437
Imp.	5	99	0.91

Weighted Runoff Coef. (Cw):	0.32	
Time of Concentration:	7.5	min
Rainfall Intensity (i) @ Tc:	4.21	in/hr
Runoff Supply Rate (q) @ Tc:	1.34	in/hr
PEAK DISCHARGE:	3.8	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	Exist A	Job #	22-010
Watershed Area:	2.8 Acres	Watershed Type	Shallow Streetflow-Natural

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	624	0.0112	0.03

Length of Watercourse (Lc):	624.1	feet	Mean Slope:	0.0112	
Length to Cen. of Gravity (Lca):	312	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.302
C	41	88.2	0.461
D	18	91.2	0.562
Imp.	5	99	0.938

Weighted Runoff Coef. (Cw):	0.44	
Time of Concentration:	5.4	min
Rainfall Intensity (i) @ Tc:	6.7	in/hr
Runoff Supply Rate (q) @ Tc:	2.95	in/hr
PEAK DISCHARGE:	8.3	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	Exist A	Job #	22-010
Watershed Area:	2.8 Acres	Watershed Type	Shallow Streetflow-Natural

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	624	0.0112	0.03

Length of Watercourse (Lc):	624.1	feet	Mean Slope:	0.0112	
Length to Cen. of Gravity (Lca):	312	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.359
C	41	88.2	0.516
D	18	91.2	0.612
Imp.	5	99	0.947

Weighted Runoff Coef. (Cw):	0.49	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	3.96	in/hr
PEAK DISCHARGE:	11.2	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	Exist A	Job #	22-010
Watershed Area:	2.8 Acres	Watershed Type	Shallow Streetflow-Natural

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	624	0.0112	0.03

Length of Watercourse (Lc):	624.1	feet	Mean Slope:	0.0112	
Length to Cen. of Gravity (Lca):	312	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.433
C	41	88.2	0.583
D	18	91.2	0.671
Imp.	5	99	0.958

Weighted Runoff Coef. (Cw):	0.56	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	5.56	in/hr
PEAK DISCHARGE:	15.7	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	CP-1 (incl. Exist A & CP-2)	Job #	22-010
Watershed Area:	96.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	80	4017	0.0199	0.027

Length of Watercourse (Lc):	4017.4	feet	Mean Slope:	0.0199	
Length to Cen. of Gravity (Lca):	2008.7	feet	Weighted Basin Fac:	0.027	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	43	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.8	81	0.158
C	68.7	86.1	0.27
D	9.5	89.1	0.362
Imp.	31	99	0.91

Weighted Runoff Coef. (Cw):	0.46	
Time of Concentration:	16.5	min
Rainfall Intensity (i) @ Tc:	2.84	in/hr
Runoff Supply Rate (q) @ Tc:	1.3	in/hr
PEAK DISCHARGE:	126.5	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	CP-1 (incl. Exist A & CP-2)	Job #	22-010
Watershed Area:	96.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	80	4017	0.0199	0.027

Length of Watercourse (Lc):	4017.4	feet	Mean Slope:	0.0199	
Length to Cen. of Gravity (Lca):	2008.7	feet	Weighted Basin Fac:	0.027	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	43	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.8	81	0.28
C	68.7	86.1	0.402
D	9.5	89.1	0.493
Imp.	31	99	0.938

Weighted Runoff Coef. (Cw):	0.56	
Time of Concentration:	12.4	min
Rainfall Intensity (i) @ Tc:	4.8	in/hr
Runoff Supply Rate (q) @ Tc:	2.67	in/hr
PEAK DISCHARGE:	259.9	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	CP-1 (incl. Exist A & CP-2)	Job #	22-010
Watershed Area:	96.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	80	4017	0.0199	0.027

Length of Watercourse (Lc):	4017.4	feet	Mean Slope:	0.0199	
Length to Cen. of Gravity (Lca):	2008.7	feet	Weighted Basin Fac:	0.027	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	43	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.8	81	0.337
C	68.7	86.1	0.459
D	9.5	89.1	0.546
Imp.	31	99	0.947

Weighted Runoff Coef. (Cw):	0.6	
Time of Concentration:	11.1	min
Rainfall Intensity (i) @ Tc:	5.87	in/hr
Runoff Supply Rate (q) @ Tc:	3.51	in/hr
PEAK DISCHARGE:	341.8	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	R Martinez
Project Name:	NWC La Canada Naranja	Date:	02/02/2022
Concentration Point:	CP-1 (incl. Exist A & CP-2)	Job #	22-010
Watershed Area:	96.7 Acres	Watershed Type	Suburban Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	80	4017	0.0199	0.027

Length of Watercourse (Lc):	4017.4	feet	Mean Slope:	0.0199	
Length to Cen. of Gravity (Lca):	2008.7	feet	Weighted Basin Fac:	0.027	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	43	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	21.8	81	0.411
C	68.7	86.1	0.53
D	9.5	89.1	0.611
Imp.	31	99	0.958

Weighted Runoff Coef. (Cw):	0.65	
Time of Concentration:	9.6	min
Rainfall Intensity (i) @ Tc:	7.71	in/hr
Runoff Supply Rate (q) @ Tc:	5.01	in/hr
PEAK DISCHARGE:	488.6	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 1E	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	260	0.0154	0.03

Length of Watercourse (Lc):	260	feet	Mean Slope:	0.0154	
Length to Cen. of Gravity (Lca):	130	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.19
C	41	88.2	0.335
D	18	91.2	0.445
Imp.	5	99	0.91

Weighted Runoff Coef. (Cw):	0.33	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	1.64	in/hr
PEAK DISCHARGE:	0.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 1E	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	260	0.0154	0.03

Length of Watercourse (Lc):	260	feet	Mean Slope:	0.0154	
Length to Cen. of Gravity (Lca):	130	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.316
C	41	88.2	0.467
D	18	91.2	0.569
Imp.	5	99	0.938

Weighted Runoff Coef. (Cw):	0.45	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	3.12	in/hr
PEAK DISCHARGE:	1.3	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 1E	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	260	0.0154	0.03

Length of Watercourse (Lc):	260	feet	Mean Slope:	0.0154	
Length to Cen. of Gravity (Lca):	130	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.373
C	41	88.2	0.522
D	18	91.2	0.619
Imp.	5	99	0.947

Weighted Runoff Coef. (Cw):	0.5	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	4.03	in/hr
PEAK DISCHARGE:	1.6	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 1E	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	260	0.0154	0.03

Length of Watercourse (Lc):	260	feet	Mean Slope:	0.0154	
Length to Cen. of Gravity (Lca):	130	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.447
C	41	88.2	0.589
D	18	91.2	0.677
Imp.	5	99	0.958

Weighted Runoff Coef. (Cw):	0.57	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	5.65	in/hr
PEAK DISCHARGE:	2.3	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 2E	Job #	22-010
Watershed Area:	1.8 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	360	0.0194	0.03

Length of Watercourse (Lc):	360	feet	Mean Slope:	0.0194	
Length to Cen. of Gravity (Lca):	180	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.19
C	41	88.2	0.335
D	18	91.2	0.445
Imp.	5	99	0.91

Weighted Runoff Coef. (Cw):	0.33	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	1.64	in/hr
PEAK DISCHARGE:	3	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 2E	Job #	22-010
Watershed Area:	1.8 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	360	0.0194	0.03

Length of Watercourse (Lc):	360	feet	Mean Slope:	0.0194	
Length to Cen. of Gravity (Lca):	180	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.316
C	41	88.2	0.467
D	18	91.2	0.569
Imp.	5	99	0.938

Weighted Runoff Coef. (Cw):	0.45	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	3.12	in/hr
PEAK DISCHARGE:	5.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 2E	Job #	22-010
Watershed Area:	1.8 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	360	0.0194	0.03

Length of Watercourse (Lc):	360	feet	Mean Slope:	0.0194	
Length to Cen. of Gravity (Lca):	180	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.373
C	41	88.2	0.522
D	18	91.2	0.619
Imp.	5	99	0.947

Weighted Runoff Coef. (Cw):	0.5	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	4.03	in/hr
PEAK DISCHARGE:	7.3	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	NWC La Canada Naranja	Date:	09/28/2022
Concentration Point:	Exist 2E	Job #	22-010
Watershed Area:	1.8 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	7	360	0.0194	0.03

Length of Watercourse (Lc):	360	feet	Mean Slope:	0.0194	
Length to Cen. of Gravity (Lca):	180	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.447
C	41	88.2	0.589
D	18	91.2	0.677
Imp.	5	99	0.958

Weighted Runoff Coef. (Cw):	0.57	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	5.65	in/hr
PEAK DISCHARGE:	10.2	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	1P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	1P	Job #	22-010
Watershed Area:	0.2 Acres	Watershed Type	Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	2	150	0.0133	0.022

Length of Watercourse (Lc):	150 feet	Mean Slope:	0.0133
Length to Cen. of Gravity (Lca):	75 feet	Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.19
C	41	88.2	0.335
D	18	91.2	0.445
Imp.	60	99	0.91

Weighted Runoff Coef. (Cw):	0.66	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	3.35	in/hr
PEAK DISCHARGE:	0.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	1P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	1P	Job #	22-010
Watershed Area:	0.2 Acres	Watershed Type	Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	2	150	0.0133	0.022

Length of Watercourse (Lc):	150 feet	Mean Slope:	0.0133
Length to Cen. of Gravity (Lca):	75 feet	Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.316
C	41	88.2	0.467
D	18	91.2	0.569
Imp.	60	99	0.938

Weighted Runoff Coef. (Cw):	0.73	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	5.09	in/hr
PEAK DISCHARGE:	1	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	1P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	1P	Job #	22-010
Watershed Area:	0.2 Acres	Watershed Type	Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	2	150	0.0133	0.022

Length of Watercourse (Lc):	150 feet	Mean Slope:	0.0133
Length to Cen. of Gravity (Lca):	75 feet	Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.373
C	41	88.2	0.522
D	18	91.2	0.619
Imp.	60	99	0.947

Weighted Runoff Coef. (Cw):	0.76	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	6.11	in/hr
PEAK DISCHARGE:	1.2	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	1P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	1P	Job #	22-010
Watershed Area:	0.2 Acres	Watershed Type	Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	2	150	0.0133	0.022

Length of Watercourse (Lc):	150 feet	Mean Slope:	0.0133
Length to Cen. of Gravity (Lca):	75 feet	Weighted Basin Fac:	0.022
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.447
C	41	88.2	0.589
D	18	91.2	0.677
Imp.	60	99	0.958

Weighted Runoff Coef. (Cw):	0.79	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	7.9	in/hr
PEAK DISCHARGE:	1.6	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	2P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	2P	Job #	22-010
Watershed Area:	1.41 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.36	0.55	0.68	0.91	1.13	1.28	1.35	1.53	1.72	2.03

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.158
C	41	88.2	0.299
D	18	91.2	0.409
Imp.	75	99	0.9

Weighted Runoff Coef. (Cw):	0.74	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	4.32	in/hr
Runoff Supply Rate (q) @ Tc:	3.2	in/hr
PEAK DISCHARGE:	4.5	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	2P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	2P	Job #	22-010
Watershed Area:	1.41 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.56	0.85	1.06	1.43	1.76	1.96	2.04	2.26	2.49	2.98

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.296
C	41	88.2	0.447
D	18	91.2	0.551
Imp.	75	99	0.934

Weighted Runoff Coef. (Cw):	0.8	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.72	in/hr
Runoff Supply Rate (q) @ Tc:	5.39	in/hr
PEAK DISCHARGE:	7.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	2P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	2P	Job #	22-010
Watershed Area:	1.41 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.87	1.32	1.64	2.2	2.73	3.04	3.19	3.48	3.76	4.55

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.442
C	41	88.2	0.584
D	18	91.2	0.673
Imp.	75	99	0.957

Weighted Runoff Coef. (Cw):	0.85	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	10.44	in/hr
Runoff Supply Rate (q) @ Tc:	8.9	in/hr
PEAK DISCHARGE:	12.7	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	La Canada-Naranja	Date:	11/07/2023
Concentration Point:	2P.1	Job #	22-010
Watershed Area:	1.16 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.36	0.55	0.68	0.91	1.13	1.28	1.35	1.53	1.72	2.03

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.158
C	41	88.2	0.299
D	18	91.2	0.409
Imp.	75	99	0.9

Weighted Runoff Coef. (Cw):	0.74	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	4.32	in/hr
Runoff Supply Rate (q) @ Tc:	3.2	in/hr
PEAK DISCHARGE:	3.7	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	La Canada-Naranja	Date:	11/07/2023
Concentration Point:	2P.1	Job #	22-010
Watershed Area:	1.16 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20

RETURN PERIOD: 10-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.56	0.85	1.06	1.43	1.76	1.96	2.04	2.26	2.49	2.98

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.296
C	41	88.2	0.447
D	18	91.2	0.551
Imp.	75	99	0.934

Weighted Runoff Coef. (Cw):	0.8	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.72	in/hr
Runoff Supply Rate (q) @ Tc:	5.39	in/hr
PEAK DISCHARGE:	6.3	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	La Canada-Naranja	Date:	11/07/2023
Concentration Point:	2P.1	Job #	22-010
Watershed Area:	1.16 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.7	370	0.01	0.02

Length of Watercourse (Lc):	370	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	185	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.87	1.32	1.64	2.2	2.73	3.04	3.19	3.48	3.76	4.55

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.442
C	41	88.2	0.584
D	18	91.2	0.673
Imp.	75	99	0.957

Weighted Runoff Coef. (Cw):	0.85	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	10.44	in/hr
Runoff Supply Rate (q) @ Tc:	8.9	in/hr
PEAK DISCHARGE:	10.4	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	3P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	3P	Job #	22-010
Watershed Area:	0.17 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.02

Length of Watercourse (Lc):	160 feet	Mean Slope:	0.01
Length to Cen. of Gravity (Lca):	80 feet	Weighted Basin Fac:	0.02
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 2-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.36	0.55	0.68	0.91	1.13	1.28	1.35	1.53	1.72	2.03

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.158
C	41	88.2	0.299
D	18	91.2	0.409
Imp.	75	99	0.9

Weighted Runoff Coef. (Cw):	0.74	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	4.32	in/hr
Runoff Supply Rate (q) @ Tc:	3.2	in/hr
PEAK DISCHARGE:	0.5	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	3P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	3P	Job #	22-010
Watershed Area:	0.17 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.02

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.02	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.56	0.85	1.06	1.43	1.76	1.96	2.04	2.26	2.49	2.98

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.296
C	41	88.2	0.447
D	18	91.2	0.551
Imp.	75	99	0.934

Weighted Runoff Coef. (Cw):	0.8	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.72	in/hr
Runoff Supply Rate (q) @ Tc:	5.39	in/hr
PEAK DISCHARGE:	0.9	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	3P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	3P	Job #	22-010
Watershed Area:	0.17 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.02

Length of Watercourse (Lc):	160 feet	Mean Slope:	0.01
Length to Cen. of Gravity (Lca):	80 feet	Weighted Basin Fac:	0.02
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 25-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.68	1.03	1.28	1.72	2.13	2.37	2.47	2.71	2.97	3.57

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.359
C	41	88.2	0.509
D	18	91.2	0.607
Imp.	75	99	0.945

Weighted Runoff Coef. (Cw):	0.83	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.16	in/hr
Runoff Supply Rate (q) @ Tc:	6.73	in/hr
PEAK DISCHARGE:	1.2	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	3P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	3P	Job #	22-010
Watershed Area:	0.17 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.02

Length of Watercourse (Lc):	160 feet	Mean Slope:	0.01
Length to Cen. of Gravity (Lca):	80 feet	Weighted Basin Fac:	0.02
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 100-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.87	1.32	1.64	2.2	2.73	3.04	3.19	3.48	3.76	4.55

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.442
C	41	88.2	0.584
D	18	91.2	0.673
Imp.	75	99	0.957

Weighted Runoff Coef. (Cw):	0.85	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	10.44	in/hr
Runoff Supply Rate (q) @ Tc:	8.9	in/hr
PEAK DISCHARGE:	1.5	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.019

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.019	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.198
C	41	88	0.329
D	18	91	0.437
Imp.	87	99	0.91

Weighted Runoff Coef. (Cw):	0.83	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	4.18	in/hr
PEAK DISCHARGE:	1.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.019

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.019	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.325
C	41	88	0.461
D	18	91	0.562
Imp.	87	99	0.938

Weighted Runoff Coef. (Cw):	0.87	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	6.06	in/hr
PEAK DISCHARGE:	2.4	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.019

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.019	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.383
C	41	88	0.516
D	18	91	0.612
Imp.	87	99	0.947

Weighted Runoff Coef. (Cw):	0.89	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	7.12	in/hr
PEAK DISCHARGE:	2.9	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P	Job #	22-010
Watershed Area:	0.4 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.019

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.019	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.456
C	41	88	0.583
D	18	91	0.671
Imp.	87	99	0.958

Weighted Runoff Coef. (Cw):	0.9	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	9	in/hr
PEAK DISCHARGE:	3.6	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P.1 -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P.1	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.015

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.015	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.198
C	41	88	0.329
D	18	91	0.437
Imp.	100	99	0.91

Weighted Runoff Coef. (Cw):	0.91	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	4.58	in/hr
PEAK DISCHARGE:	0.5	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P.1 -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P.1	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.015

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.015	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.325
C	41	88	0.461
D	18	91	0.562
Imp.	100	99	0.938

Weighted Runoff Coef. (Cw):	0.94	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	6.53	in/hr
PEAK DISCHARGE:	0.7	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	4P.1 -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	4P.1	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	High Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	1.6	160	0.01	0.015

Length of Watercourse (Lc):	160	feet	Mean Slope:	0.01	
Length to Cen. of Gravity (Lca):	80	feet	Weighted Basin Fac:	0.015	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.456
C	41	88	0.583
D	18	91	0.671
Imp.	100	99	0.958

Weighted Runoff Coef. (Cw):	0.96	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	9.53	in/hr
PEAK DISCHARGE:	1	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	5P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	5P	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	Suburban Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.3	64	0.0516	0.03

Length of Watercourse (Lc):	64	feet	Mean Slope:	0.0516	
Length to Cen. of Gravity (Lca):	32	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 2-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.42	0.63	0.75	1.05	1.26	1.37	1.45	1.62	1.68	1.9

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.198
C	41	88	0.329
D	18	91	0.437
Imp.	20	99	0.91

Weighted Runoff Coef. (Cw):	0.42	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	5.04	in/hr
Runoff Supply Rate (q) @ Tc:	2.1	in/hr
PEAK DISCHARGE:	0.2	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	5P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	5P	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	Suburban Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.3	64	0.0516	0.03

Length of Watercourse (Lc):	64	feet	Mean Slope:	0.0516	
Length to Cen. of Gravity (Lca):	32	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 10-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.58	0.89	1.1	1.5	1.87	2.08	2.23	2.52	2.64	3.12

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.325
C	41	88	0.461
D	18	91	0.562
Imp.	20	99	0.938

Weighted Runoff Coef. (Cw):	0.53	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.96	in/hr
Runoff Supply Rate (q) @ Tc:	3.66	in/hr
PEAK DISCHARGE:	0.4	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	5P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	5P	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	Suburban Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.3	64	0.0516	0.03

Length of Watercourse (Lc):	64	feet	Mean Slope:	0.0516	
Length to Cen. of Gravity (Lca):	32	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 25-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.67	1.03	1.28	1.8	2.22	2.49	2.67	3	3.12	3.84

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.383
C	41	88	0.516
D	18	91	0.612
Imp.	20	99	0.947

Weighted Runoff Coef. (Cw):	0.57	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.04	in/hr
Runoff Supply Rate (q) @ Tc:	4.6	in/hr
PEAK DISCHARGE:	0.5	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier Engineering	Prepared by:	LAV
Project Name:	5P -NWC La Canada Naranja	Date:	05/31/2022
Concentration Point:	5P	Job #	22-010
Watershed Area:	0.1 Acres	Watershed Type	Suburban Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.3	64	0.0516	0.03

Length of Watercourse (Lc):	64	feet	Mean Slope:	0.0516	
Length to Cen. of Gravity (Lca):	32	feet	Weighted Basin Fac:	0.03	
Veg. Cover Type(s):	Desert Brush		Veg. Cover Density:	20	

RETURN PERIOD: 100-years NOAA data user generated

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4104 Longitude: -110.9965

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.83	1.27	1.6	2.25	2.77	3.12	3.35	3.84	3.96	4.8

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	83	0.456
C	41	88	0.583
D	18	91	0.671
Imp.	20	99	0.958

Weighted Runoff Coef. (Cw):	0.63	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	9.96	in/hr
Runoff Supply Rate (q) @ Tc:	6.26	in/hr
PEAK DISCHARGE:	0.6	cfs

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	6P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	6P	Job #	22-010
Watershed Area:	0.054 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	40	0.1	0.04

Length of Watercourse (Lc):	40 feet	Mean Slope:	0.1
Length to Cen. of Gravity (Lca):	20 feet	Weighted Basin Fac:	0.04
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 2-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.36	0.55	0.68	0.91	1.13	1.28	1.35	1.53	1.72	2.03

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.158
C	41	88.2	0.299
D	18	91.2	0.409
Imp.	0	99	0.9

Weighted Runoff Coef. (Cw):	0.26	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	4.32	in/hr
Runoff Supply Rate (q) @ Tc:	1.13	in/hr
PEAK DISCHARGE:	0.1	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	6P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	6P	Job #	22-010
Watershed Area:	0.054 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	40	0.1	0.04

Length of Watercourse (Lc):	40 feet	Mean Slope:	0.1
Length to Cen. of Gravity (Lca):	20 feet	Weighted Basin Fac:	0.04
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 10-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.56	0.85	1.06	1.43	1.76	1.96	2.04	2.26	2.49	2.98

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.296
C	41	88.2	0.447
D	18	91.2	0.551
Imp.	0	99	0.934

Weighted Runoff Coef. (Cw):	0.4	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	6.72	in/hr
Runoff Supply Rate (q) @ Tc:	2.71	in/hr
PEAK DISCHARGE:	0.1	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	6P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	6P	Job #	22-010
Watershed Area:	0.054 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	40	0.1	0.04

Length of Watercourse (Lc):	40 feet	Mean Slope:	0.1
Length to Cen. of Gravity (Lca):	20 feet	Weighted Basin Fac:	0.04
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 25-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.68	1.03	1.28	1.72	2.13	2.37	2.47	2.71	2.97	3.57

Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.359
C	41	88.2	0.509
D	18	91.2	0.607
Imp.	0	99	0.945

Weighted Runoff Coef. (Cw):	0.47	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	8.16	in/hr
Runoff Supply Rate (q) @ Tc:	3.79	in/hr
PEAK DISCHARGE:	0.2	cfs

PIMA COUNTY
FLOOD CONTROL

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Generated using methonds provided by Pima County Regional Flood Control District

Client:	Grenier	Prepared by:	BJK
Project Name:	6P- La Canada-Naranja	Date:	10/23/2023
Concentration Point:	6P	Job #	22-010
Watershed Area:	0.054 Acres	Watershed Type	Undeveloped-Valley

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	4	40	0.1	0.04

Length of Watercourse (Lc):	40 feet	Mean Slope:	0.1
Length to Cen. of Gravity (Lca):	20 feet	Weighted Basin Fac:	0.04
Veg. Cover Type(s):	Desert Brush	Veg. Cover Density:	20

RETURN PERIOD: 100-years NOAA Data Obtained: 2022-05-05 03:46:18 PM

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.4103 Longitude: -110.9967

Duration:	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in):	0.87	1.32	1.64	2.2	2.73	3.04	3.19	3.48	3.76	4.55

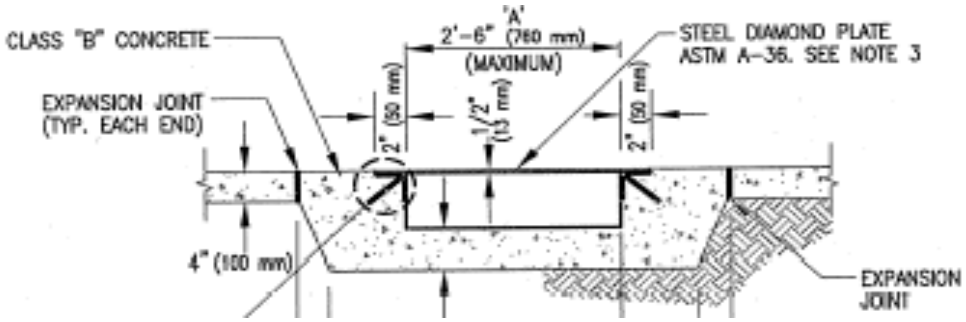
Soil Type	Percent	Curve # (CN)	Runoff Coef. (C)
B	41	82.6	0.442
C	41	88.2	0.584
D	18	91.2	0.673
Imp.	0	99	0.957

Weighted Runoff Coef. (Cw):	0.54	
Time of Concentration:	5	min
Rainfall Intensity (i) @ Tc:	10.44	in/hr
Runoff Supply Rate (q) @ Tc:	5.66	in/hr
PEAK DISCHARGE:	0.3	cfs

APPENDIX C - HYDRAULIC CALCULATIONS

Type 2 Scupper Calculations

Project Name:	La Canada and Naranja
Job Number:	22-010
Page:	1 of 1



$Q = CLH^{3/2}$ WEIR FLOW

C= 2.3

H= 0.5 ft

$$L = \frac{Q}{C \times H^{3/2}}$$

CP	Q100	Length	# Cells Rq'd	Opening Length
	(cfs)	(ft)		(ft)
4P.2	1.6	2.0	1	2.5
CP	Q10	Length *	# Cells Rq'd	Opening Length
4P.2	1	2.5	1	2.5

*Includes clogging factor of 2

Prepared by: LAM Date:

Curb Opening Calculations
(Weir Equation - COT Drainage Manual Eq. 10.14)

Project Name:	La Canada and Naranja
Job Number:	22-010

$Q = 2.3 * L * (H ^ {1.5})$

$L = Q / (2.3 * (H ^ 1.5))$

Curb Opening Summary				
Location	Q100	Height	Length Required	Length Provided
(CP)	(cfs)	(ft)	(ft)	(ft)
2P.1	10.4	0.5	**12.8**	**13.0**

Prepared by:	LAV
Checked by:	
Company:	CMG
Date:	10/31/2023

HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 1.20 cfs

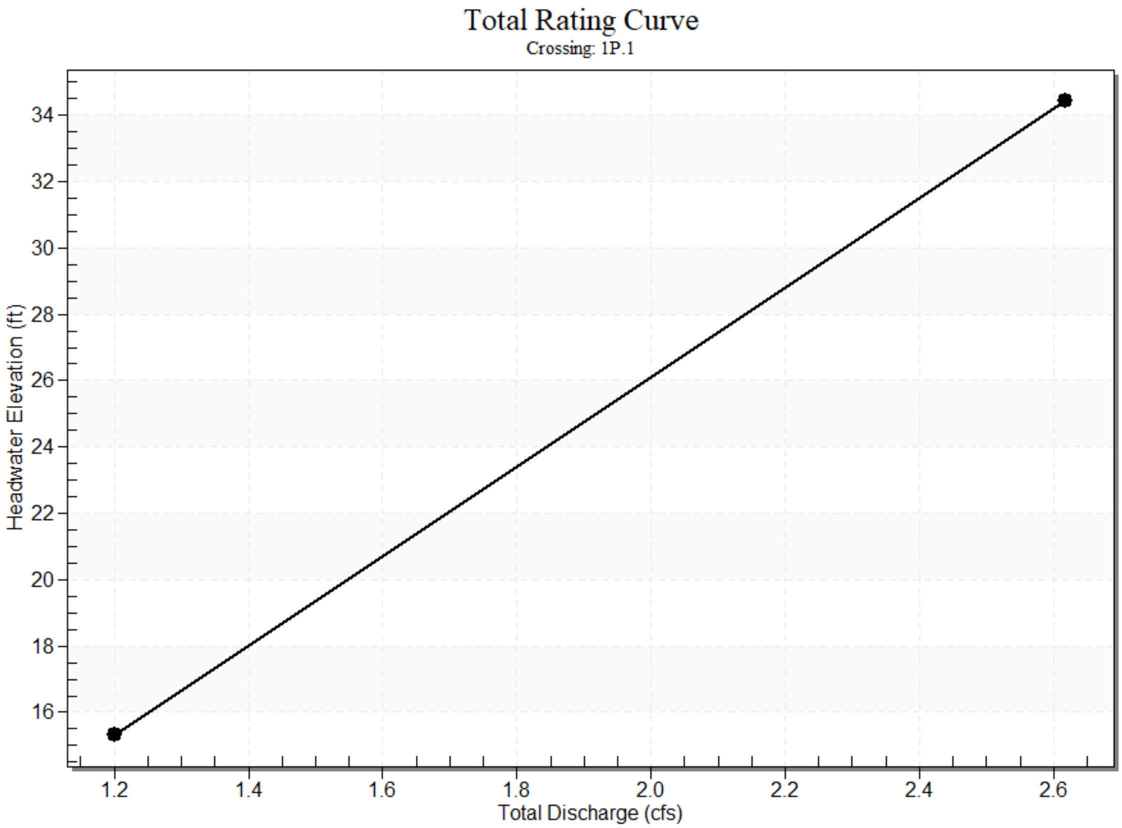
Design Flow: 1.20 cfs

Maximum Flow: 1.20 cfs

Table 1 - Summary of Culvert Flows at Crossing: 1P.1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
15.33	1.20	1.20	0.00	1
34.50	2.61	2.61	0.00	Overtopping

Rating Curve Plot for Crossing: 1P.1



Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.233	4-FFf	0.50	0.49	0.50	1.20	6.11	0.00

1.20 cfs	1.20 cfs	15.33	1.84	5.23 3	4-FFf	0.50	0.49	0.5 0	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.23 3	4-FFf	0.50	0.49	0.5 0	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.23 3	4-FFf	0.50	0.49	0.5 0	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.23 3	4-FFf	0.50	0.49	0.5 0	1.20	6.11	0.00
1.20 cfs	1.20 cfs	15.33	1.84	5.23 3	4-FFf	0.50	0.49	0.5 0	1.20	6.11	0.00

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

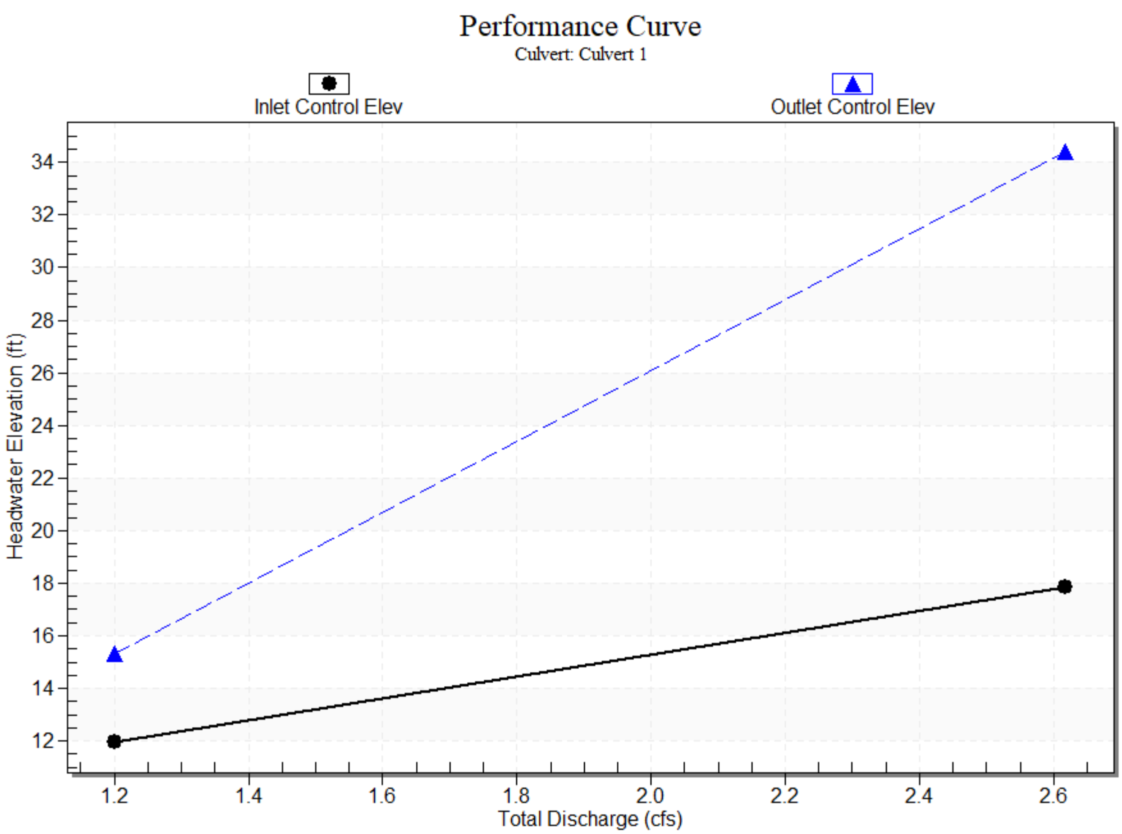
Inlet Elevation (invert): 10.10 ft,

Outlet Elevation (invert): 9.00 ft

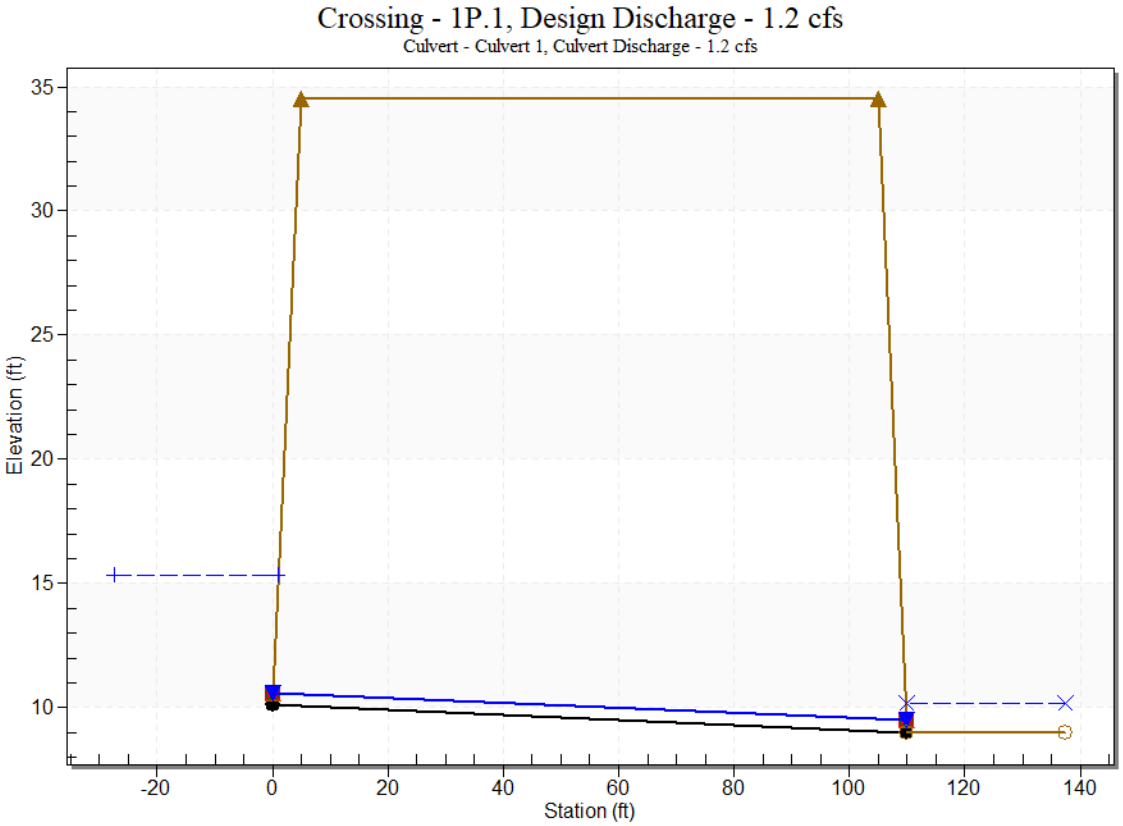
Culvert Length: 110.01 ft,

Culvert Slope: 0.0100

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: 10.10 ft

Outlet Station: 110.00 ft

Outlet Elevation: 9.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 0.50 ft

Barrel Material:

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: 1P.1

Table 3 - Downstream Channel Rating Curve (Crossing: 1P.1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20
1.20	10.20	1.20

Tailwater Channel Data - 1P.1

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 10.20 ft

Roadway Data for Crossing: 1P.1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 34.50 ft

Roadway Surface: Paved

Roadway Top Width: 100.00 ft

Crossing Discharge Data

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

Minimum Flow: 1.60 cfs

Design Flow: 1.60 cfs

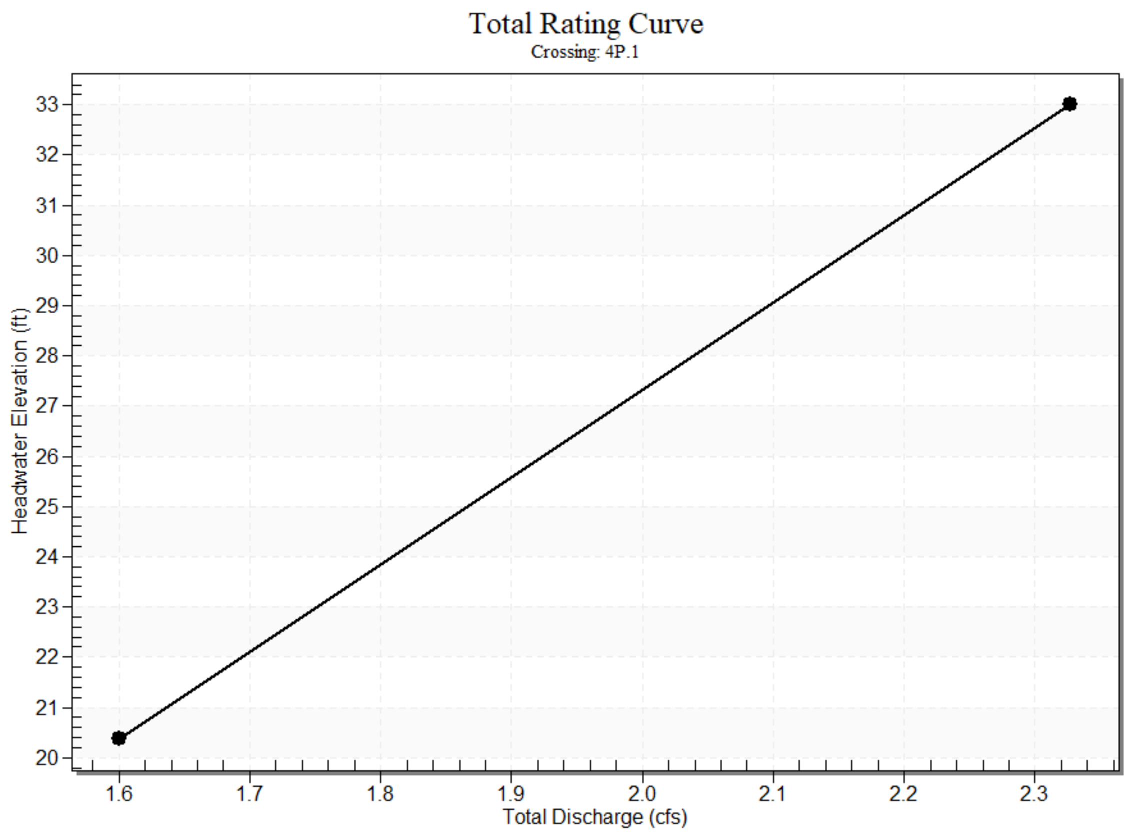
Maximum Flow: 1.60 cfs

Table 4 - Summary of Culvert Flows at Crossing: 4P.1

Headwater	Total	Culvert 1	Roadway	Iterations

Elevation (ft)	Discharge (cfs)	Discharge (cfs)	Discharge (cfs)	
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
20.38	1.60	1.60	0.00	1
33.00	2.30	2.30	0.00	Overtopping

Rating Curve Plot for Crossing: 4P.1



Culvert Data: Culvert 1

Table 5 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge	Headwater Elevation	Inlet Control	Outlet Control	Flow Type	Normal Depth	Critical Depth	Outlet Depth	Tailwater Depth (ft)	Outlet Velocity	Tailwater Velocity

	(cfs)	(ft)	Depth (ft)	Depth (ft)		(ft)	(ft)	(ft)		(ft/s)	(ft/s)
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00
1.60 cfs	1.60 cfs	20.38	3.07	11.581	4-FFf	0.50	0.50	0.50	1.26	8.15	0.00

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

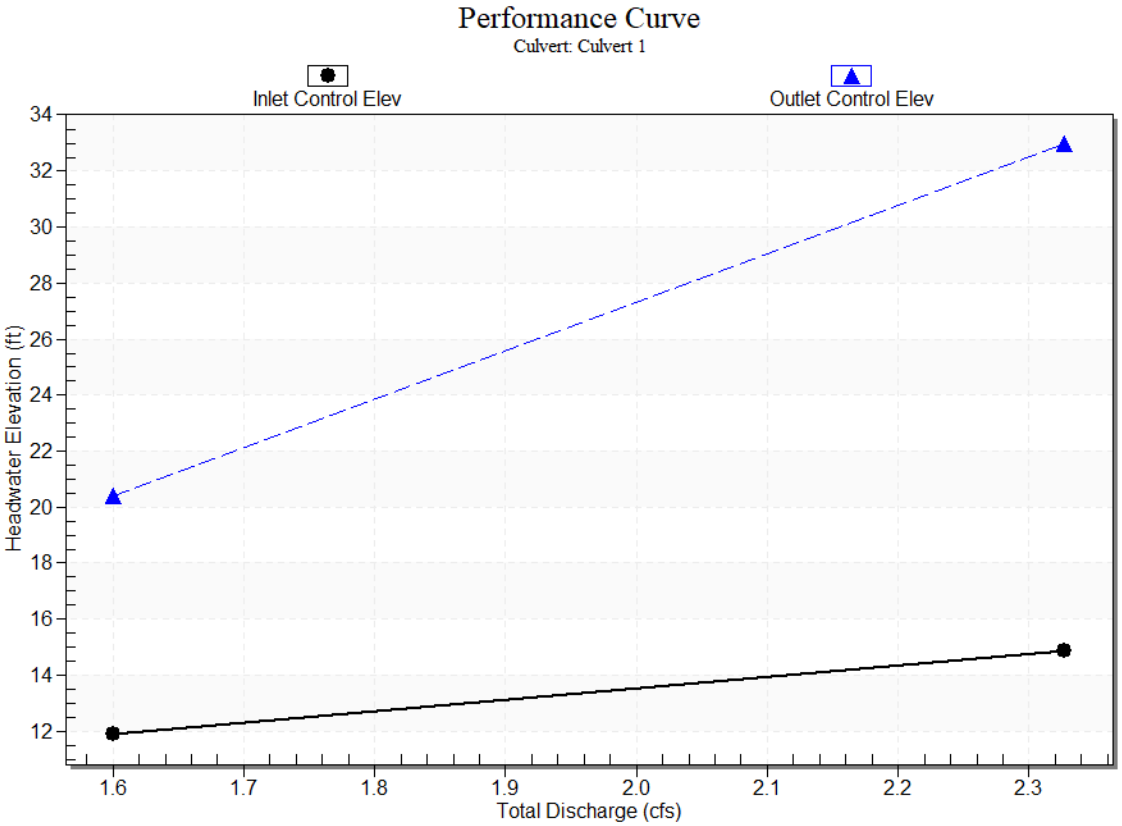
Inlet Elevation (invert): 8.80 ft,

Outlet Elevation (invert): 7.24 ft

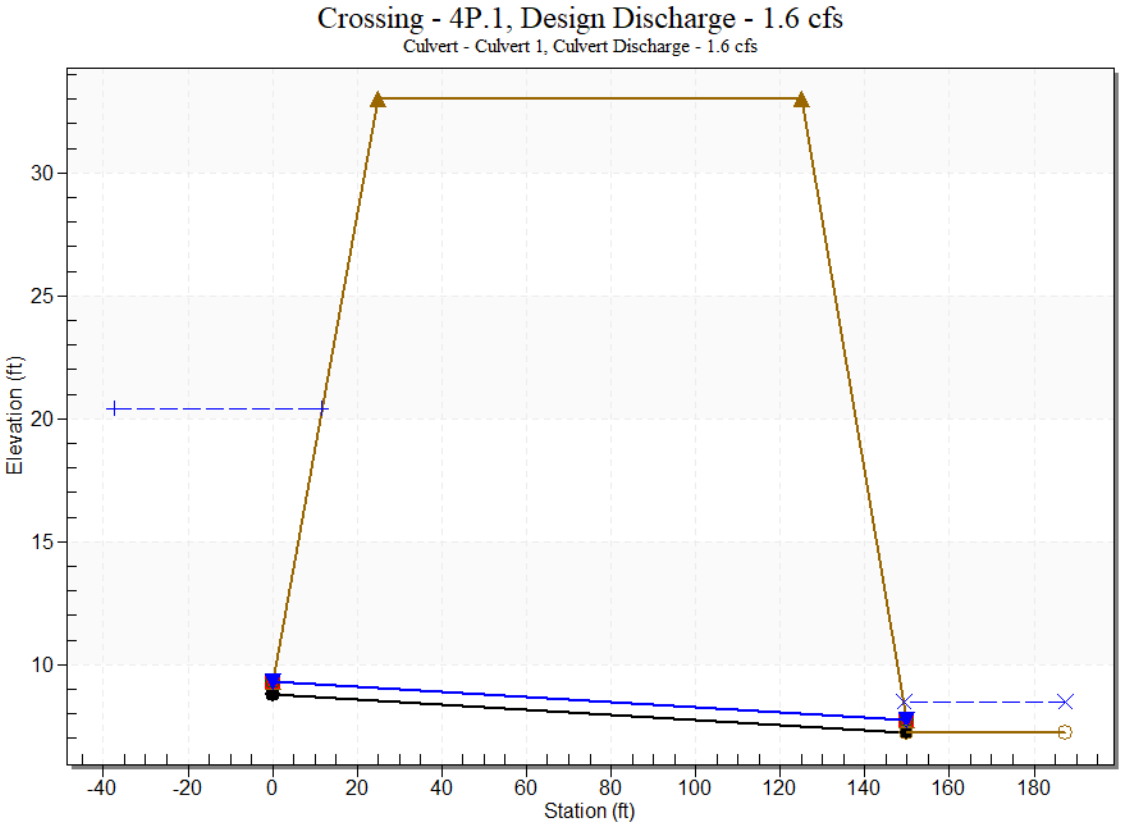
Culvert Length: 150.01 ft,

Culvert Slope: 0.0104

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: 8.80 ft

Outlet Station: 150.00 ft

Outlet Elevation: 7.24 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 0.50 ft

Barrel Material:

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: 4P.1

Table 6 - Downstream Channel Rating Curve (Crossing: 4P.1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26
1.60	8.50	1.26

Tailwater Channel Data - 4P.1

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 8.50 ft

Roadway Data for Crossing: 4P.1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 33.00 ft

Roadway Surface: Paved

Roadway Top Width: 100.00 ft

Crossing Discharge Data

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

Minimum Flow: 1.20 cfs

Design Flow: 1.20 cfs

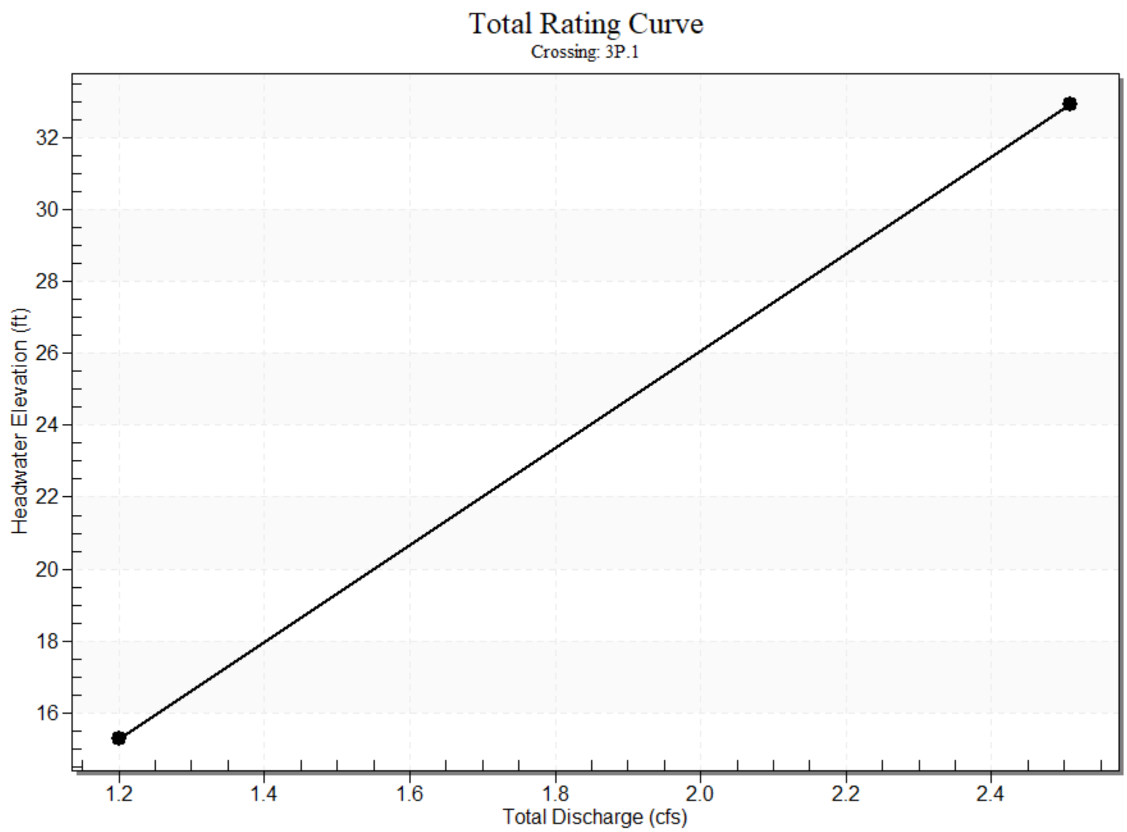
Maximum Flow: 1.20 cfs

Table 7 - Summary of Culvert Flows at Crossing: 3P.1

Headwater	Total	Culvert 1	Roadway	Iterations

Elevation (ft)	Discharge (cfs)	Discharge (cfs)	Discharge (cfs)	
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
15.29	1.20	1.20	0.00	1
33.00	2.50	2.50	0.00	Overtopping

Rating Curve Plot for Crossing: 3P.1



Culvert Data: Culvert 1

Table 8 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge	Headwater Elevation	Inlet Control	Outlet Control	Flow Type	Normal Depth	Critical Depth	Outlet Depth	Tailwater Depth (ft)	Outlet Velocity	Tailwater Velocity

	(cfs)	(ft)	Depth (ft)	Depth (ft)		(ft)	(ft)	(ft)		(ft/s)	(ft/s)
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00
1.20 cfs	1.20 cfs	15.29	1.84	5.088	4-FFf	0.50	0.49	0.50	1.00	6.11	0.00

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

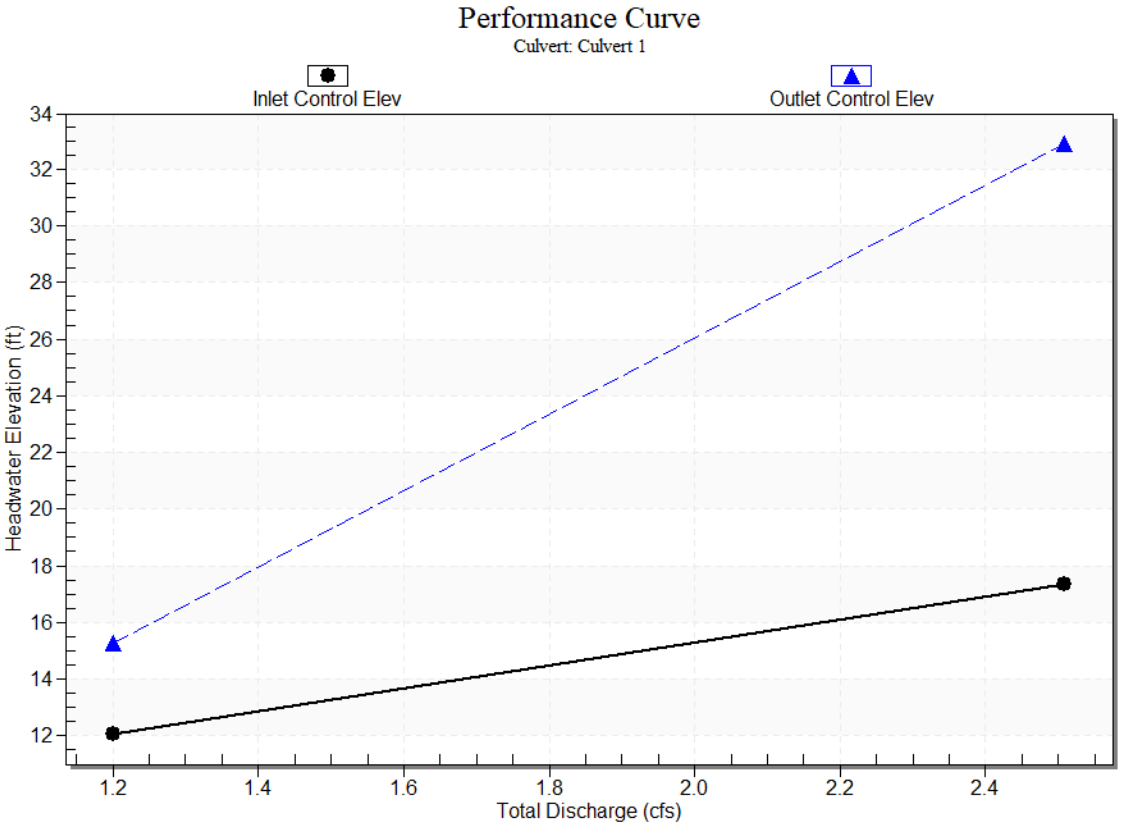
Inlet Elevation (invert): 10.20 ft,

Outlet Elevation (invert): 9.00 ft

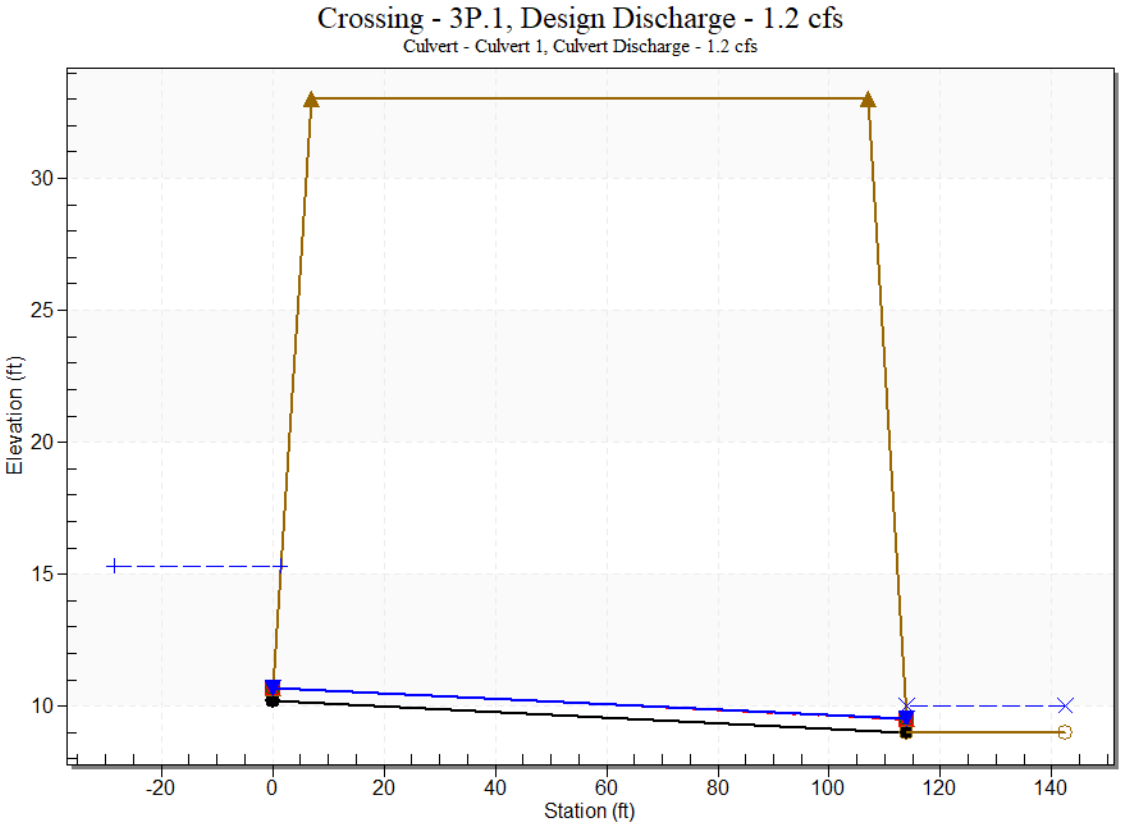
Culvert Length: 114.01 ft,

Culvert Slope: 0.0105

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: 10.20 ft

Outlet Station: 114.00 ft

Outlet Elevation: 9.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 0.50 ft

Barrel Material:

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: 3P.1

Table 9 - Downstream Channel Rating Curve (Crossing: 3P.1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00
1.20	10.00	1.00

Tailwater Channel Data - 3P.1

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 10.00 ft

Roadway Data for Crossing: 3P.1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 33.00 ft

Roadway Surface: Paved

Roadway Top Width: 100.00 ft

RIPRAP APRON CALCULATION

PIMA COUNTY DRAINAGE & CHANNEL DESIGN STANDARDS (Pg VI-14)

PROJECT NAME: La Canada/Naranja - 22-010

IF Froude Number is greater than 1 (F>1)

$L_{sb} = D_c (8 + 17 \log F)$ for minimum tailwater (Equation 4-VI)

$L_{sb} = D_c (8 + 55 \log F)$ for maximum tailwater (Equation 5-VI)

Where:

L_{sb} = Length of scour basin, ft.

F = Froude number of flow at the culvert outlet

D_c = Culvert diameter or depth of flow, ft

W_c = Culvert width, ft

IF Froude Number is less than or equal to 1 (F<=1)

$Lsb = 8\ D_c$

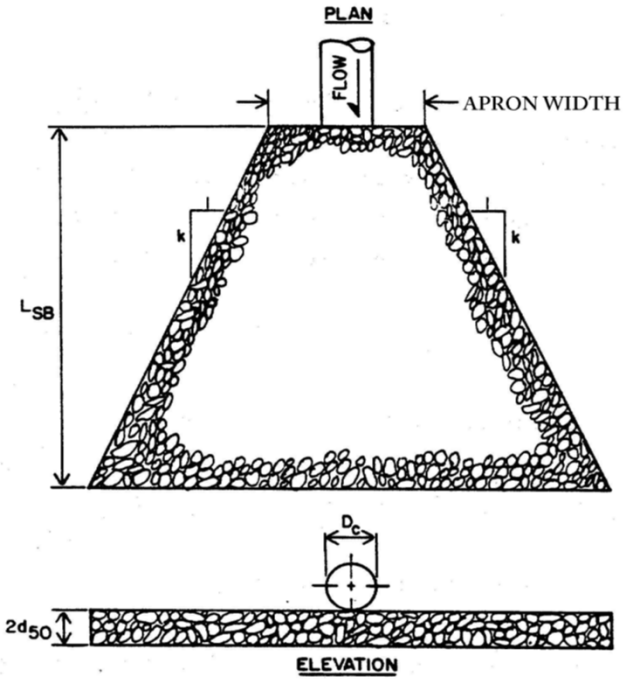
$W = 3\ D_c$

k = 2 for minimum tailwater

k = 5 for maximum tailwater

$$d_{50} = 0.02 \left[\frac{D_c^2}{TW} \right] (R)^{1.33}$$ (Equation 6-VI)

$t = 2\ d_{50}$



CP or X-Section/Wash	Q100 (cfs)	No. of Barrels -	Froude Number -	Wc (ft)	Dc (ft)	TW (ft)	Tailwater Condition -	R -	Apron Length (L_{sb}) (ft)	Apron Width (ft)	Taper Coefficient (*k*) -	Size d_{50} (ft)	Apron Thickness (ft)
1P.1 Pipe	1.2	1	1.00	0.5	0.5	1.20	MAXIMUM	6.79	4	1.5	5.0	0.1	0
3P.1 Pipe	1.2	1	1.00	0.5	0.5	1.00	MAXIMUM	6.79	4	1.5	5.0	0.1	0
4P.1 Pipe	1.6	1	1.00	0.5	0.5	1.26	MAXIMUM	9.05	4	1.5	5.0	0.1	0

For D_{50} > 6"; Option: Use wire-tied

APPENDIX D - BASIN CALCULATIONS

Stage Storage Calculations
(Average-End-Area Method)

Basin Name: **1**

$$\Delta S = \frac{A_1 + A_2}{2} (h_2 - h_1)$$

ΔS = Incremental storage volume available between H1 and H2
h1 = Water surface elevation 1
h2 = Water surface elevation 2 (h2>h1)
A1 = Surface area 1
A2 = Surface area 2

Elevation (ft)	Area (sq.ft.)	(A1+A2)/2 (sq.ft.)	(h2-h1) (ft)	ΔS (cu.ft)	Cummulative S (cu.ft)	**Elevation (ft)**	**Storage (Ac-ft)**
9.00	624	0	0.0	0	0	**9.0**	**0.000**
9.50	714	669	0.5	335	335	**9.5**	**0.008**
10.00	806	760	0.5	380	715	**10.0**	**0.016**
10.50	900	853	0.5	427	1,141	**10.5**	**0.026**
11.00	997	949	0.5	474	1,615	**11.0**	**0.037**

Prepared by: LAV Checked by: _____ Company: CMG Drainage Engineering Date: 1/24/2024

Stage Storage Calculations
(Average-End-Area Method)

Basin Name: **2**

$$\Delta S = \frac{A_1 + A_2}{2} (h_2 - h_1)$$

ΔS = Incremental storage volume available between H1 and H2
h1 = Water surface elevation 1
h2 = Water surface elevation 2 (h2>h1)
A1 = Surface area 1
A2 = Surface area 2

Elevation (ft)	Area (sq.ft.)	(A1+A2)/2 (sq.ft.)	(h2-h1) (ft)	ΔS (cu.ft)	Cummulative S (cu.ft)	**Elevation (ft)**	**Storage (Ac-ft)**
8.17	4,507	0	0.0	0	0	**8.2**	**0.000**
8.50	4,727	4,617	0.3	1,524	1,524	**8.5**	**0.035**
9.00	5,062	4,895	0.5	2,447	3,971	**9.0**	**0.091**
9.50	5,398	5,230	0.5	2,615	6,586	**9.5**	**0.151**
10.00	5,735	5,567	0.5	2,783	9,369	**10.0**	**0.215**

Prepared by: LAV Checked by: _____ Company: CMG Drainage Engineering Date: 1/24/2024

Stage Storage Calculations
(Average-End-Area Method)

Basin Name: **3**

$$\Delta S = \frac{A_1 + A_2}{2} (h_2 - h_1)$$

ΔS = Incremental storage volume available between H1 and H2
h1 = Water surface elevation 1
h2 = Water surface elevation 2 (h2>h1)
A1 = Surface area 1
A2 = Surface area 2

Elevation (ft)	Area (sq.ft.)	(A1+A2)/2 (sq.ft.)	(h2-h1) (ft)	ΔS (cu.ft)	Cummulative S (cu.ft)	**Elevation (ft)**	**Storage (Ac-ft)**
7.00	376	0	0.0	0	0	**7.0**	**0.000**
7.50	450	413	0.5	207	207	**7.5**	**0.005**
8.00	527	489	0.5	244	451	**8.0**	**0.010**
8.50	607	567	0.5	284	734	**8.5**	**0.017**
9.00	690	649	0.5	324	1,059	**9.0**	**0.024**
9.50	777	734	0.5	367	1,425	**9.5**	**0.033**
10.00	866	822	0.5	411	1,836	**10.0**	**0.042**

Prepared by: LAV Checked by: _____ Company: CMG Drainage Engineering Date: 1/24/2024

Stage Storage Calculations
(Average-End-Area Method)

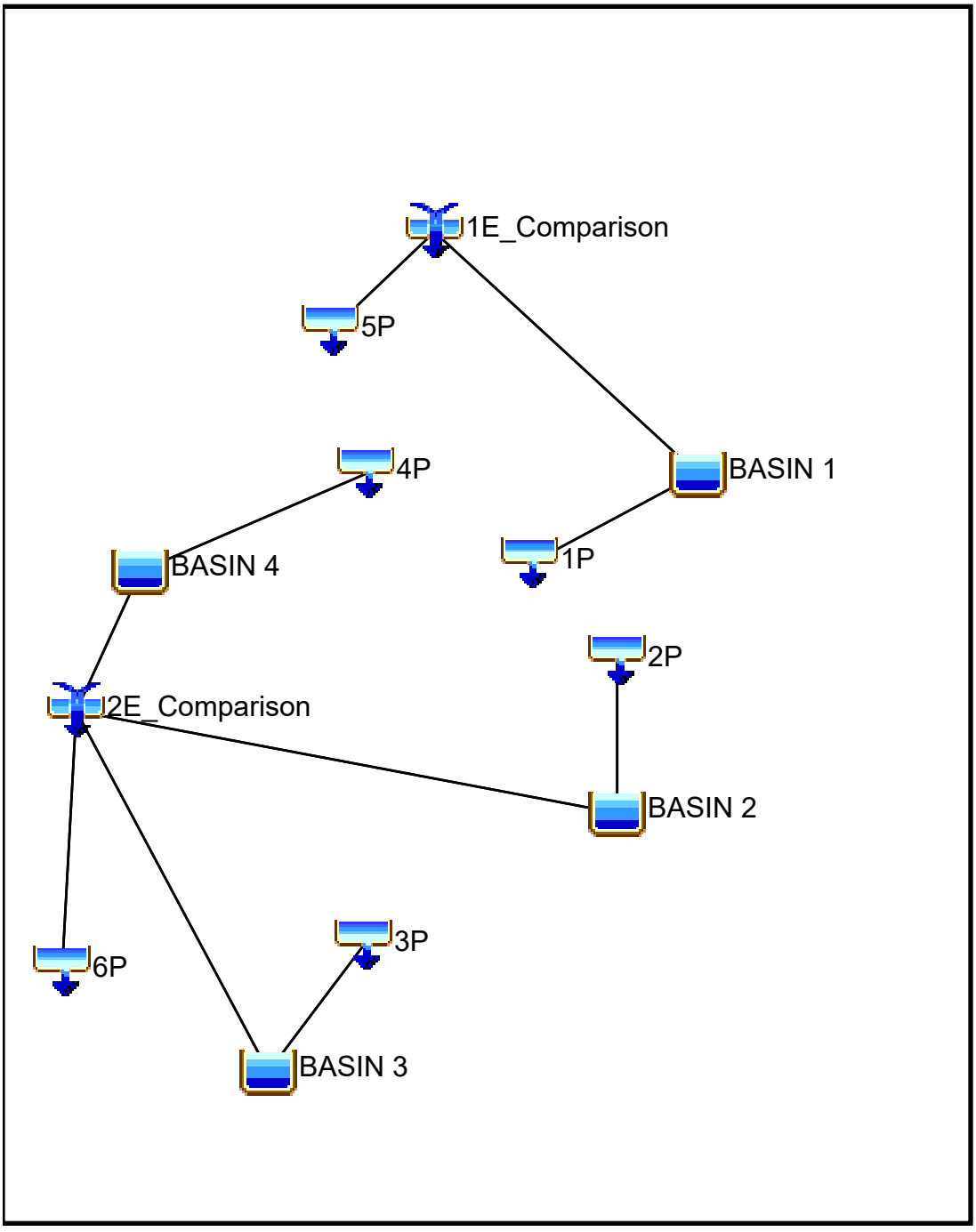
Basin Name: **4**

$$\Delta S = \frac{A_1 + A_2}{2} (h_2 - h_1)$$

ΔS = Incremental storage volume available between H1 and H2
h1 = Water surface elevation 1
h2 = Water surface elevation 2 (h2>h1)
A1 = Surface area 1
A2 = Surface area 2

Elevation (ft)	Area (sq.ft.)	(A1+A2)/2 (sq.ft.)	(h2-h1) (ft)	ΔS (cu.ft)	Cummulative S (cu.ft)	**Elevation (ft)**	**Storage (Ac-ft)**
7.24	382	0	0.0	0	0	**7.2**	**0.000**
7.50	413	398	0.3	103	103	**7.5**	**0.002**
8.00	473	443	0.5	222	325	**8.0**	**0.007**
8.50	534	504	0.5	252	577	**8.5**	**0.013**
9.00	595	565	0.5	282	859	**9.0**	**0.020**
9.24	626	611	0.2	147	1,005	**9.2**	**0.023**

Prepared by: LAV Checked by: _____ Company: CMG Drainage Engineering Date: 1/24/2024


1E_Comparison
5P
4P
BASIN 1
BASIN 4
1P
2P
2E_Comparison
BASIN 2
3P
6P
BASIN 3

Project: 22_010_Final_Plat_rev
Simulation Run: Prop_2
Simulation Start: 31 December 2000, 24:00
Simulation End: 1 January 2001, 06:00

HMS Version: 4.11
Executed: 24 January 2024, 17:24

Global Results Summary

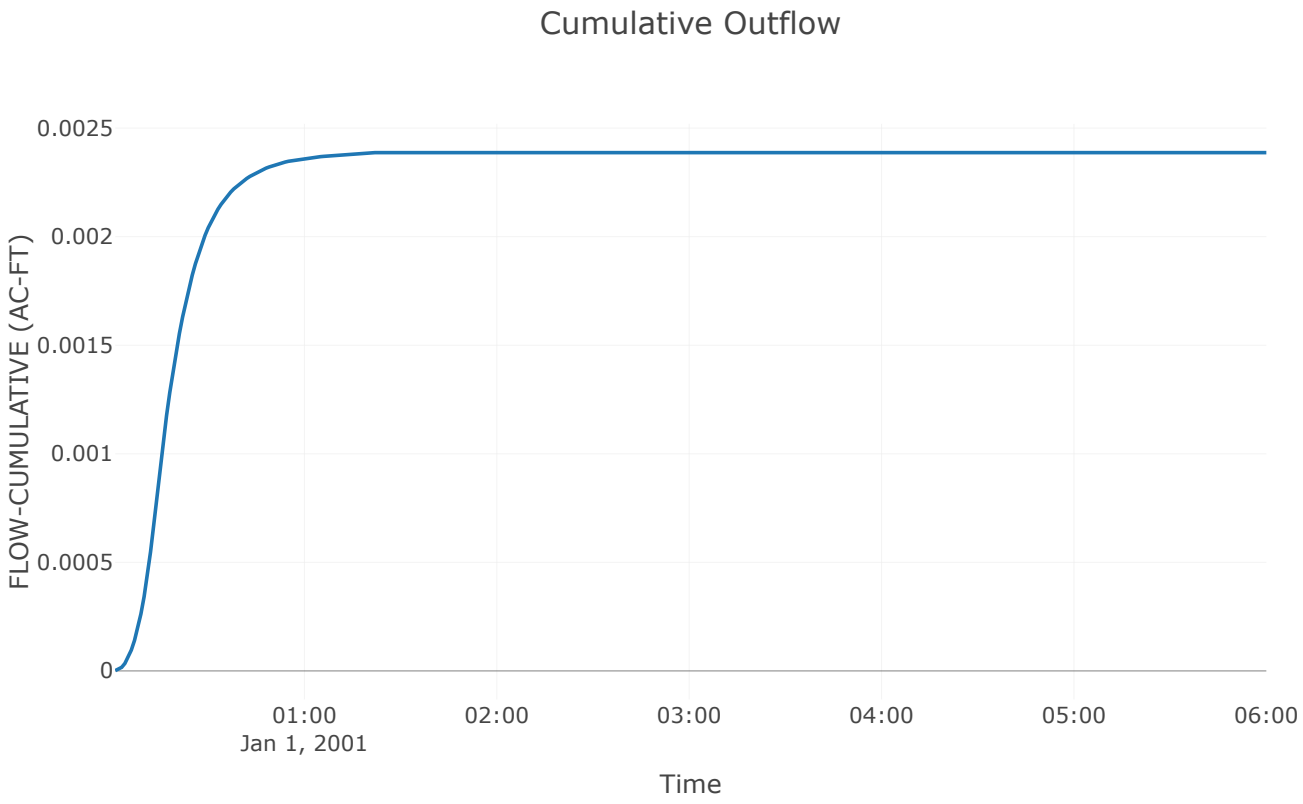
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume ()
6p	Not specified	0.1	01Jan2001, 00:14	Not specified
4p	Not specified	1.7	01Jan2001, 00:14	Not specified
Basin 4	Not specified	1.48	01Jan2001, 00:16	Not specified
3p	Not specified	0.5	01Jan2001, 00:14	Not specified
Basin 3	Not specified	0.3	01Jan2001, 00:21	Not specified
2p	Not specified	4.5	01Jan2001, 00:14	Not specified
Basin 2	Not specified	1.12	01Jan2001, 00:30	Not specified
2E_Comparison	Not specified	2.41	01Jan2001, 00:19	Not specified
5p	Not specified	0.2	01Jan2001, 00:14	Not specified
1p	Not specified	1	01Jan2001, 00:14	Not specified
Basin 1	Not specified	0.45	01Jan2001, 00:24	Not specified
1E_Comparison	Not specified	0.55	01Jan2001, 00:22	Not specified

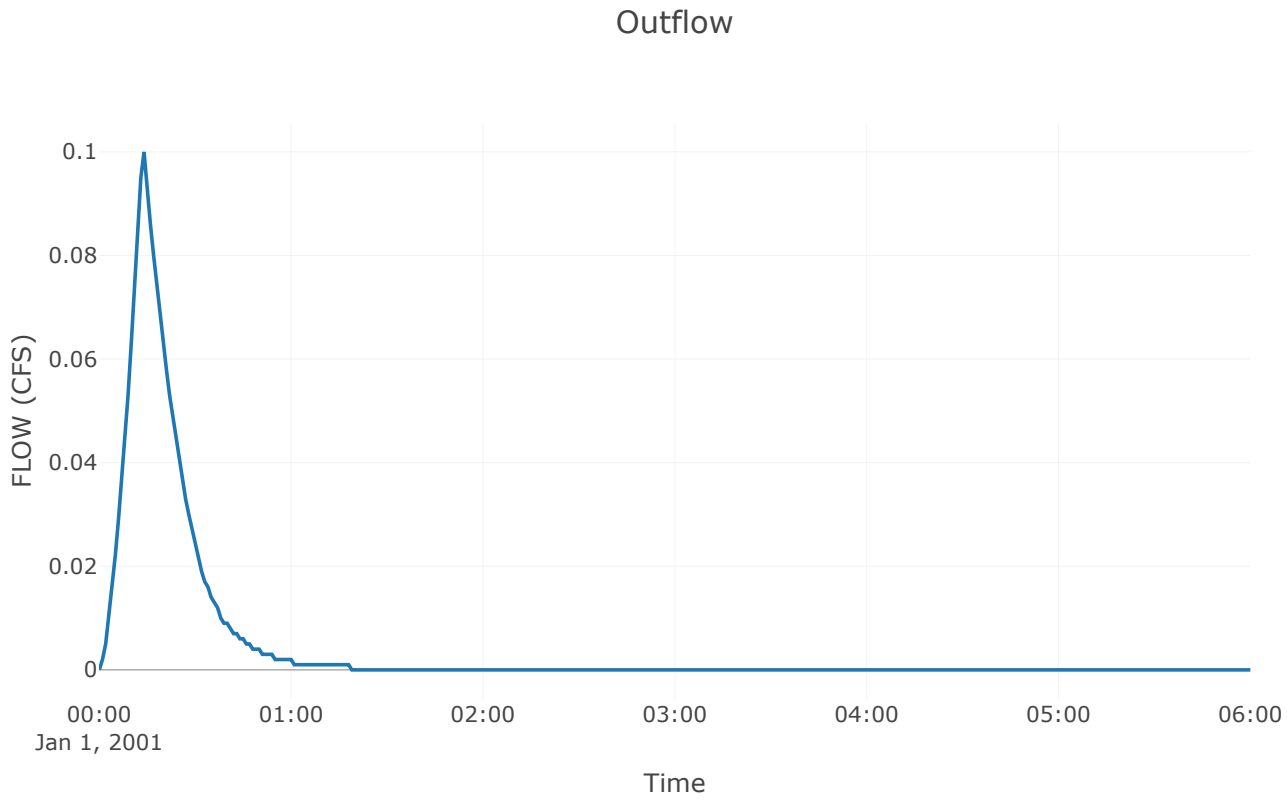
Source: 6P

Downstream : 2E_Comparison
Flow Method : Gage Flow
Flow Gage : 6p 2

Results: 6P

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
0.0025
0.002
0.0015
0.001
0.0005
0
FLOW-CUMULATIVE (AC-FT)
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

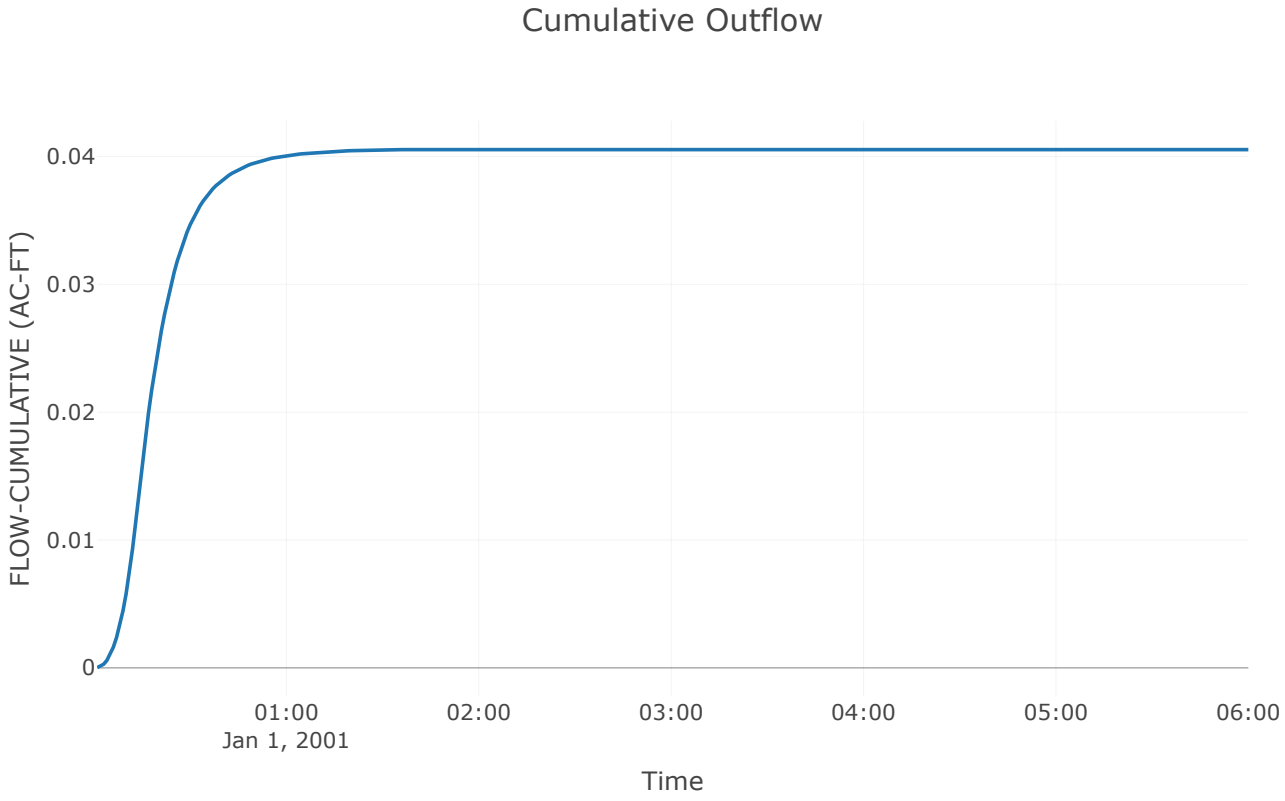

Outflow
0.1
0.08
0.06
0.04
0.02
0
FLOW (CFS)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

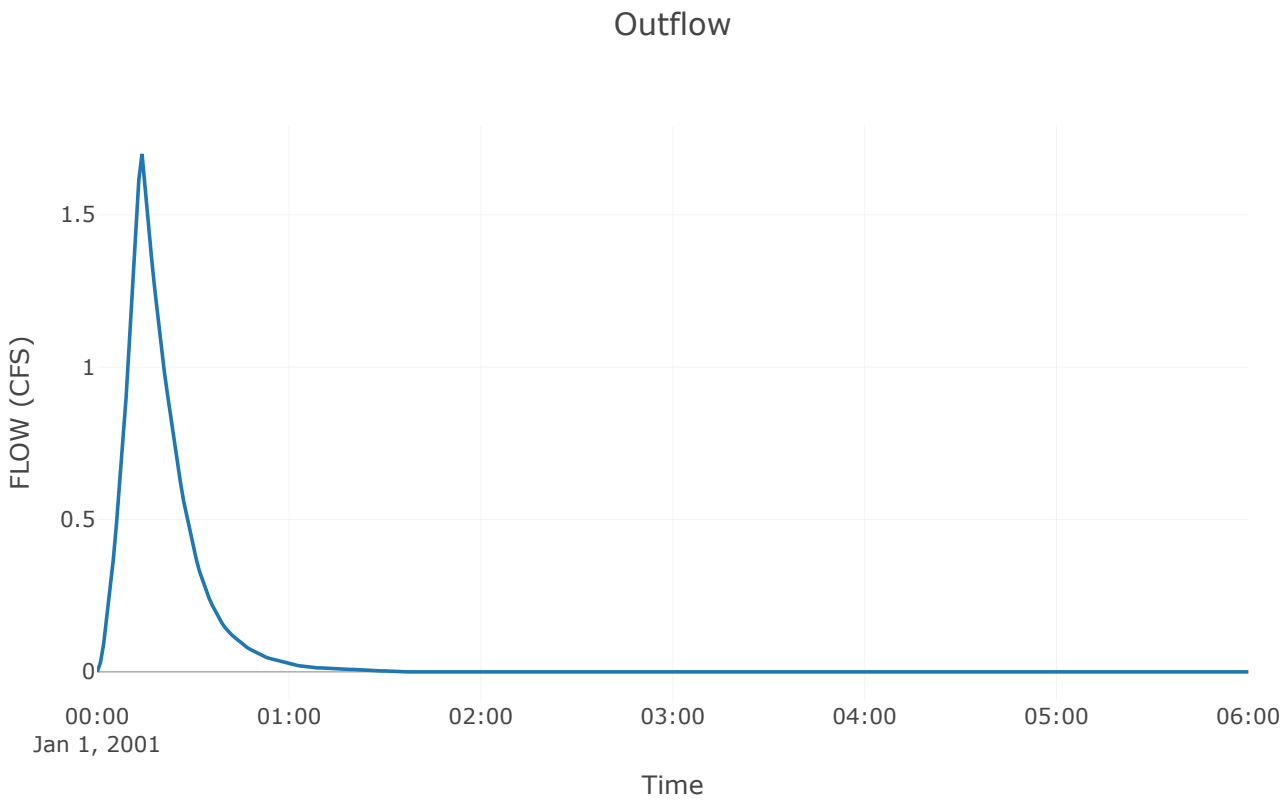
Source: 4P

Downstream : Basin 4
Flow Method : Gage Flow
Flow Gage : 4p 2

Results: 4P

Peak Discharge (CFS)	1.7
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.04
0.03
0.02
0.01
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

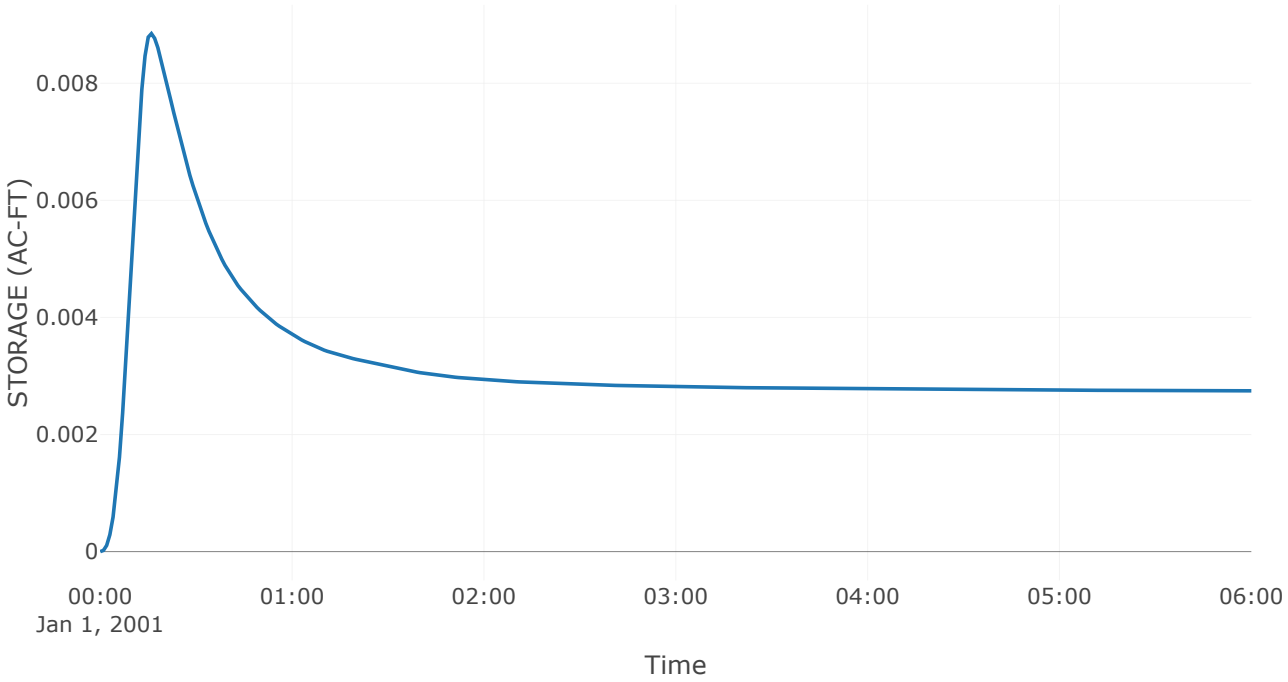

Outflow
FLOW (CFS)
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 4

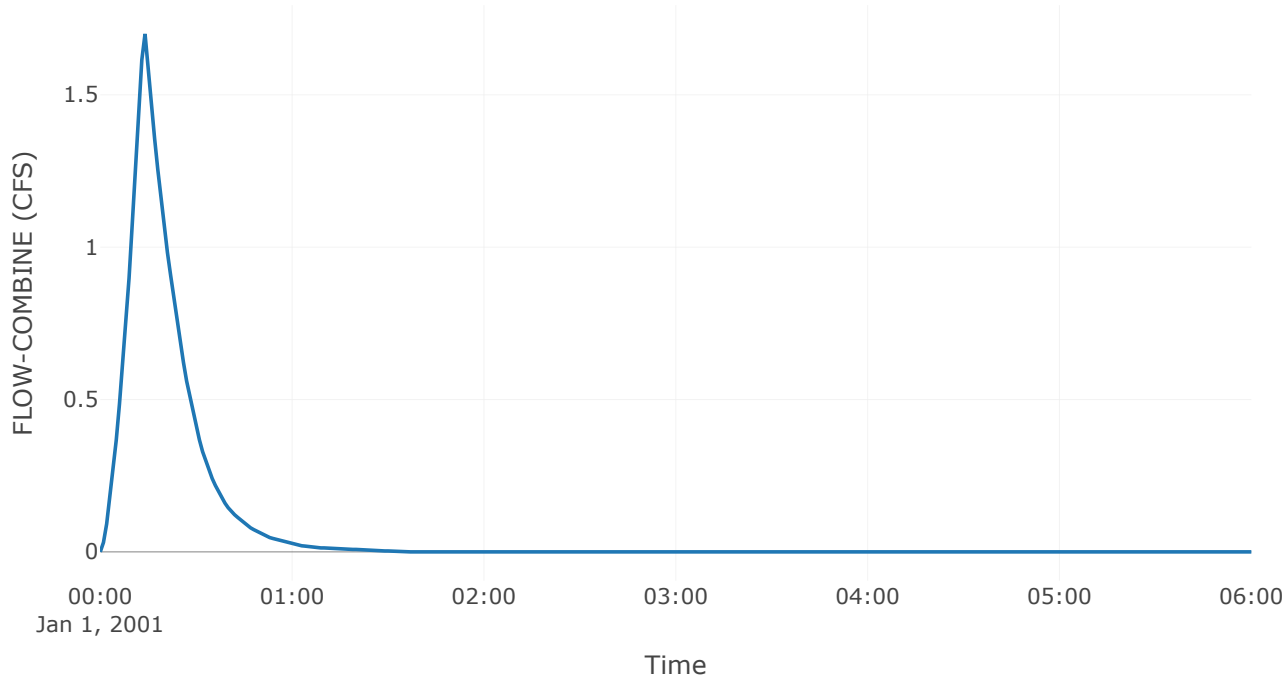
Downstream : 2E_Comparison

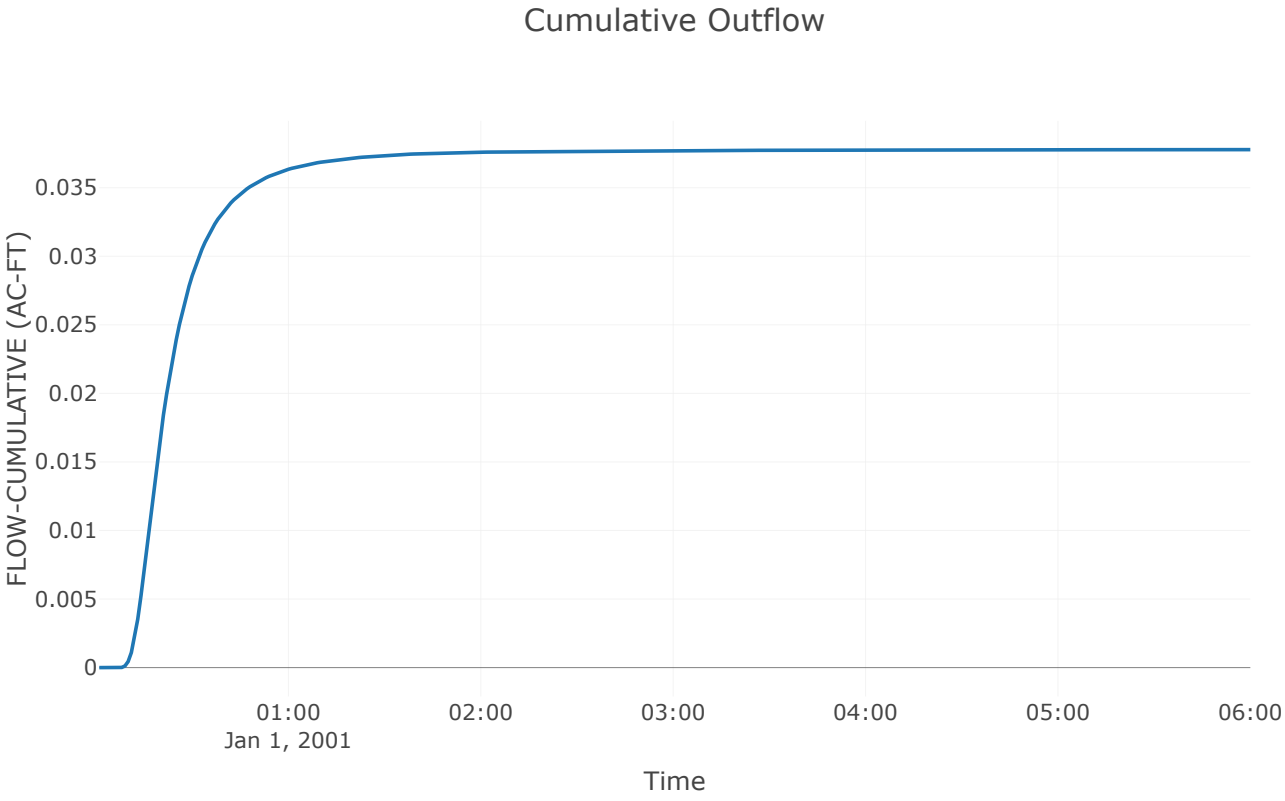
Results: BASIN 4	
Peak Discharge (CFS)	1.48
Time of Peak Discharge	01Jan2001, 00:16
Peak Inflow (CFS)	1.7
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.04
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	8.15
Discharge Volume (AC - FT)	0.04

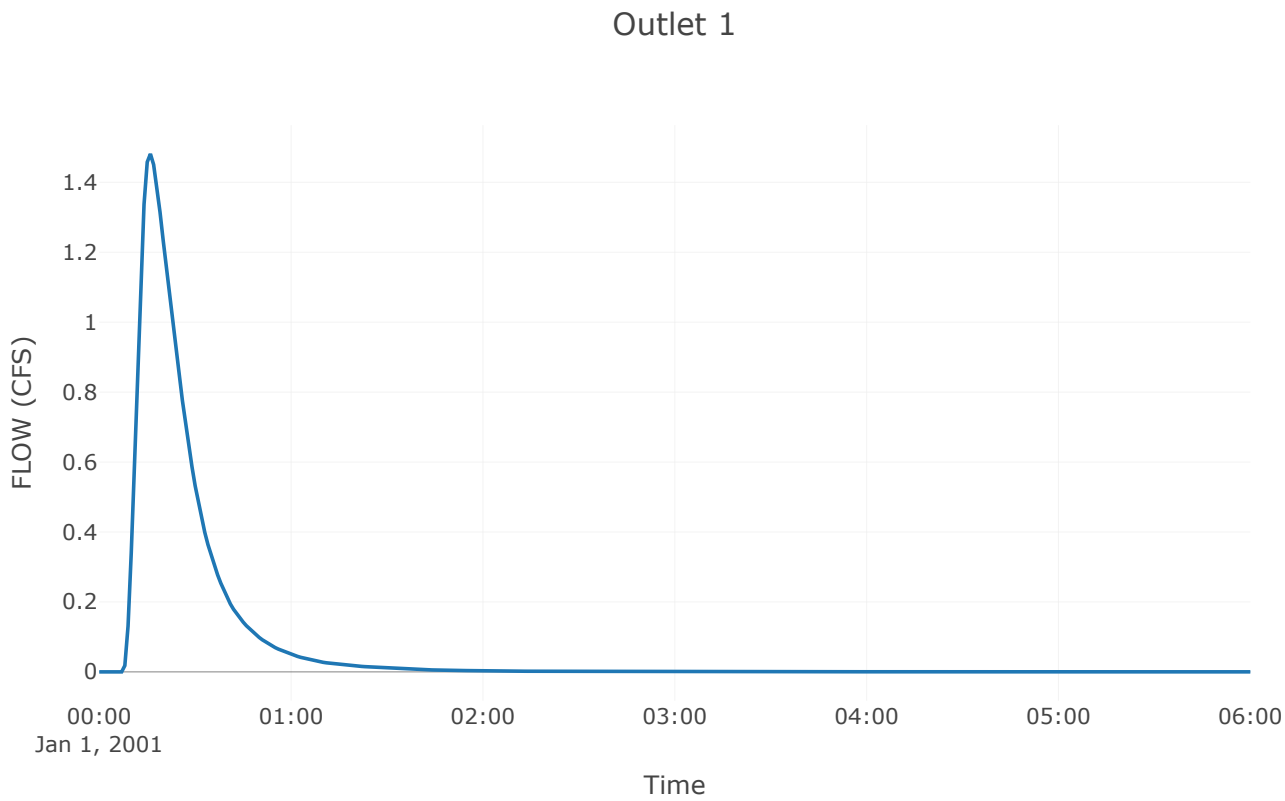
Storage



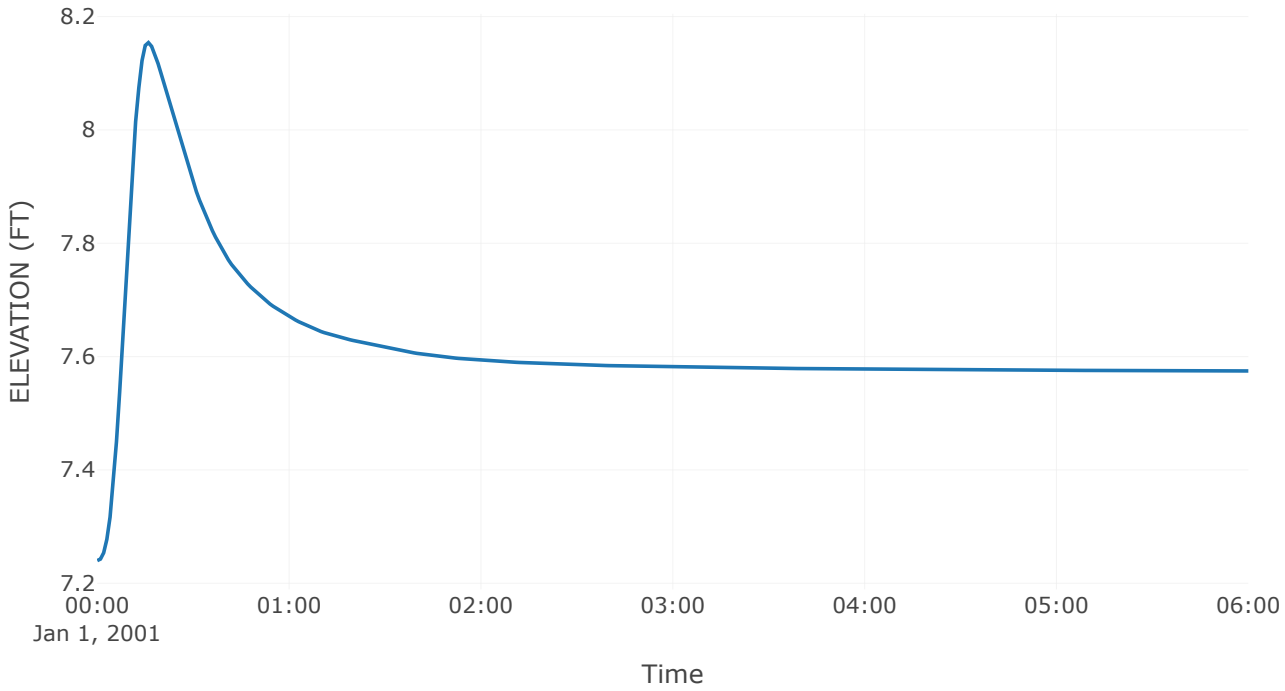
Combined Inflow



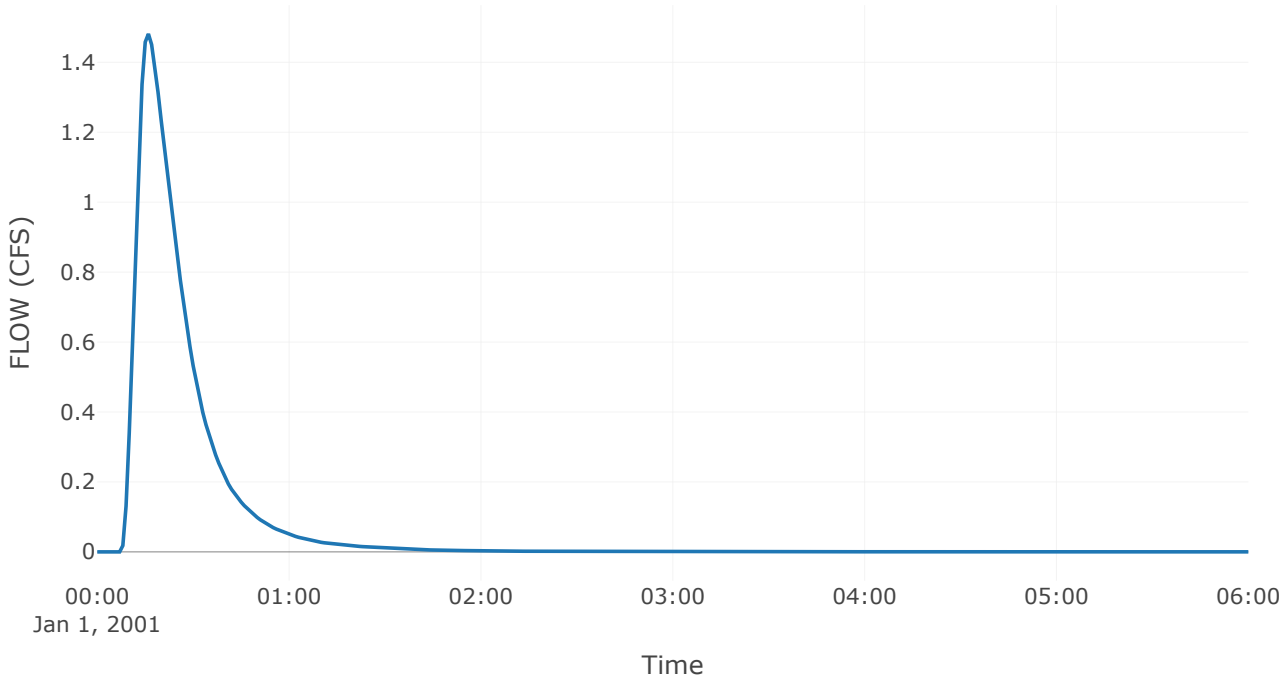

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

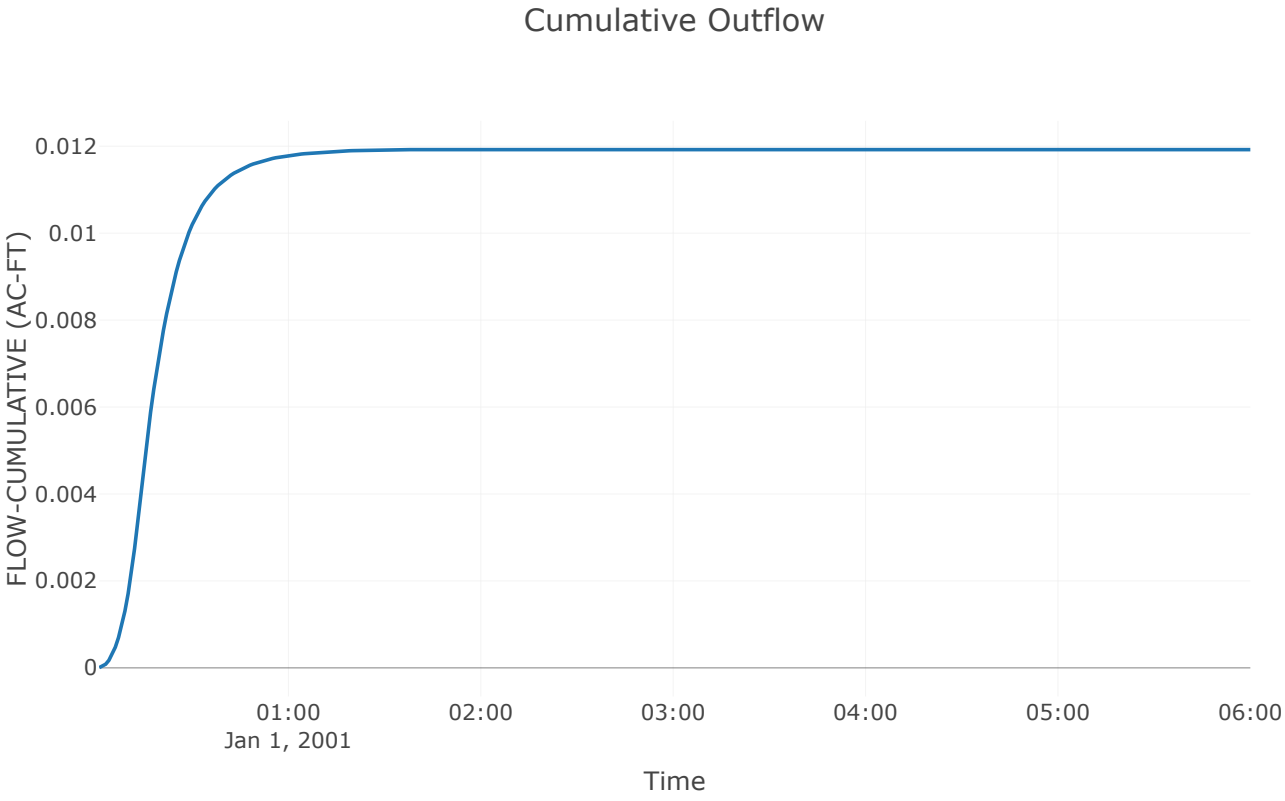


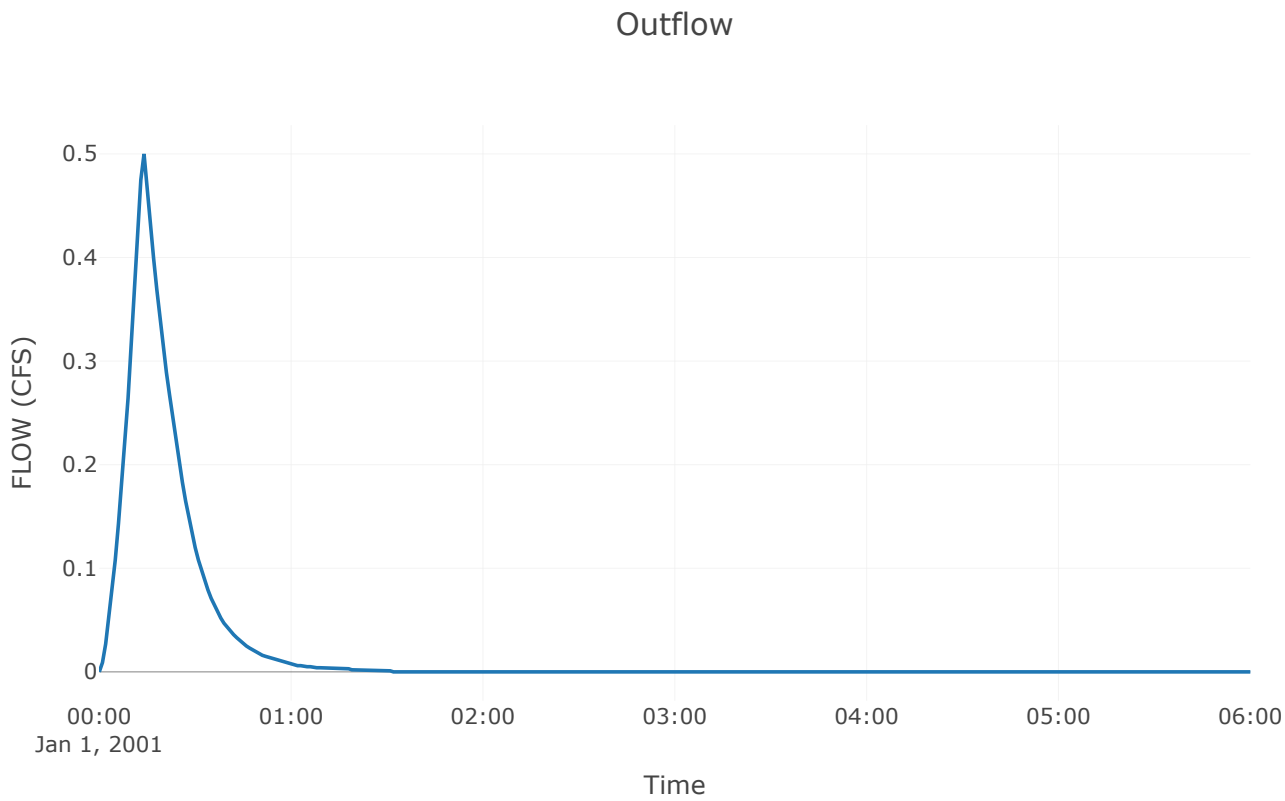
Source: 3P

Downstream : Basin 3
Flow Method : Gage Flow
Flow Gage : 3p 2

Results: 3P

Peak Discharge (CFS)	0.5
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.012
0.01
0.008
0.006
0.004
0.002
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

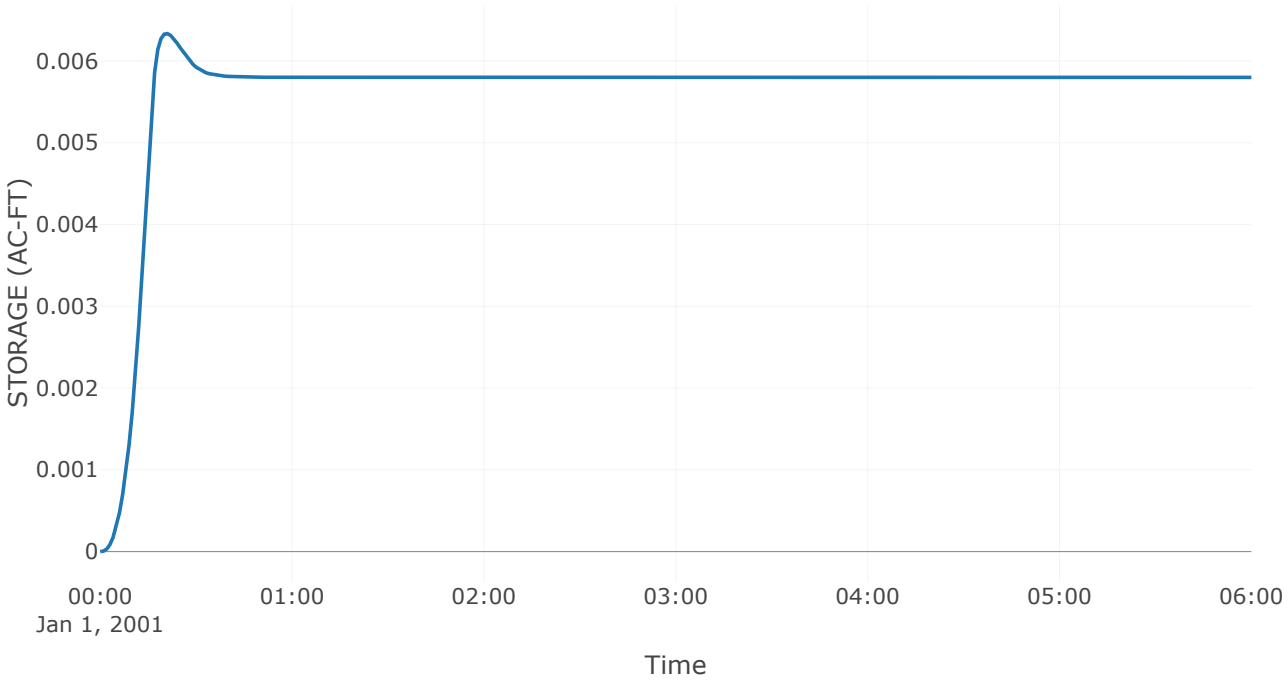

Outflow
FLOW (CFS)
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 3

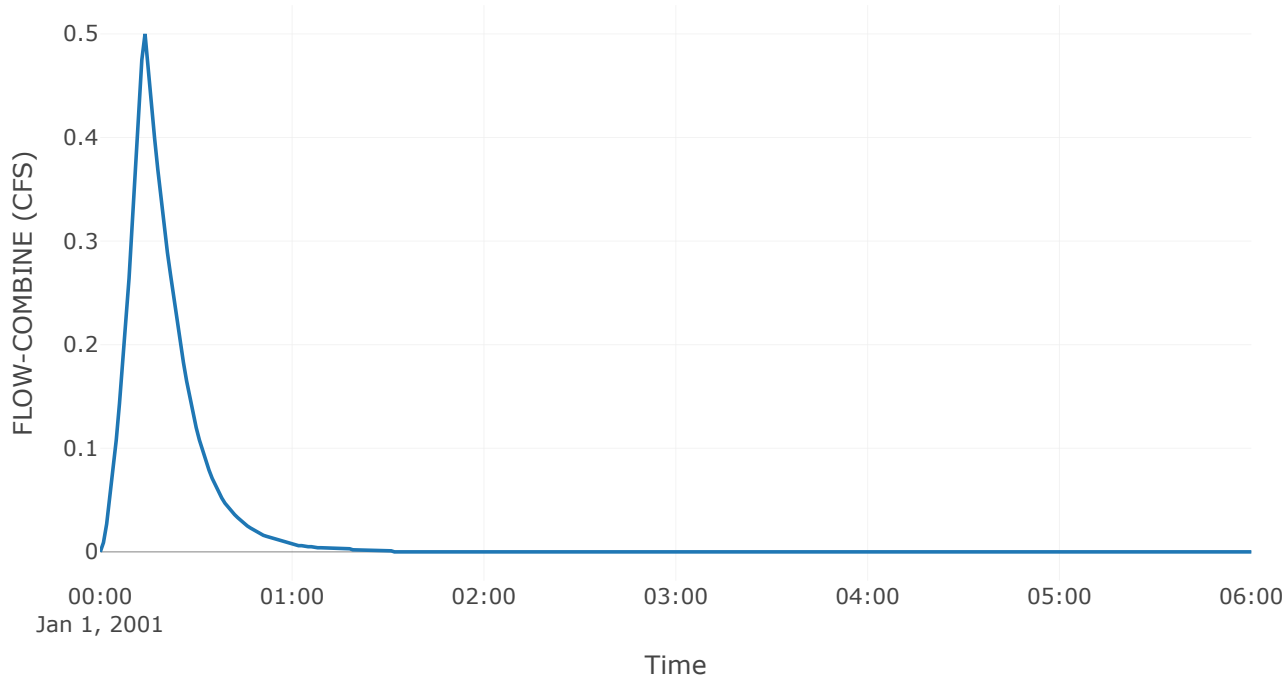
Downstream : 2E_Comparison

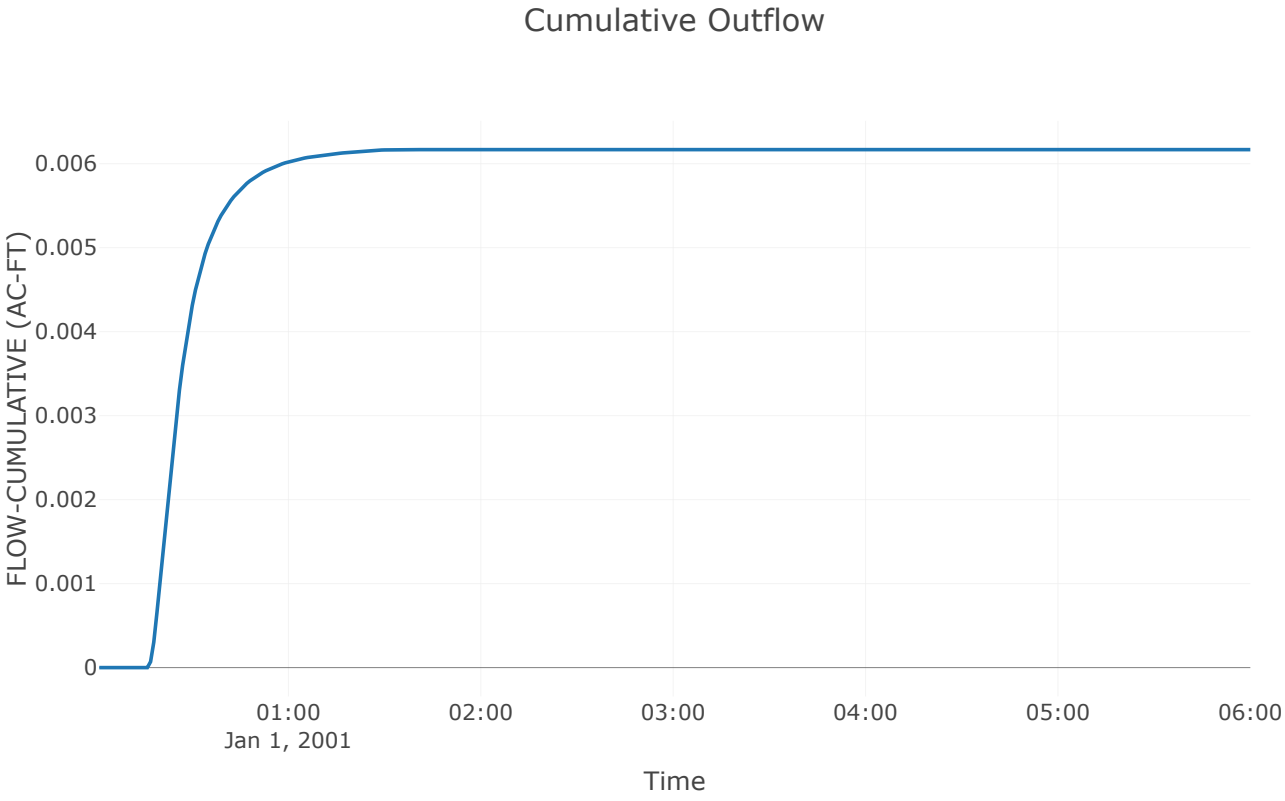
Results: BASIN 3	
Peak Discharge (CFS)	0.3
Time of Peak Discharge	01Jan2001, 00:21
Peak Inflow (CFS)	0.5
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.01
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	7.63
Discharge Volume (AC - FT)	0.01

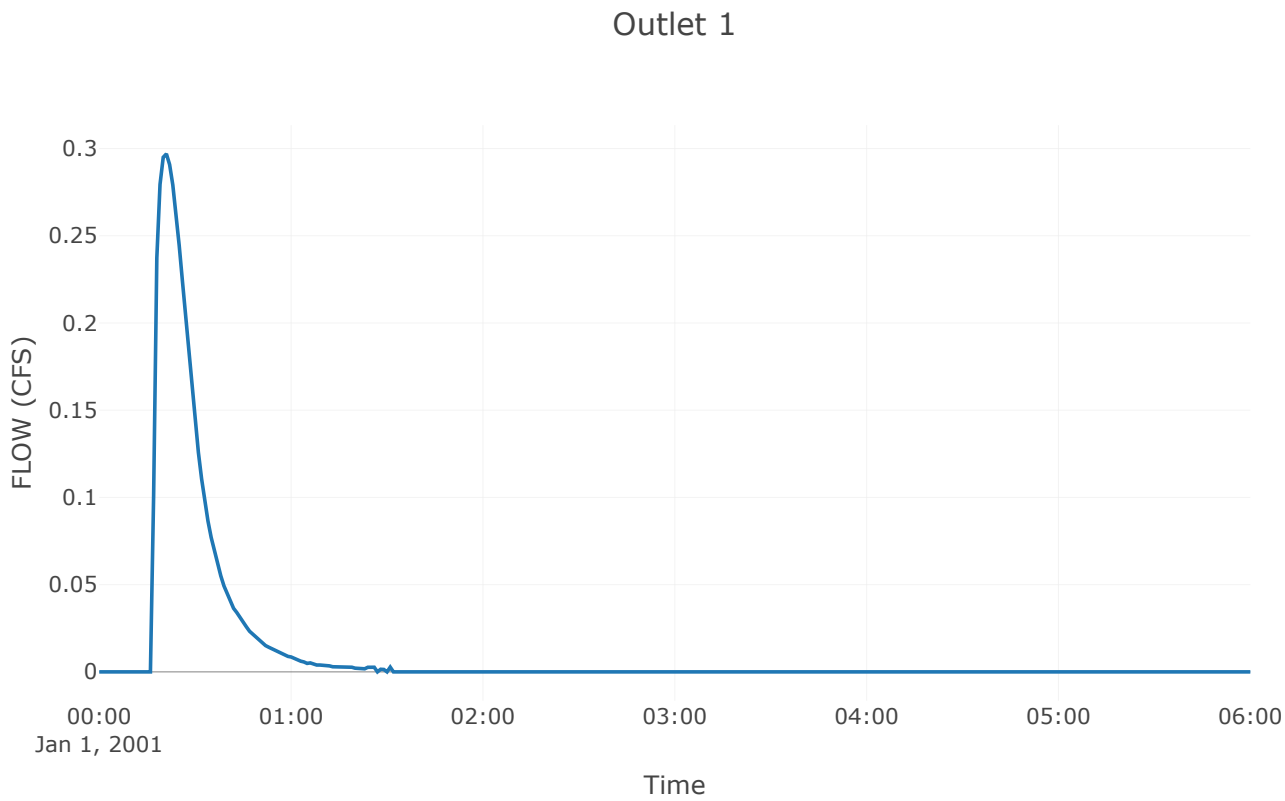
Storage



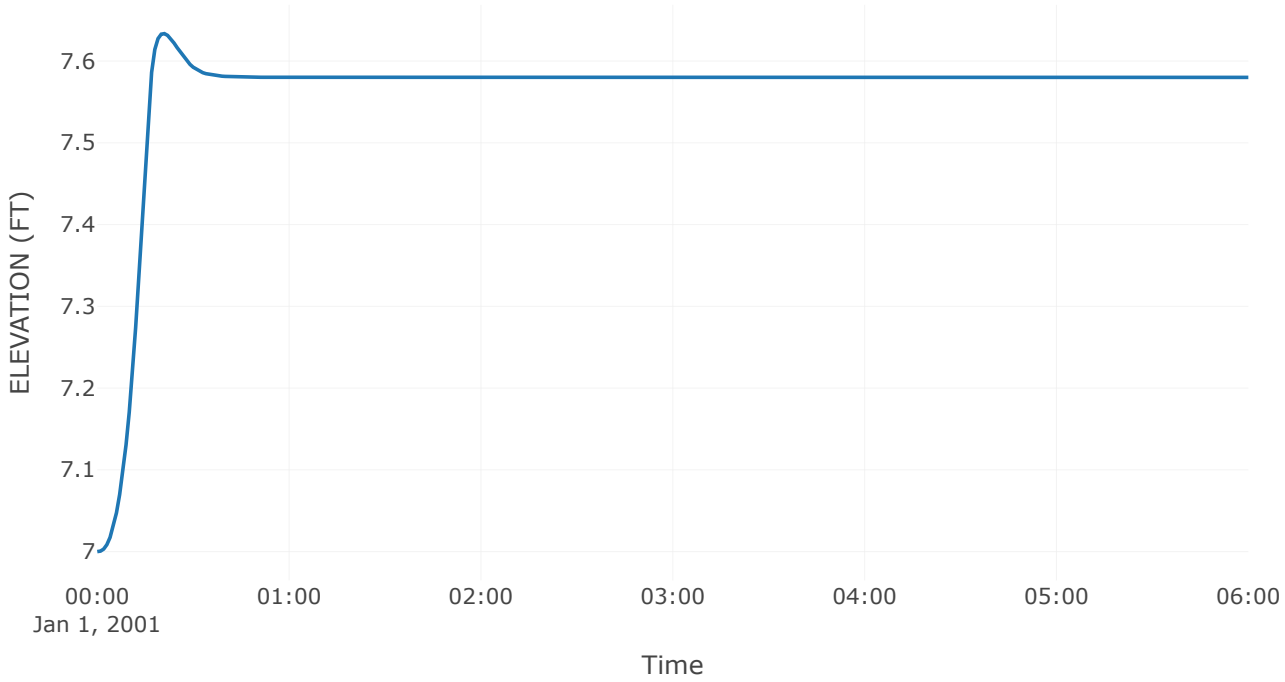
Combined Inflow



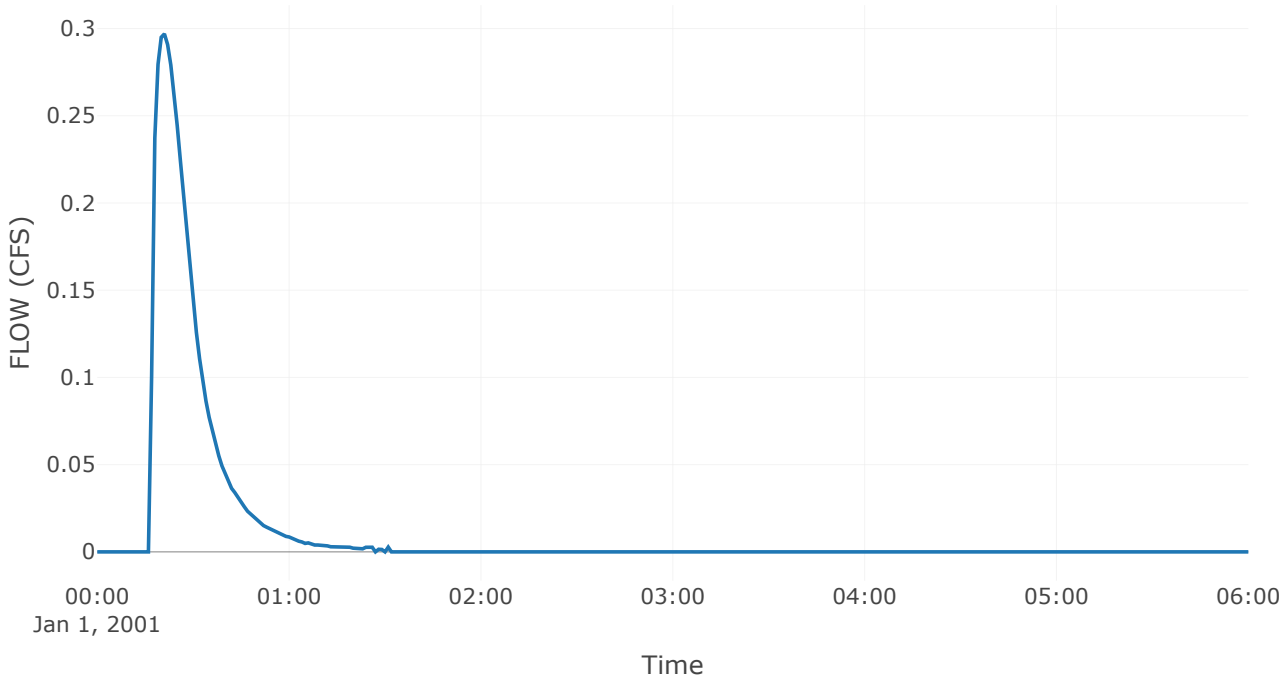

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.006
0.005
0.004
0.003
0.002
0.001
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
0.3
0.25
0.2
0.15
0.1
0.05
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

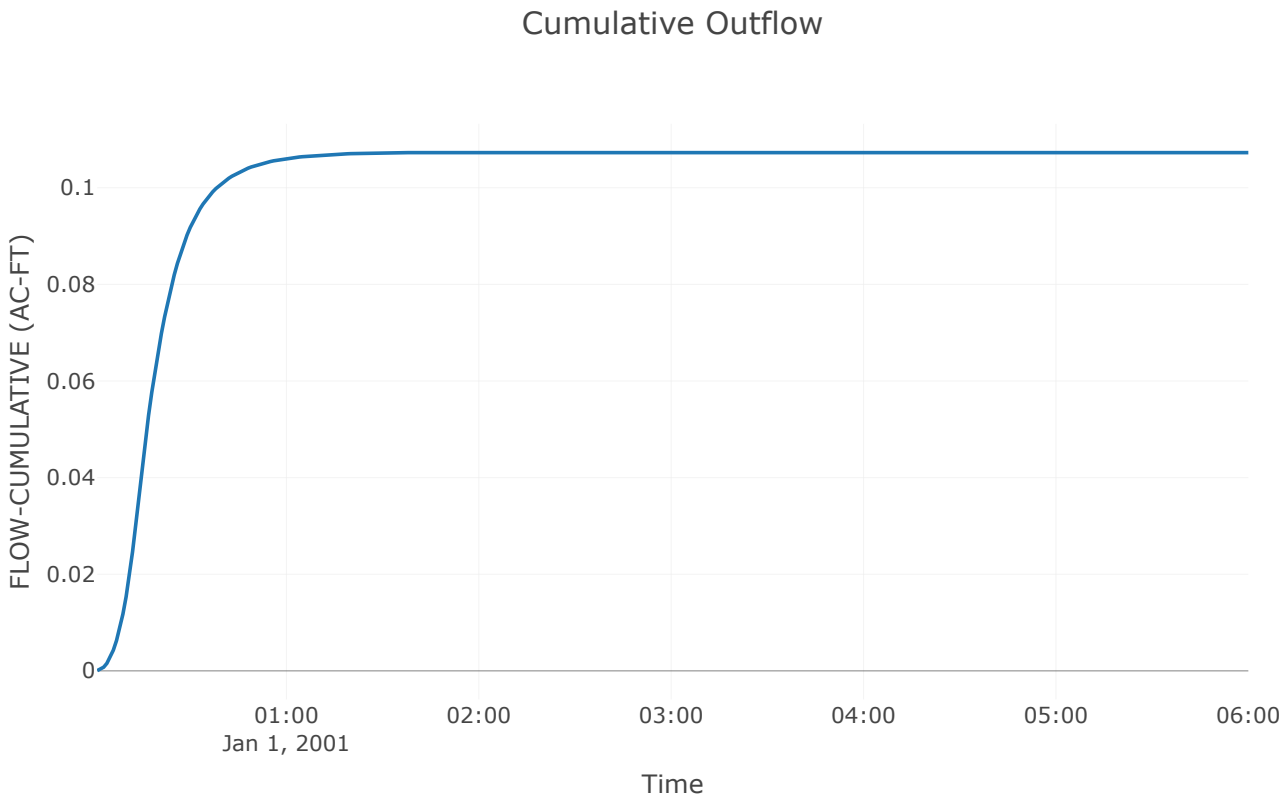


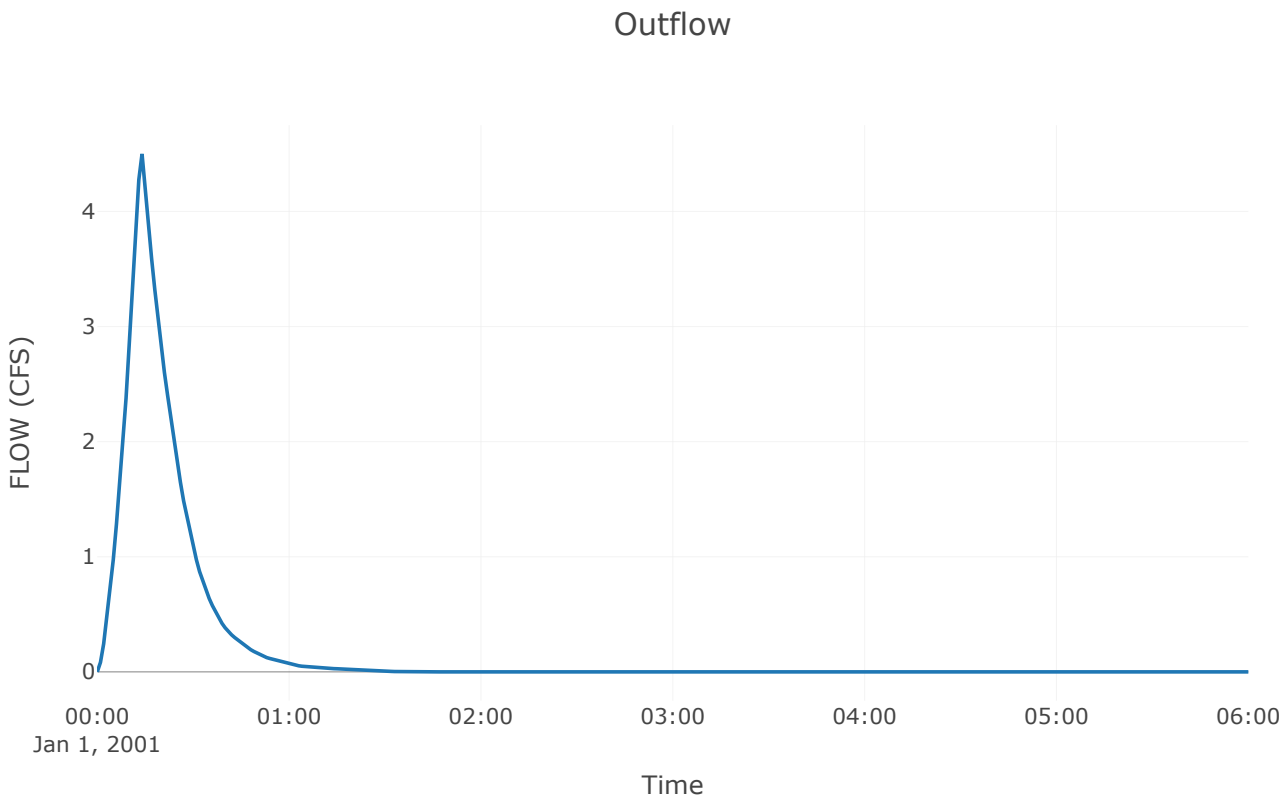
Source: 2P

Downstream : Basin 2
Flow Method : Gage Flow
Flow Gage : 2p 2

Results: 2P

Peak Discharge (CFS)	4.5
Time of Peak Discharge	01Jan2001, 00:14

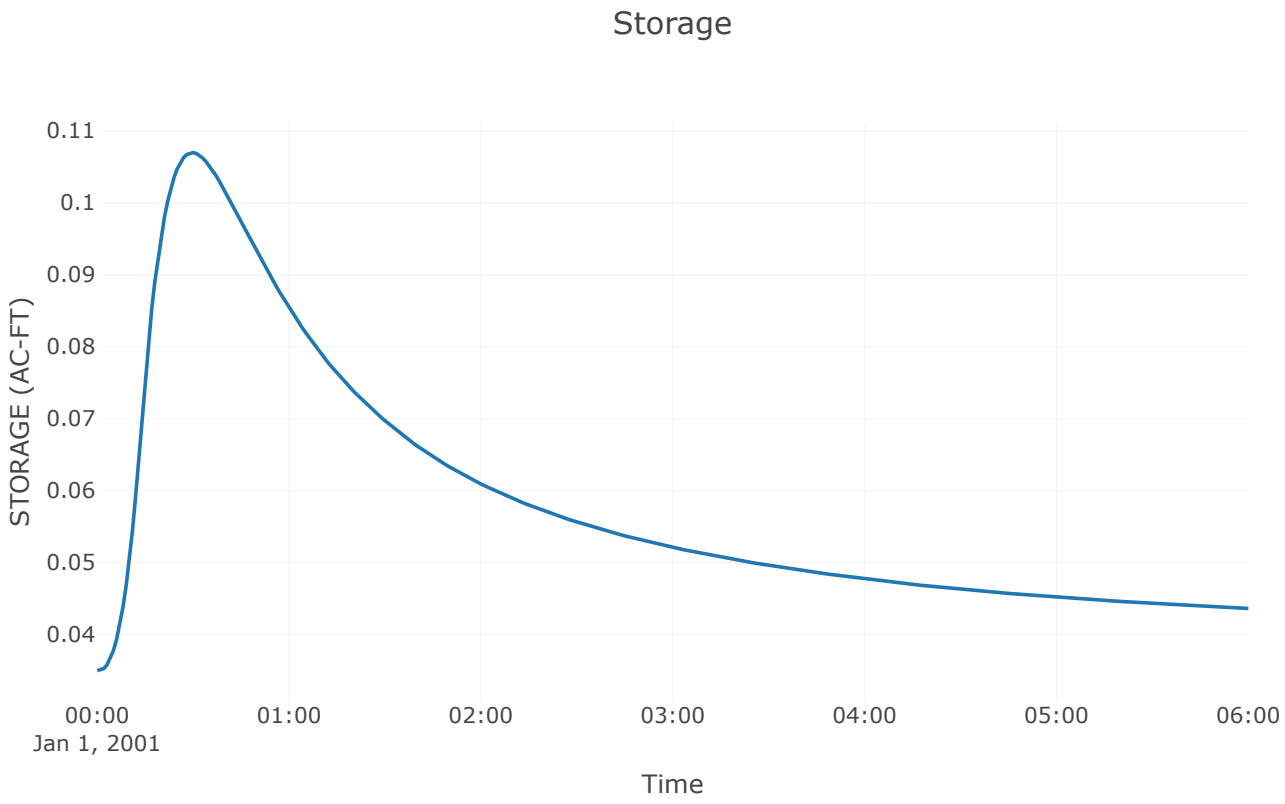

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.1
0.08
0.06
0.04
0.02
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

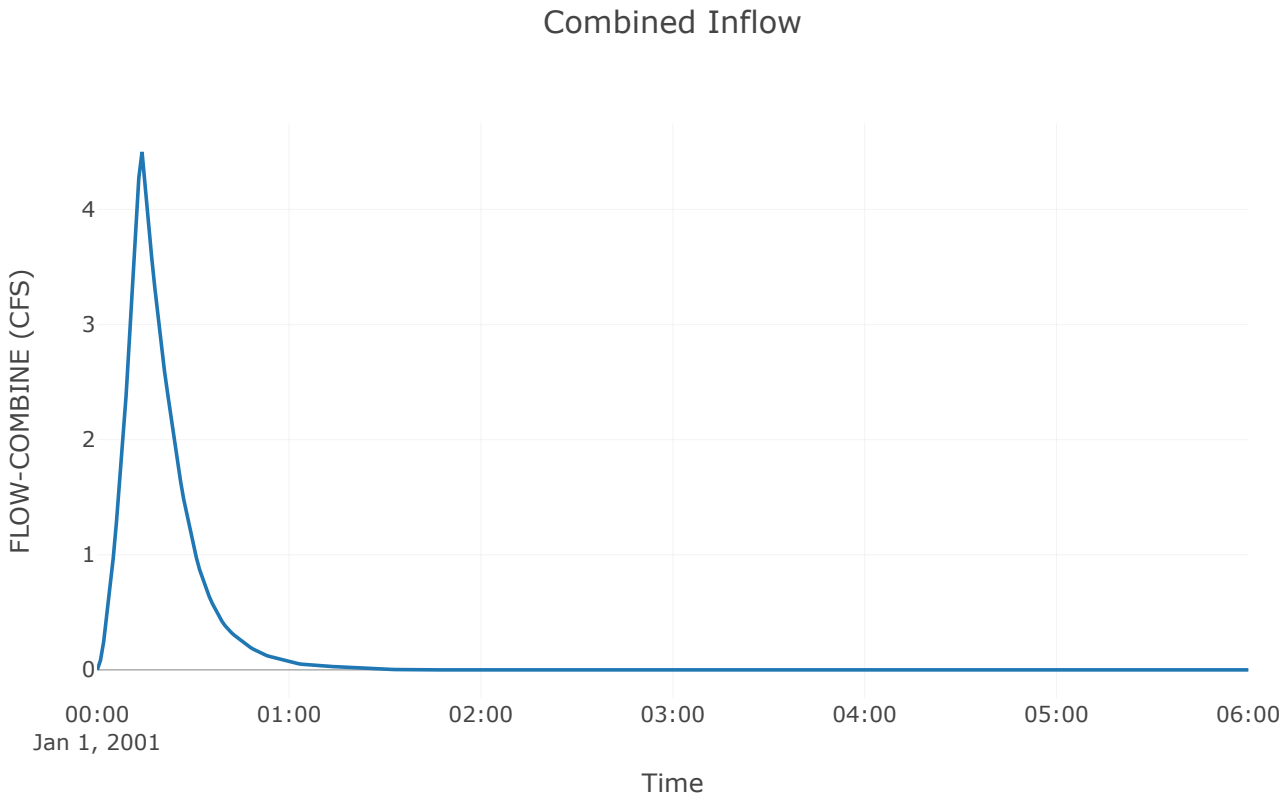

Outflow
FLOW (CFS)
4
3
2
1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

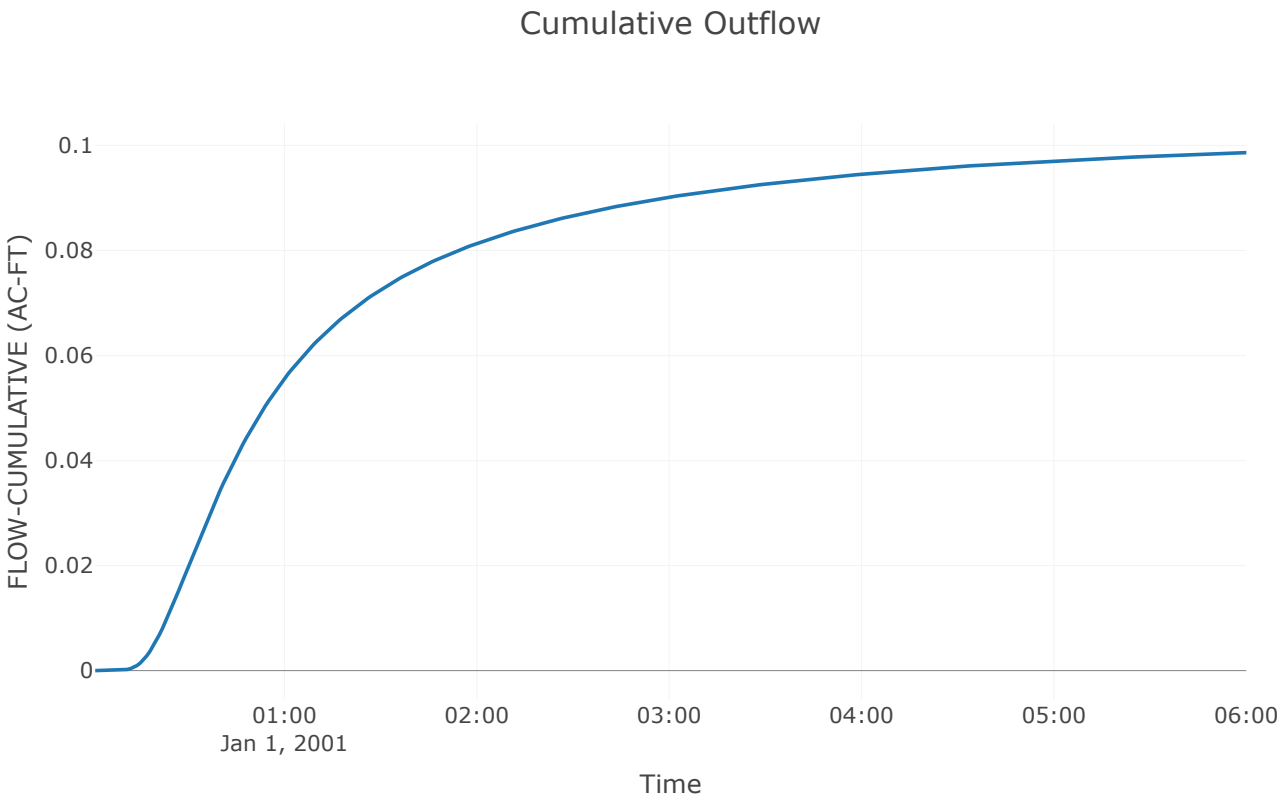
Reservoir: BASIN 2

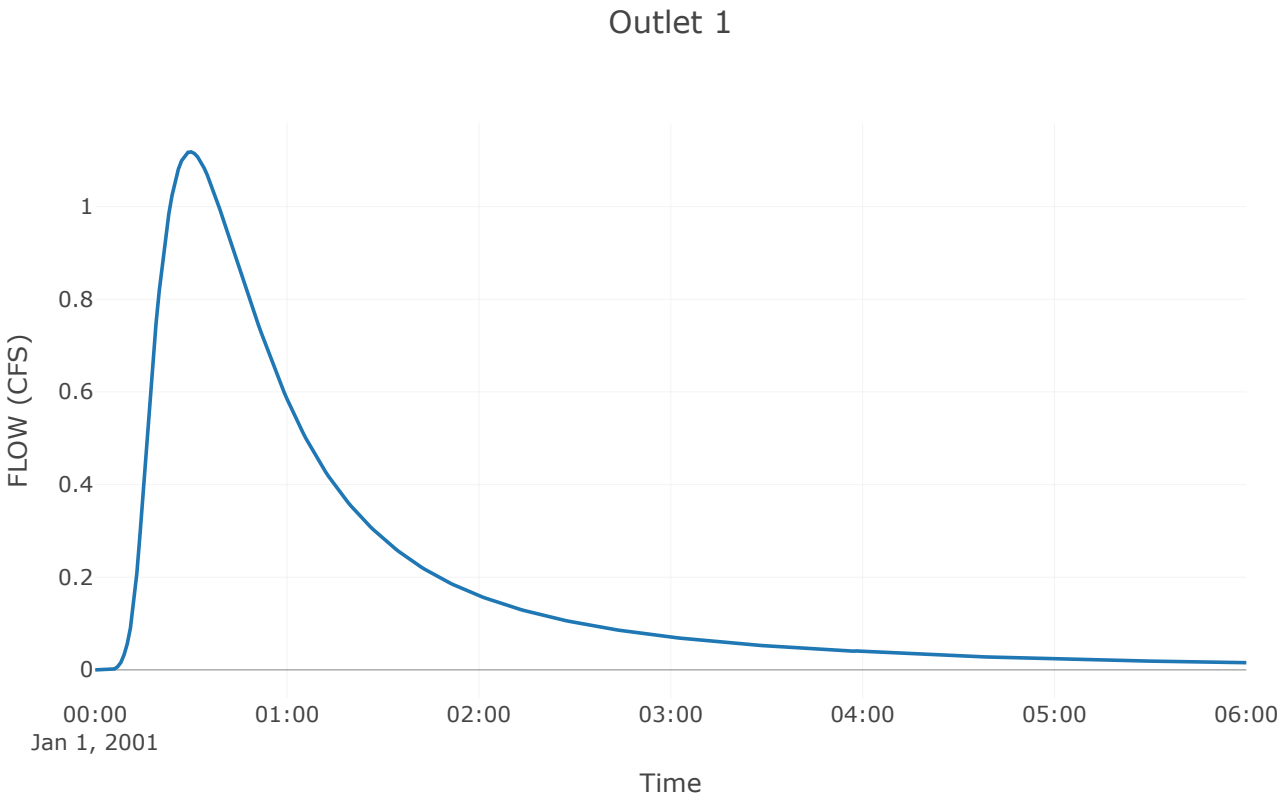
Downstream : 2E_Comparison

Results: BASIN 2	
Peak Discharge (CFS)	1.12
Time of Peak Discharge	01Jan2001, 00:30
Peak Inflow (CFS)	4.5
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.11
Maximum Storage (AC - FT)	0.11
Peak Elevation (FT)	9.13
Discharge Volume (AC - FT)	0.1

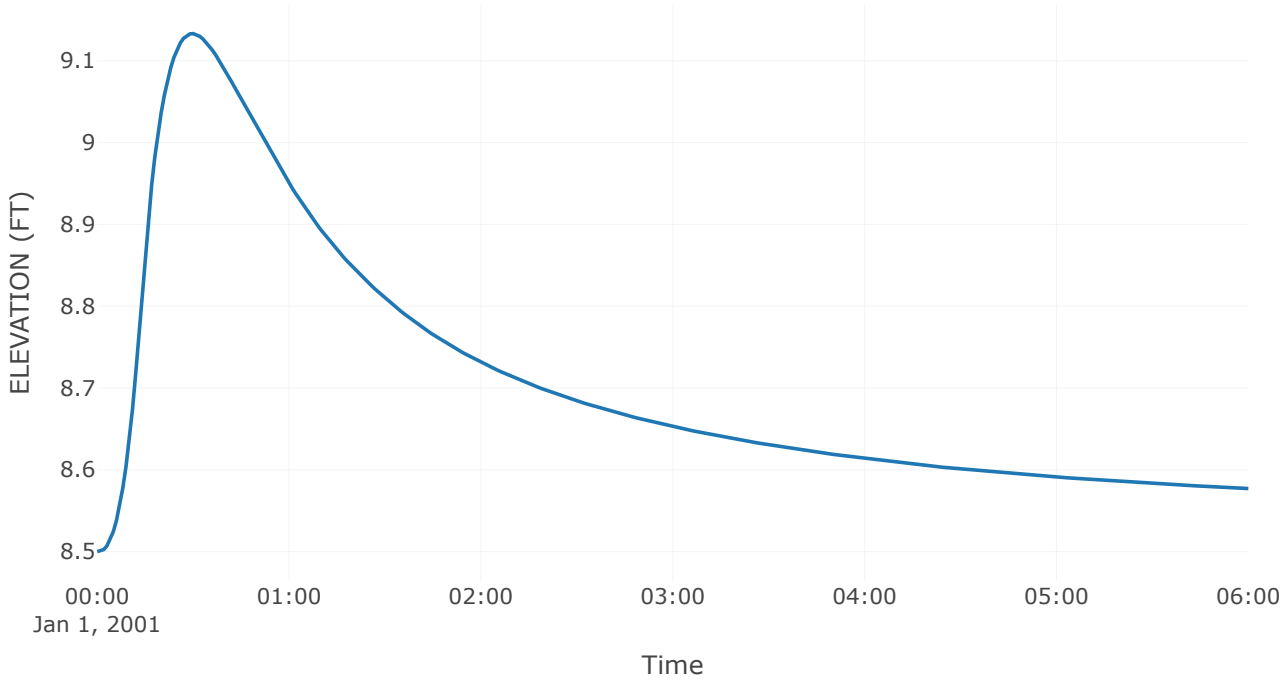

Storage
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
STORAGE (AC-FT)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time


Combined Inflow
4
3
2
1
0
FLOW-COMBINE (CFS)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

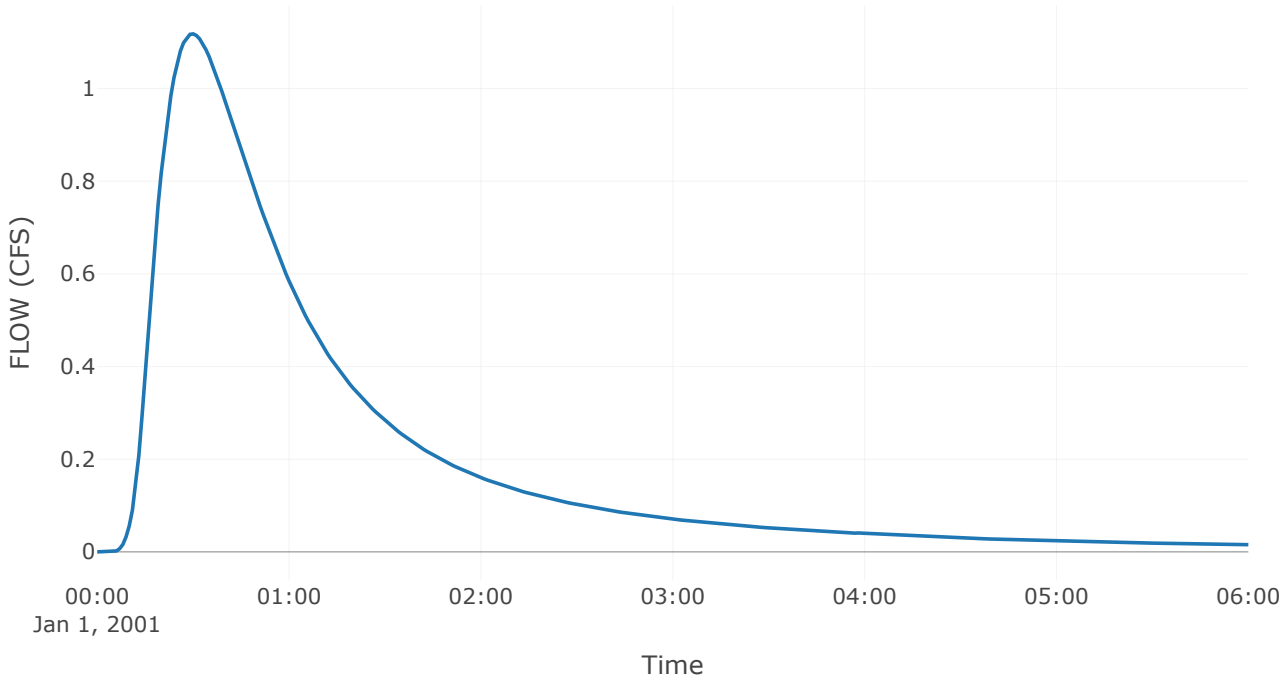

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.1
0.08
0.06
0.04
0.02
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

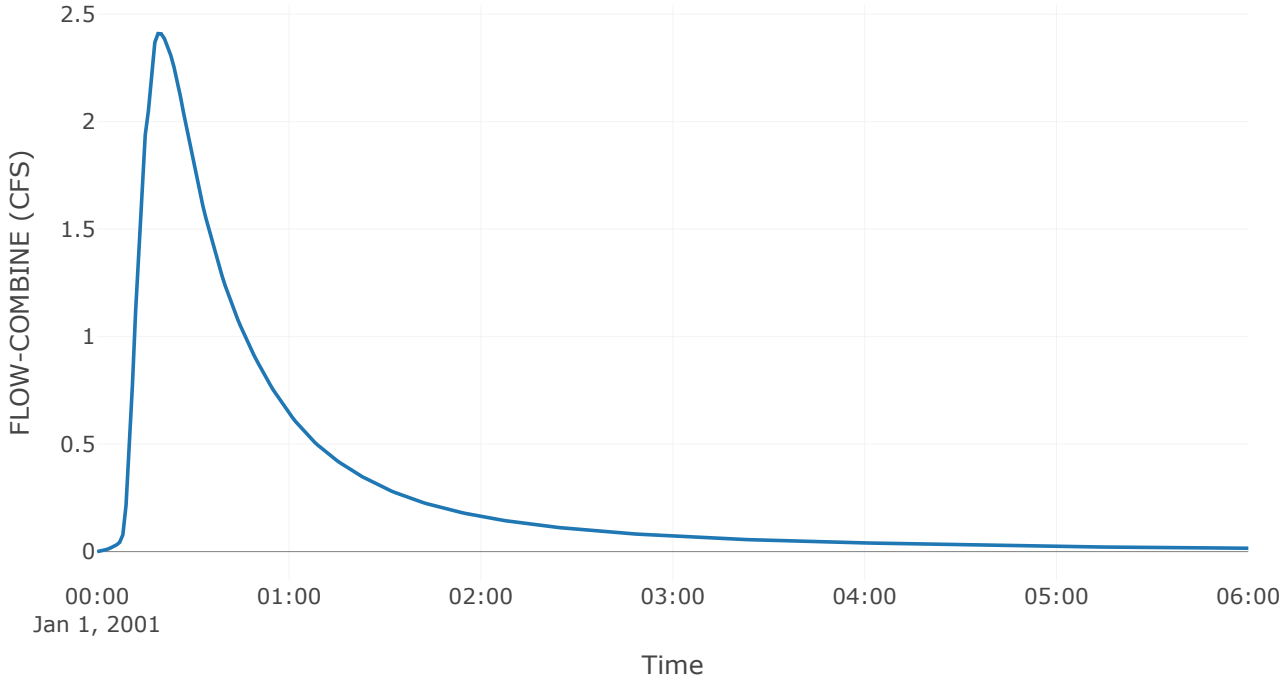


Junction: 2E_Comparison

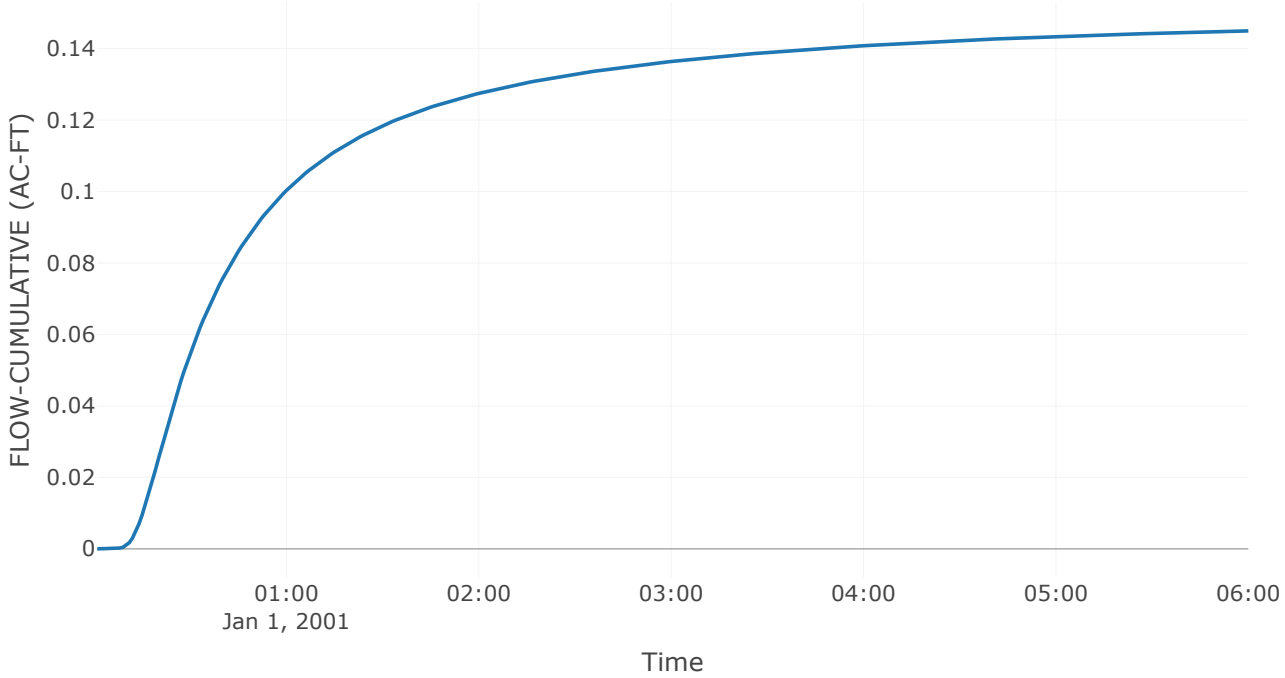
Results: 2E_Comparison

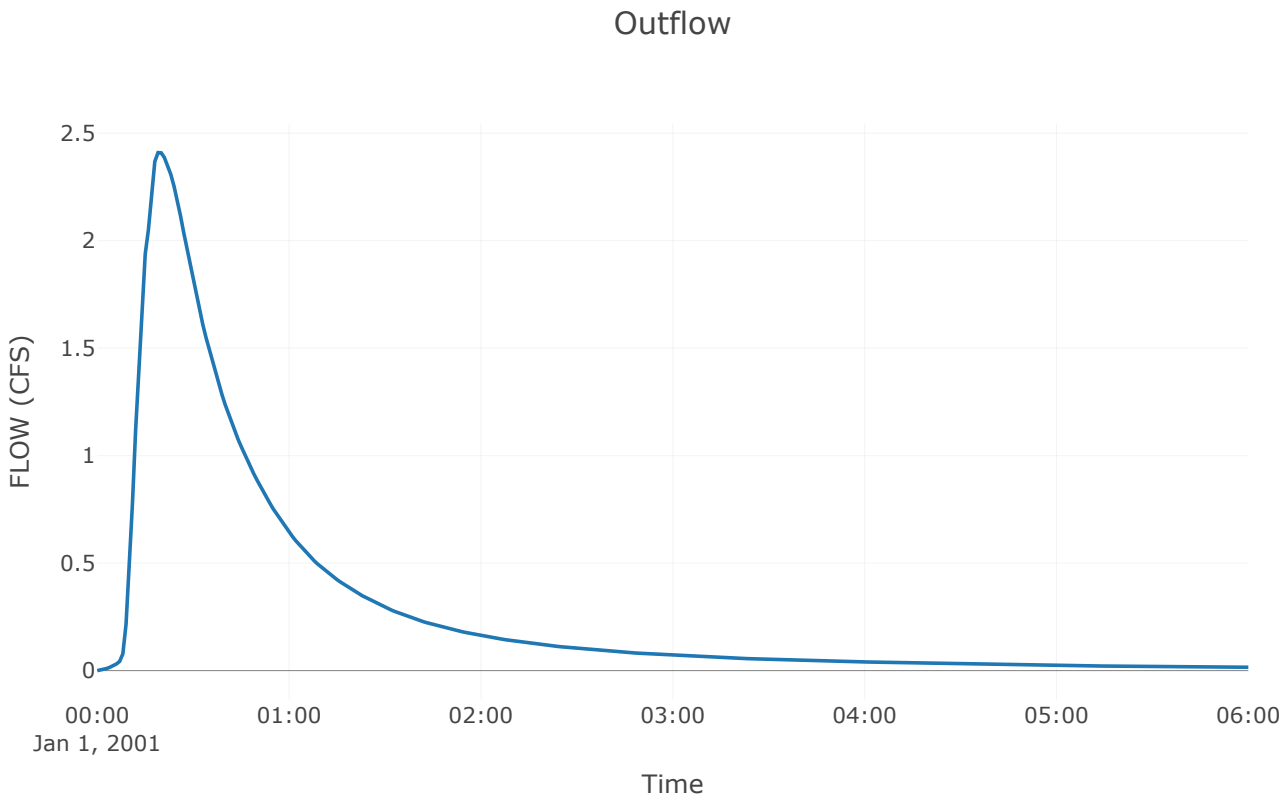
Peak Discharge (CFS)	2.41
Time of Peak Discharge	01Jan2001, 00:19

Combined Inflow



Cumulative Outflow



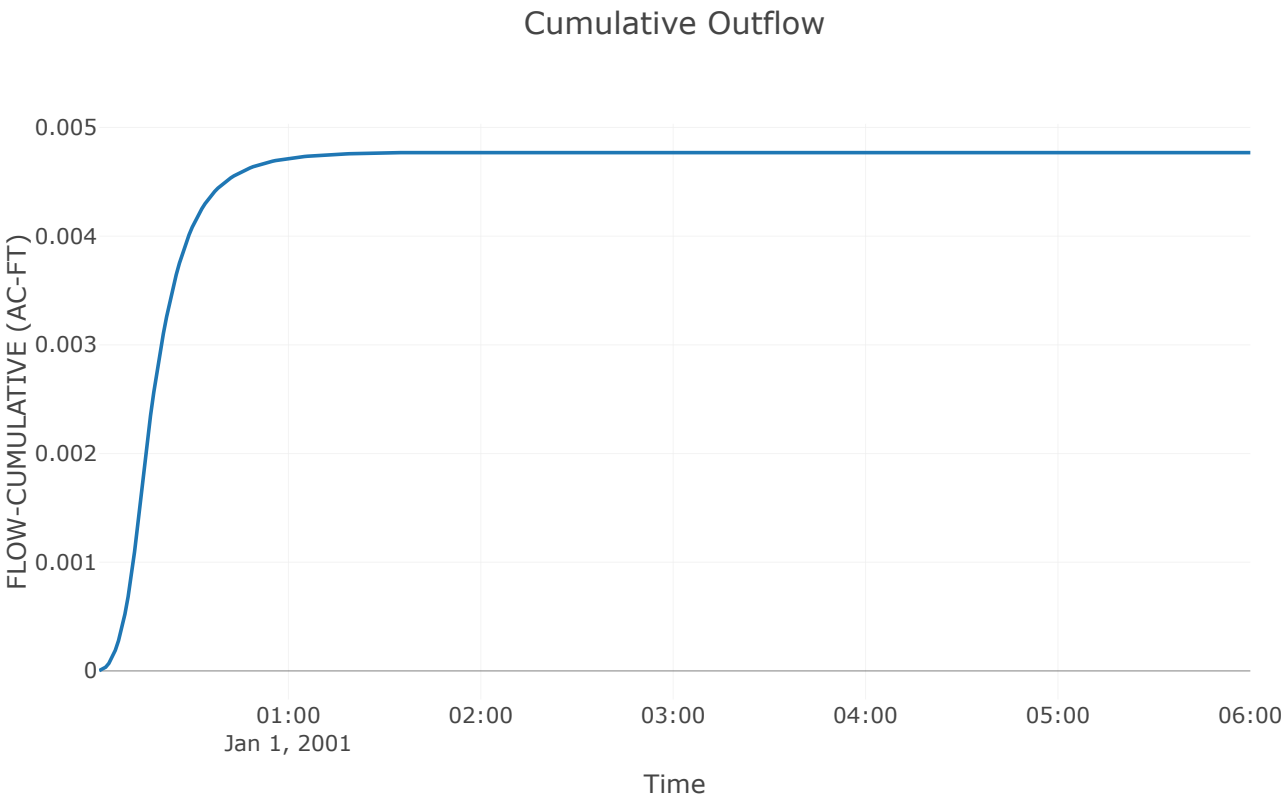

Outflow
2.5
2
1.5
1
0.5
0
FLOW (CFS)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

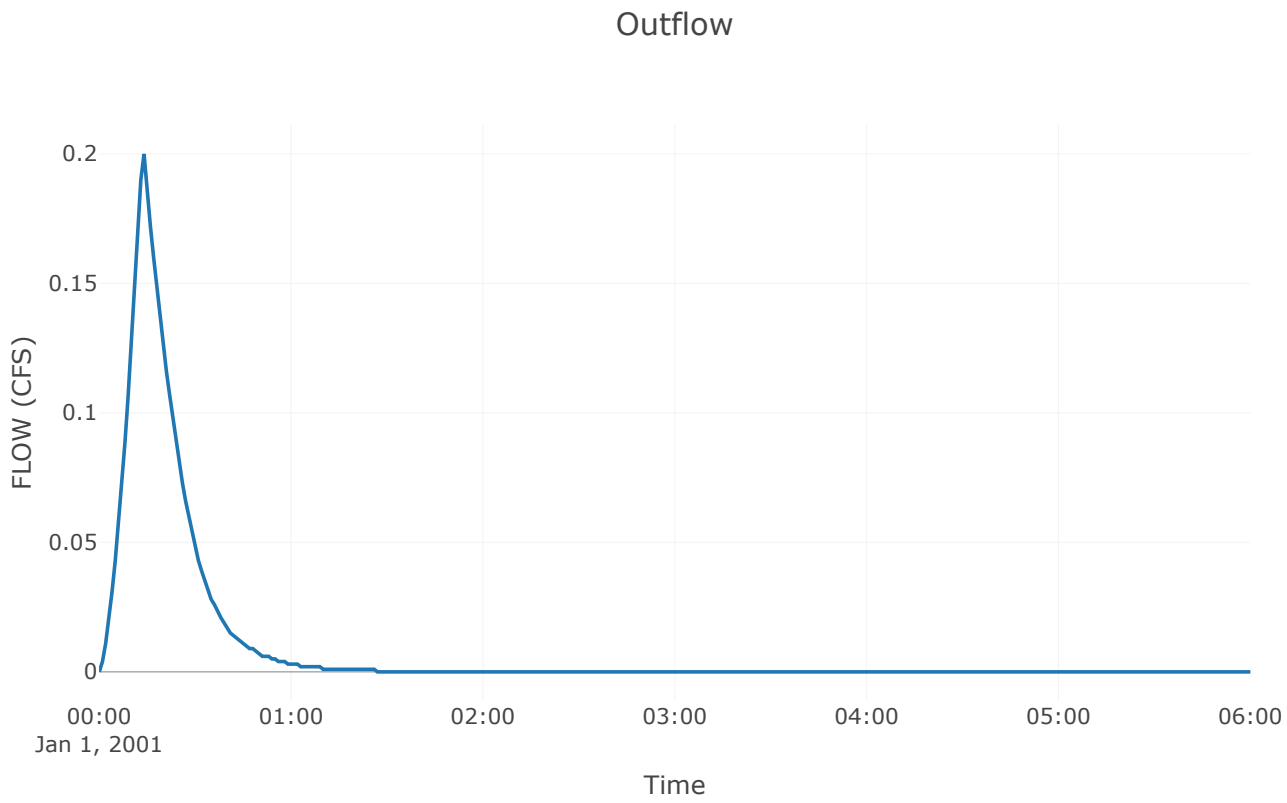
Source: 5P

Downstream : 1E_Comparison
Flow Method : Gage Flow
Flow Gage : 5p 2

Results: 5P

Peak Discharge (CFS)	0.2
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.005
0.004
0.003
0.002
0.001
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

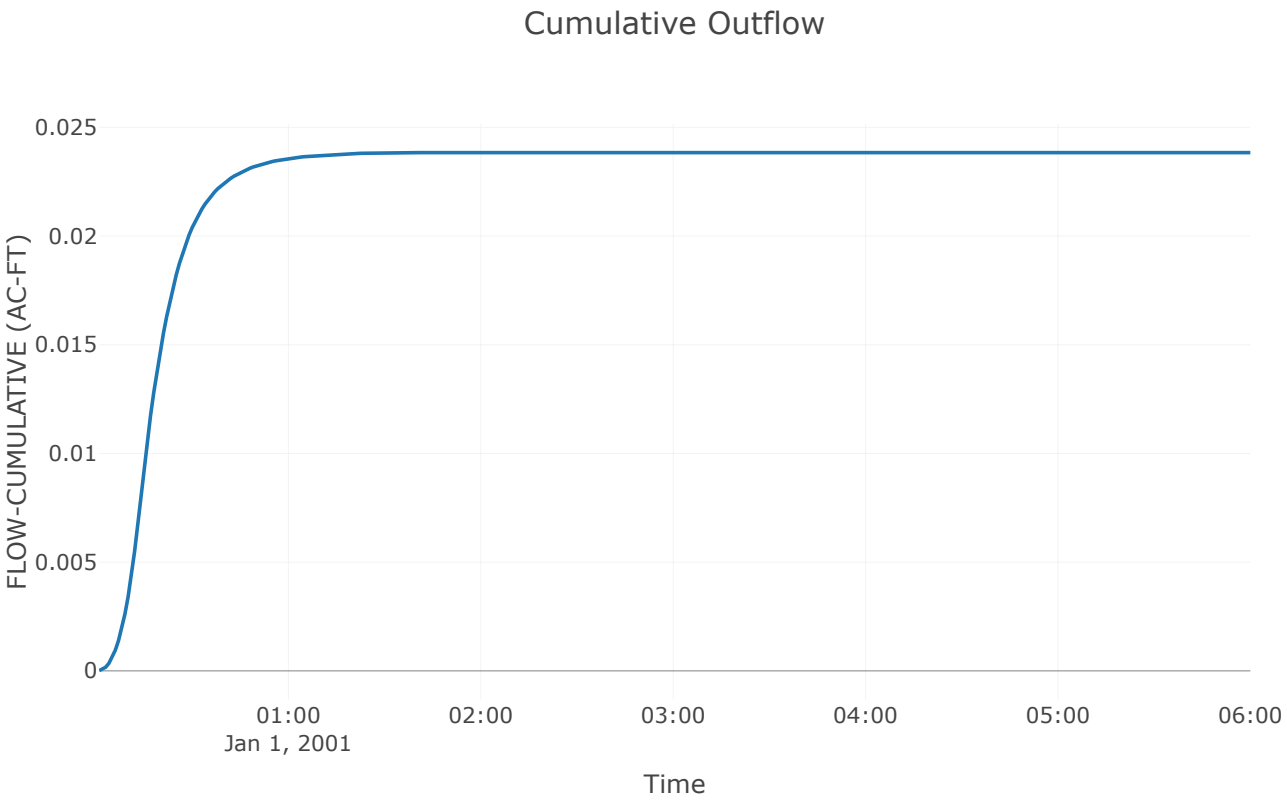

Outflow
FLOW (CFS)
0.2
0.15
0.1
0.05
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

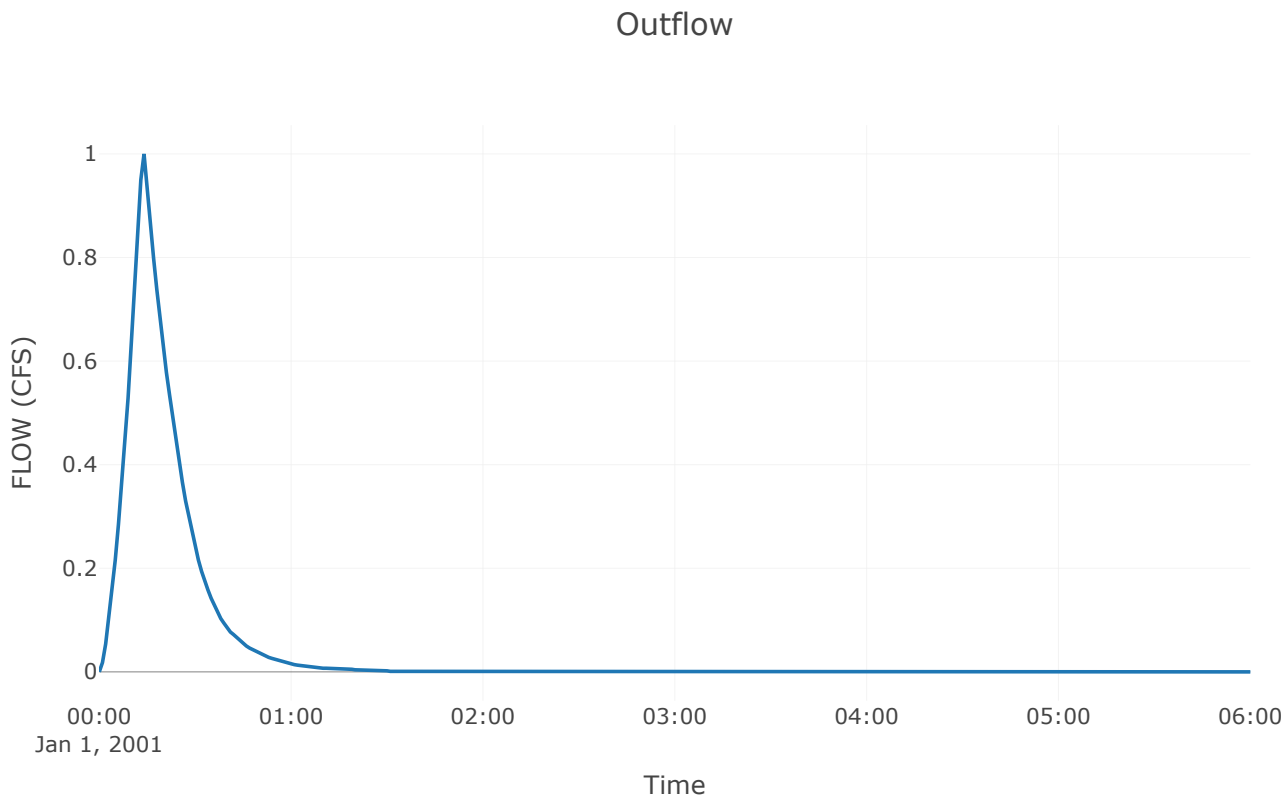
Source: 1P

Downstream : Basin 1
Flow Method : Gage Flow
Flow Gage : 1p 10

Results: 1P

Peak Discharge (CFS)	1
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

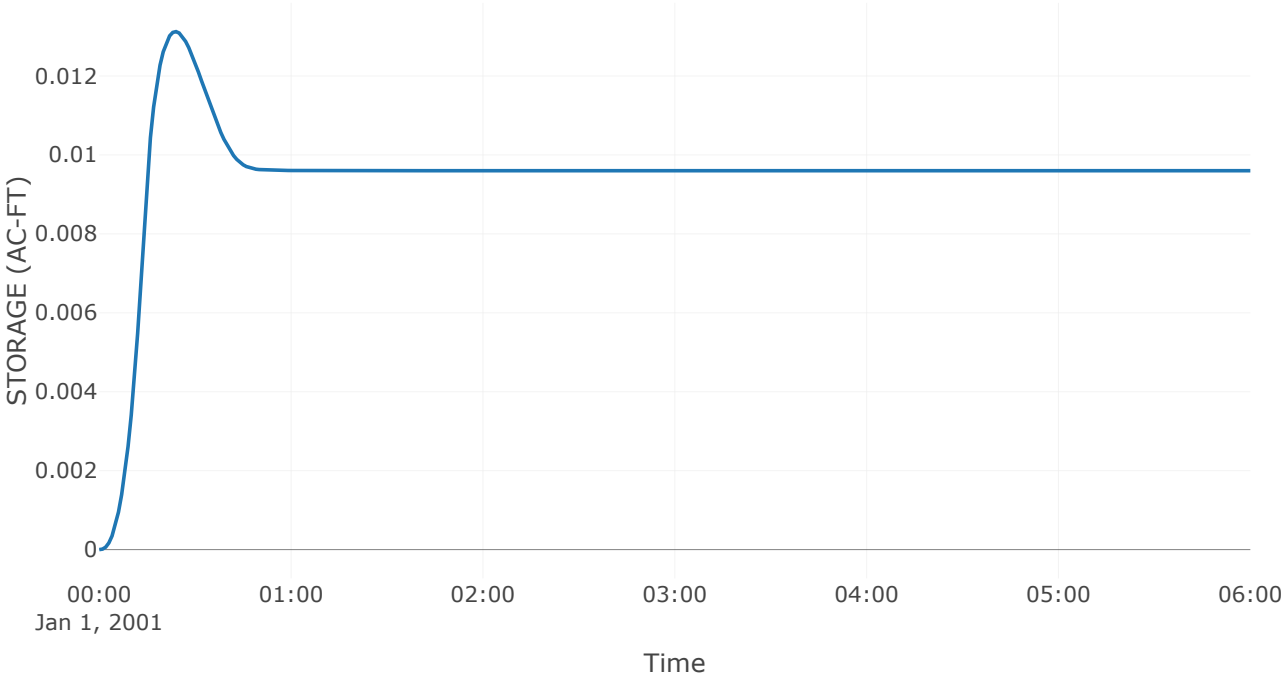

Outflow
FLOW (CFS)
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 1

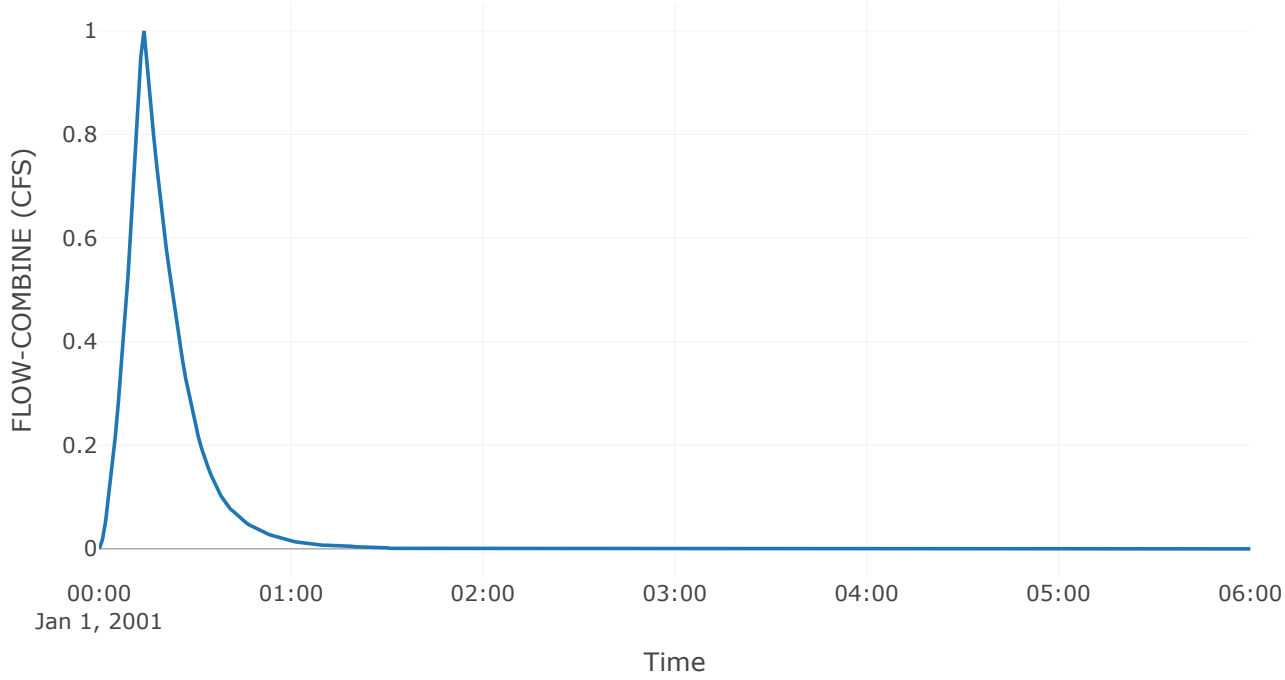
Downstream : 1E_Comparison

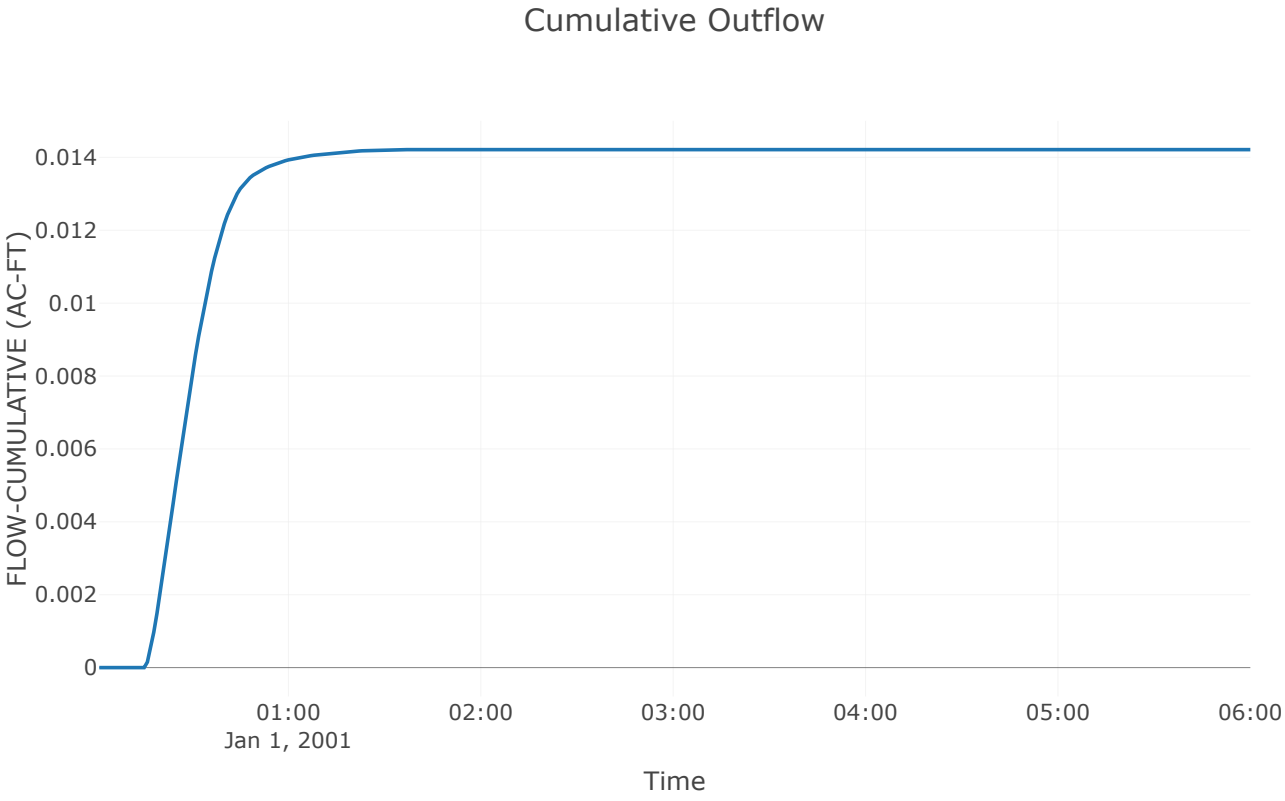
Results: BASIN 1	
Peak Discharge (CFS)	0.45
Time of Peak Discharge	01Jan2001, 00:24
Peak Inflow (CFS)	1
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.02
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	9.82
Discharge Volume (AC - FT)	0.01

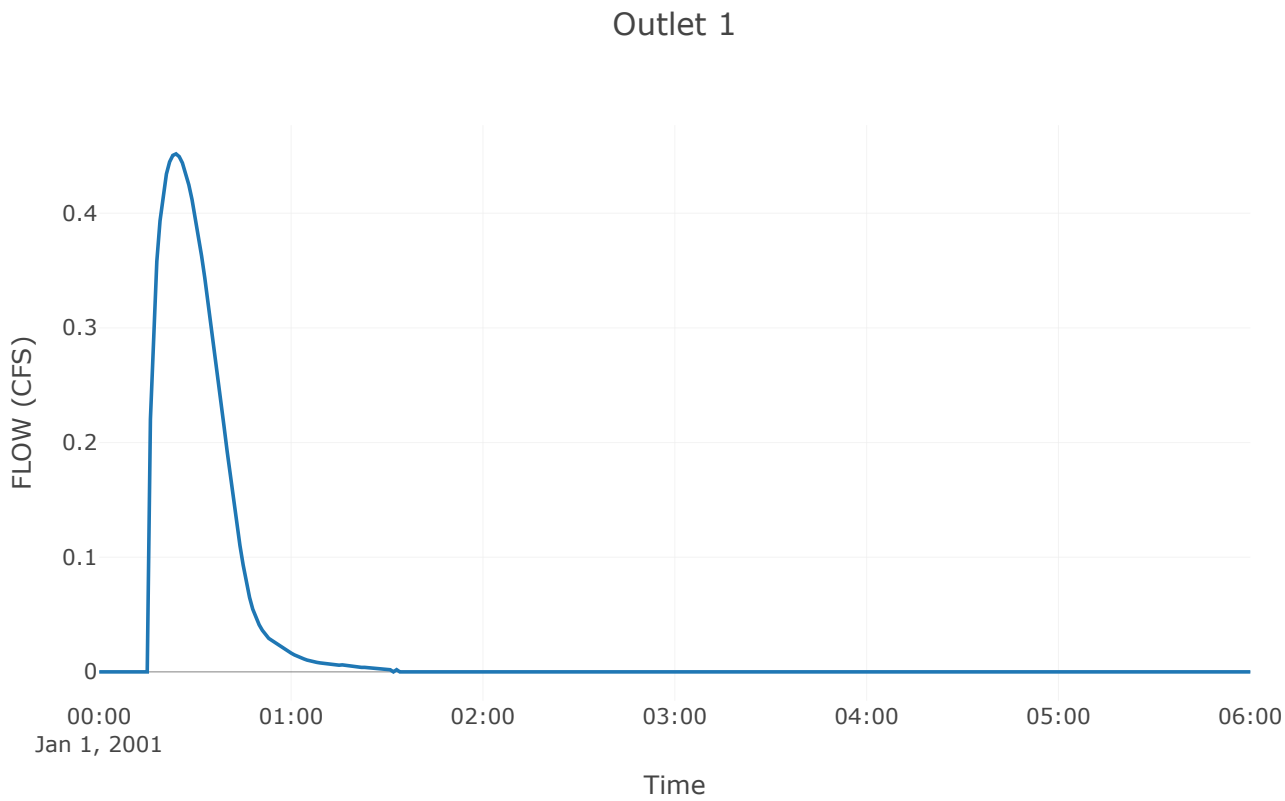
Storage



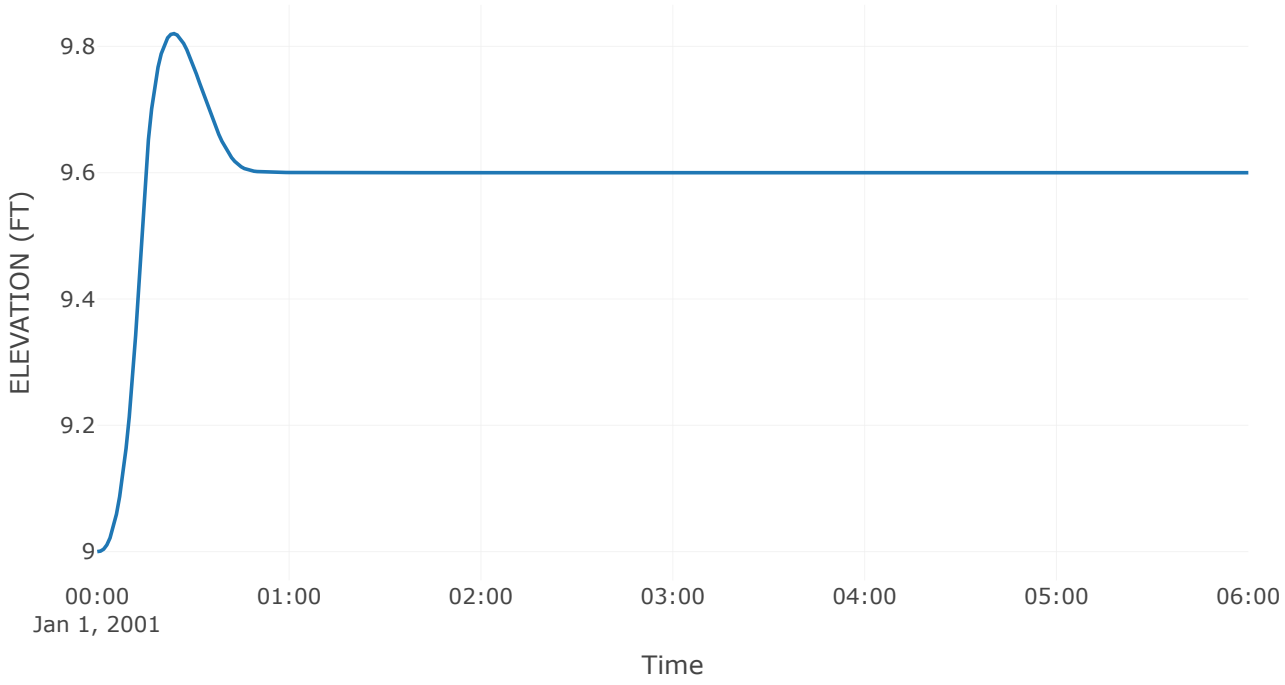
Combined Inflow



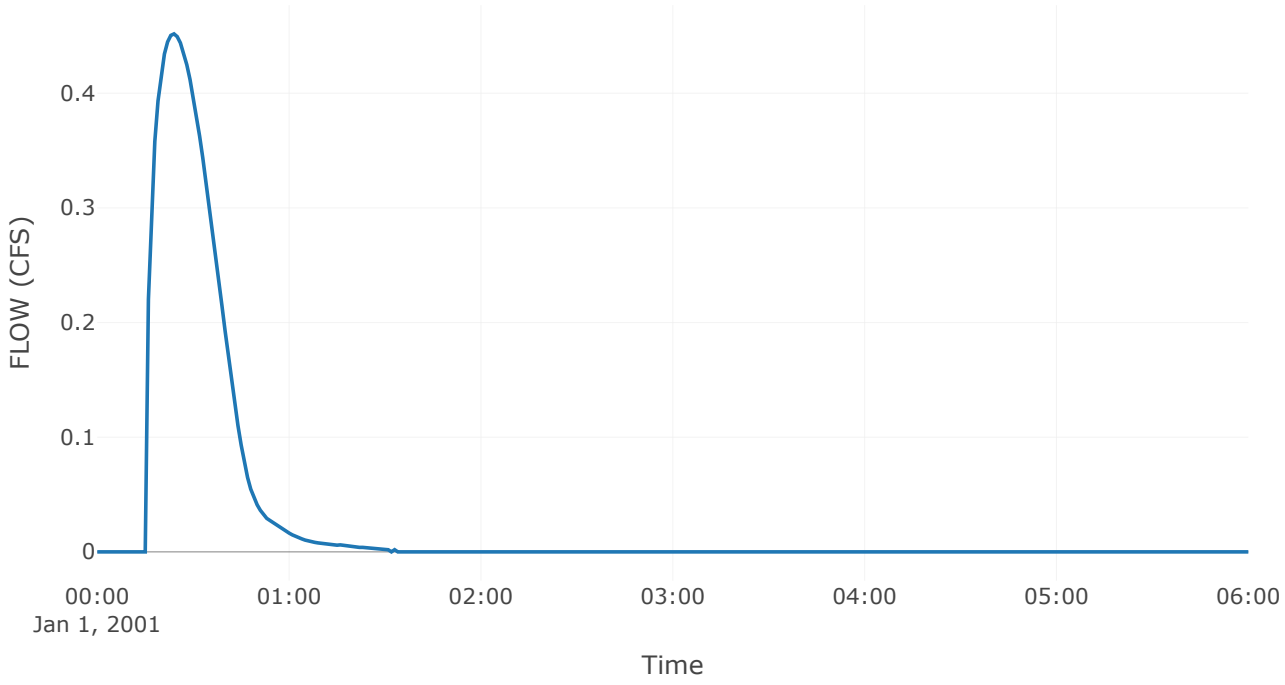

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



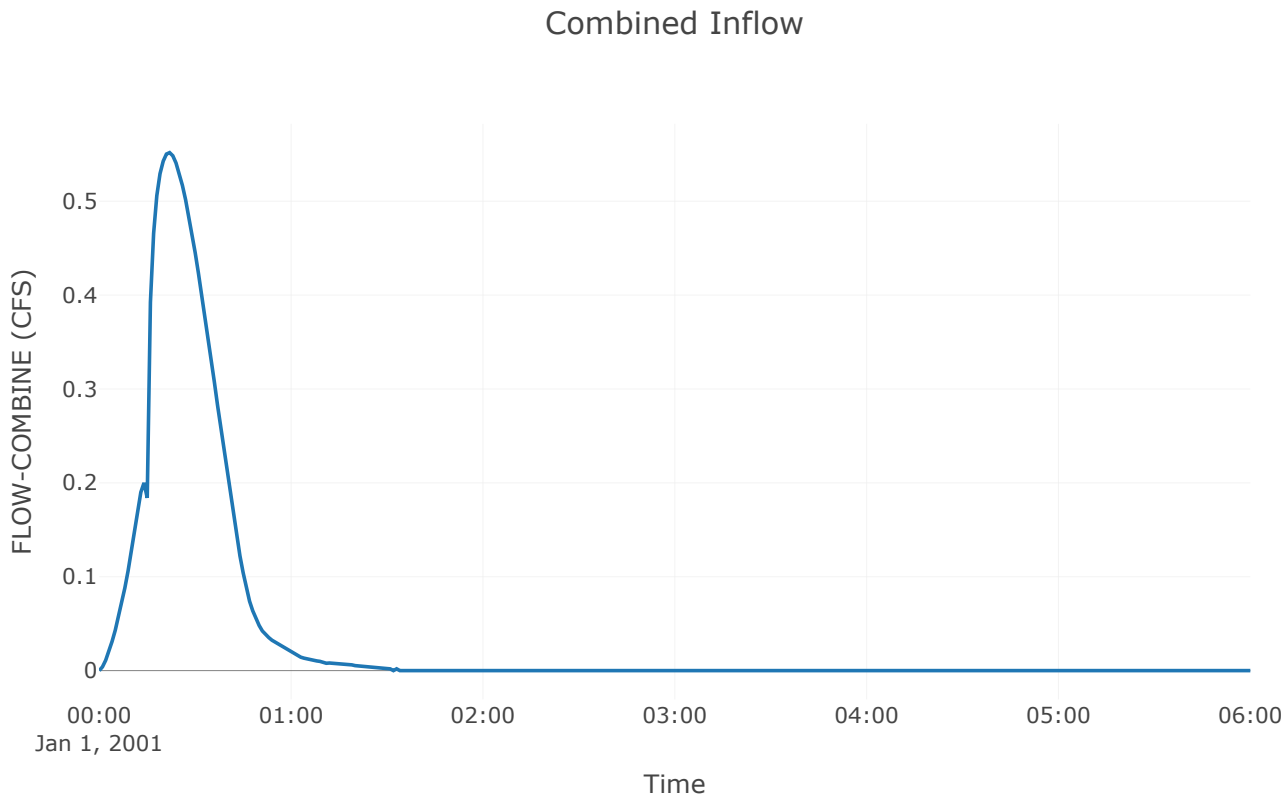
Outflow

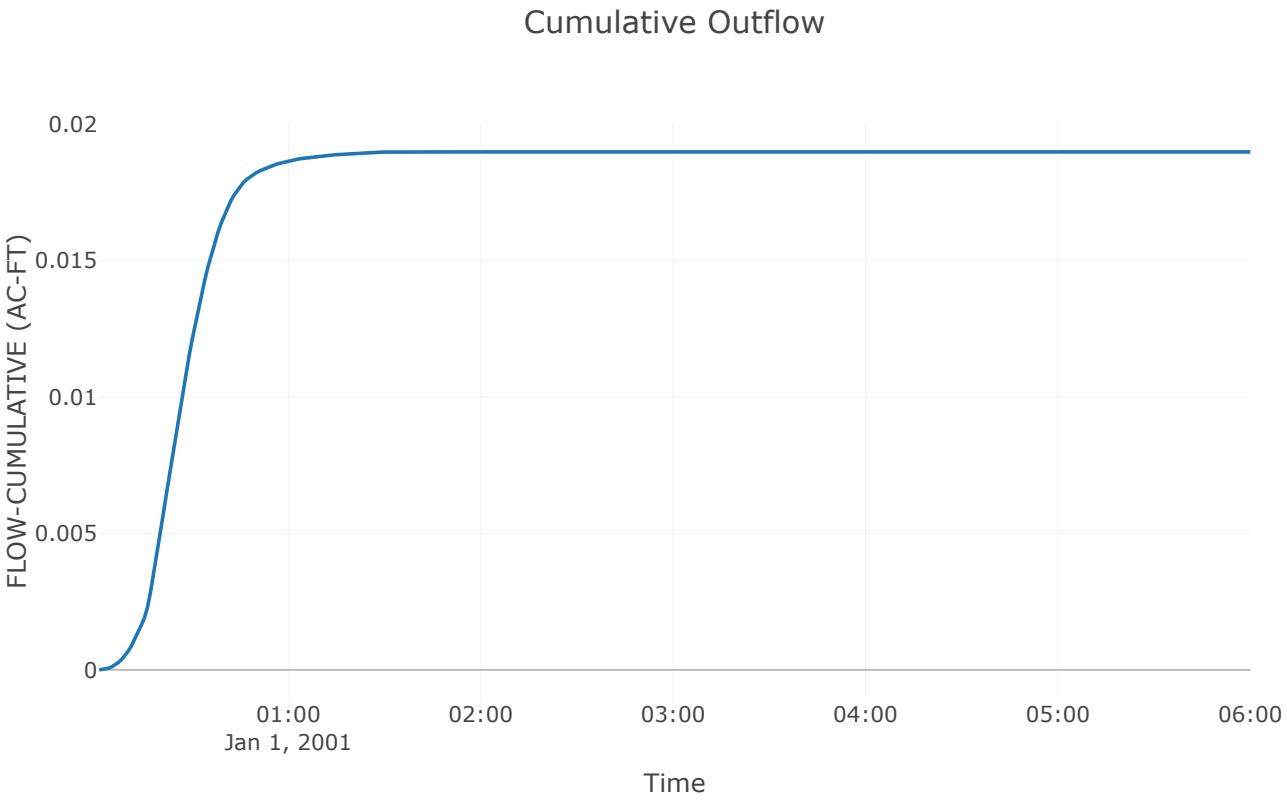


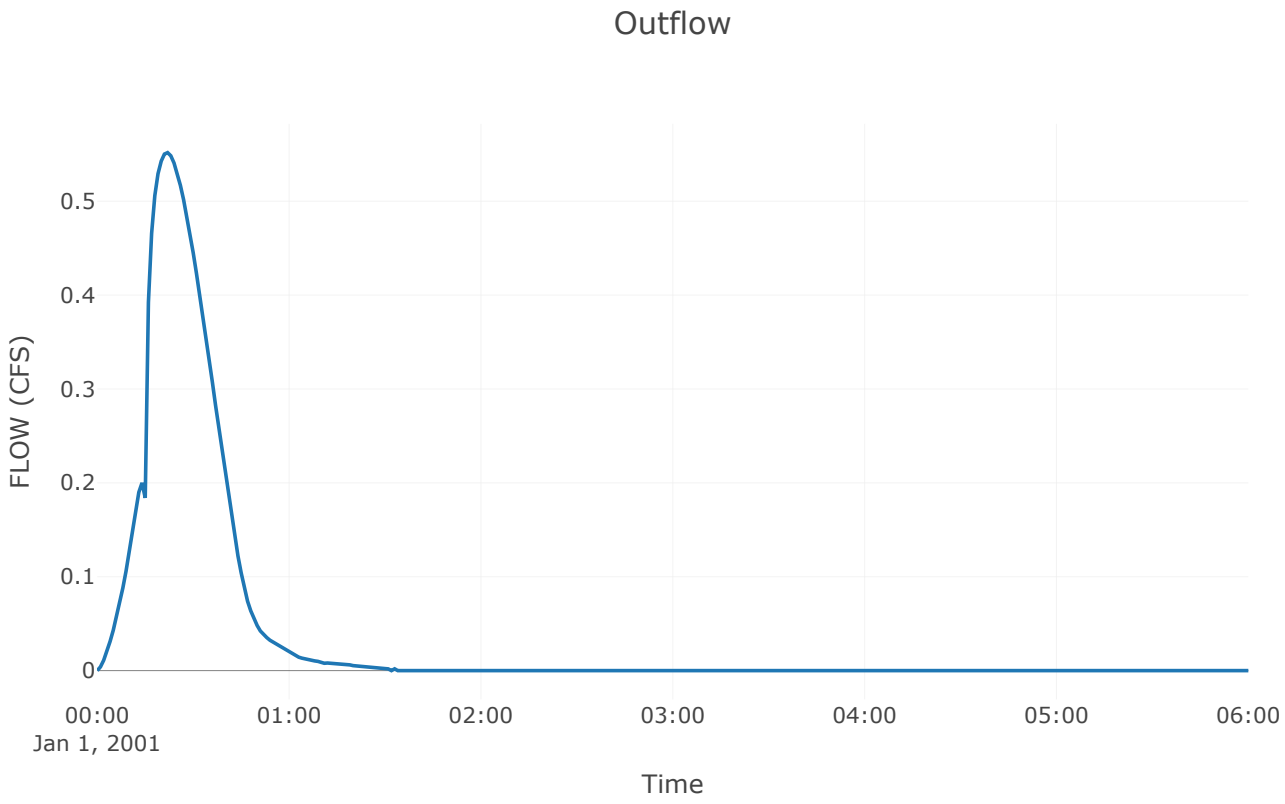
Junction: 1E_Comparison

Results: 1E_Comparison

Peak Discharge (CFS)	0.55
Time of Peak Discharge	01Jan2001, 00:22


Combined Inflow
FLOW-COMBINE (CFS)
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outflow
FLOW (CFS)
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Project: 22_010_Final_Plat_rev
Simulation Run: Prop_10
Simulation Start: 31 December 2000, 24:00
Simulation End: 1 January 2001, 06:00

HMS Version: 4.11
Executed: 24 January 2024, 17:24

Global Results Summary

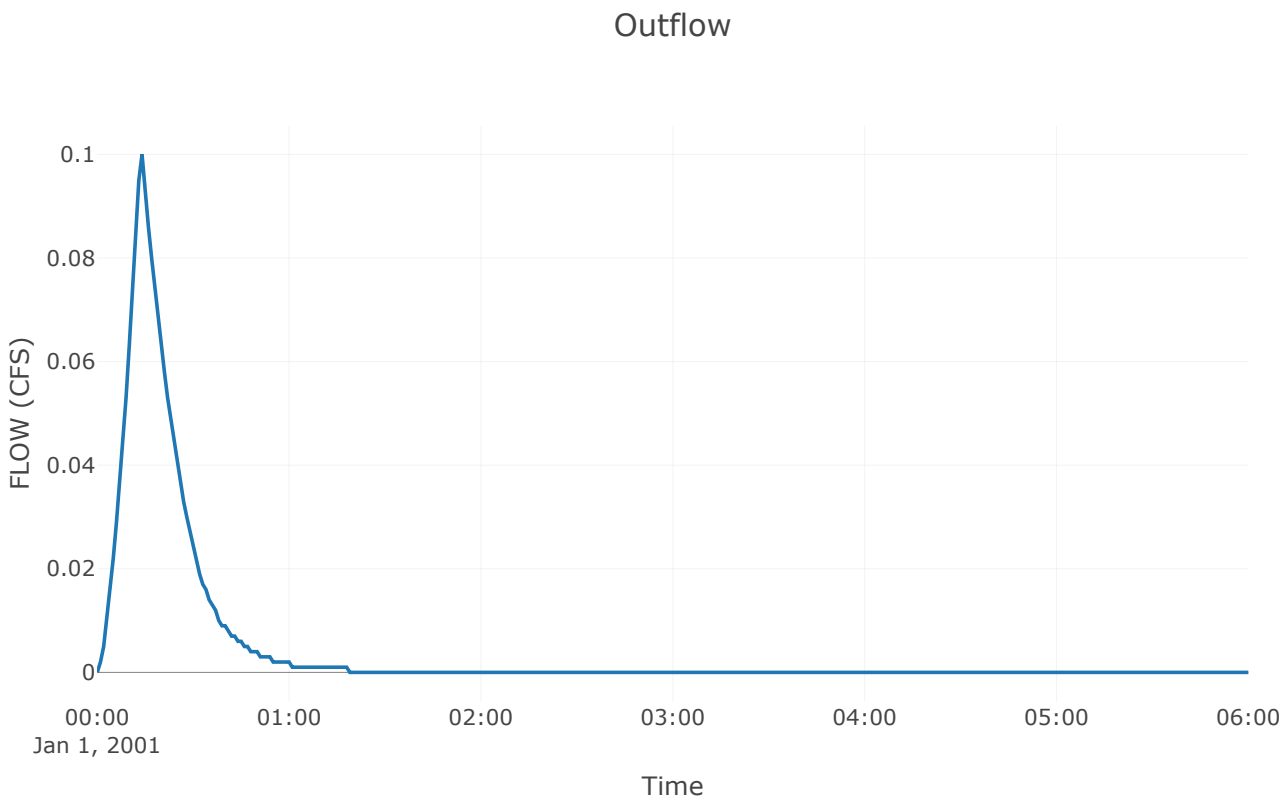
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume ()
6p	Not specified	0.1	01Jan2001, 00:14	Not specified
4p	Not specified	2.4	01Jan2001, 00:14	Not specified
Basin 4	Not specified	2.14	01Jan2001, 00:15	Not specified
3p	Not specified	0.9	01Jan2001, 00:14	Not specified
Basin 3	Not specified	0.62	01Jan2001, 00:19	Not specified
2p	Not specified	7.7	01Jan2001, 00:14	Not specified
Basin 2	Not specified	2.43	01Jan2001, 00:27	Not specified
2E_Comparison	Not specified	4.35	01Jan2001, 00:20	Not specified
5p	Not specified	0.4	01Jan2001, 00:14	Not specified
1p	Not specified	1	01Jan2001, 00:14	Not specified
Basin 1	Not specified	0.45	01Jan2001, 00:24	Not specified
1E_Comparison	Not specified	0.67	01Jan2001, 00:20	Not specified

Source: 6P

Downstream : 2E_Comparison
Flow Method : Gage Flow
Flow Gage : 6p 10

Results: 6P

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Jan2001, 00:14

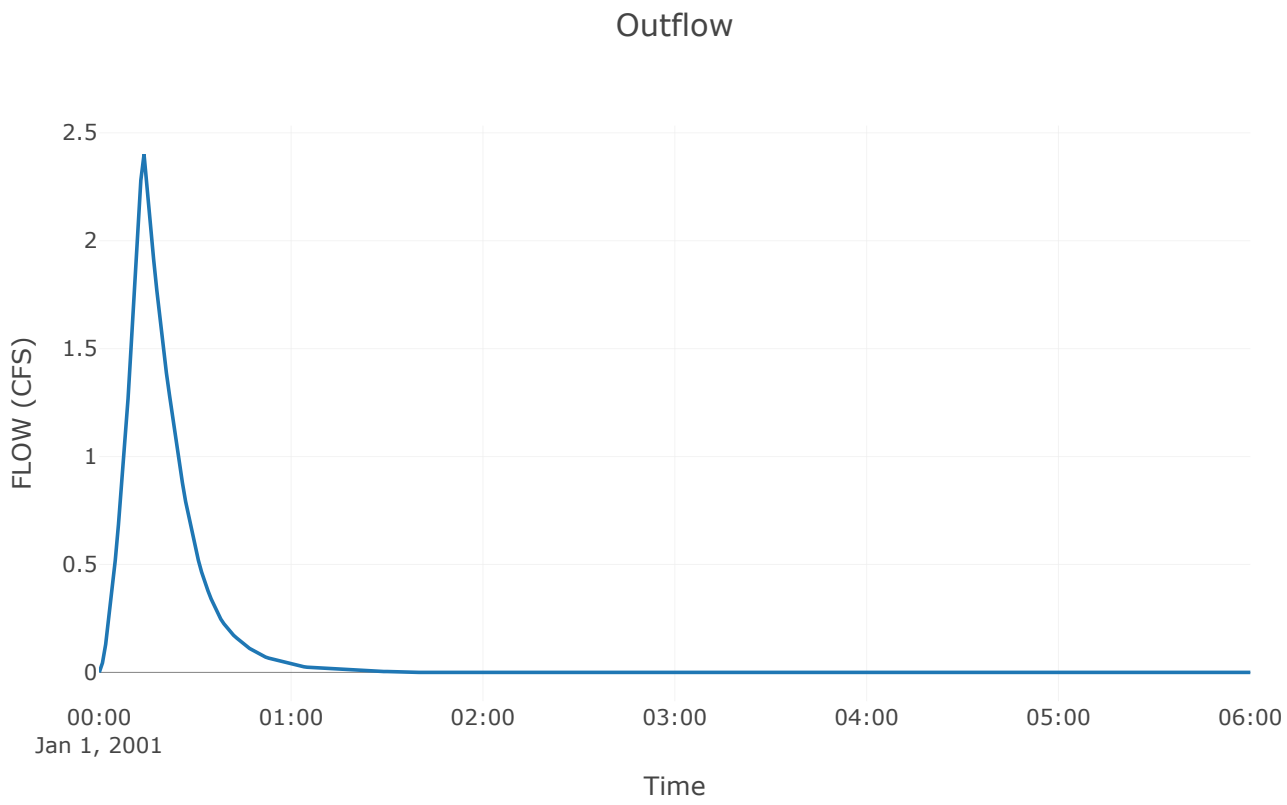


Source: 4P

Downstream : Basin 4
Flow Method : Gage Flow
Flow Gage : 4p 10

Results: 4P

Peak Discharge (CFS)	2.4
Time of Peak Discharge	01Jan2001, 00:14

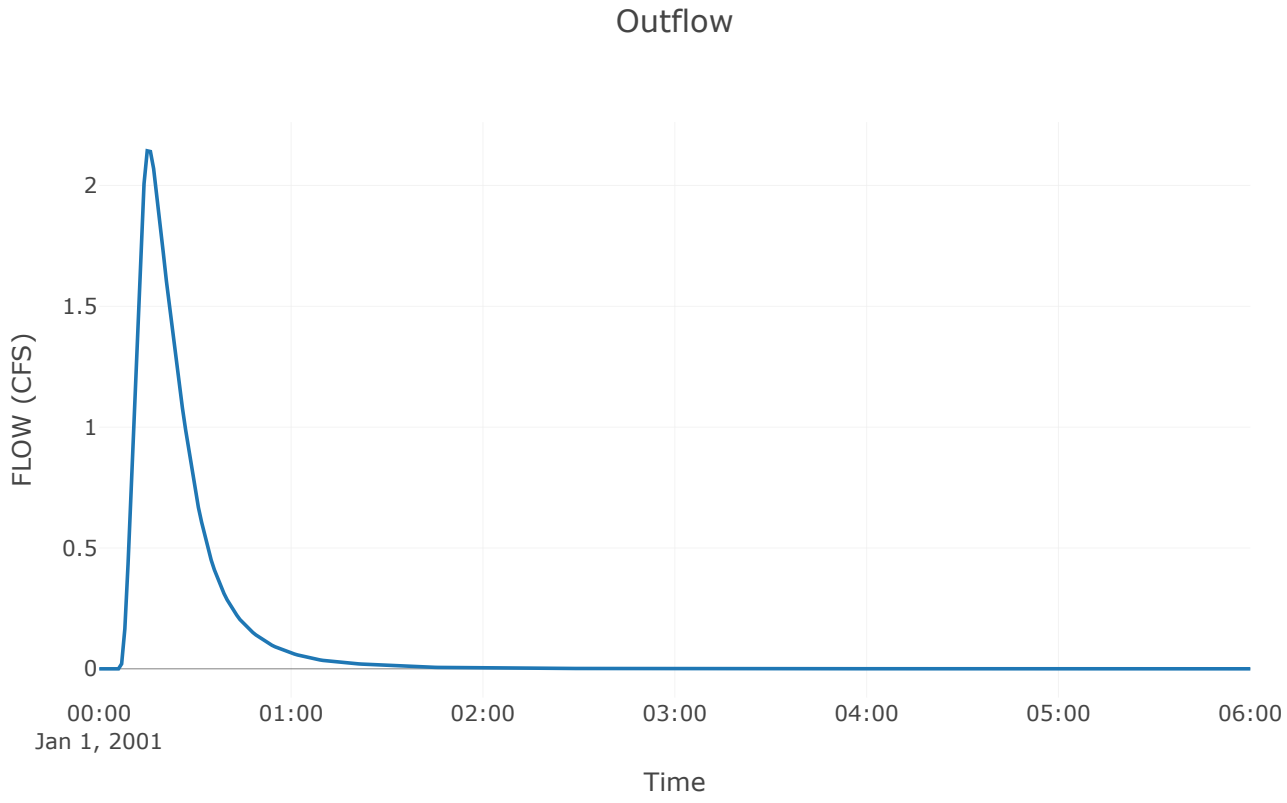


Reservoir: BASIN 4

Downstream : 2E_Comparison

Results: BASIN 4

Peak Discharge (CFS)	2.14
Time of Peak Discharge	01Jan2001, 00:15
Peak Inflow (CFS)	2.4
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.06
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	8.29
Discharge Volume (AC - FT)	0.05

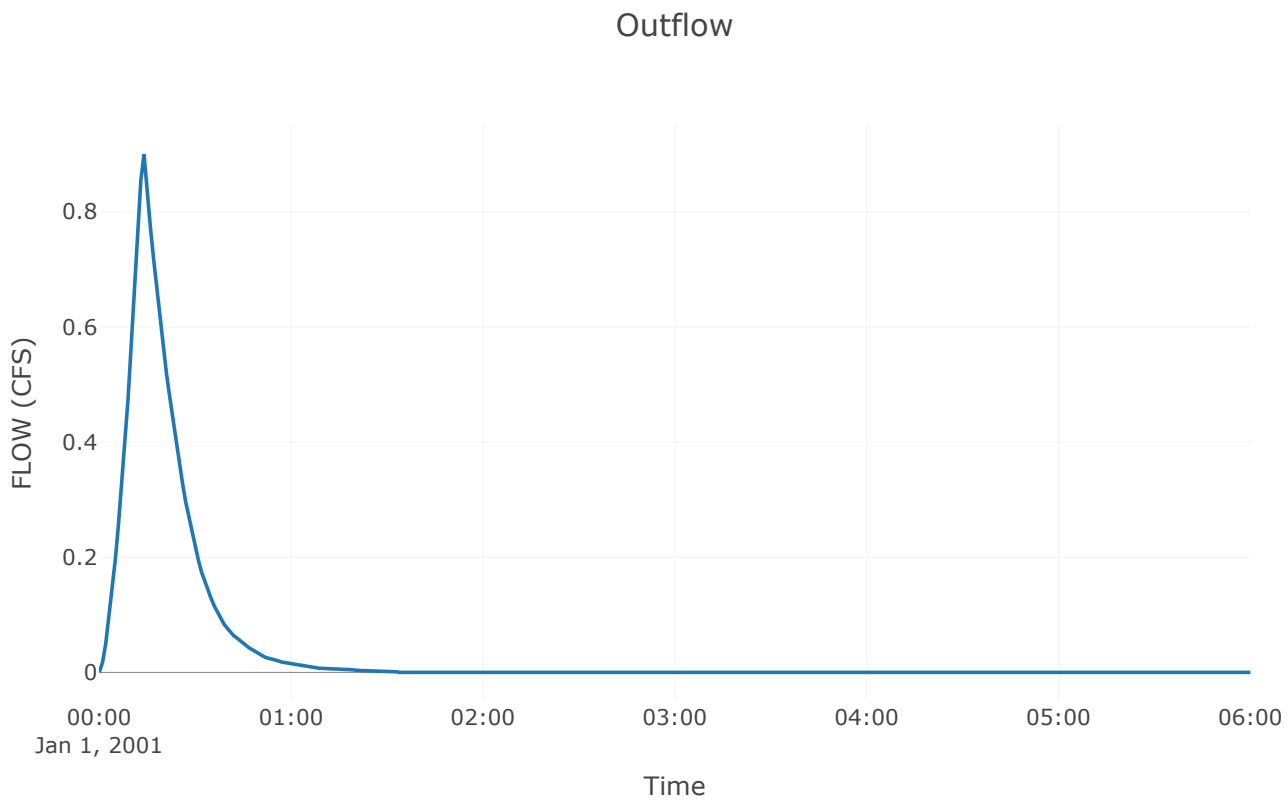


Source: 3P

Downstream : Basin 3
Flow Method : Gage Flow
Flow Gage : 3p 10

Results: 3P

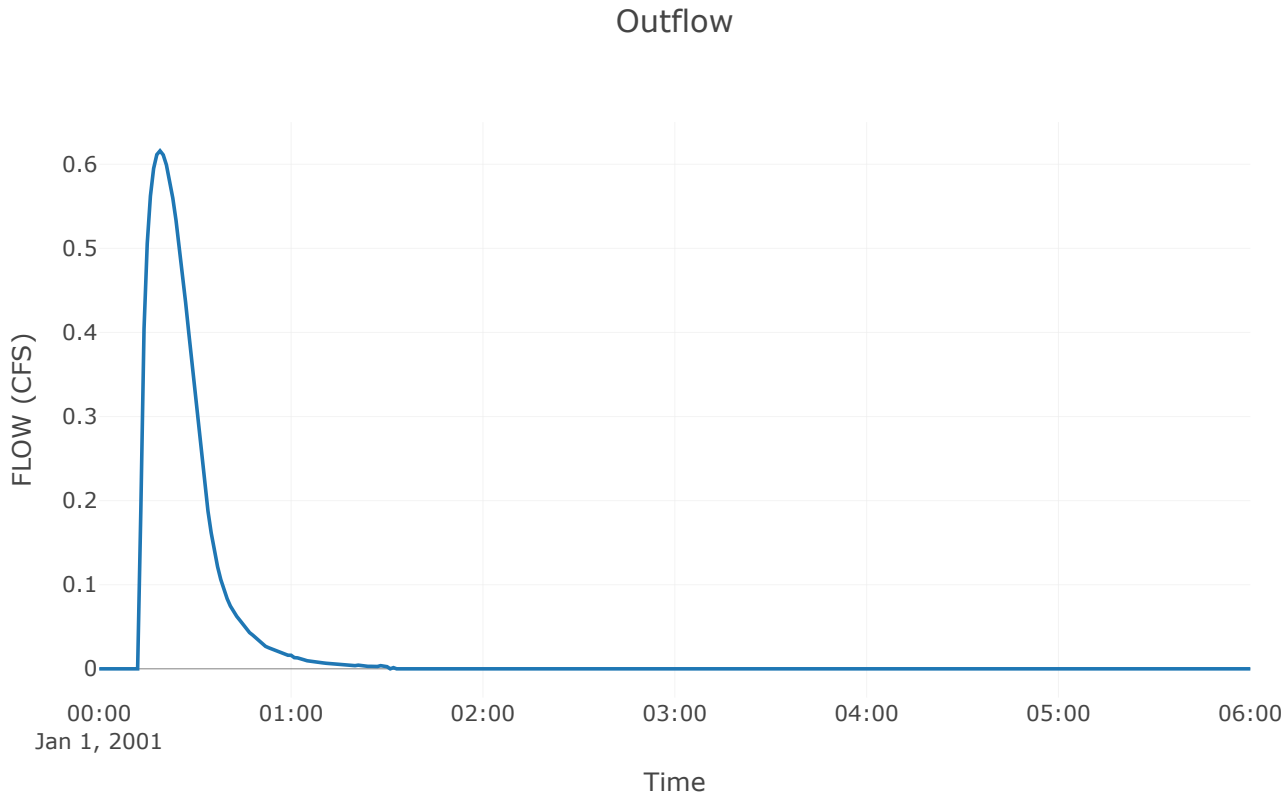
Peak Discharge (CFS)	0.9
Time of Peak Discharge	01Jan2001, 00:14



Reservoir: BASIN 3

Downstream : 2E_Comparison

Results: BASIN 3	
Peak Discharge (CFS)	0.62
Time of Peak Discharge	01Jan2001, 00:19
Peak Inflow (CFS)	0.9
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.02
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	7.81
Discharge Volume (AC - FT)	0.02

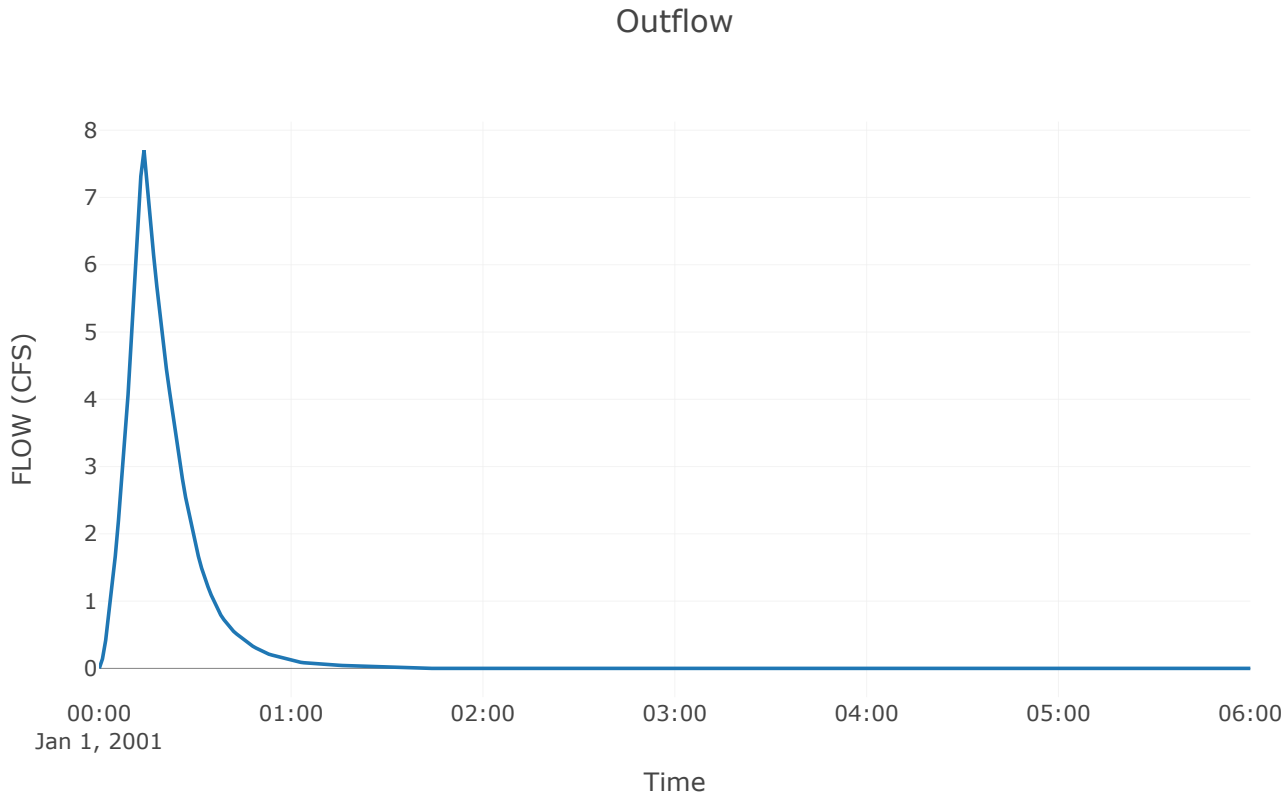


Source: 2P

Downstream : Basin 2
Flow Method : Gage Flow
Flow Gage : 2p 10

Results: 2P

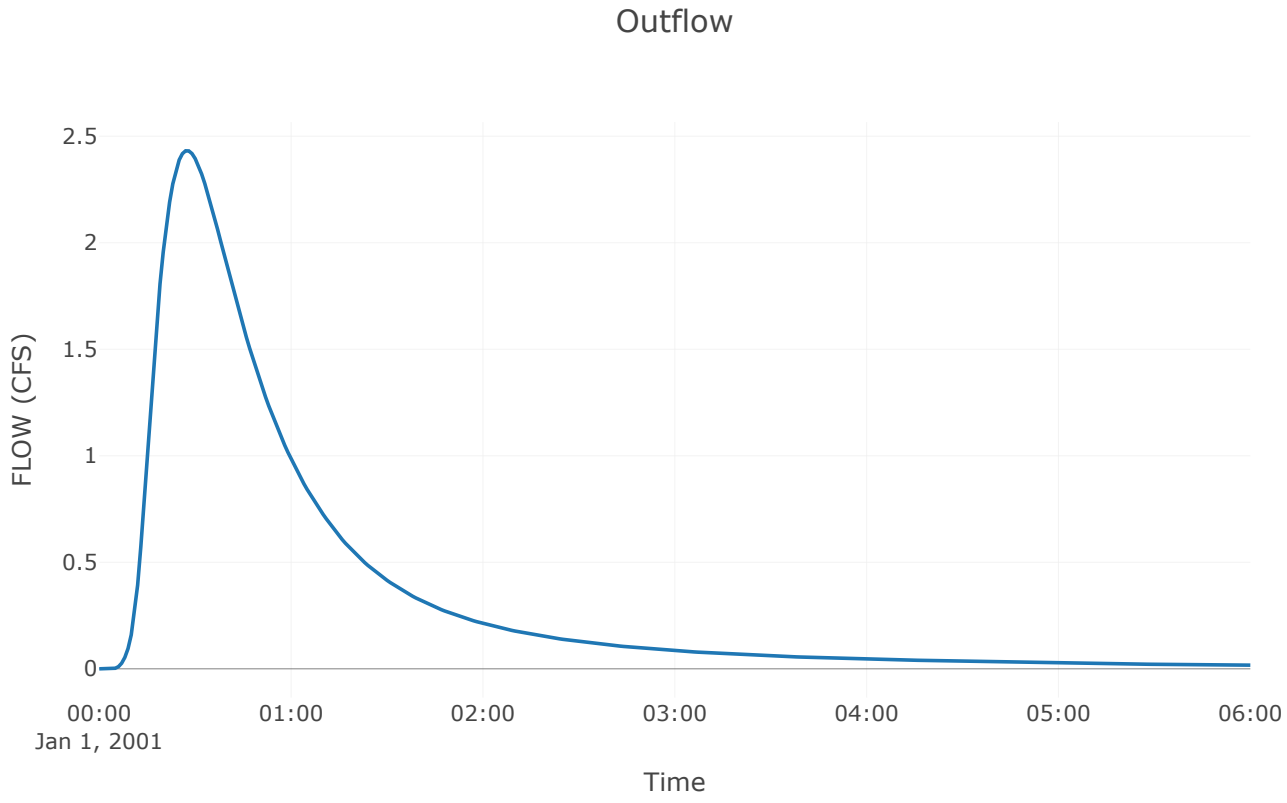
Peak Discharge (CFS)	7.7
Time of Peak Discharge	01Jan2001, 00:14



Reservoir: BASIN 2

Downstream : 2E_Comparison

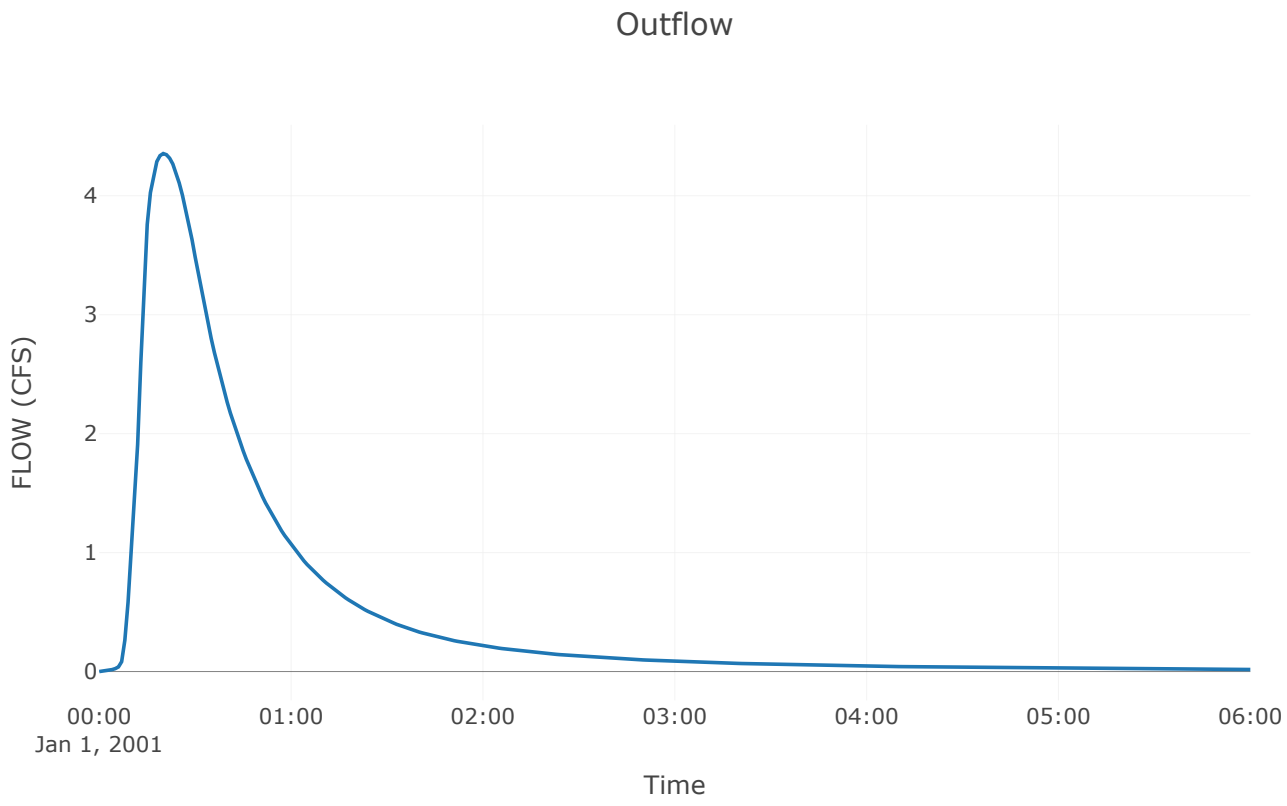
Results: BASIN 2	
Peak Discharge (CFS)	2.43
Time of Peak Discharge	01Jan2001, 00:27
Peak Inflow (CFS)	7.7
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.18
Maximum Storage (AC - FT)	0.15
Peak Elevation (FT)	9.46
Discharge Volume (AC - FT)	0.17



Junction: 2E_Comparison

Results: 2E_Comparison

Peak Discharge (CFS)	4.35
Time of Peak Discharge	01Jan2001, 00:20

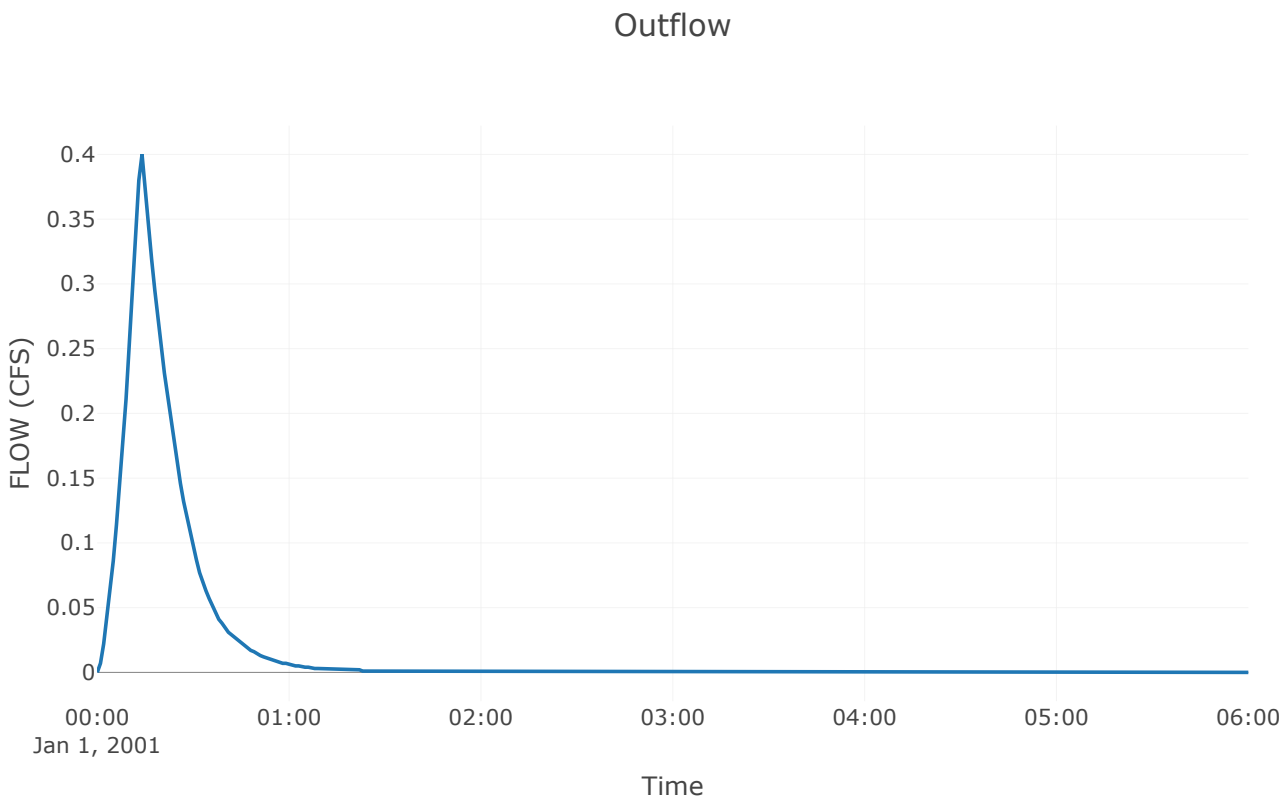


Source: 5P

Downstream : 1E_Comparison
Flow Method : Gage Flow
Flow Gage : 5p 10

Results: 5P

Peak Discharge (CFS)	0.4
Time of Peak Discharge	01Jan2001, 00:14

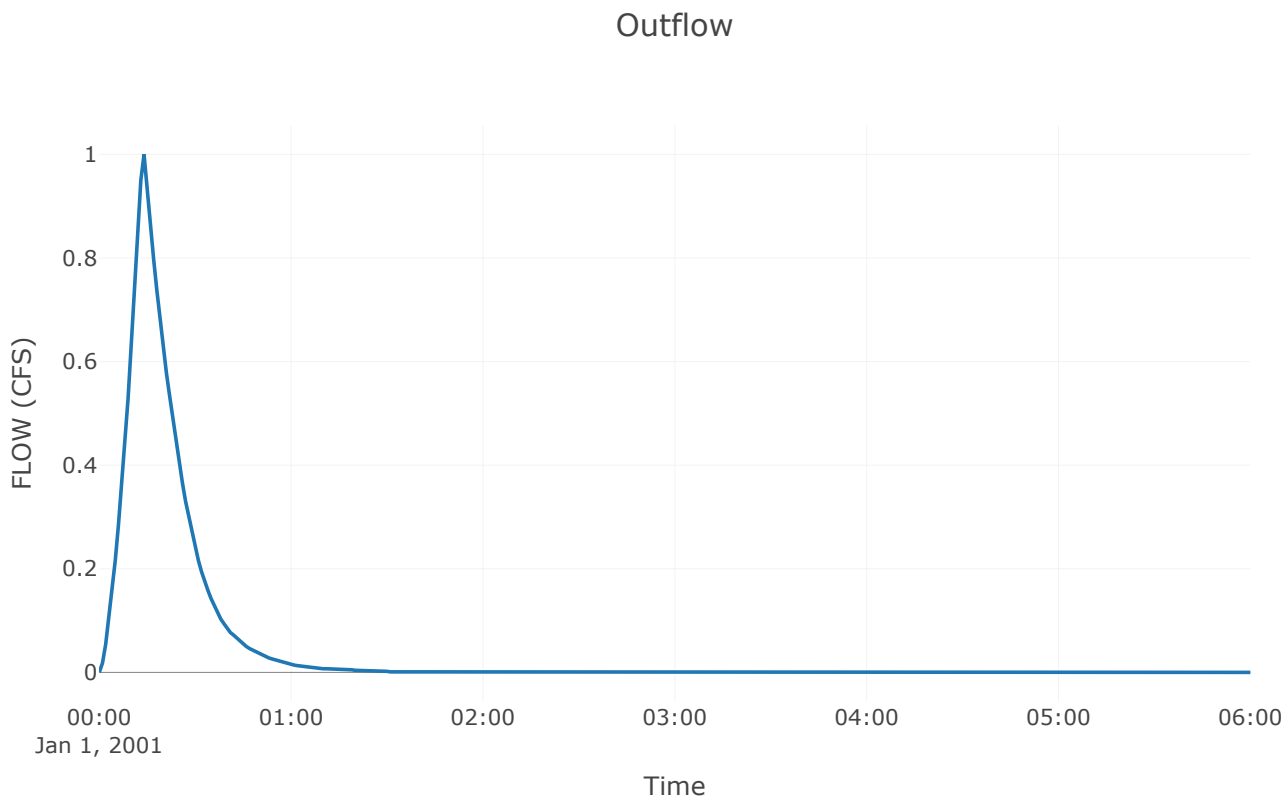


Source: 1P

Downstream : Basin 1
Flow Method : Gage Flow
Flow Gage : 1p 10

Results: 1P

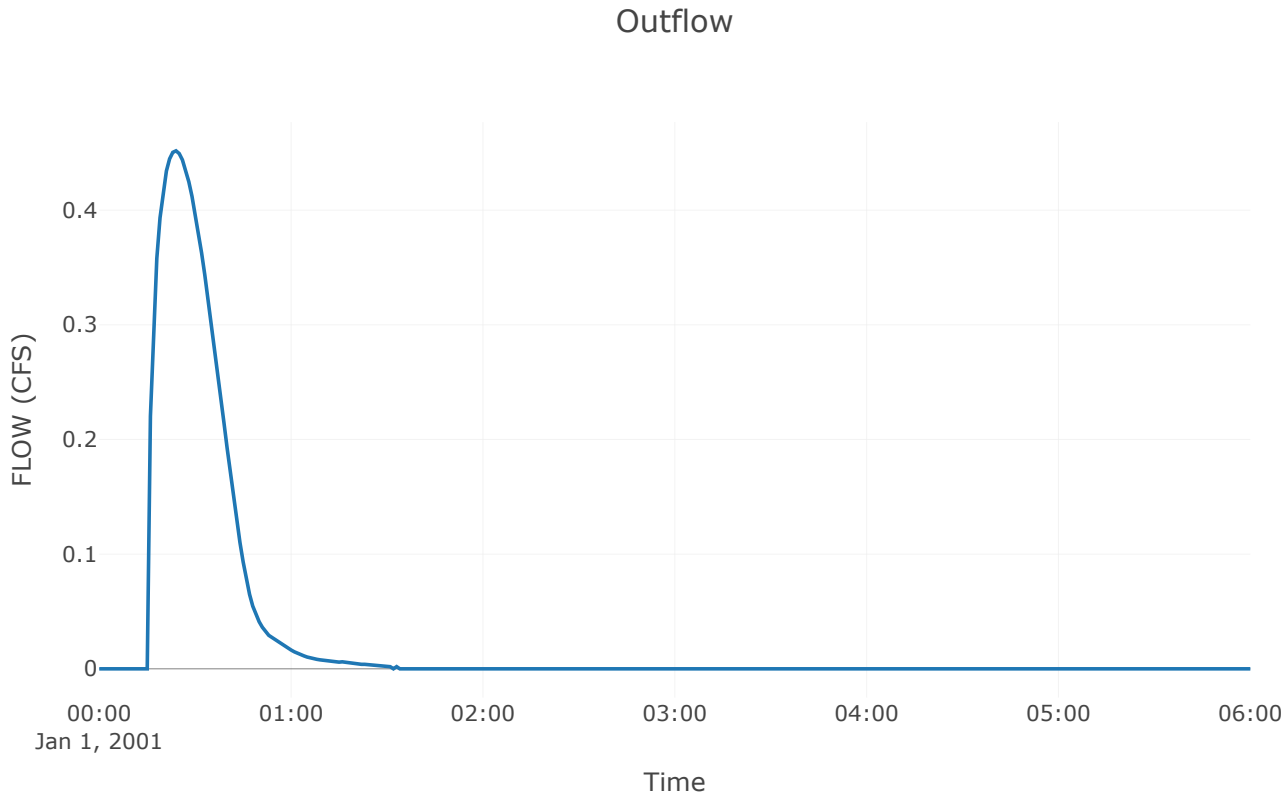
Peak Discharge (CFS)	1
Time of Peak Discharge	01Jan2001, 00:14



Reservoir: BASIN 1

Downstream : 1E_Comparison

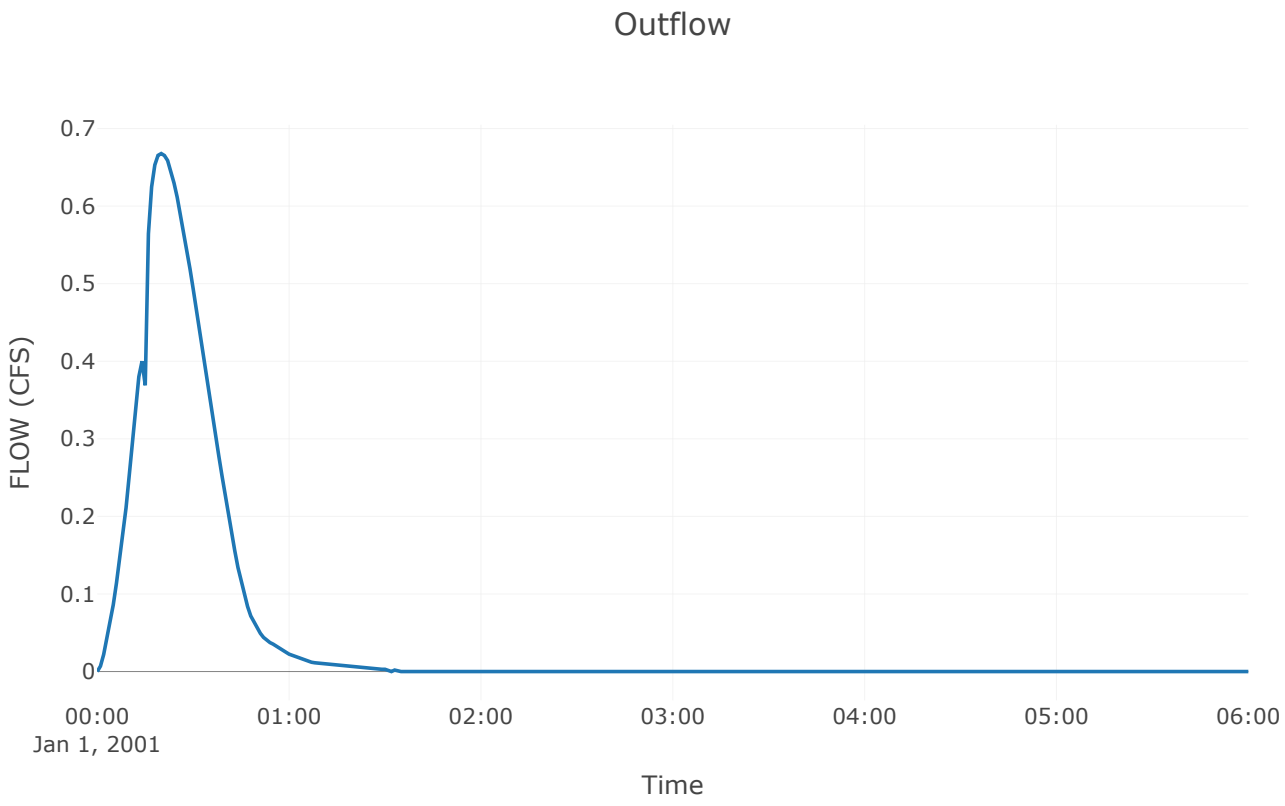
Results: BASIN 1	
Peak Discharge (CFS)	0.45
Time of Peak Discharge	01Jan2001, 00:24
Peak Inflow (CFS)	1
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.02
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	9.82
Discharge Volume (AC - FT)	0.01



Junction: 1E_Comparison

Results: 1E_Comparison

Peak Discharge (CFS)	0.67
Time of Peak Discharge	01Jan2001, 00:20



Project: 22_010_Final_Plat_rev
Simulation Run: Prop_25
Simulation Start: 31 December 2000, 24:00
Simulation End: 1 January 2001, 06:00

HMS Version: 4.11
Executed: 24 January 2024, 17:24

Global Results Summary

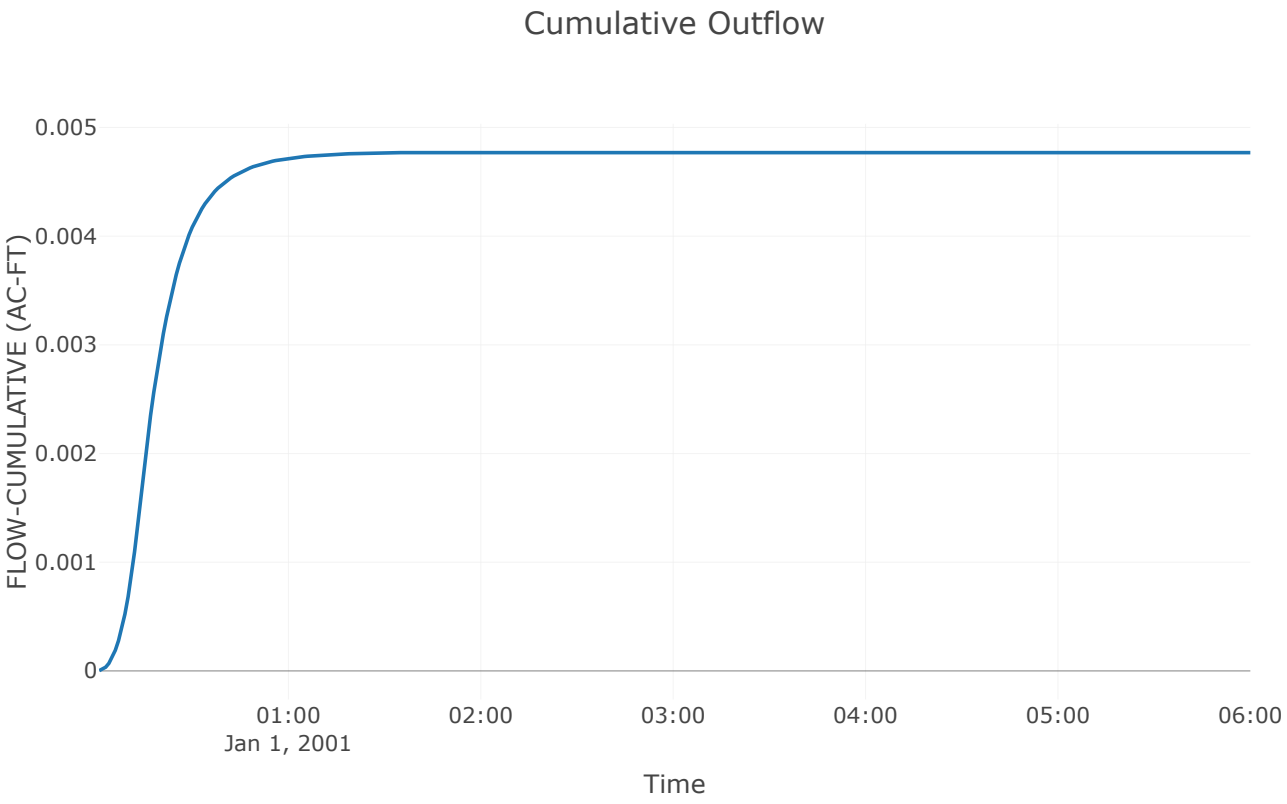
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume ()
6p	Not specified	0.2	01Jan2001, 00:14	Not specified
4p	Not specified	2.9	01Jan2001, 00:14	Not specified
Basin 4	Not specified	2.63	01Jan2001, 00:15	Not specified
3p	Not specified	1.2	01Jan2001, 00:14	Not specified
Basin 3	Not specified	0.81	01Jan2001, 00:19	Not specified
2p	Not specified	9.6	01Jan2001, 00:14	Not specified
Basin 2	Not specified	2.57	01Jan2001, 00:29	Not specified
2E_Comparison	Not specified	4.81	01Jan2001, 00:21	Not specified
5p	Not specified	0.5	01Jan2001, 00:14	Not specified
1p	Not specified	1.2	01Jan2001, 00:14	Not specified
Basin 1	Not specified	0.55	01Jan2001, 00:24	Not specified
1E_Comparison	Not specified	0.84	01Jan2001, 00:19	Not specified

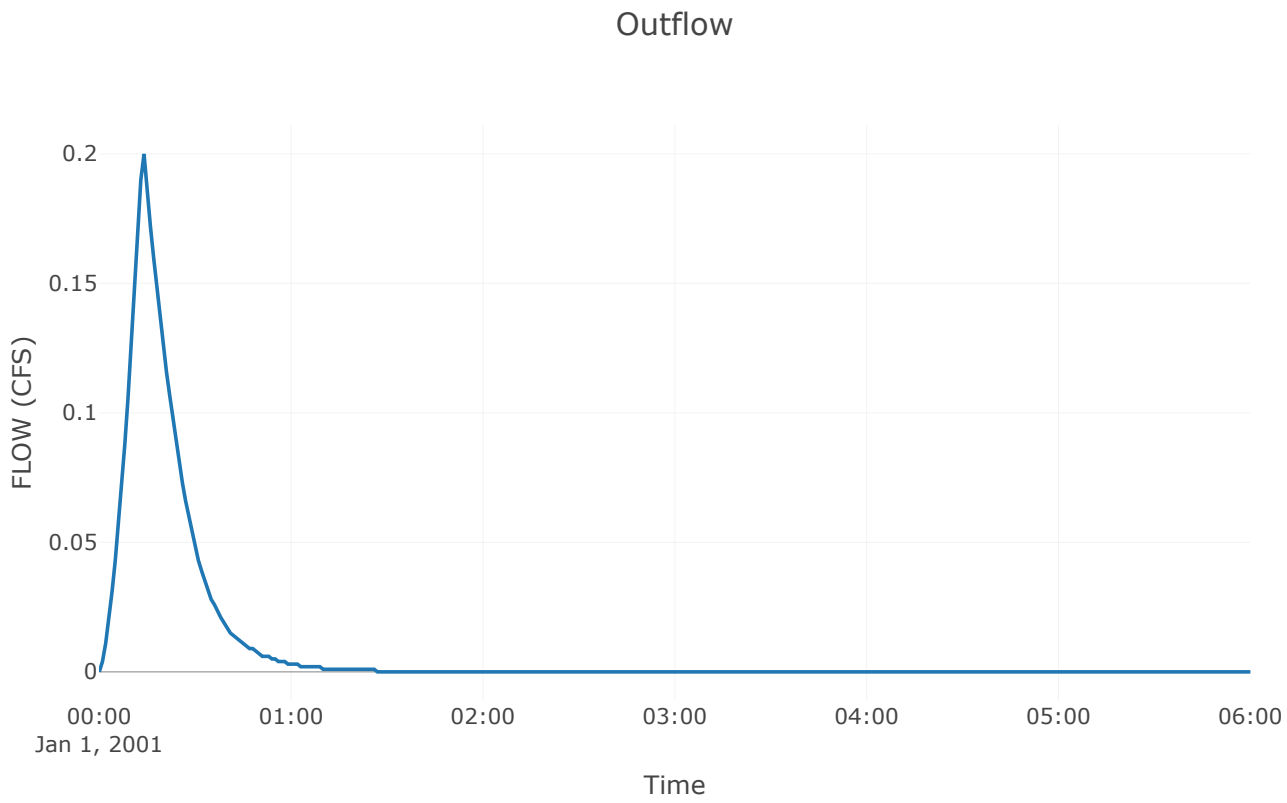
Source: 6P

Downstream : 2E_Comparison
Flow Method : Gage Flow
Flow Gage : 6p 25

Results: 6P

Peak Discharge (CFS)	0.2
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.005
0.004
0.003
0.002
0.001
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outflow
FLOW (CFS)
0.2
0.15
0.1
0.05
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

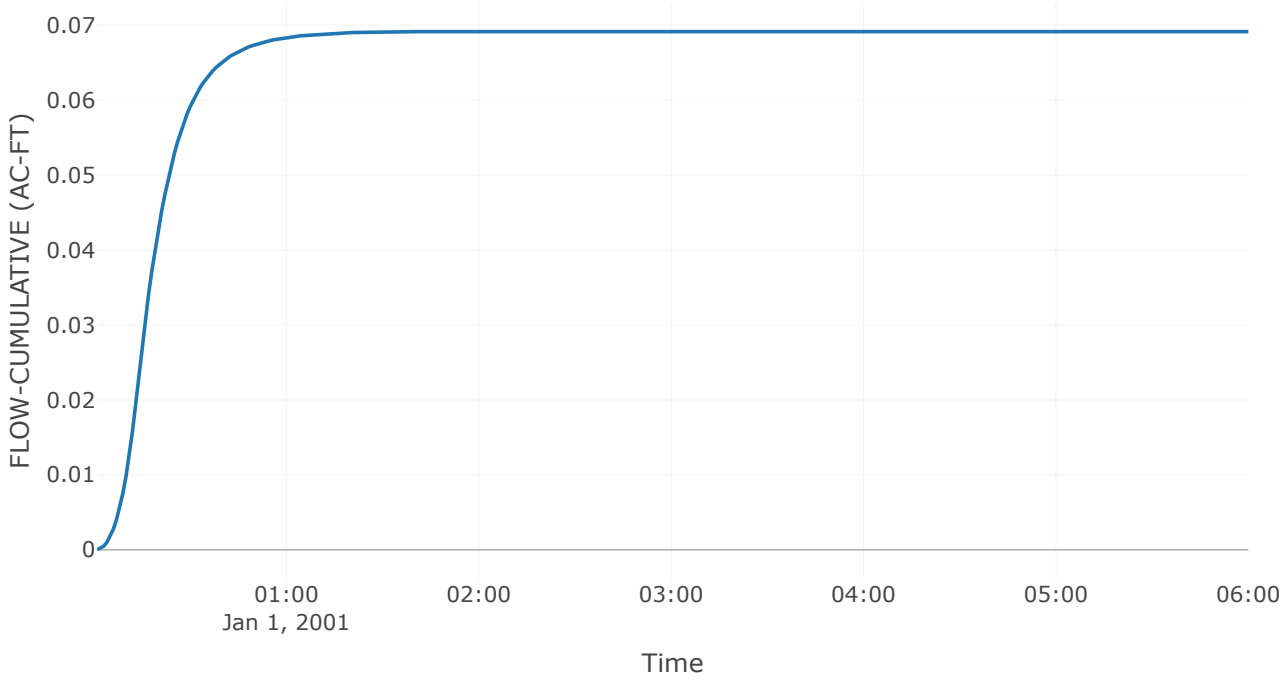
Source: 4P

Downstream : Basin 4
Flow Method : Gage Flow
Flow Gage : 4p 25

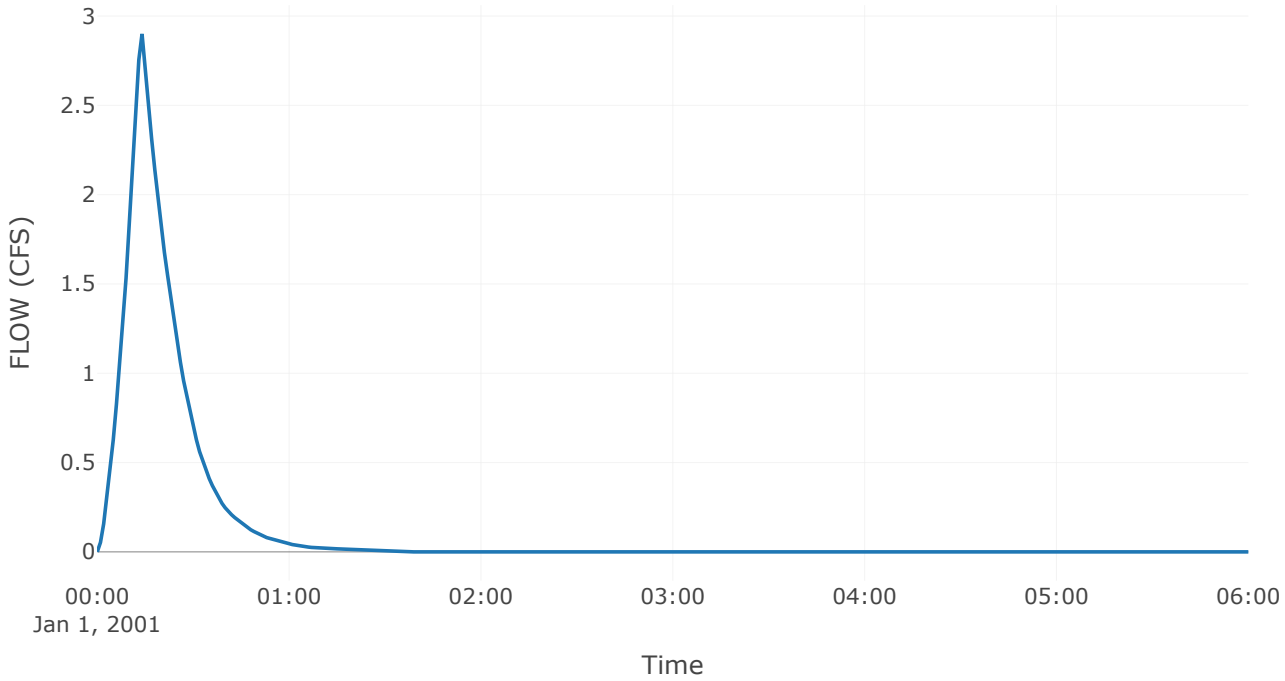
Results: 4P

Peak Discharge (CFS)	2.9
Time of Peak Discharge	01Jan2001, 00:14

Cumulative Outflow



Outflow

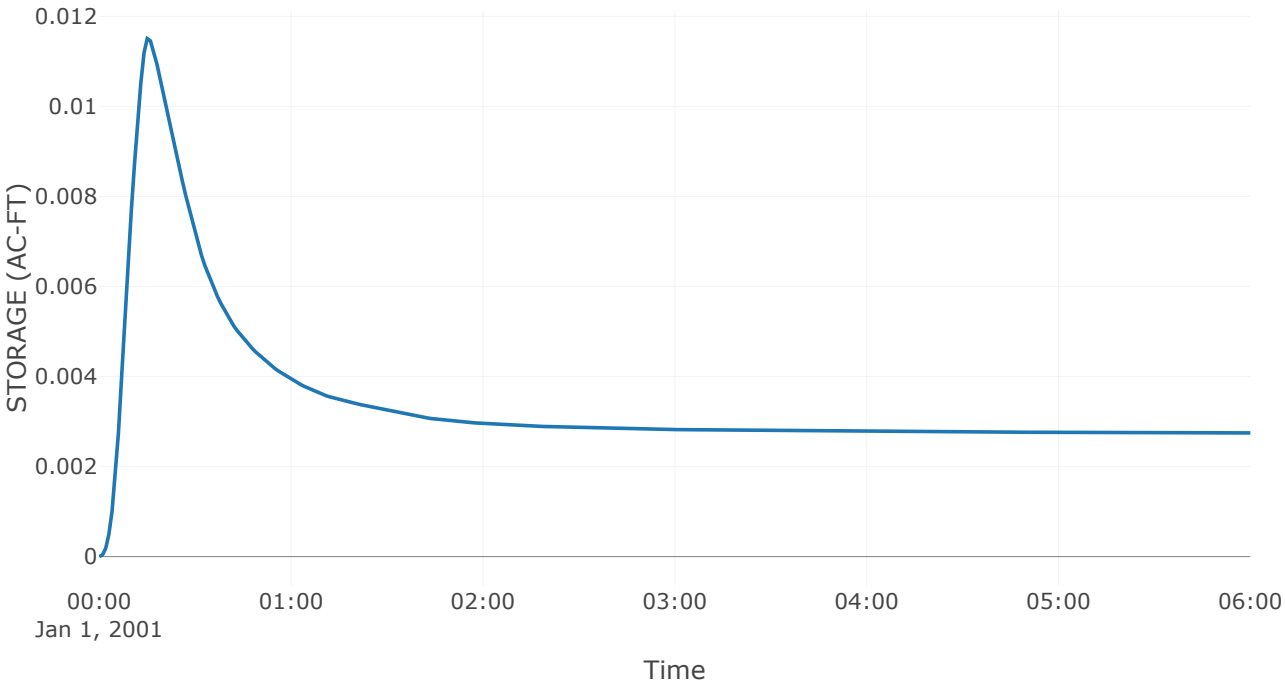


Reservoir: BASIN 4

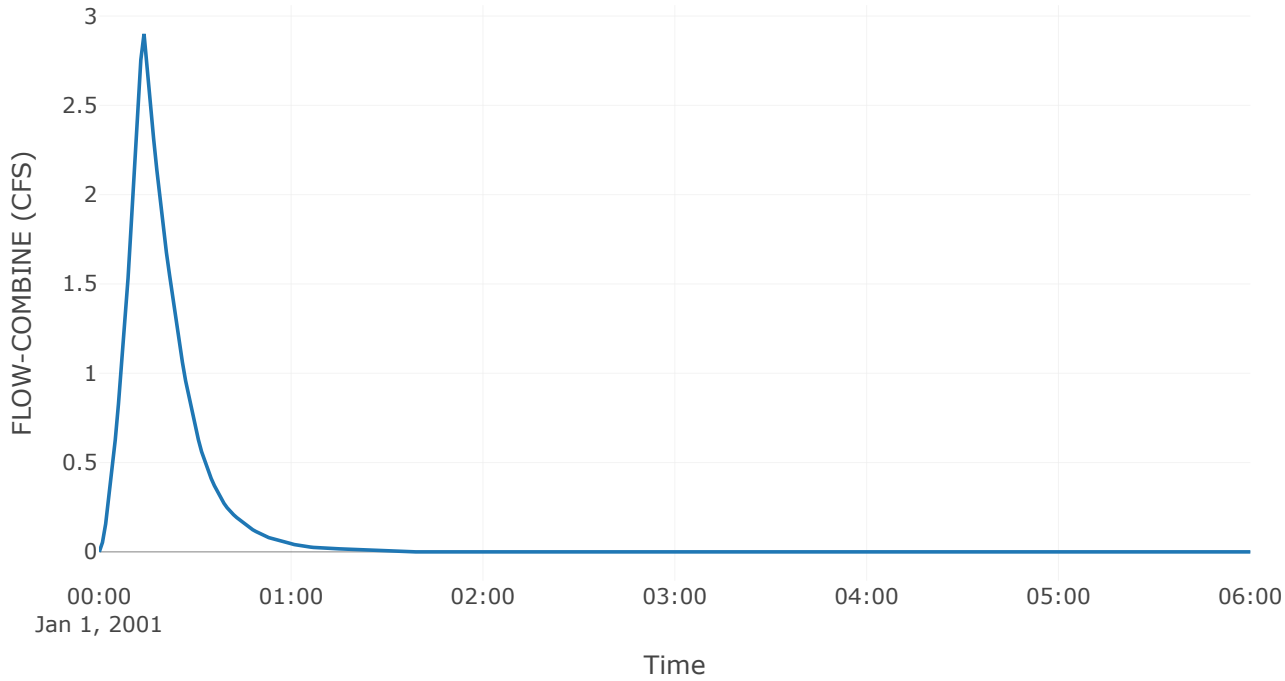
Downstream : 2E_Comparison

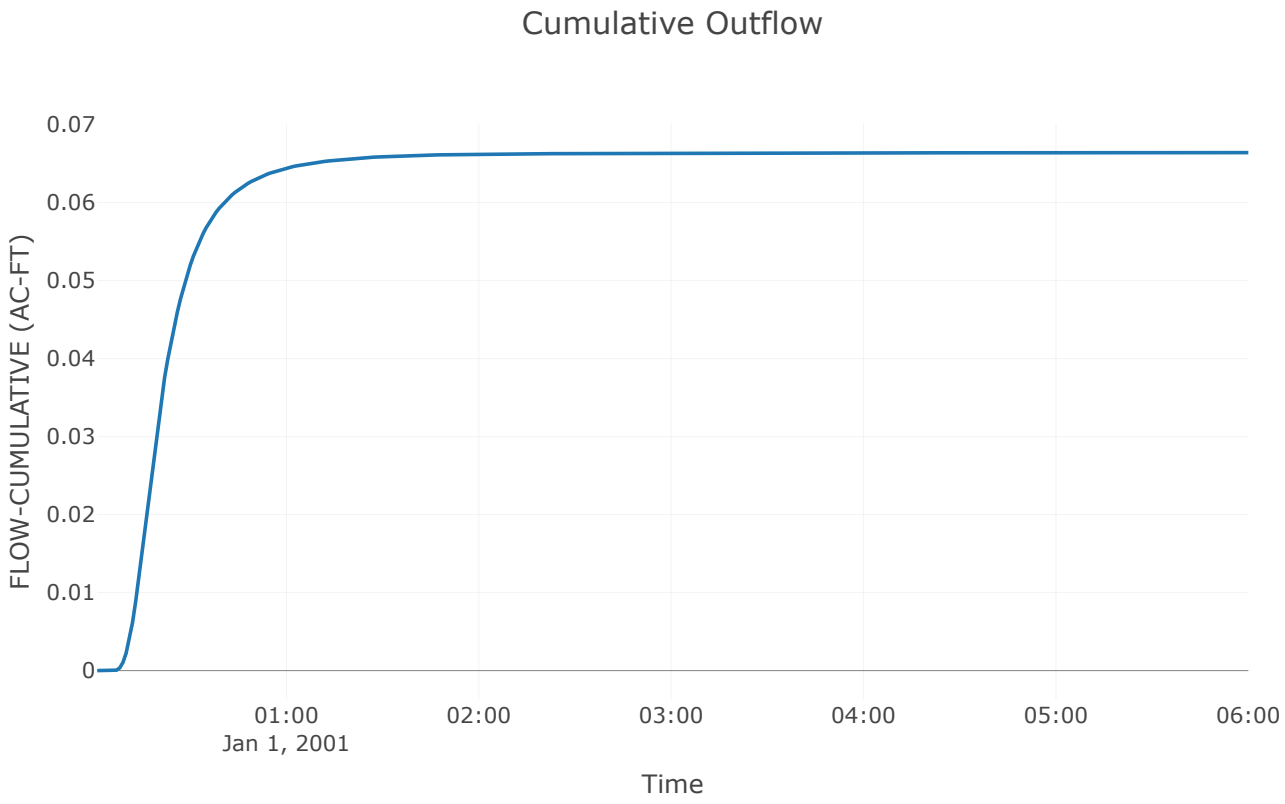
Results: BASIN 4	
Peak Discharge (CFS)	2.63
Time of Peak Discharge	01Jan2001, 00:15
Peak Inflow (CFS)	2.9
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.07
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	8.38
Discharge Volume (AC - FT)	0.07

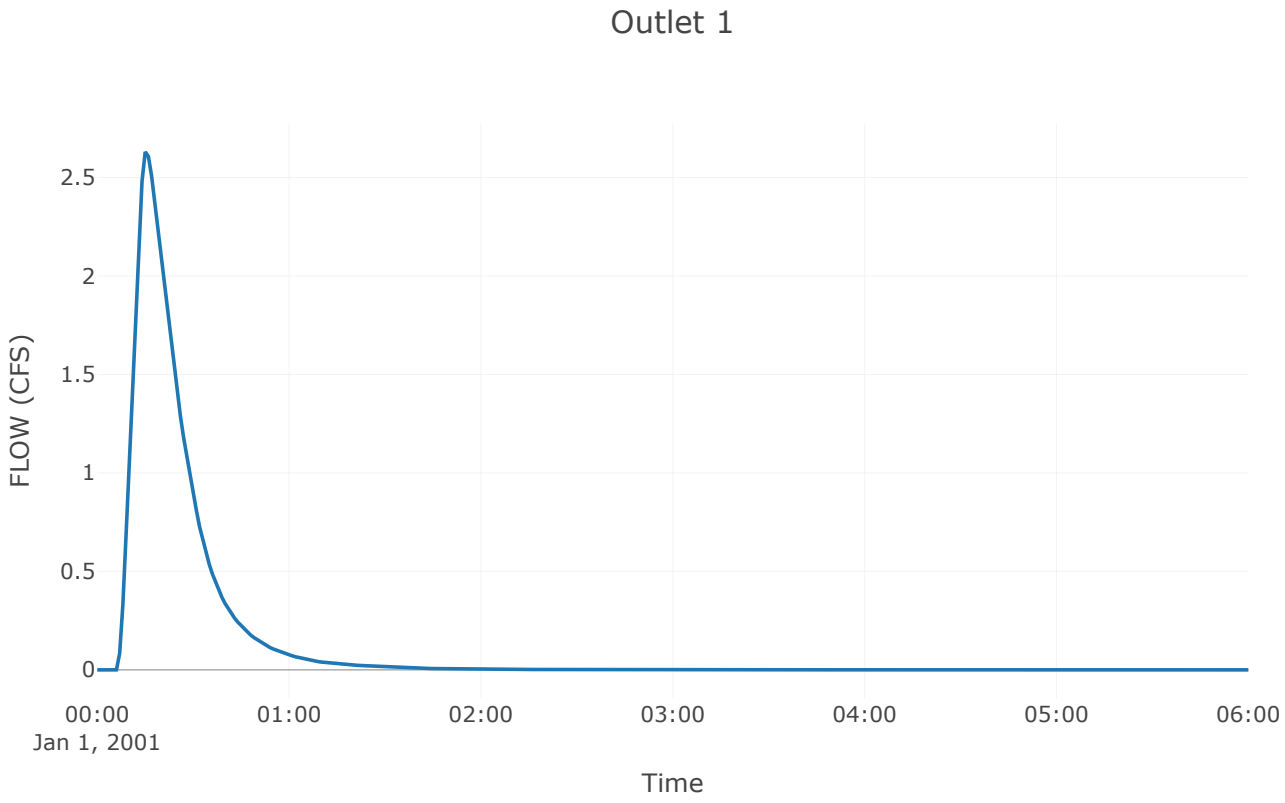
Storage



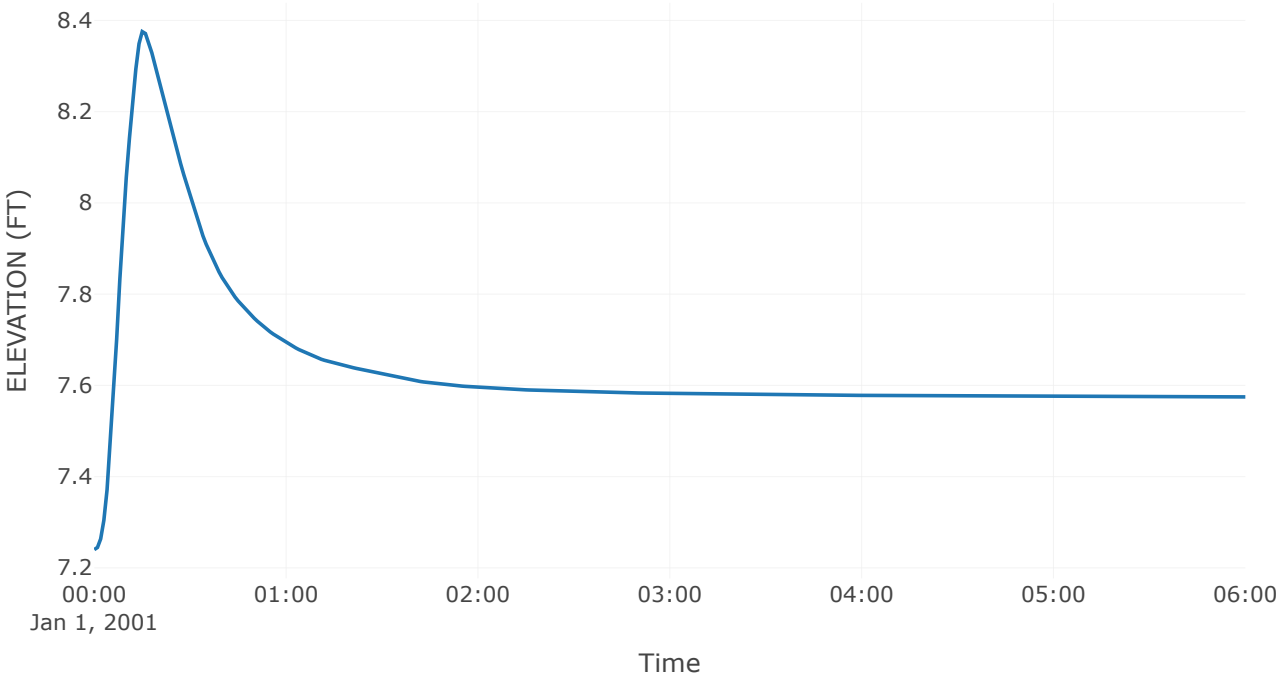
Combined Inflow



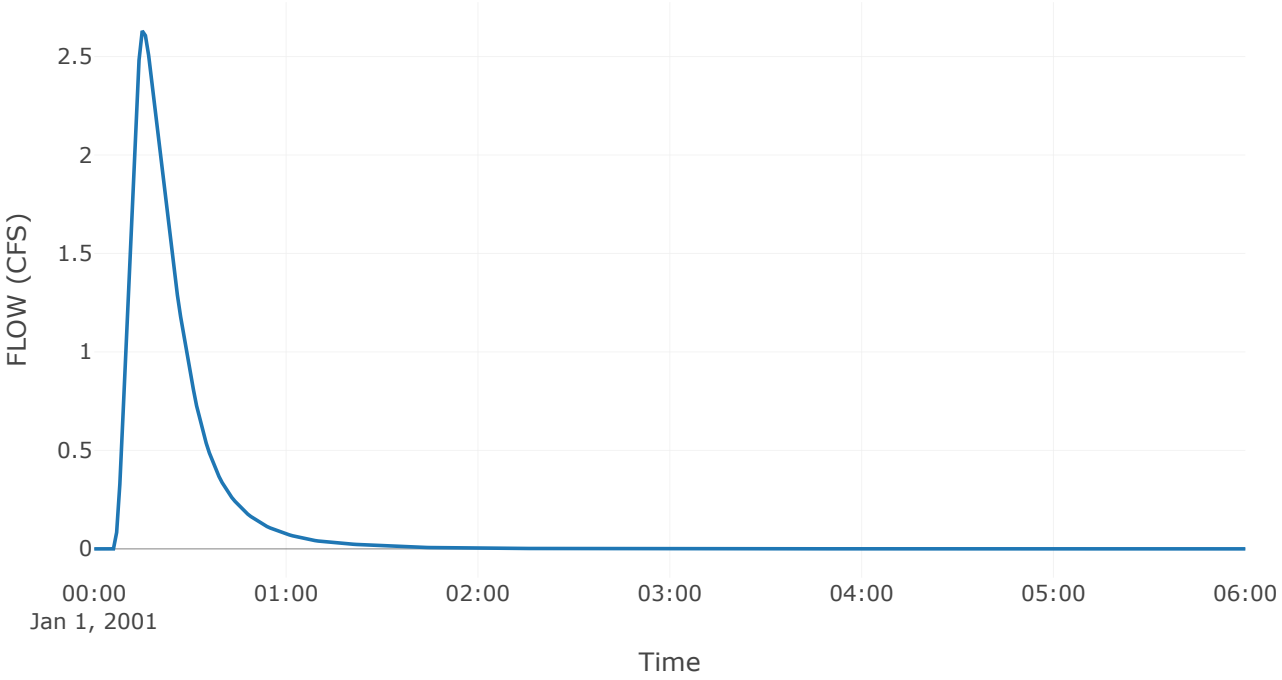

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
2.5
2
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

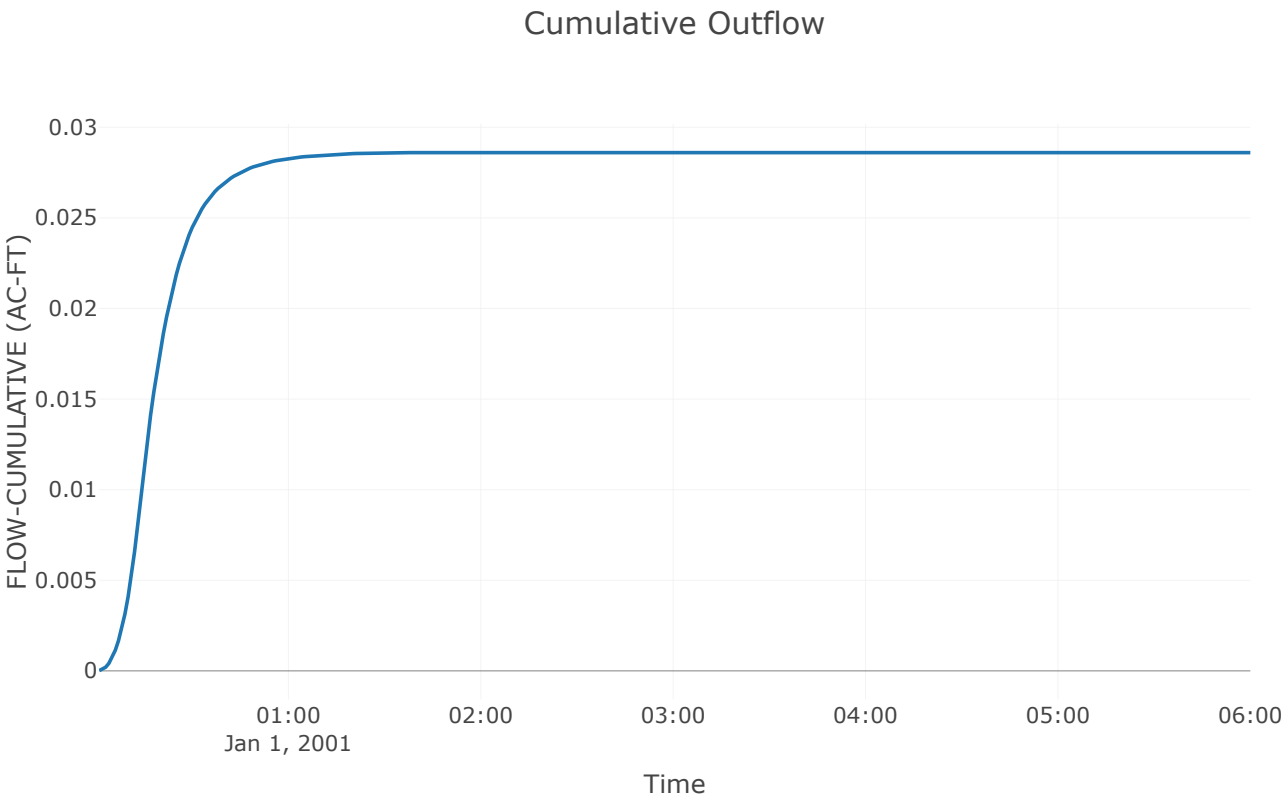


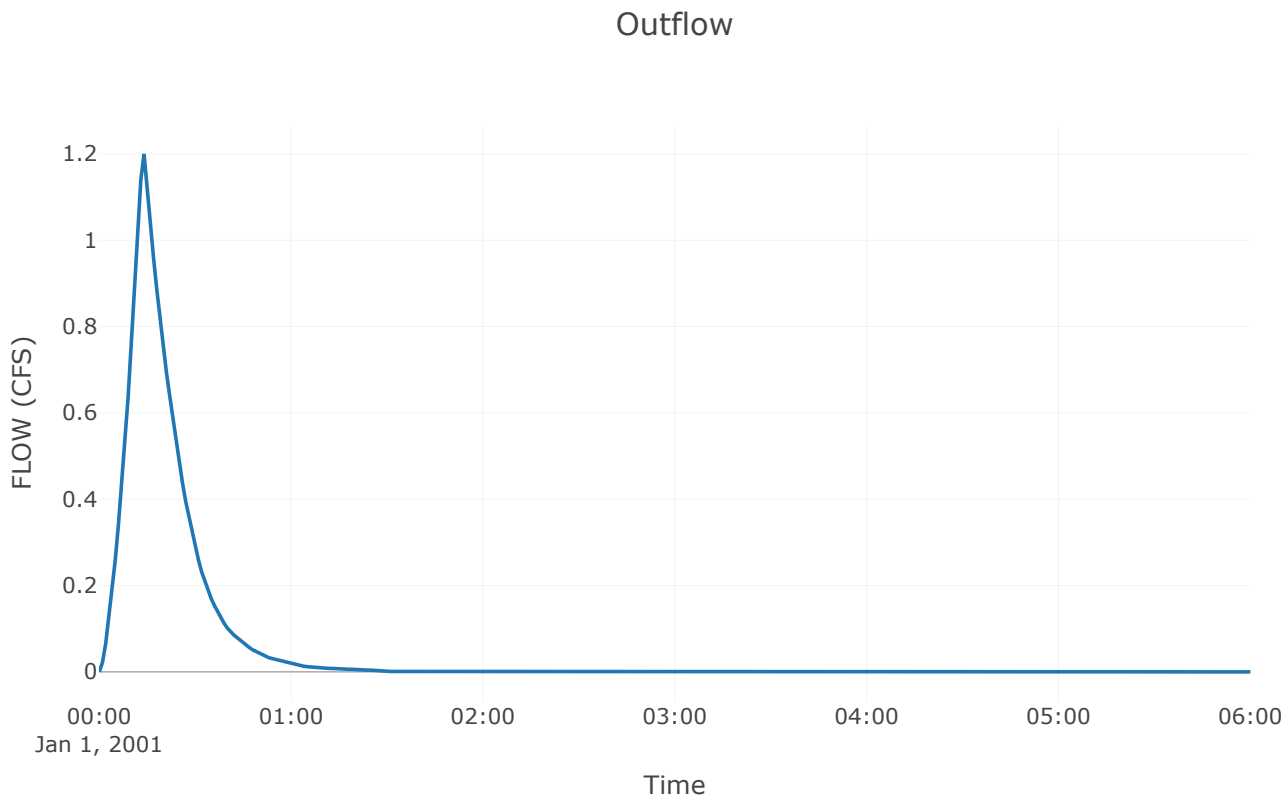
Source: 3P

Downstream : Basin 3
Flow Method : Gage Flow
Flow Gage : 3p 25

Results: 3P

Peak Discharge (CFS)	1.2
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

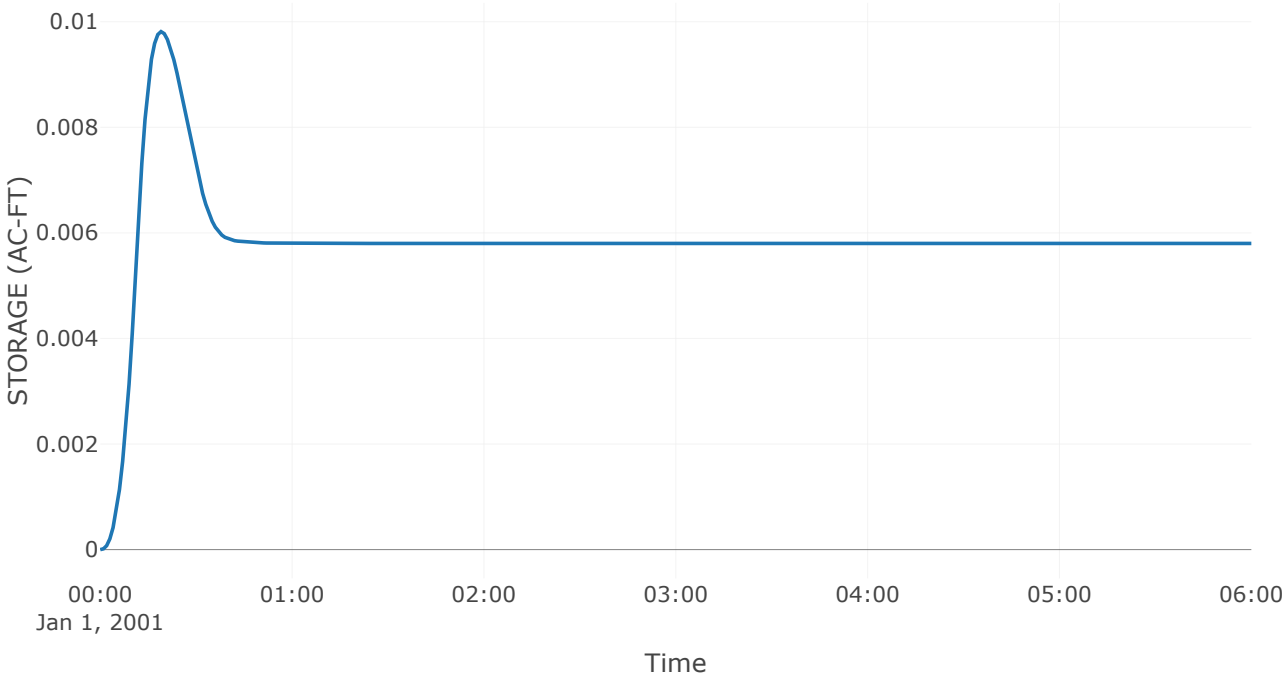

Outflow
FLOW (CFS)
1.2
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 3

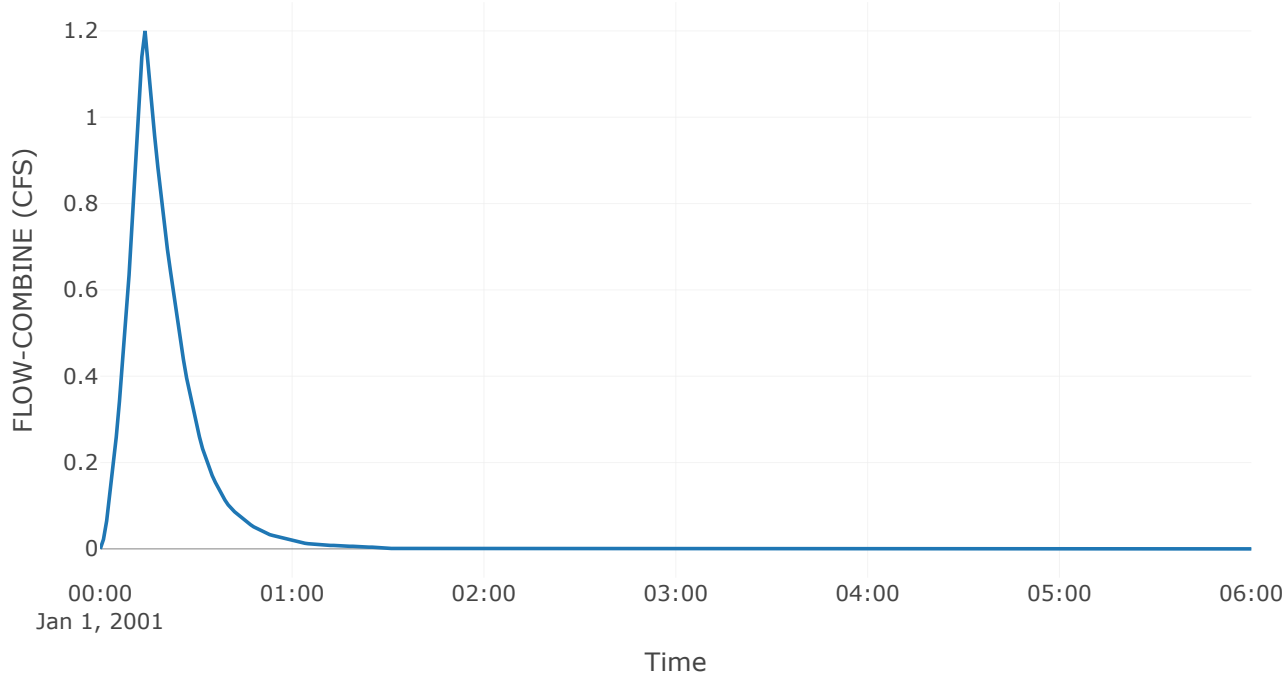
Downstream : 2E_Comparison

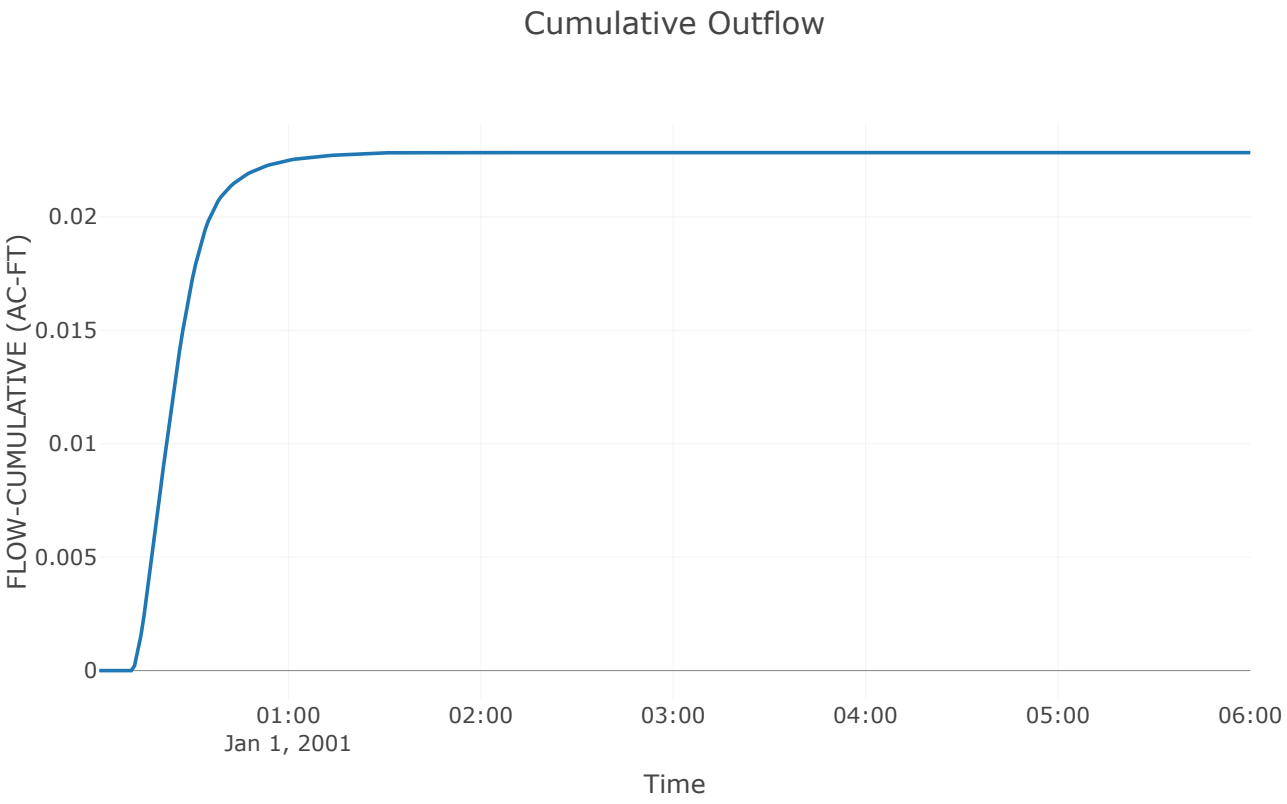
Results: BASIN 3	
Peak Discharge (CFS)	0.81
Time of Peak Discharge	01Jan2001, 00:19
Peak Inflow (CFS)	1.2
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.03
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	7.98
Discharge Volume (AC - FT)	0.02

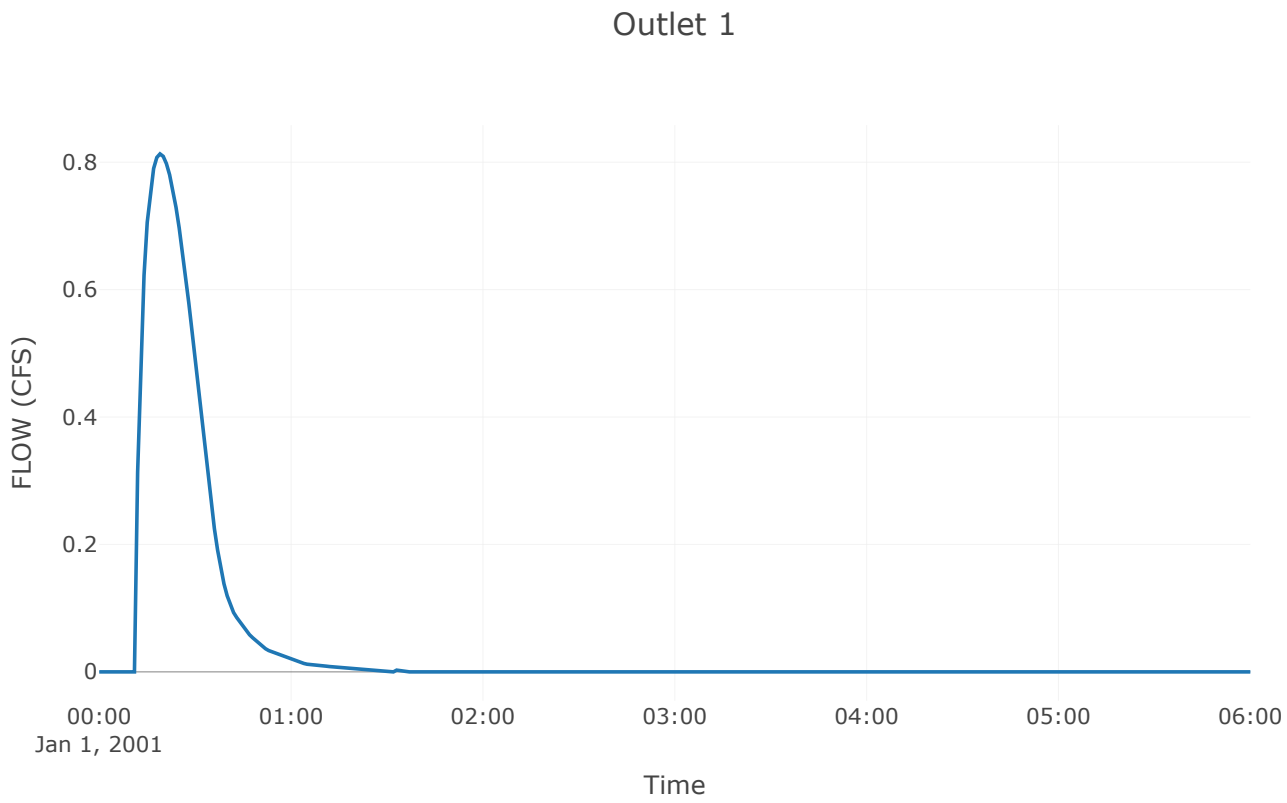
Storage



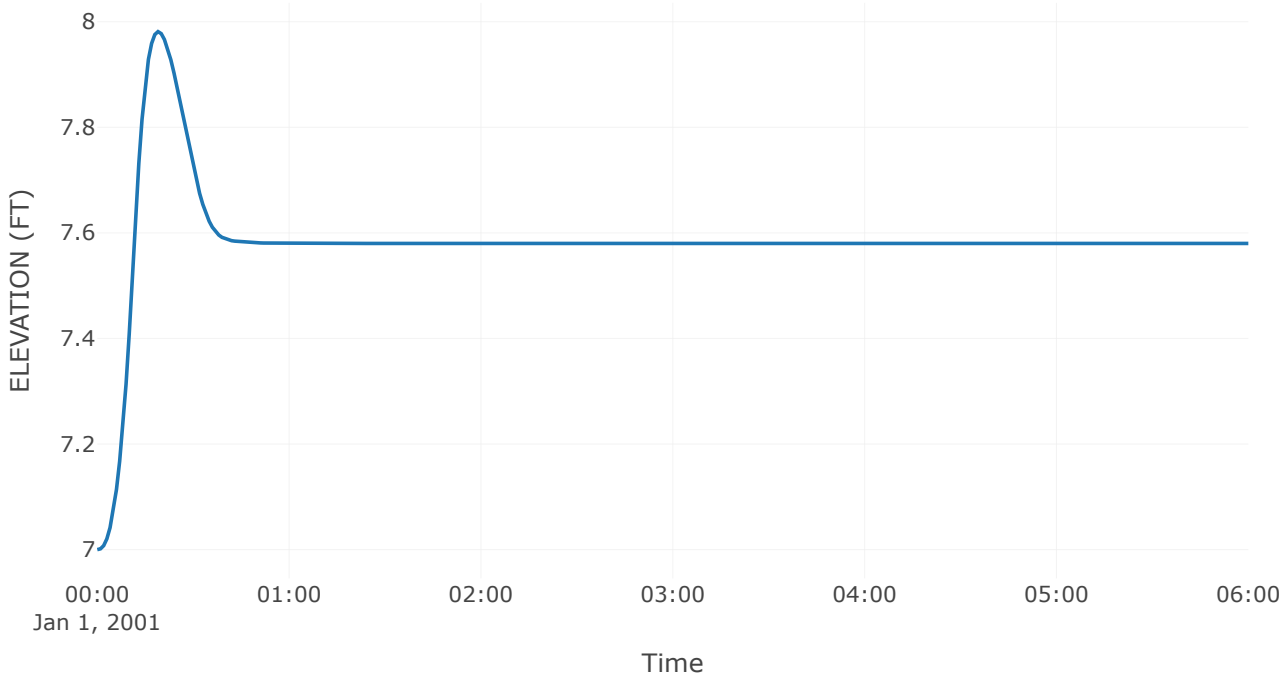
Combined Inflow



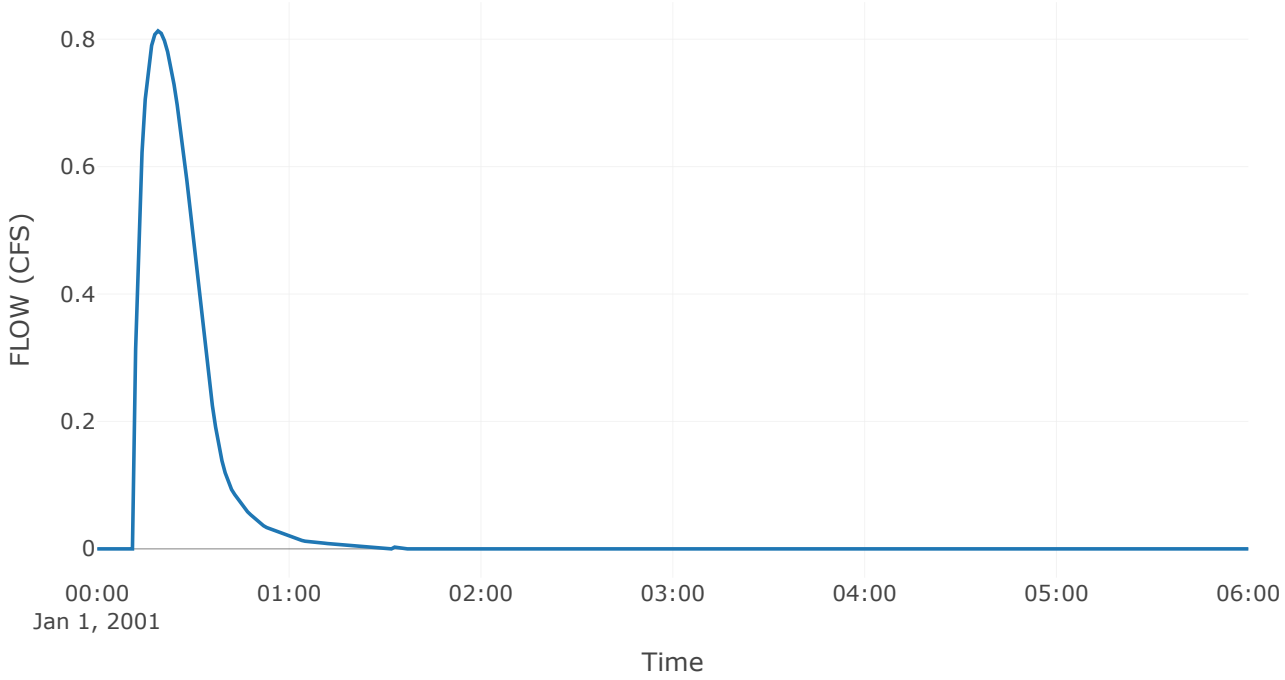

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

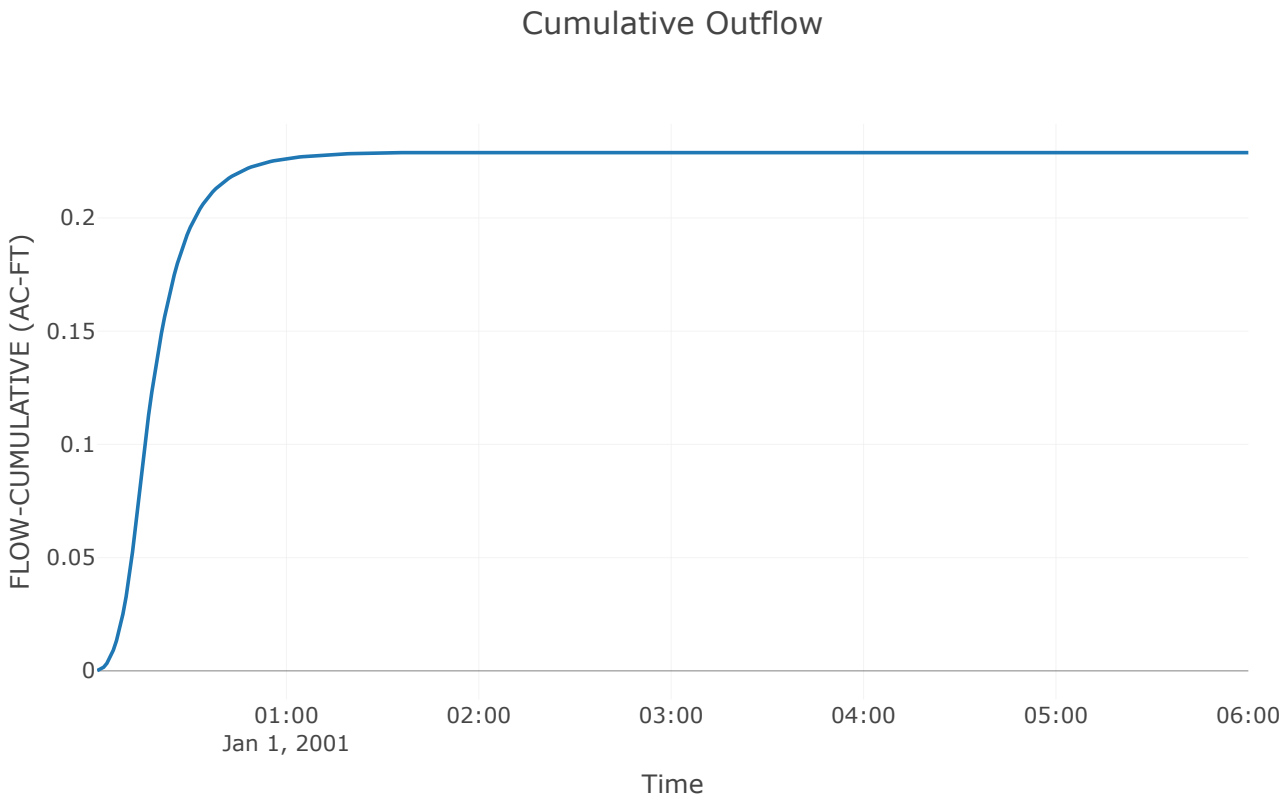


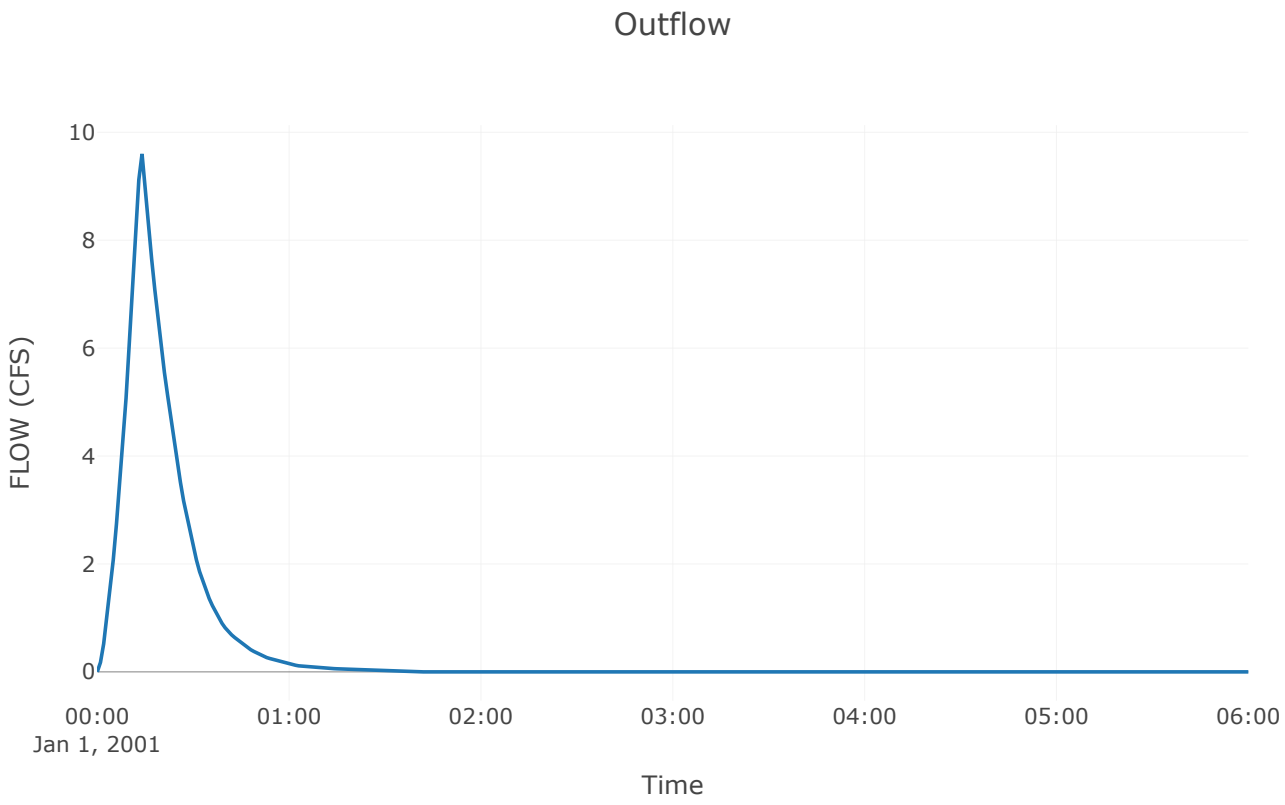
Source: 2P

Downstream : Basin 2
Flow Method : Gage Flow
Flow Gage : 2p 25

Results: 2P

Peak Discharge (CFS)	9.6
Time of Peak Discharge	01Jan2001, 00:14

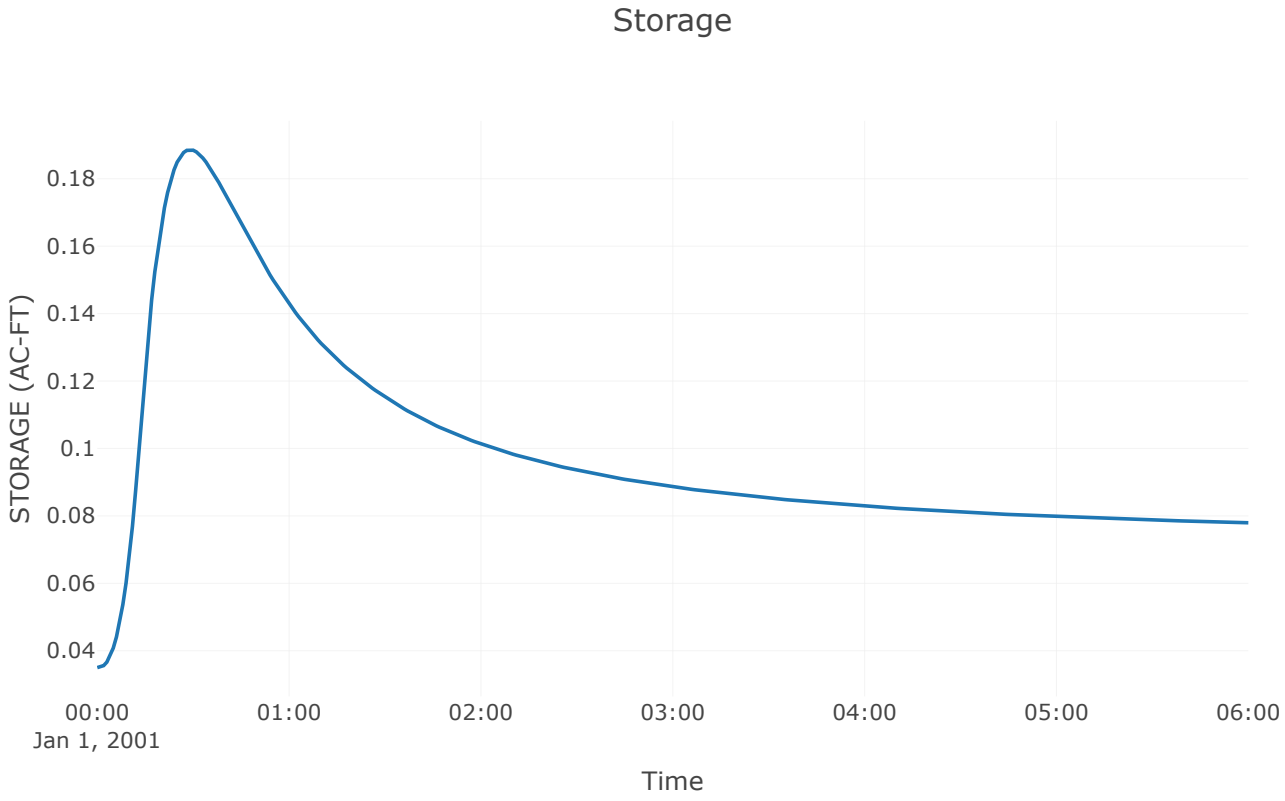

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.2
0.15
0.1
0.05
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

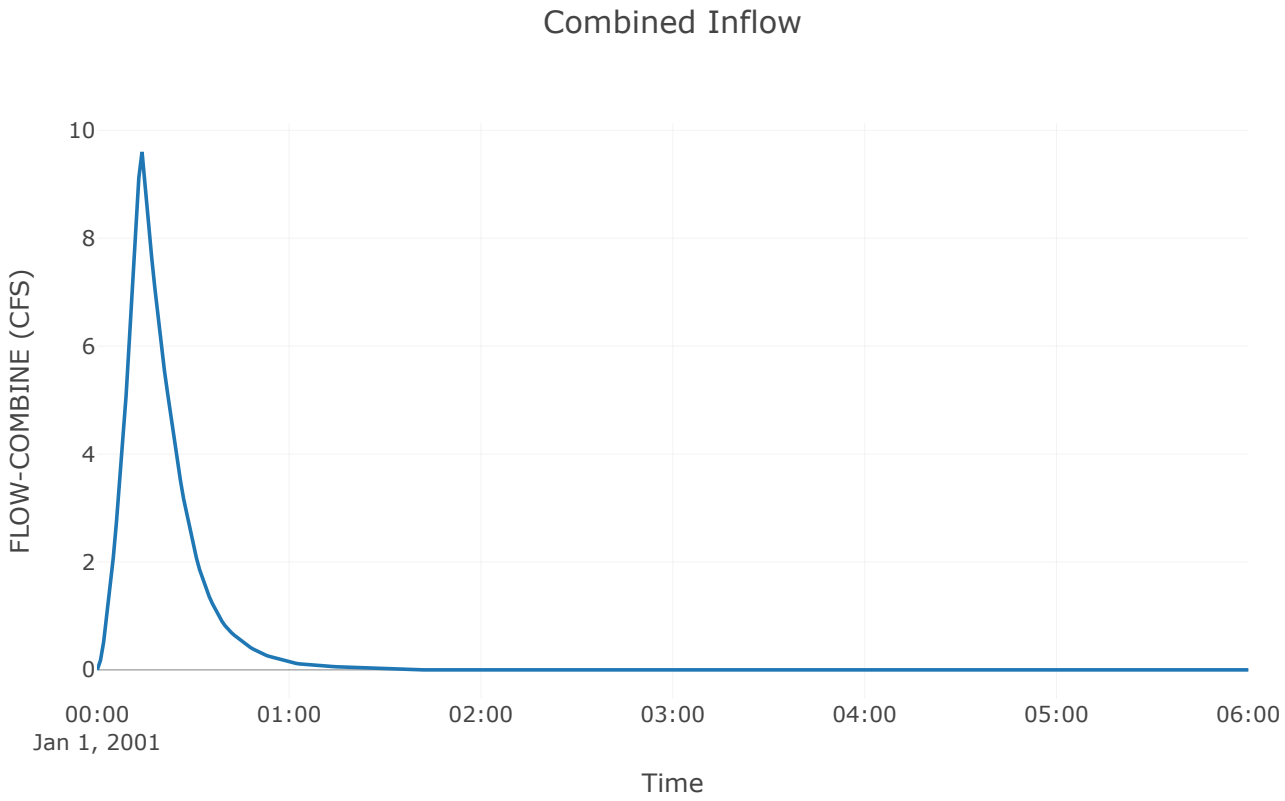

Outflow
FLOW (CFS)
10
8
6
4
2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

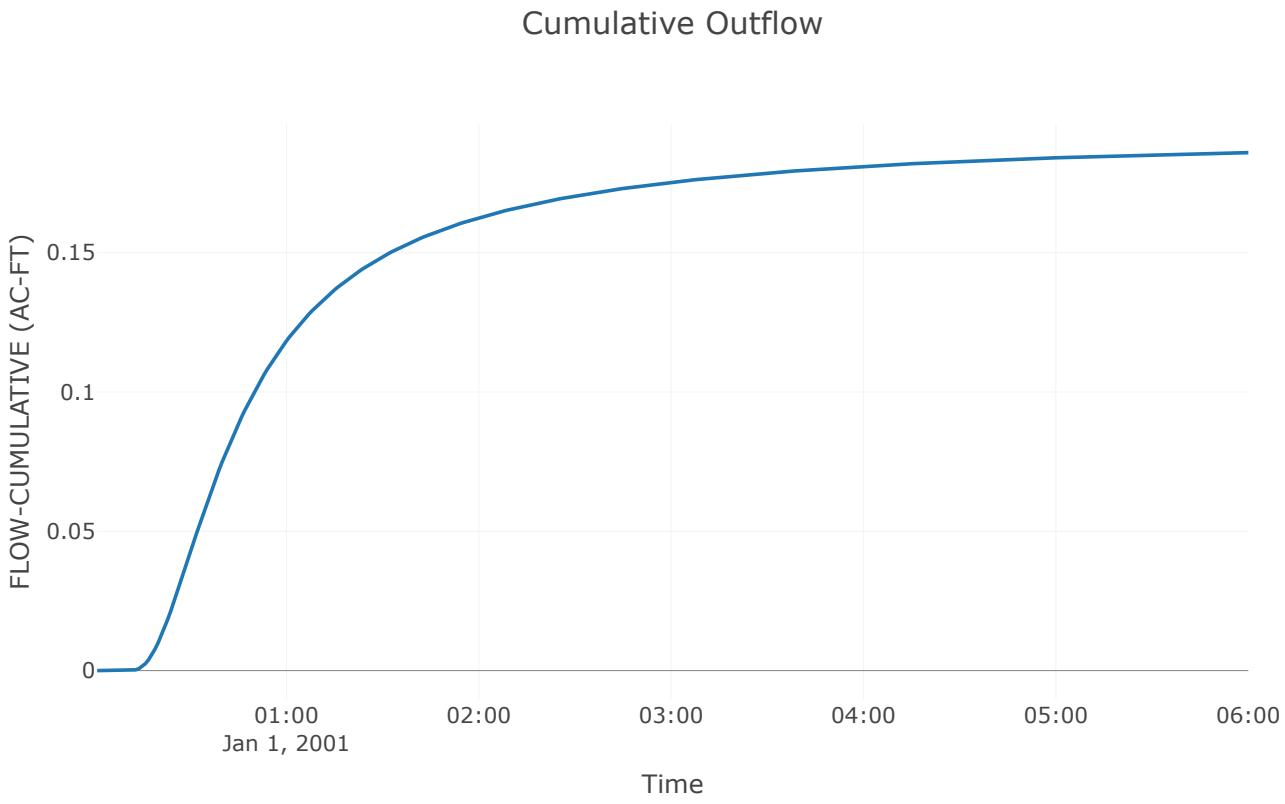
Reservoir: BASIN 2

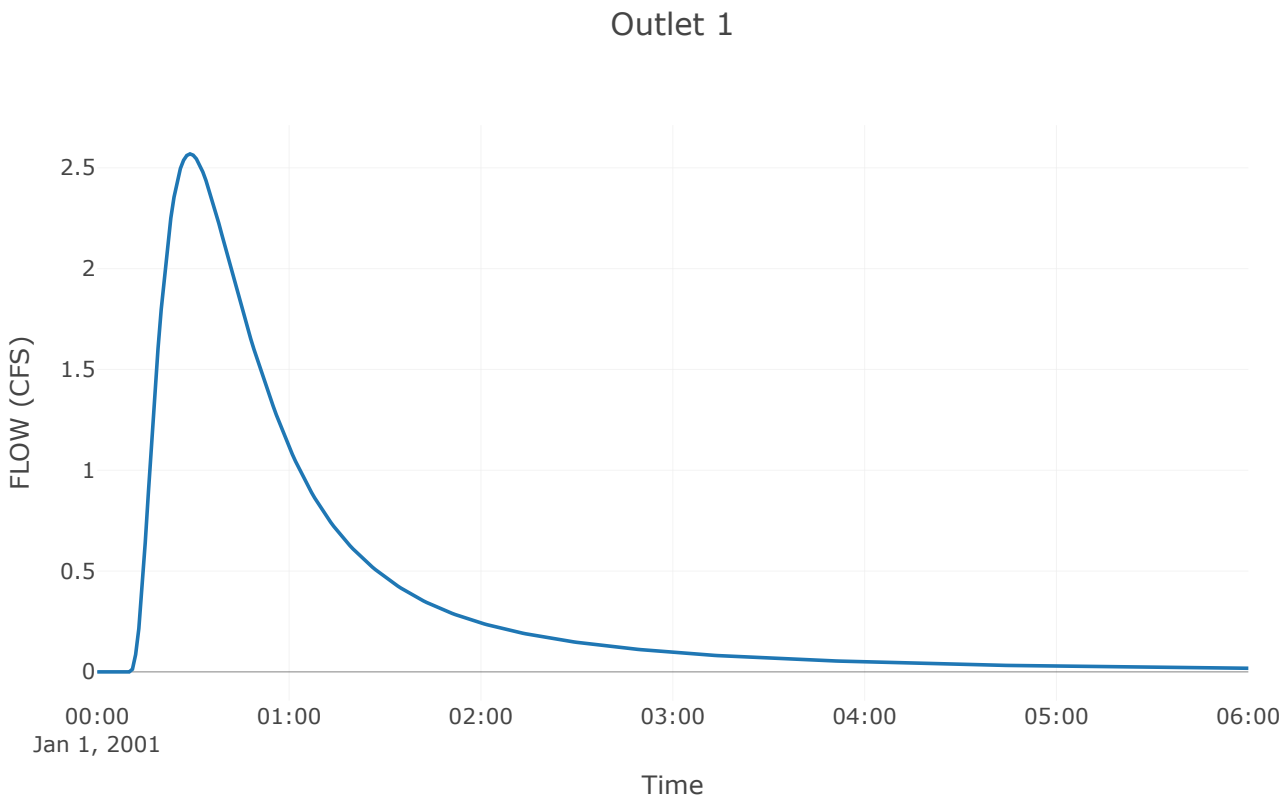
Downstream : 2E_Comparison

Results: BASIN 2	
Peak Discharge (CFS)	2.57
Time of Peak Discharge	01Jan2001, 00:29
Peak Inflow (CFS)	9.6
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.23
Maximum Storage (AC - FT)	0.19
Peak Elevation (FT)	9.79
Discharge Volume (AC - FT)	0.19

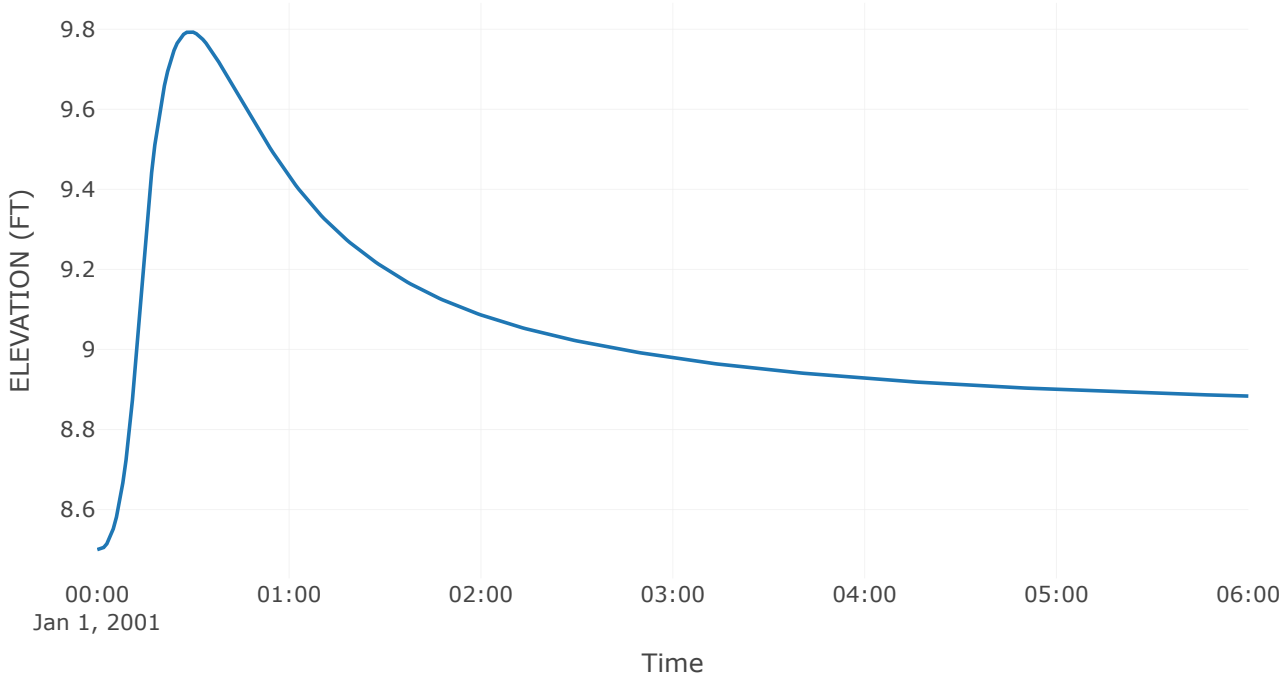

Storage
STORAGE (AC-FT)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time


Combined Inflow
FLOW-COMBINE (CFS)
10
8
6
4
2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

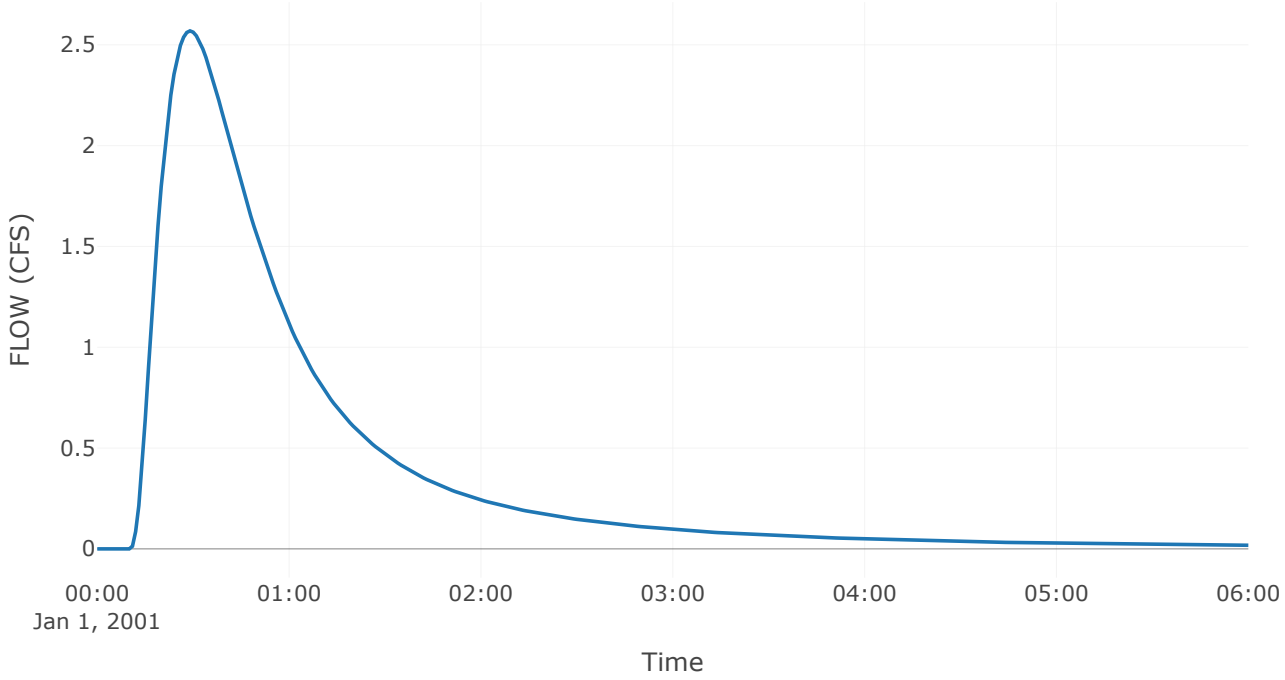

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.15
0.1
0.05
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
2.5
2
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

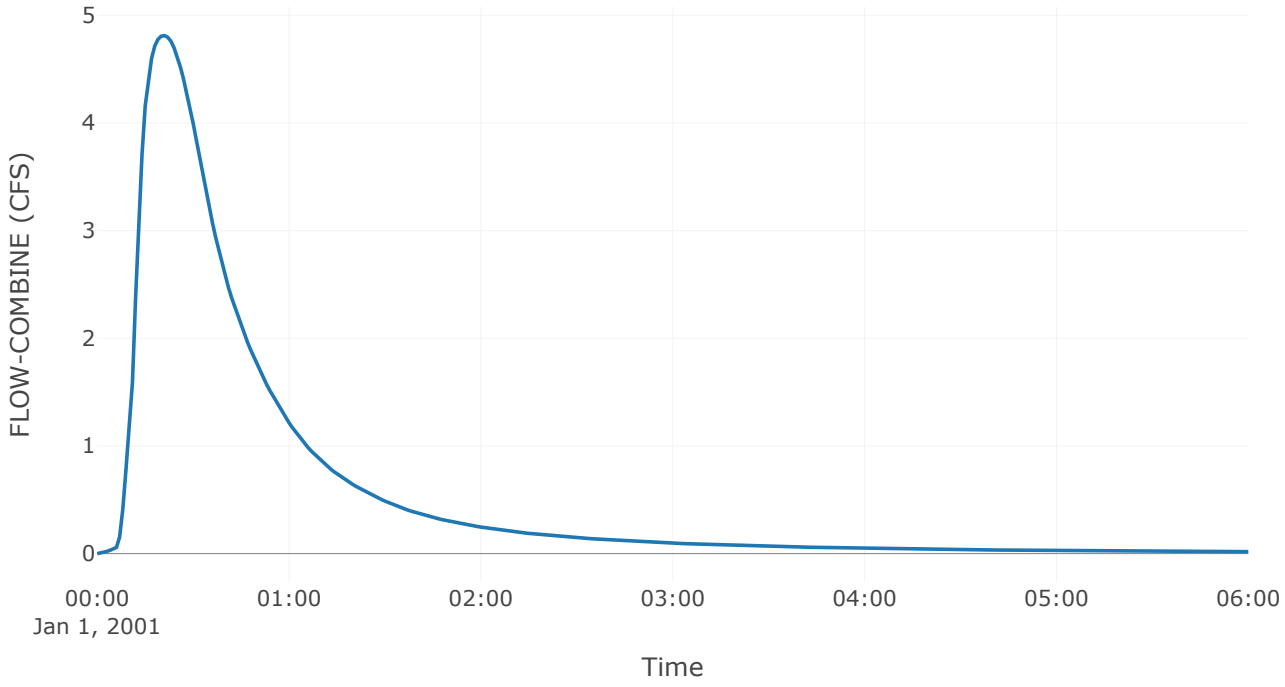


Junction: 2E_Comparison

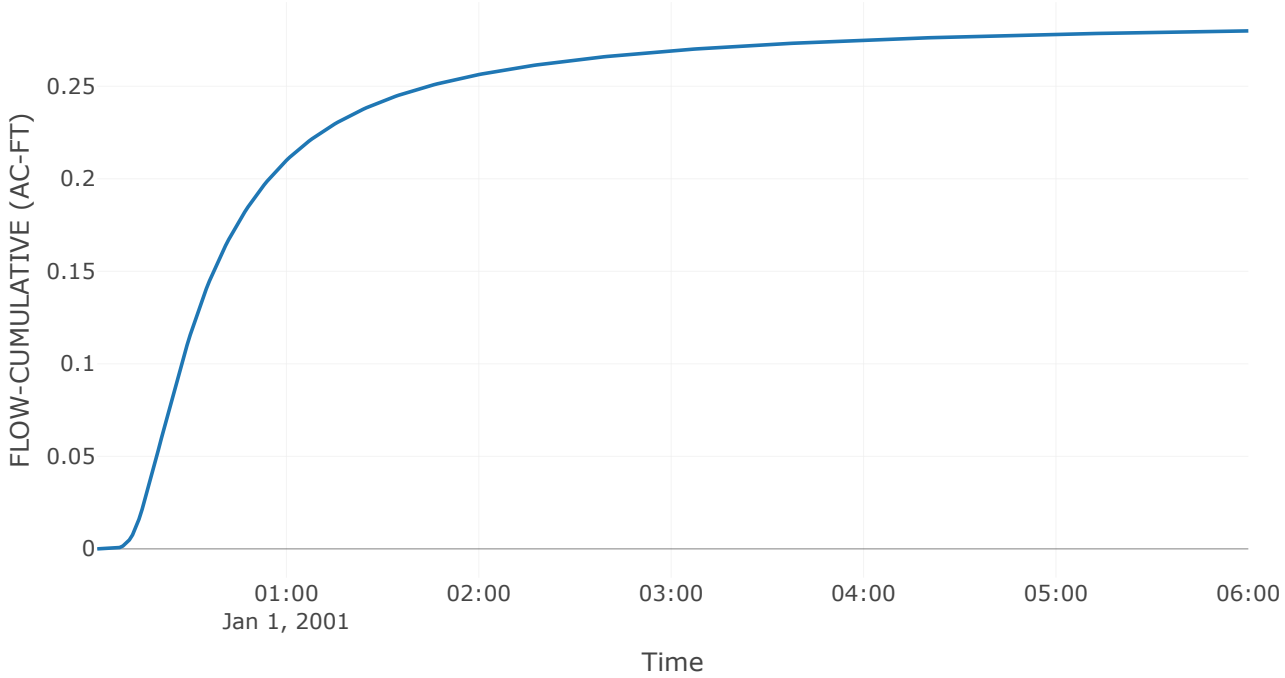
Results: 2E_Comparison

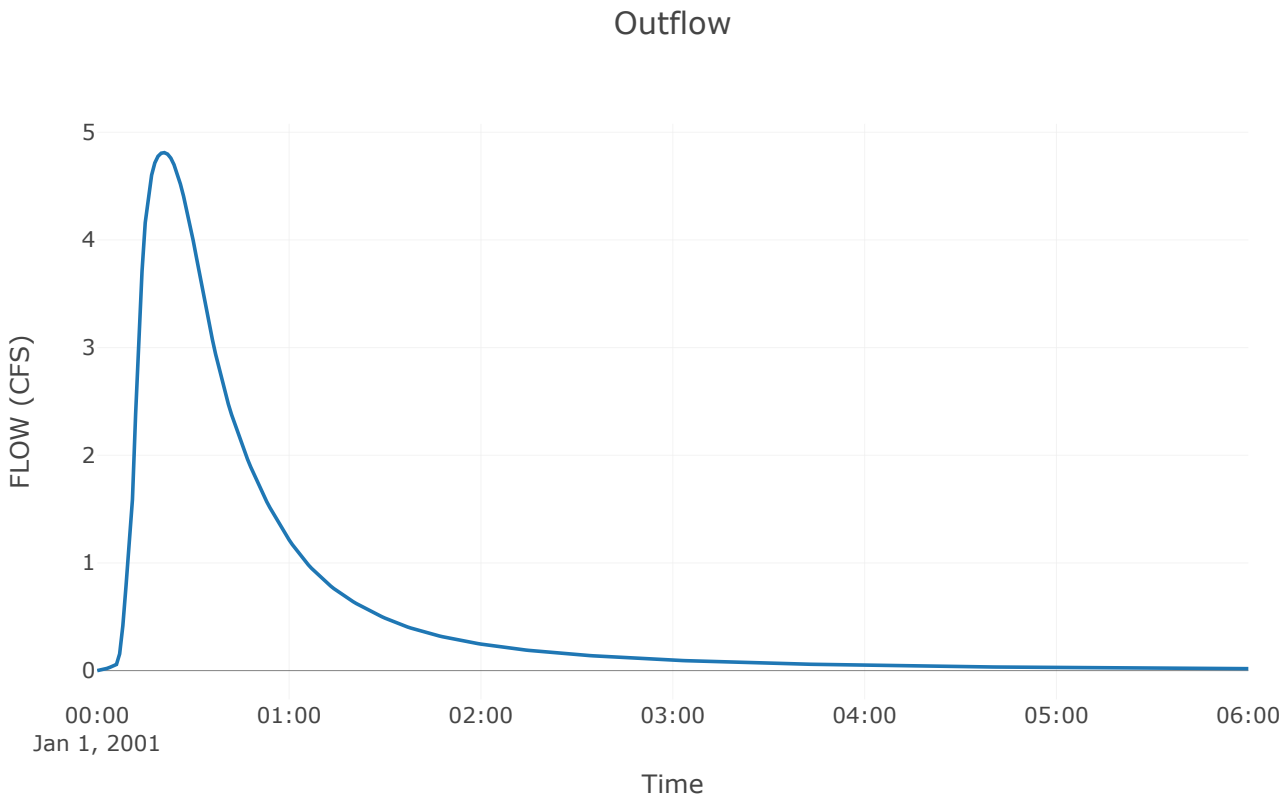
Peak Discharge (CFS)	4.81
Time of Peak Discharge	01Jan2001, 00:21

Combined Inflow



Cumulative Outflow



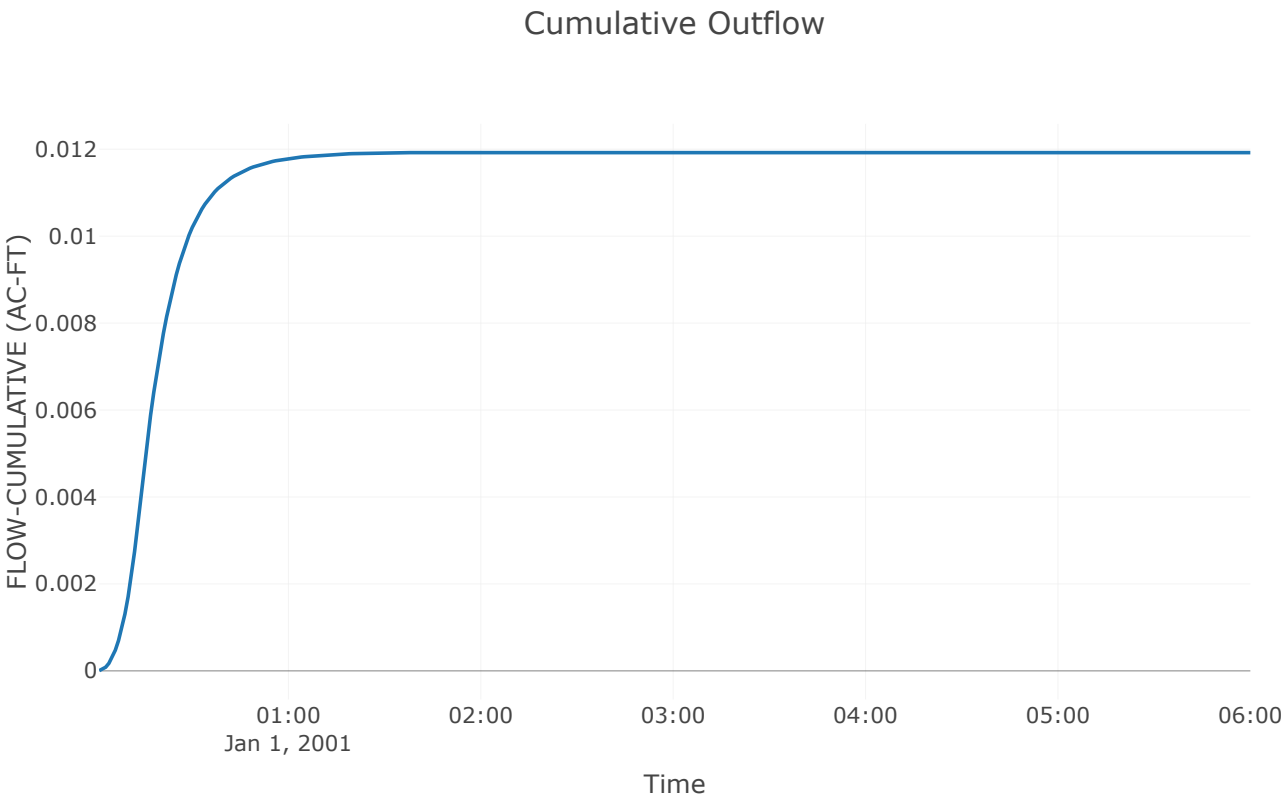

Outflow
FLOW (CFS)
5
4
3
2
1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

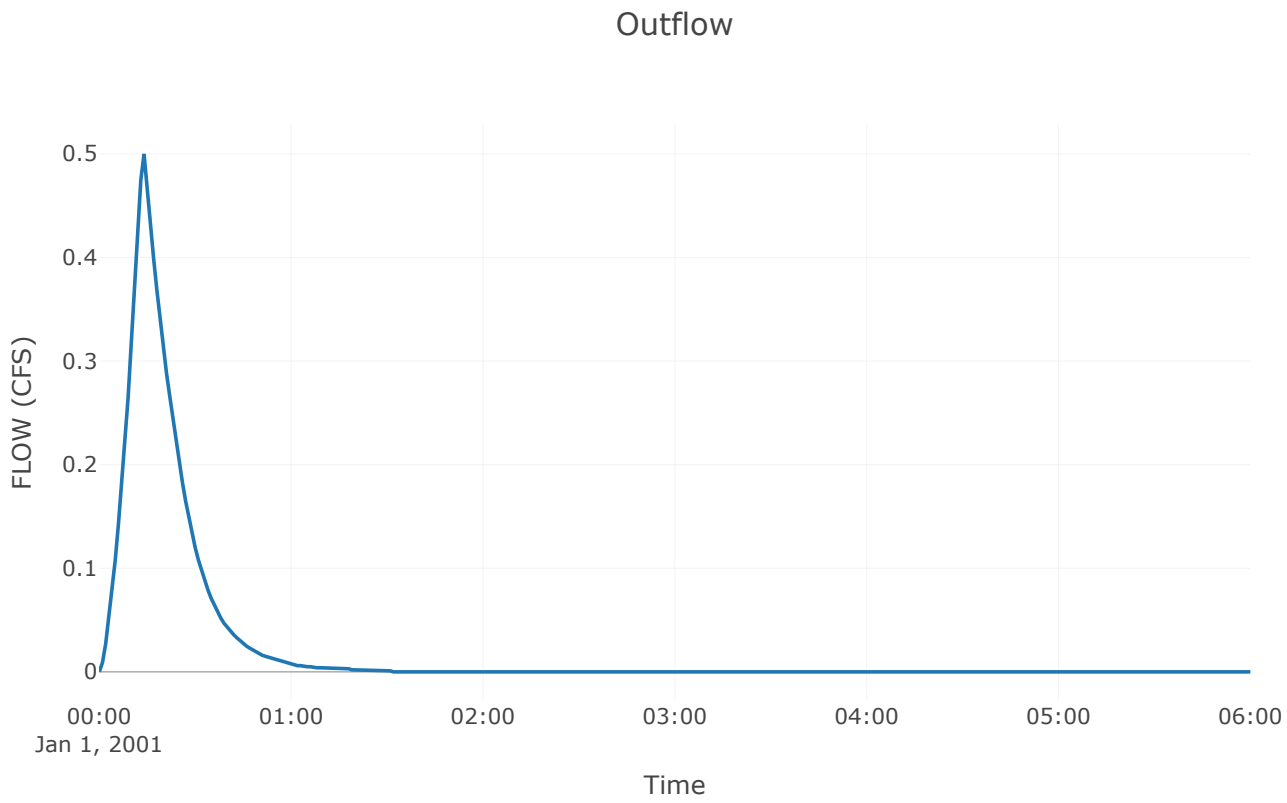
Source: 5P

Downstream : 1E_Comparison
Flow Method : Gage Flow
Flow Gage : 5p 25

Results: 5P

Peak Discharge (CFS)	0.5
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.012
0.01
0.008
0.006
0.004
0.002
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

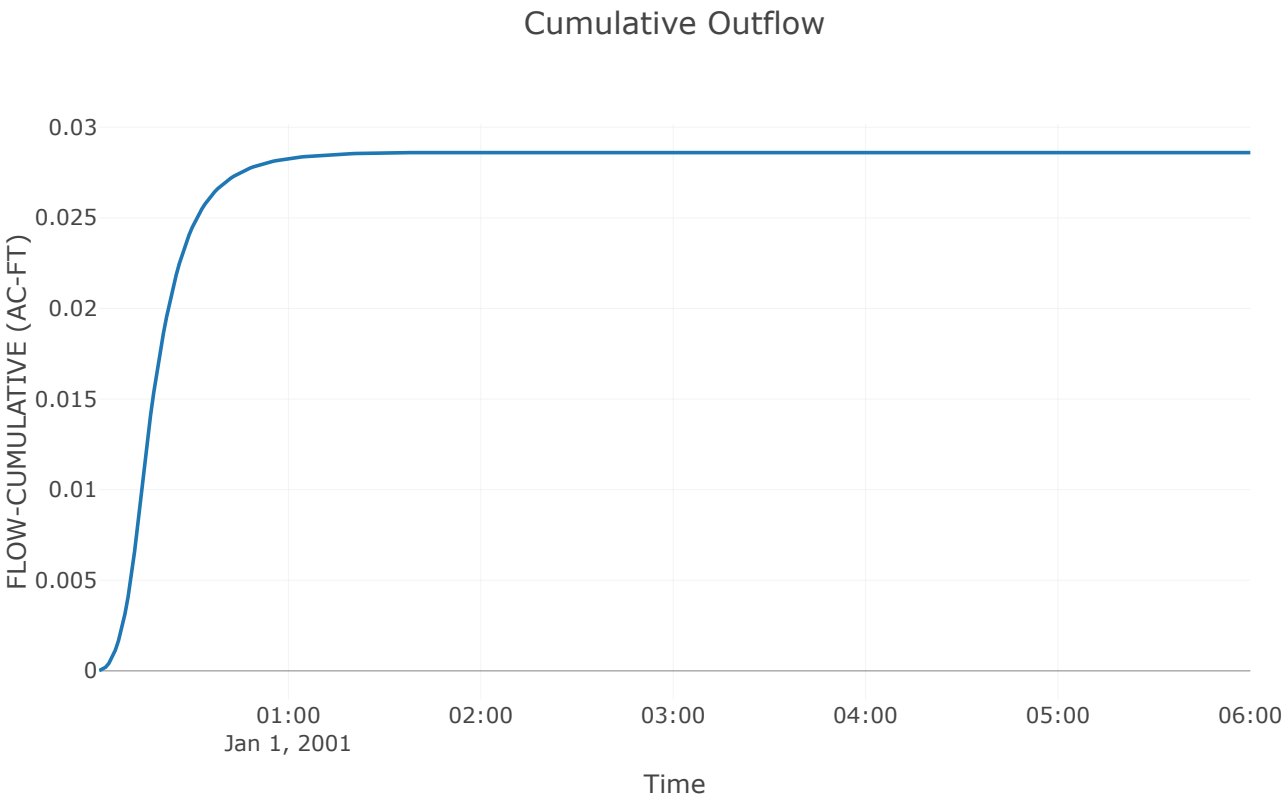

Outflow
FLOW (CFS)
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

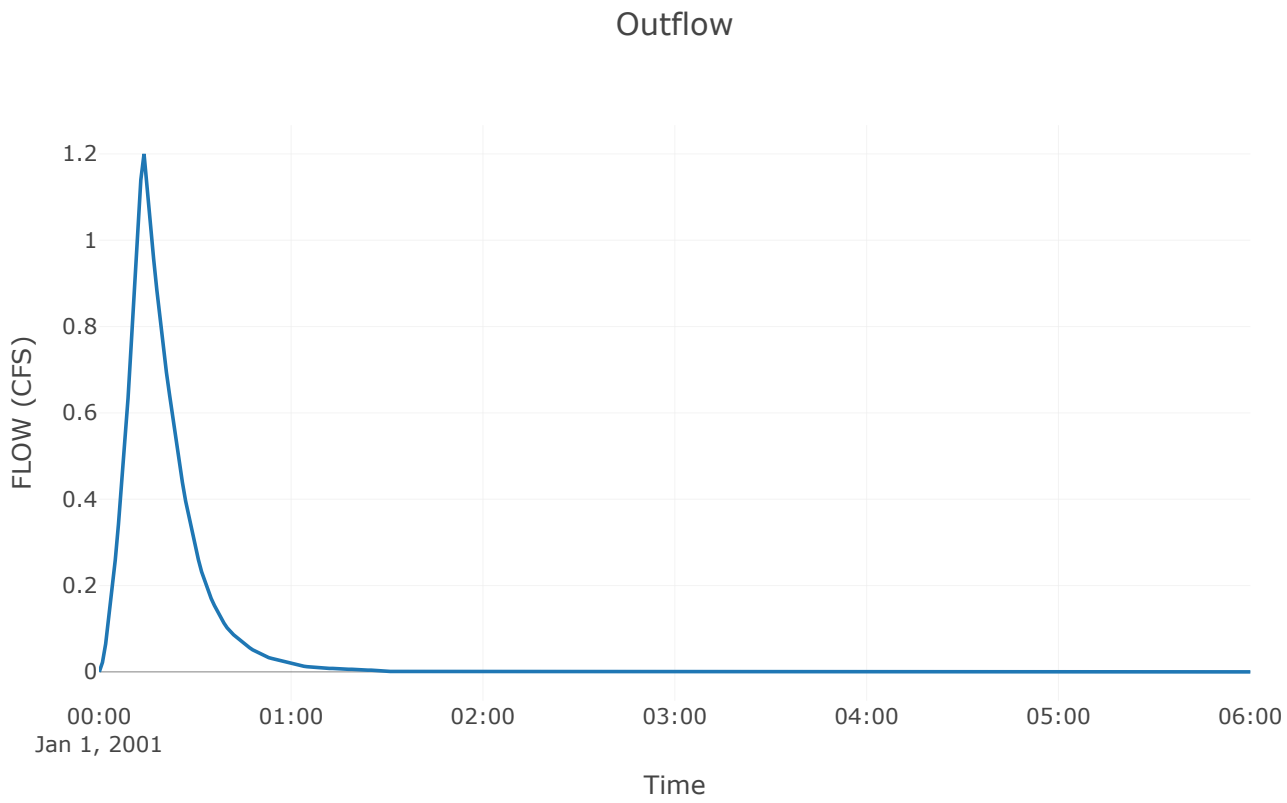
Source: 1P

Downstream : Basin 1
Flow Method : Gage Flow
Flow Gage : 1p 25

Results: 1P

Peak Discharge (CFS)	1.2
Time of Peak Discharge	01Jan2001, 00:14

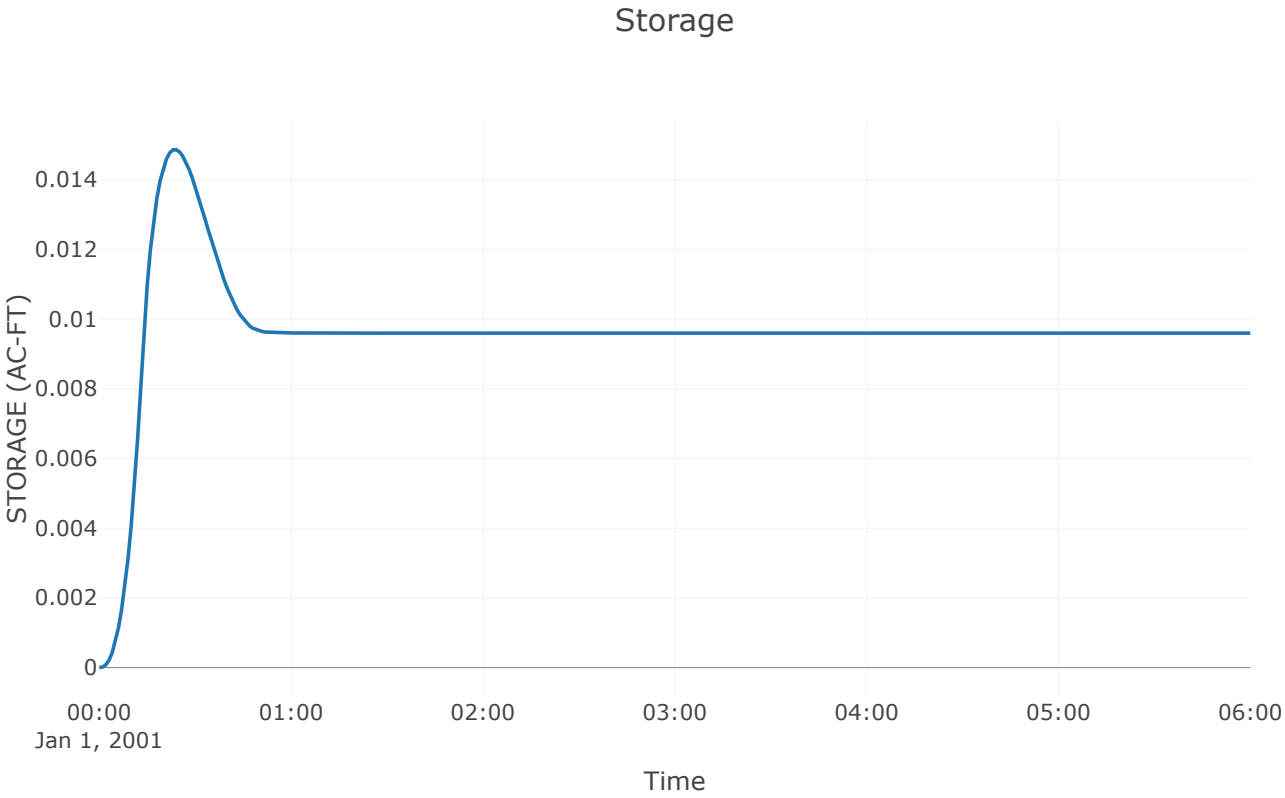

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

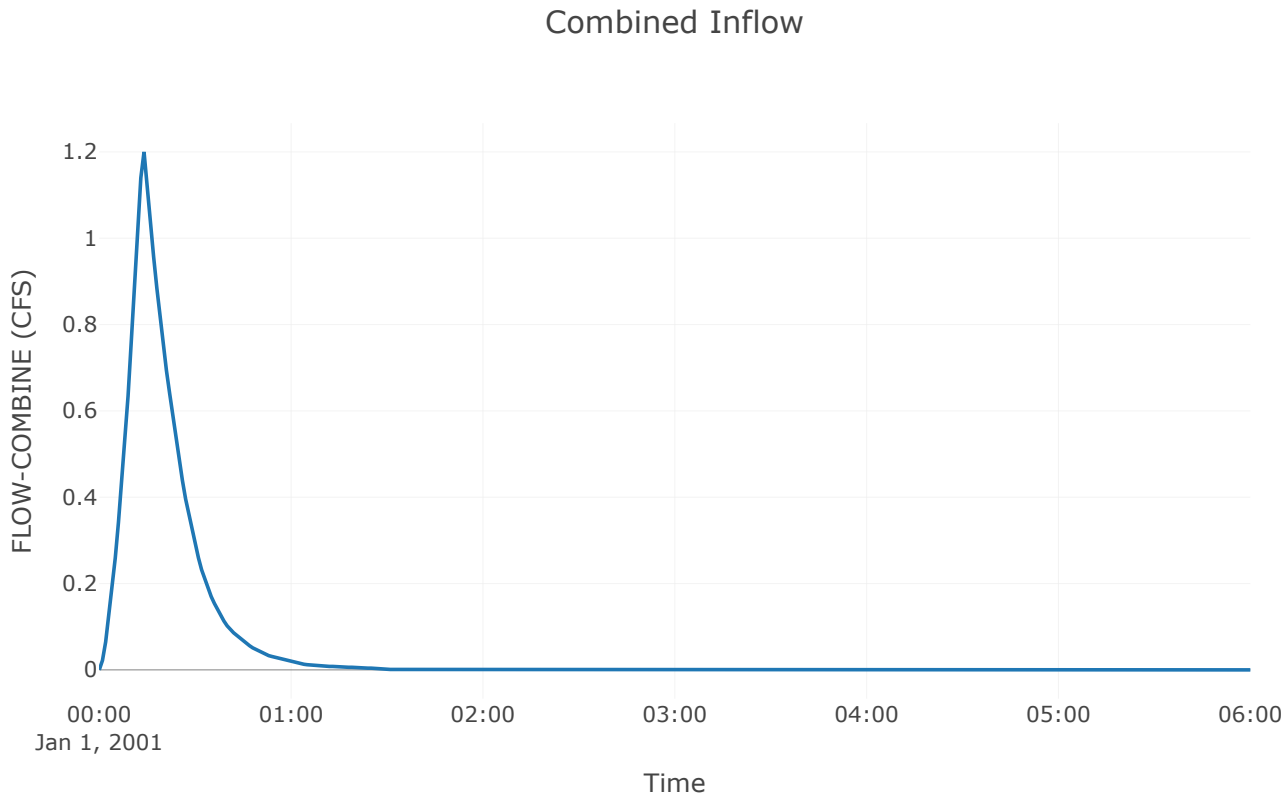

Outflow
FLOW (CFS)
1.2
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

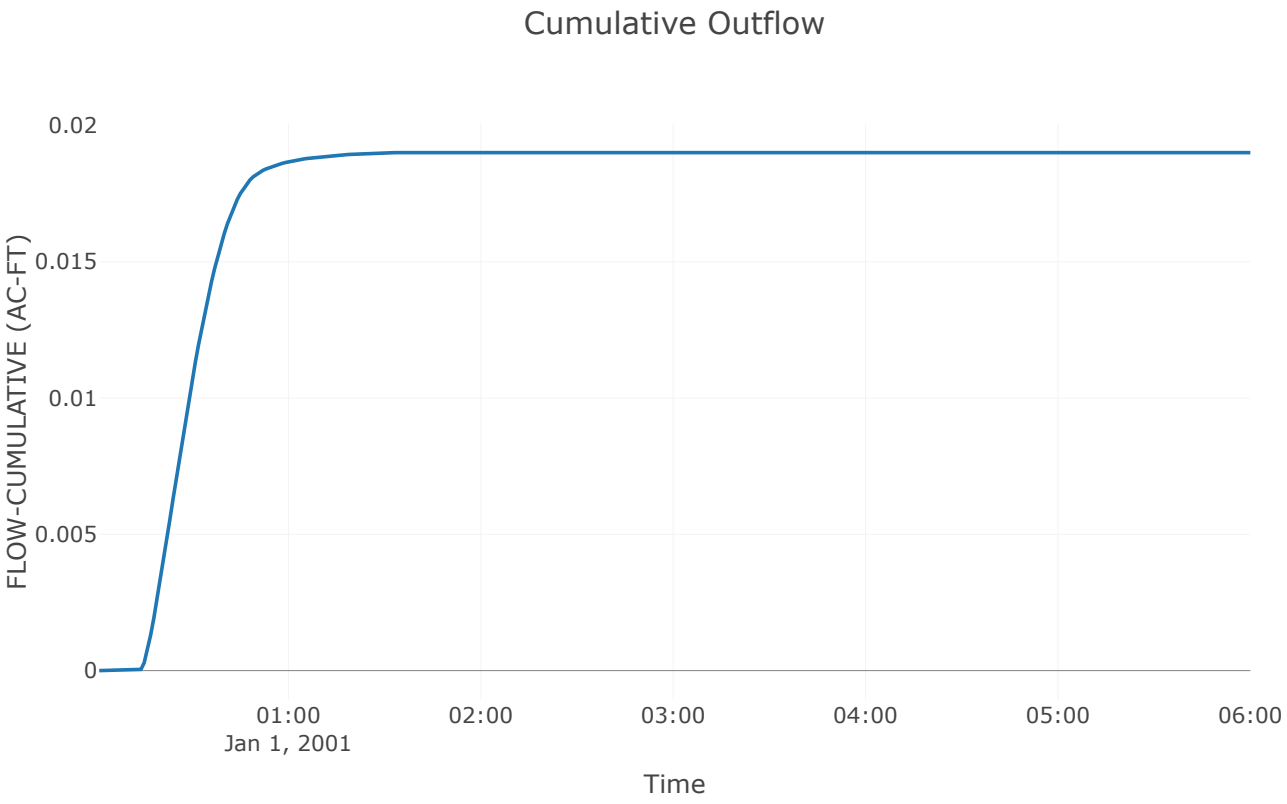
Reservoir: BASIN 1

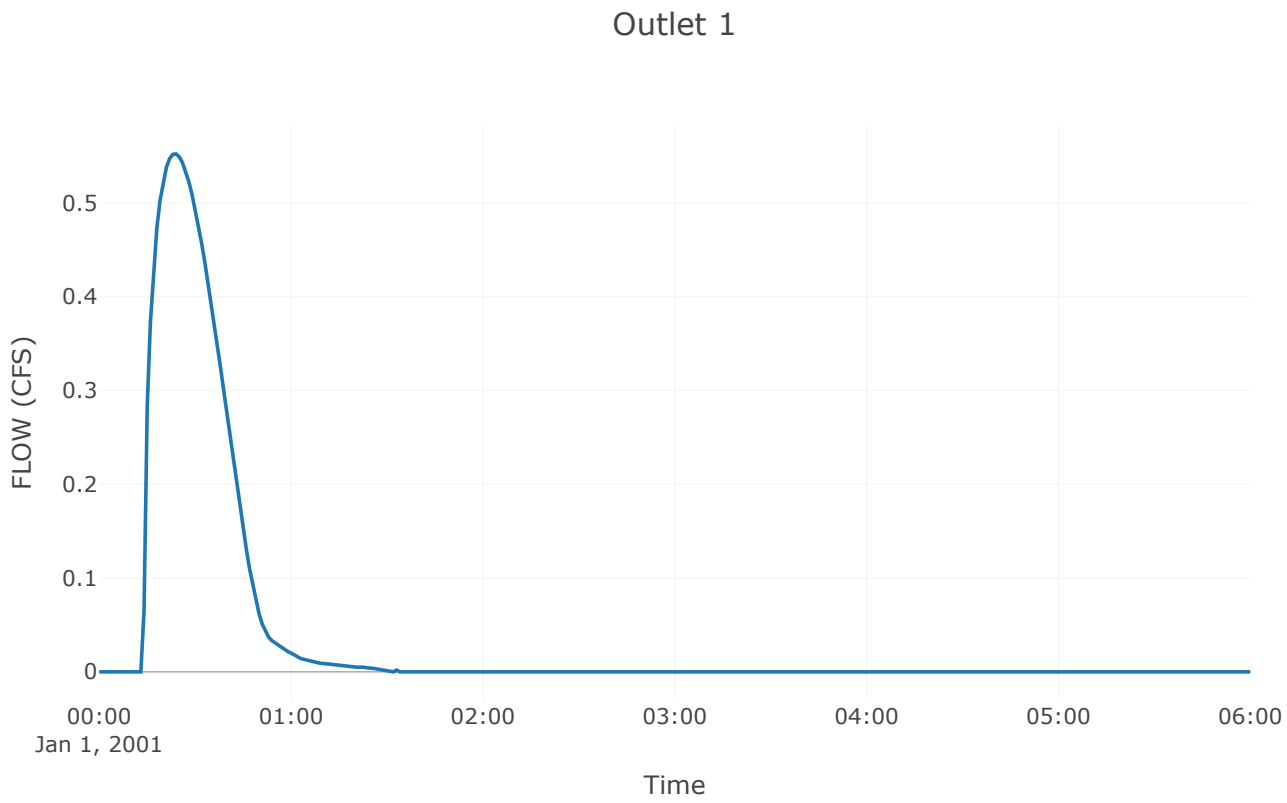
Downstream : 1E_Comparison

Results: BASIN 1	
Peak Discharge (CFS)	0.55
Time of Peak Discharge	01Jan2001, 00:24
Peak Inflow (CFS)	1.2
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.03
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	9.93
Discharge Volume (AC - FT)	0.02

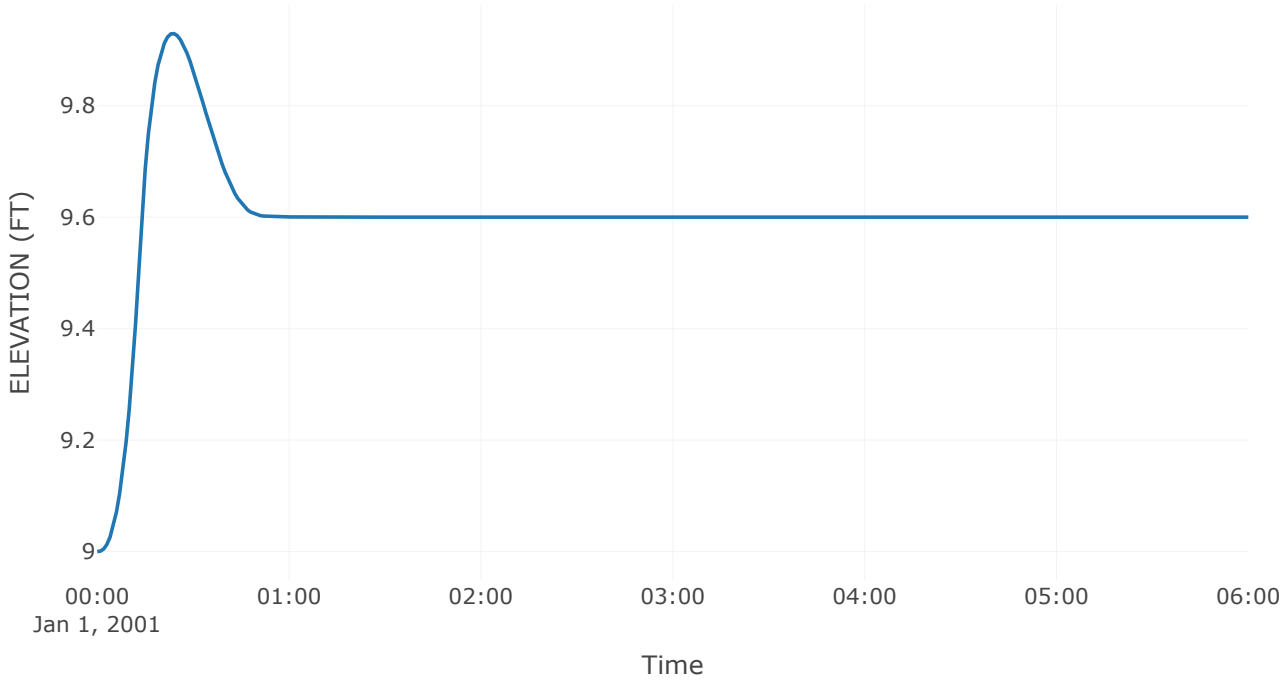

Storage
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
STORAGE (AC-FT)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time


Combined Inflow
1.2
1
0.8
0.6
0.4
0.2
0
FLOW-COMBINE (CFS)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

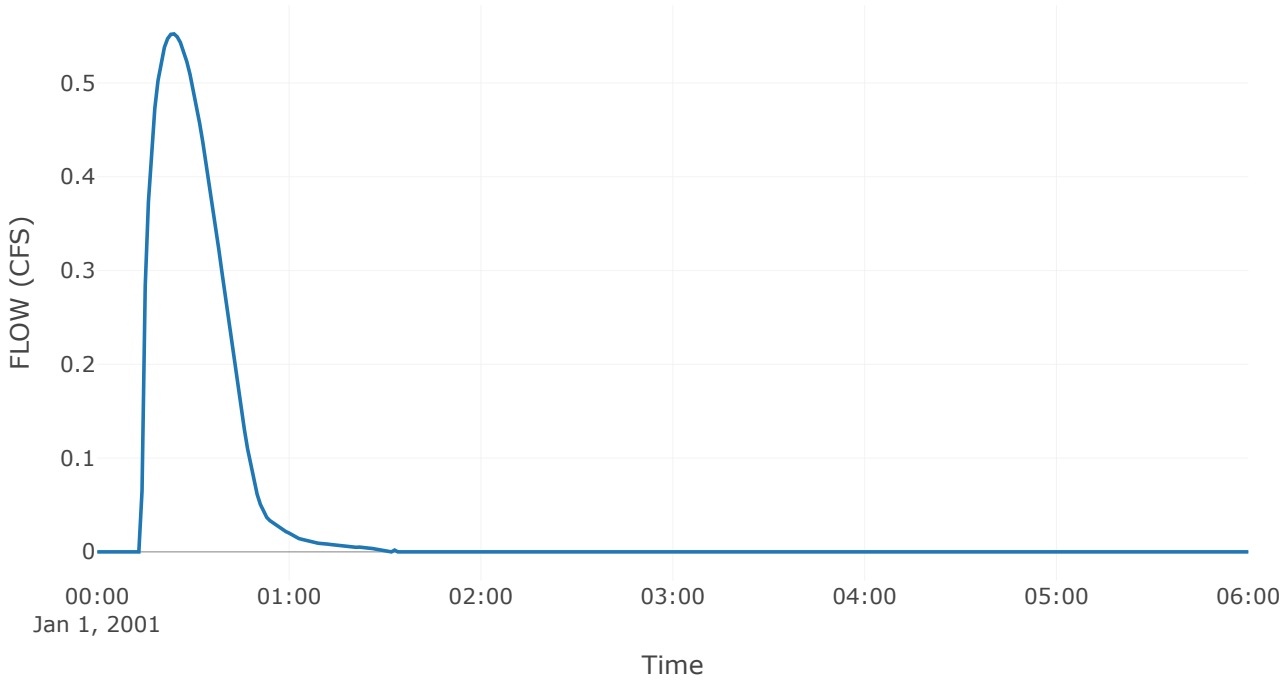

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

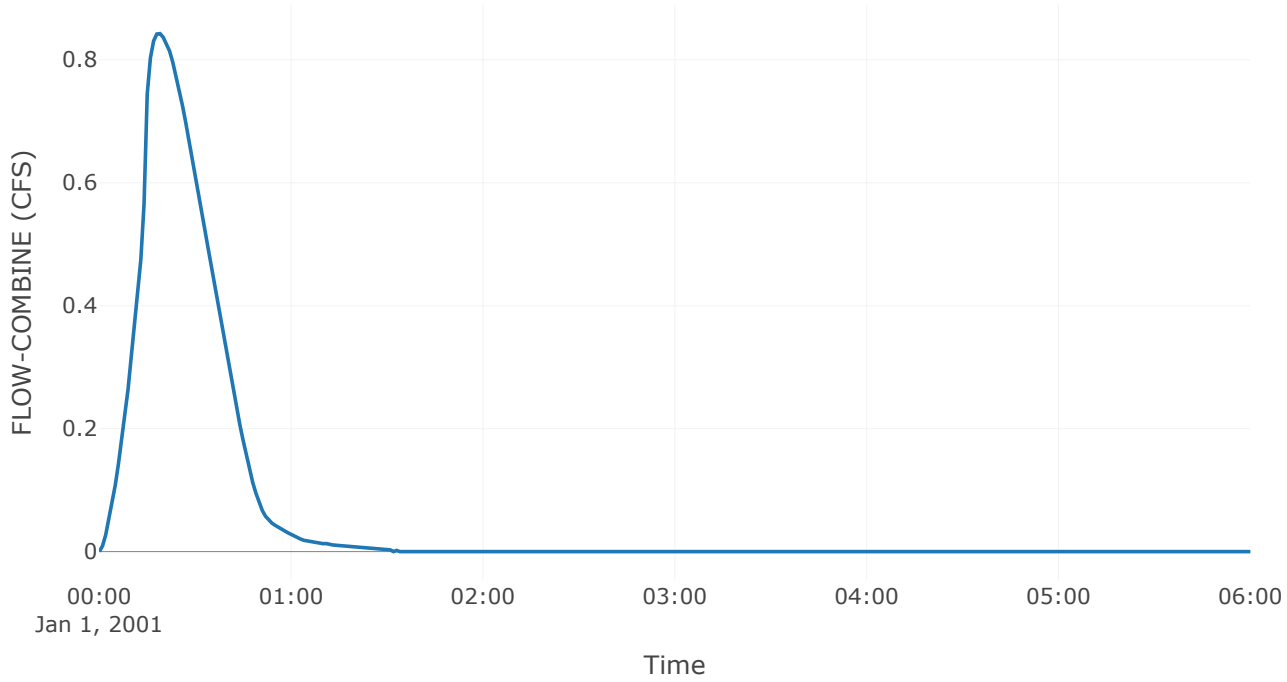


Junction: 1E_Comparison

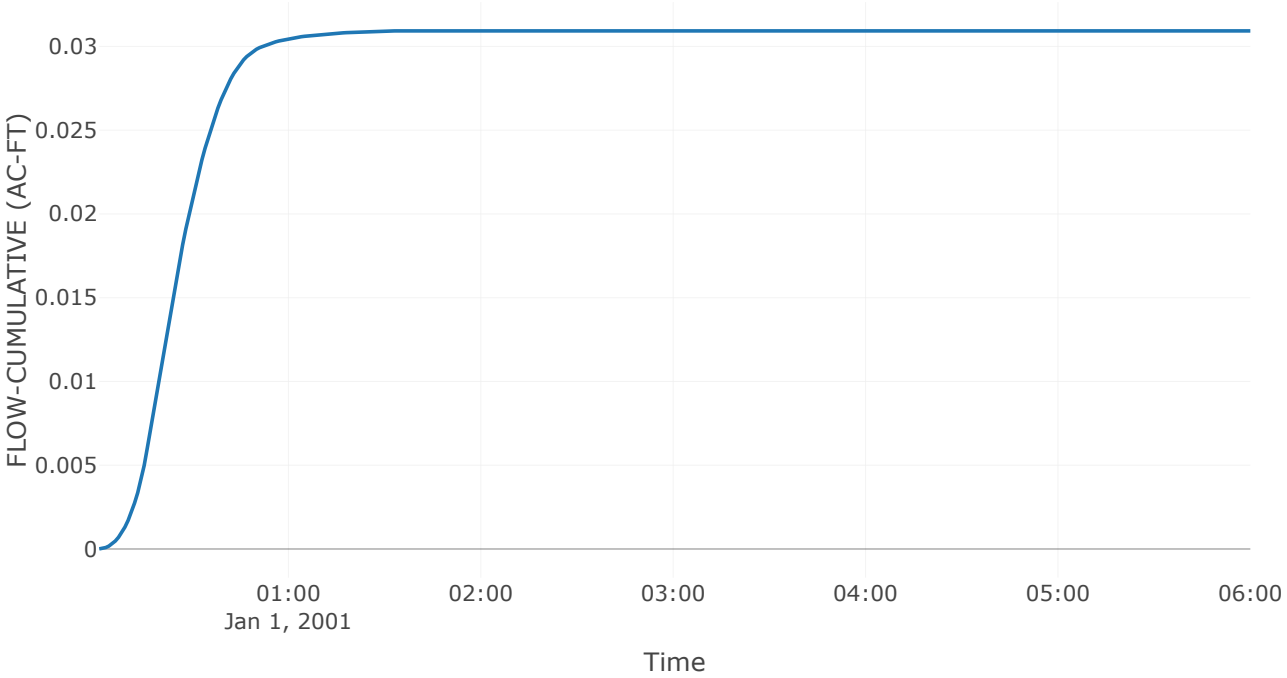
Results: 1E_Comparison

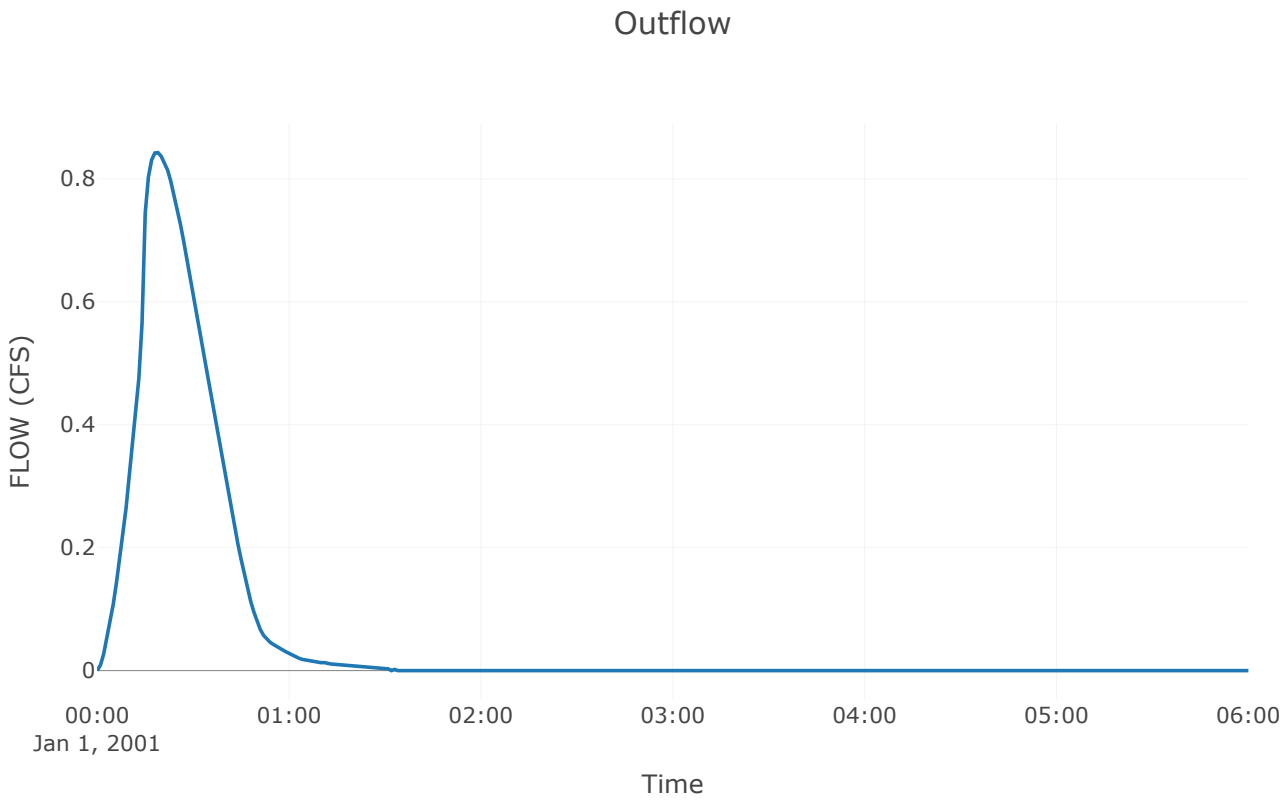
Peak Discharge (CFS)	0.84
Time of Peak Discharge	01Jan2001, 00:19

Combined Inflow



Cumulative Outflow




Outflow
FLOW (CFS)
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Project: 22_010_Final_Plat_rev
Simulation Run: Prop_100
Simulation Start: 31 December 2000, 24:00
Simulation End: 1 January 2001, 06:00

HMS Version: 4.11
Executed: 24 January 2024, 17:24

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume ()
6p	Not specified	0.3	01Jan2001, 00:14	Not specified
4p	Not specified	3.6	01Jan2001, 00:14	Not specified
Basin 4	Not specified	3.3	01Jan2001, 00:15	Not specified
3p	Not specified	1.5	01Jan2001, 00:14	Not specified
Basin 3	Not specified	0.96	01Jan2001, 00:20	Not specified
2p	Not specified	12.7	01Jan2001, 00:14	Not specified
Basin 2	Not specified	4.71	01Jan2001, 00:26	Not specified
2E_Comparison	Not specified	7.8	01Jan2001, 00:20	Not specified
5p	Not specified	0.6	01Jan2001, 00:14	Not specified
1p	Not specified	1.7	01Jan2001, 00:14	Not specified
Basin 1	Not specified	0.71	01Jan2001, 00:24	Not specified
1E_Comparison	Not specified	1.09	01Jan2001, 00:17	Not specified

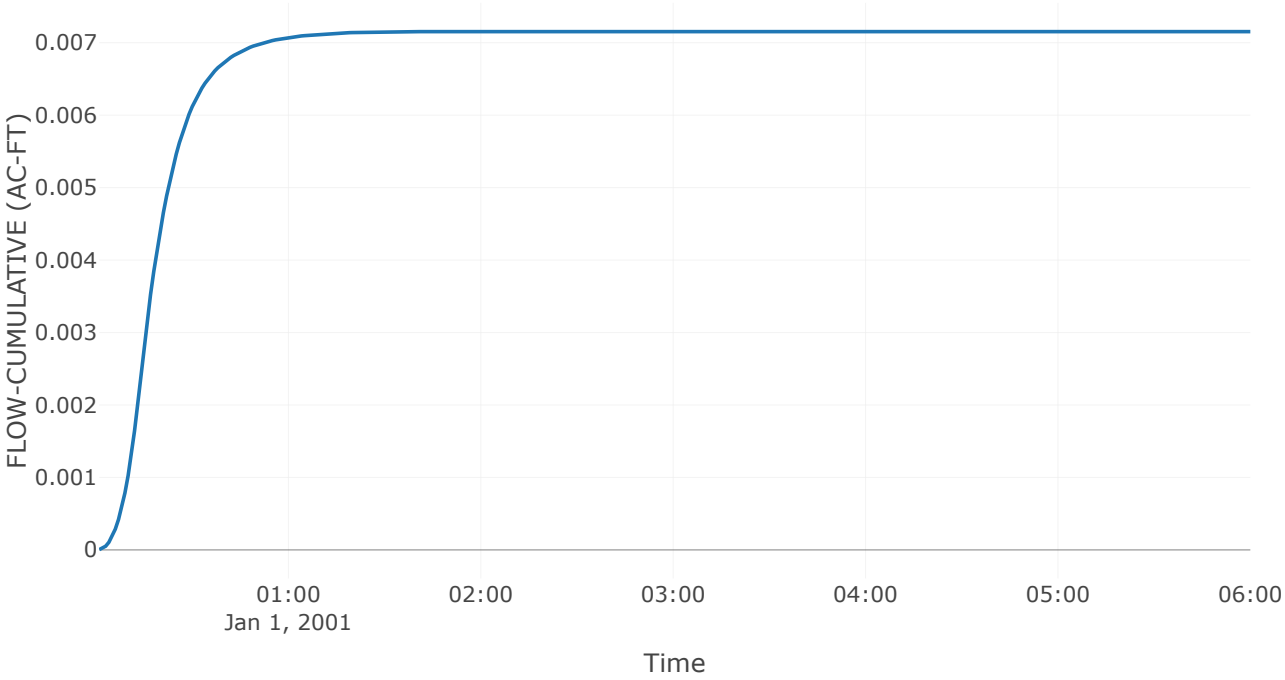
Source: 6P

Downstream : 2E_Comparison
Flow Method : Gage Flow
Flow Gage : 6p 100

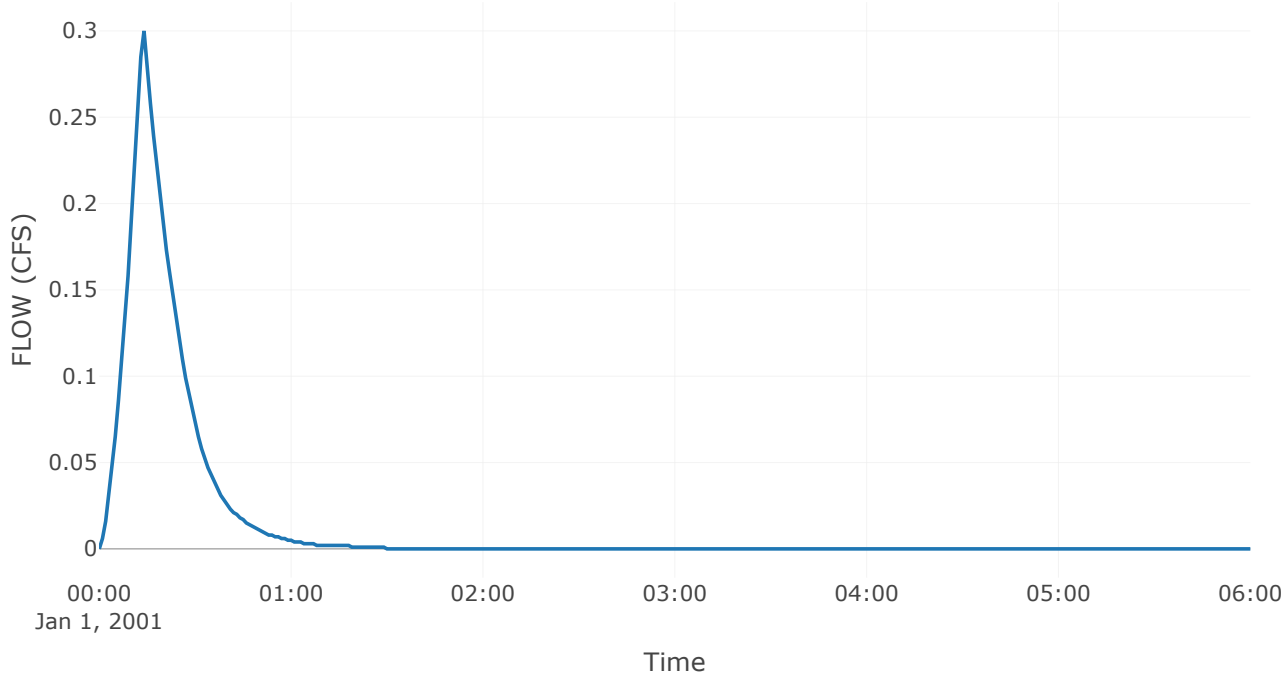
Results: 6P

Peak Discharge (CFS)	0.3
Time of Peak Discharge	01Jan2001, 00:14

Cumulative Outflow



Outflow

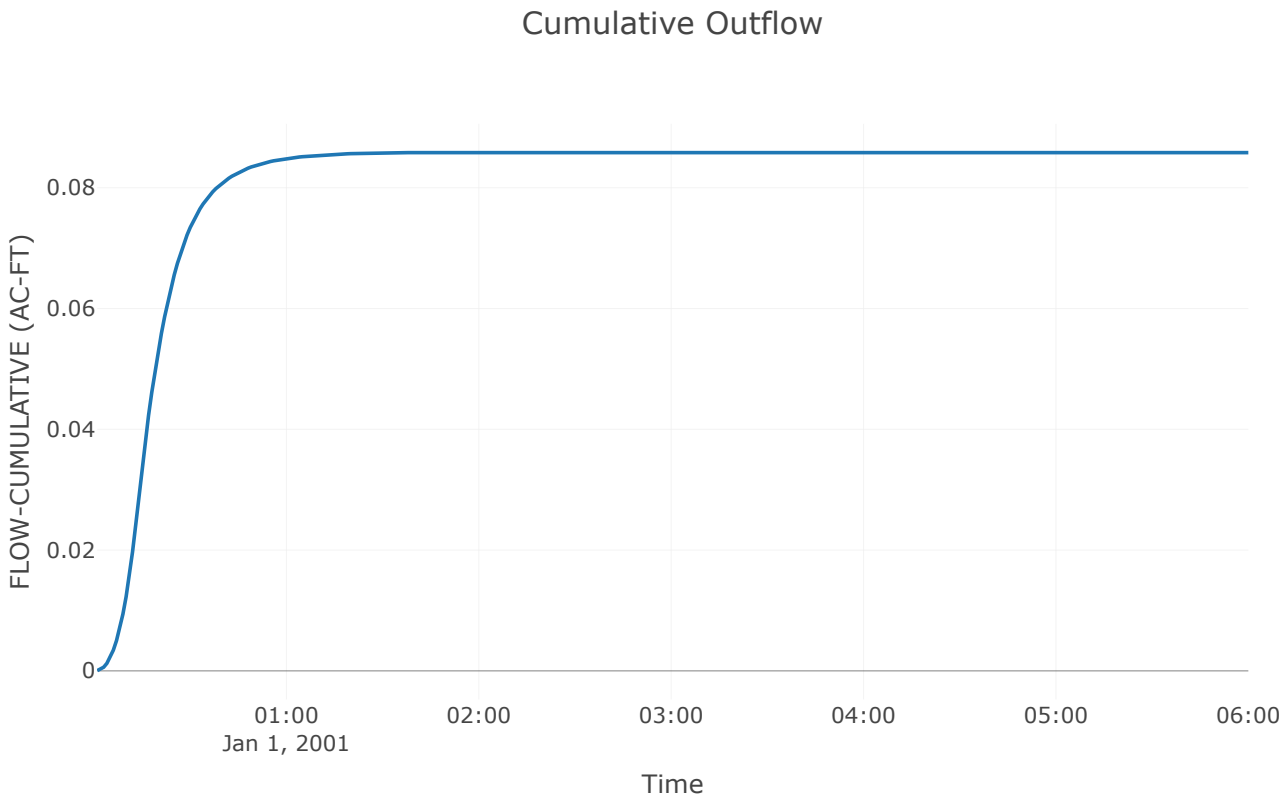


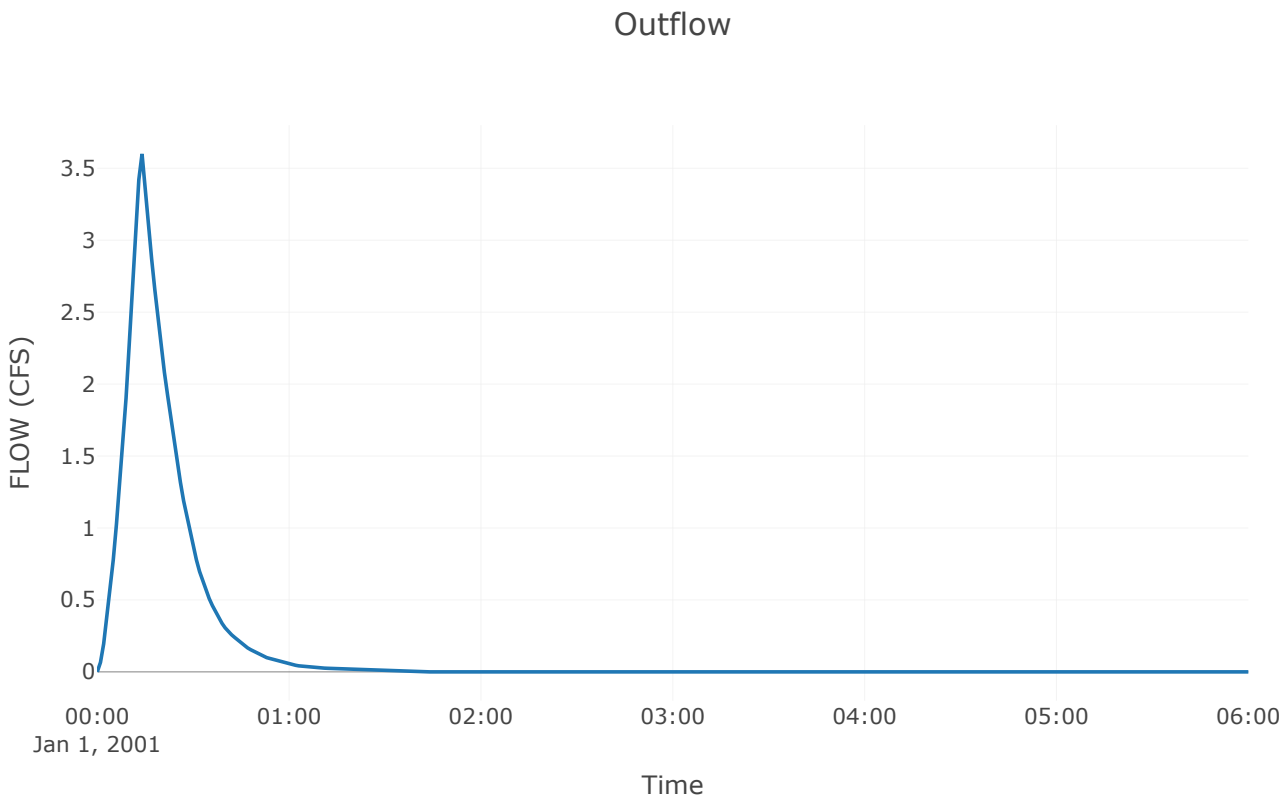
Source: 4P

Downstream : Basin 4
Flow Method : Gage Flow
Flow Gage : 4p 100

Results: 4P

Peak Discharge (CFS)	3.6
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.08
0.06
0.04
0.02
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

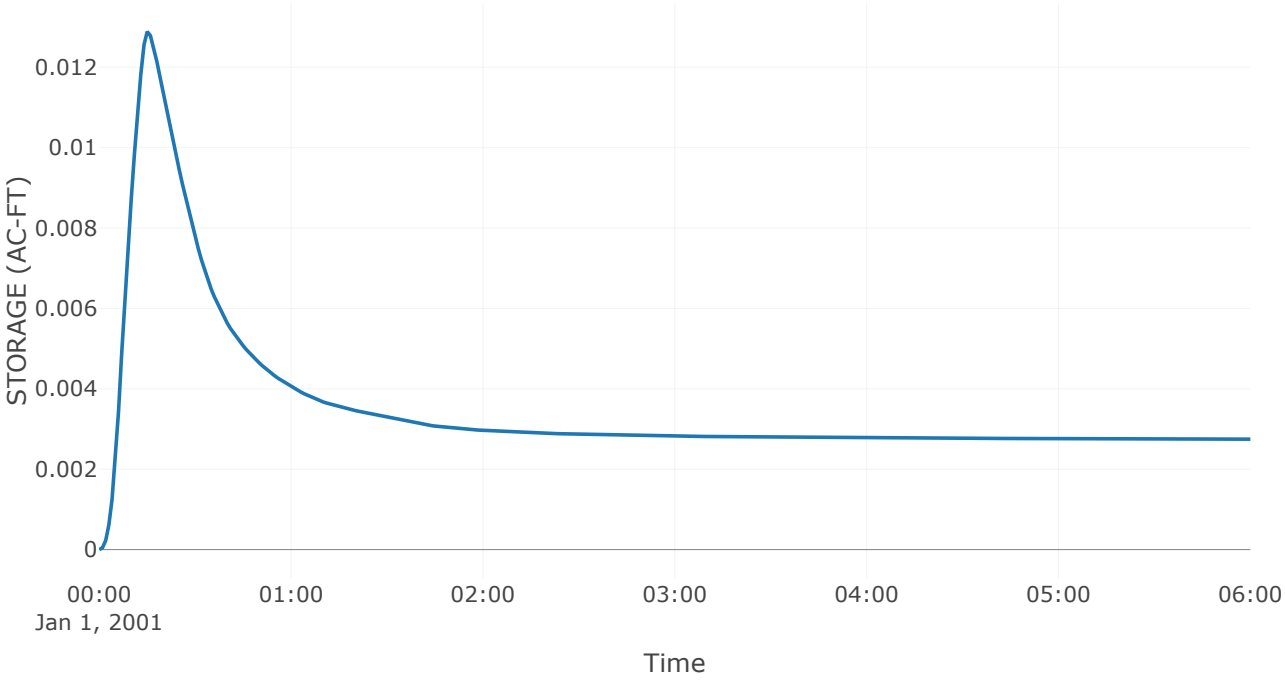

Outflow
FLOW (CFS)
3.5
3
2.5
2
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 4

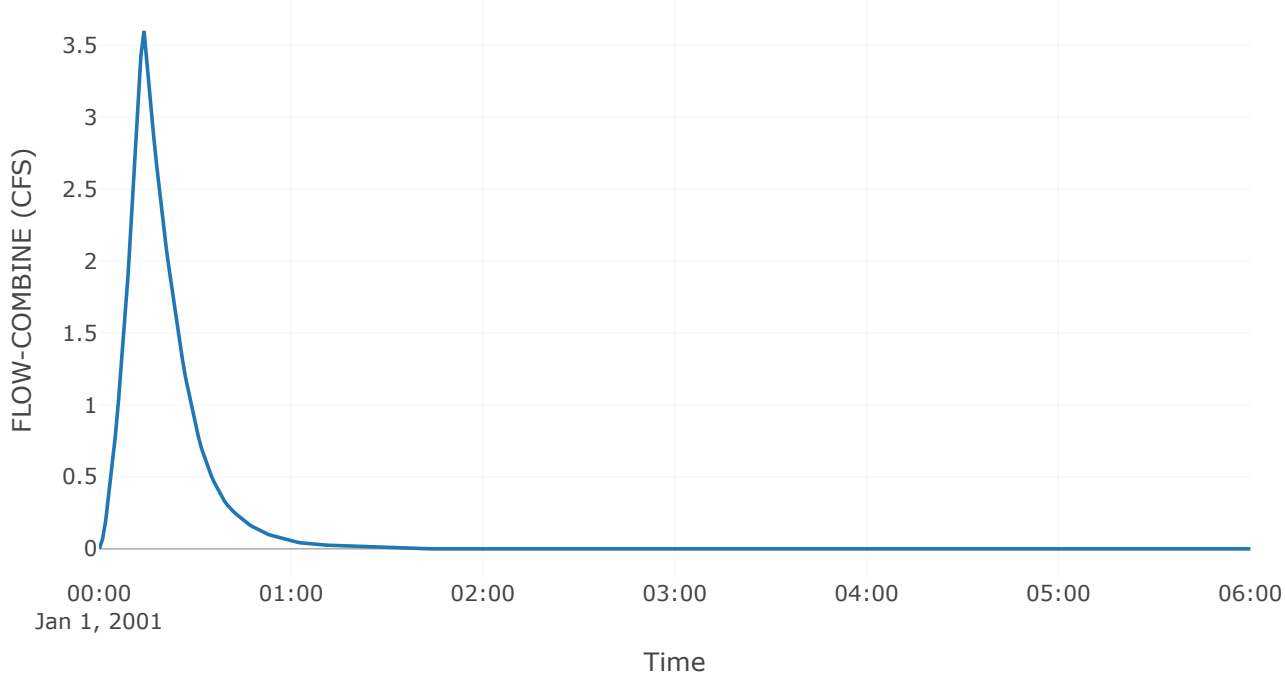
Downstream : 2E_Comparison

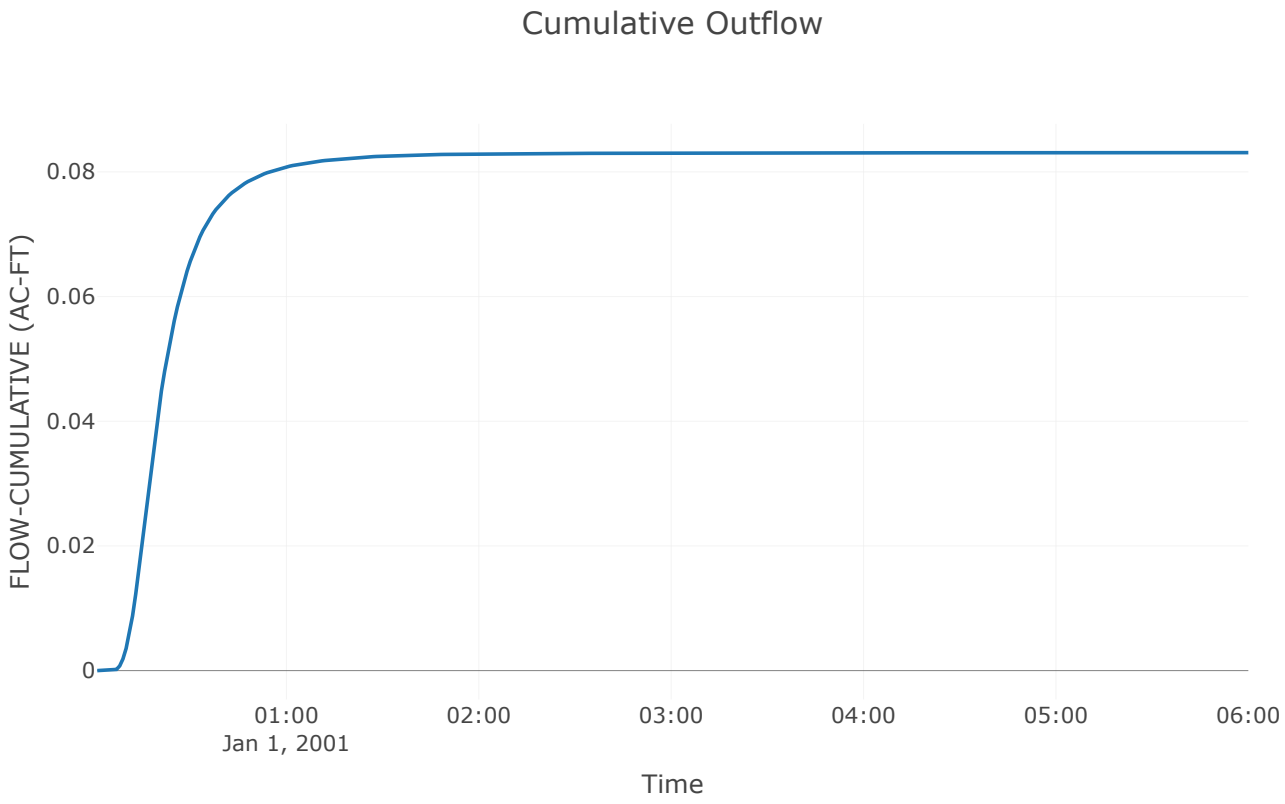
Results: BASIN 4	
Peak Discharge (CFS)	3.3
Time of Peak Discharge	01Jan2001, 00:15
Peak Inflow (CFS)	3.6
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.09
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	8.49
Discharge Volume (AC - FT)	0.08

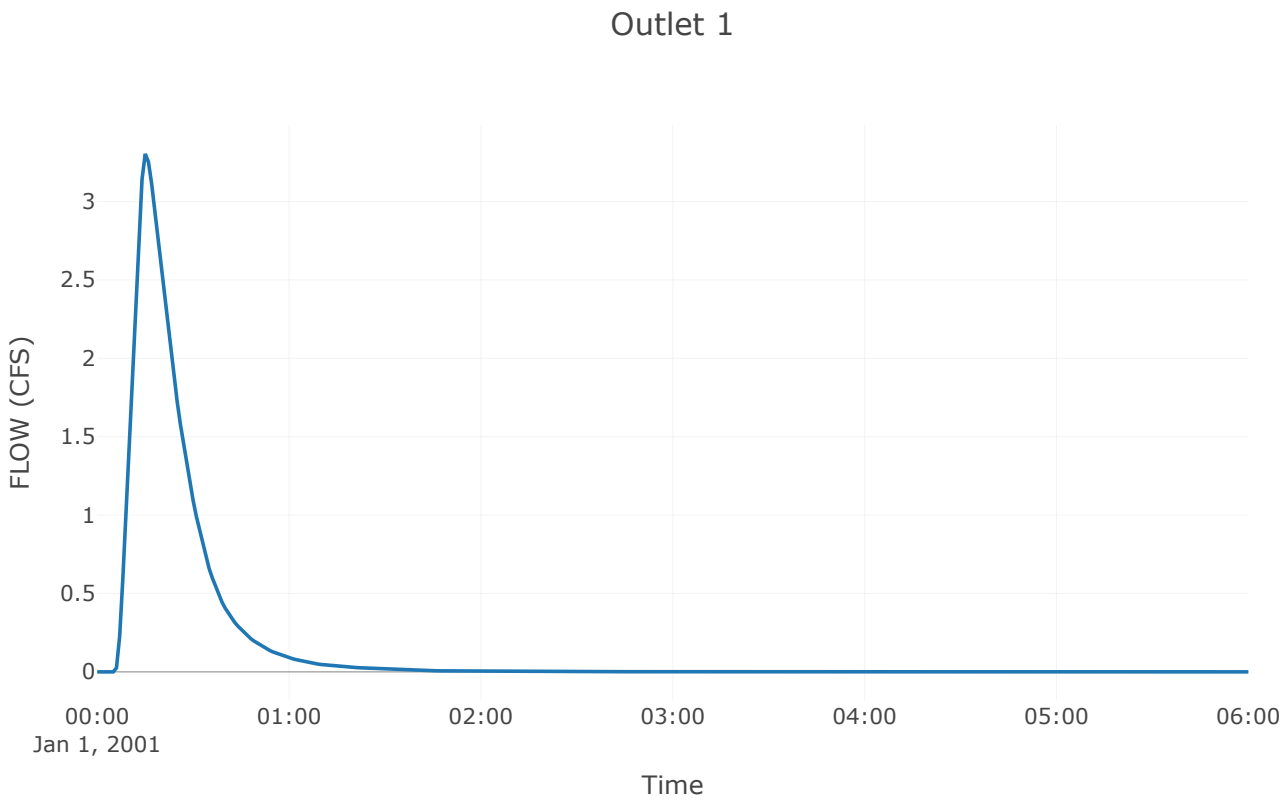
Storage



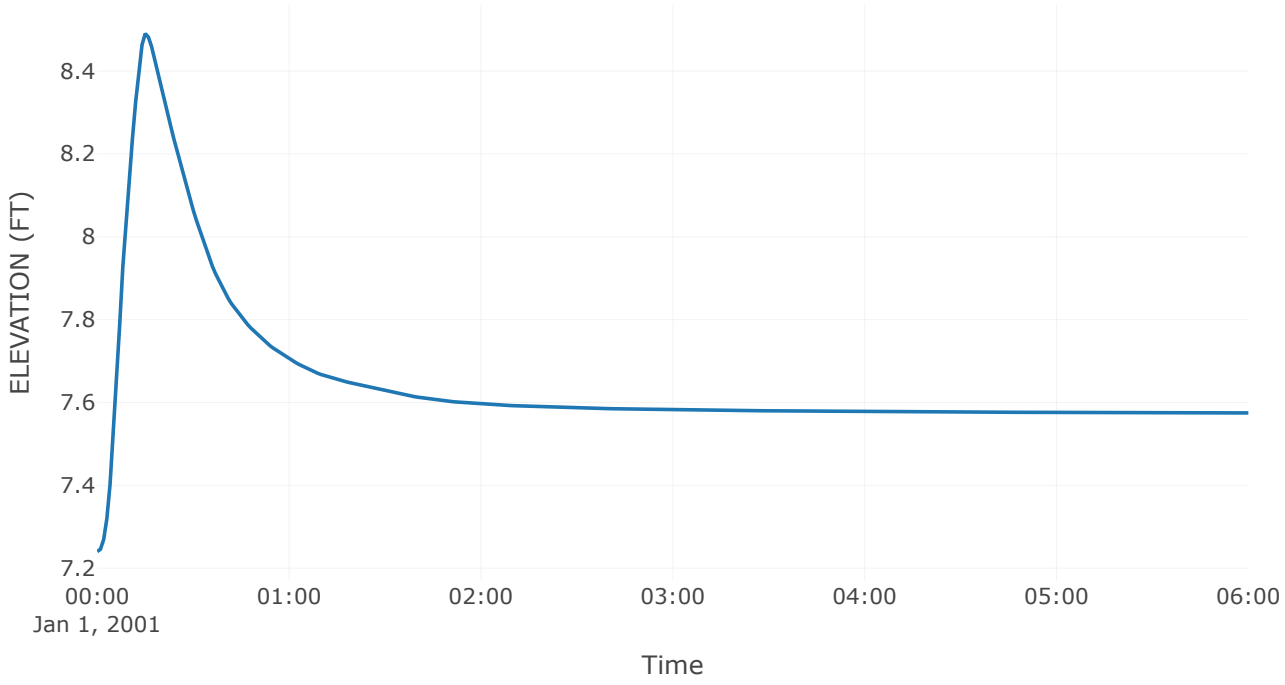
Combined Inflow



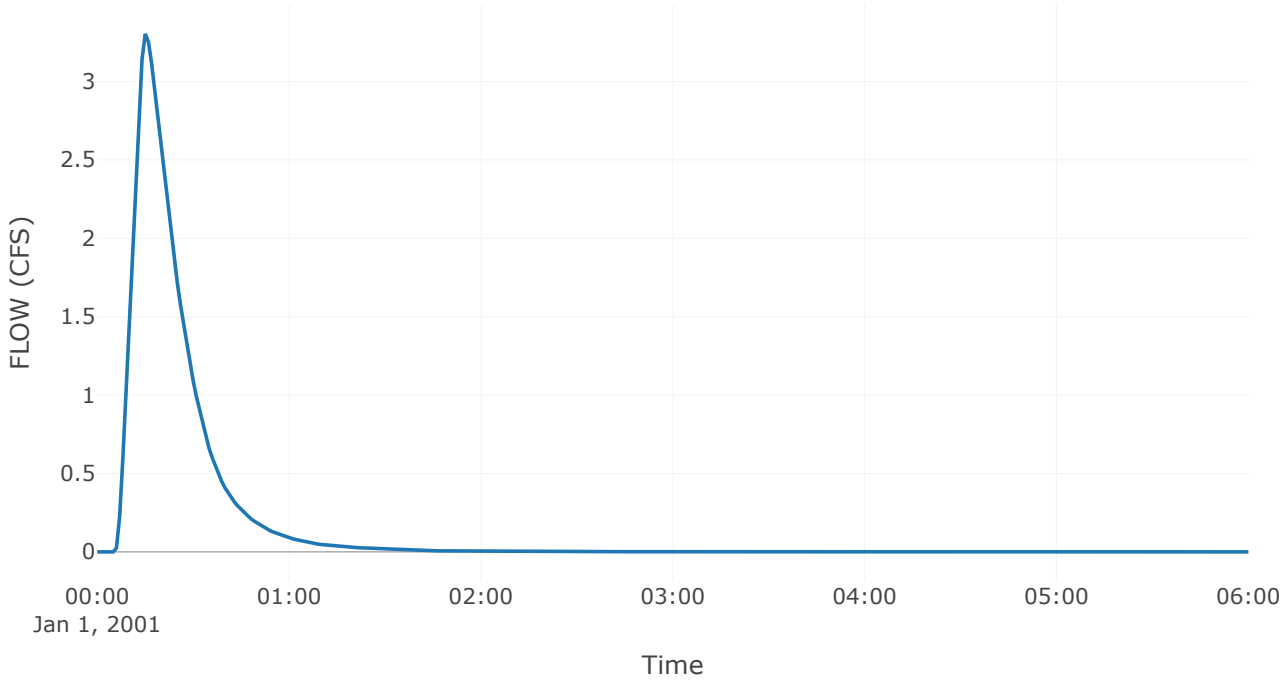

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.08
0.06
0.04
0.02
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
3
2.5
2
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

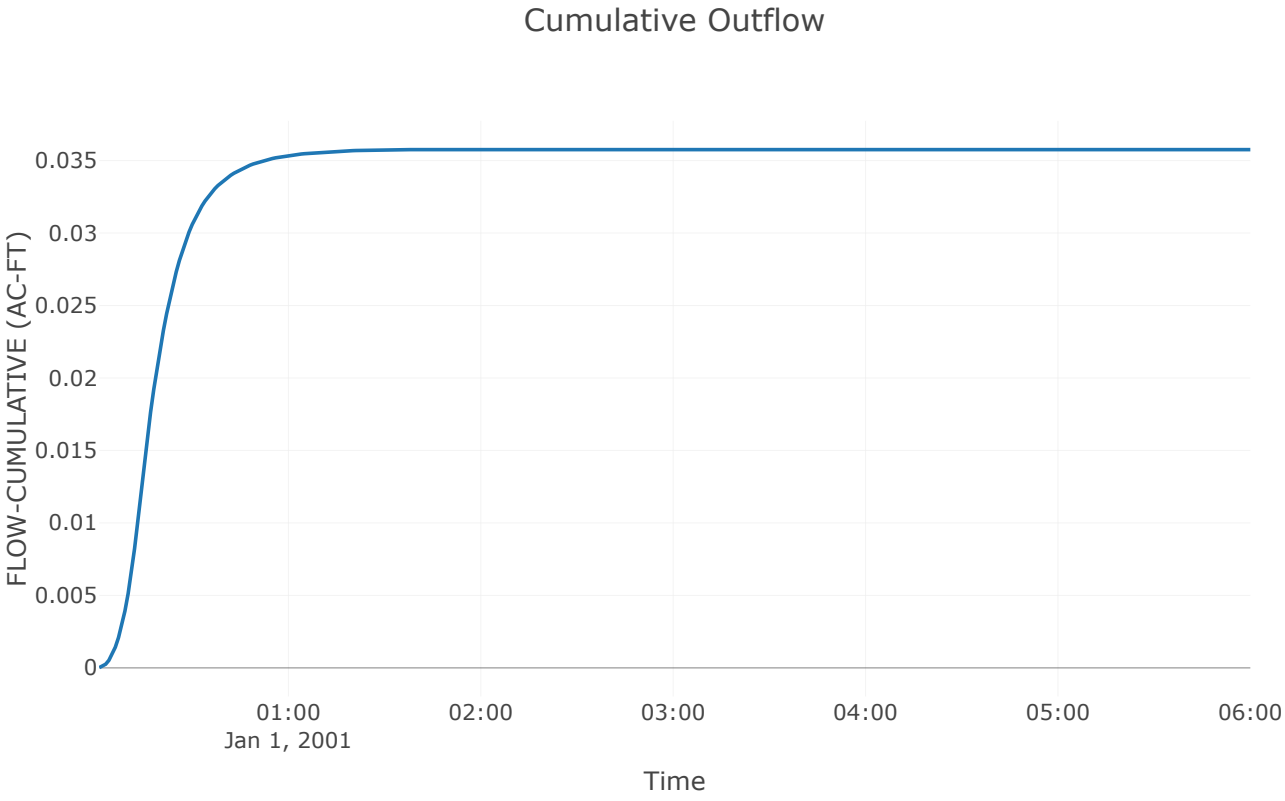


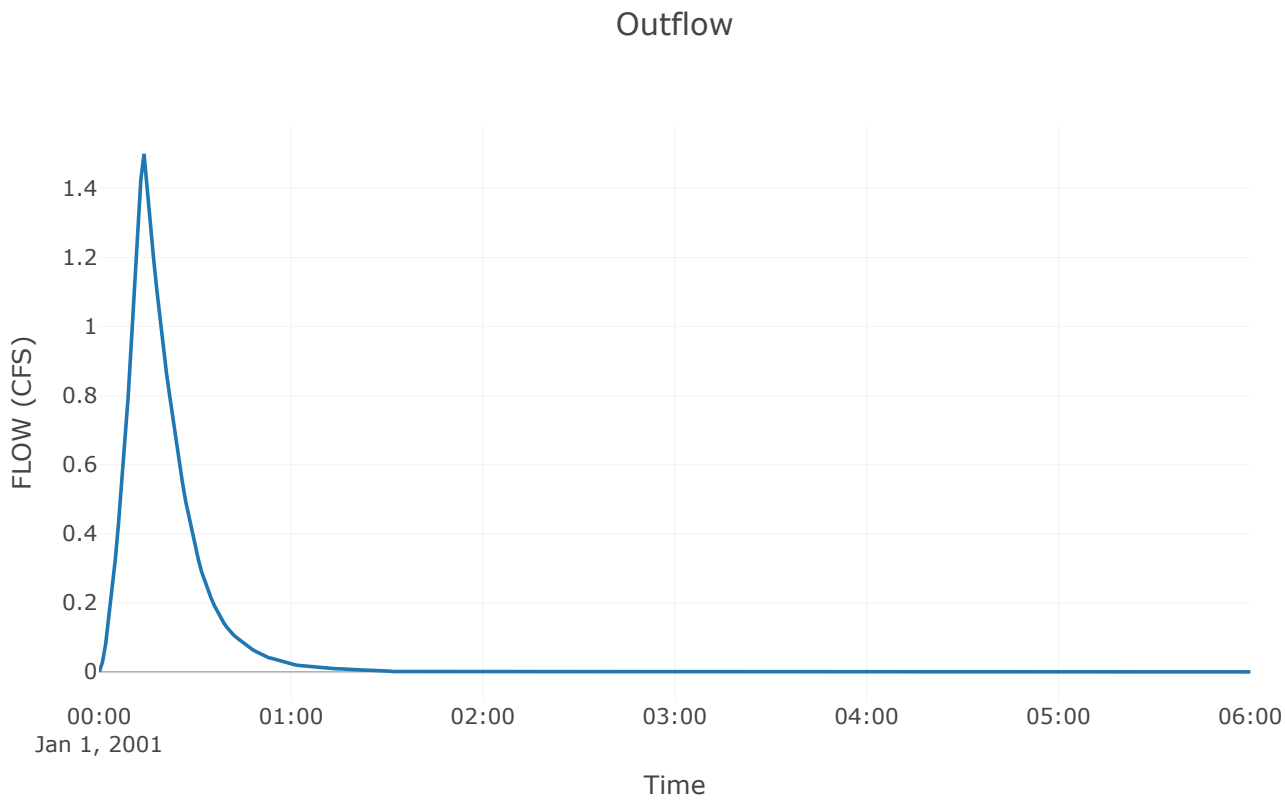
Source: 3P

Downstream : Basin 3
Flow Method : Gage Flow
Flow Gage : 3p 100

Results: 3P

Peak Discharge (CFS)	1.5
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

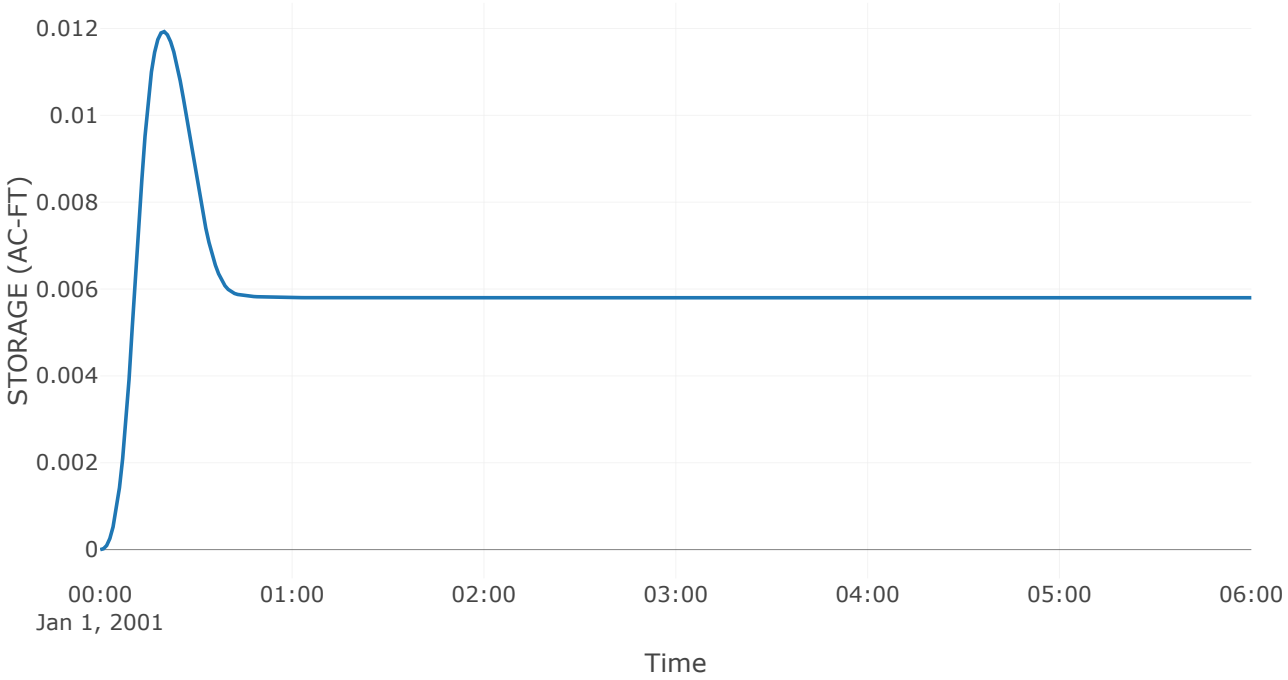

Outflow
FLOW (CFS)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 3

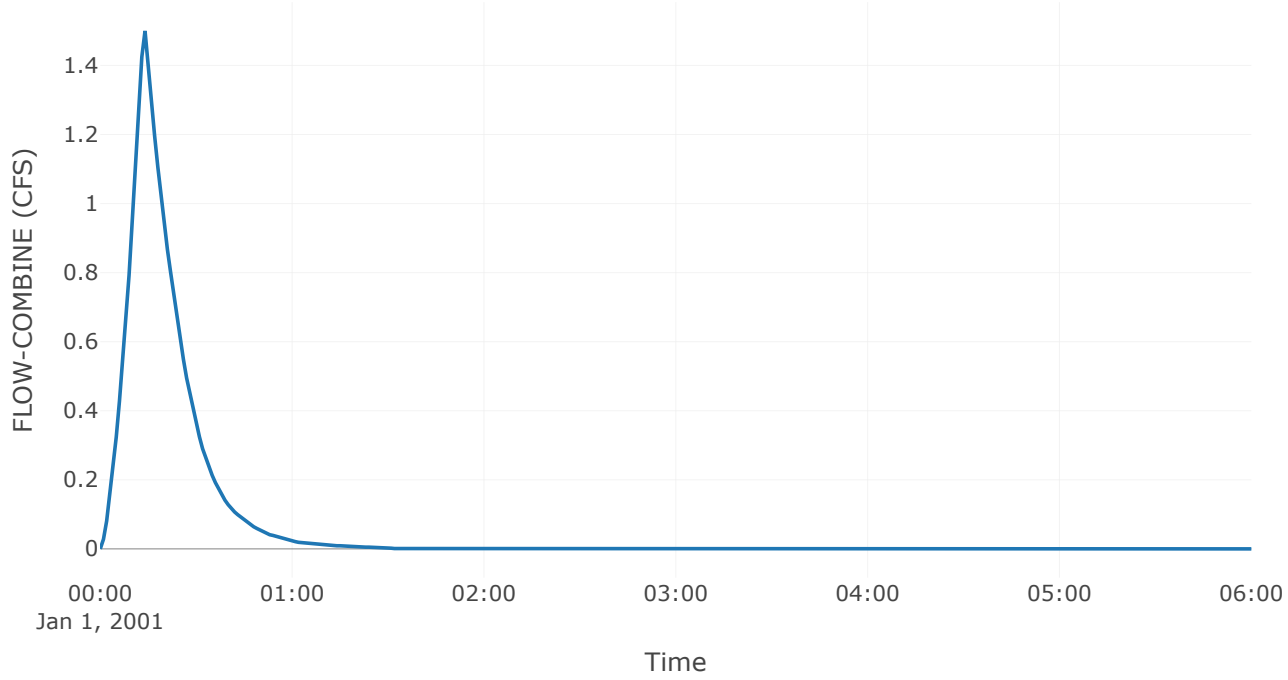
Downstream : 2E_Comparison

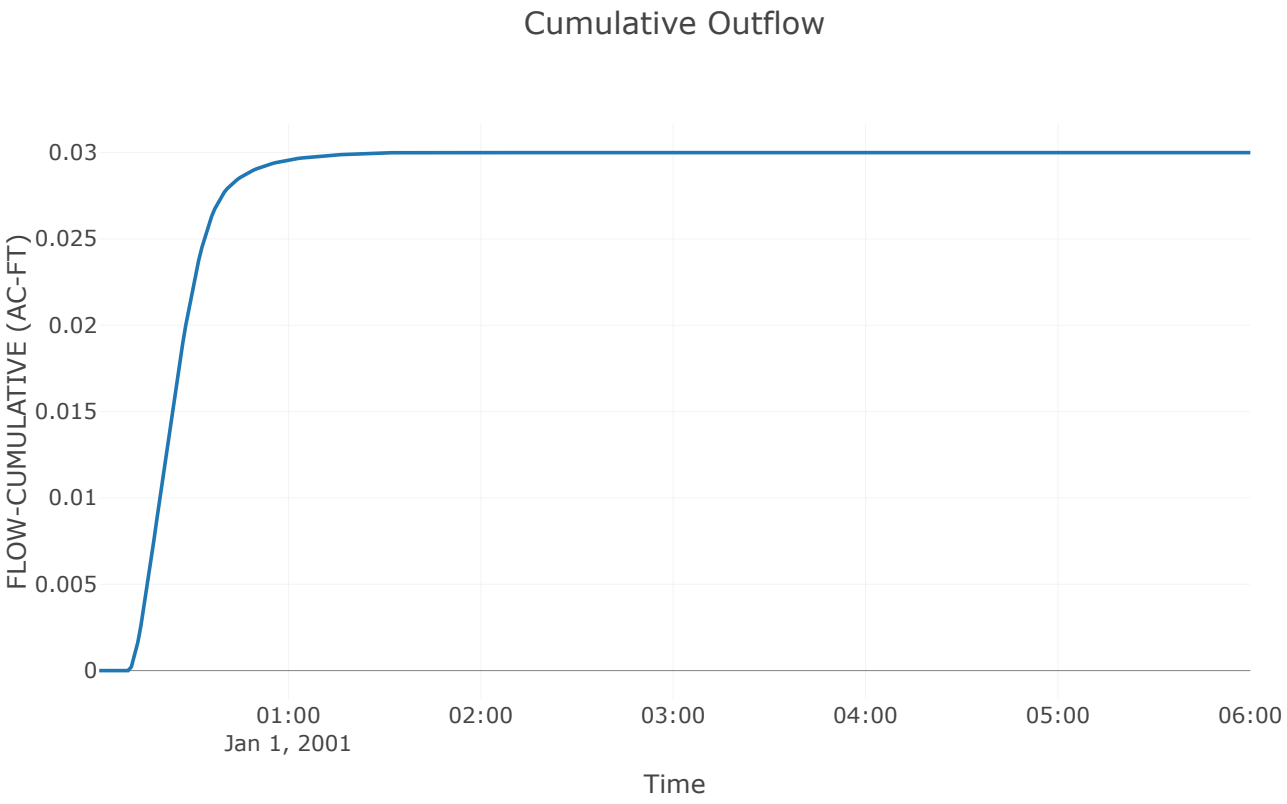
Results: BASIN 3	
Peak Discharge (CFS)	0.96
Time of Peak Discharge	01Jan2001, 00:20
Peak Inflow (CFS)	1.5
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.04
Maximum Storage (AC - FT)	0.01
Peak Elevation (FT)	8.14
Discharge Volume (AC - FT)	0.03

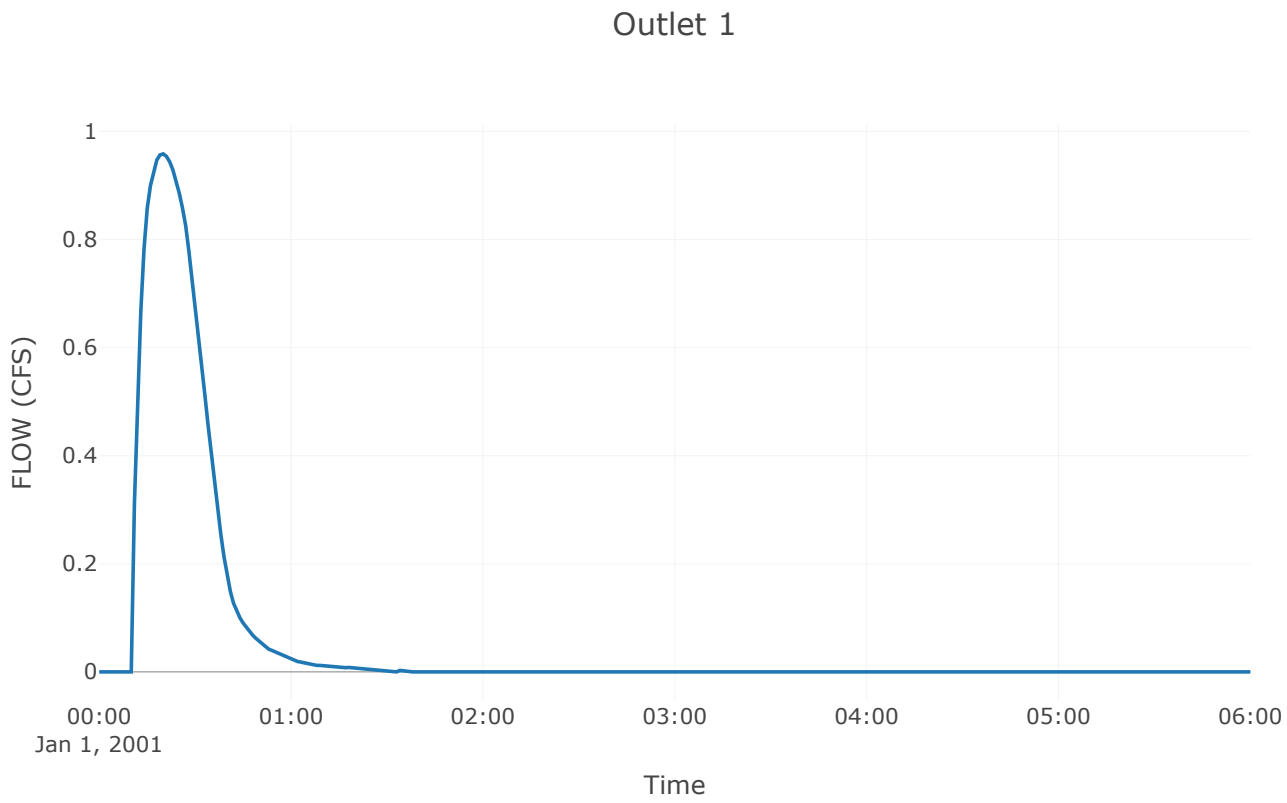
Storage



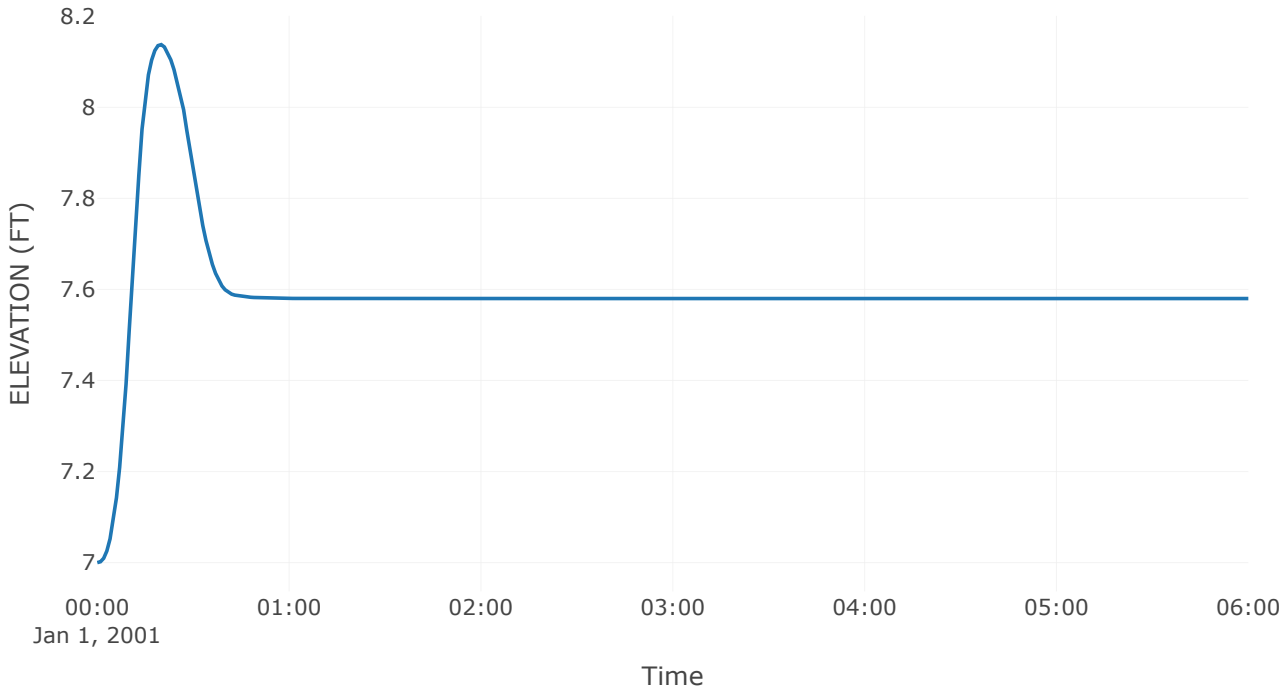
Combined Inflow



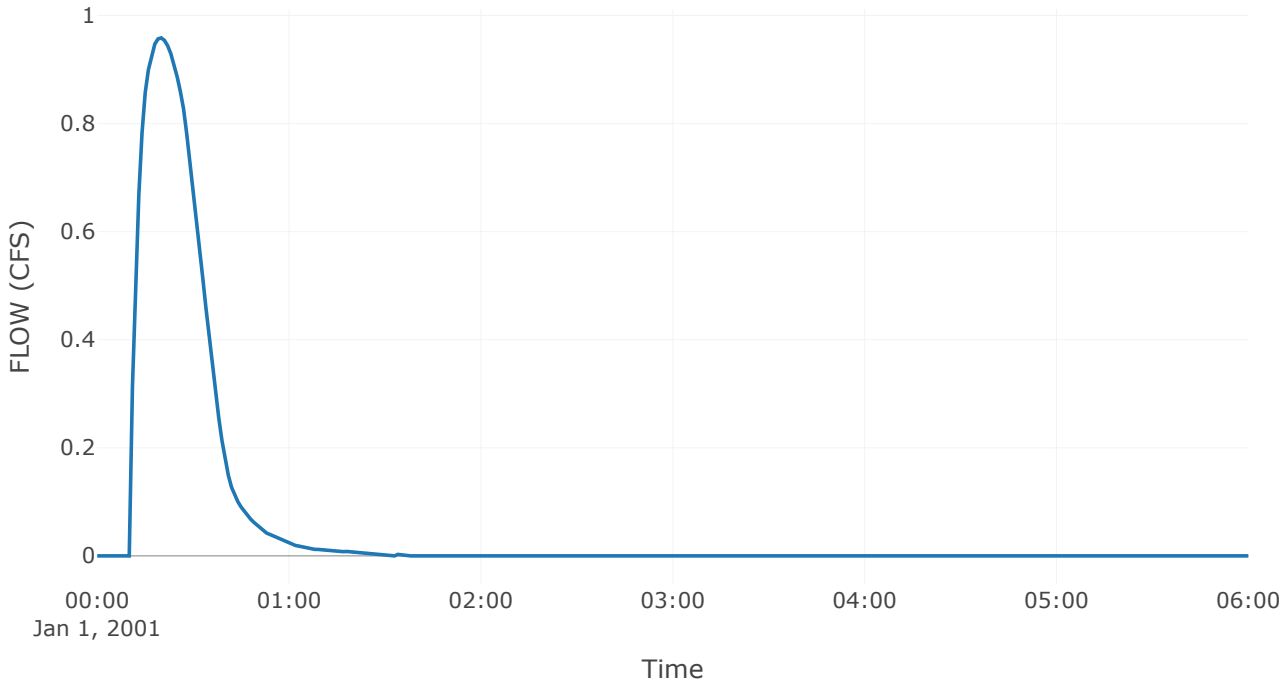

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

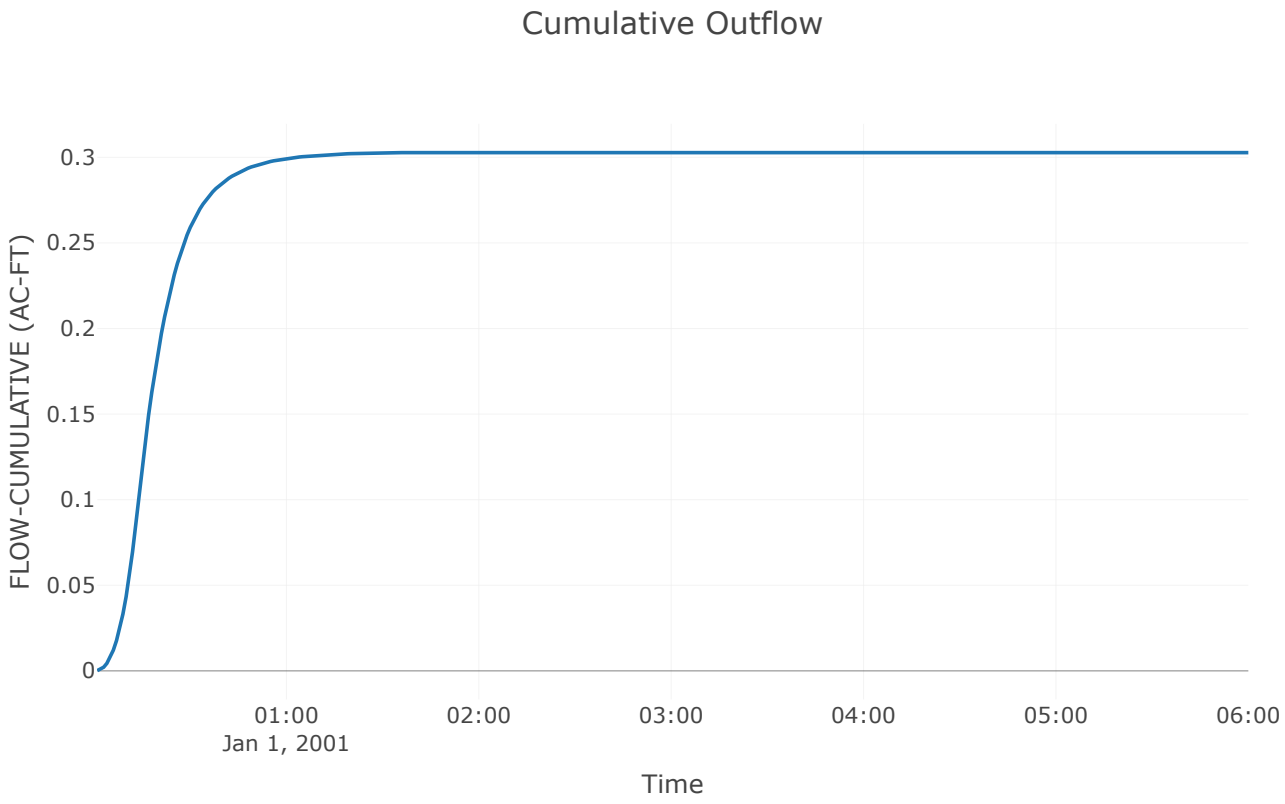


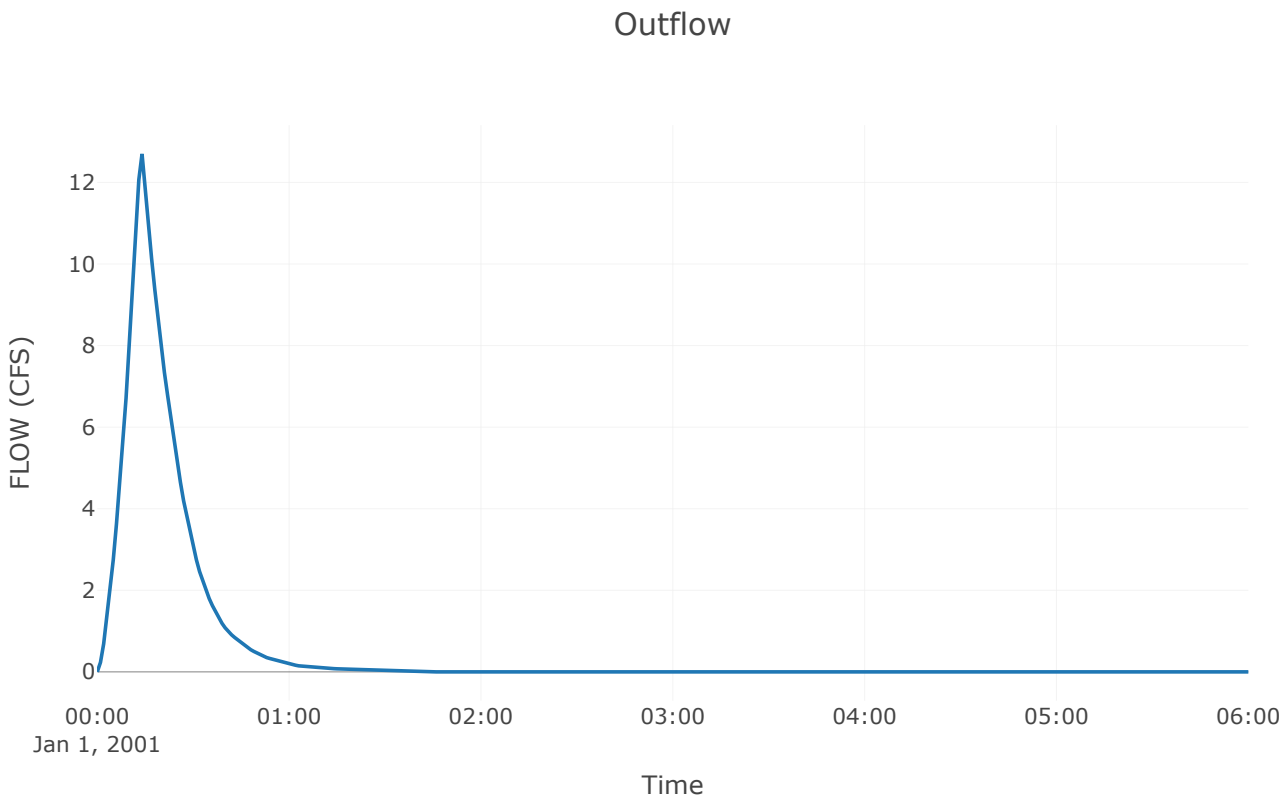
Source: 2P

Downstream : Basin 2
Flow Method : Gage Flow
Flow Gage : 2p 100

Results: 2P

Peak Discharge (CFS)	12.7
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.3
0.25
0.2
0.15
0.1
0.05
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

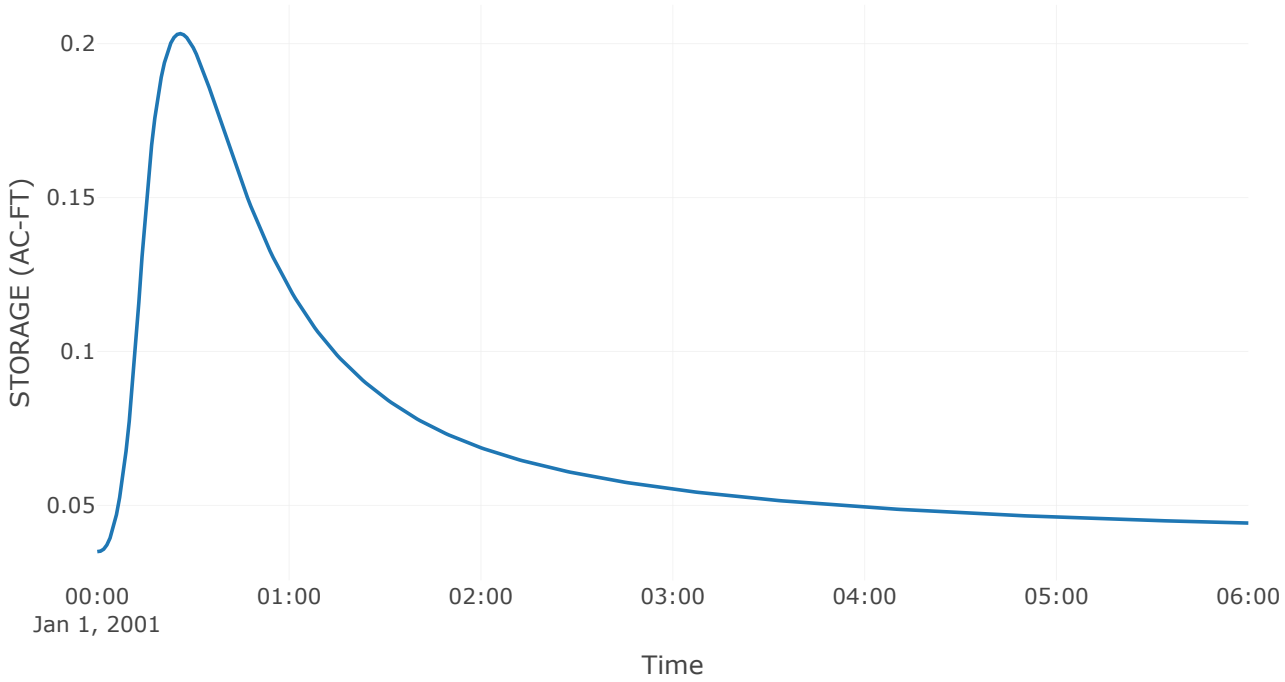

Outflow
FLOW (CFS)
12
10
8
6
4
2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Reservoir: BASIN 2

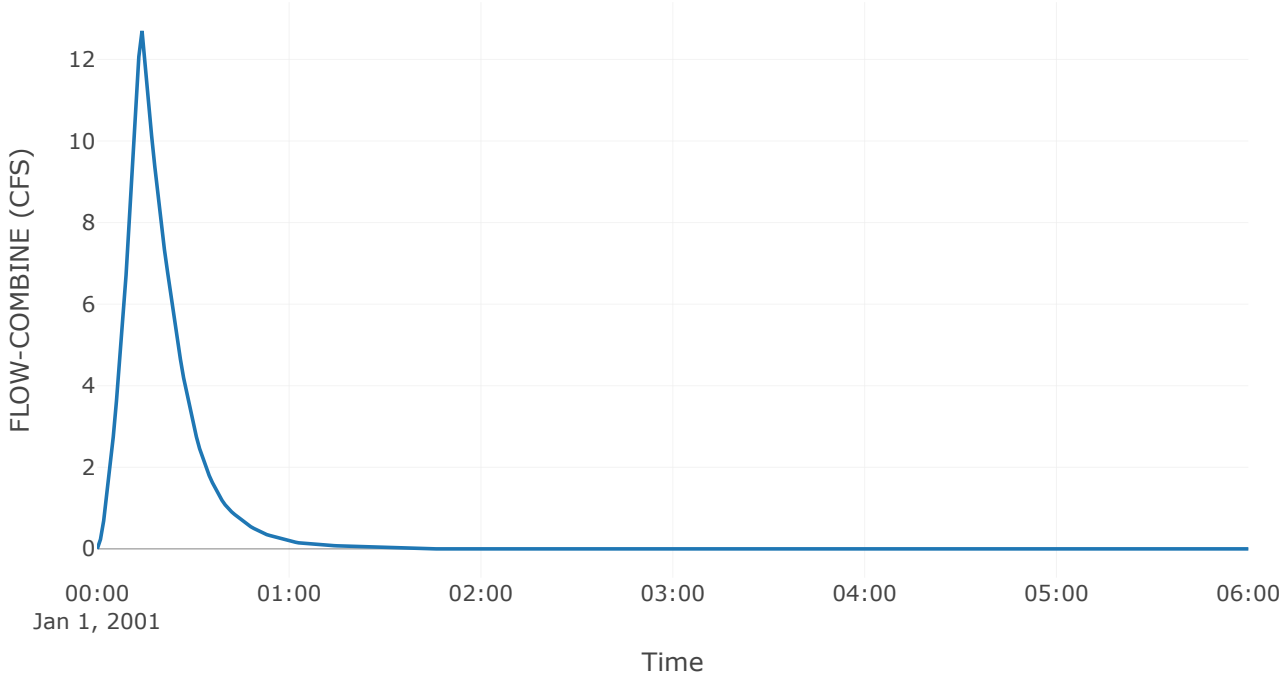
Downstream : 2E_Comparison

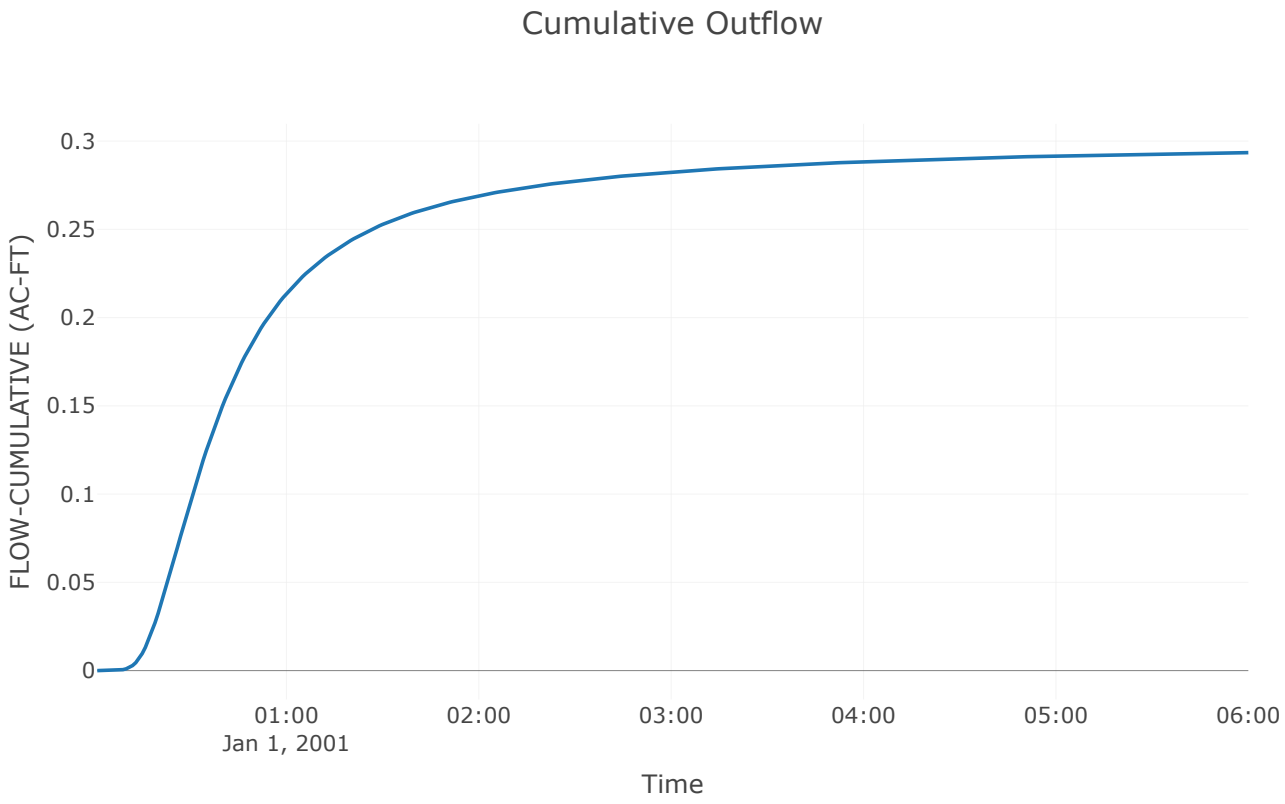
Results: BASIN 2	
Peak Discharge (CFS)	4.71
Time of Peak Discharge	01Jan2001, 00:26
Peak Inflow (CFS)	12.7
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.3
Maximum Storage (AC - FT)	0.2
Peak Elevation (FT)	9.91
Discharge Volume (AC - FT)	0.29

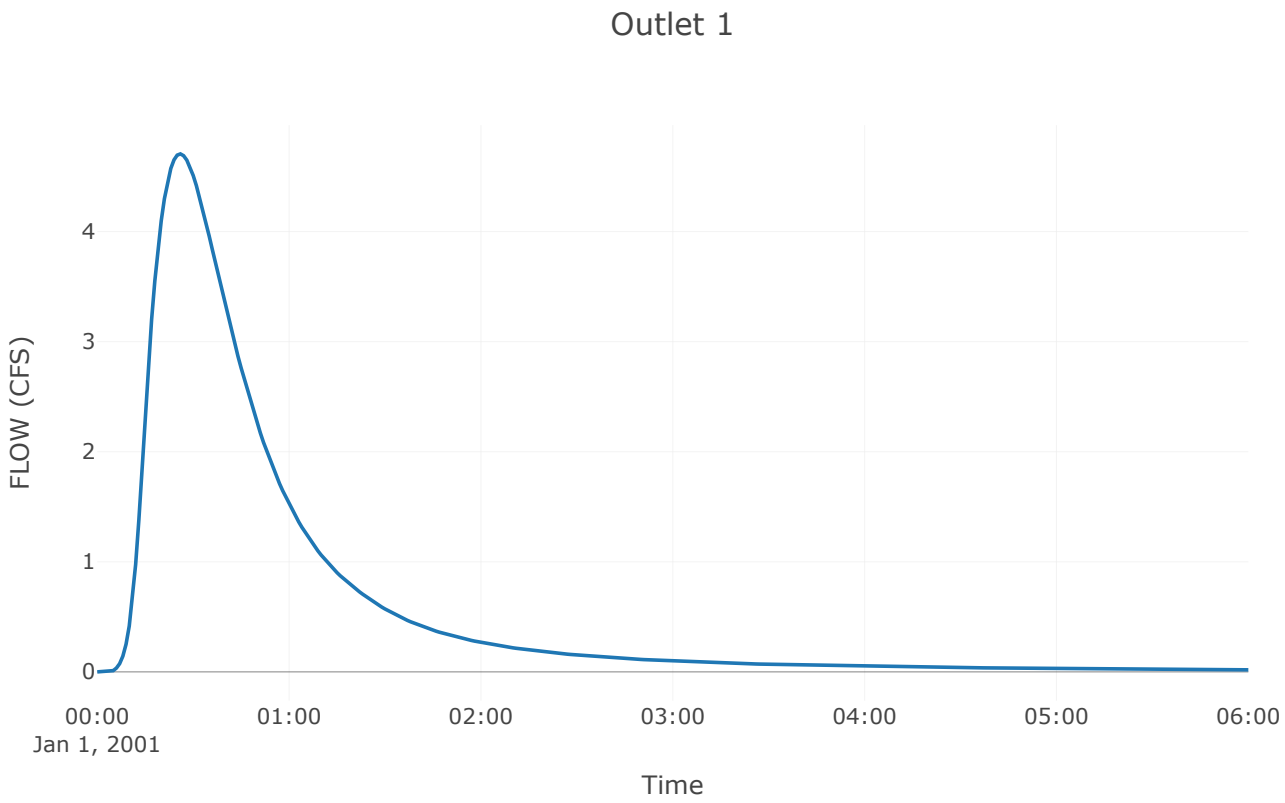
Storage



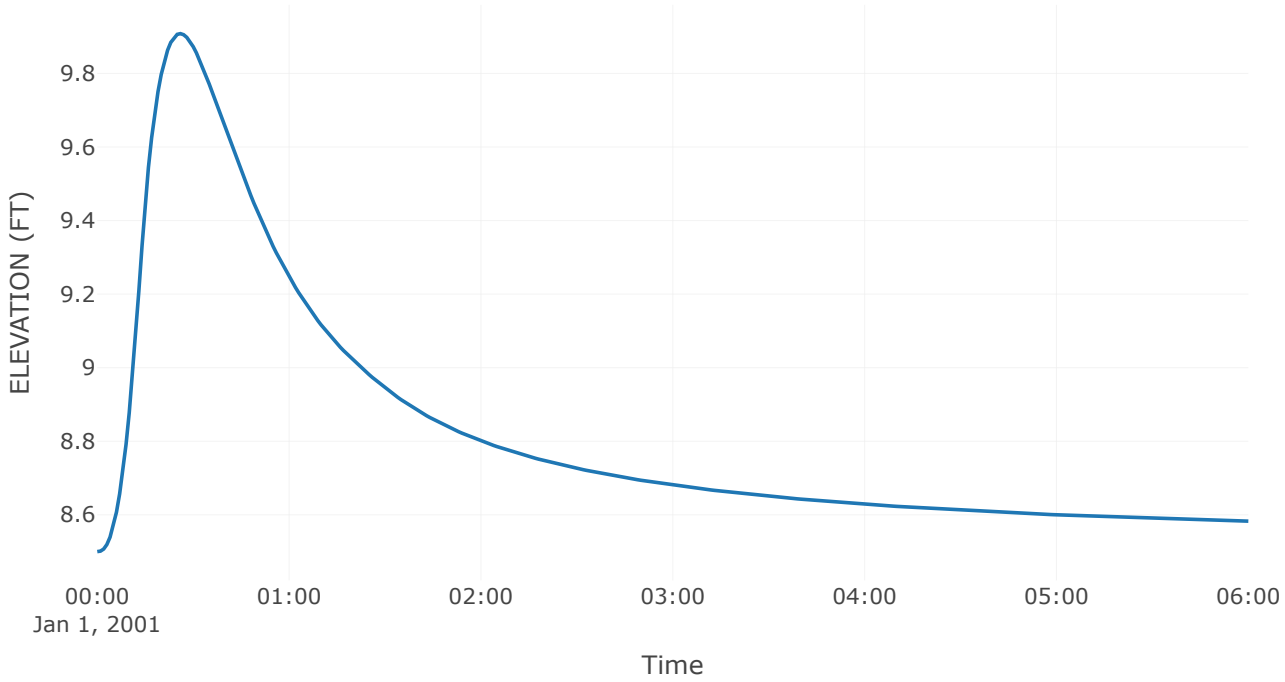
Combined Inflow



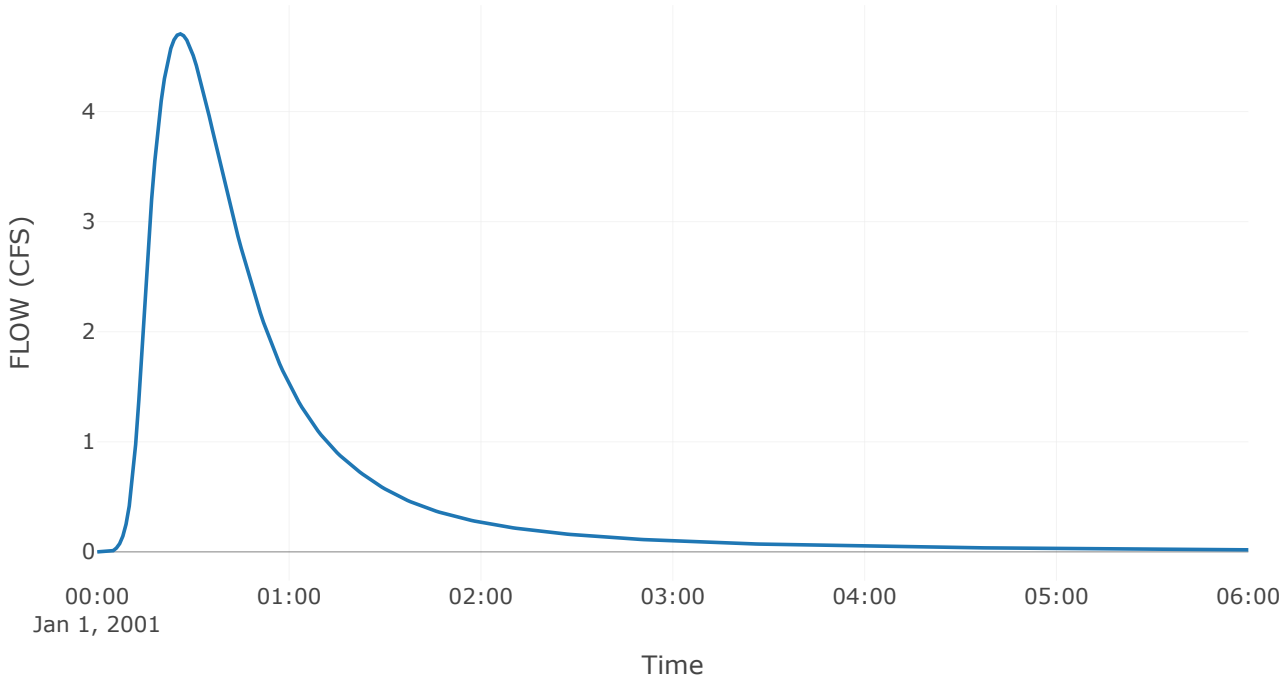

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.3
0.25
0.2
0.15
0.1
0.05
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
4
3
2
1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

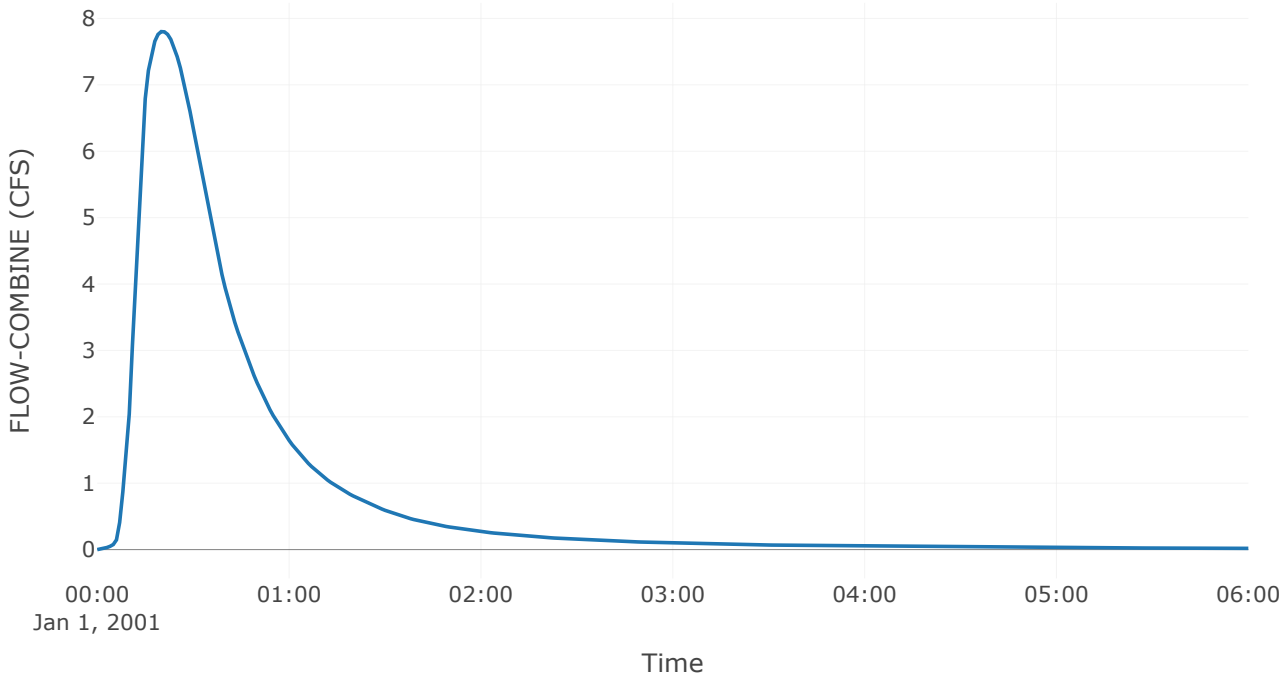


Junction: 2E_Comparison

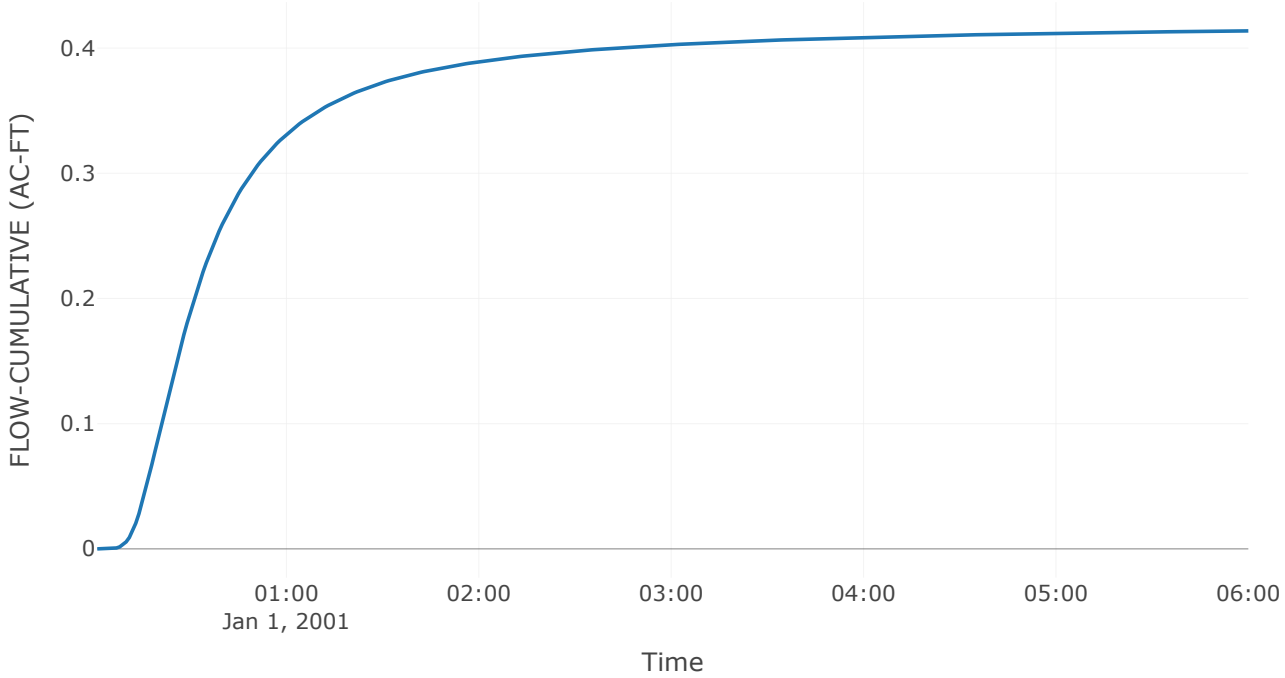
Results: 2E_Comparison

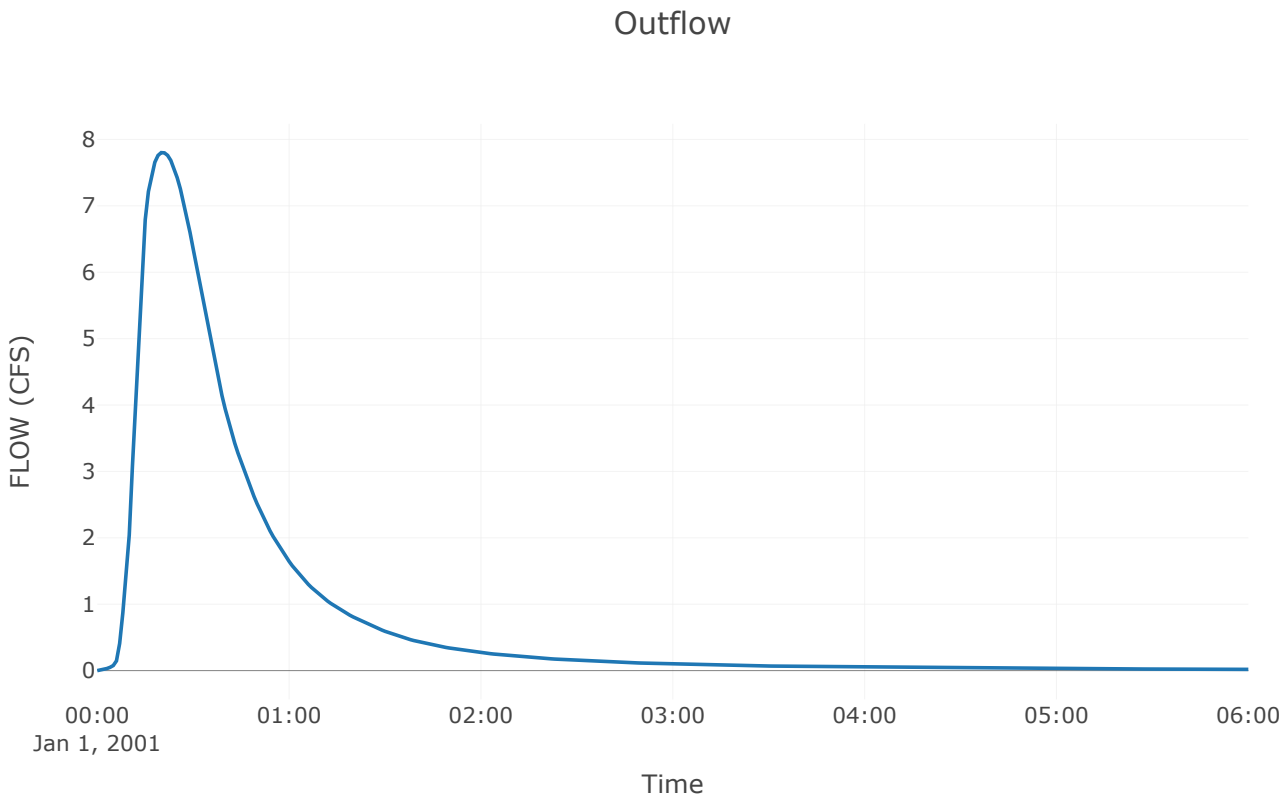
Peak Discharge (CFS)	7.8
Time of Peak Discharge	01Jan2001, 00:20

Combined Inflow



Cumulative Outflow



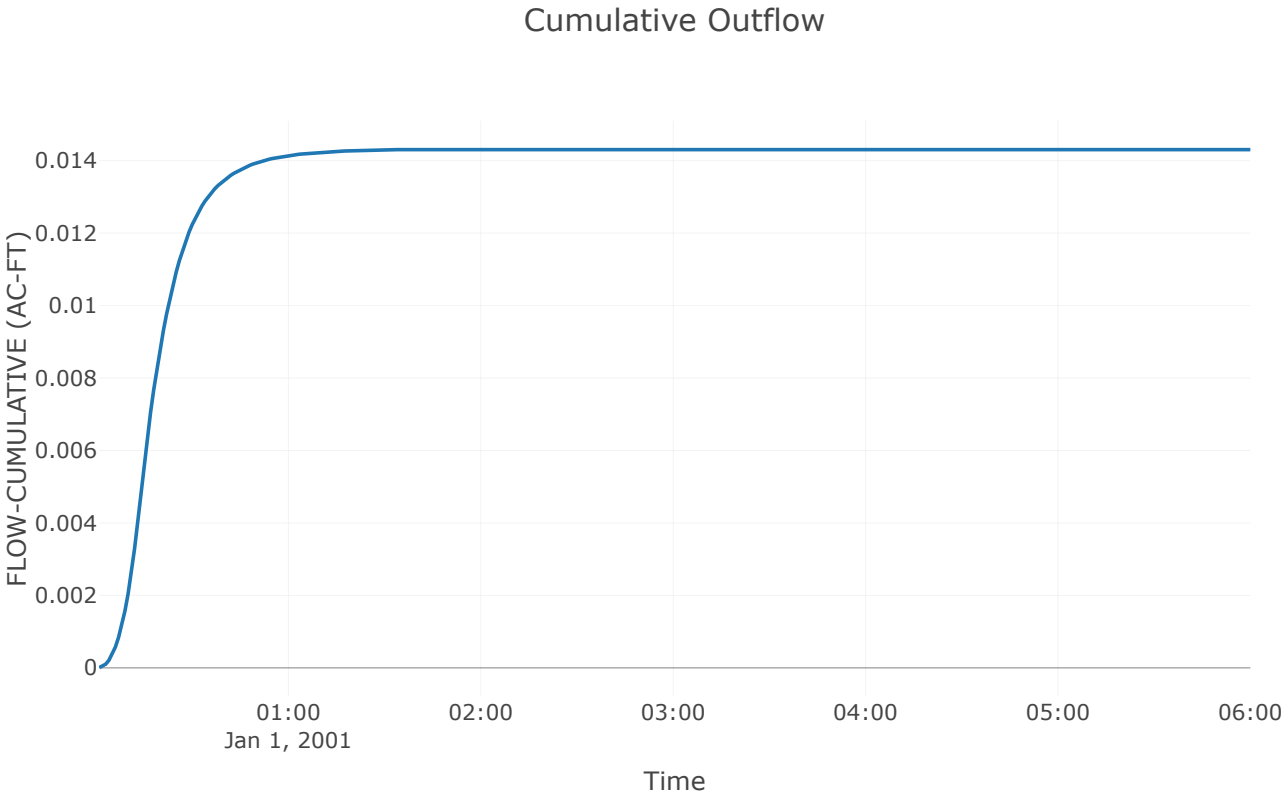

Outflow
FLOW (CFS)
8
7
6
5
4
3
2
1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

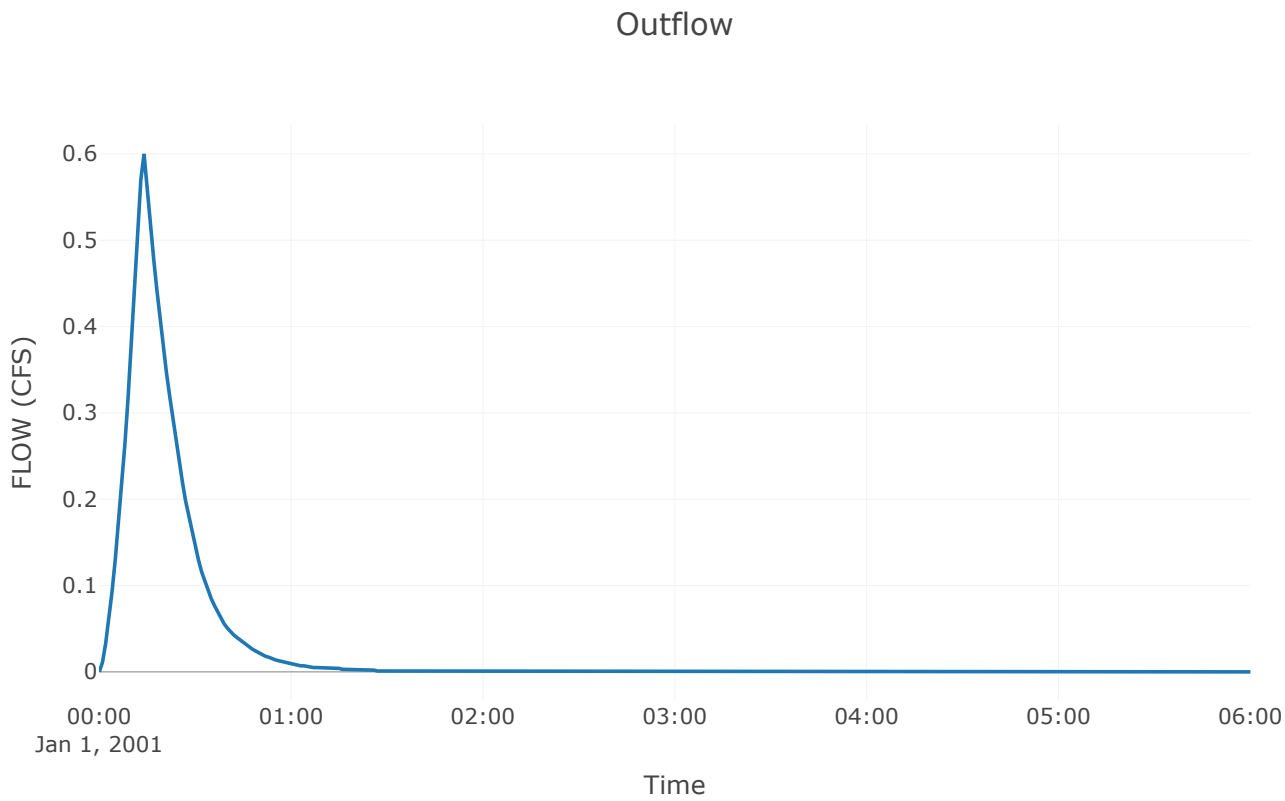
Source: 5P

Downstream : 1E_Comparison
Flow Method : Gage Flow
Flow Gage : 5p 100

Results: 5P

Peak Discharge (CFS)	0.6
Time of Peak Discharge	01Jan2001, 00:14


Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

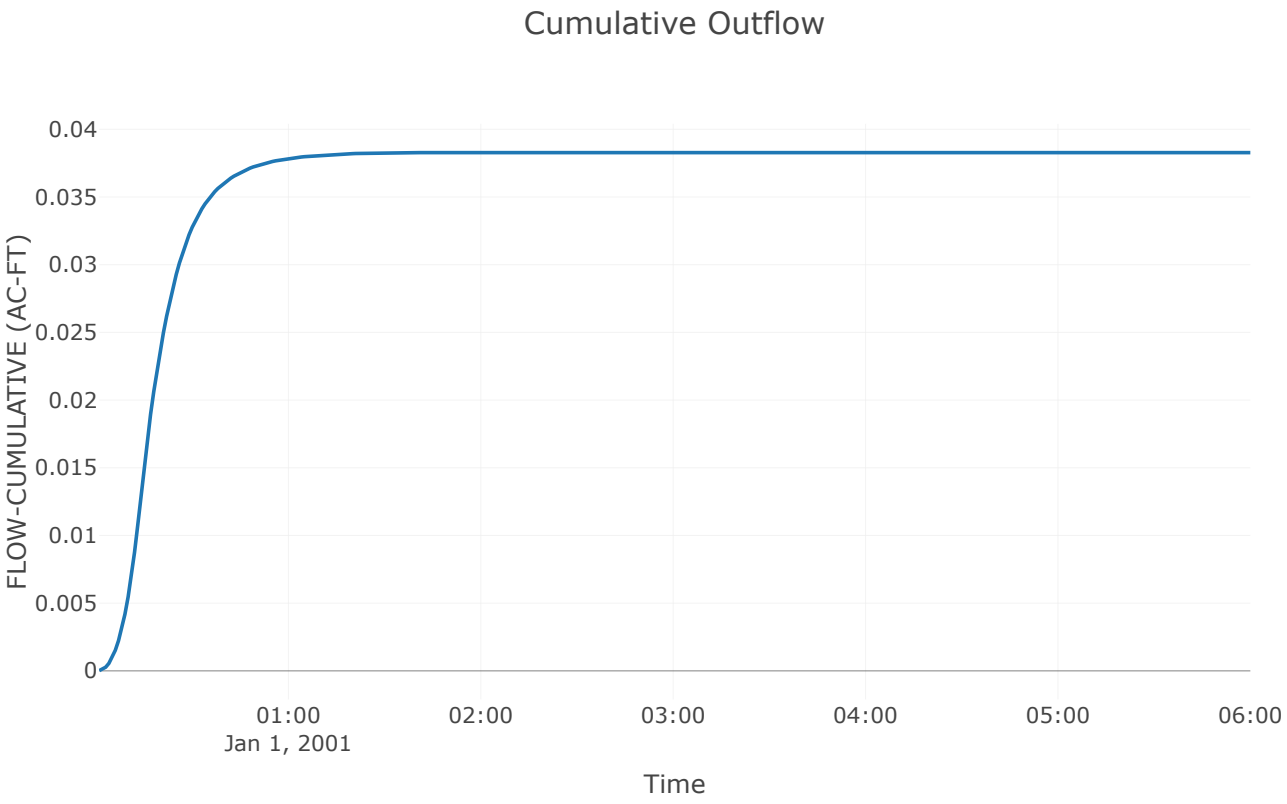

Outflow
FLOW (CFS)
0.6
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

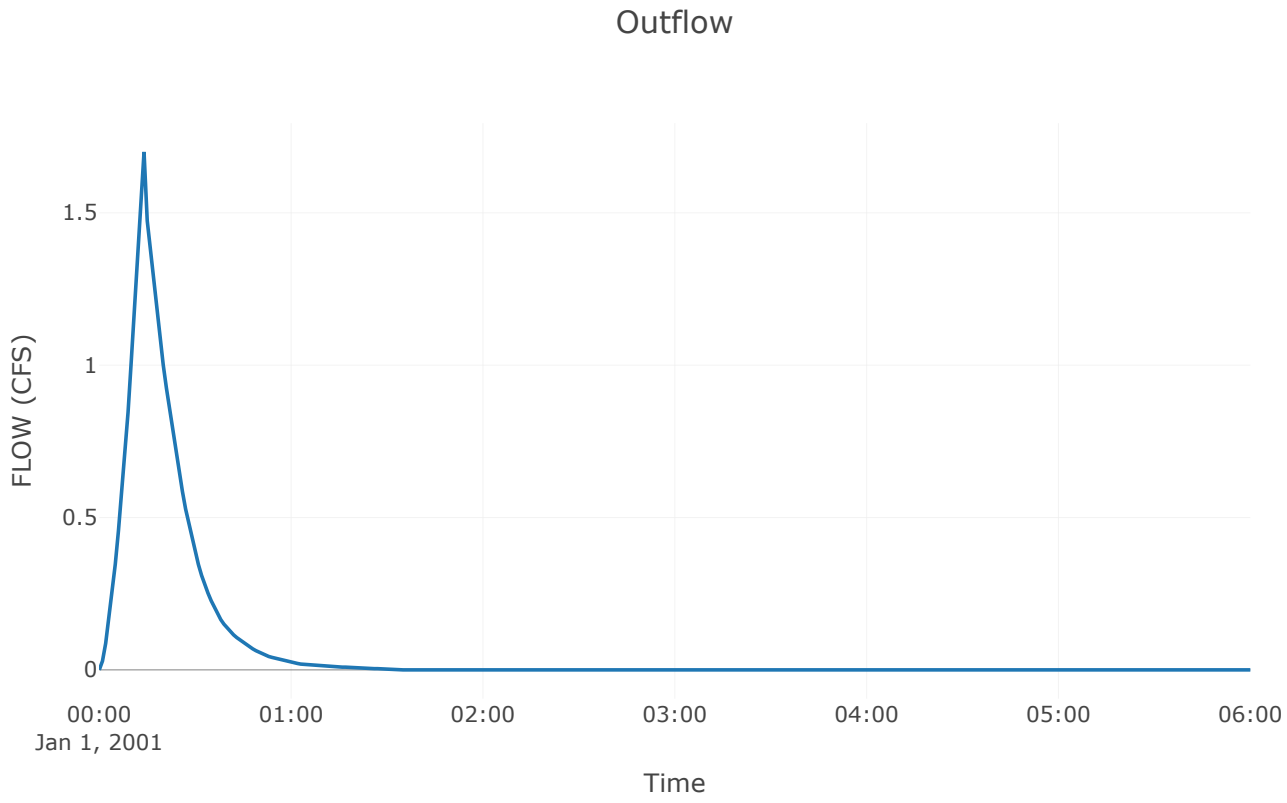
Source: 1P

Downstream : Basin 1
Flow Method : Gage Flow
Flow Gage : 1p 100

Results: 1P

Peak Discharge (CFS)	1.7
Time of Peak Discharge	01Jan2001, 00:14

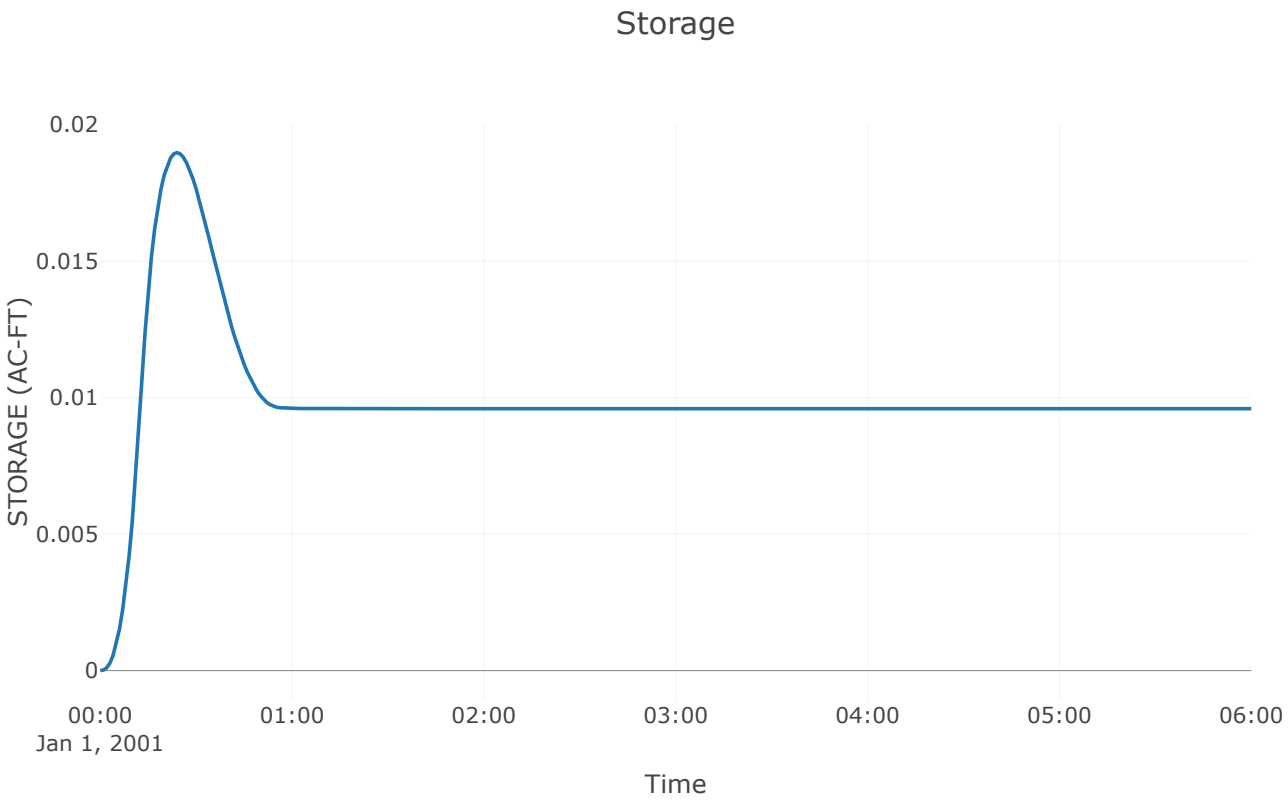

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time

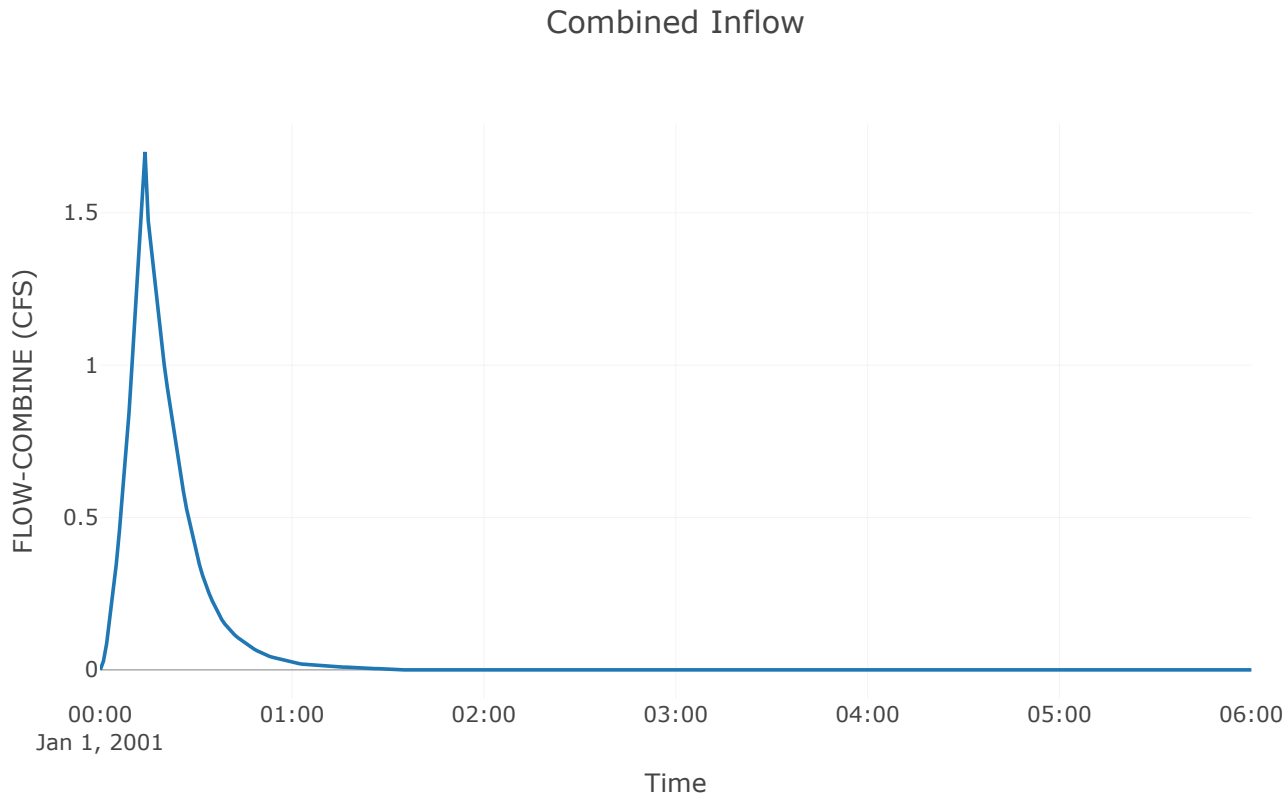

Outflow
FLOW (CFS)
1.5
1
0.5
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

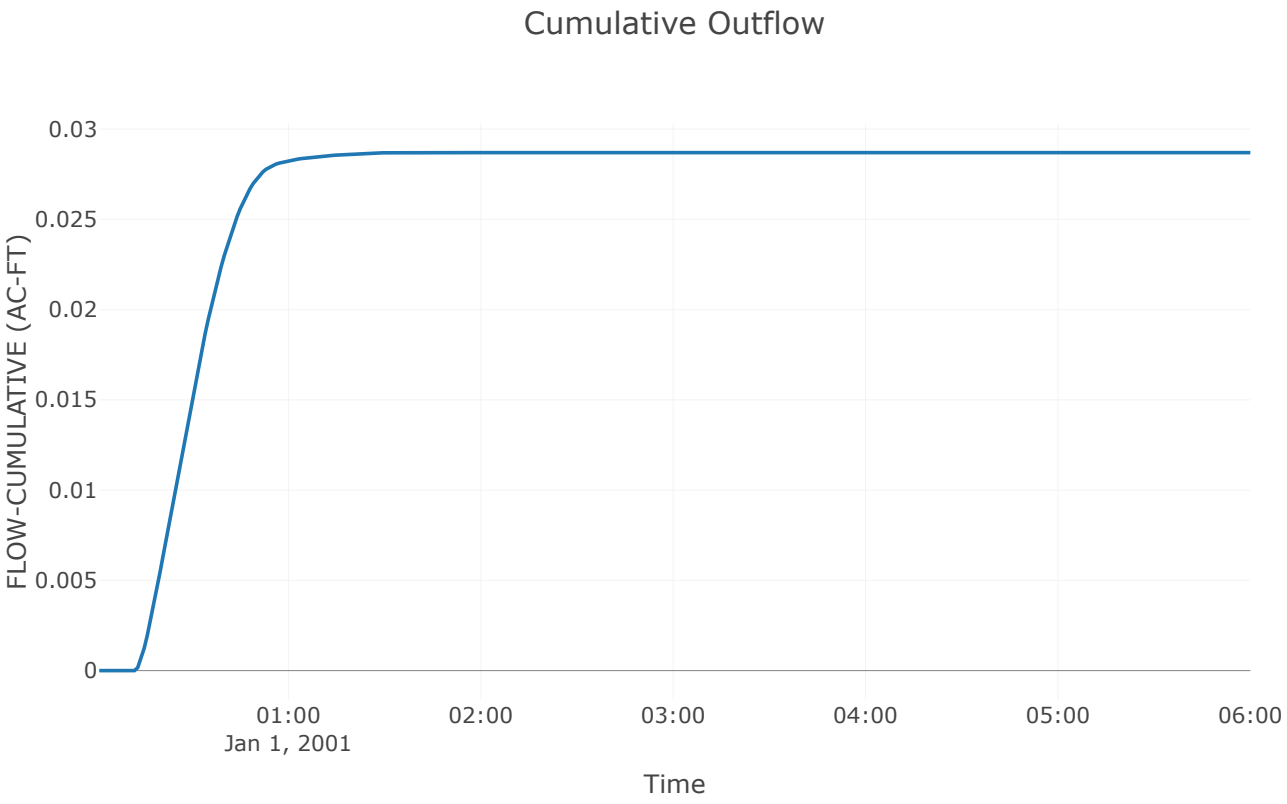
Reservoir: BASIN 1

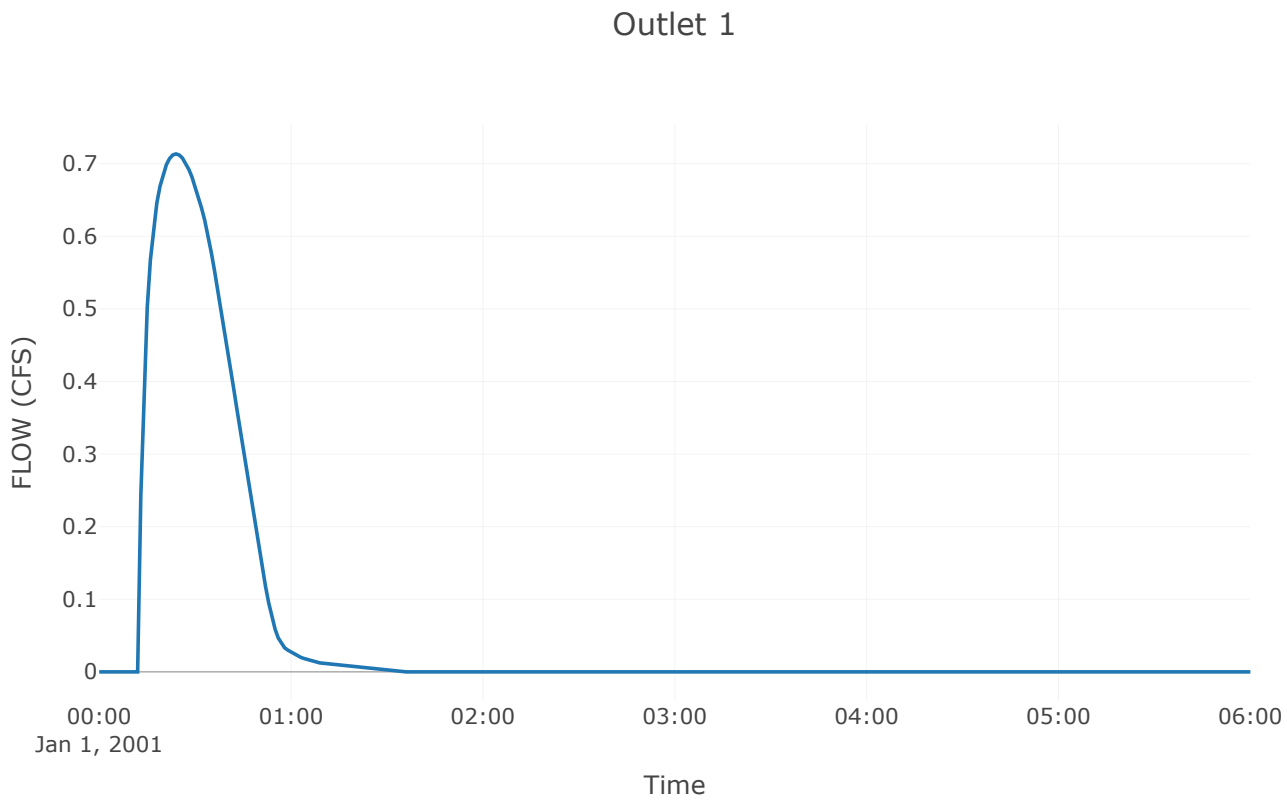
Downstream : 1E_Comparison

Results: BASIN 1	
Peak Discharge (CFS)	0.71
Time of Peak Discharge	01Jan2001, 00:24
Peak Inflow (CFS)	1.7
Time of Peak Inflow	01Jan2001, 00:14
Inflow Volume (AC - FT)	0.04
Maximum Storage (AC - FT)	0.02
Peak Elevation (FT)	10.15
Discharge Volume (AC - FT)	0.03

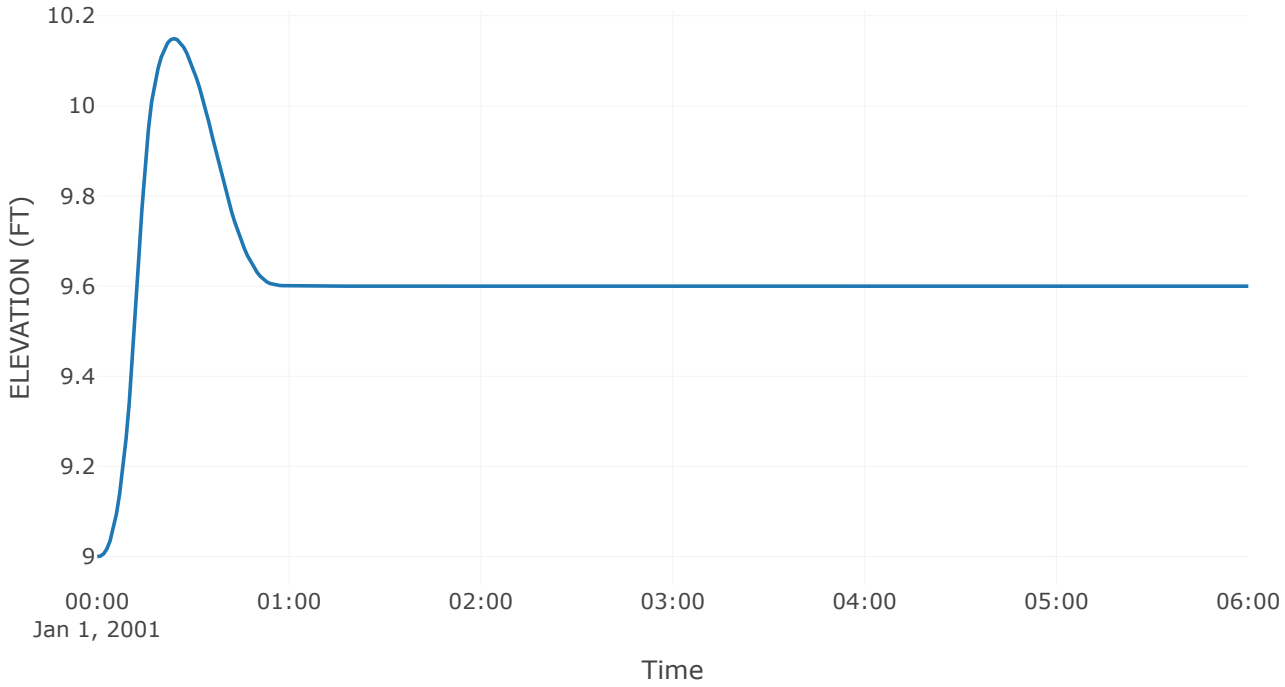

Storage
0.02
0.015
0.01
0.005
0
STORAGE (AC-FT)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time


Combined Inflow
1.5
1
0.5
0
FLOW-COMBINE (CFS)
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

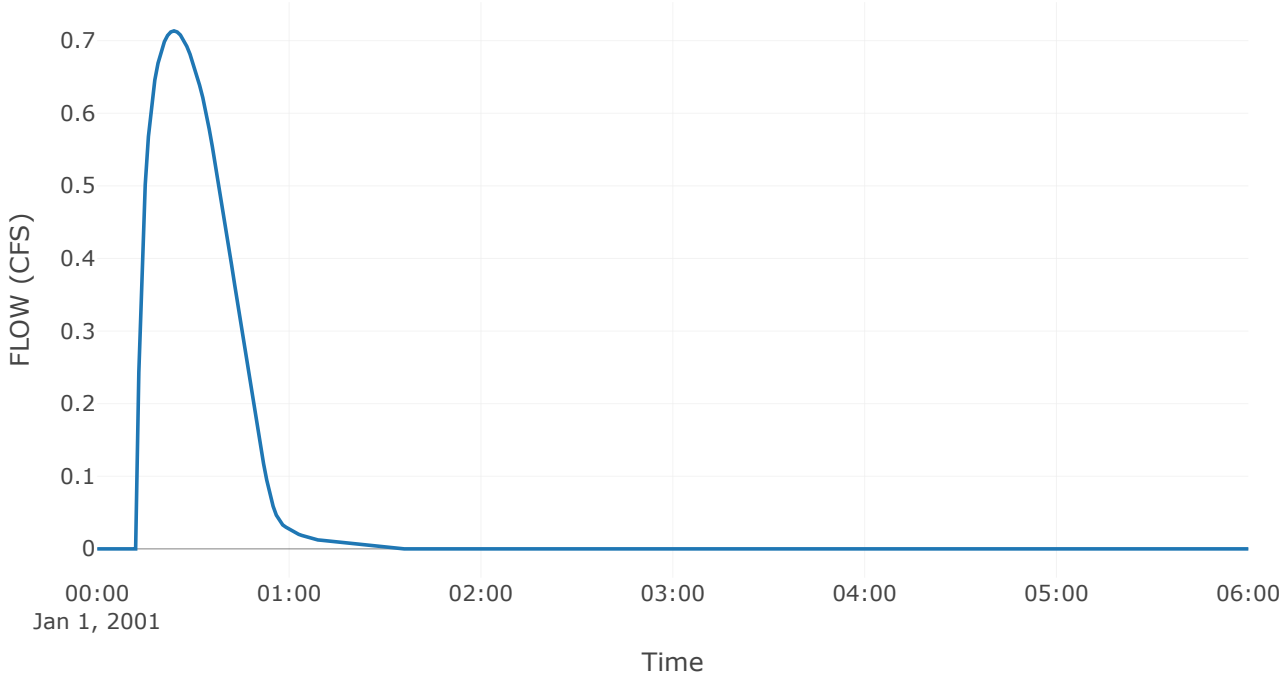

Cumulative Outflow
FLOW-CUMULATIVE (AC-FT)
0.03
0.025
0.02
0.015
0.01
0.005
0
01:00
Jan 1, 2001
02:00
03:00
04:00
05:00
06:00
Time


Outlet 1
FLOW (CFS)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

Pool Elevation



Outflow

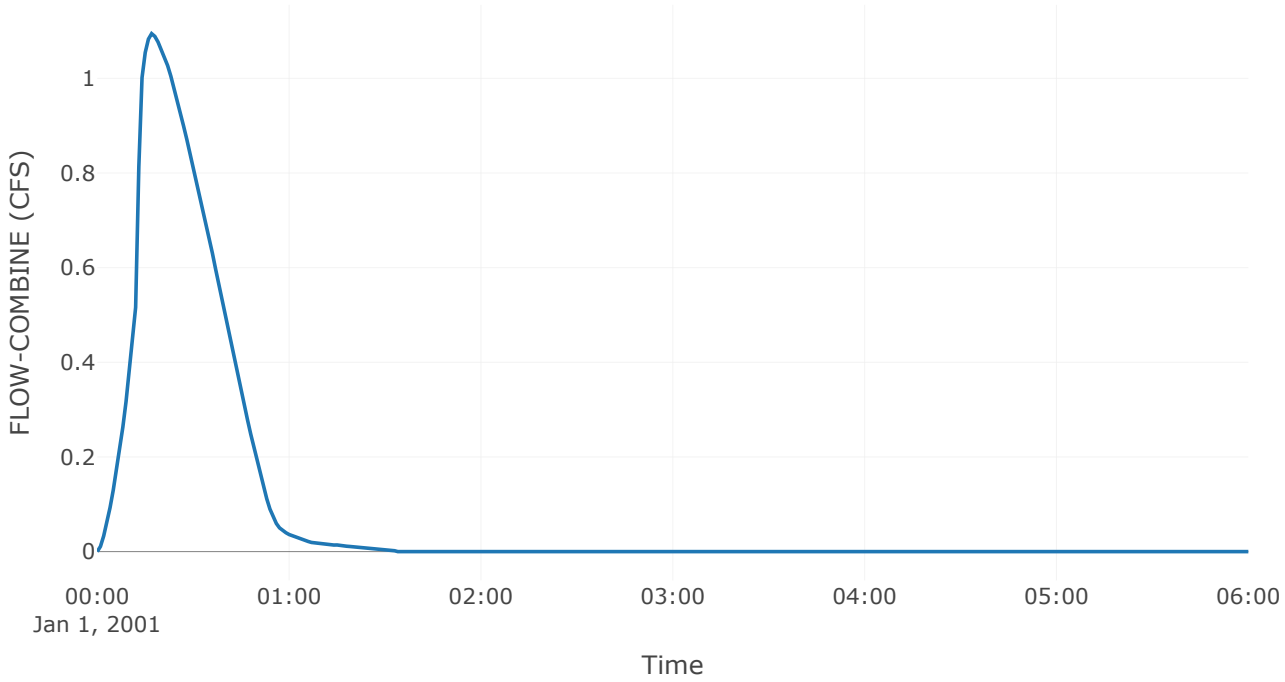


Junction: 1E_Comparison

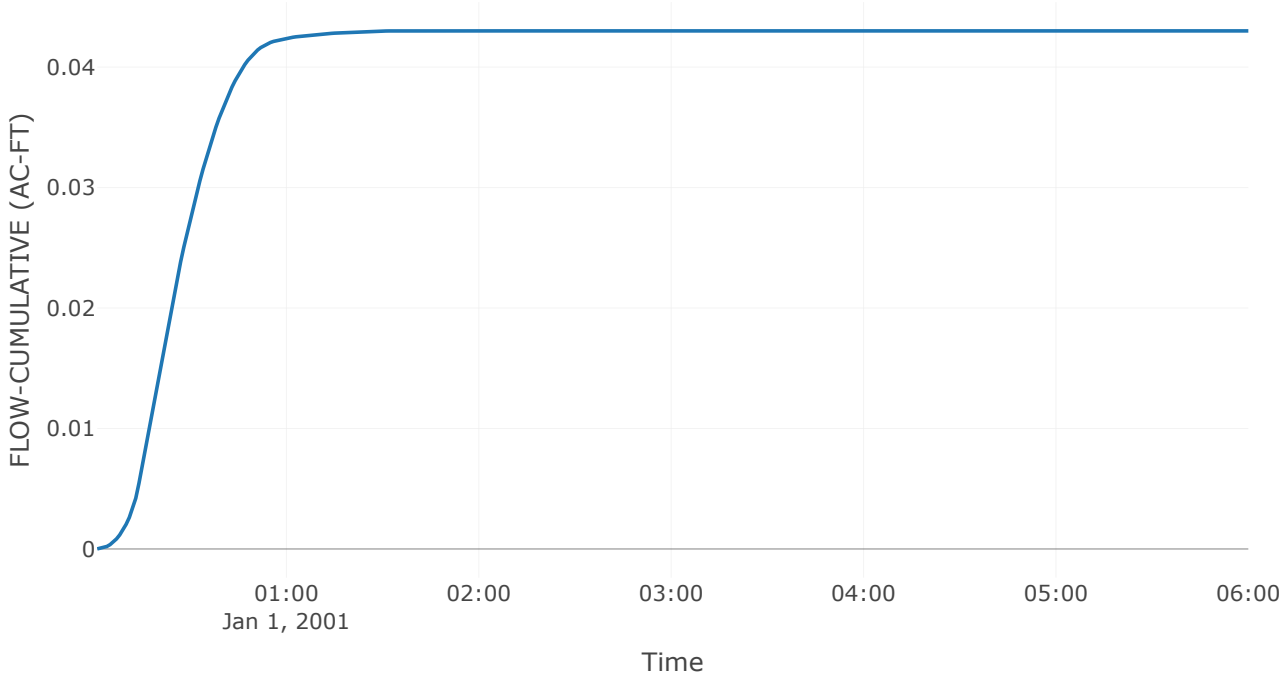
Results: 1E_Comparison

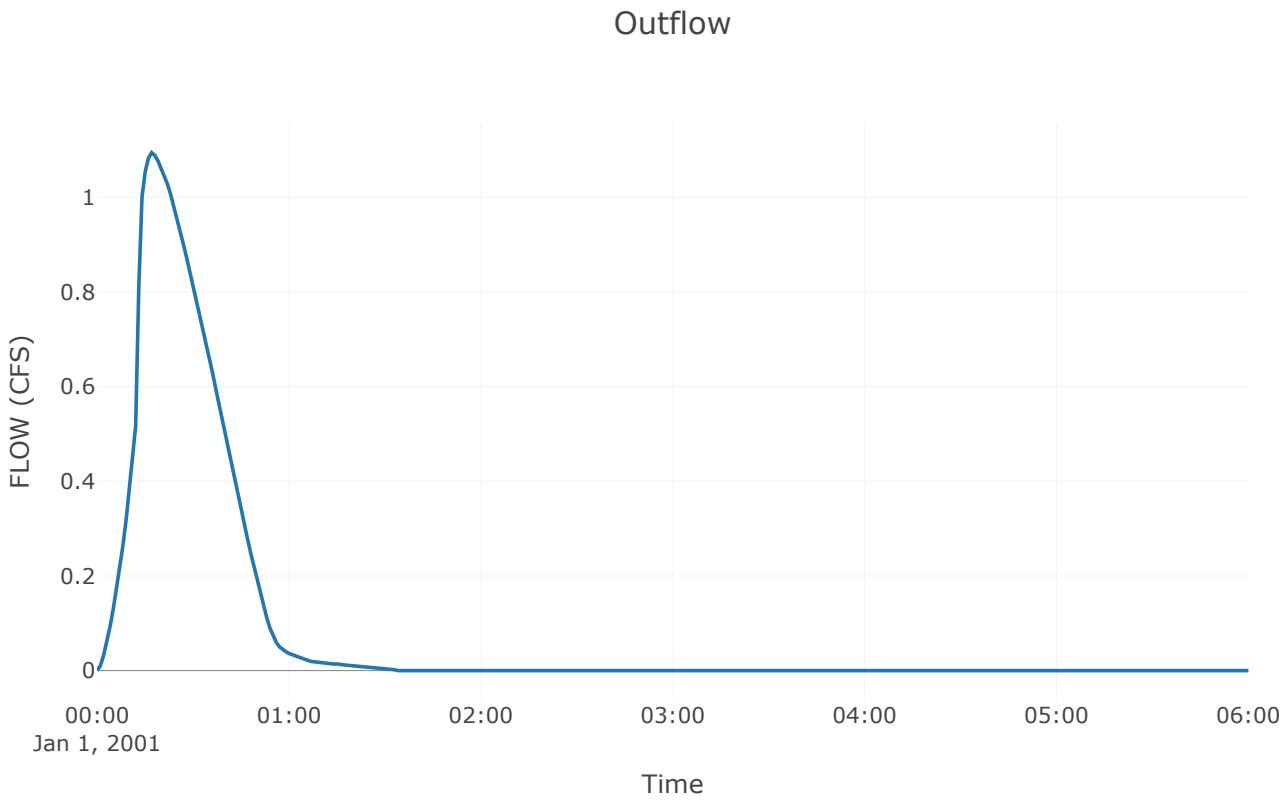
Peak Discharge (CFS)	1.09
Time of Peak Discharge	01Jan2001, 00:17

Combined Inflow



Cumulative Outflow

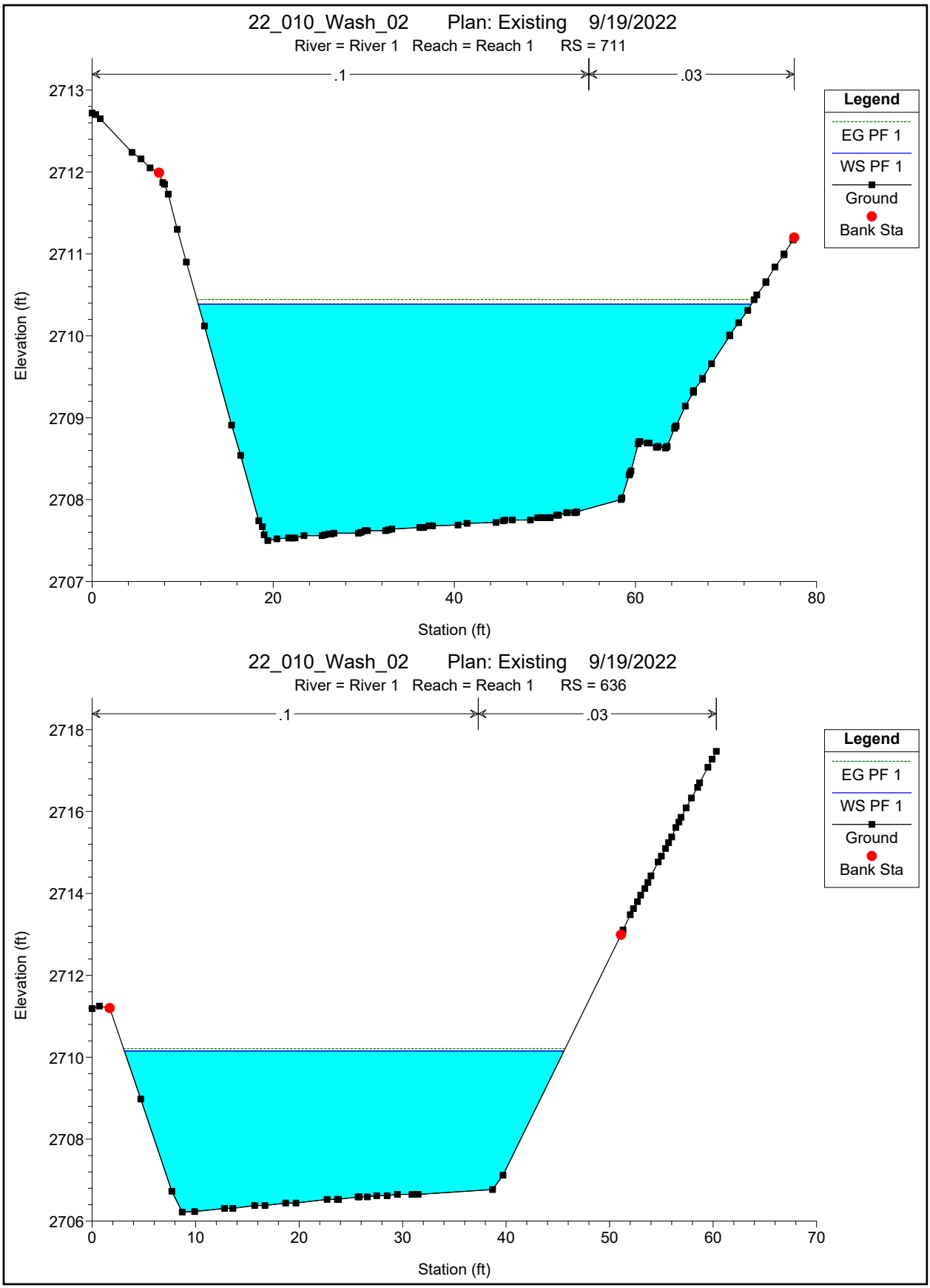


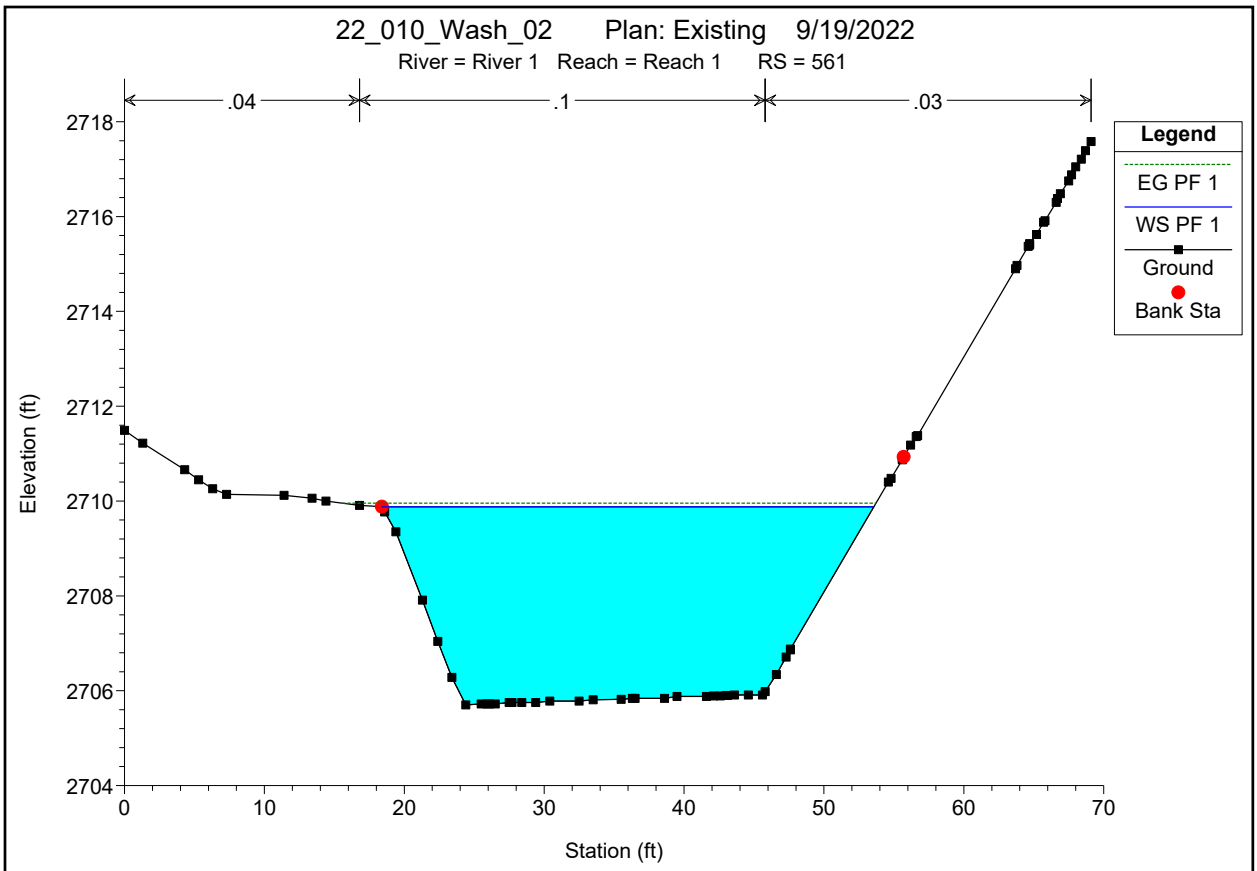

Outflow
FLOW (CFS)
1
0.8
0.6
0.4
0.2
0
00:00
Jan 1, 2001
01:00
02:00
03:00
04:00
05:00
06:00
Time

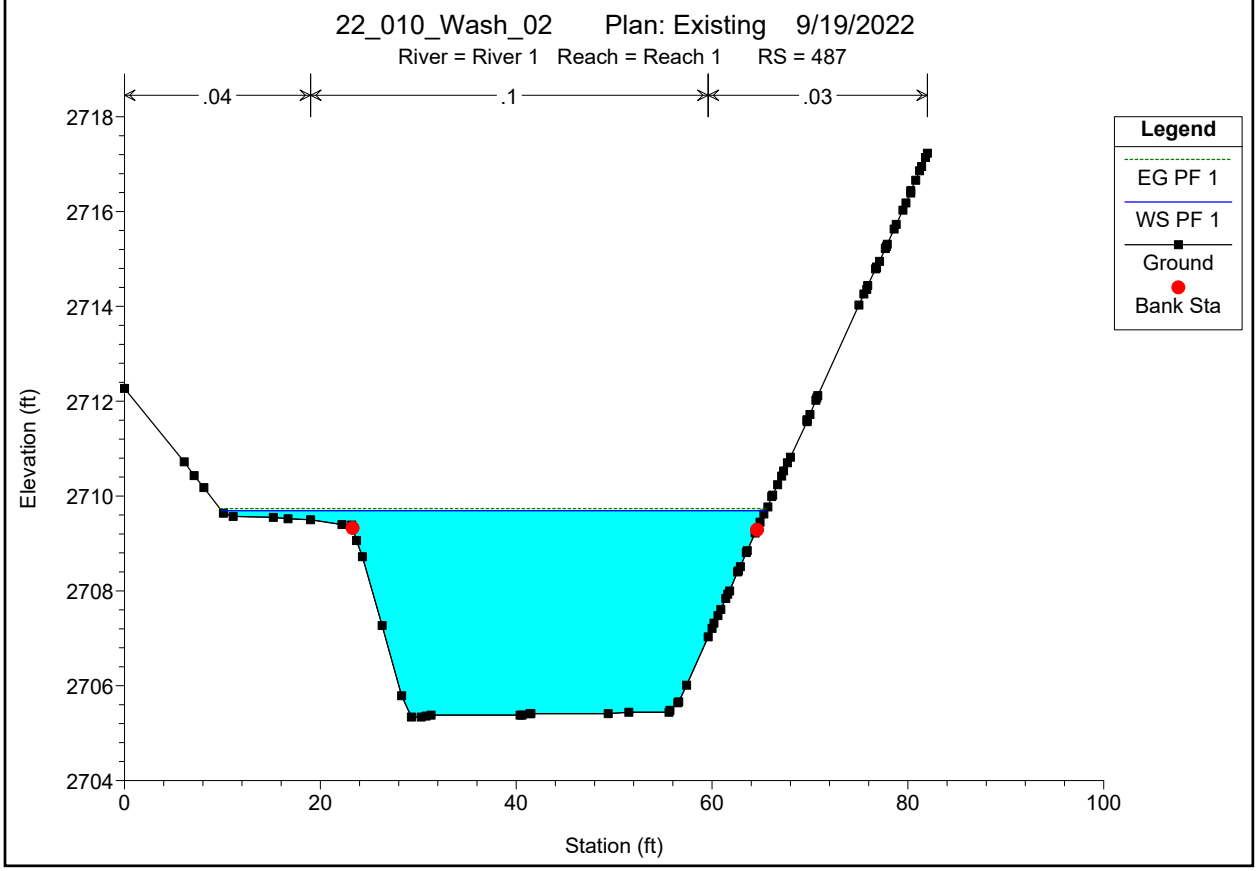
APPENDIX E - WASH 1 HYDRAULIC ANALYSIS

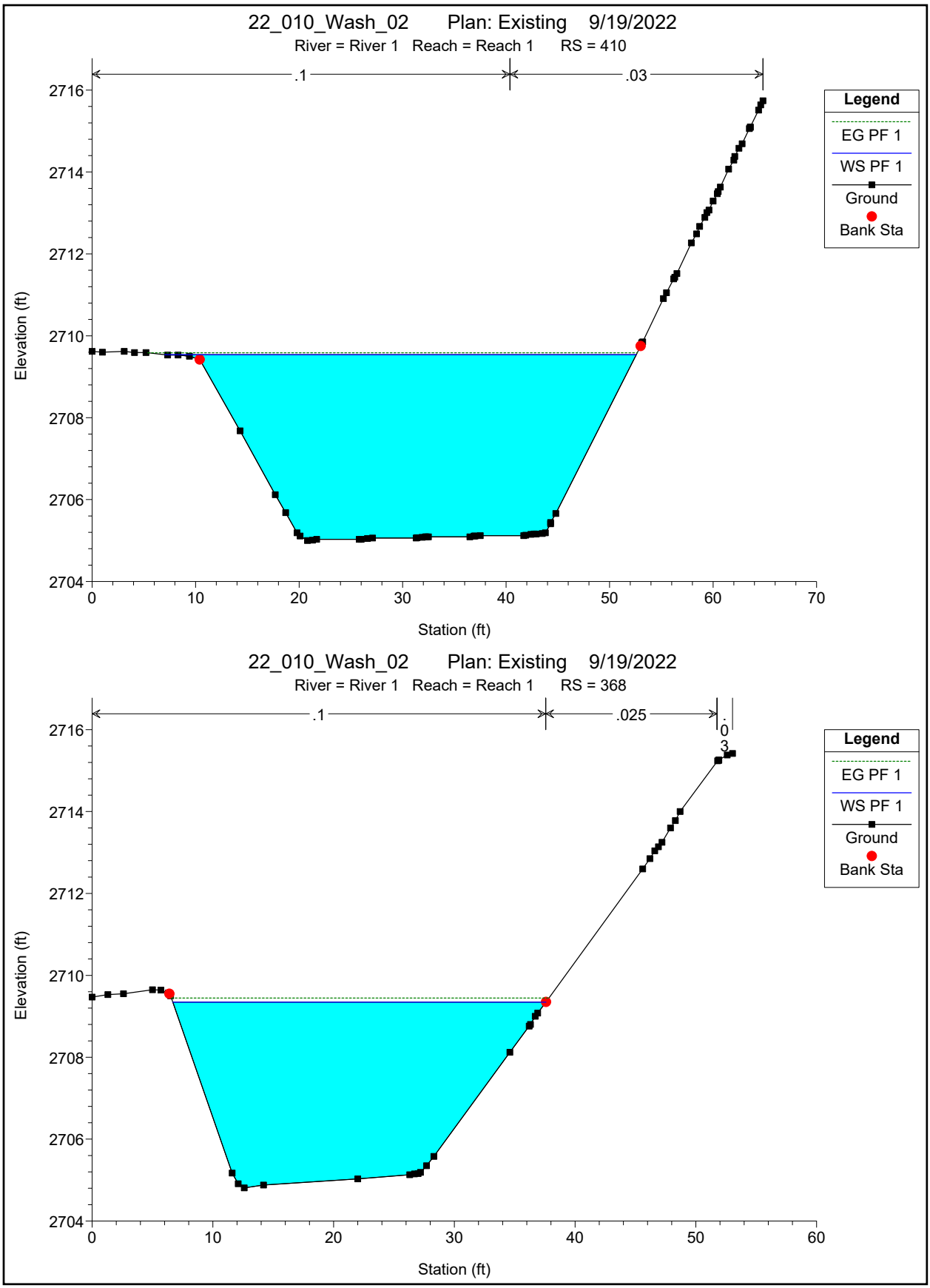
HEC-RAS Plan: Exist River: River 1 Reach: Reach 1 Profile: PF 1

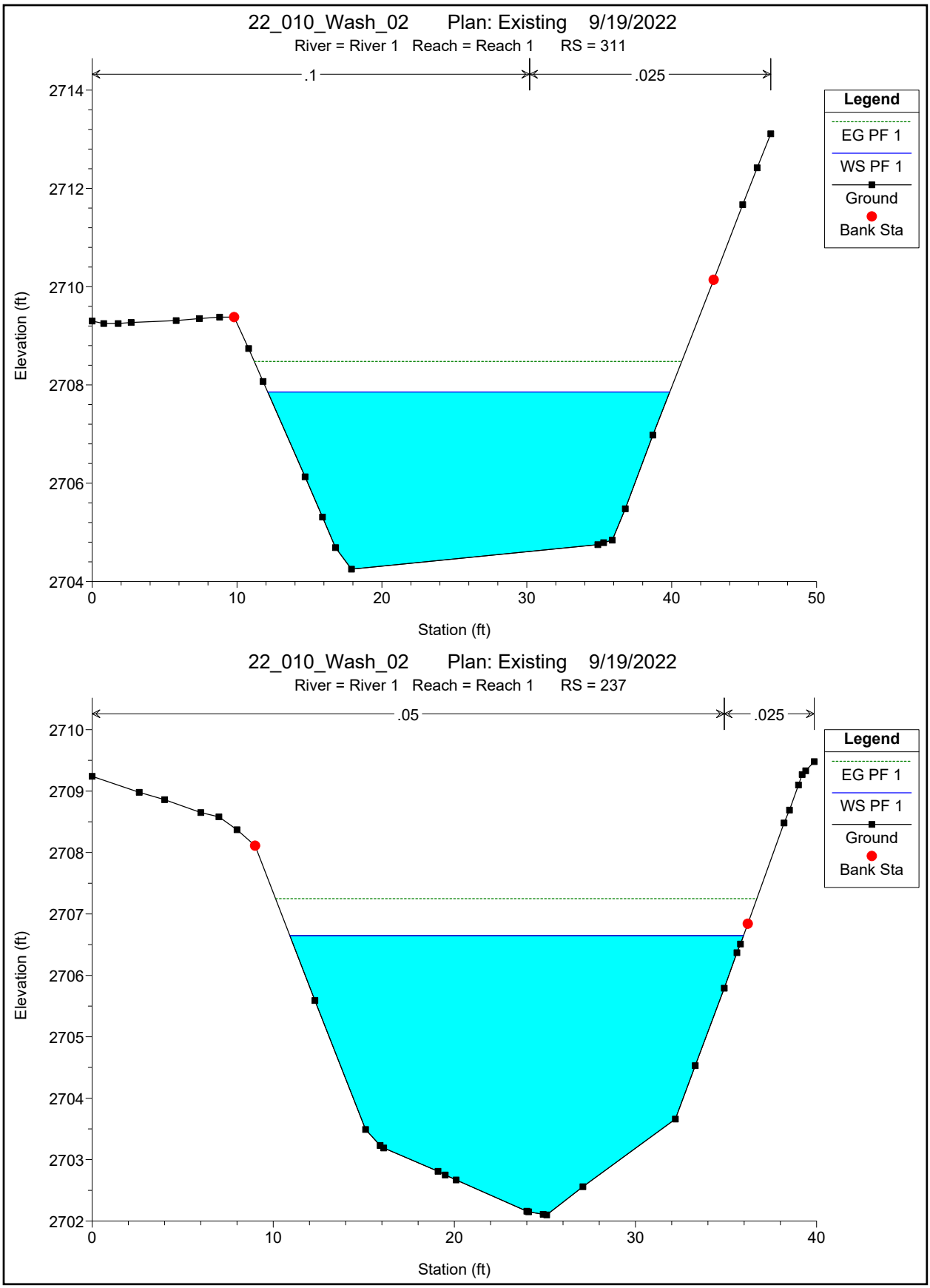
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	711	PF 1	254.20	2707.50	2710.39		2710.44	0.003187	1.91	133.35	61.10	0.23
Reach 1	636	PF 1	254.20	2706.22	2710.15		2710.21	0.003021	1.92	132.72	42.47	0.19
Reach 1	561	PF 1	254.20	2705.70	2709.88		2709.96	0.003773	2.22	114.48	35.16	0.22
Reach 1	487	PF 1	254.20	2705.34	2709.69		2709.74	0.002156	1.70	151.87	55.59	0.16
Reach 1	410	PF 1	254.20	2705.00	2709.54		2709.59	0.001846	1.73	147.29	45.57	0.16
Reach 1	368	PF 1	254.20	2704.81	2709.35		2709.45	0.006726	2.54	100.14	30.91	0.25
Reach 1	311	PF 1	488.60	2704.25	2707.86		2708.48	0.030887	6.33	77.21	27.74	0.67
Reach 1	237	PF 1	488.60	2702.10	2706.65		2707.25	0.010299	6.22	78.58	25.05	0.62
Reach 1	162	PF 1	488.60	2700.65	2706.36		2706.70	0.004143	4.66	104.81	28.44	0.43
Reach 1	87	PF 1	488.60	2700.12	2706.27		2706.46	0.001855	3.51	139.13	32.85	0.30
Reach 1	16	PF 1	488.60	2699.22	2706.25	2702.80	2706.37	0.000554	2.08	203.48	53.18	0.16

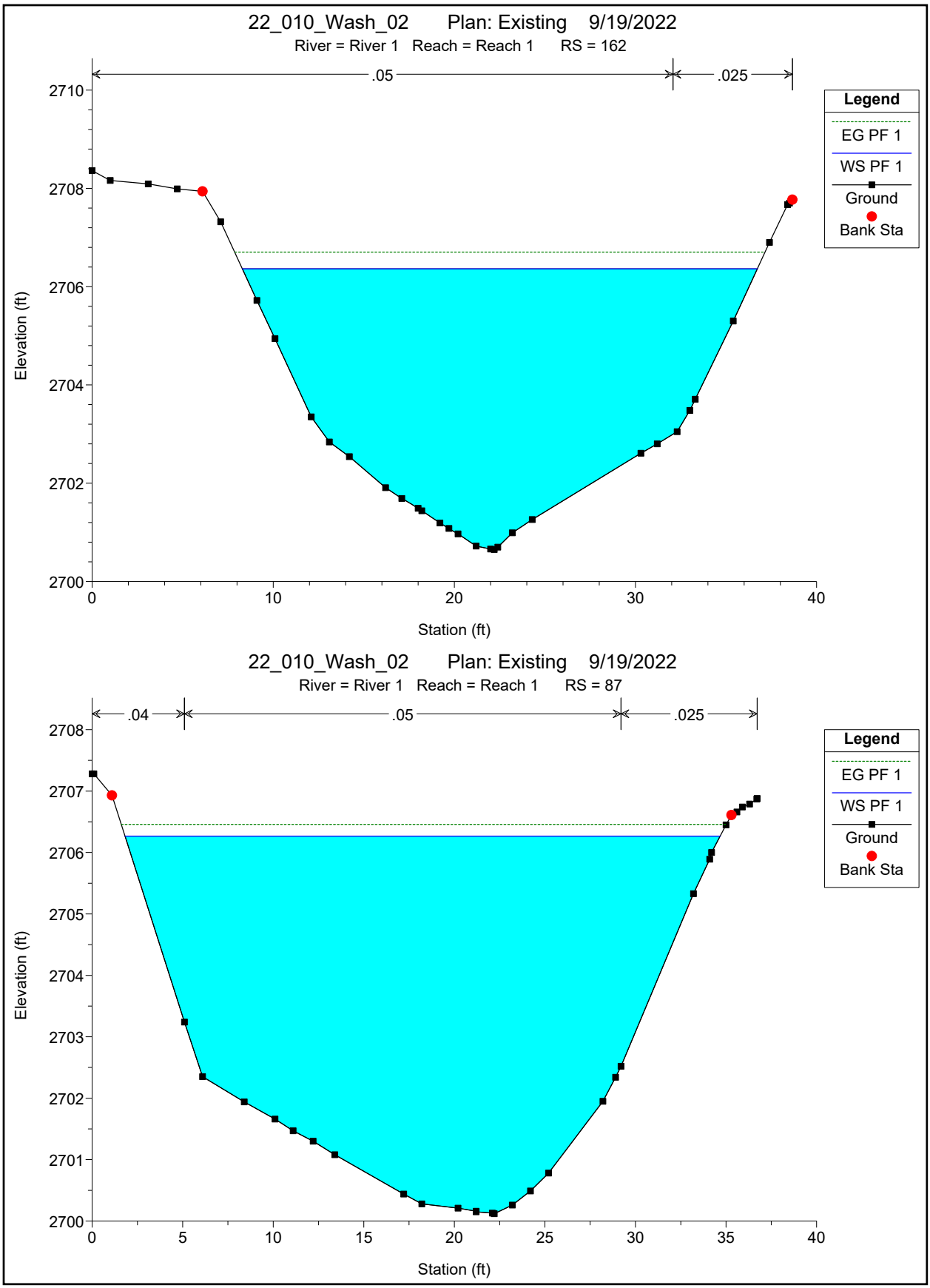

22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 711
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 636
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

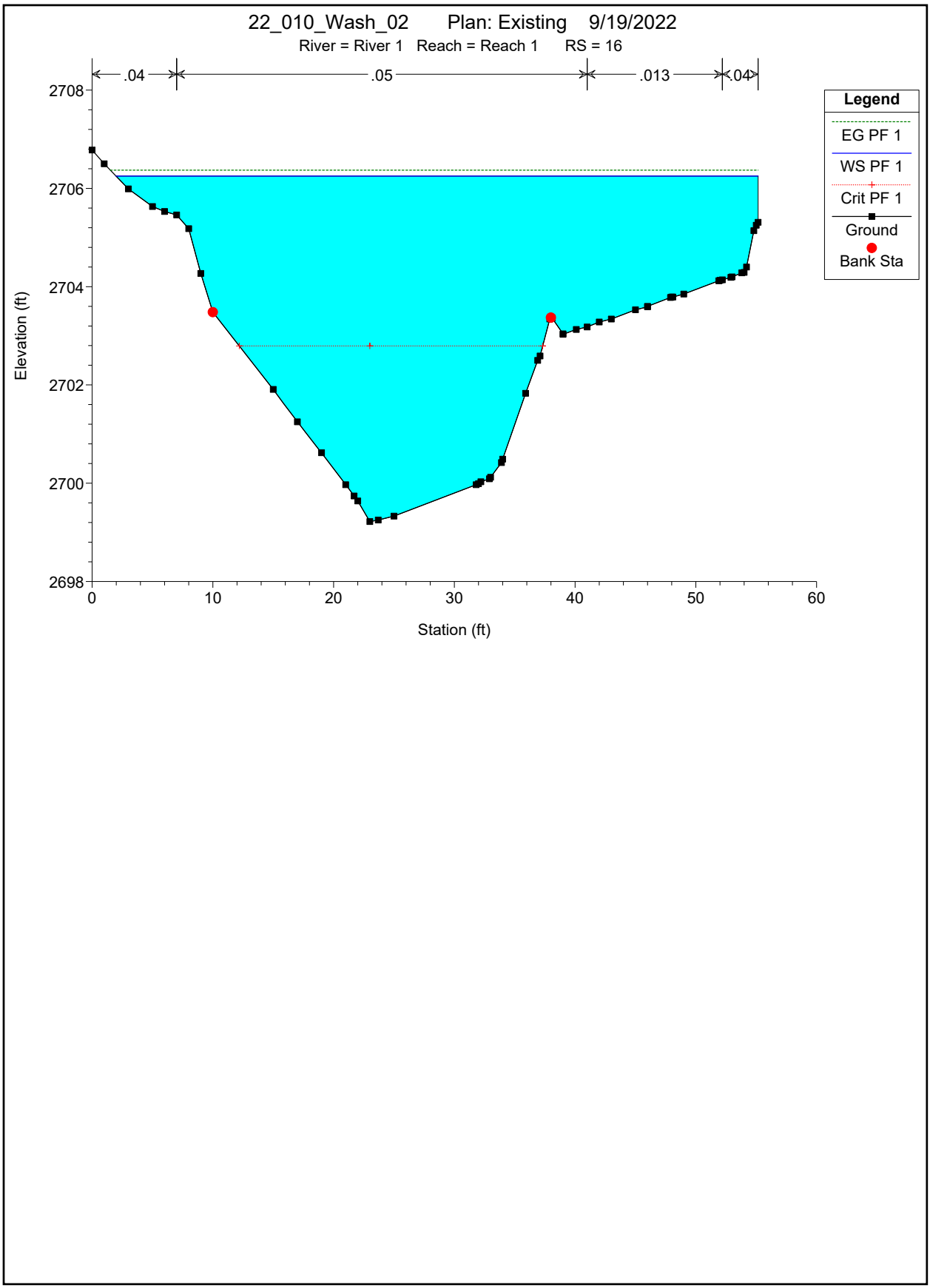

22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 561
.04
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2704
2706
2708
2710
2712
2714
2716
2718
0
10
20
30
40
50
60
70

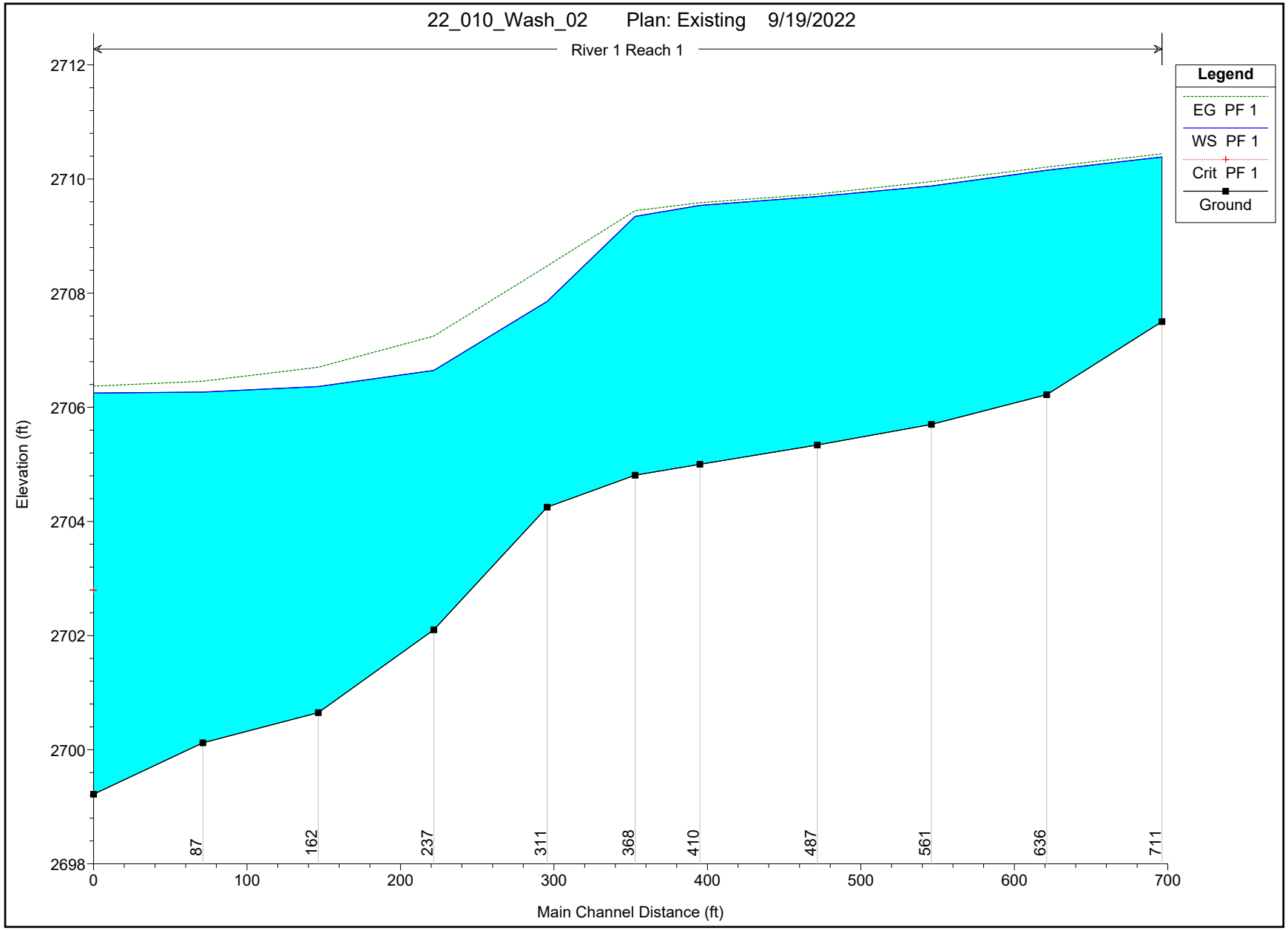

22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 487
.04
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2704
2706
2708
2710
2712
2714
2716
2718
0
20
40
60
80
100


22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 410
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 368
.1
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 311
.1
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 237
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 162
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 87
.04
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Existing 9/19/2022
River = River 1 Reach = Reach 1 RS = 16
.04
.05
.013
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2708
2706
2704
2702
2700
2698
0
10
20
30
40
50
60
Station (ft)


22_010_Wash_02 Plan: Existing 9/19/2022
River 1 Reach 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2712
2710
2708
2706
2704
2702
2700
2698
87
162
237
311
368
410
487
561
636
711
0
100
200
300
400
500
600
700
Main Channel Distance (ft)

HEC-RAS HEC-RAS 6.1.0 September 2021
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 22_010_Wash_02
Project File : 22_010_Wash_02.prj
Run Date and Time: 9/19/2022 10:56:05 AM

Project in English units

PLAN DATA

Plan Title: Existing
Plan File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.p01

Geometry Title: ExistWash
Geometry File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.g01

Flow Title : Flow01
Flow File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.f01

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow01
Flow File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.f01

Flow Data (cfs)

River	Reach	RS	PF 1
River 1	Reach 1	711	254.2
River 1	Reach 1	311	488.6

Boundary Conditions

River	Reach	Profile	Upstream	Downstream

GEOMETRY DATA

Geometry Title: ExistWash
Geometry File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.g01

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 711

INPUT
Description:
Station Elevation Data num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2712.72	.4	2712.7	.9	2712.65	4.4	2712.24	5.4	2712.16
6.4	2712.05	7.4	2711.99	7.8	2711.87	8	2711.85	8.4	2711.73
9.4	2711.3	10.4	2710.9	12.4	2710.12	15.4	2708.91	16.4	2708.54
18.4	2707.74	18.8	2707.67	19	2707.57	19.4	2707.5	20.4	2707.52
21.7	2707.53	22.1	2707.53	22.4	2707.53	23.4	2707.56	25.4	2707.56
25.7	2707.57	26.1	2707.58	26.4	2707.58	26.7	2707.59	29.4	2707.59
29.7	2707.6	30.1	2707.62	30.4	2707.62	32.4	2707.62	32.7	2707.63
33.1	2707.64	36.2	2707.66	36.4	2707.66	36.6	2707.66	37.2	2707.68
37.4	2707.68	37.6	2707.68	40.4	2707.69	41.4	2707.71	44.6	2707.72
45.4	2707.74	45.6	2707.75	46.4	2707.75	48.4	2707.75	49.2	2707.78
49.4	2707.78	49.6	2707.78	50.3	2707.78	50.4	2707.78	50.6	2707.78
51.3	2707.81	51.4	2707.81	51.5	2707.81	52.4	2707.84	52.5	2707.84
53.3	2707.84	53.4	2707.84	53.5	2707.85	58.4	2708	58.5	2708.02
59.3	2708.3	59.4	2708.32	59.5	2708.35	60.3	2708.68	60.4	2708.71
60.5	2708.71	61.3	2708.69	61.4	2708.69	61.5	2708.69	62.3	2708.64
62.4	2708.64	62.5	2708.65	63.3	2708.63	63.4	2708.64	63.5	2708.65
64.3	2708.87	64.4	2708.89	64.5	2708.9	65.5	2709.14	66.4	2709.31
66.4	2709.32	66.4	2709.33	67.4	2709.47	67.4	2709.48	68.4	2709.66
70.4	2710	70.4	2710.01	71.4	2710.16	72.4	2710.31	73.1	2710.44
73.4	2710.5	74.4	2710.65	74.4	2710.66	75.4	2710.84	76.4	2710.99
76.4	2711	77.4	2711.17	77.4	2711.1877.52294	2711.2			

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.154.85276	.03	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
7.477.52294 75.1 75.1 75.1 .1 .3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 636

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2711.19	.7	2711.25	1.7	2711.2	4.7	2708.98	7.7	2706.73
8.7	2706.22	9.9	2706.23	12.8	2706.31	13.6	2706.31	15.7	2706.38
16.7	2706.38	18.7	2706.44	19.7	2706.44	22.7	2706.53	23.7	2706.53
23.8	2706.53	25.7	2706.59	25.8	2706.59	26.6	2706.59	27.5	2706.62
28.5	2706.62	29.5	2706.65	30.9	2706.65	31.5	2706.65	38.7	2706.77
39.7	2707.12	51.1	2712.99	51.3	2713.11	52	2713.48	52.3	2713.63
52.7	2713.8	53	2713.96	53.4	2714.12	53.7	2714.27	54	2714.43
54.7	2714.77	55	2714.91	55.4	2715.1	55.7	2715.24	56	2715.38
56.4	2715.61	56.7	2715.74	56.9	2715.86	57.4	2716.09	57.9	2716.33
58.5	2716.59	58.7	2716.7	59.5	2717.08	59.9	2717.2860.30812		2717.47

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.137.30593	.03	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1.7 51.1 75.1 75.1 75.1 .1 .3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 561

INPUT
Description:
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2711.49	1.3	2711.22	4.3	2710.66	5.3	2710.45	6.3	2710.26
7.3	2710.14	11.4	2710.12	13.4	2710.06	14.4	2710	16.8	2709.91
18.4	2709.88	18.6	2709.77	19.4	2709.35	21.3	2707.91	22.4	2707.04
23.4	2706.28	24.4	2705.7	25.5	2705.72	25.9	2705.72	26.1	2705.72
26.5	2705.72	27.5	2705.75	27.7	2705.75	28.4	2705.75	29.4	2705.75
30.4	2705.78	32.5	2705.78	33.5	2705.81	35.5	2705.82	36.3	2705.84
36.5	2705.84	38.6	2705.84	39.5	2705.88	41.6	2705.88	42.1	2705.89
42.6	2705.89	43	2705.9	43.1	2705.9	43.6	2705.91	44.6	2705.91
45.6	2705.91	45.8	2705.98	46.6	2706.34	47.3	2706.71	47.6	2706.86
47.6	2706.88	54.6	2710.4	54.8	2710.48	55.6	2710.87	55.6	2710.9
55.7	2710.93	56.2	2711.18	56.6	2711.36	56.7	2711.38	63.7	2714.9
63.8	2714.97	64.6	2715.37	64.7	2715.4	64.7	2715.43	65.2	2715.62
65.7	2715.88	65.8	2715.91	66.6	2716.3	66.7	2716.38	66.9	2716.48
67.5	2716.75	67.7	2716.88	68	2717.05	68.4	2717.21	68.7	2717.39
69.1	2717.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	16.8	.1	45.8	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
18.4	55.7	74.4	74.4	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 487

INPUT
Description:
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2712.27	6.1	2710.72	7.1	2710.43	8.1	2710.18	10.1	2709.64
11.1	2709.57	15.2	2709.55	16.7	2709.52	19	2709.5	22.2	2709.4
23.2	2709.39	23.32	709.324	23.7	2709.06	24.3	2708.72	26.3	2707.27
28.3	2705.79	29.3	2705.34	30.3	2705.34	30.8	2705.36	31.3	2705.38
40.4	2705.38	40.6	2705.38	41.4	2705.41	41.5	2705.41	49.4	2705.41
51.5	2705.44	55.6	2705.44	55.7	2705.48	56.5	2705.64	56.6	2705.66
57.4	2706.01	59.6	2707.03	60	2707.21	60.2	2707.32	60.6	2707.48
60.9	2707.61	61.4	2707.84	61.6	2707.93	61.8	2708	62.6	2708.4
62.7	2708.42	62.9	2708.51	63.5	2708.81	63.6	2708.85	64.4	2709.22
64.62	709.287	64.7	2709.32	64.9	2709.45	65.3	2709.62	65.7	2709.77
66.1	2709.99	66.2	2710.02	66.7	2710.24	67.1	2710.42	67.3	2710.53
67.7	2710.7	68	2710.82	69.7	2711.57	69.7	2711.59	69.7	2711.61
70	2711.72	70.6	2712.02	70.7	2712.07	70.8	2712.12	75	2714.03
75.5	2714.26	75.8	2714.36	75.9	2714.44	76.7	2714.79	76.8	2714.81
76.8	2714.83	77.1	2714.95	77.7	2715.22	77.8	2715.26	77.9	2715.31
78.6	2715.63	78.8	2715.73	79.5	2716.03	79.8	2716.18	80.3	2716.39
80.3	2716.44	80.8	2716.66	81.2	2716.86	81.4	2716.95	81.8	2717.14
82	2717.23								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	19	.1	59.6	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
23.3	64.6	76.5	76.5	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 410

INPUT
Description:
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2709.62	1	2709.6	3.1	2709.62	4.1	2709.59	5.2	2709.59
7.3	2709.53	8.3	2709.53	9.4	2709.5	10.4	2709.42	14.3	2707.68
17.7	2706.12	18.7	2705.68	19.8	2705.19	20.1	2705.11	20.8	2705
21.3	2705.01	21.7	2705.03	25.8	2705.03	26	2705.03	26.6	2705.05
27.1	2705.06	31.3	2705.06	31.4	2705.07	31.9	2705.08	32.2	2705.09
32.3	2705.09	32.5	2705.09	36.5	2705.09	36.9	2705.11	37	2705.11
37.5	2705.12	41.7	2705.12	41.9	2705.13	42.4	2705.15	42.7	2705.16
42.9	2705.16	43.5	2705.17	43.8	2705.19	44.3	2705.41	44.3	2705.44
44.8	2705.66	53	2709.75	53.1	2709.83	53.2	2709.85	55.2	2710.91
55.5	2711.05	56.2	2711.39	56.3	2711.43	56.5	2711.52	57.9	2712.27
58.4	2712.49	58.7	2712.67	59.2	2712.89	59.4	2713.01	59.6	2713.07
60	2713.29	60.4	2713.47	60.5	2713.52	60.7	2713.63	61.5	2714.07
62	2714.29	62.1	2714.38	62.5	2714.58	62.8	2714.69	63.5	2715.06
63.6	2715.09	63.6	2715.1	64.4	2715.51	64.6	2715.64	64.8216	2715.74

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.140.37765		.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10.4	53	42.2	42.2	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 368

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2709.47	1.3	2709.53	2.6	2709.55	5	2709.65	5.7	2709.64
6.3	2709.57	6.4	2709.55	6.5	2709.5	11.6	2705.17	12.1	2704.91
12.6	2704.81	14.2	2704.88	22	2705.03	26.3	2705.13	26.7	2705.15
27	2705.16	27.2	2705.19	27.7	2705.35	28.3	2705.58	34.6	2708.12
36.2	2708.76	36.3	2708.8	36.7	2709	36.9	2709.08	37.6	2709.35
45.6	2712.6	46.2	2712.85	46.6	2713.04	46.9	2713.14	47.2	2713.25
47.9	2713.6	48.3	2713.78	48.7	2714	51.8	2715.24	51.9	2715.25
51.9	2715.26	52.6	2715.3853	.03458	2715.42				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.137.57352		.02551.75945		.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
6.4	37.6	57.3	57.3	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 311

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2709.3	.8	2709.25	1.8	2709.25	2.7	2709.27	5.8	2709.31
7.4	2709.35	8.8	2709.38	9.8	2709.38	10.8	2708.74	11.8	2708.07
14.7	2706.13	15.9	2705.31	16.8	2704.69	17.9	2704.25	34.9	2704.75
35.3	2704.79	35.9	2704.84	36.8	2705.48	38.7	2706.98	42.9	2710.14
44.9	2711.67	45.9	2712.4246	.83741	2713.11				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.130.19435		.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9.8	42.9	73.9	73.9	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 237

INPUT
Description:

Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2709.24	2.6	2708.98	4	2708.86	6	2708.65	7	2708.58
8	2708.37	9	2708.11	12.3	2705.59	15.1	2703.49	15.9	2703.23
16.1	2703.19	19.1	2702.81	19.5	2702.75	20.1	2702.67	24	2702.16
24.1	2702.15	24.9	2702.11	25.1	2702.1	27.1	2702.56	32.2	2703.66
33.3	2704.53	34.9	2705.79	35.6	2706.37	35.8	2706.51	36.2	2706.84
38.2	2708.48	38.5	2708.69	39	2709.1	39.2	2709.27	39.4	2709.33
39.87134	2709.48								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.05	34.9	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9	36.2	75.3	75.3	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 162

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2708.36	1	2708.16	3.1	2708.09	4.7	2707.99	6.1	2707.94
7.1	2707.32	9.1	2705.72	10.1	2704.94	12.1	2703.35	13.1	2702.84
14.2	2702.54	16.2	2701.91	17.1	2701.69	18	2701.49	18.2	2701.44
19.2	2701.19	19.7	2701.08	20.2	2700.97	21.2	2700.72	22	2700.66
22.2	2700.65	22.4	2700.7	23.2	2700.99	24.3	2701.26	30.3	2702.61
31.2	2702.8	32.3	2703.05	33	2703.48	33.3	2703.71	35.4	2705.3
37.4	2706.9	38.4	2707.67	38.5	2707.7	38.664	2707.77		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.0532.07001		.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
6.1	38.664	75.2	75.2	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 87

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2707.28	.1	2707.28	1.1	2706.93	5.1	2703.24	6.1	2702.35
8.4	2701.94	10.1	2701.66	11.1	2701.47	12.2	2701.3	13.4	2701.08
17.2	2700.44	18.2	2700.28	20.2	2700.21	21.2	2700.16	21.2	2700.15
22.1	2700.13	22.2	2700.12	23.2	2700.26	24.2	2700.49	25.2	2700.78
28.2	2701.95	28.9	2702.34	29.2	2702.52	33.2	2705.33	34.1	2705.89
34.2	2706	35	2706.45	35.3	2706.61	35.6	2706.66	35.9	2706.74
36.3	2706.79	36.7	2706.8736.72185		2706.88				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	5.1	.05	29.2	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1.1	35.3	71.2	71.2	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 16

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2706.78	1	2706.5	3	2705.99	5	2705.63	6	2705.53
7	2705.46	8	2705.18	9	2704.27	10	2703.48	15	2701.91
17	2701.25	19	2700.62	21	2699.97	21.7	2699.74	22	2699.64
23	2699.22	23.7	2699.25	25	2699.33	31.8	2699.97	32	2699.99
32.2	2700.03	32.9	2700.09	33	2700.12	33.9	2700.42	34	2700.49
35.9	2701.83	36.9	2702.5	37.1	2702.59	37.9	2703.34	38	2703.37
38.1	2703.36	39	2703.04	39	2703.03	40.1	2703.13	41	2703.18
42	2703.28	43	2703.34	45	2703.53	46	2703.59	46	2703.6
47.9	2703.78	48	2703.79	48.1	2703.79	49	2703.85	51.9	2704.12
52	2704.13	52.2	2704.14	52.9	2704.19	53	2704.2	53.8	2704.28
54	2704.29	54.2	2704.4	54.8	2705.14	55	2705.2555.15612		2705.31

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	7	.05	41	.013	52.2	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
10	38	.1	.3

SUMMARY OF MANNING'S N VALUES

River:River 1

Reach	River Sta.	n1	n2	n3	n4
Reach 1	711	.1	.03		
Reach 1	636	.1	.03		
Reach 1	561	.04	.1	.03	
Reach 1	487	.04	.1	.03	
Reach 1	410	.1	.03		
Reach 1	368	.1	.025	.03	
Reach 1	311	.1	.025		
Reach 1	237	.05	.025		
Reach 1	162	.05	.025		
Reach 1	87	.04	.05	.025	
Reach 1	16	.04	.05	.013	.04

SUMMARY OF REACH LENGTHS

River: River 1

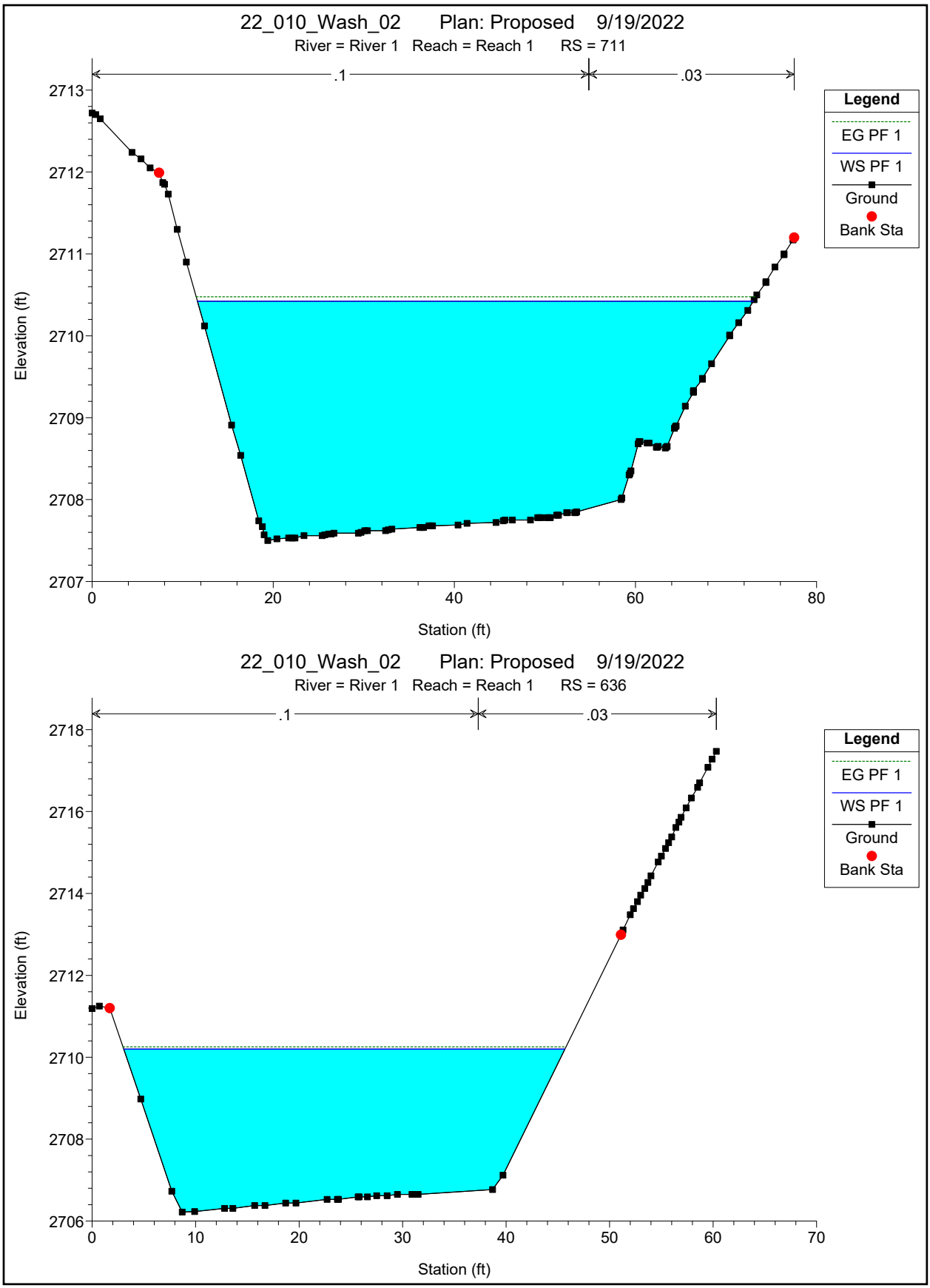
Reach	River Sta.	Left	Channel	Right
Reach 1	711	75.1	75.1	75.1
Reach 1	636	75.1	75.1	75.1
Reach 1	561	74.4	74.4	74.4
Reach 1	487	76.5	76.5	76.5
Reach 1	410	42.2	42.2	42.2
Reach 1	368	57.3	57.3	57.3
Reach 1	311	73.9	73.9	73.9
Reach 1	237	75.3	75.3	75.3
Reach 1	162	75.2	75.2	75.2
Reach 1	87	71.2	71.2	71.2
Reach 1	16			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River 1

Reach	River Sta.	Contr.	Expan.
Reach 1	711	.1	.3
Reach 1	636	.1	.3
Reach 1	561	.1	.3
Reach 1	487	.1	.3
Reach 1	410	.1	.3
Reach 1	368	.1	.3
Reach 1	311	.1	.3
Reach 1	237	.1	.3
Reach 1	162	.1	.3
Reach 1	87	.1	.3
Reach 1	16	.1	.3

HEC-RAS Plan: PROP River: River 1 Reach: 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)	
Reach 1	711	PF 1	254.20	2707.50	2710.42		2710.48	0.003026	1.88	135.49	61.37	0.22
Reach 1	636	PF 1	254.20	2706.22	2710.20		2710.25	0.002887	1.89	134.67	42.63	0.19
Reach 1	561	PF 1	254.20	2705.70	2709.94		2710.01	0.003530	2.18	116.68	35.13	0.21
Reach 1	487	PF 1	254.20	2705.34	2709.76		2709.81	0.002086	1.67	152.53	43.02	0.15
Reach 1	410	PF 1	254.20	2705.00	2709.61		2709.66	0.001834	1.69	150.29	42.75	0.16
Reach 1	368	PF 1	254.20	2704.81	2709.43		2709.52	0.006238	2.48	102.62	31.20	0.24
Reach 1	311	PF 1	488.60	2704.25	2707.96		2708.54	0.035439	6.11	79.99	33.84	0.64
Reach 1	237	PF 1	488.60	2702.10	2706.65		2707.25	0.010299	6.22	78.58	25.05	0.62
Reach 1	162	PF 1	488.60	2700.65	2706.36		2706.70	0.004143	4.66	104.81	28.44	0.43
Reach 1	87	PF 1	488.60	2700.12	2706.27		2706.46	0.001855	3.51	139.13	32.85	0.30
Reach 1	16	PF 1	488.60	2699.22	2706.25	2702.80	2706.37	0.000554	2.08	203.48	53.18	0.16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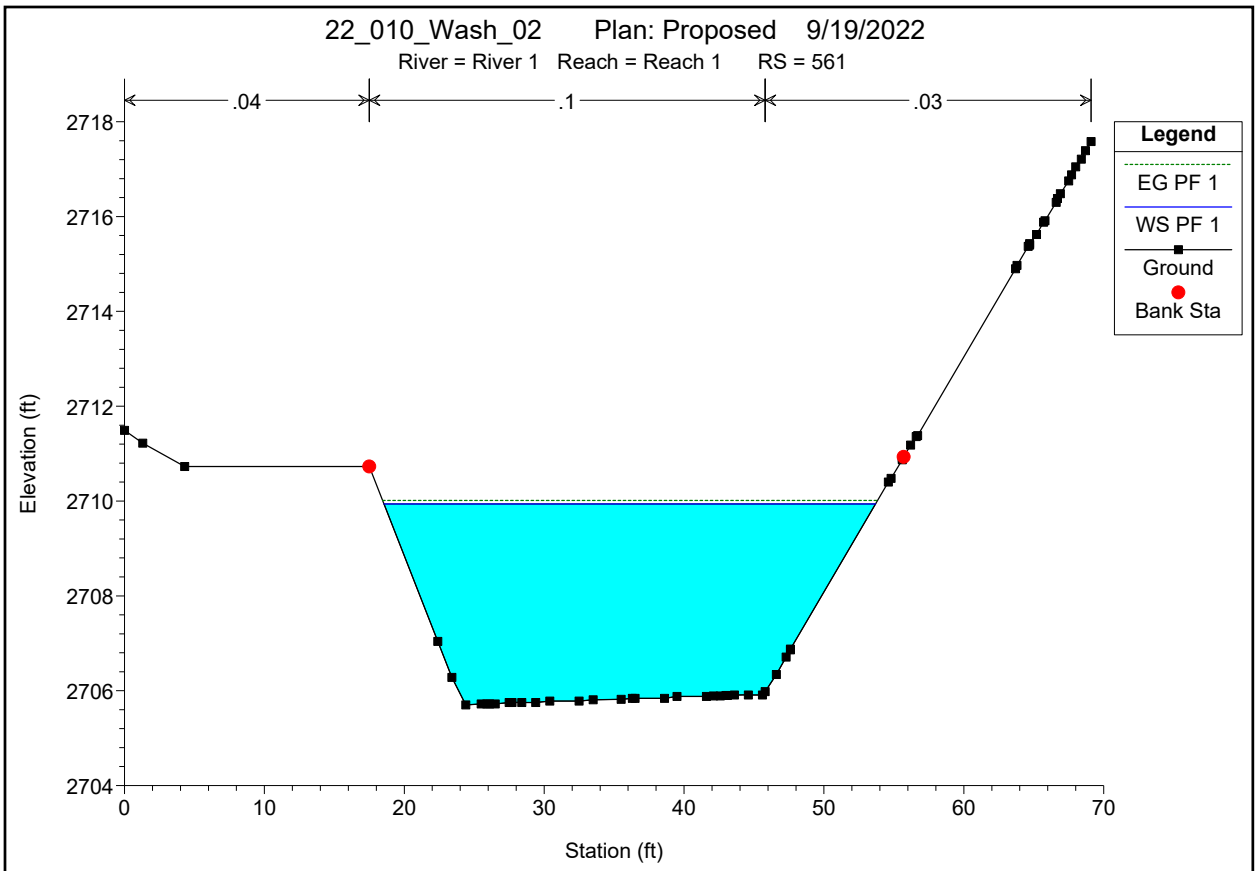
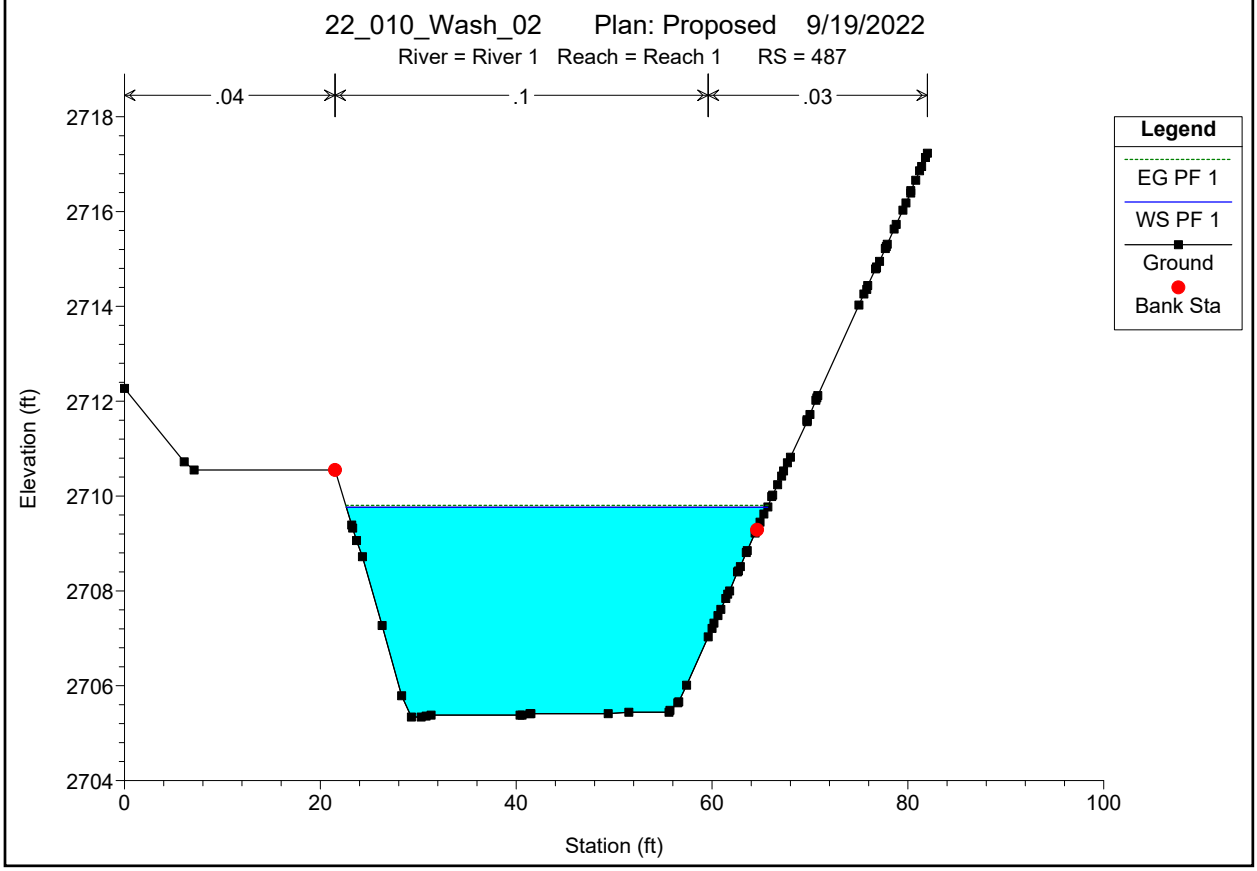
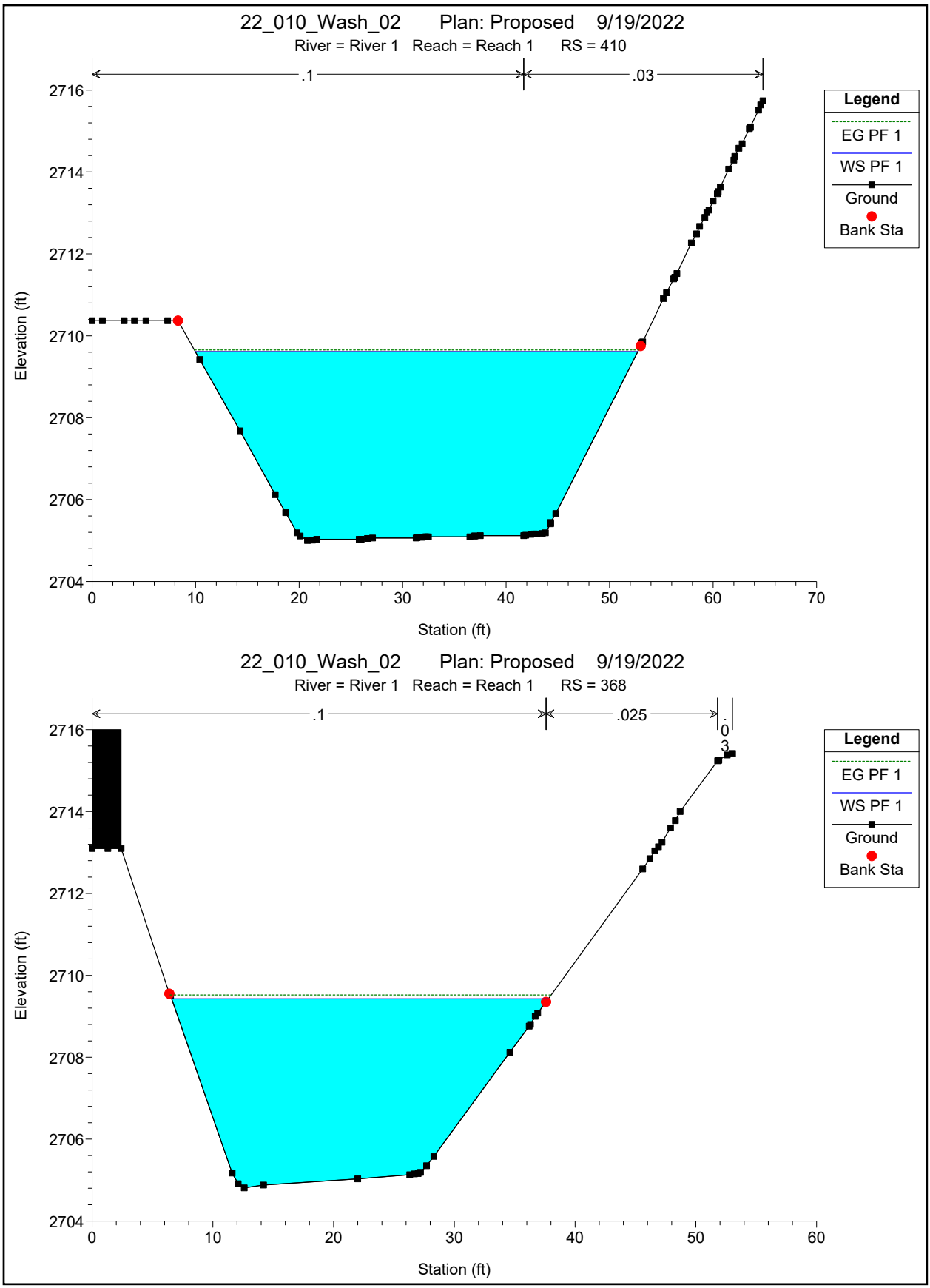
River = River 1 Reach = Reach 1 RS = 711
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 636
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 561
.04
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2704
2706
2708
2710
2712
2714
2716
2718
0
10
20
30
40
50
60
70


22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 487
.04
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2704
2706
2708
2710
2712
2714
2716
2718
0
20
40
60
80
100


22_010_Wash_02 Plan: Proposed 9/19/2022
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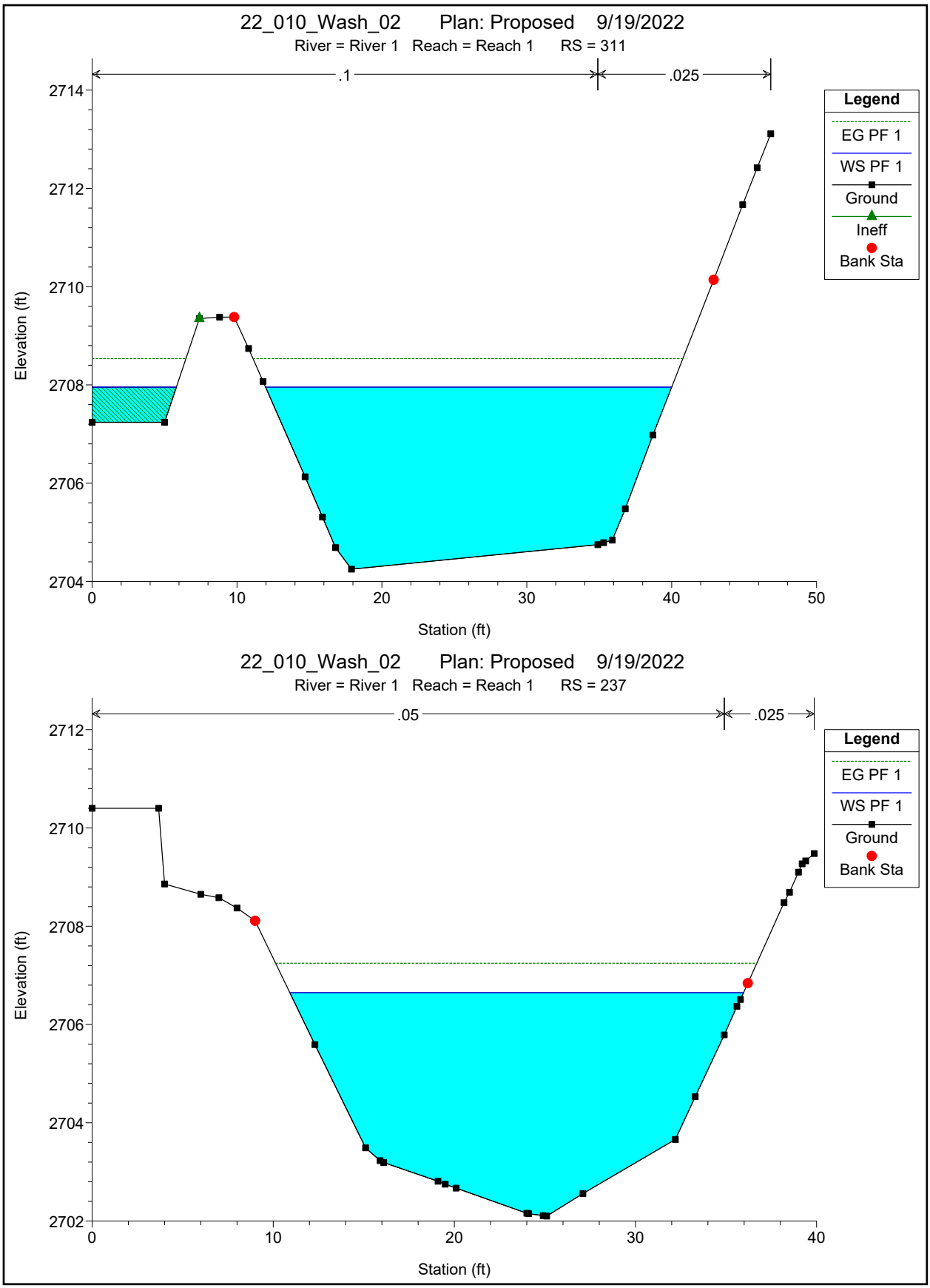
.1
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 368
.1
.025
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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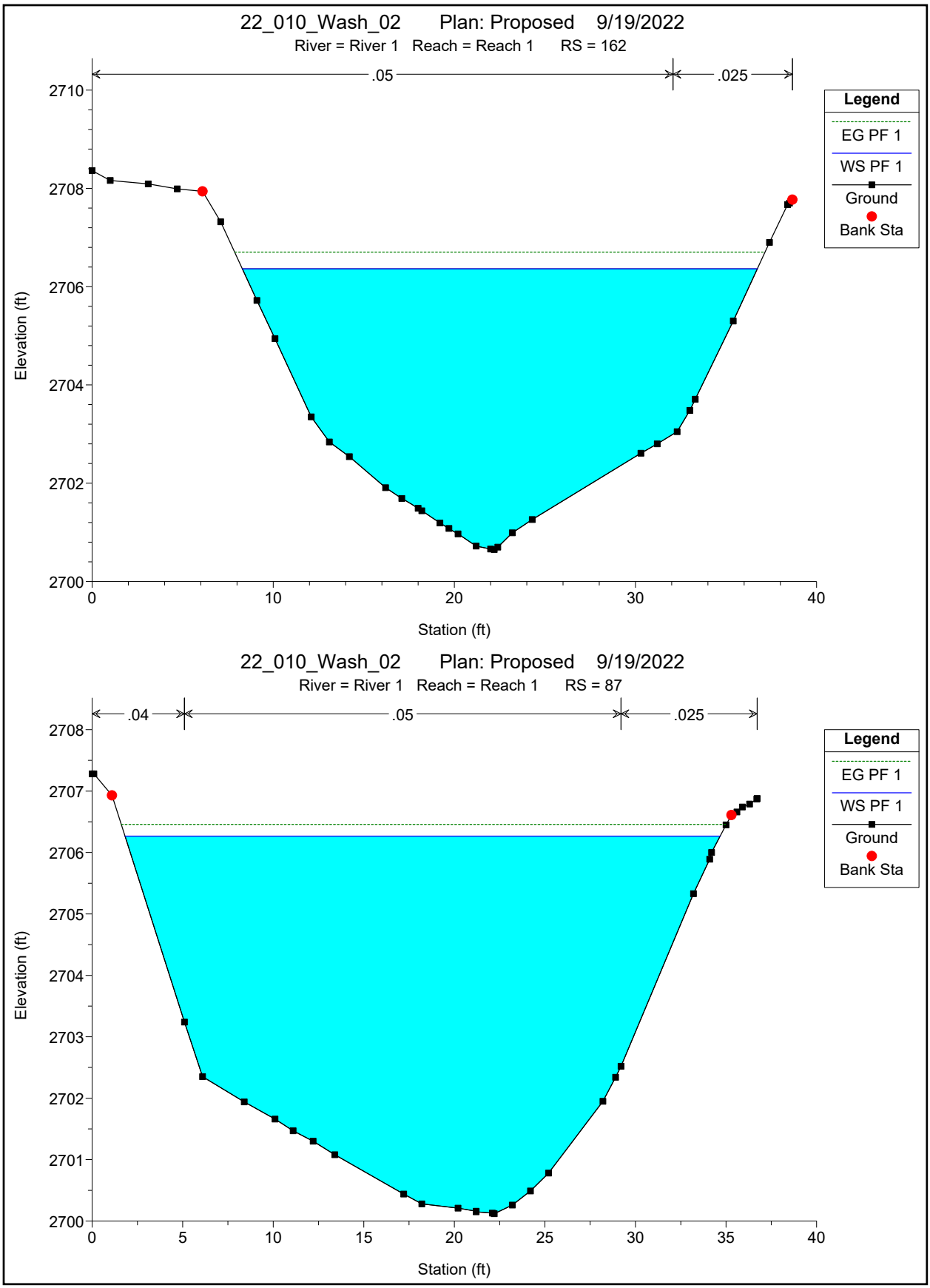
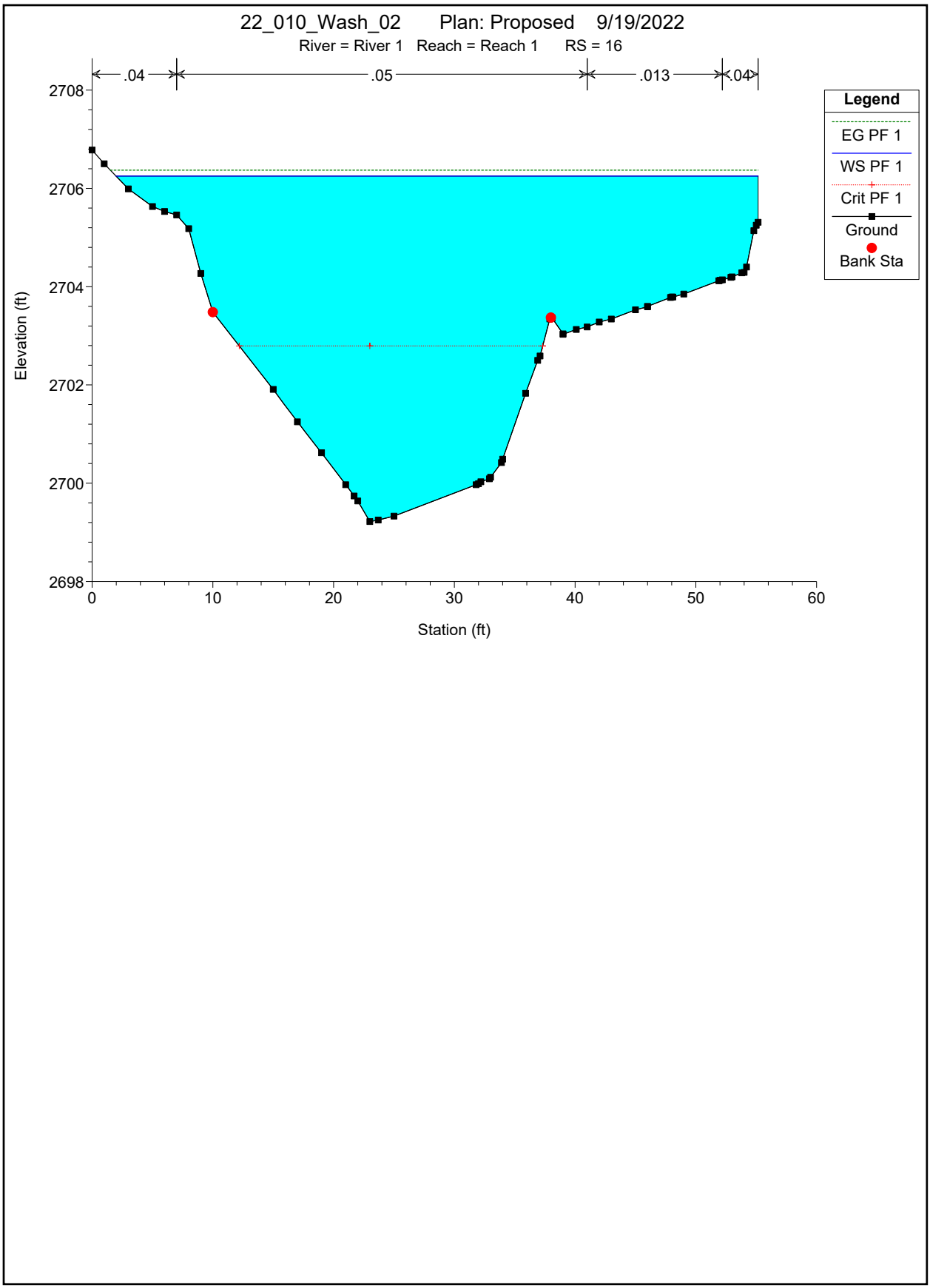
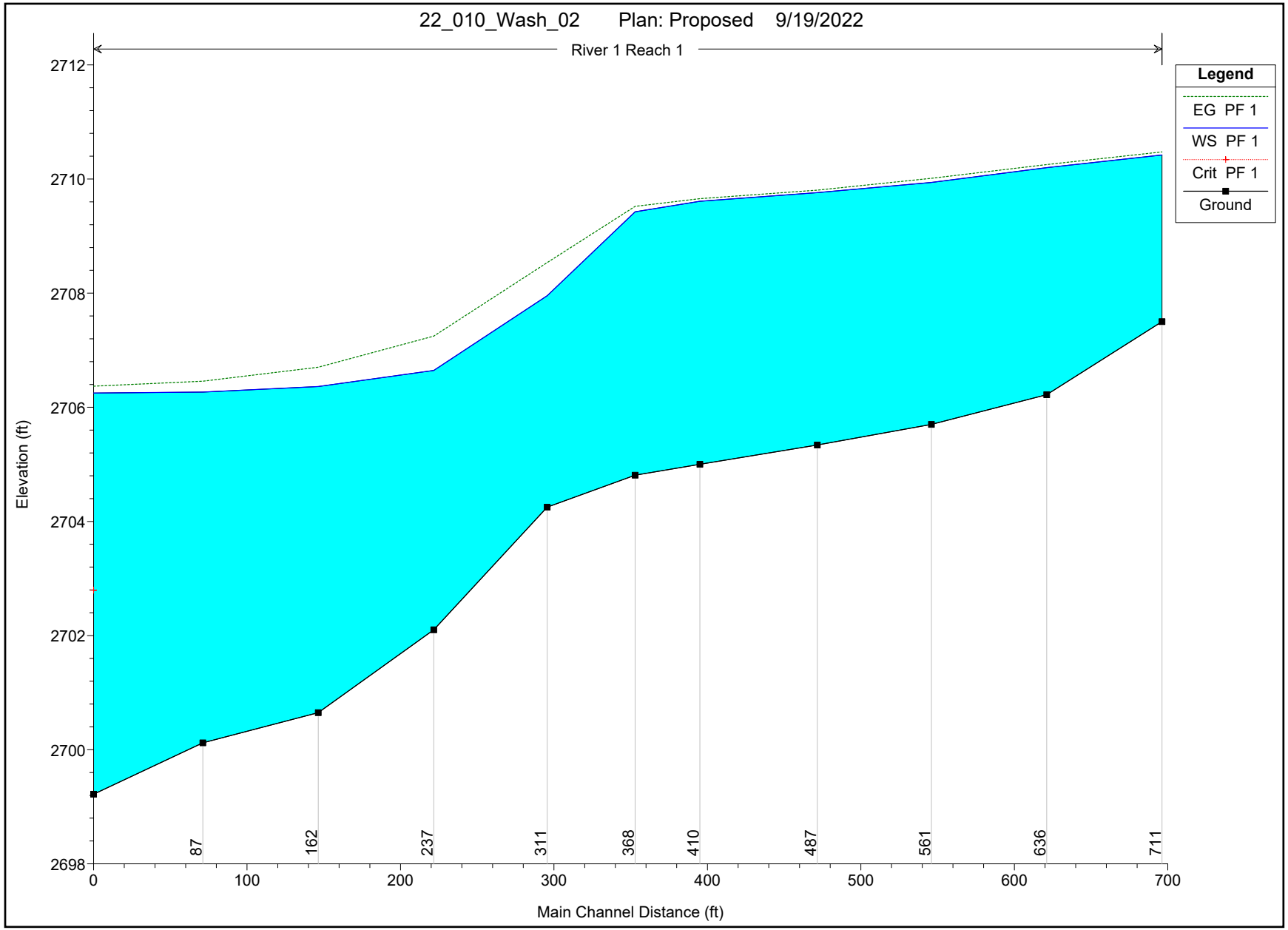
River = River 1 Reach = Reach 1 RS = 311
.1
.025
Legend
EG PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 237
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 162
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 87
.04
.05
.025
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


22_010_Wash_02 Plan: Proposed 9/19/2022
River = River 1 Reach = Reach 1 RS = 16
.04
.05
.013
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2708
2706
2704
2702
2700
2698
0
10
20
30
40
50
60
Station (ft)


22_010_Wash_02 Plan: Proposed 9/19/2022
River 1 Reach 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
2712
2710
2708
2706
2704
2702
2700
2698
87
162
237
311
368
410
487
561
636
711
0
100
200
300
400
500
600
700
Main Channel Distance (ft)

HEC-RAS HEC-RAS 6.1.0 September 2021
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 22_010_Wash_02
Project File : 22_010_Wash_02.prj
Run Date and Time: 9/19/2022 10:55:54 AM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.p02

Geometry Title: PropWash
Geometry File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.g02

Flow Title : Flow01
Flow File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.f01

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow01
Flow File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.f01

Flow Data (cfs)

River	Reach	RS	PF 1
River 1	Reach 1	711	254.2
River 1	Reach 1	311	488.6

Boundary Conditions

River	Reach	Profile	Upstream	Downstream

GEOMETRY DATA

Geometry Title: PropWash
Geometry File : z:\PROJECTS\2022\22-010_Grenier_NWC_LaCanadaNaranja\Hydraulics\Existing\HEC-RAS_V6.1\22_010_Wash_02.g02

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 711

INPUT
Description:
Station Elevation Data num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2712.72	.4	2712.7	.9	2712.65	4.4	2712.24	5.4	2712.16
6.4	2712.05	7.4	2711.99	7.8	2711.87	8	2711.85	8.4	2711.73
9.4	2711.3	10.4	2710.9	12.4	2710.12	15.4	2708.91	16.4	2708.54
18.4	2707.74	18.8	2707.67	19	2707.57	19.4	2707.5	20.4	2707.52
21.7	2707.53	22.1	2707.53	22.4	2707.53	23.4	2707.56	25.4	2707.56
25.7	2707.57	26.1	2707.58	26.4	2707.58	26.7	2707.59	29.4	2707.59
29.7	2707.6	30.1	2707.62	30.4	2707.62	32.4	2707.62	32.7	2707.63
33.1	2707.64	36.2	2707.66	36.4	2707.66	36.6	2707.66	37.2	2707.68
37.4	2707.68	37.6	2707.68	40.4	2707.69	41.4	2707.71	44.6	2707.72
45.4	2707.74	45.6	2707.75	46.4	2707.75	48.4	2707.75	49.2	2707.78
49.4	2707.78	49.6	2707.78	50.3	2707.78	50.4	2707.78	50.6	2707.78
51.3	2707.81	51.4	2707.81	51.5	2707.81	52.4	2707.84	52.5	2707.84
53.3	2707.84	53.4	2707.84	53.5	2707.85	58.4	2708	58.5	2708.02
59.3	2708.3	59.4	2708.32	59.5	2708.35	60.3	2708.68	60.4	2708.71
60.5	2708.71	61.3	2708.69	61.4	2708.69	61.5	2708.69	62.3	2708.64
62.4	2708.64	62.5	2708.65	63.3	2708.63	63.4	2708.64	63.5	2708.65
64.3	2708.87	64.4	2708.89	64.5	2708.9	65.5	2709.14	66.4	2709.31
66.4	2709.32	66.4	2709.33	67.4	2709.47	67.4	2709.48	68.4	2709.66
70.4	2710	70.4	2710.01	71.4	2710.16	72.4	2710.31	73.1	2710.44
73.4	2710.5	74.4	2710.65	74.4	2710.66	75.4	2710.84	76.4	2710.99
76.4	2711	77.4	2711.17	77.4	2711.1877.52294	2711.2			

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.154.85276	.03	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
7.477.52294 75.1 75.1 75.1 .1 .3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 636

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2711.19	.7	2711.25	1.7	2711.2	4.7	2708.98	7.7	2706.73
8.7	2706.22	9.9	2706.23	12.8	2706.31	13.6	2706.31	15.7	2706.38
16.7	2706.38	18.7	2706.44	19.7	2706.44	22.7	2706.53	23.7	2706.53
23.8	2706.53	25.7	2706.59	25.8	2706.59	26.6	2706.59	27.5	2706.62
28.5	2706.62	29.5	2706.65	30.9	2706.65	31.5	2706.65	38.7	2706.77
39.7	2707.12	51.1	2712.99	51.3	2713.11	52	2713.48	52.3	2713.63
52.7	2713.8	53	2713.96	53.4	2714.12	53.7	2714.27	54	2714.43
54.7	2714.77	55	2714.91	55.4	2715.1	55.7	2715.24	56	2715.38
56.4	2715.61	56.7	2715.74	56.9	2715.86	57.4	2716.09	57.9	2716.33
58.5	2716.59	58.7	2716.7	59.5	2717.08	59.9	2717.2860.30812		2717.47

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.137.30593	.03	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1.7 51.1 75.1 75.1 75.1 .1 .3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 561

INPUT
Description:
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2711.49	1.3	2711.22	4.3	2710.73	17.5	2710.73	22.4	2707.04
23.4	2706.28	24.4	2705.7	25.5	2705.72	25.9	2705.72	26.1	2705.72
26.5	2705.72	27.5	2705.75	27.7	2705.75	28.4	2705.75	29.4	2705.75
30.4	2705.78	32.5	2705.78	33.5	2705.81	35.5	2705.82	36.3	2705.84
36.5	2705.84	38.6	2705.84	39.5	2705.88	41.6	2705.88	42.1	2705.89
42.6	2705.89	43	2705.9	43.1	2705.9	43.6	2705.91	44.6	2705.91
45.6	2705.91	45.8	2705.98	46.6	2706.34	47.3	2706.71	47.6	2706.86
47.6	2706.88	54.6	2710.4	54.8	2710.48	55.6	2710.87	55.6	2710.9
55.7	2710.93	56.2	2711.18	56.6	2711.36	56.7	2711.38	63.7	2714.9
63.8	2714.97	64.6	2715.37	64.7	2715.4	64.7	2715.43	65.2	2715.62
65.7	2715.88	65.8	2715.91	66.6	2716.3	66.7	2716.38	66.9	2716.48
67.5	2716.75	67.7	2716.88	68	2717.05	68.4	2717.21	68.7	2717.39
69.1	2717.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	17.5	.1	45.8	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
17.5	55.7	74.4	74.4	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 487

INPUT
Description:
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2712.27	6.1	2710.72	7.1	2710.55	21.5	2710.55	23.2	2709.39
23.32	709.324	23.7	2709.06	24.3	2708.72	26.3	2707.27	28.3	2705.79
29.3	2705.34	30.3	2705.34	30.8	2705.36	31.3	2705.38	40.4	2705.38
40.6	2705.38	41.4	2705.41	41.5	2705.41	49.4	2705.41	51.5	2705.44
55.6	2705.44	55.7	2705.48	56.5	2705.64	56.6	2705.66	57.4	2706.01
59.6	2707.03	60	2707.21	60.2	2707.32	60.6	2707.48	60.9	2707.61
61.4	2707.84	61.6	2707.93	61.8	2708	62.6	2708.4	62.7	2708.42
62.9	2708.51	63.5	2708.81	63.6	2708.85	64.4	2709.22	64.62	709.287
64.7	2709.32	64.9	2709.45	65.3	2709.62	65.7	2709.77	66.1	2709.99
66.2	2710.02	66.7	2710.24	67.1	2710.42	67.3	2710.53	67.7	2710.7
68	2710.82	69.7	2711.57	69.7	2711.59	69.7	2711.61	70	2711.72
70.6	2712.02	70.7	2712.07	70.8	2712.12	75	2714.03	75.5	2714.26
75.8	2714.36	75.9	2714.44	76.7	2714.79	76.8	2714.81	76.8	2714.83
77.1	2714.95	77.7	2715.22	77.8	2715.26	77.9	2715.31	78.6	2715.63
78.8	2715.73	79.5	2716.03	79.8	2716.18	80.3	2716.39	80.3	2716.44
80.8	2716.66	81.2	2716.86	81.4	2716.95	81.8	2717.14	82	2717.23

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	21.5	.1	59.6	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
21.5	64.6	76.5	76.5	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 410

INPUT
Description:
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2710.37	1	2710.37	3.1	2710.37	4.1	2710.37	5.2	2710.37
7.3	2710.37	8.3	2710.37	10.4	2709.42	14.3	2707.68	17.7	2706.12
18.7	2705.68	19.8	2705.19	20.1	2705.11	20.8	2705	21.3	2705.01
21.7	2705.03	25.8	2705.03	26	2705.03	26.6	2705.05	27.1	2705.06
31.3	2705.06	31.4	2705.07	31.9	2705.08	32.2	2705.09	32.3	2705.09
32.5	2705.09	36.5	2705.09	36.9	2705.11	37	2705.11	37.5	2705.12
41.7	2705.12	41.9	2705.13	42.4	2705.15	42.7	2705.16	42.9	2705.16
43.5	2705.17	43.8	2705.19	44.3	2705.41	44.3	2705.44	44.8	2705.66
53	2709.75	53.1	2709.83	53.2	2709.85	55.2	2710.91	55.5	2711.05
56.2	2711.39	56.3	2711.43	56.5	2711.52	57.9	2712.27	58.4	2712.49
58.7	2712.67	59.2	2712.89	59.4	2713.01	59.6	2713.07	60	2713.29
60.4	2713.47	60.5	2713.52	60.7	2713.63	61.5	2714.07	62	2714.29
62.1	2714.38	62.5	2714.58	62.8	2714.69	63.5	2715.06	63.6	2715.09
63.6	2715.1	64.4	2715.51	64.6	2715.64	64.8216	2715.74		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.1	41.7	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
8.3	53	42.2	42.2	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 368

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2713.1	1.3	2713.1	2.4	2713.1	6.4	2709.55	6.5	2709.5
11.6	2705.17	12.1	2704.91	12.6	2704.81	14.2	2704.88	22	2705.03
26.3	2705.13	26.7	2705.15	27	2705.16	27.2	2705.19	27.7	2705.35
28.3	2705.58	34.6	2708.12	36.2	2708.76	36.3	2708.8	36.7	2709
36.9	2709.08	37.6	2709.35	45.6	2712.6	46.2	2712.85	46.6	2713.04
46.9	2713.14	47.2	2713.25	47.9	2713.6	48.3	2713.78	48.7	2714
51.8	2715.24	51.9	2715.25	51.9	2715.26	52.6	2715.3853	.03458	2715.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	37.6	.025	51.8	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
6.4	37.6	57.3	57.3	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	2.4	2716

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 311

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2707.24	5	2707.24	7.4	2709.35	8.8	2709.38	9.8	2709.38
10.8	2708.74	11.8	2708.07	14.7	2706.13	15.9	2705.31	16.8	2704.69
17.9	2704.25	34.9	2704.75	35.3	2704.79	35.9	2704.84	36.8	2705.48
38.7	2706.98	42.9	2710.14	44.9	2711.67	45.9	2712.4246	.83741	2713.11

Manning's n Values num= 2

Sta	n Val	Sta	n Val
0	.1	34.9	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9.8	42.9	73.9	73.9	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	7.4	2709.35	T

CROSS SECTION

RIVER: River 1
REACH: Reach 1 RS: 237

INPUT
Description:

```
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  2710.4    3.67  2710.4       4 2708.86       6 2708.65       7 2708.58
       8 2708.37       9 2708.11    12.3 2705.59    15.1 2703.49    15.9 2703.23
    16.1 2703.19    19.1 2702.81    19.5 2702.75    20.1 2702.67      24 2702.16
    24.1 2702.15    24.9 2702.11    25.1  2702.1    27.1 2702.56    32.2 2703.66
    33.3 2704.53    34.9 2705.79    35.6 2706.37    35.8 2706.51    36.2 2706.84
    38.2 2708.48    38.5 2708.69      39  2709.1    39.2 2709.27    39.4 2709.33
39.87134 2709.48

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .05    34.9    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            9    36.2             75.3    75.3    75.3             .1      .3

CROSS SECTION


RIVER: River 1
REACH: Reach 1            RS: 162

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2708.36       1 2708.16     3.1 2708.09     4.7 2707.99     6.1 2707.94
     7.1 2707.32     9.1 2705.72    10.1 2704.94    12.1 2703.35    13.1 2702.84
    14.2 2702.54    16.2 2701.91    17.1 2701.69      18 2701.49    18.2 2701.44
    19.2 2701.19    19.7 2701.08    20.2 2700.97    21.2 2700.72      22 2700.66
    22.2 2700.65    22.4  2700.7    23.2 2700.99    24.3 2701.26    30.3 2702.61
    31.2  2702.8    32.3 2703.05      33 2703.48    33.3 2703.71    35.4  2705.3
    37.4  2706.9    38.4 2707.67    38.5  2707.7  38.664 2707.77

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .0532.07001    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          6.1  38.664             75.2    75.2    75.2             .1      .3

CROSS SECTION


RIVER: River 1
REACH: Reach 1            RS: 87

INPUT
Description:
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2707.28      .1 2707.28     1.1 2706.93     5.1 2703.24     6.1 2702.35
     8.4 2701.94    10.1 2701.66    11.1 2701.47    12.2  2701.3    13.4 2701.08
    17.2 2700.44    18.2 2700.28    20.2 2700.21    21.2 2700.16    21.2 2700.15
    22.1 2700.13    22.2 2700.12    23.2 2700.26    24.2 2700.49    25.2 2700.78
    28.2 2701.95    28.9 2702.34    29.2 2702.52    33.2 2705.33    34.1 2705.89
    34.2    2706      35 2706.45    35.3 2706.61    35.6 2706.66    35.9 2706.74
    36.3 2706.79    36.7 2706.8736.72185 2706.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04     5.1     .05    29.2    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1.1    35.3             71.2    71.2    71.2             .1      .3

CROSS SECTION


RIVER: River 1
REACH: Reach 1            RS: 16

INPUT
Description:
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 2706.78       1  2706.5       3 2705.99       5 2705.63       6 2705.53
       7 2705.46       8 2705.18       9 2704.27      10 2703.48      15 2701.91
      17 2701.25      19 2700.62      21 2699.97    21.7 2699.74      22 2699.64
      23 2699.22    23.7 2699.25      25 2699.33    31.8 2699.97      32 2699.99
    32.2 2700.03    32.9 2700.09      33 2700.12    33.9 2700.42      34 2700.49
    35.9 2701.83    36.9  2702.5    37.1 2702.59    37.9 2703.34      38 2703.37
    38.1 2703.36      39 2703.04      39 2703.03    40.1 2703.13      41 2703.18
      42 2703.28      43 2703.34      45 2703.53      46 2703.59      46  2703.6
    47.9 2703.78      48 2703.79    48.1 2703.79      49 2703.85    51.9 2704.12
      52 2704.13    52.2 2704.14    52.9 2704.19      53  2704.2    53.8 2704.28
      54 2704.29    54.2  2704.4    54.8 2705.14      55 2705.2555.15612 2705.31

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04       7     .05      41    .013    52.2     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
           10      38             .1       .3


SUMMARY OF MANNING'S N VALUES

River:River 1

      Reach          River Sta.       n1        n2        n3        n4

 Reach 1              711               .1       .03
 Reach 1              636               .1       .03
 Reach 1              561              .04        .1       .03
 Reach 1              487              .04        .1       .03
 Reach 1              410               .1       .03
 Reach 1              368               .1      .025       .03
 Reach 1              311               .1      .025
 Reach 1              237              .05      .025
 Reach 1              162              .05      .025
 Reach 1              87               .04       .05      .025
 Reach 1              16               .04       .05      .013       .04


SUMMARY OF REACH LENGTHS

River: River 1

      Reach          River Sta.      Left     Channel    Right

 Reach 1              711              75.1      75.1      75.1
 Reach 1              636              75.1      75.1      75.1
 Reach 1              561              74.4      74.4      74.4
 Reach 1              487              76.5      76.5      76.5
 Reach 1              410              42.2      42.2      42.2
 Reach 1              368              57.3      57.3      57.3
 Reach 1              311              73.9      73.9      73.9
 Reach 1              237              75.3      75.3      75.3
 Reach 1              162              75.2      75.2      75.2
 Reach 1              87               71.2      71.2      71.2
 Reach 1              16


SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River 1

      Reach          River Sta.     Contr.    Expan.

 Reach 1              711              .1        .3
 Reach 1              636              .1        .3
 Reach 1              561              .1        .3
 Reach 1              487              .1        .3
 Reach 1              410              .1        .3
 Reach 1              368              .1        .3
 Reach 1              311              .1        .3
 Reach 1              237              .1        .3
 Reach 1              162              .1        .3
 Reach 1              87               .1        .3
 Reach 1              16               .1        .3
```

APPENDIX F - REFERENCE DOCUMENTATION

BASIN INSPECTION AND MAINTENANCE PROTOCAL

Project Name: _____
Prepared By: _____

A. Inspection and Maintenance General Requirements

1. Inspection and maintenance are required for all basins. An inspection and maintenance protocol including frequency of inspection, a checklist of items to be inspected and recommended maintenance when an inspection identifies a maintenance requirement shall be prepared by an Arizona registrant.

2. Upon completion of construction of all basins, an As-built Certification shall be prepared by an Arizona registrant and submitted to the Floodplain Administrator and entity responsible for basin maintenance. The plan associated with the As-built Certification shall be used by the responsible party when performing periodic inspections and when restoring the basin to design specifications, if required. The Floodplain Administrator may utilize the certification during enforcement actions.

3. The periodic maintenance described in this protocol does not require a Floodplain Use Permit.

4. Periodic inspections shall occur a minimum of once per year. If significant storm events occur between annual inspections, additional inspections are required following each of the significant events.

5. During an inspection, conditions shall be checked for proper functioning and compared to design specifications. If function impairment or deviation from design specifications is observed, maintenance shall be performed as described below or as directed by the inspector.

B. Inspection and Maintenance Requirements for <u>All Basins</u>

<u>Basin Location and Collection</u>

1. Verify that drainage system conveying flows to basin(s) is in accordance with design specifications and maintained free of leaves, debris, or other obstructions.

2. Flow paths and structures delivering flow to basins shall not be altered. If necessary, obstruction of flow paths or structures, alteration of basin location or modification of flow direction shall be remedied, and the basin functioning shall be restored to design specifications.

<u>Basin Depth and Freeboard</u>

1. The depth of the basin shall be inspected to ensure the design volume, depth and freeboard are maintained.

2. For detention basins, the design depth shall be restored when the depth of sediment exceeds 6 inches above the lowest bottom floor elevation shown on the basin as-built plans. For stormwater harvesting basins, the design depth shall be restored when the design depth of the basin is reduced by more than 1 inch.

3. Slopes shall be maintained to the original design configuration.

4. Trash and debris shall be removed.

Basin Storage Time

1. Basin bottoms shall be inspected for evidence of ponding lasting longer than 12 hours per Town of Oro Valley Ordinance Chapters 15 and 27.
2. If an inspection identifies evidence of ponding exceeding these limits, the following maintenance shall be performed:
    a. Areas of ponding shall be graded to drain to the outlet for basins with no retention;
    b. Compacted soil shall be scarified to promote infiltration;
    c. Basin outlets shall be maintained to function as designed; and
    d. Obstructions at the outlet shall be removed.
    e. Additional design remedies may be required, if problems persist.

Basin Floor

1. The basin floor shall be inspected to ensure that the design slope is maintained, that infiltration has not been significantly reduced and that vegetation or other obstructions do not alter slope, infiltration or basin volume.

2. Maintenance shall be performed when accumulated sediment and debris alter the design slope to the basin outlet or infiltration potential.

3. Invasive non-native plants shall be removed.

4. Soil with evidence of oil, grease or other chemicals shall be removed and disposed of properly.

Basin Side Slope

1. Inspections shall occur to ensure that slope treatment has not been damaged by settling, vegetation, erosion, or other causes.

2. Should damage be observed, basin side slopes shall be restored to design specifications.

3. When slope treatment is dumped riprap, the treatment shall be repaired when foundation soil is lost or filter fabric is exposed.

4. Filter fabric that has migrated under a dumped rock riprap layer or has tears or holes shall be restored to design specifications.

5. Grouted riprap side slopes shall be restored to design specifications when foundation soil is lost or grout beds become damaged.

6. Retaining walls shall be restored to design specifications when signs of tipping, clogged weep holes or soil subsidence are observed.

Basin Inlet Structure

1. Inspections shall occur to ensure the inlet is free of obstructions and not damaged.

2. Should obstructions or damage be observed, inlets shall be restored to design specifications.

3. When an inlet includes a sediment trap, sediment shall be removed to the design elevation.

Basin Outlet Structure

1. Inspections shall occur to ensure the outlet and all components are free of obstructions and not damaged.

2. Should obstructions or damage be observed, outlets shall be restored to design specifications.

Basin Maintenance Access

1. Inspections shall be conducted to ensure access to the basin is not compromised.

2. Conditions which compromise the design access shall be repaired.

Basin Landscaping

1. Inspections shall occur to ensure that landscaping has not impacted basin function.

2. If damage is observed, the basin shall be restored to design specifications.

3. Invasive non-native plants shall be removed.

4. Any vegetation or debris within the 20-foot radius of the basin inlet, outlet, or maintenance access ramp shall be removed.

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Detention Basin Inspection and Maintenance Checklist

Date:	Basin Name/Location:	
Inspector:	Title:	Affiliation:
Type of Inspection: ☐ Annual ☐ After a Significant Storm Event		

General Requirements

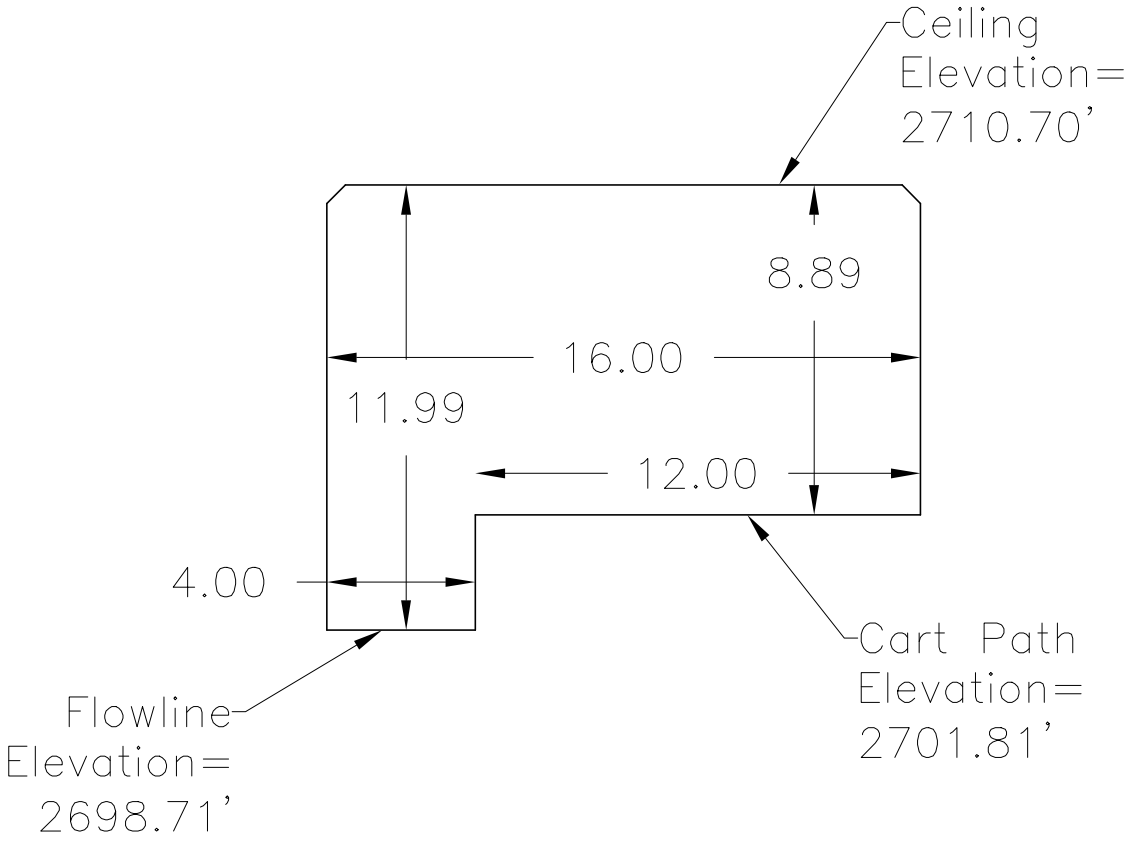
- Basins shall be maintained to perform as designed for the life of the project and shall not be converted to a different use without a Floodplain Use Permit. A Floodplain Use Permit is not required for maintenance activities.
- Basins shall be inspected annually and after significant storm events.
- The purpose of the inspection is to evaluate whether as-built characteristics are maintained.

Basin Component	Inspection Item	Requires Maintenance	If maintenance is required, describe corrective action
Inlet	As-built grades and elevations	☐	
	Presence of obstructions	☐	
	Evidence of material damage	☐	
Outlet	As-built grades and elevations	☐	
	Presence of obstructions	☐	
	Evidence of material damage	☐	
Slopes	As-built grades and elevations	☐	
	Invasive non-native plants	☐	
	Slope treatment	☐	
Retaining walls	As-built grades and elevations	☐	
	Presence of damage or instability	☐	
	Drainage function	☐	
Depth	As-built grades and elevations	☐	
	Sediment accumulation >10% of design volume	☐	
Floor	As-built grades and elevations	☐	
	Presence of ponding	☐	
	Evidence of oil, grease, chemicals or trash	☐	
	Presence of invasive non-native plants	☐	

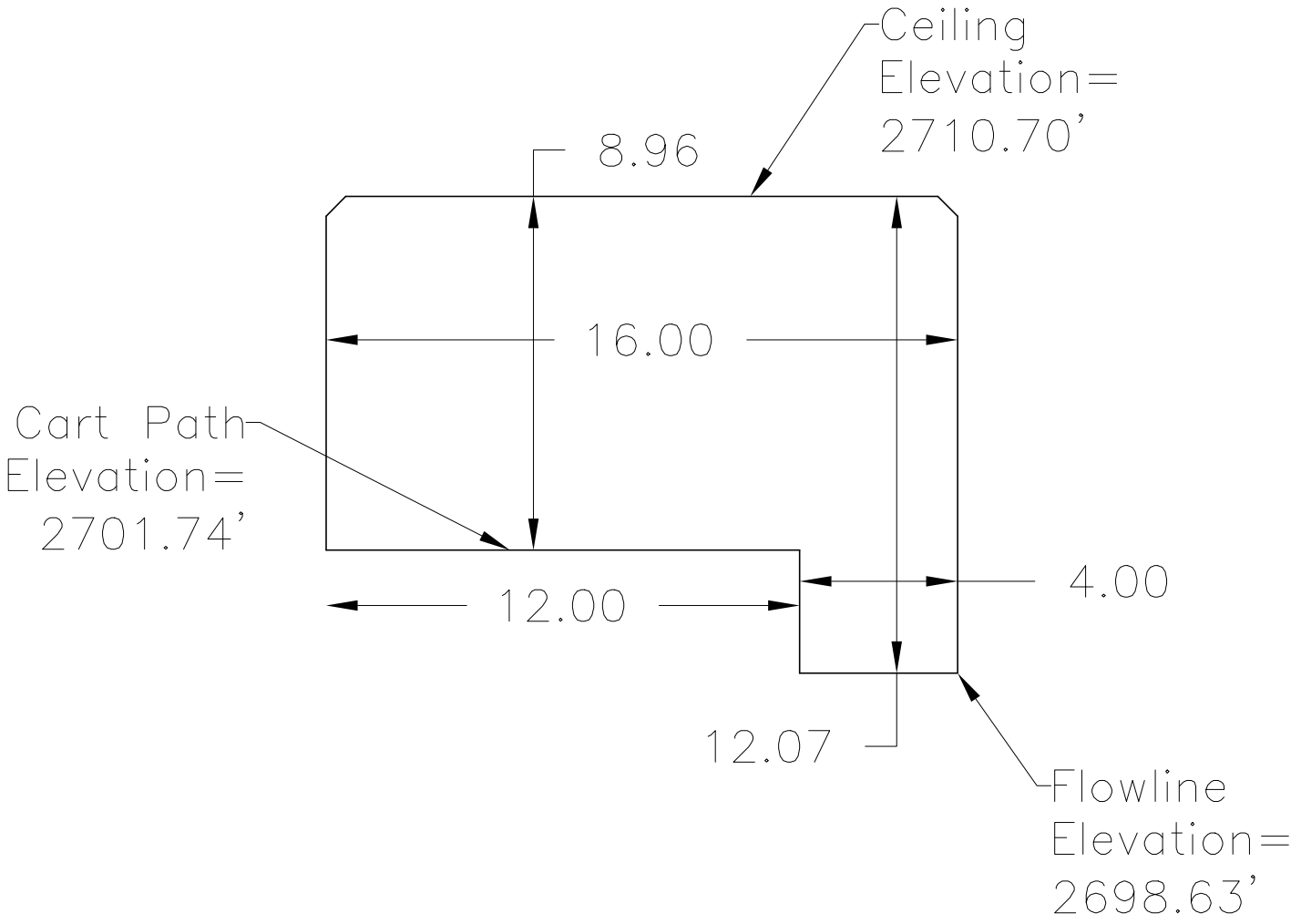
Detention Basin Inspection and Maintenance Checklist (Continued)

Date:	Basin Name/Location:

Basin Component	Inspection Item	Requires Maintenance	If maintenance is required, describe corrective action
Perimeter Wall	As-built grades and elevations	☐	
	Presence of damage or instability	☐	
	Drainage function	☐	
Security Barrier	Presence of damage or instability	☐	
Access	Presence of obstruction	☐	
Landscaping	Presence of overgrown vegetation	☐	
	Presence of invasive non-native plants	☐	
	Damage to basin due to landscape elements	☐	
Pump	Alarm System	☐	
	Presence of obstruction	☐	
	As-built specifications	☐	
Other			


Ceiling
Elevation=
2710.70'
8.89
16.00
11.99
12.00
4.00
Cart Path
Elevation=
2701.81'
Flowline
Elevation=
2698.71'

North End


Ceiling
Elevation=
2710.70'
8.96
16.00
Cart Path
Elevation=
2701.74'
12.00
4.00
12.07
Flowline
Elevation=
2698.63'

South End

PHASE I (EXISTING): LOTS 11 THRU 47, 75 THRU 104
PHASE II: LOTS 1 THRU 10, 48 THRU 74, 105 THRU 112

OWNER/DEVELOPER

CAÑADA HILLS DEVELOPMENT CO.
1330 W. LAMBERT LANE
ORO VALLEY, AZ 85737
PHONE NO. 742-1171

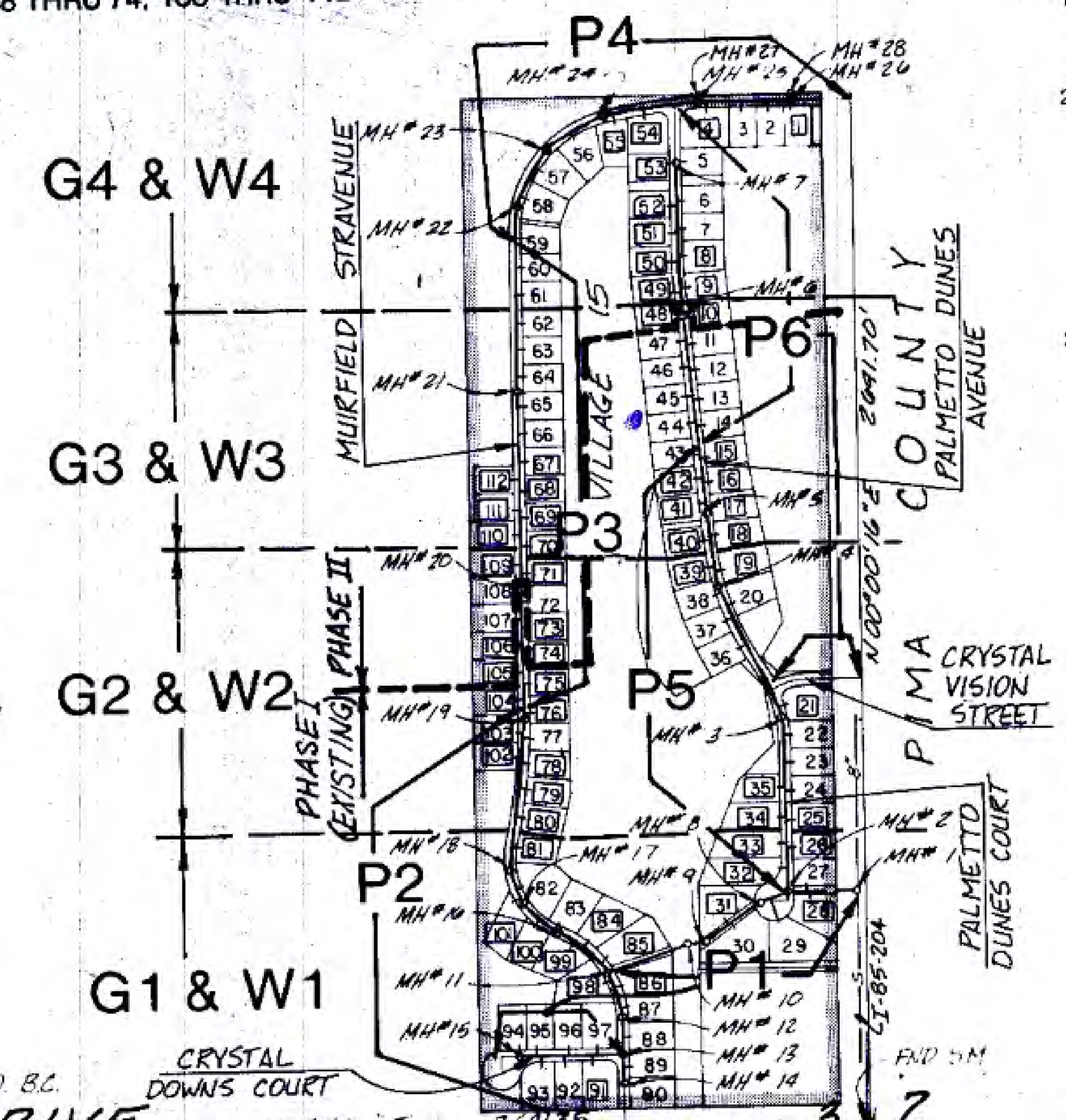
BASIS OF BEARING

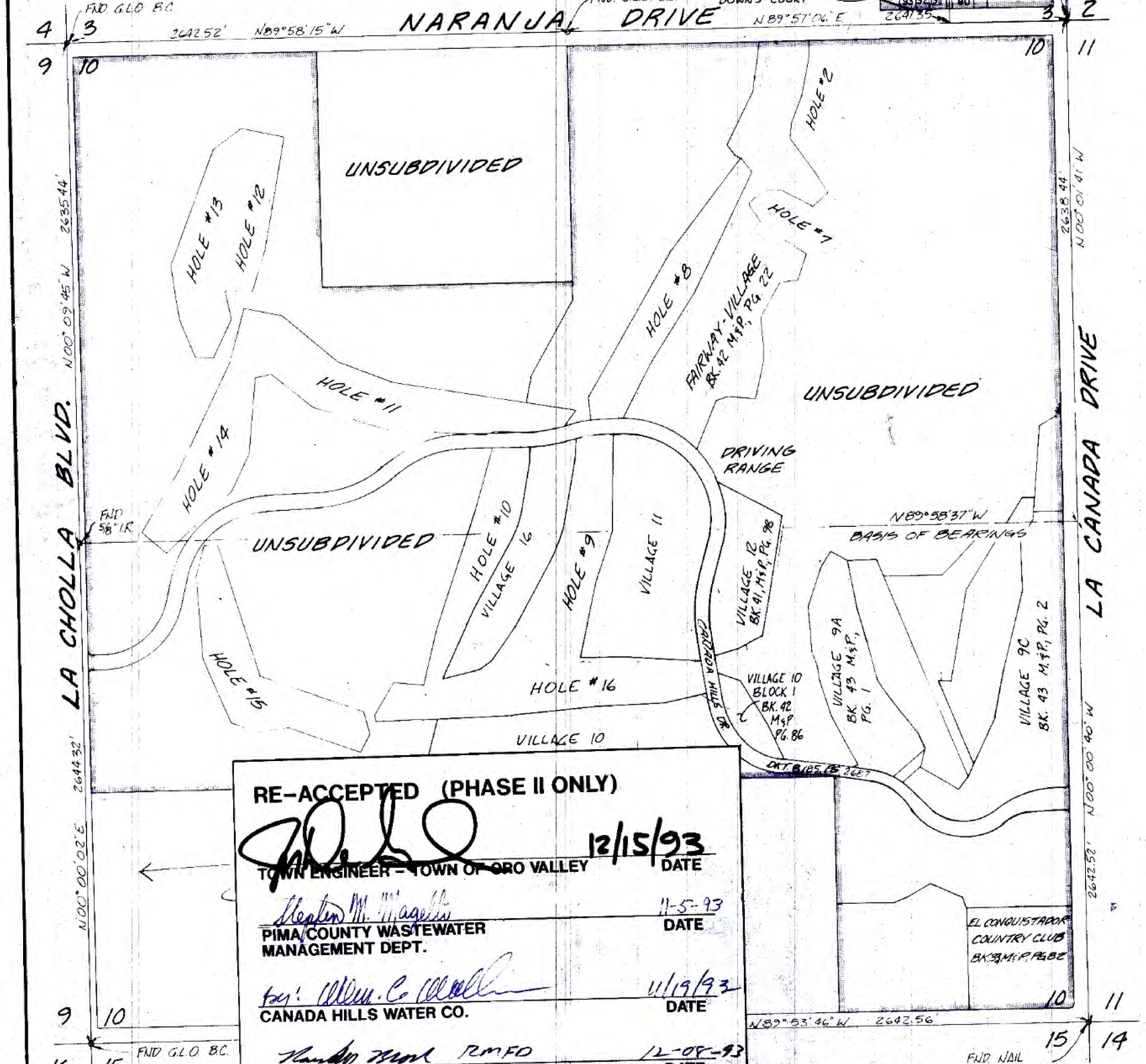
AS ASSUMED BEARING OF N89 58 37 W FOR THE NORTH LINE OF THE SE 1/4 OF SECTION 10, T12S, R13E.

BENCH MARK

BENCHMARK IS AT EXISTING MANHOLE WEST OF PUMP STATION ON PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT CONTRACT NO. 150-150A (SHEET 33/42), ELEVATION 2513.13.

NOTE: "□" INDICATES LOTS REQUIRING BACKWATER VALVE, REFER TO AREA MAP.
"(BV)" INDICATES LOTS REQUIRING BACKWATER VALVE, REFER TO SHEETS P1-P6.
SEE SHEET P2 FOR BACKWATER VALVE LIST





AREA MAP

1" = 400'

SPECIAL NOTES

1. CONTRACTOR SHALL RECONSTRUCT ANY IRRIGATION LINES, IRRIGATION CONTROLS, OR CART PATHS DAMAGED DURING CONSTRUCTION OF THE SUBDIVISION. THE IRRIGATION SYSTEM SHALL REMAIN OPERABLE DURING CONSTRUCTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE SURVEYOR PROVIDING THE CONSTRUCTION LAYOUT TO COMPARE THE SITE CONDITIONS WITH THE PLANS AND NOTIFY CBA OF ANY DISCREPANCIES OBSERVED. SHOULD ANY GRADE OR DESIGN INDICATED ON THE PLANS BE SUSPECT, CBA SHALL BE NOTIFIED OF SAID AREA AT LEAST TWENTY-FOUR HOURS BEFORE CONSTRUCTION IS SCHEDULED TO BEGIN ON THE AFFECTED AREA. IF CBA IS NOT NOTIFIED PRIOR TO START OF CONSTRUCTION OF THE AFFECTED AREA, ANY DISCREPANCIES SHALL BE DEEMED TO BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE SURVEYOR.
3. IT SHALL BE THE SOLE RESPONSIBILITY OF THE OWNER(S), THEIR SUCCESSORS OR ASSIGNS, (AND/OR THEIR CONTRACTOR, THEIR SUCCESSORS OR ASSIGNS AS APPLICABLE) TO PURSUE ANY NEGOTIATIONS, OBTAIN ANY AGREEMENTS AND/OR PERMITS, ETC., FROM ALL NECESSARY OWNERS, PRIVATE AND/OR GOVERNMENTAL AGENCIES IN CHARGE OF PROPERTIES AND/OR RIGHTS-OF-WAY ADJACENT TO (OR NEIGHBORING) THIS PROJECT, THAT MAY BE REQUIRED TO DO ANY WORK (CONSTRUCTION, ACCESS, MODIFICATIONS, GRADING, DRAINAGE, STRUCTURES, ROADS, ETC.) ENCROACHING OR AFFECTING - DIRECTLY OR INDIRECTLY - ON THESE ADJACENT PROPERTIES AND RIGHTS-OF-WAY IN ANY CONCEIVABLE MANNER, REGARDLESS OF WHETHER OR NOT THIS WORK IS SHOWN OR DESCRIBED ON THESE PLANS.
4. ALL REVISIONS TO THE APPROVED PLANS AND SPECIFICATIONS SHALL BE APPROVED BY THE ORO VALLEY TOWN ENGINEER PRIOR TO COMMENCEMENT OF WORK RELATING TO SAID REVISIONS.
5. THE DESIGN SPEED FOR THIS STREET IS 20 MPH. THE DESIGN VEHICLE IS WB-40. POSTED SPEED WILL BE 15 MPH ON MUIRFIELD STRAVENUE.
6. CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED BY ALL GOVERNMENTAL AGENCIES. NO WORK AS DELINEATED ON THESE PLANS SHALL BE STARTED UNTIL THE CONTRACTOR HAS OBTAINED ALL THE NECESSARY PERMITS FROM ALL AFFECTED AGENCIES.
7. CONCRETE SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE ARIZONA STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 1987 EXCEPT AS MODIFIED HEREBY. ALL CONCRETE SHALL BE CLASS S, 4.5-INCH SLUMP MAXIMUM, 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.
8. APPROVAL OF THESE PLANS DOES NOT CONSTITUTE FINAL APPROVAL OF THE ROADWAY. FIELD CONDITIONS, DESIGN OVERSIGHTS, ETC. MAY REQUIRE ADDITIONAL WORK AND/OR IMPROVEMENTS BEFORE FINAL APPROVAL IS GIVEN.
9. THE PROFESSIONAL ENGINEER OF RECORD SHALL CERTIFY, IN WRITING, THAT ALL IMPROVEMENTS, WHETHER PRIVATE OR PUBLIC, HAVE BEEN CONSTRUCTED, PLACED, INSTALLED, ETC. IN SUBSTANTIAL CONFORMANCE WITH THE APPROVED PLANS FOR THIS DEVELOPMENT. SAID ENGINEER WILL FURTHER CERTIFY, IN WRITING, THAT ALL MATERIALS UTILIZED IN THIS DEVELOPMENT ARE IN CONFORMANCE WITH THE APPROVED PLANS AND SPECIFICATIONS. CERTIFICATIONS, IN WRITING, ARE TO BE RECEIVED BY THE TOWN ENGINEER OF THE TOWN OF ORO VALLEY PRIOR TO THE REQUEST FOR FINAL INSPECTION AND THE RELEASE OF ASSURANCES.
10. APPROVAL OF THESE PLANS DOES NOT CONSTITUTE OR IMPLY APPROVAL OF ANY OF THE FOLLOWING:
    A. WALL(S), RETAINING OR OTHER TYPES(S).
    B. ANY REINFORCED CONCRETE STRUCTURE(S).
    C. ANY EMBANKMENT(S) WHOSE PRIMARY PURPOSE IS TO FUNCTION AS A RETENTION/DETENTION STRUCTURE.

    SEPARATE PLAN CHECK(S) AND PERMITS(S) ARE REQUIRED, ALL IN ACCORDANCE WITH THE APPLICABLE CODES OF THE TOWN OF ORO VALLEY FOR ITEMS A & B.
11. CONTRACTOR SHALL INSTALL ALL STREET NAME AND REGULATORY SIGNS IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF ORO VALLEY.
12. ALL SIGNING AND MARKING SHALL BE IN CONFORMANCE WITH THE STATE OF ARIZONA, DEPARTMENT OF TRANSPORTATION SIGNING AND MARKING, STANDARD DRAWINGS, DATED AUGUST, 1986.
13. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FURNISH, HAUL AND APPLY ALL WATER REQUIRED FOR COMPACTION AND FOR THE CONTROL OF DUST FROM CONSTRUCTION ACTIVITY. THE COST THEREOF IS TO BE INCLUDED IN THE GRADING CONSTRUCTION PRICE.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CARE, MAINTENANCE, REPAIR OR REPLACEMENT OF EXISTING IMPROVEMENTS IN THE WORK AREA WHICH HAVE BEEN REMOVED OR DAMAGED DURING THE COURSE OF CONSTRUCTION. ALL REPAIR, REPLACEMENT, OR CLEANUP SHALL BE DONE TO THE SATISFACTION OF THE OWNER AND/OR THE TOWN OR ORO VALLEY.

GENERAL SEWER NOTES

1. ALL DESIGN STANDARDS, MATERIALS AND WORKMANSHIP FOR SEWERS ARE TO BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND DETAILS OF THE PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT, PIMA COUNTY, ARIZONA, SAID SPECIFICATIONS AND DETAILS ARE ON FILE IN THAT OFFICE.
2. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
3. CONTRACTOR TO VERIFY LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. CALL BLUE STAKE (792-2211) TWO FULL WORKING DAYS PRIOR TO EXCAVATION.
4. THE HORIZONTAL DISTANCE BETWEEN A PUBLIC WATER PIPE AND A SEWER MAIN SHALL NOT BE LESS THAN SIX (6) FEET. VERTICAL CLEARANCE BETWEEN WATER AND SEWER LINE SHALL BE A MINIMUM OF 24 INCHES. (IF THESE CRITERIA CANNOT BE MET, DESIGN CHANGES WILL BE REQUIRED.)
5. ALL CHANGES SHALL BE APPROVED BY THE PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT PRIOR TO CONSTRUCTION.
6. CONTRACTOR SHALL FIELD VERIFY EXISTING SEWER ELEVATIONS AND ALIGNMENT PRIOR TO CONSTRUCTION.
7. ALL ROUGH GRADING TO BE COMPLETE PRIOR TO THE INSTALLATION OF SEWERS, INCLUDING FILL AND COMPACTION AS INDICATED ON PLANS.
8. WHERE CONNECTIONS TO EXISTING MANHOLES ARE TO BE MADE, THE CONTRACTOR SHALL CONSTRUCT NEW INVERTS IN THE EXISTING BENCH TO DIRECT THE FLOW IN THE PROPER DIRECTION.
9. CONTRACTOR SHALL INSTALL ALL FRAMES AND COVERS FOR MANHOLES ___ TO THE ELEVATIONS STAKED BY THE ENGINEER.
10. PAVING CONTRACTOR SHALL ADJUST MANHOLE ___ FRAMES AND COVERS TO FINAL PAVEMENT SURFACE GRADE.
11. THE CONTRACTOR SHALL FURNISH, OPERATE AND MAINTAIN ALL EQUIPMENT NECESSARY TO PROVIDE SEWER SERVICE TO ALL PARTIES TRIBUTARY TO A LIVE SEWER TO WHICH A CONNECTION IS TO BE MADE. NOTIFY PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT MAINTENANCE DEPARTMENT 48 HOURS PRIOR TO CONSTRUCTION AFFECTING LIVE SEWERS.
12. ALL HOUSE CONNECTION SEWER STUB-OUTS SHALL HAVE A MINIMUM SLOPE OF 2% AND A MINIMUM COVER OF FOUR FEET IN THE AREA BETWEEN THE MAIN LINE SEWER AND PROPERTY LINE. IF COVER IS LESS THAN FOUR FEET, THE HCS STUB-OUT SHALL BE DUCTILE IRON. ALL HCS STUB-OUTS SHALL BE MARKED AT PROPERTY LINE WITH A #9 WIRE ANCHORED WITH A BRICK.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING CARELESSLY DESTROYED LOT PINS.
14. HCS WILL BE LOCATED BY THE ENGINEER AS STATIONED ON THE PLANS. BACKWATER VALVES TO BE INSTALLED IN HCS WHEN THE FINISH FLOOR ELEVATION IS LESS THAN ONE FOOT ABOVE THE NEAREST UPSTREAM MANHOLE.
15. ALL PIPE CLASSES ARE COMPUTED CONSIDERING TRENCH WIDTH AT TOP OF PIPE NOT EXCEEDING 2'6". SHOULD WIDTH EXCEED 2'6", CONTRACTOR TO NOTIFY PIMA COUNTY WASTEWATER MANAGEMENT AND ENGINEER.
16. DESIGN CRITERIA IS GRANULAR MATERIAL WITH A WEIGHT OF 115 LBS. PER CUBIC FOOT. S.F. 1.5.
17. FILL OVER SEWER SHALL BE PLACED TO 95% MAXIMUM DENSITY IN STREETS AND TO 90% MAXIMUM DENSITY IN ALL OTHER AREAS. ALL FILLING SHALL BE DONE PRIOR TO SEWER CONSTRUCTION.
18. THIS SET OF SEWER PLANS SHALL BE PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT PLAN NO. G-89-106.
19. THE CONTRACTOR MAY SELECT ANY OF THE FOLLOWING SANITARY SEWER PIPE FOR USE ON THIS PROJECT:
    A) PVC - SDR 35 AND CONFORM TO AMERICAN SOCIETY FOR TESTING MATERIALS DESIGNATION D-3034 AND ALL REVISIONS;
    B) VCP - (EXTRA STRENGTH) SHALL CONFORM TO THE AMERICAN SOCIETY FOR TESTING MATERIALS DESIGNATION C-700 AND ALL REVISIONS.
20. IF PVC IS USED FOR CONSTRUCTION OF THE SANITARY SEWER, ALL SPECIFICATIONS AND FLEXIBLE PIPE BEDDING AS DESIGNATED BY THE PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT SHALL BE INCORPORATED.
21. WATER SETTLING OF TRENCH BACKFILL ON THIS PROJECT IS SPECIFICALLY PROHIBITED.
22. BEDDING FOR SANITARY SEWER IN THIS PROJECT SHALL COMPLY WITH PIMA COUNTY WASTEWATER MANAGEMENT STANDARD AS FOLLOWS:
    RIGID PIPE STD. DETAIL NO. 104
    FLEXIBLE PIPE STD. DETAIL NO. 105
23. ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY APPROVAL IS REQUIRED PRIOR TO CONSTRUCTION.
24. CONSTRUCTION SHALL PROCEED FROM DOWNSTREAM TO UPSTREAM REGARDLESS OF STATIONING.

GENERAL PAVING NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN CONFORMANCE WITH THE ARIZONA STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (ADOTSSRBC), EDITION OF 1987 AS AMENDED, EXCEPT AS MODIFIED HEREBY.
2. ALL TEST METHODS SHALL CONFORM TO THE REQUIREMENTS OF THE ARIZONA HIGHWAY DEPARTMENT MATERIALS TESTING MANUAL AND REVISIONS TO DATE.
3. SUBBASE MATERIAL SHALL CONFORM TO ADOTSSRBC, SECTION 303.1, CLASS 6. THE GRADATION SHALL BE:

SIEVE SIZE	PERCENT PASSING	PLASTICITY INDEX MAXIMUM
3" (SQUARE)	100	5
#200	0 - 12	

IN NO CASE, HOWEVER, IS THE MAXIMUM AGGREGATE SIZE TO EXCEED THE THICKNESS OF SUBBASE MATERIAL REQUIRED.

4. EXCAVATION AND BACKFILL FOR STRUCTURES SHALL CONFORM TO ADOTSSRBC, SECTION 203.5.
5. AGGREGATE BASE COURSE SHALL BE CLASS 1, AND SHALL CONFORM TO THE REQUIREMENTS OF SECTION 303 OF ADOTSSRBC.

SIEVE SIZE	PERCENT PASSING	PLASTICITY INDEX MAXIMUM
1"	100	5
3/4"	90 - 100	
1/4"	45 - 75	
#200	0 - 10	

6. ASPHALTIC CONCRETE. ASPHALTIC CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 406, ADOTSSRBC. THE GRADATION OF MINERAL AGGREGATE SHALL BE:

3" ASPHALTIC BASE COURSE SIEVE SIZE	PERCENT PASSING	1" ASPHALTIC SURFACE COURSE SIEVE SIZE	PERCENT PASSING
1"	100	3/4"	100
3/4"	90-100	1/2"	90-100
3/8"	70-85	3/8"	70-85
#8	40-51	#8	40-51
#40	12-20	#40	12-20
#200	2.0-5.0	#200	2.0-5.0

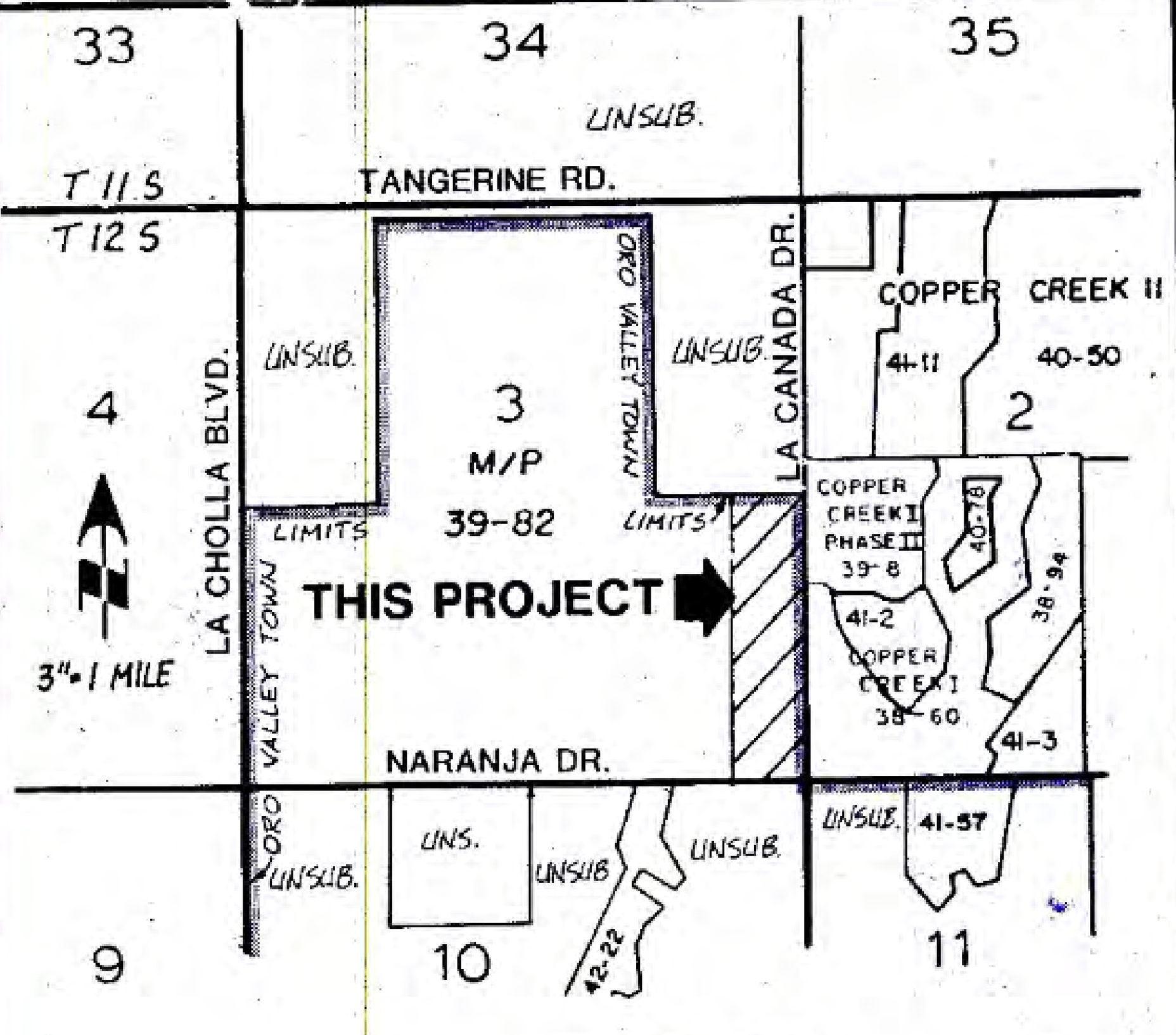
PAVING ASPHALT SHALL BE GRADE 40 AND SHALL CONFORM TO THE REQUIREMENTS AS SET FORTH IN TABLE 404.1, ADOTSSRBC. THE PAVING ASPHALT SHALL BE SIX (6) PERCENT BY WEIGHT OF TOTAL MIX UNLESS OTHERWISE AMENDED BY A MATERIALS SECTION MIX DESIGN.

7. THE ORO VALLEY TOWN ENGINEER RESERVES THE RIGHT TO CHECK PAVEMENT THICKNESS DESIGN REQUIREMENTS BY SAMPLING AND TESTING SUBGRADE PRIOR TO THE PLACING OF THE SUBBASE OR BASE.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
9. THE CONTRACTOR SHALL CALL BLUE STAKE (792-2211) A MINIMUM OF TWO (2) WORKING DAYS PRIOR TO COMMENCEMENT OF WORK TO FIELD LOCATE EXISTING UTILITIES. SATURDAY AND SUNDAY ARE NOT CONSIDERED TO BE WORKING DAYS.
10. THE PAVING CONTRACTOR SHALL ADJUST WATER VALVES, MANHOLE AND CLEANOUT FRAMES AND COVERS TO GRADE.
11. SEE FINAL PLAT FOR ADDITIONAL DIMENSIONS AND LAYOUT INFORMATION.
12. PAVEMENT THICKNESS. THE MAXIMUM PAVEMENT THICKNESS WHICH MAY BE PLACED IN A SINGLE LIFT WILL BE DETERMINED BY THE ORO VALLEY TOWN ENGINEER.
13. PAVEMENT DENSITY. ROLLING SHALL CONTINUE UNTIL THE PAVEMENT HAS BEEN COMPACTED TO NOT LESS THAN 95 PERCENT OF LABORATORY DENSITY AS DETERMINED BY ARIZONA METHOD 811.
14. COMPACTION REQUIREMENTS:

MATERIAL TYPE	PERCENT OF LAB DENSITY	TEST METHOD
SUBGRADE & SHOULDERS	100	T99 - METHOD A
SPECIAL BACKFILL	95	ARIZ. 225 AND 227A
SELECT	100	ARIZ. 225 AND 227A
AGGREGATE BASE	100	ARIZ. 225 AND 227A
ASPHALT CONCRETE	95	ARIZ. 225 AND 227A

15. BITUMINOUS MIXTURES. THE AGGREGATE MIXING TEMPERATURE SHALL BE APPROXIMATELY 275 DEGREES F., THE EXACT TEMPERATURE TO BE DETERMINED IN THE FIELD BY THE ENGINEER. IN NO CASE SHALL THE AGGREGATE MIXING TEMPERATURE EXCEED 324 DEGREES F.

ACCEPTED
11/27/89
PIMA COUNTY TRANSPORTATION & FLOOD CONTROL — DATE
for work w/in La Canada Drive R/W only



LOCATION MAP

SEC. 3, T12S, R13E,
TOWN OF ORO VALLEY,
PIMA COUNTY, ARIZONA

SHEET INDEX

GENERAL GRADING NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN CONFORMANCE WITH THE ARIZONA STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (ADOTSSRBC), EDITION OF 1987 AS AMENDED, EXCEPT AS MODIFIED ON THESE PLANS AND BY THE GEOTECHNICAL REPORT DELINEATED IN NOTE NO. 11.
2. CONSTRUCTION STAKING AND TESTING WILL BE FURNISHED BY THE OWNER.
3. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY GRADING PERMITS.
4. ANY UTILITY RELOCATION WILL BE AT THE EXPENSE OF THE OWNER.
5. CONTRACTOR SHALL EXERCISE EXTREME CARE TO MINIMIZE DAMAGE TO NATURAL GROWTH AND WORK WITHIN EASEMENTS AND ROADWAYS.
6. THE PAVING CONTRACTOR SHALL ADJUST WATER VALVES, MANHOLE AND CLEANOUT FRAMES AND COVERS TO GRADE.
7. EXCAVATION AND BACKFILL FOR STRUCTURES SHALL CONFORM TO THE REQUIREMENTS OF SECTION 203-5, ADOTSSRBC.
8. ALL CUT/FILL SLOPES TO BE RIP RAP OR REVEGETATED ACCORDING TO THE SOILS REPORT AS DELINEATED IN NOTE NO. 11 AND CAÑADA HILLS GUIDELINES.
9. ALL SLOPES 3:1 MAX UNLESS SHOWN OTHERWISE ON THE PLANS.
10. THE DETENTION BASIN LOCATED WEST OF LOTS 36-42 IS TO BE CONSTRUCTED AS PART OF THIS DEVELOPMENT IS PRIVATE AND IS TO BE MAINTAINED BY THE CAÑADA HILLS COMMUNITY ASSOCIATION. SHOULD DEDICATION TO THE TOWN OF ORO VALLEY BE DESIRED AT SOME LATER DATE, SPECIFIC IMPROVEMENTS AND CONDITIONS ALONG WITH THE APPROVAL AND ACCEPTANCE OF SAID IMPROVEMENTS AND CONDITIONS SHALL BE MADE BY THE TOWN ENGINEER OF THE TOWN OF ORO VALLEY PRIOR TO DEDICATION. THE TOWN OF ORO VALLEY IS UNDER NO OBLIGATION TO ACCEPT SUCH PRIVATE DEDICATION.
11. THE SOILS ENGINEER OF RECORD OR OTHER REGISTERED PROFESSIONAL CIVIL ENGINEER WITH EXPERTISE IN THE AREA OF SOILS ENGINEERING SHALL CERTIFY, IN WRITING, THAT ALL SOILS OPERATIONS FOR THIS DEVELOPMENT WERE PERFORMED IN ACCORDANCE WITH THE RECOMMENDATIONS AS SET FORTH IN THE GEOTECHNICAL INVESTIGATION BY GRC CONSULTANTS, JOB NO. 1358, DATED APRIL, 1988.
    CERTIFICATION, IN WRITING, IS TO BE RECEIVED BY THE TOWN ENGINEER OF THE TOWN OF ORO VALLEY PRIOR TO THE REQUEST FOR ANY BUILDING PERMITS AND/OR FINAL INSPECTION AND THE RELEASE OF ASSURANCES.
12. IN PLACE DENSITIES SHALL BE DETERMINED IN ACCORDANCE WITH U.B.C. STANDARD NO. 70-2. IN PLACE DENSITIES SHALL NOT BE DETERMINED BY OTHER U.B.C. STANDARDS UNLESS SPECIFIC WRITTEN APPROVAL IS OBTAINED FROM THE BUILDING OFFICIAL AND TOWN ENGINEER OF THE TOWN OF ORO VALLEY.

ACCEPTED

TOWN ENGINEER - TOWN OF ORO VALLEY	DATE 2-23-90
PIMA COUNTY WASTEWATER MANAGEMENT DEPT.	DATE 11/9/89
CANADA HILLS WATER CO.	DATE 1/22/90
RURAL METRO FIRE DEPT.	DATE 11/30/89

RE-ACCEPTED (PHASE II ONLY)

TOWN ENGINEER - TOWN OF ORO VALLEY	DATE 12/15/93
PIMA COUNTY WASTEWATER MANAGEMENT DEPT.	DATE 11-5-93
CANADA HILLS WATER CO.	DATE 11/19/93
RURAL METRO FIRE DEPT. RMFD	DATE 12-08-93
PIMA COUNTY DEVELOPMENT SERVICES (LA CANADA DR R/W ONLY)	DATE 12/13/93

ASBUILT
RECORD DRAWING
CELLA BARR ASSOC.
1/27/92 PHASE 1
OV12-86-6

No.	DATE	REVISION and SHEET No.		
8	1/27/92	ASBUILT INFORMATION PER FIELD DATA	BWT	WDT
7	10/90	PVM'T ASBUILT/NEW CONC. VALLEY GUTTER-G1	BWT	RJI
6	9/20/90	REVISED PER PCWWM COMMENTS - P3	JP	RGB
5	9/18/90	DRAINAGE REVISION TO FAIRWAY 4 - G2	VK	RJI
4	6/90	ADDED AIR RELEASE VALVE - W2,W5	JP	RGB
3	4/90	REV. MH. LOC. TO AVOID UTIL. CONFLICT - P1	JP	RGB
2	4/90	REVISED DETAILS - D1, D2	NK	RJI
1	3/90	REV. PHASE LINE; CULVERT - D2, P1, P2, G1	RJE	RGB

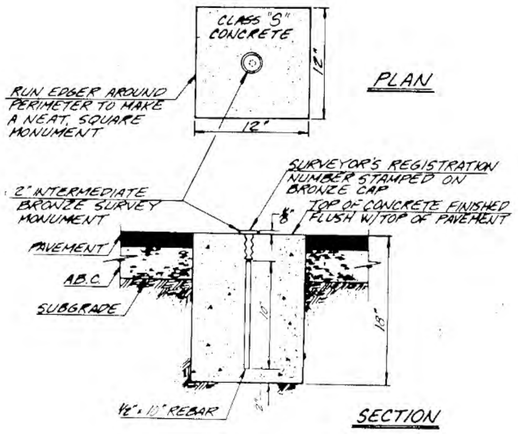
CALL FOR THE BLUE STAKES 792-2211 CALL COLLECT

G-89-106

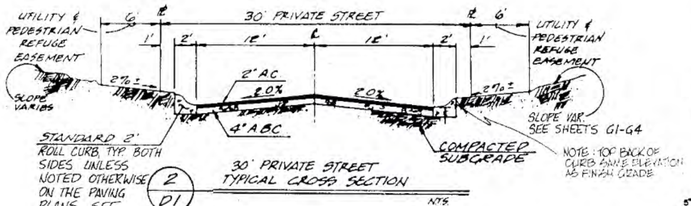
IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
COVER SHEET

CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401

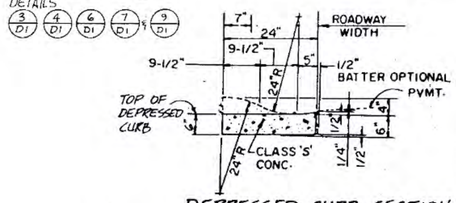
Horiz.	—
Vert.	—
Fld. Bk. Pg.	
Design	RGB/BWT
Drawn	BWT
Chkd.	DCR
Date	SEPT 89
Job No.	05121-06-74
Sht.	1 of 18



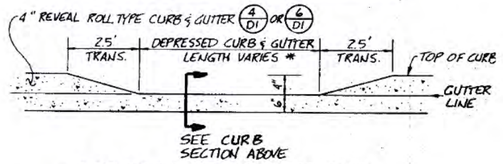
1/D1 SURVEY MONUMENT N.T.S.



2/D1 30' PRIVATE STREET TYPICAL CROSS SECTION N.T.S.

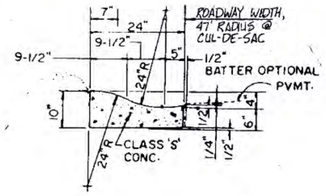


DEPRESSED CURB SECTION

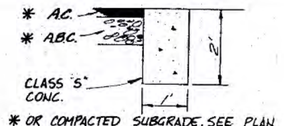


* SEE GRADING SHEETS G1-G4 FOR LENGTH

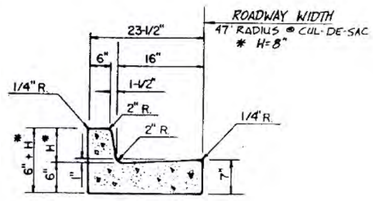
3/D1 DEPRESSED CURB DETAIL N.T.S.



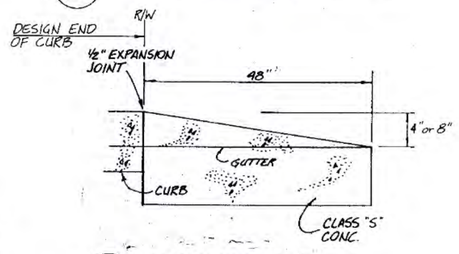
4/D1 CURB DETAIL ROLL TYPE CUBB & GUTTER N.T.S.



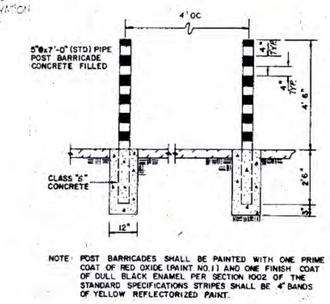
5/D1 CONC. HEADER DETAIL N.T.S.



6/D1 CONCRETE CURB & GUTTER

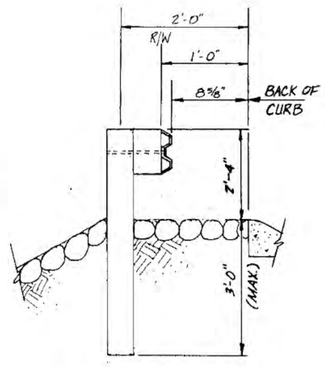


7/D1 CONCRETE CURB TERMINAL SECTION N.T.S.



NOTE: POST BARRICADES SHALL BE PAINTED WITH ONE PRIME COAT OF RED OXIDE (PAINT NO.1) AND ONE FINISH COAT OF DULL BLACK ENAMEL PER SECTION 1002 OF THE STANDARD SPECIFICATIONS STRIPES SHALL BE 4" BANDS OF YELLOW REFLECTORIZED PAINT.

8/D1 POST BARRICADE DETAIL N.T.S.



10/D1 GUARD RAIL INSTALLATION DETAIL A.D.O.T. STD. C-10.15, C-10.18 & C-10.22 N.T.S.

CURVE DATA

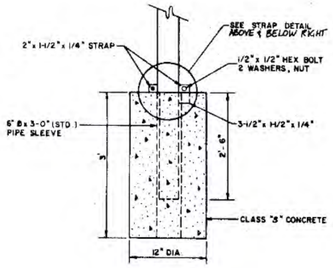
NO.	DELTA	RADIUS	LENGTH
1	67°32'28"	250.00	294.70
2	80°27'00"	200.00	280.82
3	12°51'41"	1,519.26	341.04
4	78°18'14"	300.00	410.00
5	11°40'44"	1,573.50	320.73
6	05°19'01"	1,573.50	146.02
7	06°21'42"	1,573.50	174.71
8	05°35'42"	750.00	73.24
9	28°44'03"	716.75	359.45
10	34°19'46"	350.00	209.71
11	23°45'56"	350.00	145.18
12	10°33'49"	350.00	64.53
13	23°42'47"	160.00	66.22
14	90°00'00"	28.00	43.98
15	72°32'33"	53.00	67.10
16	252°32'33"	47.00	207.16
17	90°00'00"	28.00	43.98
18	67°32'28"	238.00	280.56
19	80°27'00"	212.00	297.67
20	12°51'41"	1,507.26	338.34
21	78°18'14"	312.00	426.40
22	11°40'44"	1,585.50	323.18
23	03°57'26"	1,561.50	107.84
24	86°01'13"	28.00	42.04
25	05°35'42"	738.00	72.07
26	28°44'03"	704.75	353.44
27	04°44'42"	362.00	29.98
28	80°17'24"	28.00	39.24
29	19°49'18"	172.00	59.50
30	17°16'45"	148.00	44.63
31	90°26'08"	28.00	44.20
32	17°46'02"	362.00	112.25
33	252°32'33"	47.00	207.16
34	72°32'33"	53.00	67.10
35	34°19'46"	338.00	202.52
36	28°44'03"	728.75	365.47
37	05°35'42"	762.00	74.41
38	96°58'58"	28.00	47.39
39	04°43'07"	1,561.50	128.60
40	78°18'14"	288.00	393.60
41	12°51'41"	1,531.26	343.73
42	80°27'00"	188.00	263.97
43	67°32'28"	262.00	308.85

℄ ROADWAY

EDGE OF PAV'T/FACE OF CURB

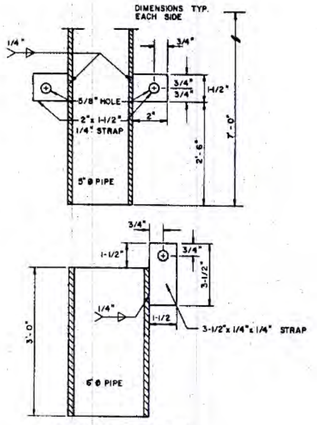
LEGEND

- EXISTING SEWER AND MANHOLE
- NEW SEWER AND MANHOLE
- EXISTING WATERLINE AND VALVE
- NEW WATERLINE AND VALVE
- EXISTING FIRE HYDRANT
- NEW FIRE HYDRANT
- LIMITS OF GRADING
- NEW CURB
- RIP-RAP
- POST BARRICADE
- RETAINING WALL
- NEW SURVEY MONUMENT
- (1) SEE CURVE TABLE
- ROAD CENTERLINE
- PROPERTY LINE
- EXISTING CONTOUR LINE
- PROPOSED CONTOUR LINE
- 67.5 PAD ELEVATION
- WATER SERVICE
- 10' X 10' ELECTRIC EASEMENT
- C.A. COMMON AREA
- S.M. SURVEY MONUMENT
- SPOT ELEVATION
- PEDESTAL
- TRANSFORMER
- LOT DRAINAGE DIRECTION ARROW
- DEVELOPED 100-YEAR FLOODPLAIN
- EXISTING 100-YEAR FLOODPLAIN



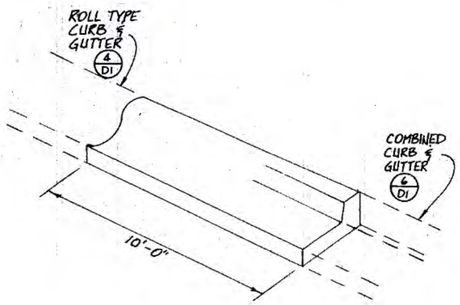
NOTES

1. REMOVABLE POST BARRICADE SHALL NOT BE CONCRETE FILLED.
2. HAND TIGHTEN BOLT & NUT USING WASHERS EACH SIDE OF STRAPS. CUT BOLT APPROX. 1/8" FROM FACE OF NUT & PEEN EXPOSED END OF BOLT.
3. REFER TO DETAIL 8/D1 FOR POST DETAILS.

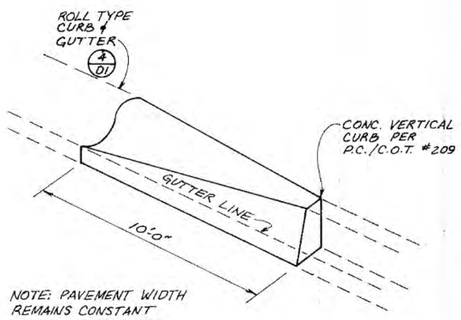


STRAP DETAIL

11/D1 REMOVABLE POST BARRICADE DETAIL N.T.S.



9/D1 CONCRETE CURB TRANSITION DETAIL N.T.S.



NOTE: PAVEMENT WIDTH REMAINS CONSTANT THROUGH TRANSITION.

12/D1 CONCRETE CURB TRANSITION DETAIL N.T.S.

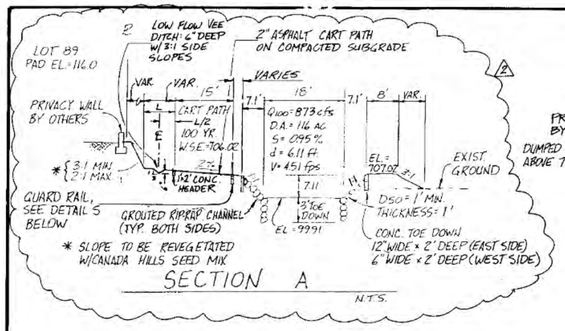
G-89-106

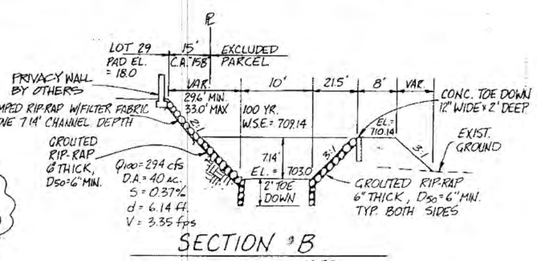
IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
DETAIL SHEET & MISC.

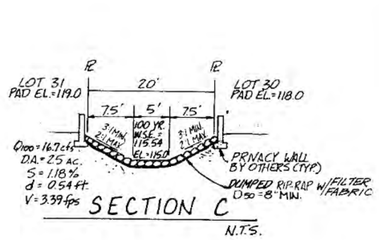
Horiz N.T.S.
Vert —
Fld Bk Pg
Design
Drawn BWT
Chkd DCR
Date SEPT. 89
Job No 05121-06-74

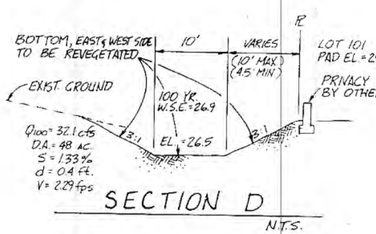
CBA CELLA BARR ASSOCIATES 2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401

Sht 01 of 18 D1

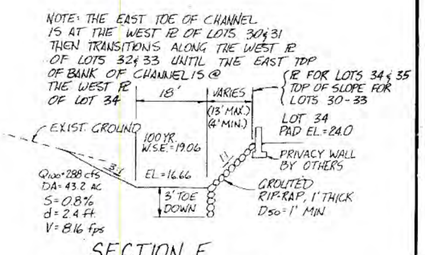


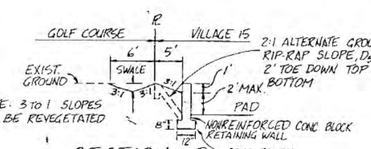


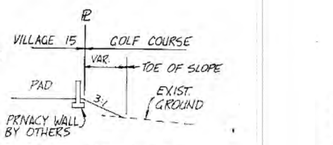


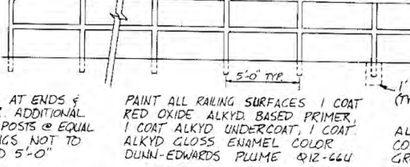


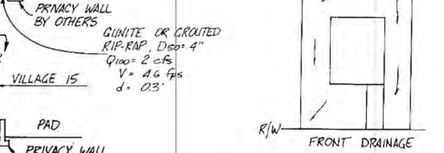
NOTE: THE EAST TOE OF CHANNEL IS AT THE WEST R/W OF LOTS 30 & 31 THEN TRANSITIONS ALONG THE WEST R/W OF LOTS 32 & 33 UNTIL THE EAST TOP OF BANK OF CHANNEL IS @ THE WEST R/W OF LOT 34

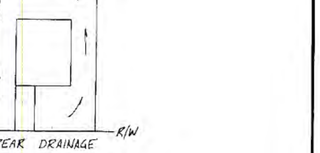




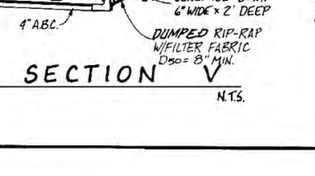


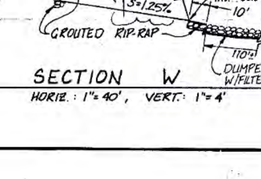


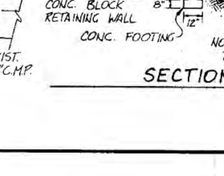


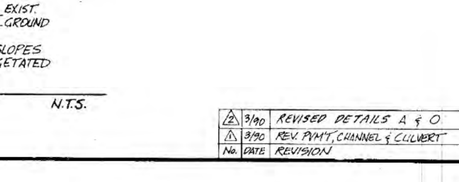


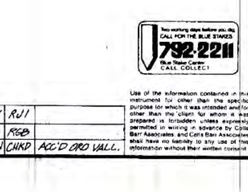
ADOT GUARDRAIL (TIMBER POSTS) DTL. 10, SHT. D1. INSTALLATION SUBJECT TO FIELD OBSERVATION BY TOWN ENGINEER AFTER ROADWAY CONSTRUCTION. IF GUARDRAIL IS NOT CONSTRUCTED INSTALL 4 POST BARRICADES - SEE DTL. 8, SHT. D1.

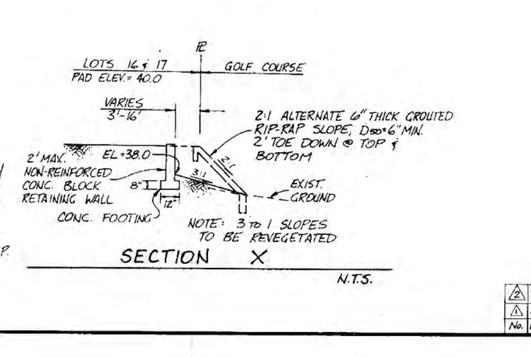


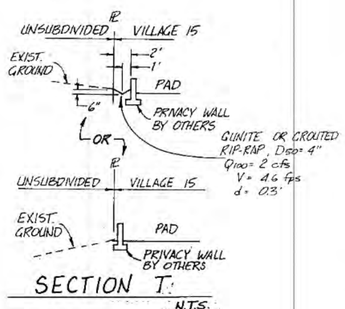


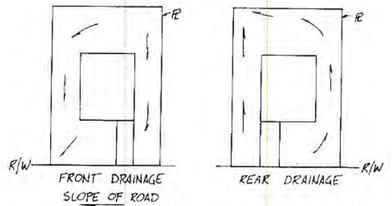












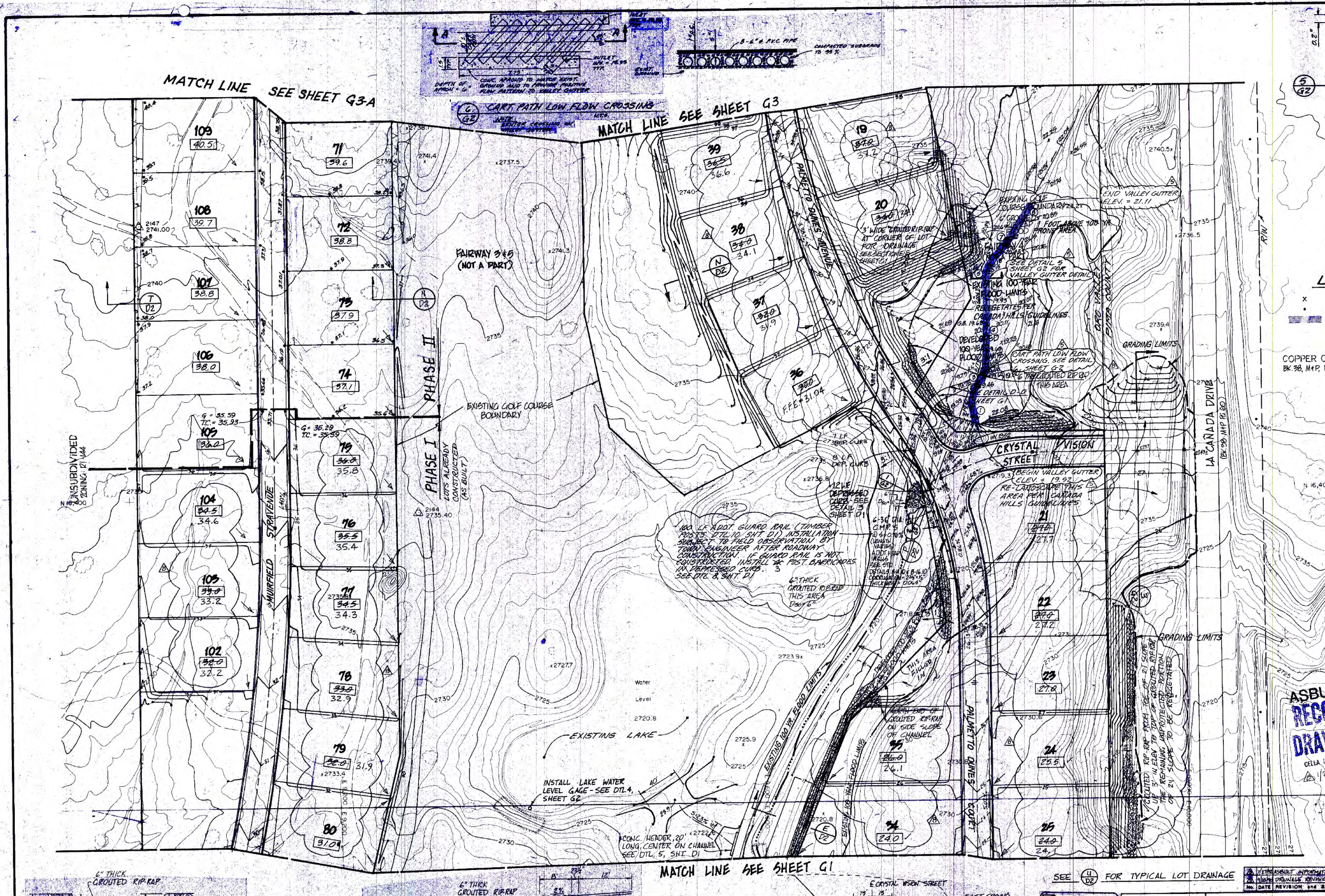
No.	DATE	REVISION	DRWN	CHKD	ACC'D DRG VALL.
2	3/90	REVISED DETAILS A & O	JVK	RJI	
1	3/90	REV. P/MT. CHANNEL & CULVERT	RJR	RGB	

IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
DETAIL SHEET

Horiz.	
Vert.	
Fld. Bk.	Pg.
Design	RGB/BWT
Drawn	BWT
Chkd.	DCR
Date	SEPT. '89
Job No.	05121-06-74
Sht.	D2
Of	18

CELLA BARR ASSOCIATES
2975 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401


MATCH LINE SEE SHEET G2
MATCH LINE SEE SHEET G2
FAIRWAY 3&6 (NOT A PART)
EXISTING GOLF COURSE BOUNDARY
TIE INTO EXIST. GOLF CART PATH THIS AREA
MUIRFIELD STRAVENUE
CRYSTAL DOWNS COURT
PALMETTO DUNES COURT
PARCEL VI EXCLUDED
LA CAÑADA DRIVE
NARANJA DRIVE
UNSUBDIVIDED ZONING: RAD
PAD BOUNDARY
INSTALL 11 POST BARRICADES 4' APART SEE DETAIL 11 SHEET D
INSTALL 3 REMOVABLE POST BARRICADES 4' APART SEE DETAIL 11 SHEET D
CONCRETE VALLEY GUTTER & PVMT PATCH DETAIL
NO CONC. VALLEY GUTTER/PVMT PATCH ONLY WITH 0.5% CROSS SLOPE
NO RET. WALL APPROX 2.5:1 SLOPE
3' WIDE GROUTED ROCK RIP-RAP @ LOT CORNERS, USE D50=6" SEE DTL E-E, SHEET G1
LIMITS OF GRADING
100' WIDE CONSTRUCTION EASEMENT
NOTE: EXISTING WATER AND ELECTRIC LINES TO HAVE A 6-8 INCH CONC. CAP TO BE 3 FEET WIDE FROM E OF EACH PIPE
EXIST. TELE. M.H. TO BE RELOCATED BY T.E.P.
EXIST. POWER POLE & ANCHOR TO BE RELOCATED BY T.E.P.
CART PATH GUARD RAIL SEE DETAIL 5, SHT. D2
EXIST. ELEC TRANSFORMERS
DEVELOPED 100 YR. FLOOD ELEV.
EXISTING 100 YEAR FLOOD LIMITS
SIGHT VISIBILITY TRIANGLE
NOTE: EXISTING ROAD GRADES SHOWN REFLECT FINISHED GRADES PER W.L.B. JOB # 186085-206 NARANJA DRIVE
EXIST. GUARDRAIL
TIE INTO EXIST. CONC. CART PATH
SOUTH 1/4 CORNER
SECTION CORNER
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION 1
SECTION E-E
SECTION F-F
SCALE: 1"=40'
CONTOUR INTERVAL: 1 FT.
SEE D/D2 FOR TYPICAL LOT DRAINAGE
NOTE:
1. ANY GRADING PERFORMED ON THE GOLF COURSE MUST BE BY PERMISSION OF THE GOLF COURSE OWNER.
2. EXACT LIMITS OF ROCK RIP-RAP, GROUTED OR OTHERWISE, TO BE DETERMINED IN THE FIELD BY THE ENGINEER OF RECORD AND APPROVED BY THE TOWN ENGINEER.
INDICATES ASBUILT AGREES WITH PLAN
ASBUILT RECORD DRAWING
CELLA BARR ASSOC. 11/27/92
792-2211
IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112 GRADING PLAN
CELLA BARR ASSOCIATES
Horiz: 1"=40'
Drawn: JL
Chkd: DCR
Date: SEPT. 89
Job No: 0512-06-74
Sht. G1 of 18



LEGEND

- x EXIST. SPOT GRADES
- • PROPOSED SPOT GRADES
- PROPOSED VALLEY GUTTER

SCALE: 1" = 40'
CONTOUR INTERVAL = 1 FT

INDICATES ASBUILT AGREES WITH PLAN

LINE TABLE

NO.	BEARING	DISTANCE
1	N04°29'00"W	22.70'
4	N00°38'05"E	75.34'
6	N40°43'38"E	12.87'
8	N30°12'10"E	37.96'

CURVE DATA

NO.	DELTA	RADIUS	LENGTH
2	34°17'57"	34.96'	21.22'
3	29°49'52"	41.11'	21.40'
5	40°00'00"	25.00'	17.45'
7	10°31'28"	75.00'	13.78'

5 / G2 VALLEY GUTTER DETAIL N.T.S.

4 / G2 LAKE WATER LEVEL GAGE N.T.S.

1 / G2 CHANNEL SECTION N.T.S.

2 / G2 CHANNEL SECTION STA. 5+40.57, 12' LT. N.T.S.

3 / G2 CRYSTAL VISION STREET SECTION N.T.S.

SEE 4 / D2 FOR TYPICAL LOT DRAINAGE

ASBUILT RECORD DRAWING — CELLA BARR ASSOC. 1/27/92

No.	DATE	REVISION and SHEET No.	DRWN	CHKD
2	1/27/92	ASBUILT INFORMATION PER FIELD DATA	BWT	WDT
1	9/18/90	DRAINAGE REVISION TO FAIRWAY 4	JNK	RJI

Two working days before you dig CALL FOR THE BLUE STAKES 792-2211 Blue Stake Center CALL COLLECT

10-2-89

IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112 GRADING PLAN

CBA CELLA BARR ASSOCIATES 2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401

Horiz.	1" = 40'
Vert.	—
Fld. Bk. Pg.	
Design	RGB/BWT
Drawn	JL
Chkd.	DCR
Date	SEPT. 89
Job No.	05121-06-74
Sht	G2 of 18

#11

PHASE II LOTS SEE SHEET G3-A
MATCH LINE SEE SHEET G4
MATCH LINE SEE SHEET G2
SCALE: 1"=40'
CONTOUR INTERVAL = 1 FT.
EXISTING GOLF COURSE BOUNDARY
FAIRWAY 3&8 (NOT A PART)
FAIRWAY 4 (NOT A PART)
PHASE I
PHASE II
SECTION APPLIES ENTIRE LENGTH OF SLOPE
EXISTING 100-YEAR FLOOD PLAIN LIMITS
DEVELOPED 100-YEAR FLOOD PLAIN LIMITS
UNSUBDIVIDED ZONING: RI-144
GROUT PER DETAIL G, SHT. D2 IN THIS AREA
3' WIDE GROUTED RIP-RAP CHANNEL, SEE DETAIL E-E SHEET G1
NOTE: NO SWALE CONSTRUCTED TO KEEP GOLF COURSE DRAINAGE FROM ENTERING THE BACK OF THESE LOTS
NOTE: DEVELOPER MAY ELECT TO USE A 2:1 SLOPE WITH RIP-RAP BLANKET INSTEAD OF 2 FT. NON-REINFORCED RETAINING WALL SEE Q/D2 X/D2
3' WIDE DUMPED RIP-RAP CHANNEL, LOTS 40 SEE DETAIL E-E, SHEET G1
CONSTRUCT DUMPED RIP-RAP APRON 25' WIDE x 30' LONG. D50 = 8"
78 L.F. DEPRESSED CURB 3&4 POST BARRICADES SHAGED 4' APART, SEE DETAILS 3&8, SHT D1
3' WIDE GROUTED RIP-RAP CHANNEL, LOTS 10-15, SEE DETAIL E-E, SHEET G1
2737.8 100-YEAR FLOOD PLAIN LIMITS EXISTING AND DEVELOPED
ASBUILT TOE OF SLOPE
MUIRFIELD STRAVENUE
PALMETTO DUNES AVENUE
ORO VALLEY PIMA COUNTY
LA CAÑADA DRIVE (BK 38 M&P PG 60)
COPPER CREEK PHASE 2 BK 39, M&P PG.8 ZONING: CR-4
FOXFIRE STREET PUBLIC STREET (BK 39, M&P PG 8)
N 17,200
N 16,800

SEE U/D2 FOR TYPICAL LOT DRAINAGE

INDICATES ASBUILT AGREES WITH PLAN

ASBUILT RECORD DRAWINGS CELLA BARR ASSOC. 1/27/92

Two working days before you dig CALL FOR THE BLUE STAKES 792-2211 Blue Stake Center CALL COLLECT

No.	DATE	REVISION and SHEET No.	DRAWN	CHKD.
1		ASBUILT INFORMATION PER FIELD DATA	BWT	WDT

IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
GRADING PLAN

CELLA BARR ASSOCIATES 2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401

Horiz: 1" = 40'
Design: RGB/BWT
Drawn: JL
Chkd: DCR
Date: SEPT. 89
Job No. 05121-06-74
Sht G3 of 18

10.2.89

100 YR. FLOODPLAIN LIMITS EXIST. & DEVELOPED
MATCH LINE SEE SHEET G4
MATCH LINE SEE SHEET G4
SCALE: 1"=40'
0 10 20 40 80 120
CONTOUR INTERVAL = 1 FT
PHASE II LOTS
MATCH EXIST. GRADE
PHASE I LOTS ALREADY CONSTRUCTED AS SHOWN ON SHEET G3
MATCH EXIST. GRADES
AS-BUILT
AS-BUILT
UNSUBDIVIDED ZONING: R1-144
MUIRFIELD STRAVENUE
PALMETTO DUNES AVENUE
100 YR. FLOODPLAIN LIMITS EXIST. & DEVELOPED
ORO VALLEY
PIMA COUNTY
LA CANADA DRIVE (BK. 38 M&P PG. 60)
EXIST. GOLF COURSE BOUNDARY
END SECTION
FAIRWAY #3 & #5 (NOT A PART OF THIS CONTRACT)
FOXFIRE STREET PUBLIC STREET (BK. 39, M&P PG. 8)
MATCH LINE SEE SHEET G2
MATCH LINE SEE SHEET G2

792-2211

IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
GRADING PLAN

Horiz.	1"=40'
Vert.	
Fld Bk.	Pg.
Design	TLH
Drawn	AGW
Chkd	WDT
Date	SEP '93
Job No.	105121-63-0250
Sht	G3-A
of	18

CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401

STA. 33+85 @ 16' LT
CONSTRUCT STRAIGHT HEADWALL
PER P.C./C.O.T. DETAIL NO. 313
INSTALL 4 POST BARRICADES
IN HEADWALL, DETAIL B, SHT. D1

SCALE: 1" = 40'
0 10 20 40 80 120
CONTOUR INTERVAL = 1 FT.

PIMA COUNTY
ORO VALLEY

UNSUBDIVIDED
ZONING: SR

MUIRFIELD STRAVENUE

COPPER CREEK
PHASE 2
BK. 39 M&P PG. 2
ZONING: CR-4

STA 25+82 TO 25+88
CATCH BASIN (TYPE 3)
PER P.C./C.O.T. #308 W/12' WING
24" INV. = 41.25
ROCK RIP-RAP D50=6"
TO BE PLACED 1' THICK
ON NORTH SIDE OF PIPE &
EXTEND 3' BELOW GRADE

23 LF 24" PIPE @ 1.0%

INV. = 41.0

NEW TEE AREA

CONNECT TO EXIST. ASPH.

24" SPIRAL RIBBED PIPE, 182 L.F. S=0.55%

24" INV. = 39.0

CATCH BASIN
RIM = 42.5
24" INV. = 40.0
SEE DETAIL 1/G4 THIS SHEET

100 YR. FLOODPLAIN LIMITS, EXIST. & DEVELOPED

EXIST. GOLF COURSE BOUNDARY

FAIRWAY #5 (NOT A PART OF THIS CONTRACT)

2 - HANDICAP RAMPS PER P.C./C.O.T. #207

30 L.F. 12" SPIRAL RIB PIPE @ 1.0%

EXIST. GOLF CART PATH TO BE RELOCATED
CONNECT TO EXIST. ASPH.

FAIRWAY #6 (NOT A PART OF THIS CONTRACT)

MT. BELL EASEMENT

1:1 SLOPE ROCK RIP-RAP D50=6

PALMETTO DUNES AVENUE

LA CANADA DRIVE
(BK. 38, M&P PG. 40)

EXIST. GOLF COURSE BOUNDARY

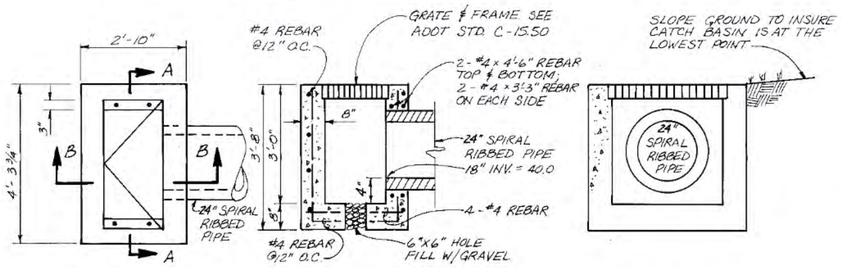
FAIRWAY #9 (NOT A PART OF THIS CONTRACT)

ORO VALLEY
PIMA COUNTY

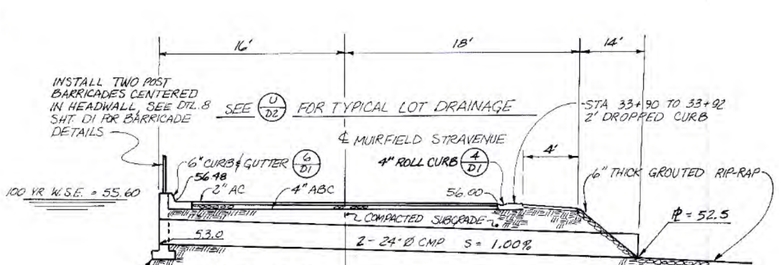
1	55.0	2	57.9
2	58.1	1	57.3
3	53.9	4	55.0
4	53.2	5	51.4
5	52.2	6	52.6
6	51.7	7	51.7
7	51.5	8	50.1
8	50.6	9	49.0
9	49.7	49	49.7
49	47.0	50	50.6
50	51.5	51	51.5
51	52.2	52	52.2
52	53.2	53	52.2
53	54.0	54	53.2
54	55.0	55	51.4
55	49.8	56	49.8
56	48.0	57	48.0
57	46.8	58	46.8
58	47.0	59	47.0
59	47.7	60	47.7
60	48.2	61	48.2

MATCH LINE SEE SHEET G3-A

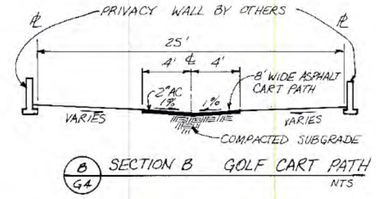
MATCH LINE SEE SHEET G3-A



1/G4 CATCH BASIN - DETAIL 1
NTS



2/G4 SECTION
HORIZ. 1"=6', VERT. 1"=6'



B/G4 SECTION B GOLF CART PATH
NTS

CALL FOR THE BLUE STAKES
792-2211
Blue Stake, Inc.

IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112 GRADING PLAN

Horiz.	1" = 40'
Vert.	
Fld. Bk.	Pg.
Design	TLH
Drawn	AGW
Chkd.	WDT
Date	SEP. '93
Job No.	10512I-63-0850

CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson, Arizona 85705
(602) 624-7401

Sht. G4
Of 18

MATCH LINE SEE SHEET W2

MATCH LINE SEE SHEET W2

STA. 8+24.58 PRC

STA. 8+44, 15'RT. 1" SPLIT WATER SVC.

STA. 7+13, 15'RT. 3/4" WATER SERVICE

STA. 6+93, 15'RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 30 LF 6" D.I.P. 1-FIRE HYDRANT

NEW 8" WATERMAIN

STA. 6+36, 15'RT. 1" SPLIT WATER SVC.

STA. 6+18.70 PRC

STA. 8+78, 15'RT. 1" SPLIT WATER SVC.

STA. 4+72, 15'RT. 3/4" WATER SVC.

STA. 3+83, 15'RT. 3/4" WATER SVC.

STA. 3+76, 15'RT. 3/4" WATER SVC.

STA. 3+19.00 P.C.

STA. 4+32, 15'RT. 3/4" WATER SVC.

STA. 0+40, 15'LT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 30 LF 6" D.I.P. 1-FIRE HYDRANT

NEW 8" WATER MAIN

STA. 3+00, 15'LT. 1-2" DRAIN VALVE SEE SHEET SW

STA. 3+10.00 CUL-DE-SAC 4 POINT

STA. 3+10.00, 35'LT. CUL-DE-SAC RADIUS POINT

STA. 2+35, 15'LT. 3/4" WATER SVC.

STA. 2+35, 15'LT. 3/4" WATER SVC.

STA. 1+19, 15'LT. 3/4" WATER SVC.

STA. 1+69, 15'LT. 3/4" WATER SVC.

STA. 0+49, 15'LT. 3/4" WATER SVC.

STA. 1+89, 15'RT. 3/4" WATER SVC.

STA. 0+98, 15'LT. 3/4" WATER SVC.

STA. 1+09, 15'RT. 3/4" WATER SVC.

STA. 2+39, 15'RT. 3/4" WATER SVC.

STA. 2+22.00, 15'RT. 1-8"x8"x8" TEE 2-8" VALVES, B&C

STA. 2+39.00(N)= STA. 0+00.00 (W) & INTERSECTION

STA. 1+81, 15'RT. 1" SPLIT WATER SVC.

STA. 1+76, 15'RT. 1" SPLIT WATER SVC.

STA. 0+35, 11'LT. 3/4" WATER SVC.

STA. 0+11, 35'LT. 1" SPLIT WATER SVC.

STA. 0+00, 35'LT. CUL-DE-SAC RADIUS POINT

STA. 0+61 1-8"-45° BEND 15'RT.

STA. 0+53, 7'RT. 3/4" WATER SVC.

STA. 0+13, 89'LT. 1" SPLIT WATER SVC.

STA. 0+00 CUL-DE-SAC & P.T.

STA. 0-20, 66'LT. 1-2" DRAIN VALVE SEE DETAIL SHEET SW

STA. 0+00(N)= STA. 47+98.94(E) & P.N.T. INTERSECTION

STA. 5+61.93 1-12"x8" TEE 1-8" VALVES, B.F.C. 1-12" VALVE, B.F.C.

STA. 8+05.87 1-12"x8" TEE 1-8" VALVE, B&C BLOCK TO N.

STA. 9+25.87 1-8"x8" TEE BLOCK TO E.

STA. 0+24 INTERSECTION & E. SECTION LINE

STA. 45+30 NARANJA RD. 18" CMP, 16 GA 36" SLEEVE BY OTHERS INV. N. = 2703.20 INV. S. = 2703.00 CONTRACTOR TO VERIFY LOCATION

INSTALL 40 L.F. 8" D.I.P. CLASS 50 TR-FLEX FIELD LOCK (U.S. PIPE) (PUSH-ON JOINT WITH RUBBER RING) FILL WITH SAND, SEE DETAIL THIS SHEET ABOVE RIGHT

1-18" CMP SEE DTL IN SHEET D2

EXACT LOCATION OF TIE-INS TO BE DETERMINED IN THE FIELD

TIE INTO EXISTING 6" WATER

TIE INTO EXISTING IRR. LINE

TIE INTO EXISTING J-BOX

FAIRWAY 3 & 5 OPEN SPACE (NOT A PART)

EXISTING GOLF COURSE BOUNDARY

PROPOSED CART PATH

GOLF COURSE IRRIGATION SYSTEM MUST NOT BE SHUT DOWN FOR MORE THAN 8 HOURS

COORDINATE RELOCATION OF POWER LINE & WATER LINES WITH GOLF COURSE SUPERINTENDANT TO MINIMIZE DOWN TIME FOR SYSTEMS

ELECTRIC LINE TO IRRIGATION PUMPS TO BE RELOCATED AS PART OF THIS CONTRACT, EXACT LOCATION UNKNOWN

10" IRRIGATION MAIN TO BE RELOCATED AS PART OF THIS CONTRACT

EXISTING 6" IRRIGATION WATERLINE TO BE RELOCATED

RELOCATE BOTH WATERLINES & POWER LINE UNDER NEW CART PATH IN COMMON TRENCH - SEE DETAIL, THIS SHEET

EXIST. ELEC. TRANSFORMERS

3/4" AIR RELEASE VALVE PER TUC WTR SD-302 TO BE INSTALLED AT HIGH POINT OF NEW 12" WATER MAIN EAST OF BOX CULVERT.

3/4" AIR RELEASE VALVE PER TUC WTR SD-302 TO BE INSTALLED AT HIGH POINT OF NEW 12" WATERMAIN EAST OF BOX CULVERT

NEW 12" WATERMAIN TO BE ROLLED UNDER 6" IRRIGATION LINE & WASH

NEW 12" WATERMAIN

STA. 53+35.87, 55'LT. NARANJA RD.= STA. 0+00 NEW WATERLINE 1-12"x12" TAPPING SLEEVE & VALVE, B&C CONTRACTOR TO VERIFY LOCATION & DEPTH AND NOTIFY THE ENGINEER AND WATER CO. OF THE MAINS LOCATION PRIOR TO BEGINNING CONSTRUCTION

EXIST. 12" WATERLINE

PARCEL VI EXCLUDED

ASBUILT LOCATION

INDICATES ASBUILT AGREES WITH PLAN

ASBUILT RECORD DRAWING
CELLA BARR ASSOC.
1/27/92

COMMON AREA 15A PRIVATE STREET MULKFIELD

COMMON AREA 15A CRYSTAL DOWNS COURT PRIVATE STREET

COMMON AREA 15A PALMETTO DUNES COURT PRIVATE STREET

COMMON AREA 15B

1' NO ACCESS ESM'T

6' U.&P.R.E.

PROPOSED CART PATH

PAD BOUNDARY

UNSUBDIVIDED
M-12-NCR

UNSUBDIVIDED
ZONING: R.A.D

NARANJA DRIVE
BK. 8, PG. 89-ROAD MAPS
PUBLIC STREET

LA CANADA DRIVE
BK. 38, M.&P., PG. 60
PUBLIC STREET

ORO VALLEY
PIMA COUNTY

COPPER CREEK 1
BK. 38, M.&P., PG. 60

SOUTH 1/4 CORNER SECTION 3
FND. GLO BC

SEE DETAIL A SHEET W4

638.14'

EXISTING 8" WATERMAIN FAIRWAY VILLAGE

SE CORNER SECTION 3 FND CLO BC STA. 53+83.87 NARANJA RD.

EXIST. 12" WATERLINE

DETAIL "A" N.T.S.

DETAIL "B" N.T.S.

DETAIL "C" N.T.S.

NEW 8" WATERMAIN SLEEVE DETAIL N.T.S.

30' PRIVATE STREET TYPICAL CROSS SECTION

TRENCH DETAIL N.T.S.

SCALE: 1"=40'

0 10 20 40 80 120

No.	DATE	REVISION and SHEET No.	BY	CHK'D
1	1/27/92	ASBUILT INFORMATION PER FIELD DATA	BWT	WDT

Use of the information contained in this document for other than the specific purpose for which it was intended and for other than the client for whom it was prepared is forbidden unless expressly permitted in writing in advance by Cella Barr Associates, and Cella Barr Associates shall have no liability to any use of the information without their written consent.

Two working days before you dig, CALL FOR THE BLUE STAKES 792-2211 Blue Stake Center CALL COLLECT

IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
WATER PLAN

CELLA BARR ASSOCIATES 2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401

Horiz	1"=40'
Vert	—
Fld. Bk.	Pg
Design	RGB
Drawn	JL
Chkd.	DCR
Date	SEPT. 89
Job No.	09121-06-74
Sht.	W1
Of	16

MATCH LINE SEE SHEET W3

MATCH LINE SEE SHEET W1

UNSUBDIVIDED

PHASE II

PHASE I

MURFIELD STRAVENUE

PRIVATE STREET COMMON AREA 15A

COMMON AREA 15B

PALMETTO DUNES AVENUE

PRIVATE STREET COMMON AREA 15A

COMMON AREA 15B

PALMETTO DUNES COURT

EXISTING GOLF COURSE BOUNDARY

6' U&P.R.E.

109 108 107 106 105 104 103 102

71 72 73 74 75 76 77 78 79 80

39 38 37 36 35 34

19 20 21 22 23 24 25

STA. 13+53±, 15' RT. REMOVE EXIST. 2" DRAIN VALVE CONNECT TO EXIST. 8" WATER MAIN, FIELD VERIFY LOCATION PRIOR TO CONSTRUCTION

STA. 13+38, 15' RT. 1" SPLIT WATER SVC.

STA. 13+03, 15' RT. 3/4" WATER SVC.

NEW 8" WATERMAIN

STA. 12+35.56 P.T.

STA. 12+32.5, 15' RT. 1" SPLIT WATER SVC.

STA. 12+00, 15' RT. 1" SPLIT WATER SVC.

STA. 11+61.7, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 30 LF 6" D.I.P 1-FIRE HYDRANT

STA. 10+91, 15' RT. 3/4" WATER SVC.

STA. 10+80, 15' RT. 1-8" VALVE B&C

STA. 10+13, 15' RT. 3/4" WATER SVC.

STA. 9+30, 15' RT. 3/4" WATER SVC.

STA. 11+23, 15' RT. 3/4" WATER SVC.

STA. 14+78, 15' RT. 1" SPLIT WATER SVC.

STA. 14+32.5, 15' RT. 1" SPLIT WATER SVC.

STA. 15+72.5, 15' RT. 1" SPLIT WATER SVC.

STA. 17+38, 15' RT. AIR-RELEASE VALVE

STA. 17+00, 15' RT. 3/4" WATER SVC.

STA. 8+24, 15' RT. 1" SPLIT WATER SVC.

STA. 8+43, 15' RT. 3/4" WATER SVC.

STA. 7+58, 15' RT. 3/4" WATER SVC.

STA. 7+27, 15' RT. 3/4" WATER SVC.

STA. 6+80, 15' RT. 3/4" WATER SVC.

STA. 6+35, 15' RT. 1-8"x8"x4" TEE 1-4" VALVE B&C

STA. 6+35, 17' LT. 2-2" METERS

STA. 5+28.78, 15' RT. 1-8"x8"x8" TEE 2-8" VALVES, B&C

STA. 4+43.8, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 7 LF 6" D.I.P 1-FIRE HYDRANT

STA. 3+96, 15' RT. 3/4" WATER SVC.

STA. 3+76, 15' RT. 3/4" WATER SVC.

STA. 2+61, 15' RT. 3/4" WATER SVC.

STA. 2+26, 15' RT. 3/4" WATER SVC.

STA. 1+81, 15' RT. 1" SPLIT WATER SVC.

STA. 1+76, 15' RT. 1" SPLIT WATER SVC.

STA. 1+43, 12' LT. 3/4" WATER SVC.

STA. 1+43.00 (W) P.C.

STA. 0+00.00 (W) INTERSECTION ℄ SECTION LINE

STA. 0-60.00, 12' LT. 1-8"-90° ELBOW

STA. 6+05.26 P.R.C. 0-36" CMP SEE DETAIL B, SHEET D2

STA. 2+09.22 (W) P.T.

STA. 0+40.78 (N) = STA. 2+33.64 (N) ℄ INTERSECTION

WATER LINE TO BE LOCATED 6' FROM MANHOLE IN THIS AREA

ROLL NEW 8" WATER LINE UNDER 6-36" DIA. CMP'S SEE STD. DTL. SHT. W5

NEW 8" WATER LINE

NEW 8" WATER MAIN

1' NO ACCESS ESM'T

EXTEND NEW 4" WATER LINE TO EXISTING LAKE WET WELL (330 L.F. ± 4" ℄ PIPE) AT THE DIRECTION OF THE GOLF COURSE MAINTENANCE SUPERVISOR (297-4163)

FAIRWAY 3 & 5 OPEN SPACE (NOT A PART)

FAIRWAY 4 OPEN SPACE (NOT A PART)

10' MT. BELL ESM'T DKT. 6511, PG 470

ORO VALLEY — PIMA COUNTY

75' 75'

COPPER CREEK 1 BK. 38, M&P., PG. 60

LA CANADA DRIVE PUBLIC STREET BK. 38, M&P., PG. 60

EXISTING 8" SEWER T-85-2092

CRYSTAL VISION STREET

0 10 20 30 40 50 FEET 100
SCALE: 1"=40'

2" AC
12" COMPACT TRENCH BACKFILL TO 95% MDD
12"
4" ABC
NEW WATER MAIN

1/W2 PAVEMENT PATCH DETAIL NTS

ASBUILT LOCATION

INDICATES ASBUILT AGREES WITH PLAN

ASBUILT RECORD DRAWING
CELLA BARR ASSOC.
1/27/92

No.	DATE	REVISION	DRAWN	CHKD.
1	1/27/92	ASBUILT INFORMATION PER FIELD DATA	JP	RGB
2	5-23-92	ADD AIR-RELEASE VALVE	BWT	WDT

792-2211

10-2-92

IMPROVEMENT PLANS FOR
CANADA HILLS
VILLAGE 15 LOTS 1-112
WATER PLAN

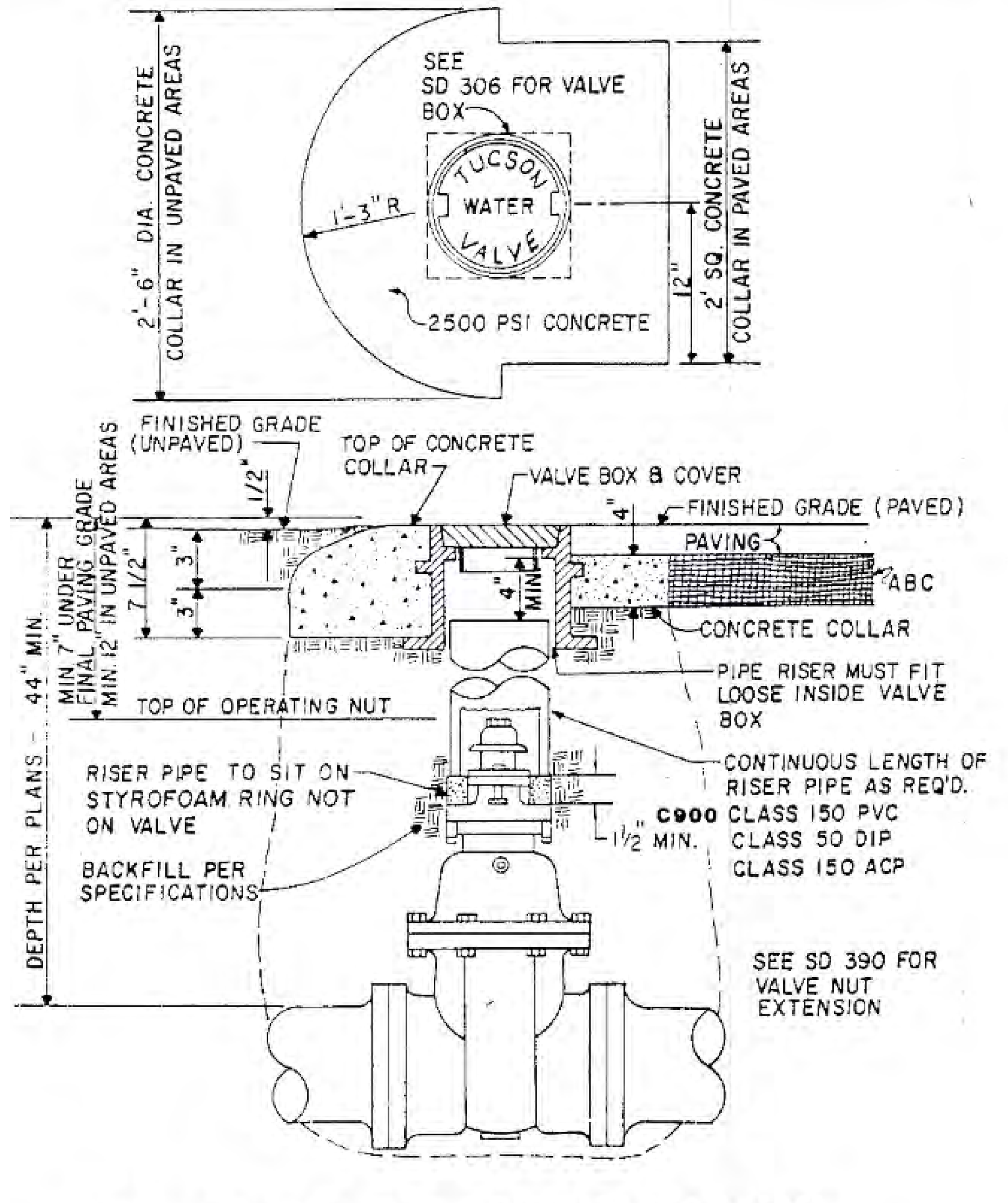
CELLA BARR ASSOCIATES
2075 North Sixth Avenue
Tucson Arizona 85705
602/ 624 7401

Horiz	1"=40'
Vert	—
Fld. Bk	Pg
Design	RGB
Drawn	JL
Chkd	DCR
Date	SEPT. 89
Job No	0912.1-06-14
Sht	W2
Of	18

5 2 1 W2


MATCH LINE SEE SHEET W4
MATCH LINE SEE SHEET W2
STA. 15+59.3, 15' RT. 1" SPLIT WATER SVC.
STA. 15+43, 15' RT. AIR-RELEASE VALVE
STA. 15+66.6, 15' RT. 1" SPLIT WATER SVC.
STA. 15+00.8±, 15' RT. REMOVE EXIST. 2" DRAIN VALVE CONNECT TO EXIST. 8" WATER MAIN FIELD VERIFY LOCATION PRIOR TO CONSTRUCTION
PHASE II
PHASE I
STA. 22+48.2, 5' RT. 1" SPLIT WATER SVC.
STA. 20+98.2, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 7 LF 6" D.I.P. 1-FIRE HYDRANT
STA. 21+18, 15' RT. 3/4" WATER SVC.
STA. 14+26.6, 15' RT. 1" SPLIT WATER SVC.
STA. 14+19.3, 15' RT. 1" SPLIT WATER SVC.
STA. 13+59.3, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 7 LF 6" D.I.P. 1-FIRE HYDRANT
STA. 13+45, 15' RT. 1-8" VALVE, B&C
STA. 13+39, 15' RT. 3/4" WATER SVC.
STA. 20+38, 15' RT. 1" SPLIT WATER SVC.
STA. 20+55 @ 15' RT. 1-3/4" IRRIGATION SERVICE & METER
COMMON AREA 15B
UNSUBDIVIDED
STRAVENUE
MUIRFIELD
PRIVATE STREET
COMMON AREA 15A
AVENUE
DUNES
PALMETTO
6' U.&P.R.E.
FAIRWAY 3 & 5 OPEN SPACE (NOT A PART)
FAIRWAY 4 OPEN SPACE (NOT A PART)
STA. 12+86.6, 15' RT. 1" SPLIT WATER SVC.
STA. 12+19, 15' RT. 3/4" WATER SVC.
STA. 19+58, 15' RT. 3/4" WATER SVC.
EXISTING GOLF COURSE BOUNDARY
STA. 11+46.6, 15' RT. 1" SPLIT WATER SVC.
STA. 11+39.3, 15' RT. 1" SPLIT WATER SVC.
STA. 18+43, 15' RT. 3/4" WATER SVC.
STA. 18+38, 15' RT. 3/4" WATER SVC.
NEW 8" WATERMAIN
STA. 17+58, 15' RT. 1" SPLIT WATER SVC.
STA. 10+17, 15' RT. 3/4" WATER SVC.
STA. 10+59, 15' RT. 3/4" WATER SVC.
STA. 9+36, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 30 LF 6" D.I.P. 1-FIRE HYDRANT
STA. 17+12.5, 15' RT. 1" SPLIT WATER SVC.
STA. 16+52.6, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE B&C 30 LF 6" D.I.P. 1-FIRE HYDRANT 1-8" VALVE, B&C
STA. 9+64.71 P.T.
STA. 9+31, 15' RT. 3/4" WATER SVC.
STA. 16+78, 15' RT. 3/4" WATER SVC.
STA. 9+82, 15' RT. 3/4" WATER SVC.
COMMON AREA 15B
ORO VALLEY
PIMA COUNTY
75'
75'
10' MT. BELL ESMT. DKT. 6511, PG. 410
LA CANADA DRIVE BK. 38, M.&P., PG. 60 PUBLIC STREET
R/W
EXISTING SEWER
COPPER CREEK 1 PHASE 2 BK. 39, M.&P., PG. 8
FOXFIRE STREET BK. 38, M.&P., PG. 60 PUBLIC STREET
EXISTING 8" WATER LINE
STA. 0+00 TIE INTO EXISTING 8" WATER LINE. DEPTH AND LOCATION OF EXISTING 8" WATER LINE UNKNOWN. CONTRACTOR TO LOCATE AND NOTIFY ENGINEER OF LOCATION PRIOR TO BEGINNING CONSTRUCTION
SCALE: 1"=40'
FEET
ASBUILT RECORD DRAWING
CELLA BARR ASSOC. 1/27/92
ASBUILT LOCATION
INDICATES ASBUILT AGREES WITH PLAN
792-2211
ASBUILT INFORMATION PER FIELD DATA
ADD AIR-RELEASE VALVE
No. DATE REVISION
IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112 - WATER PLAN
CELLA BARR ASSOCIATES 2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401
Horiz. 1"=40'
Design RGB
Drawn JL
Chkd. DCR
Date SEPT. 1989
Job No. 05121-06-74
Sht. W3 of 18

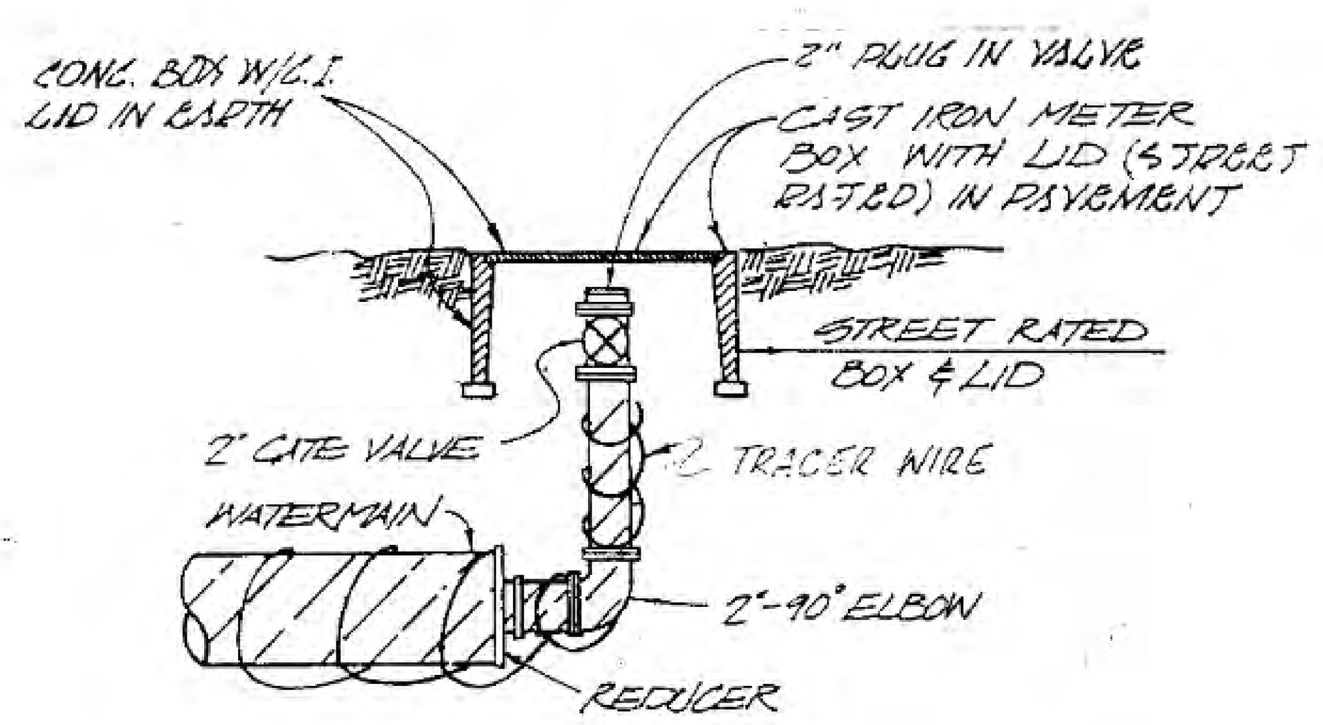
UNSUBDIVIDED
PIMA COUNTY
ORO VALLEY
STA. 28+75 @ 15' RT. 1 3/4" IRRIGATION SERVICE & METER
STA. 29+00.8, 15' RT. 1" SPLIT WATER SVC.
STA. 30+24.46(E)= STA. 20+62.46(N) ℄ INTERSECTION
STA. 30+39.46(E), 15' RT. 1-8"x8"x8" TEE 2-8" VALVES, B&C
STA. 31+70.48
STA. 33+55 1-8"-45° BEND 8" INV. EL = 49.8
24" PIPE INV = 52.84 8" WATER INV = 49.8
STA. 34+02.50 1-2" DRAIN VALVE ASSY. SEE DETAIL, SHEET W5
E 1/4 CORNER SECTION 3
SCALE: 1"=40'
0 10 20 40 80 120
STA. 28+49.74 P.C.
COMMON AREA 15B
PRIVATE STREET
COMMON AREA 15A
STA. 28+06, 15' RT. 3/4" WATER SVC.
1' NO ACCESS ESM'T
STA. 33+75 @ 15' RT. 1-3/4" IRRIGATION SERVICE & METER
STA. 34+73.50(E)= STA. 26+23.70(N) LA CANADA DRIVE INTERSECTION ℄ & SECTION LINE
STA. 31+63.4, 15' RT. 1" SPLIT WATER SVC.
STA. 32+94, 15' RT. 3/4" WATER SVC.
STA. 33+14, 15' RT. 3/4" WATER SVC.
STA. 33+40, 15' RT. 1-8"-45° BEND 8" INV. EL = 51.9
MUIRFIELD STRAVENUE
DUNES AVENUE
PALMETTO
STA. 25+94, 15' RT. 3/4" WATER SVC.
STA. 18+80, 15' RT. 3/4" WATER SVC.
STA. 18+92, 15' RT. 3/4" WATER SVC.
GOLF COURSE IRRIGATION SYSTEM MUST NOT BE SHUT DOWN FOR MORE THAN 8 HOURS
STA. 25+74.5, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 7 LF 6" D.I.P. 1-FIRE HYDRANT 1-8" VALVE, B&C
TIE INTO EXISTING
TIE INTO EXISTING STA. 18+78 @ 15' RT. 1-3/4" IRRIGATION SERVICE & METER
EXISTING IRRIGATION MAIN TO BE LOWERED TO 44" COVER OVER PIPE (IN THIS CONTRACT)
STA. 24+90, 15' RT. 3/4" WATER SVC.
STA. 18+35, 15' RT. 3/4" WATER SVC.
COMMON AREA 15A
STA. 18+42.3, 15' RT. 1-8"x8"x6" TEE 1-6" VALVE, B&C 7 LF 6" D.I.P. 1-FIRE HYDRANT
18" PIPE INV = 39.4 8" WATER INV = 36.4
APPROXIMATE LOCATION. CONTRACTOR TO FIELD VERIFY. COORDINATE WITH GOLF COURSE PERSONNEL PRIOR TO STARTING WORK
6' U.&P.R.E.
STA. 24+60, 15' RT. 3/4" WATER SVC.
STA. 17+97, 15' RT. 3/4" WATER SVC.
FAIRWAY 4 OPEN SPACE (NOT A PART)
FAIRWAY 3 & 5 OPEN SPACE (NOT A PART)
STA. 28+54 4" PVC SLEEVE
STA. 17+17.5, 15' RT. 1" SPLIT WATER SVC.
STA. 17+05.2, 15' RT. 1" SPLIT WATER SVC.
STA 24+39.74 P.C.
1' NO ACCESS ESM'T
ORO VALLEY PIMA COUNTY
75' 75'
LA CANADA DRIVE BK. 38, M.&P., PG. 60 PUBLIC STREET
COPPER CREEK 1 PHASE 2 BK. 39, M.&P., PG. 8
STA. 16+82.69 P.T.
EXISTING GOLF COURSE BOUNDARY
STA. 23+78, 15' RT. 3/4" WATER SVC.
NEW 8" WATERMAIN
STA. 15+66.6, 15' RT. 1" SPLIT WATER SVC.
10' MT. BELL ESM'T DKT. 6511, Pg. 470
STA. 16+09.45 P.C.
STA. 15+59.3, 15' RT. 1" SPLIT WATER SVC.
STA. 22+48.2, 15' RT. 1" SPLIT WATER SVC.
MATCH LINE SEE SHEET W3
MATCH LINE SEE SHEET W3
STUB & BLOCK WATERLINE ONE 20' JOINT BEYOND VALVE SEE DETAIL ON SHEET 5W
6" CLAYTON 92-01 SERIES PRESSURE REDUCING & PRESSURE SUSTAINING VALVE WITH 3'x5' CONC. BLOCK VAULT PER CANADA HILLS WATER CO. STANDARDS
SEE SHEET W1
STA. 22+05, 10' RT. BROADSTONE DR. REMOVE 2" DRAIN VALVE CONNECT NEW 8" WATERMAIN 1-8"x8"x8" TEE 1-8" VALVE, B&C
BROADSTONE DR.
EXISTING 8" WATERMAIN FAIRWAY VILLAGE
DETAIL A - FAIRWAY VILLAGE CONNECTION
N.T.S.
792-2211
IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112
WATER PLAN
CBA CELLA BARR ASSOCIATES
2075 North Sixth Avenue Tucson, Arizona 85705 (602) 624-7401
Horiz 1"=40'
Design RGB
Chkd DCR
Date SEPT. 1989
Job No. 05121-06-74
Sht W4 of 18



VALVE AND VALVE BOX INSTALLATION

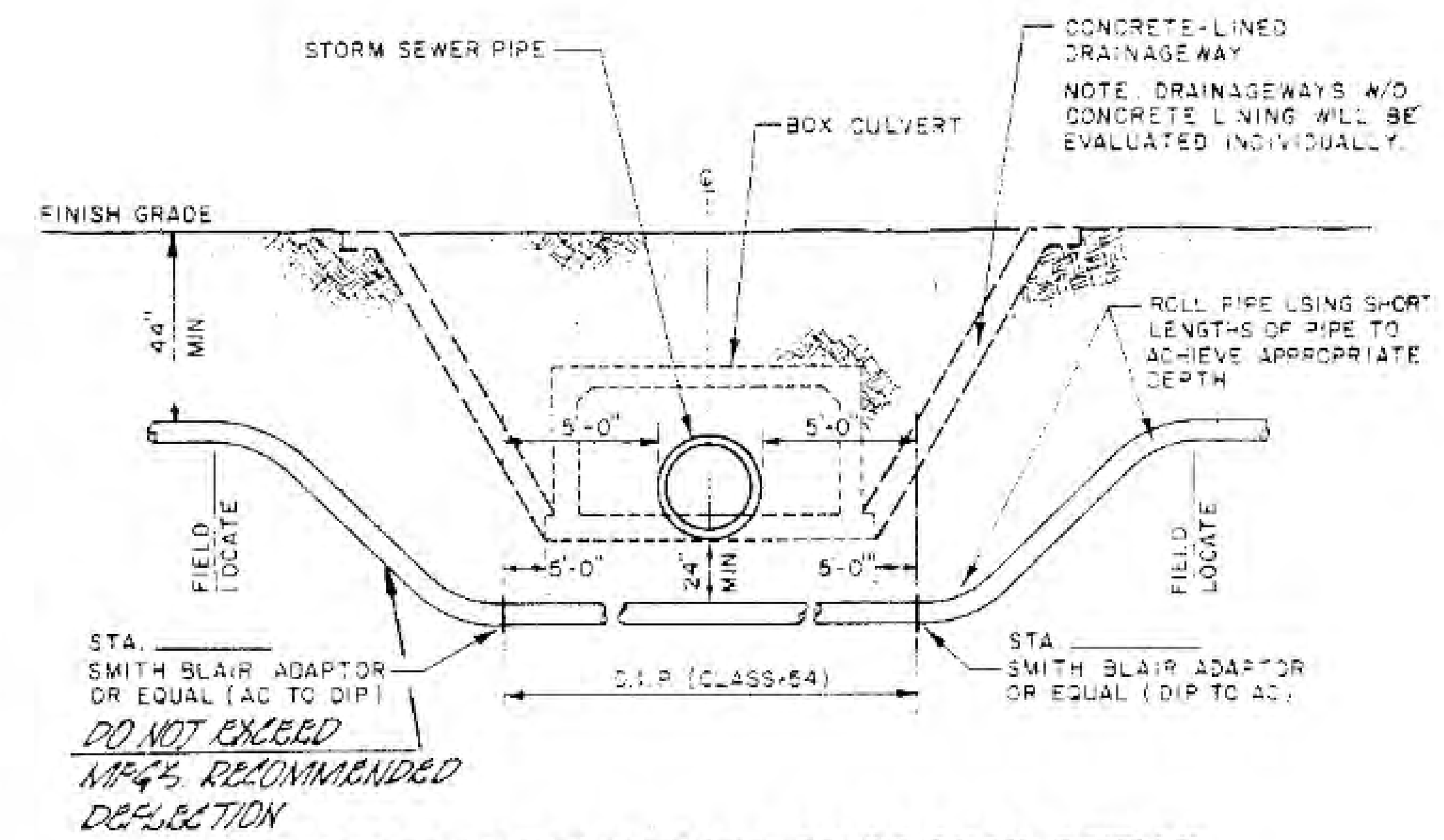
N.T.S.

SD 306 AND SD 390 REFERS TO STANDARD DETAIL NUMBERS FROM TUCSON WATER COMPANY'S "WATERWORKS STANDARD SPECIFICATIONS AND DETAILS".



2" DRAIN VALVE DETAIL

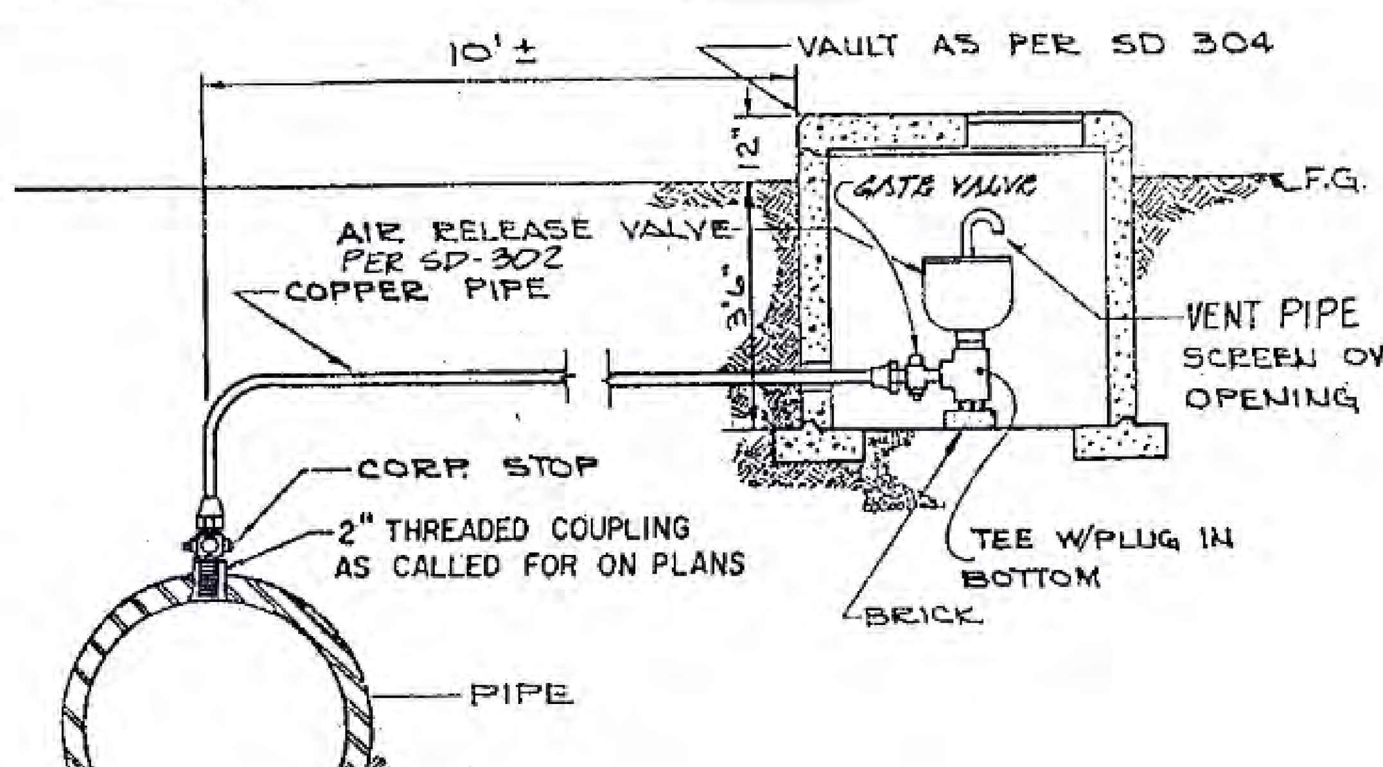
N.T.S.



DRAINAGE STRUCTURE CROSSING DETAIL

FOR 4" TO 12" WATERMAINS

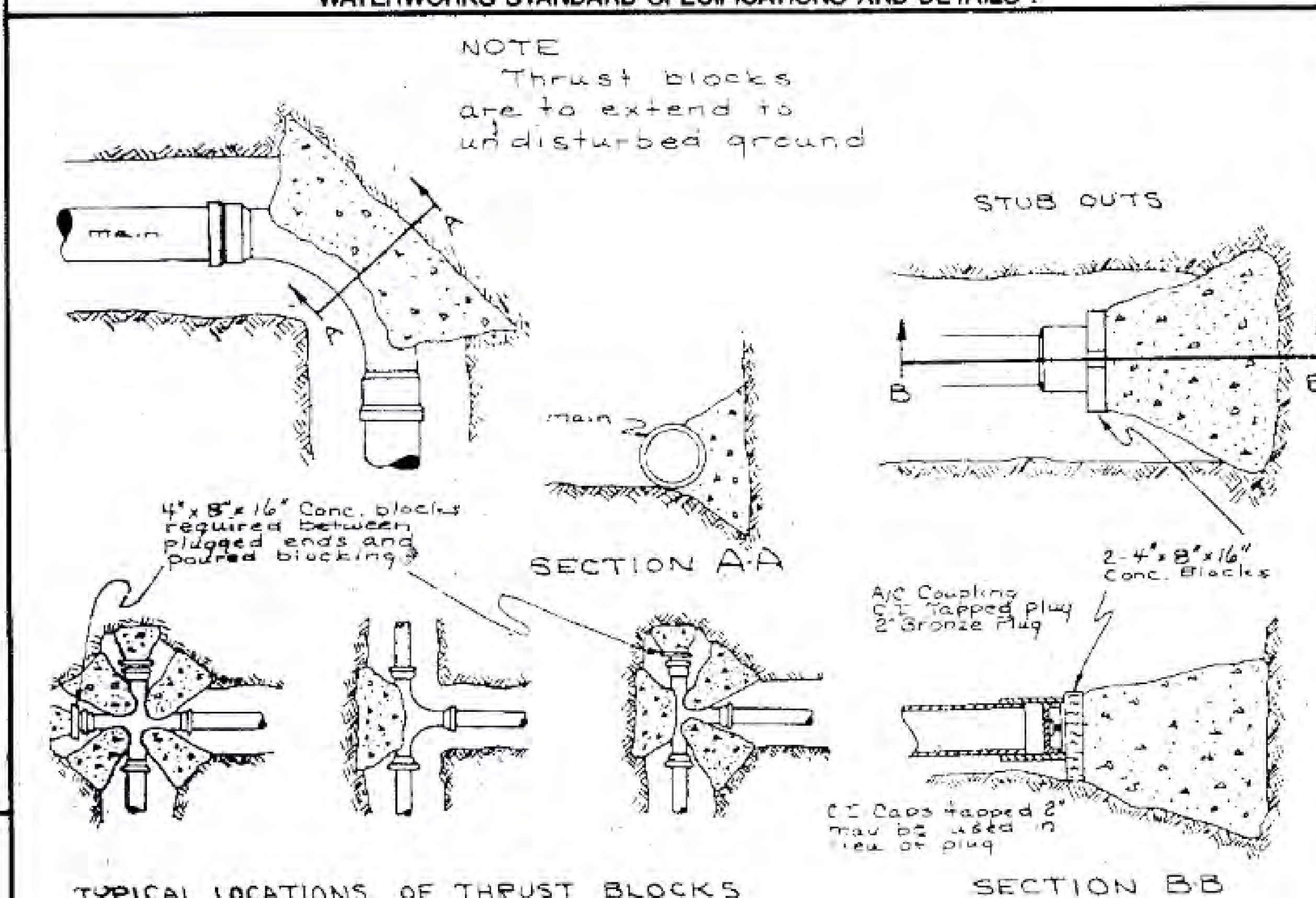
N.T.S.

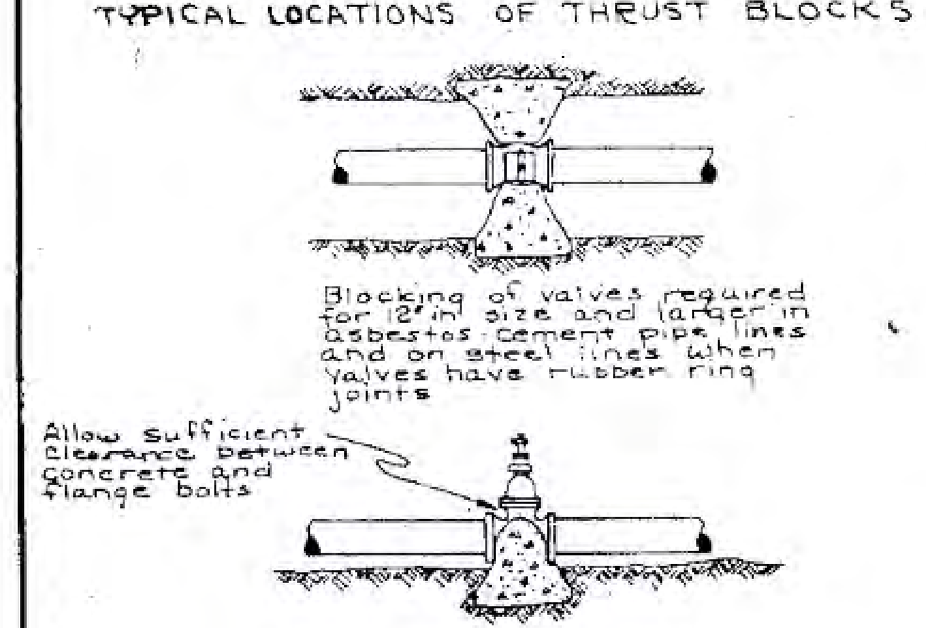


AIR RELEASE VALVE ASSEMBLY

2" AND SMALLER

SD 302 & SD 304 REFERS TO STANDARD DETAIL NUMBERS FROM TUCSON WATER COMPANY'S "WATERWORKS STANDARD SPECIFICATIONS AND DETAILS".





Safe Bearing Loads

The safe bearing loads given in the following table are for horizontal thrusts when the depth of cover over the pipe exceeds 2 feet

Soil	Safe Bearing Load lb per sq. ft.
*Muck, peat, etc.	0
Soft clay	500
Sand	1000
Sand and gravel	1500
Sand and gravel cemented with clay	2000
Shale	5000

*In muck or peat, all thrusts are resisted by piles or tie rods to solid foundations or by removal of muck or peat and replacement with a ballast of sufficient stability to resist thrusts.

TABLE 2

Thrust at Fittings in Pounds at 100 Pounds per Square Inch of Water Pressure

Pipe Size and Class		Tees	90 deg Bend	45 deg Bend	22 1/2 deg Bend
4"	100	1,720	2,440	1,320	660
	150	1,850	2,610	1,420	720
	200	1,850	2,610	1,420	720
6"	100	3,800	5,370	2,910	1,470
	150	3,800	5,370	2,910	1,470
	200	3,800	5,370	2,910	1,470
8"	100	6,580	9,300	5,040	2,550
	150	6,580	9,300	5,040	2,550
	200	6,580	9,300	5,040	2,550
10"	100	9,380	13,270	7,190	3,640
	150	10,750	15,200	8,240	4,170
	200	10,750	15,200	8,240	4,170
12"	100	13,330	18,800	10,240	5,170
	150	15,310	21,640	11,720	5,940
	200	15,310	21,640	11,720	5,940
14"	100	[illegible]	25,360	13,740	6,960
	150	20,770	29,360	15,910	8,060
	200	20,770	29,360	15,910	8,060
16"	100	23,210	32,820	17,880	[illegible]
	150	26,880	38,010	20,590	10,430
	200	26,880	38,010	20,590	10,430

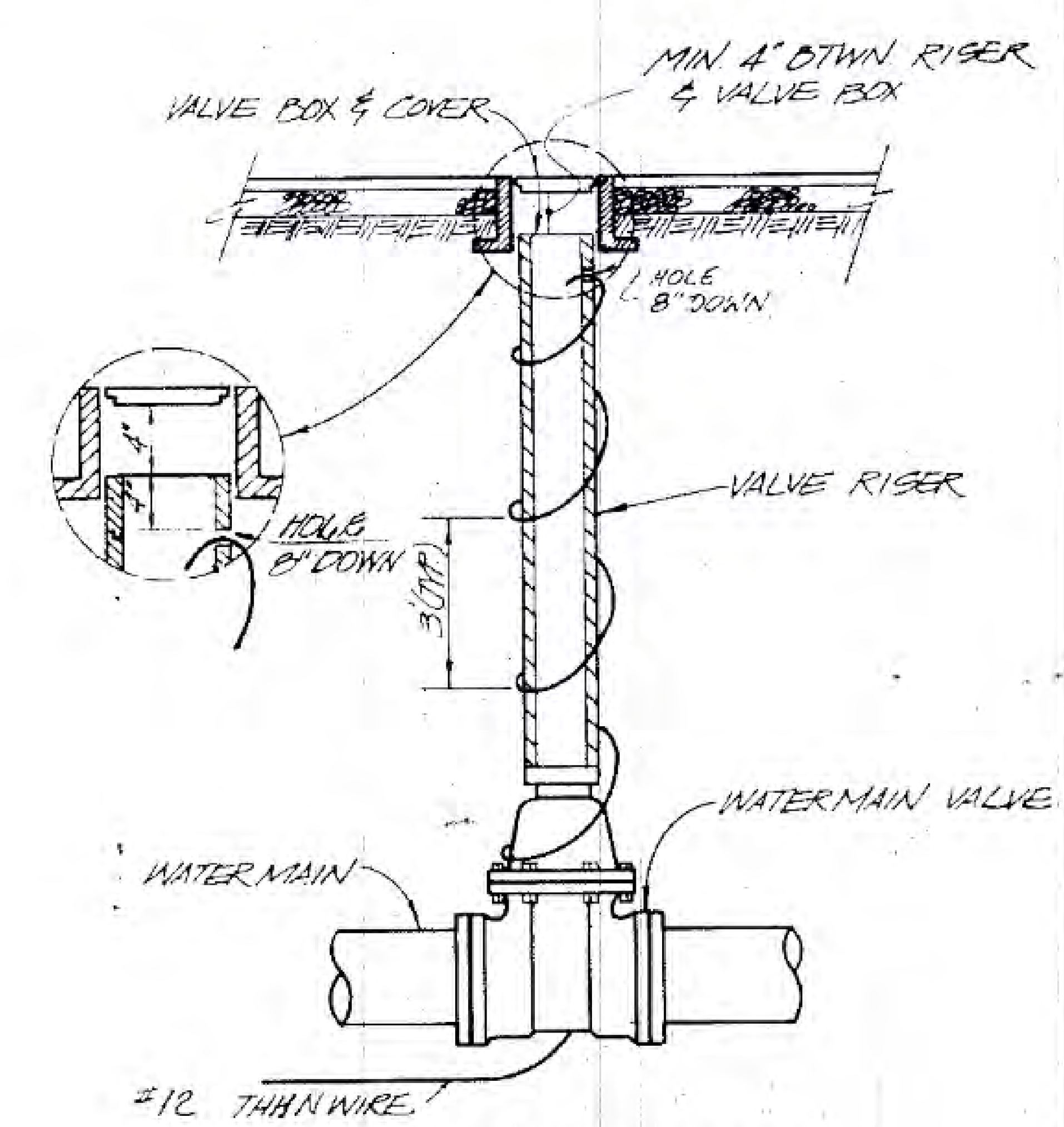
TABLE 1

THRUST BLOCKS

N.T.S.

GENERAL NOTES

1. ANY REFERENCES MADE TO TUCSON WATER STANDARDS AND SPECIFICATIONS SHALL BE INTERPRETED AS CANADA HILLS WATER COMPANY STANDARDS ON THESE PLANS.
2. CONTRACTOR SHALL NOTIFY CANADA HILLS WATER COMPANY A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO ANY CONSTRUCTION TO SCHEDULE A PRECONSTRUCTION CONFERENCE. WORK SHALL NOT COMMENCE UNTIL A "NOTICE TO PROCEED" HAS BEEN ISSUED BY CANADA HILLS WATER COMPANY AND THE CERTIFICATION OF "APPROVAL TO CONSTRUCT" HAS BEEN RECEIVED BY CANADA HILLS WATER COMPANY FROM THE PIMA COUNTY DEPARTMENT OF HEALTH SERVICES. ANY PIPE INSTALLED PRIOR TO THE "NOTICE TO PROCEED" SHALL BE REMOVED BY THE CONTRACTOR AT HIS OWN EXPENSE.
3. A REGISTERED ENGINEER OR REGISTERED LAND SURVEYOR MUST CERTIFY THAT THE GRADE IS WITHIN 6" OF FINAL GRADE PRIOR TO ISSUANCE OF A "NOTICE TO PROCEED."
4. THE CONTRACTOR IS REQUIRED TO CONTACT "BLUE STAKE" (792-2211) 48 HOURS PRIOR TO ANY EXCAVATION TO DETERMINE ACCURATE UTILITY LOCATIONS.
5. NO CONNECTION TO THE EXISTING CANADA HILLS WATER SYSTEM WILL BE PERMITTED ON ANY WORKDAY AFTER 10:30 A.M. OR ON ANY SATURDAY OR SUNDAY UNLESS PRIOR APPROVAL HAS BEEN OBTAINED IN WRITING FROM THE FIELD ENGINEER.
6. IF NEW CONSTRUCTION REQUIRES THE WATER TO BE SHUT OFF TO MAKE TIE-INS TO THE EXISTING SYSTEM, THE CONTRACTOR SHALL PROVIDE CANADA HILLS WATER COMPANY WITH A WRITTEN SCHEDULE OF THE PROPOSED CONNECTIONS AT LEAST 48 HOURS PRIOR TO THE START OF SUCH TIE-INS. HOWEVER, NO WATER WILL BE TURNED OFF UNTIL ALL AFFECTED WATER USERS HAVE BEEN NOTIFIED BY THE CONTRACTOR OF THE SCHEDULE AND NOT LESS THAN FOUR (4) HOURS BEFORE WATER IS TO BE TURNED OFF.
7. THE CONTRACTOR IS REQUIRED TO NOTIFY ALL WATER USERS IN THE IMMEDIATE VICINITY REGARDING POSSIBLE SERVICE INTERRUPTION OR INCONVENIENCE DURING CONSTRUCTION AND PROVIDE A PHONE NUMBER AT WHICH HE CAN BE REACHED IN THE EVENT OF CUSTOMER INQUIRY.
8. FOR REFERENCE, SEE "TUCSON WATER - WATERWORKS STANDARD SPECIFICATIONS AND DETAILS."
9. WATER MAINS TO BE INSTALLED AFTER SEWER INSTALLATION AND GRADING OF STREETS AND WALK AREAS TO WITHIN 6" OF FINAL GRADE.
10. WATER MAINS TO BE INSTALLED WITH A MINIMUM OF 44" OF COVER, EXCEPT AS OTHERWISE NOTED ON THESE PLANS.
11. INDIVIDUAL WATER SERVICE (SHOWN 3/4" W) TO BE INSTALLED AS SHOWN PER WATER PLANS, AND TO INCLUDE SERVICE CLAMP, CORPORATION STOP, COPPER LINE, ANGLE METER STOP, METER BOX AND LID PER TUCSON WATER COMPANY'S STANDARD DETAIL SD-600.
12. SPLIT WATER SERVICE (SHOWN 1" W) TO BE INSTALLED AT LOT LINES UNLESS OTHERWISE INDICATED AND TO INCLUDE SERVICE CLAMP, CORPORATION STOP, COPPER LINE, 3/4" X 3/4" X 1" BRANCH PIECE AND TWO 3/4" ANGLE METER STOPS, METER BOX AND LID PER TUCSON WATER COMPANY'S STANDARD DETAIL SD-602. METER BOX AND LID TO BE INSTALLED BY CONTRACTOR.
13. ELECTRIC LINES SHALL NOT BE INSTALLED WITHIN A HORIZONTAL DISTANCE OF 5' FROM A WATER MAIN UNLESS SHOWN IN A JOINT TRENCH DETAIL ON THE APPROVED PLANS. IN AN APPROVED JOINT TRENCH, THE MINIMUM HORIZONTAL SEPARATION SHALL BE 3'.
14. ONLY APPROVED PLANS OR APPROVED REVISED PLANS SHALL BE USED FOR THE INSTALLATION OF WATER MAINS AND WATER FACILITIES.
15. WHERE WATER MAINS CROSS EXISTING OR FUTURE DRAINAGE PIPES, A MINIMUM VERTICAL SEPARATION OF 24" IS REQUIRED. IF NEW WATER MAINS CANNOT BE INSTALLED ABOVE DRAINAGE PIPE AT MINIMUM COVER AND VERTICAL SEPARATION SPECIFIED, IT WILL BE NECESSARY TO INSTALL THE NEW MAIN BELOW THE DRAINAGE PIPES.
16. ALL WATER MAINS TO HAVE A MINIMUM HORIZONTAL SEPARATION FROM SEWER MAINS OF 6' AND A MINIMUM VERTICAL SEPARATION OF 2'. SANITARY SEWER HCS'S WHICH CROSS OVER WATER MAINS SHALL HAVE A MINIMUM VERTICAL SEPARATION OF 6".
17. WHEN A SEWER MAIN CROSSES A WATER PIPE AT A POINT AT WHICH THE SEWER IS TWO FEET (2') OR MORE BELOW THE WATER PIPE, EXTRA PROTECTION IS NOT REQUIRED. AT ALL OTHER CROSSINGS, THE SEWER SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE WITH MECHANICAL JOINTS, OR APPROVED EQUAL, FOR A DISTANCE OF AT LEAST TEN FEET (10') IN EACH DIRECTION MEASURED PERPENDICULAR TO THE OUTSIDE EDGE OF THE WATERLINE. REQUIREMENTS PER ARIZONA DEPARTMENT OF HEALTH SERVICES ENGINEERING BULLETIN NO. 10, CHAPTER 7.

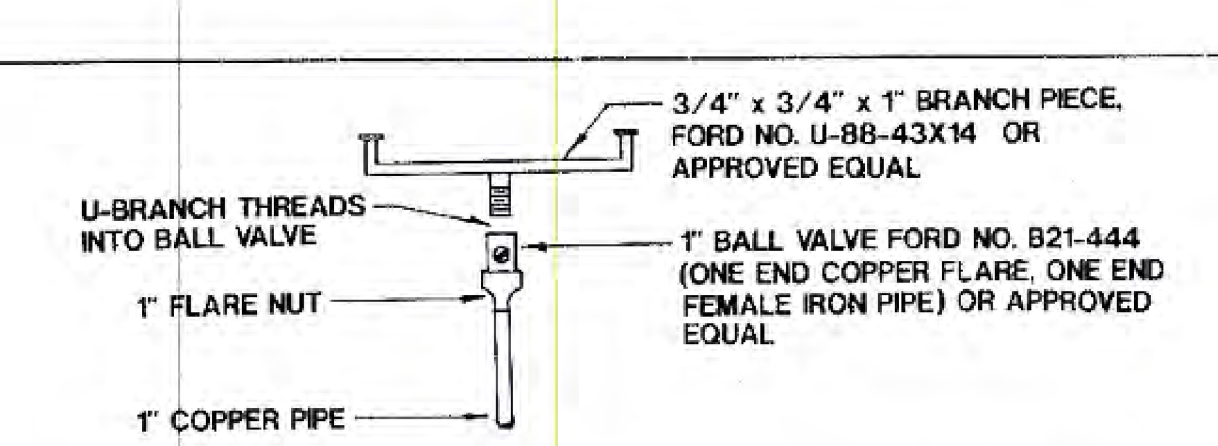


TRACER WIRE DETAIL

N.T.S.

GENERAL NOTES , CONT.

18. EXISTING DEAD-END MAINS SHALL BE THOROUGHLY FLUSHED BEFORE TIE-INS ARE MADE TO THE NEW LINES BEING INSTALLED BY THIS PROJECT.
19. FIRE HYDRANTS SHALL BE SET AT CURB RETURNS, LOT LINES, OR AS INDICATED, IN ACCORDANCE WITH TUCSON WATER COMPANY'S STANDARD DETAIL NO. 500.
20. ALL STATIONING IS ALONG CENTERLINE OF STREETS UNLESS OTHERWISE INDICATED.
21. NEW FIRE HYDRANT TO BE SET AT CURB RETURNS, LOT LINES OR AS INDICATED AND 24" BEHIND BACK OF CURB OR WALK (AS APPLICABLE).
22. THE DEVELOPER/APPLICANT SHALL HAVE ALL CURB STOPS LOCATED AND PROTECTED DURING ALL PHASES OF CONSTRUCTION.
23. SET CURB STOPS 18" BEHIND BACK OF CURB OR WALK (AS APPLICABLE) FROM STREET WITH CURBS AND BETWEEN 8" AND 12" BELOW FINISH GRADE.
24. SET CURB STOPS 3' FROM PROPERTY LINE FOR STREETS WITHOUT CURBS AND BETWEEN 8" AND 12" BELOW FINISH GRADE.
25. CURB STOPS SHALL NOT BE INSTALLED AT THE SAME LOT CORNERS AS THE ELECTRIC SERVICE. WHERE THIS CANNOT BE ACCOMPLISHED, THE WATER SERVICE AND ELECTRIC SERVICE MUST HAVE A MINIMUM HORIZONTAL SEPARATION OF 5'-0".
26. ALL DRAIN VALVE ASSEMBLIES AND BLOW-OFF VALVES SHALL BE EQUIPPED WITH A 2" BALL VALVE INSTEAD OF A 2" GATE VALVE (SEE DETAIL).
27. THE DEVELOPER/APPLICANT SHALL HAVE ALL WATER VALVES IDENTIFIED AND LOCATED PRIOR TO PAVING AND SHALL HAVE ALL VALVE BOXES SET TO FINAL GRADE AFTER PAVING.
28. OWNER TO PAY FOR ALL INSPECTION FEES. ALL FEES TO BE PAID IN FULL BEFORE ACCEPTANCE OF WATER SYSTEM.
29. METER BOXES AND LIDS TO BE FURNISHED BY DEVELOPER AND INSTALLED TO FINISH GRADE BY CONTRACTOR.
30. WATER SERVICE TO REMAIN MARKED DURING CONSTRUCTION. ANY RELOCATION OF SERVICES TO BE BY DEVELOPER, INCLUDING HEIGHT ADJUSTMENTS.
31. PAVING CONTRACTOR TO MARK CURBS WITH "W" AT ALL SERVICE LOCATIONS.
32. NO WATER BOXES AND LIDS SHALL BE INSTALLED WITHIN CONCRETE PAVED DRIVEWAYS OR SIDEWALKS.
33. DEVELOPER OR BUILDER IS REQUIRED TO INSTALL A CUTOFF VALVE WITHIN 18" OF METER ON CUSTOMER SIDE IN ACCORDANCE WITH THE ARIZONA CORPORATION R14-2-405B3.
34. THE CONTRACTOR IS REQUIRED TO INSTALL ONE #12 THHN STANDARD WIRE BELOW THE PIPE WITH 3' LOOPS BROUGHT UP IN VALVE RISERS. VALVE RISERS ARE TO BE FIELD SELECTED BY THE CANADA HILLS WATER COMPANY OR THEIR REPRESENTATIVE.
35. THE FIRE FLOW REQUIRED FOR THIS PROJECT IS 1,000 GPM.
36. THE LOCATION OF AIR RELEASE VALVE ASSEMBLIES SHOWN IN THESE PLANS IS FOR INFORMATION ONLY. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF HIGH POINTS IN THE WATER MAIN. VALVE BOX AND COVERS SHALL BE INSTALLED AT THE SAME GRADE AS EXISTING GROUND AND IN ACCORDANCE WITH TUCSON WATER COMPANY STANDARD DETAIL NO. 302 AIR RELEASE VALVE ASSEMBLIES SHALL NOT BE INSTALLED IN STREETS, DRIVEWAYS, OR SIDEWALKS.
37. THE CONTRACTOR SHALL SUBMIT A "PRELIMINARY FLUSHING SEQUENCE" TO THE CANADA HILLS WATER COMPANY'S FIELD ENGINEER FOR APPROVAL PRIOR TO FLUSHING. THE SUBMITTAL SHALL BE PER TUCSON WATER'S OFFICE PROCEDURE NO 6, "PRELIMINARY FLUSHING SEQUENCE." COPIES ARE AVAILABLE AT THE TUCSON WATER ENGINEERING OFFICE.
38. THE CONTRACTOR SHALL NOTIFY CANADA HILLS WATER COMPANY FOUR (4) DAYS IN ADVANCE FOR SCHEDULING WATER MAIN TESTING. CANADA HILLS WATER COMPANY WILL NOTIFY A.D.H.S. FOR LINE CHLORINATION TESTS.
39. DISINFECTION TO BE PERFORMED IN ACCORDANCE WITH A.D.H.S. ENGINEERING BULLETIN NO. 8.
40. "AS-BUILT" PLANS TO BE PROVIDED BEFORE ACCEPTANCE BY CANADA HILLS WATER COMPANY (SEPIA AND THREE (3) BLUELINES).
41. FINAL ACCEPTANCE WILL NOT BE GRANTED UNTIL THE PIPE CERTIFICATION, BACKFILL CERTIFICATION, VALVE CERTIFICATION, AND THE PASSING MICROBIOLOGICAL TEST AND A.D.H.S. CERTIFICATION OF "APPROVAL TO OPERATE" HAVE BEEN RECEIVED BY THE FIELD ENGINEER.
42. AFTER THE PAVING, CURBS, AND SIDEWALKS HAVE BEEN INSTALLED, THE FIELD ENGINEER WILL CHECK ALL VALVE RISERS AND FIRE HYDRANTS FOR OPERATION AND FIELD ADJUSTMENT PRIOR TO FINAL APPROVAL.



SEE TUCSON WATER STANDARD DETAIL #602 FOR ADDITIONAL INFORMATION

DOUBLE SERVICE BALL VALVE DETAIL

N.T.S.

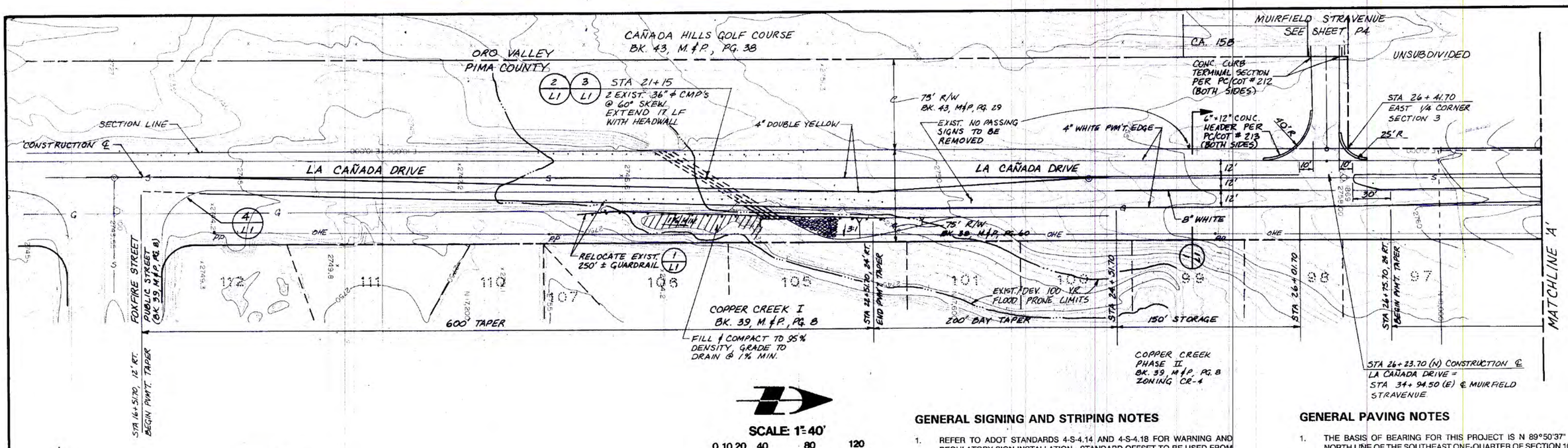
REV. MARCH, 1993, REPLACE DVA DETAIL

W.L.B. NO. 182037-001

CANADA HILLS WATER CO.

GENERAL NOTES AND STANDARD DETAILS

DESIGNED BY D.M.	DATE 3-91	FIELD BK. NO.		
DRAWN BY D.M.	DATE 3-91	SCALE: VERT. N/A HORIZ.	SHEET W5 OF 18	
CHECKED BY D.W.D.	DATE 3-91		PLAN NO. 105121-63-0250	



SCALE: 1"=40'

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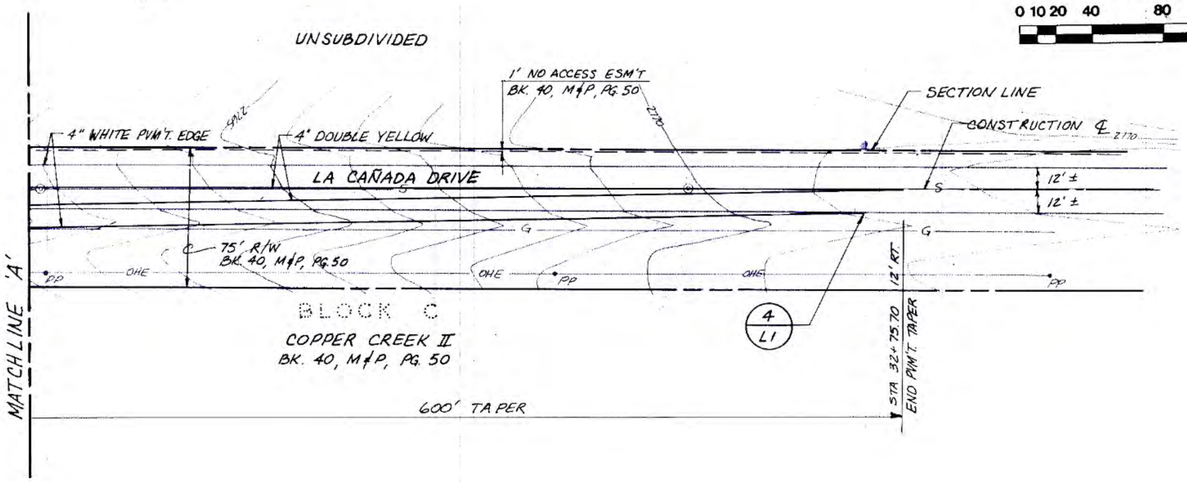
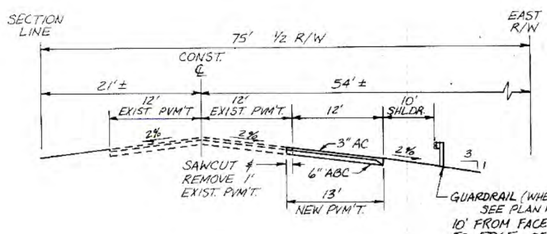


GENERAL SIGNING AND STRIPING NOTES

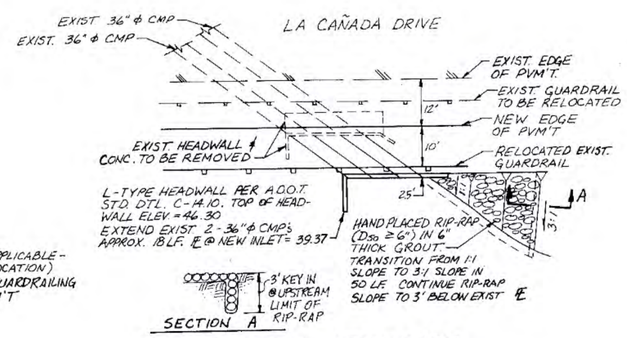
1. REFER TO ADOT STANDARDS 4-S-4.14 AND 4-S-4.18 FOR WARNING AND REGULATORY SIGN INSTALLATION. STANDARD OFFSET TO BE USED FROM EDGE OF SIGN TO SHOULDER EDGE SHALL BE 6'.
2. THE SIGN LOCATIONS, SETBACKS, ETC., SHOWN ON THE SIGNING PLANS ARE APPROXIMATE AND SHALL BE VERIFIED BY THE ENGINEER OR CONTRACTOR AT THE OPTION OF THE ENGINEER.
3. EXISTING PAVEMENT MARKINGS SHALL BE REMOVED AS NECESSARY BETWEEN STATIONS 16+51.70 AND 31+75.70 AND SHALL BE ACCOMPLISHED BY SANDBLASTING IN ACCORDANCE WITH 1990 ADOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SECTION 701-3.06, "OBLITERATION OF EXISTING PAVEMENT MARKINGS."
4. ALL STRIPING SHALL BE 0.06-INCH THICK HOT-SPRAYED THERMOPLASTIC MARKING MATERIAL.
5. ALL STOP BARS, ARROWS AND "ONLY" LEGENDS SHALL USE WHITE TYPE I PREFORMED PAVEMENT MARKING MATERIAL.
6. THE CONTRACTOR SHALL CLEAN THE ROADWAY SURFACE, TYPICALLY BY AIR-JET BLOWING, PRIOR TO THE PLACEMENT OF THERMOPLASTIC MARKING MATERIAL, AS DIRECTED BY THE ENGINEER.
7. CONTROL POINTS SHALL BE SET NO MORE THAN 50' APART ALONG THE ROADWAY BY THE CONSTRUCTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF PERMANENT STRIPING, FOLLOWING THE CONTROL POINTS THAT HAVE BEEN SET.
9. EXISTING ROADWAY DELINEATORS REQUIRING RELOCATION SHALL BE PLACED IN ACCORDANCE WITH THE DETAILS OF ADOT STANDARD DRAWINGS 4-M-4.01 AND 4-M-4.02.
10. THE COST FOR SIGNING AND STRIPING WILL BE PAID FOR BY THE DEVELOPER.

GENERAL PAVING NOTES

1. THE BASIS OF BEARING FOR THIS PROJECT IS N 89°50'37" W FOR THE NORTH LINE OF THE SOUTHEAST ONE-QUARTER OF SECTION 10, TOWNSHIP 12 SOUTH, RANGE 13 EAST.
2. THE BASIS OF ELEVATION IS AT EXISTING MANHOLE WEST OF PUMP STATION ON PIMA COUNTY DEPARTMENT OF WASTEWATER MANAGEMENT CONTRACT NO. 150-150A (SHEET 33/42). SAID BENCHMARK HAS AN ELEVATION OF 2513.13.
3. THE DESIGN SPEED FOR THESE STREETS IS 45 MPH. THE DESIGN VEHICLE IS WB-40.
4. ALL CONSTRUCTION AND TEST METHODS SHALL BE IN CONFORMANCE WITH PIMA COUNTY/CITY OF TUCSON STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS (PC/COT SSPI), 1988 EDITION.
5. AGGREGATE BASE COURSE SHALL CONFORM TO PC/COT SSPI SECTION 303.
6. ASPHALTIC CONCRETE SHALL CONFORM TO PC/COT SSPI SECTION 406, MIX #2 SPECIFICATIONS.
7. ALL CONCRETE SHALL COMPLY WITH PC/COT SSPI SECTION 1006, CLASS S, 3,000 PSI COMPRESSIVE STRENGTH AT 28 DAYS, UNLESS OTHERWISE SPECIFIED.
8. ALL WORK SHALL CONFORM TO GRADING STANDARDS, CHAPTER 18.81 OF THE PIMA COUNTY ZONING CODE.
9. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
10. CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED BY GOVERNMENTAL AGENCIES.
11. ALL REVISIONS TO THESE PLANS MUST BE APPROVED BY PCDOT&FCD PRIOR TO CONSTRUCTION.
12. A COPY OF THIS PLAN SHALL BE KEPT IN AN EASILY ACCESSIBLE LOCATION ON THE SITE AT ALL TIMES DURING CONSTRUCTION.
13. IF UNANTICIPATED CONDITIONS ARE ENCOUNTERED DURING THE COURSE OF CONSTRUCTION AND ARE BEYOND THE SCOPE OF THE DESIGN, THE ENGINEER SHALL SUBMIT THE NECESSARY REVISED OR SUPPLEMENTAL IMPROVEMENT PLANS FOR REVIEW AND APPROVAL BY THE COUNTY ENGINEER.
14. UPON COMMENCEMENT OF WORK, TRAFFIC CONTROL DEVICES SHALL BE POSTED AND MAINTAINED BY THE CONTRACTOR UNTIL SUCH TIME AS THE WORK IS COMPLETED. ALL WARNING SIGNS, BARRICADES, ETC. SHALL BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES ADOPTED BY THE STATE OF ARIZONA PURSUANT TO A.R.S. 28-650.

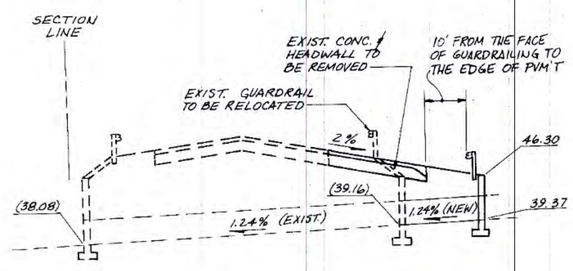


1/L1 NEW LA CAÑADA DRIVE ROADWAY SECTION
NTS



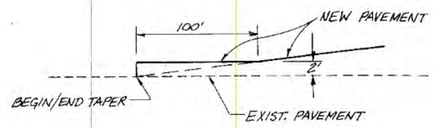
2/L1 DRAINAGE STRUCTURE DETAIL
NTS

Q100= 203 cfs
D.A.= 30 ac.



3/L1 STRUCTURE DETAIL
NTS

2 EXIST. 36" ϕ X 87.5 LF CMP's
SKEW 60°
EXTEND 18 LF EAST SIDE
NEW INLET L-TYPE HEADWALL PER ADOT. STD. DTL. C-14.10 & DOUBLE PIPE HEADWALL (MODIFIED)
F = 3'1"
L/2 = 7'9"
E = 4'6"



4/L1 BEGIN/END TAPER DETAIL
NTS

REGISTERED PROFESSIONAL ENGINEER 19095 JAMSHEED D. BEHRANA Date Signed 12-9-93 ARIZONA U.S.A.

IMPROVEMENT PLANS FOR CANADA HILLS VILLAGE 15 LOTS 1-112 LA CANADA DRIVE WIDENING PLAN

Horiz.	1" = 40'
Vert.	
Fld. Bk.	Pg.
Design	BWT
Drawn	AGW
Chkd.	WDT
Date	11/93
Job No.	105121-63-0241

CELLA BARR ASSOCIATES 4911 EAST BROADWAY TUCSON, ARIZONA 85711 (602) 750-7474 FAX (602) 750-7470

Sht. L1 of 18