Drainage Reports
Abbreviated Water & Sewer Need Reports
Water Study
Wastewater Study
Stormwater Waiver Application

Engineering and Environmental Consultants, Inc.
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Stormwater Review By:
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Review Cycle 1 Date 3-28-18

PENDING APPROVAL (UPON COMMENT RESOLUTION) OF 10-UP-2017

DRAINAGE REPORT

FOR

SCOTTSDALE FIRE STATION # 616

10905 E. Loving Tree Lane
Scottsdale, Arizona 85262

OWNER:
City of Scottsdale
7447 E. Indian School Road; Suite 100
Scottsdale, AZ 85251

Registered Professional Engineer (Civil)
CERTIFICATE NO
31682
JAMES M.
GRIFFIN
Date Signed 3/5/18
ARIZONA, U.S.A.
Expires 9/30/18

September 8, 2017
Revised December 13, 2017
Revised March 5, 2018

Prepared by:
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FIGURES:

1.0 INTRODUCTION/PURPOSE

The purpose of this report is to provide a drainage narrative of the onsite and offsite drainage considerations for this proposed Scottsdale Fire Station # 616 located at 10905 E. Loving Tree Lane situated within Scottsdale, Arizona. The site is in Flood Zone X (Shaded), as depicted on the FEMA Flood Insurance Rate Map 04013C0903L dated October 16, 2013. The site is located on the south side of Cave Creek Road approximately 1,400 feet east of Lone Mountain Parkway.

2.0 LOCATION

This site lies within the North Half of Section 28, Township 6 North, Range 5 East of the Gila and Salt River Base & Meridian, Maricopa County Arizona. The legal description for the property is as follows: **Lot 2A "Minor Subdivision Plat Linsenmeyer West Land Division 2", as recorded in Book 1110, Page 13, Records of Maricopa County, Arizona.** The site is bordered to the north by Cave Creek Road, to the east, south and west by existing residential properties. The Assessor's Parcel Number for this property is 219-60-912A. Based on the information provided on the Maricopa County Assessor's Maps, the site has a Latitude of 33.838909°N and a Longitude 111.848099°W at the approximate center of the site. The elevations of the site range from 3013.00 to 3049.00 above sea level. A vicinity map is provided in the "FIGURES" section of this report.

3.0 SITE DESCRIPTION

The property is currently zoned R1-43 ESL single family and is approximately 144,687 square feet, or 3.32 acres (net area). The slope of the land is generally from northeast to southwest. There is approximately 36-feet of fall from the eastern edge of the site to the southwest corner of the site providing slopes ranging from 12.5% at the east side to just under 5.5% towards the southwest corner of the site. The property is primarily native desert with some rock outcroppings located near the top of the small ridge along the east side of the site. There is one notable wash that flows along the north property line paralleling Cave Creek Road. This wash flows from northeast to southwest within an existing drainage easement that is also located within a dedicated scenic corridor. Based on preliminary calculations and investigation, it appears as though this wash conveys a peak discharge of approximately 83 cfs. The site is in Flood Zone X (Shaded), as depicted on the FEMA Flood Insurance Rate Map. A site aerial map has been provided within the "FIGURES" section of this report.

4.0 FEMA FLOODPLAN CLASSIFICATION

The site lies within Zone "X" (shaded) as indicated on the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona, Map Number 04013C0903L, dated October 16, 2013. Zone "X" (shaded) is defined as "areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood". A copy of the FIRM is provided in the "FIGURES" section of this report.

5.0 OFFSITE DRAINAGE DESCRIPTION

As previously discussed, the site is in Flood Zone X (Shaded), defined as areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. There is one existing wash that enters the site along the east property line at the northeast corner of the site that conveys approximately 83 cfs (100-year peak) onto the proposed Scottsdale Fire Station site. For the most part, the drainage is contained within an existing drainage easement that is located along and parallel to the north property line. Approximately at the midpoint of the property, the wash and easement turn in a southerly direction towards the south property line. At this turning point, the wash changes from a more concentrated flow to a partial sheet flow. When the wash exits the south property line it outlets at two existing locations with a combined flow of approximately 94 cfs.

6.0 ONSITE DRAINAGE DESCRIPTION

In an effort to create a more substantial building pad for the Fire Station, provide natural NAOS desert landscape corridors and protect the native desert surroundings within this area, the site will require some very minor re-routing of the wash along the building frontage and to allow for access from the building to and from Cave Creek Road. The wash will be re-routed in such a manner that the existing/historical entrance locations and exit locations will be undisturbed. Additionally, the "first flush" retention shall be provided on the site for the areas of disturbance to ensure the post development discharge does not exceed the pre development discharge.

Along the building frontage, retaining walls will be utilized to allow the building to be located nearer to the Cave Creek Road access. At the main Fire Station exit, the 83 cfs will be routed through four 36-inch RCP culvert pipes. The 100-year peak discharge will be entirely contained within the pipe culverts with no overtopping onto the drives. An exhibit has been provided within this report illustrating the deltas between existing and proposed water surface elevations at specific river stations. At River Station 3+75 (upstream culvert inlet) there is a slight dip (approximately 1.5-feet) due to the drop inlet at the headwall entrance. Within 50-feet in an upstream direction, the proposed water surface elevation is less than, or matching existing (River Station 4+25), therefore eliminating any adverse impacts on upstream conditions. Decorative/natural looking headwalls will be constructed at both upstream and downstream locations. The headwalls are located within a scenic corridor, therefore, their aesthetic appearance and material pallet must be approved by the City of Scottsdale Planning Department.

The proposed wash modification will be designed to convey the 100-year peak discharges while maintaining near historical flow velocities and depths. Although the existing and proposed velocities are below 5 ft/sec, it may still be necessary to incorporate native angular rip-rap to assist in providing erosion protection along the banks and reducing flow velocities.

In addition to allowing offsite drainage to pass through the site, the development will provide onsite retention for the areas of proposed disturbance. Retention calculations will be based on the 100-year,

"first flush" rainfall event. Shallow retention basins will be located within landscape areas along the eastern and southern part of the building and will collect roof-top and parking runoff within the area. The basin will not exceed 1-foot in depth and will drain from basin to basin with an ultimate outfall to the existing wash. Surface retention basins will be maximum 1 feet deep and have side slopes not exceeding 4:1. Basins will be revegetated to provide a natural appearance. Basin will percolate or bleed-off within a 36-hour time frame.

7.0 HYDROLOGY/HYDRAULICS

Onsite washes requiring re-routing will be designed in accordance with the City of Scottsdale Design Standards & Policies Manual for 100-year peak discharges. Portions of the wash requiring re-routing will be designed with maximum 3:1 side slopes and where velocities exceed 6 ft/sec will contain angular rip-rap bank protection and rip-rap within the bottom of the washes where necessary to reduce flow velocities and prevent erosion. The intent of the re-routed washes is to keep the flow velocities similar to historical rates. Calculations provided within the "Figures" section of the report conclude that the angular rip-rap will not be required because of the minimum increase and in some instances a reduction in channel velocities from historical velocities.

A HEC-RAS model has been developed to demonstrate that the existing and proposed conditions have no adverse impact on existing upstream and downstream conditions. The HEC-RAS Generate Report is provided within this report. A summary table depicting existing and proposed Water Surface Elevations and existing and proposed Velocities has also been provided to demonstrate a comparison for the existing and proposed site drainage conditions based on the HEC-RAS models. Refer to the Existing Conditions Floodplain Map and the Proposed Conditions Floodplain Map for specific cross section data from the HEC-RAS output model.

A Preliminary Grading and Drainage Plan has been provided to schematically depict how the lot and surrounding areas will drain to the existing wash and any proposed retention areas. Erosion protection "cut off" walls at a minimum of 3-feet in depth shall be required at both the inlet and outlet pipe culvert structures. Additionally, a minimum of a 10-foot wide area of angular native rip-rap shall be placed upstream and downstream of the "cut off" walls to provide additional erosion protection at the culvert structures. This information shall be detailed more specifically on the final grading and drainage plans.

Onsite storm drain pipes shall be designed to handle the 100-year peak discharge. Headwalls will be constructed at both upstream and downstream ends for pipe sections. Native angular rip-rap will also be utilized to reduce velocities and erosion at the entrance and exit locations of pipe sections.

8.0 CONCLUSSIONS AND RECOMMEDATIONS

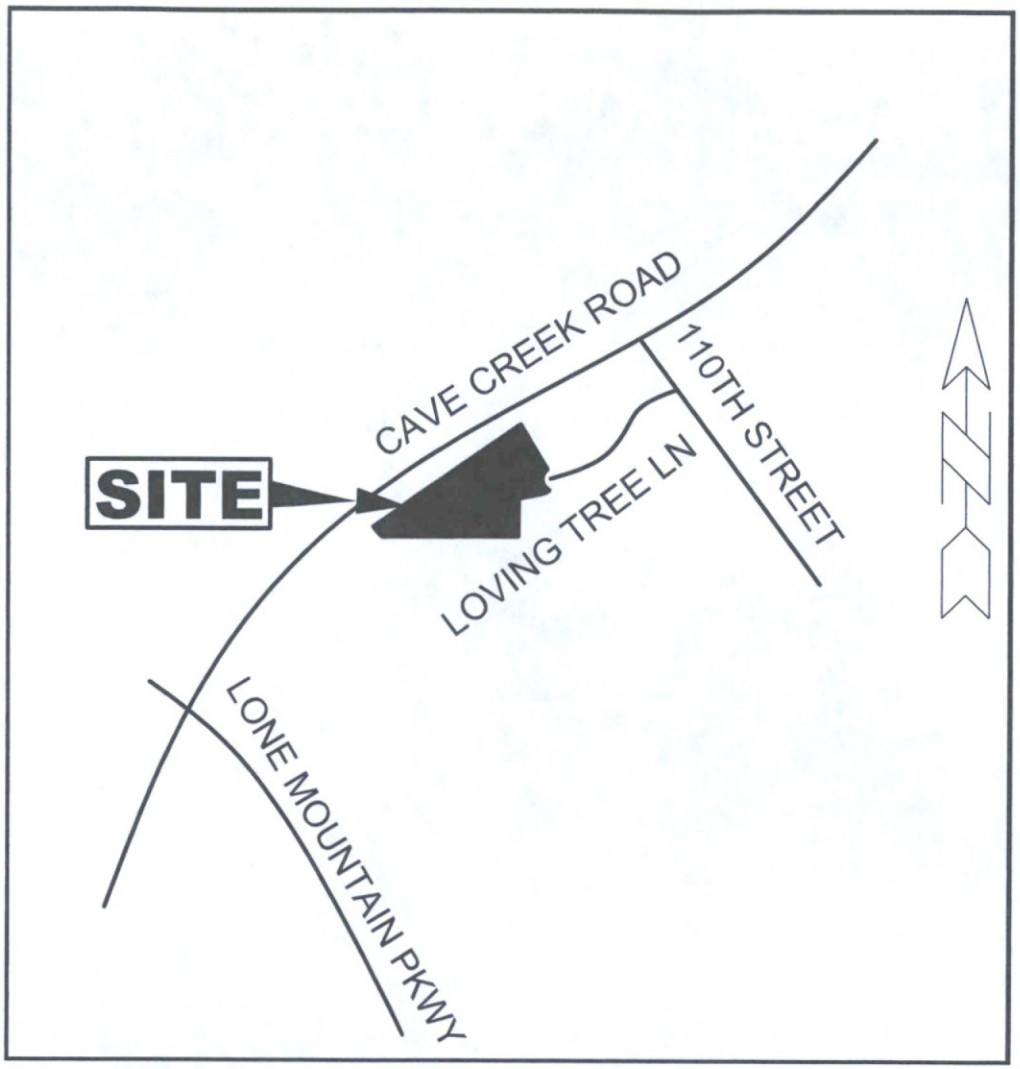
The proposed developed site does have offsite flows impacting the proposed site characteristics. As a result, some wash re-routing will occur to create a more usable building pad, provide natural NAOS desert landscape corridors and protect the native desert surroundings within this area. Portions of the wash not requiring re-routing will remain undisturbed and be utilized as NAOS for the proposed development.

Wash entrance locations and exit locations will remain in their historical locations and conditions. The 100-year peak discharge will be entirely contained within the pipe culverts with no overtopping onto the drives.

Onsite retention for the 100-year, "first flush" rainfall event will be provided for the areas of disturbance. Retention storage shall be provided in either surface/landscape basins adjacent to the building and parking to intercept this runoff. These storage locations will be established at low points within the lot to ensure onsite runoff can enter. Ultimately, the storage method will be designed with a metered bleed off to ensure it drain entirely within a 36-hour period.

FIGURE 1

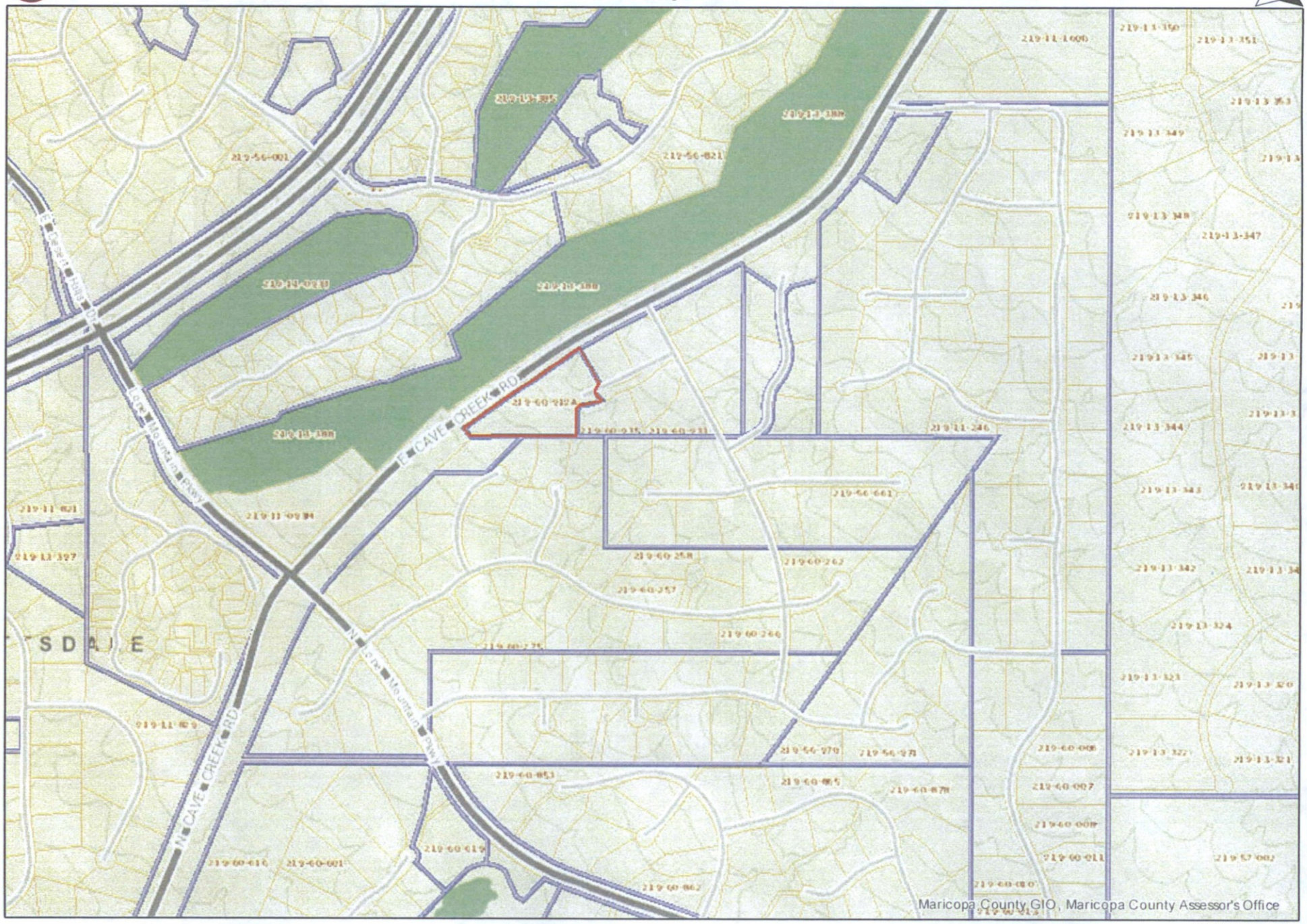
FIGURES



VICINITY MAP N.T.S.

FIGURE 2

Map



8/24/2017 6:34:23 AM

FIGURE 3

MAP SCALE 1" = 500'

250 0 500 1000 FEET METE

PANEL 0903L

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 903 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAREFREE, TOWN OF	040126	0903	L
SCOTTSDALE, CITY OF	045012	0903	L

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

MAP NUMBER
04013C0903L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

FIGURE 4

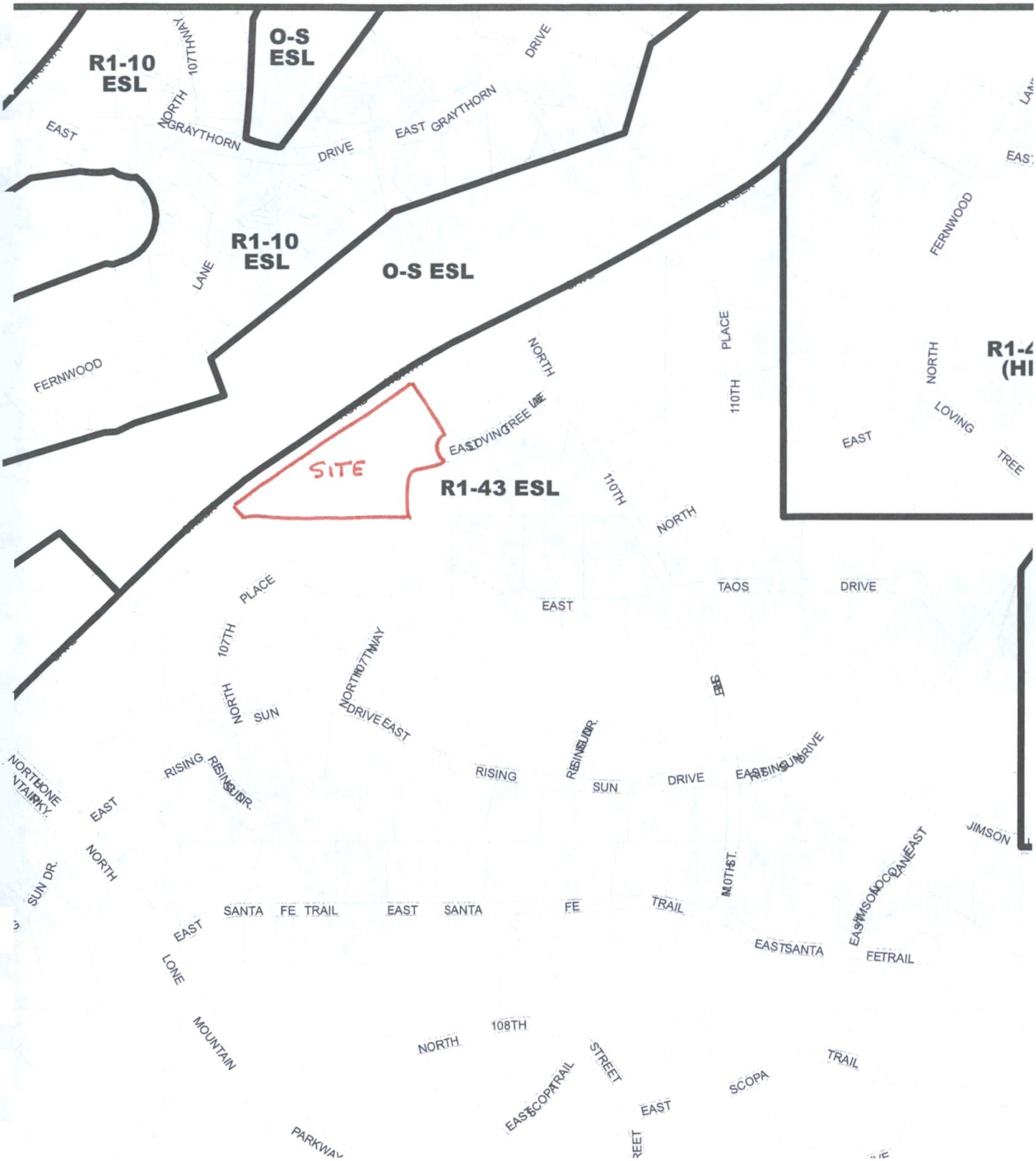
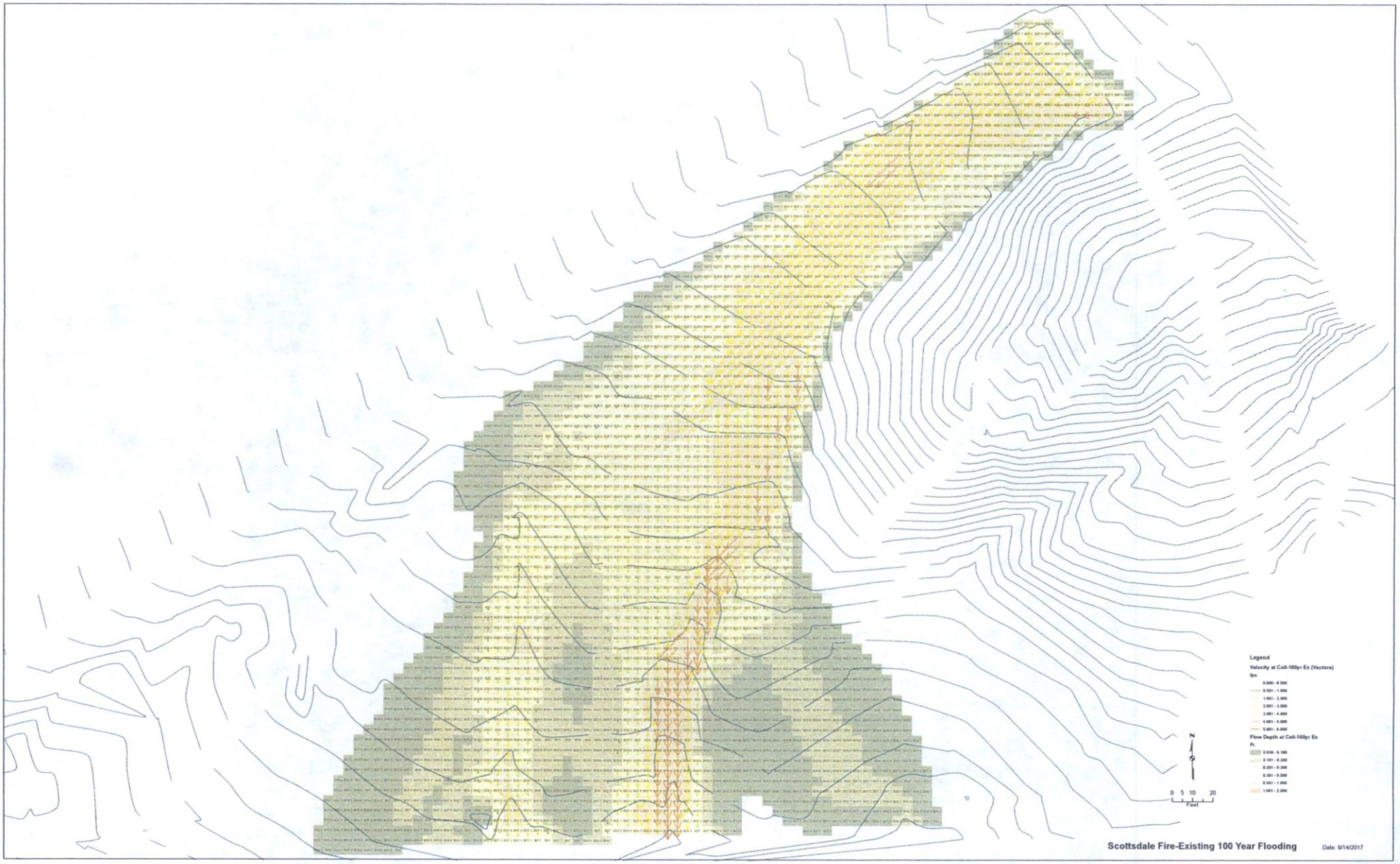

R1-10
ESL
O-S
ESL
R1-10
ESL
O-S ESL
R1-43 ESL
SITE
EAST GRAYTHORN
DRIVE
FERNWOOD
LANE
EAST LOVING TREE LN
110TH
PLACE
NORTH
EAST
TAOS
DRIVE
LOVING
TREE
RISING
SUN
EAST
SANTA
FE
TRAIL
LONE
MOUNTAIN
PARKWAY
NORTH
108TH
STREET
SCOPA
JIMSON

FIGURE 5


E Fernwood Ln
N 109th St
10905 E Loving Tree Ln
N Cave Creek Rd
SITE
N 104th Pl
E Taos Dr
© 2017 Google
Google earth

FIGURE 6


Legend
Velocity at Cell-100yr Ex (Vectors)
fps
0.000 - 0.500
0.501 - 1.000
1.001 - 2.000
2.001 - 3.000
3.001 - 4.000
4.001 - 5.000
5.001 - 6.000
Flow Depth at Cell-100yr Ex
Ft
0.000 - 0.100
0.101 - 0.200
0.201 - 0.300
0.301 - 0.500
0.501 - 1.000
1.001 - 2.000
N
0 5 10 20
Feet
Scottsdale Fire-Existing 100 Year Flooding
Date: 6/14/2017

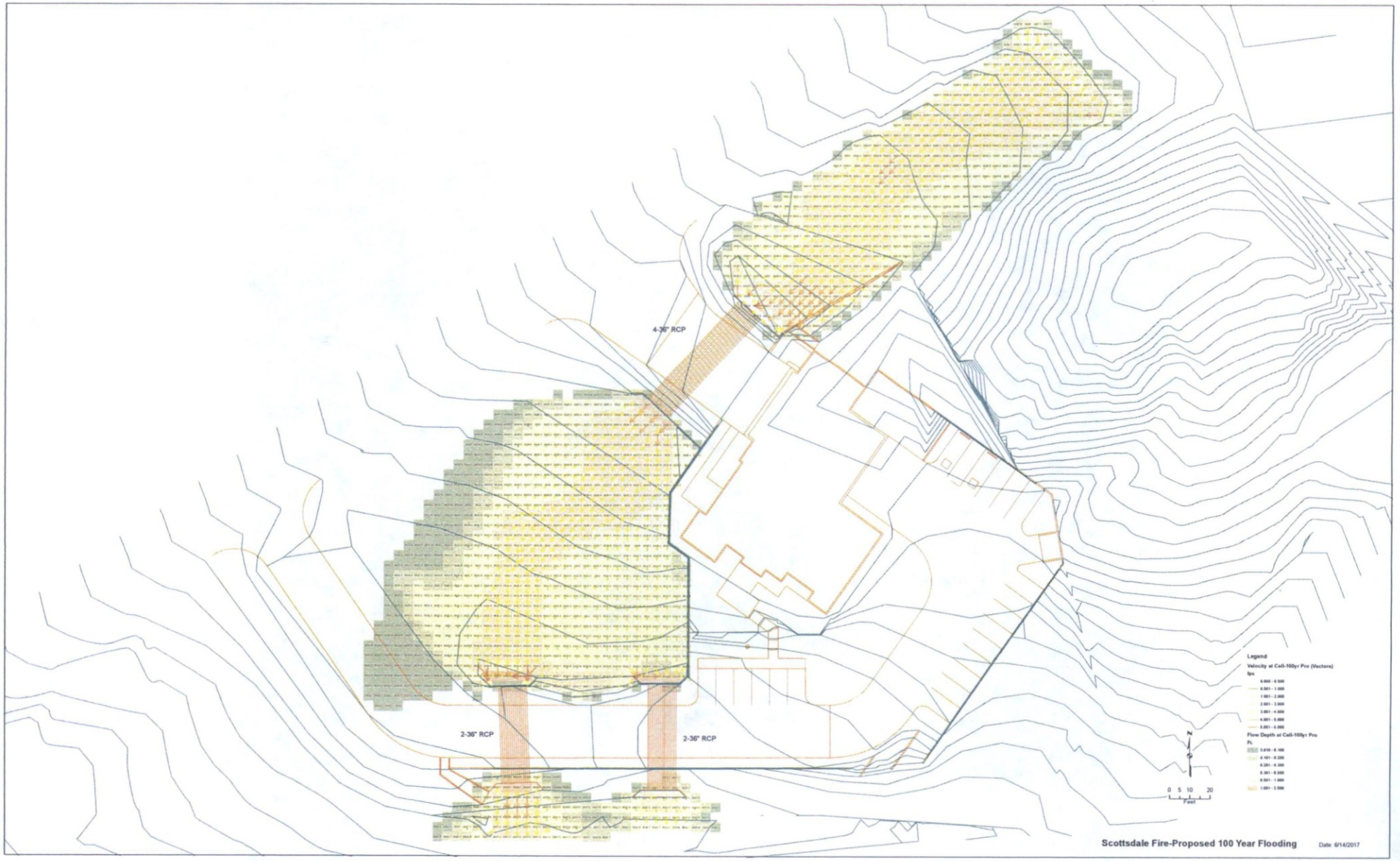
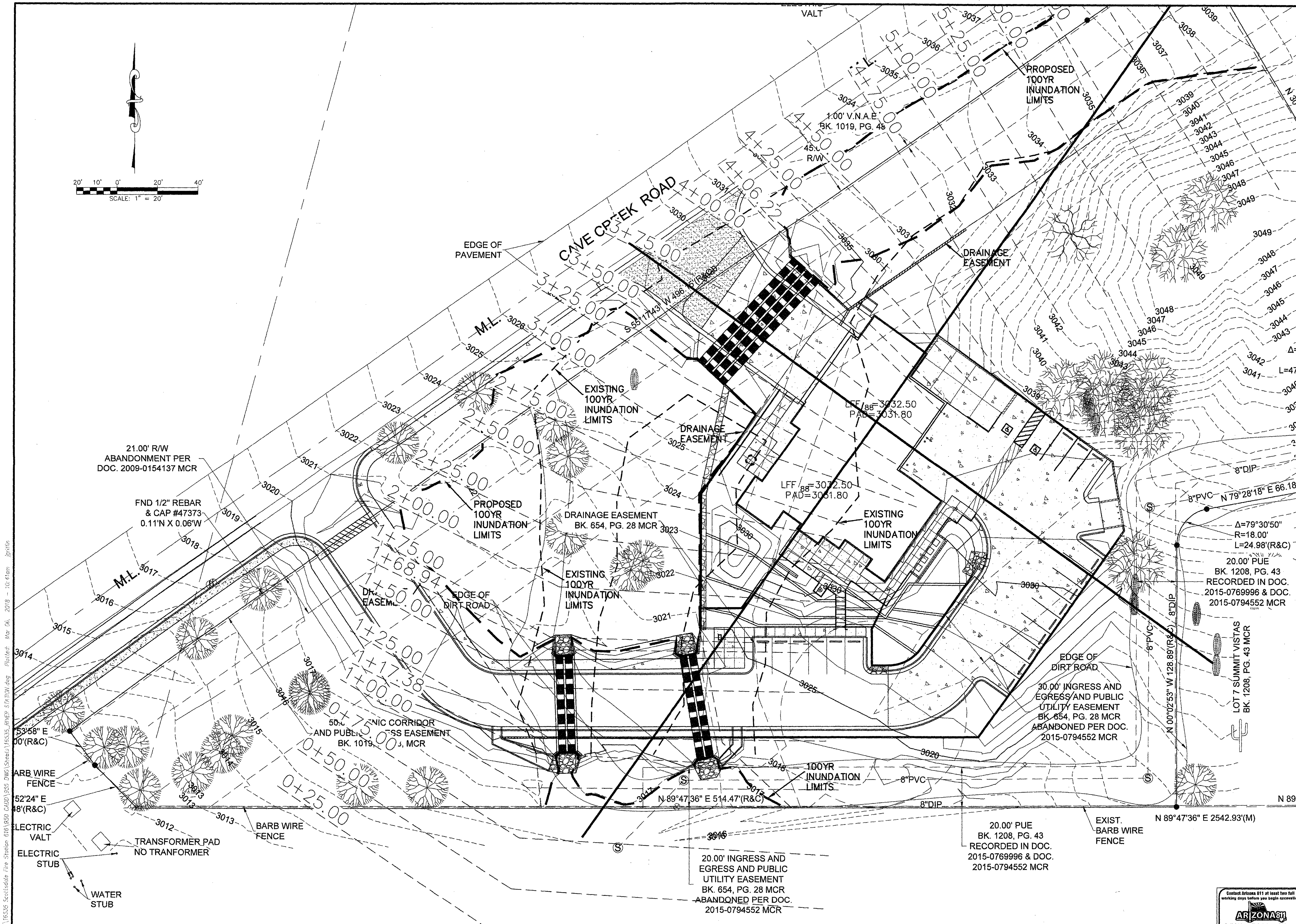

4-36" RCP
2-36" RCP
2-36" RCP
Legend
Velocity at Cell-100yr Pro (Vectors)
fps
0.000 - 0.500
0.501 - 1.000
1.001 - 2.000
2.001 - 3.000
3.001 - 4.000
4.001 - 5.000
5.001 - 6.000
Flow Depth at Cell-100yr Pro
Ft.
0.010 - 0.100
0.101 - 0.200
0.201 - 0.300
0.301 - 0.500
0.501 - 1.000
1.001 - 2.500
N
0 5 10 20
Feet
Scottsdale Fire-Proposed 100 Year Flooding
Date: 6/14/2017

FIGURE 7


SCALE: 1" = 20'
CAVE CREEK ROAD
EDGE OF PAVEMENT
M.L.
1.00' V.N.A.E. BK. 1019, PG. 45
PROPOSED 100YR INUNDATION LIMITS
EXISTING 100YR INUNDATION LIMITS
DRAINAGE EASEMENT
DRAINAGE EASEMENT BK. 654, PG. 28 MCR
LFF88=3032.50 PAD=3031.80
21.00' R/W ABANDONMENT PER DOC. 2009-0154137 MCR
FND 1/2" REBAR & CAP #47373 0.11'N X 0.06'W
EDGE OF DIRT ROAD
50.00' SCENIC CORRIDOR AND PUBLIC ACCESS EASEMENT BK. 1019, PG. 45, MCR
BARB WIRE FENCE
ELECTRIC VALT
TRANSFORMER PAD NO TRANFORMER
ELECTRIC STUB
WATER STUB
100YR INUNDATION LIMITS
N 89°47'36" E 514.47'(R&C)
N 89°47'36" E 2542.93'(M)
20.00' INGRESS AND EGRESS AND PUBLIC UTILITY EASEMENT BK. 654, PG. 28 MCR ABANDONED PER DOC. 2015-0794552 MCR
20.00' PUE BK. 1208, PG. 43 RECORDED IN DOC. 2015-0769996 & DOC. 2015-0794552 MCR
EXIST. BARB WIRE FENCE
30.00' INGRESS AND EGRESS AND PUBLIC UTILITY EASEMENT BK. 654, PG. 28 MCR ABANDONED PER DOC. 2015-0794552 MCR
LOT 7 SUMMIT VISTAS BK. 1208, PG. 43 MCR
N 00°02'53" W 128.89'(R&C)
N 79°28'18" E 66.18'(R&C)
Δ=79°30'50" R=18.00' L=24.98'(R&C)
8"PVC
8"DIP
Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

REV.	DATE	DESCRIPTION	CK. BY

CITY OF SCOTTSDALE FIRE STATION
CAVE CREEK ROAD, SCOTTSDALE, AZ

LOCATED IN A PORTION OF NORTHEAST QUARTER OF SECTION 28 T 6 N, R 5 E, G&SRM, MARICOPA COUNTY, SCOTTSDALE, ARIZONA

SHEET TITLE: HEC-RAS RIVER STATION EXHIBIT

PROJECT TITLE

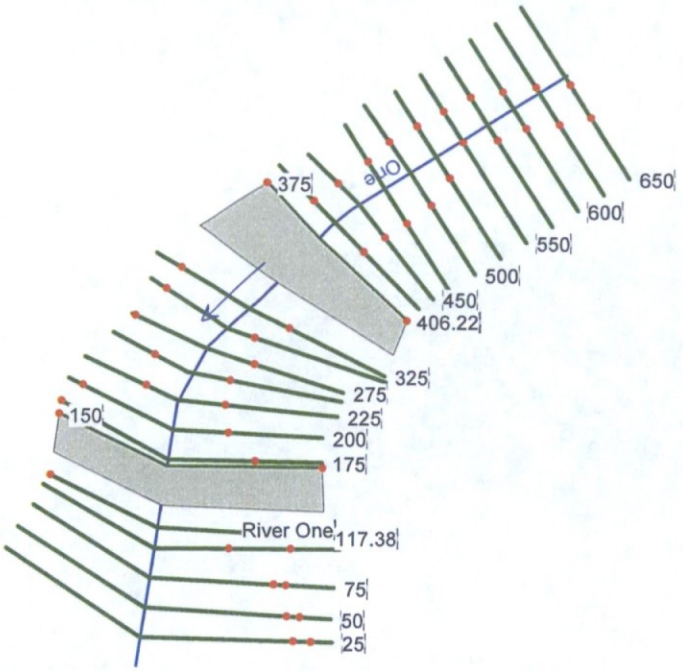
civil engineering • land development surveying • environmental services staking • flood control and drainage transportation

Engineering and Environmental Consultants, Inc.
7740 N. 16th Street, Suite 135 | Phoenix, Arizona 85020
Tel 602.248.7702 | Fax 602.248.7851

DESIGN BY:	JAM
DRAWN BY:	JAM
CHK'D BY:	JMG
DATE:	SEPT. 2017
SCALE:	
EEC NO	16535
DRAWING NO	OF

EXISTING

River One
500
475
450
425
400
325
300
275
250
225
200
175
150
100
75
25
0.5


375
One
650
600
550
500
450
406.22
325
275
225
200
175
150
River One
117.38
75
50
25

PROPOSED

HEC-RAS River: One Reach: River One Profile: Q100

Reach	River Sta	Profile	Plan	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)	
River One	650	Q100	Pro	94.00	3038.99	3039.85	3039.85	3040.10	0.018304	4.20	25.01	53.88	0.94
River One	650	Q100	Ex	94.00	3038.99	3039.85	3039.85	3040.10	0.018357	4.20	24.98	53.86	0.94
River One	625	Q100	Pro	94.00	3037.76	3038.50	3038.50	3038.72	0.017731	3.91	27.55	66.28	0.91
River One	625	Q100	Ex	94.00	3037.76	3038.50	3038.50	3038.72	0.017714	3.91	27.56	66.28	0.91
River One	600	Q100	Pro	94.00	3036.09	3036.84	3036.84	3037.09	0.019788	4.12	24.93	53.37	0.96
River One	600	Q100	Ex	94.00	3036.09	3036.84	3036.84	3037.09	0.019776	4.12	24.94	53.37	0.96
River One	575	Q100	Pro	94.00	3035.17	3035.75	3035.75	3035.99	0.020887	4.01	24.56	52.57	0.97
River One	575	Q100	Ex	94.00	3035.17	3035.75	3035.75	3035.99	0.020620	4.00	24.66	52.60	0.97
River One	550	Q100	Pro	94.00	3033.96	3034.73	3034.73	3034.99	0.017091	4.25	24.59	49.22	0.91
River One	550	Q100	Ex	94.00	3033.96	3034.73	3034.73	3034.99	0.017160	4.26	24.56	49.19	0.92
River One	525	Q100	Pro	94.00	3033.01	3033.91	3033.91	3034.15	0.023626	3.94	24.09	54.40	1.01
River One	525	Q100	Ex	94.00	3033.01	3033.91	3033.91	3034.15	0.023577	3.94	24.10	54.43	1.01
River One	500	Q100	Pro	94.00	3032.52	3033.08	3033.08	3033.28	0.023480	3.61	26.18	65.71	0.99
River One	500	Q100	Ex	94.00	3032.52	3033.08	3033.08	3033.28	0.024338	3.65	25.90	65.65	1.01
River One	475	Q100	Pro	94.00	3031.62	3032.17	3032.17	3032.38	0.024328	3.69	25.57	62.19	1.01
River One	475	Q100	Ex	94.00	3031.62	3032.18	3032.18	3032.39	0.024062	3.69	25.64	62.90	1.00
River One	450	Q100	Pro	94.00	3030.70	3031.42	3031.42	3031.63	0.023932	3.70	25.63	63.42	1.00
River One	450	Q100	Ex	94.00	3030.70	3031.41	3031.41	3031.62	0.023924	3.68	25.98	65.58	1.00
River One	425	Q100	Pro	94.00	3029.34	3030.10	3030.10	3030.35	0.023093	4.00	23.54	48.81	1.01
River One	425	Q100	Ex	94.00	3029.67	3030.24	3030.24	3030.44	0.023835	3.58	26.51	68.16	0.99
River One	406.22	Q100	Pro	94.00	3027.22	3028.48	3028.48	3028.84	0.020912	4.79	19.64	28.05	1.01
River One	400	Q100	Ex	94.00	3028.33	3029.25	3029.25	3029.43	0.016880	3.56	29.96	89.81	0.87
River One	375			Culvert									
River One	375	Q100	Ex	94.00	3026.83	3027.88	3027.88	3028.09	0.014707	3.79	27.95	96.32	0.84
River One	345.11	Q100	Ex	94.00	3025.60	3026.35	3026.35	3026.57	0.024518	3.82	24.62	56.98	1.02
River One	325	Q100	Pro	94.00	3025.64	3026.13	3026.13	3026.33	0.025308	3.51	26.79	71.20	1.01
River One	325	Q100	Ex	94.00	3024.96	3025.78	3025.78	3025.96	0.016019	3.38	30.36	120.72	0.84
River One	300	Q100	Pro	94.00	3024.96	3025.42	3025.42	3025.59	0.028976	3.26	28.56	90.95	1.04
River One	300	Q100	Ex	94.00	3024.44	3025.28	3025.28	3025.42	0.011901	3.32	37.42	153.38	0.75
River One	275	Q100	Pro	94.00	3023.67	3024.32	3024.32	3024.48	0.027042	3.23	29.25	95.48	1.01
River One	275	Q100	Ex	94.00	3023.58	3024.19	3024.19	3024.33	0.019916	3.51	32.74	121.76	0.92
River One	250	Q100	Pro	94.00	3022.00	3022.88	3022.88	3023.14	0.022460	4.13	22.76	43.46	1.01
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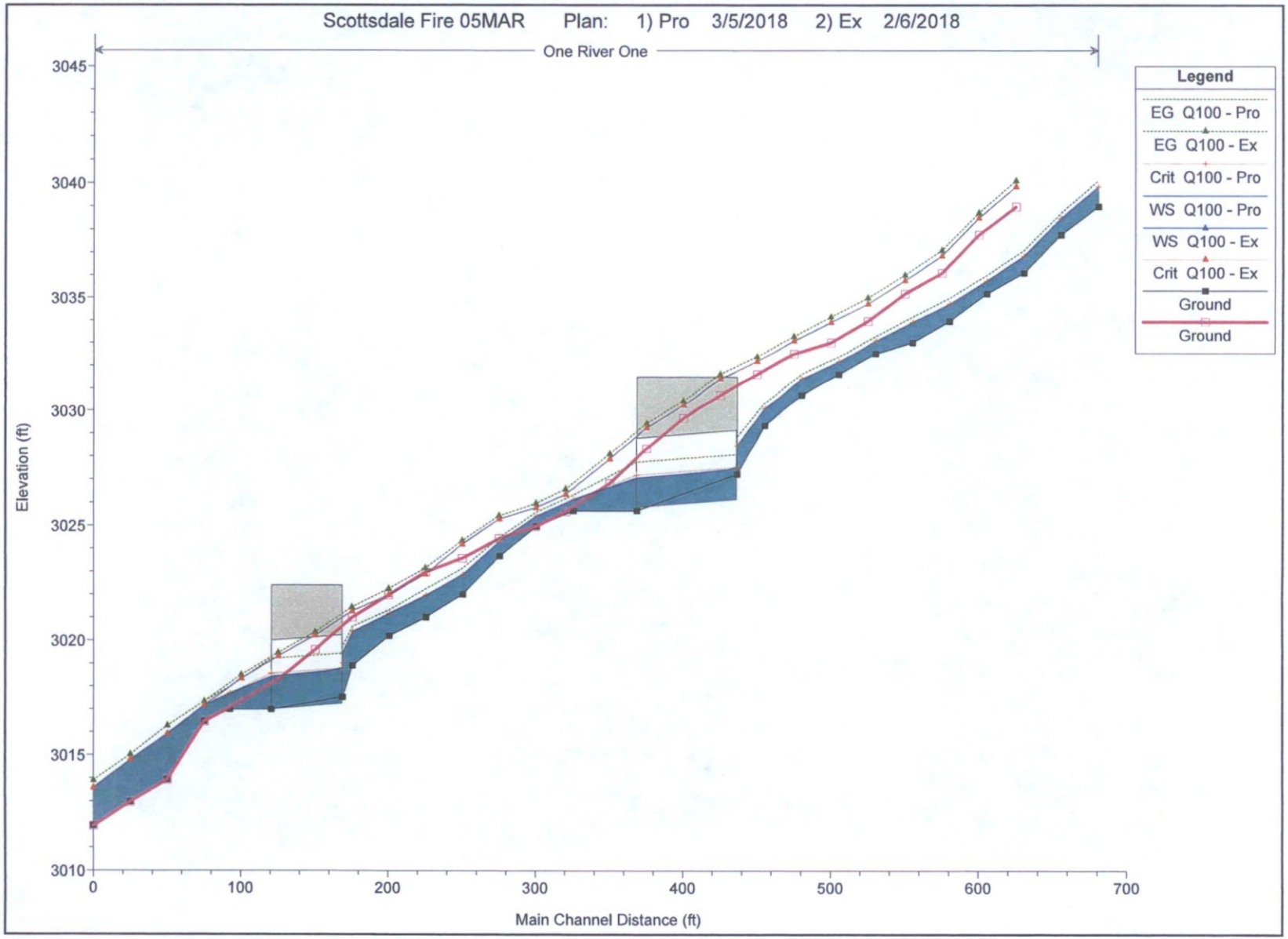
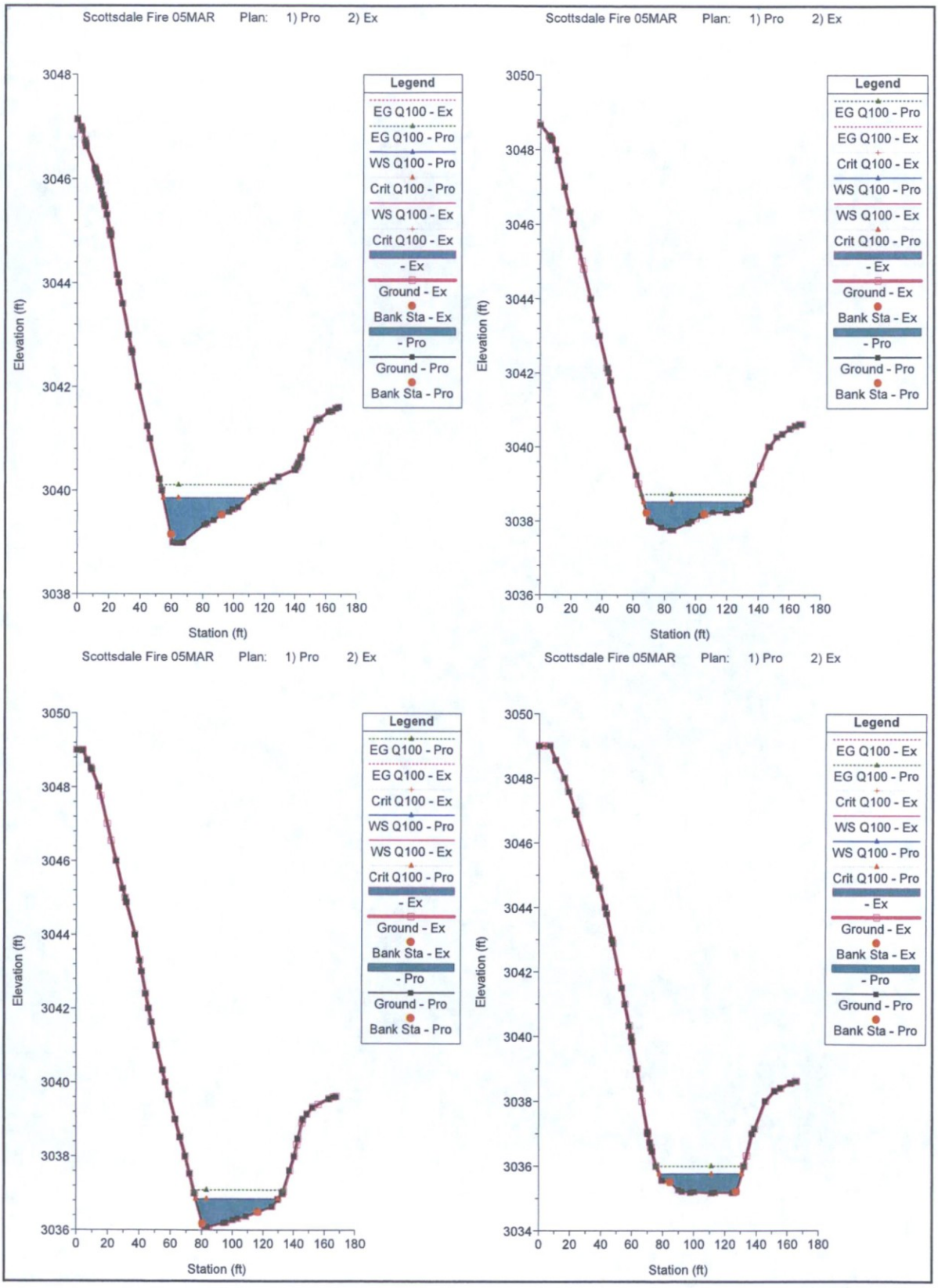
River One	225	Q100	Pro	94.00	3021.00	3021.96	3021.96	3022.23	0.022049	4.18	22.52	44.57	1.00
River One	225	Q100	Ex	94.00	3021.97	3021.97	3021.97	3022.24	0.021395	0.08	22.79	49.55	0.37
River One	200	Q100	Pro	94.00	3020.19	3021.17	3021.17	3021.31	0.028737	3.06	30.70	110.52	1.02
River One	200	Q100	Ex	94.00	3021.00	3021.26	3021.26	3021.43	0.017197	2.10	29.01	147.58	0.77
River One	175	Q100	Pro	94.00	3018.90	3020.39	3020.39	3020.60	0.024966	3.74	25.15	59.04	1.01
River One	175	Q100	Ex	94.00	3019.59	3020.22	3020.22	3020.36	0.017962	3.48	33.37	166.14	0.89
River One	168.94	Q100	Pro	94.00	3017.52	3019.46	3019.03	3019.73	0.008096	4.18	22.50	16.01	0.62
River One	150			Culvert									
River One	150	Q100	Ex	94.00	3018.30	3019.30	3019.30	3019.46	0.010826	3.61	35.31	178.38	0.74
River One	125	Q100	Ex	94.00	3017.35	3018.34	3018.34	3018.49	0.015139	3.60	33.91	125.74	0.84
River One	117.38	Q100	Pro	94.00	3016.98	3017.70	3017.70	3017.98	0.024636	4.28	21.98	39.63	1.01
River One	100	Q100	Pro	94.00	3016.46	3017.17	3017.17	3017.34	0.016784	3.44	31.53	104.50	0.86
River One	100	Q100	Ex	94.00	3016.46	3017.17	3017.17	3017.34	0.017121	3.45	30.65	100.94	0.87
River One	75	Q100	Pro	94.00	3013.94	3015.93	3015.93	3016.26	0.008858	5.11	26.00	49.54	0.74
River One	75	Q100	Ex	94.00	3013.94	3015.90	3015.90	3016.27	0.009795	5.31	24.68	46.70	0.78
River One	50	Q100	Pro	94.00	3012.98	3014.80	3014.80	3015.02	0.006736	4.34	34.78	75.15	0.64
River One	50	Q100	Ex	94.00	3012.98	3014.80	3014.80	3015.02	0.006721	4.34	34.81	75.16	0.64
River One	25	Q100	Pro	94.00	3011.94	3013.58	3013.58	3013.90	0.011880	4.88	24.92	49.60	0.82
River One	25	Q100	Ex	94.00	3011.94	3013.58	3013.58	3013.90	0.011891	4.88	24.91	49.56	0.82



HEC-RAS PROFILE


Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
Station (ft)
Legend
EG Q100 - Ex
EG Q100 - Pro
WS Q100 - Pro
Crit Q100 - Pro
WS Q100 - Ex
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- Ex
Ground - Ex
Bank Sta - Ex
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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Legend
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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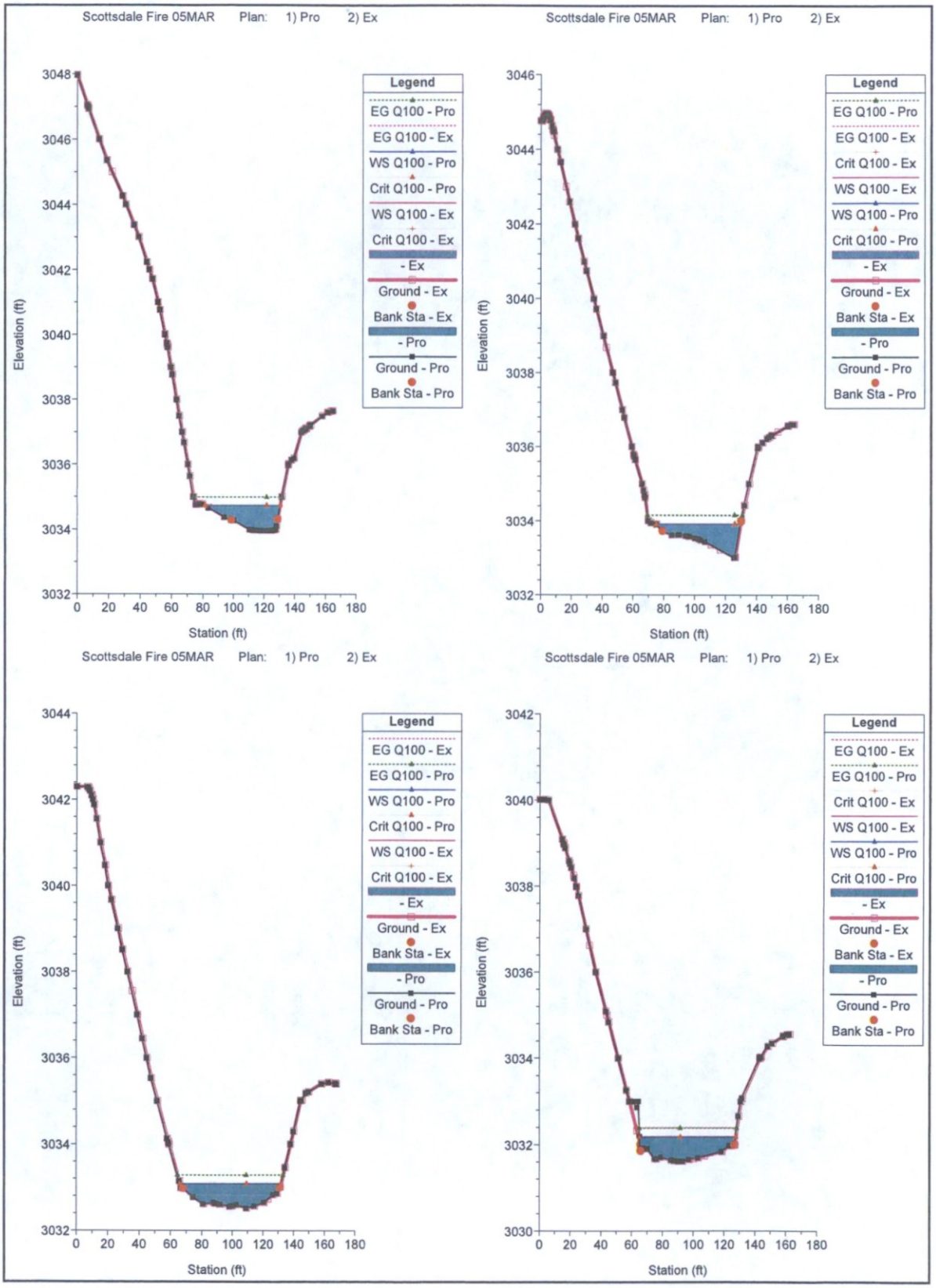
Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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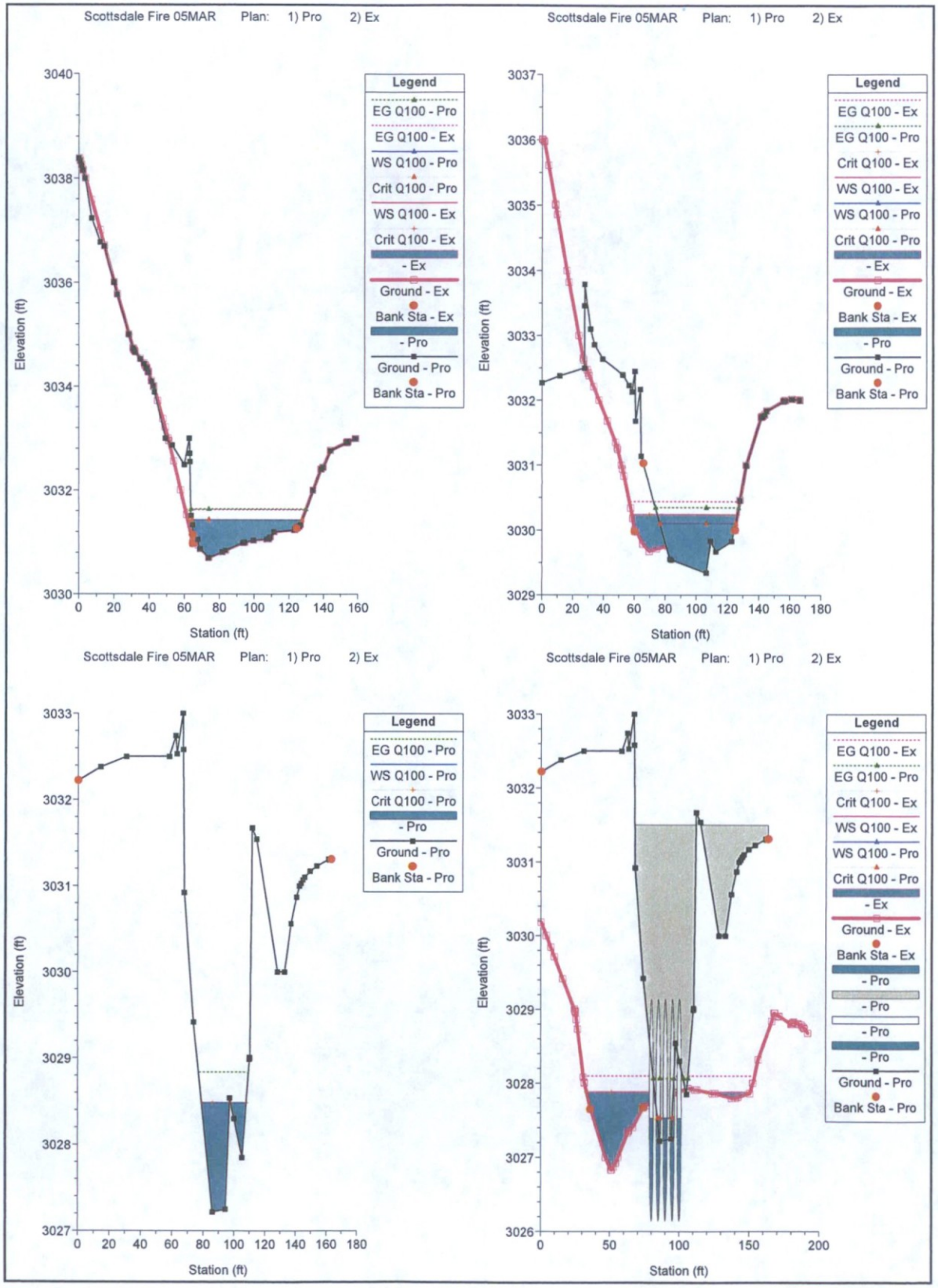
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
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Crit Q100 - Pro
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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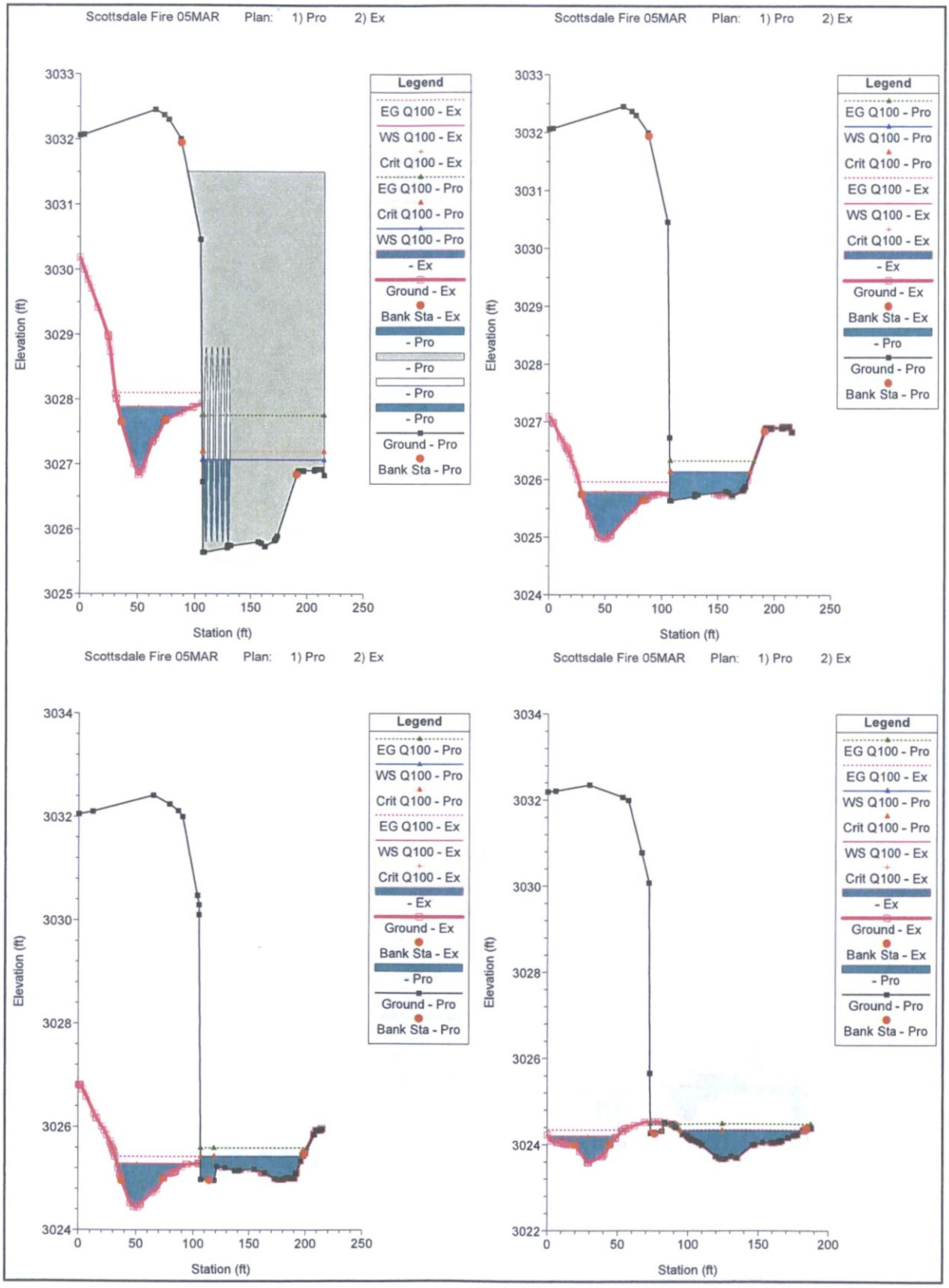
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Elevation (ft)
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Legend
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
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Legend
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
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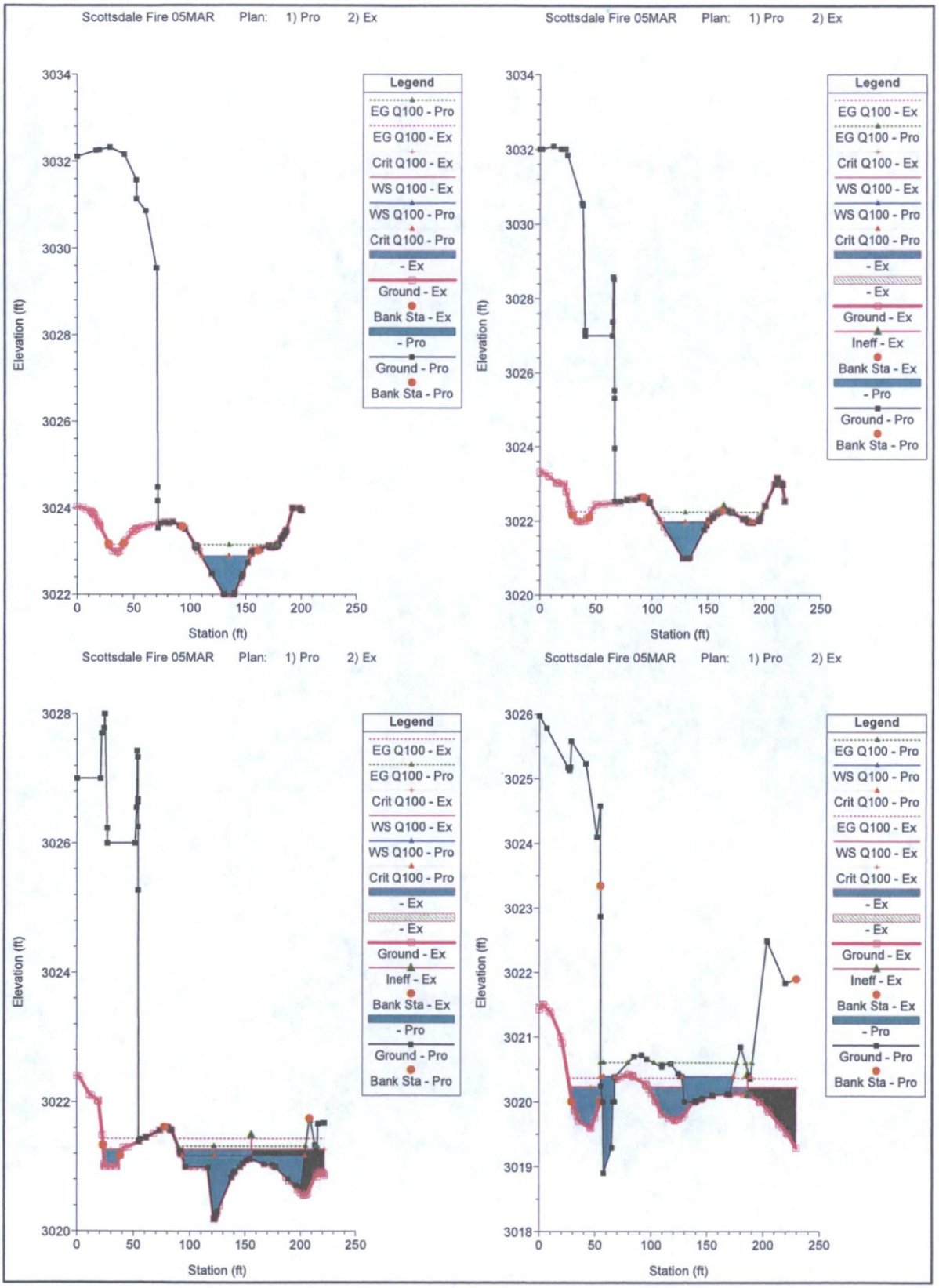
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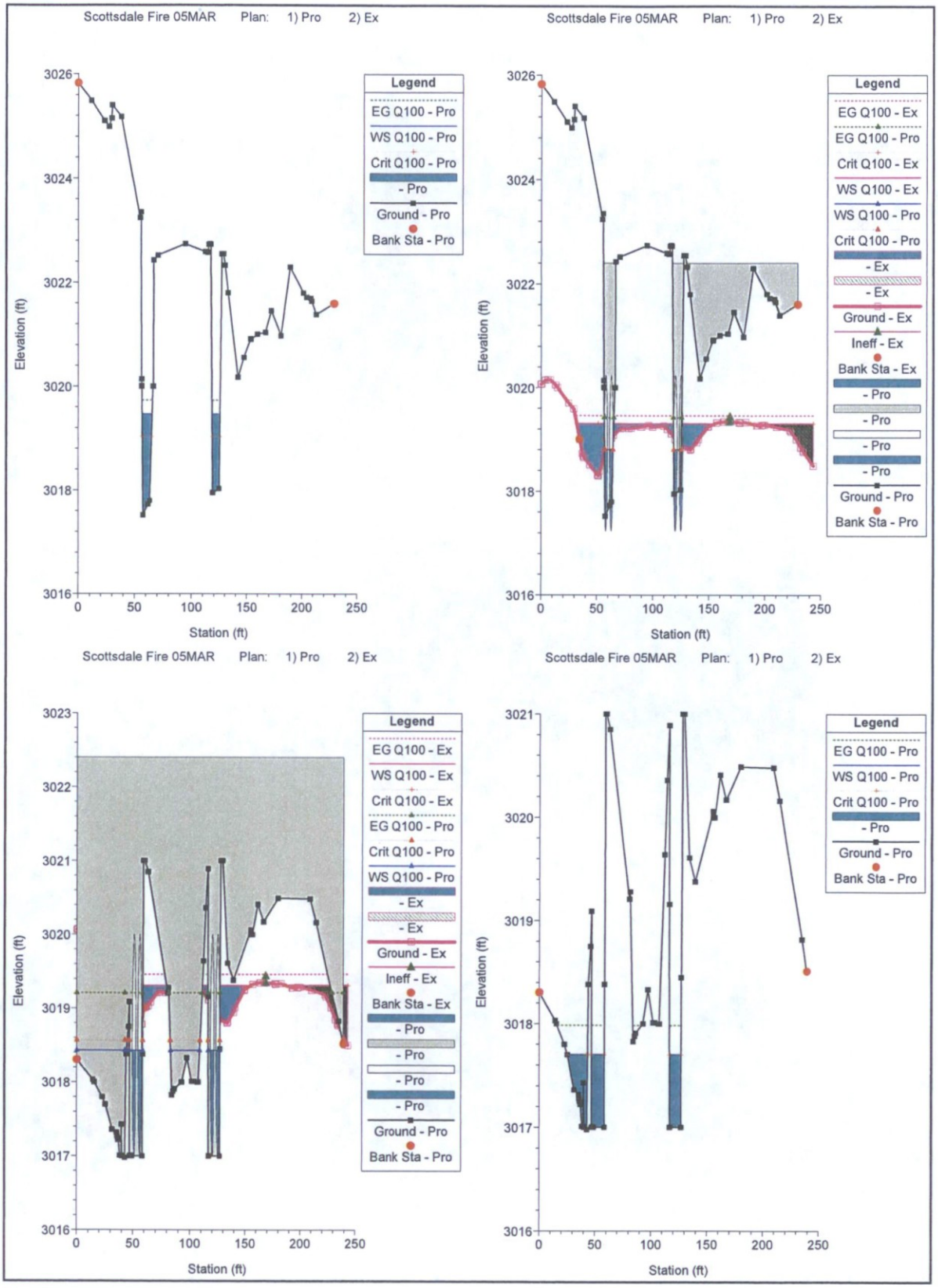
- Pro
Ground - Pro
Bank Sta - Pro
Ineff - Ex


Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
Station (ft)
Legend
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WS Q100 - Pro
Crit Q100 - Pro
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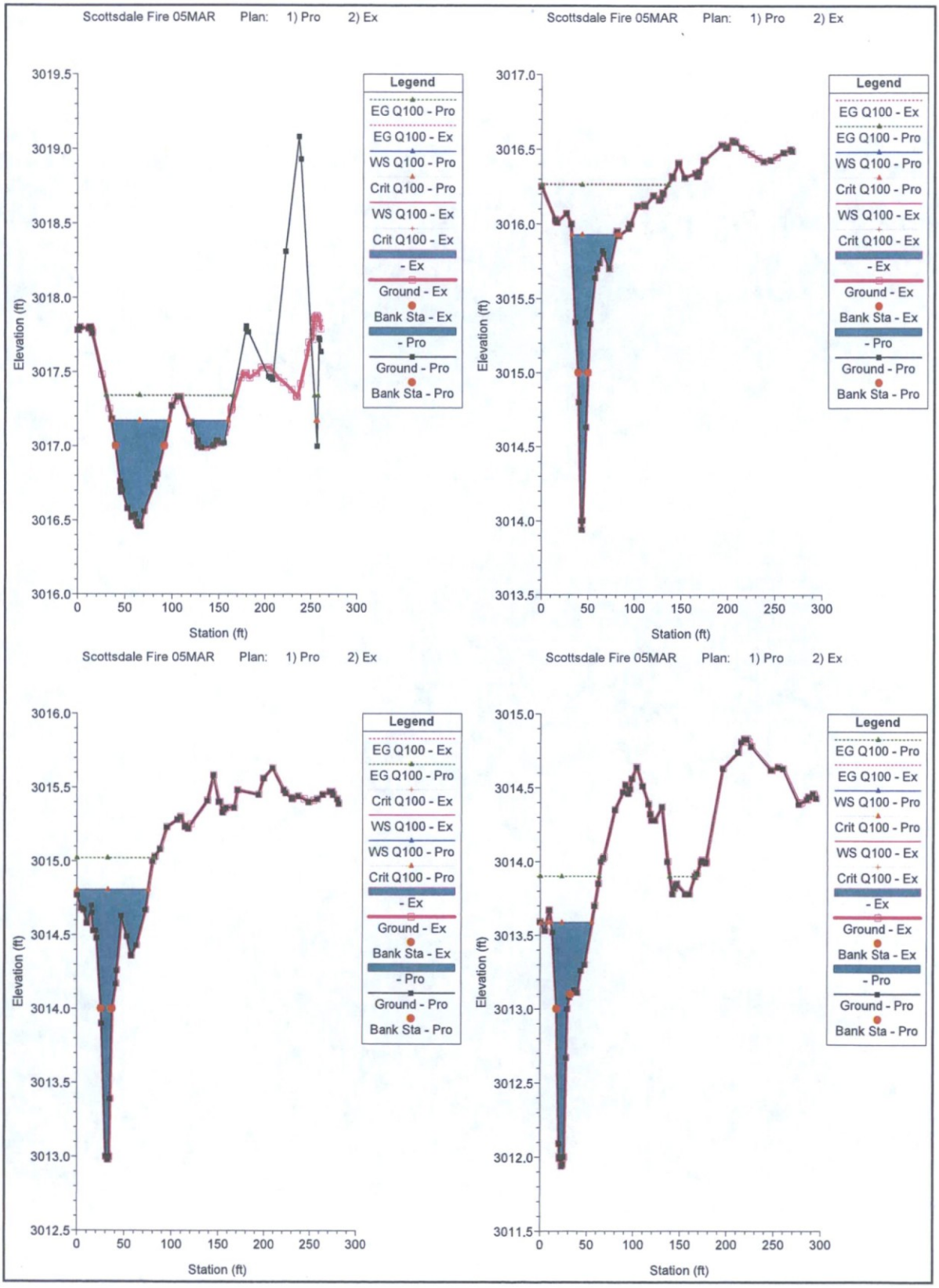
Ground - Pro
Bank Sta - Pro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Elevation (ft)
Station (ft)
Legend
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
Station (ft)
Legend
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EG Q100 - Pro
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Elevation (ft)
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Scottsdale Fire 05MAR Plan: 1) Pro 2) Ex
Elevation (ft)
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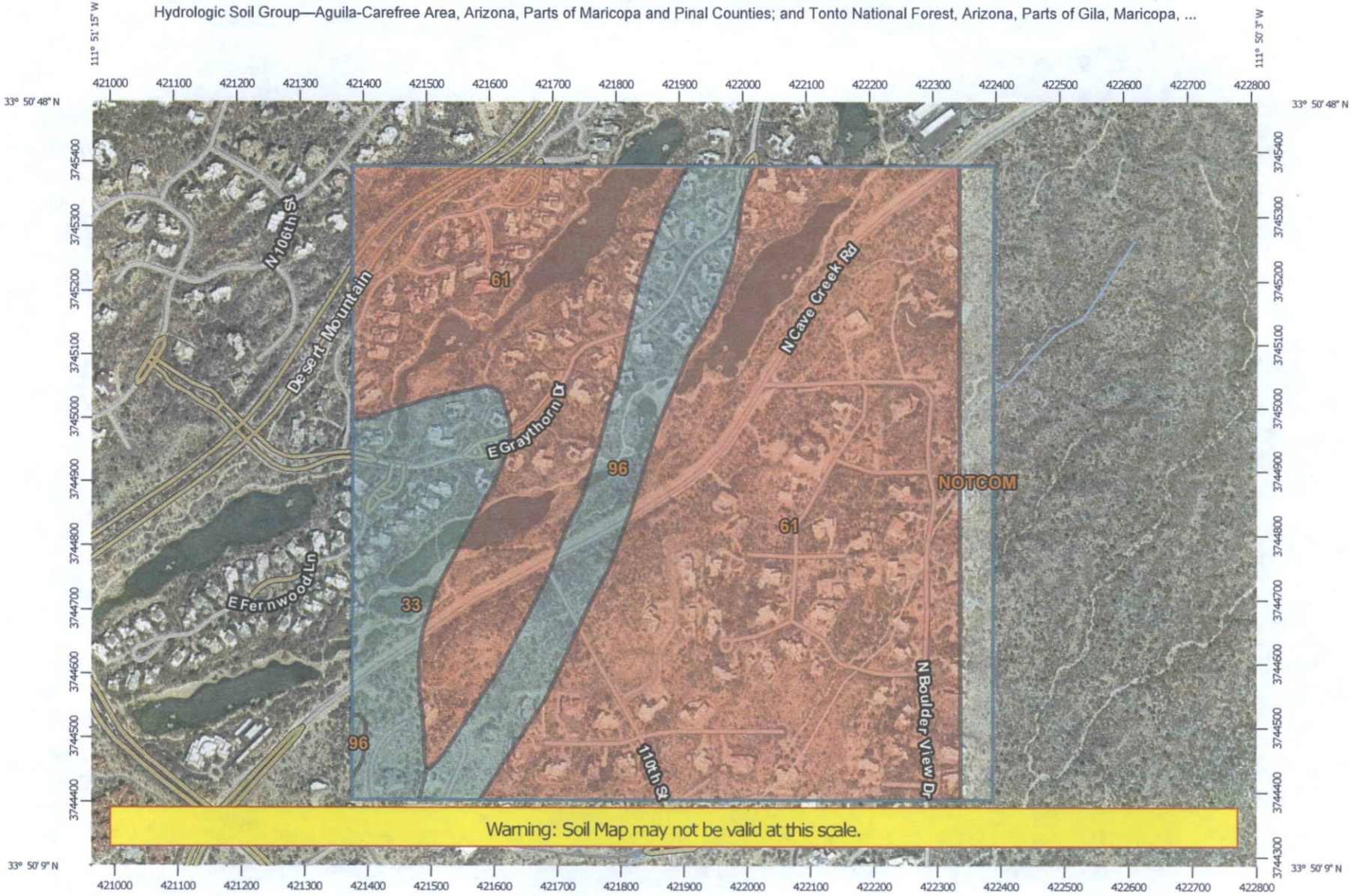

Map Scale: 1:8,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties
Survey Area Data: Version 10, Oct 1, 2015

Soil Survey Area: Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties
Survey Area Data: Version 4, Oct 1, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 1, 2010—Nov 27, 2010

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties (AZ645)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
33	Eba very gravelly loam, 1 to 8 percent slopes	C	23.9	9.6%
61	Gran-Wickenburg complex, 1 to 10 percent slopes	D	186.6	74.9%
96	Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes	C	25.5	10.2%
Subtotals for Soil Survey Area			**236.0**	**94.8%**
Totals for Area of Interest			**249.0**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — Tonto National Forest, Arizona, Parts of Gila, Maricopa, Pinal and Yavapai Counties (AZ687)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
NOTCOM	No Digital Data Available		13.0	5.2%
Subtotals for Soil Survey Area			**13.0**	**5.2%**
Totals for Area of Interest			**249.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

ScottsdaleFire.rep

HEC-RAS Version 4.1.0 Jan 2010
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
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PROJECT DATA
Project Title: Scottsdale Fire
Project File : ScottsdaleFire.prj
Run Date and Time: 12/11/2017 1:55:13 PM

Project in English units

PLAN DATA

Plan Title: Existing
Plan File : x:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire.p01

Geometry Title: Existing
Geometry File : x:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire.g01

Flow Title : Existing
Flow File : x:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire.f01

Plan Summary Information:

Number of:	Cross Sections	= 21	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: Existing
Flow File : x:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire.f01

Flow Data (cfs)

River	Reach	RS	Q100	Q10	Q2
One	River One	500	94	45	25

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
One	River One	Q100		

Normal S = 0.04

GEOMETRY DATA

Geometry Title: Existing
Geometry File : x:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire.g01

CROSS SECTION

RIVER: One
REACH: River One RS: 500

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3040.93	3.900002	3040.43	7.299995	3040	12.5	3039.26	14.66	3039
17.08	3038.98	17.59	3038.97	18	3038.98	21.97	3038.97	28.11	3039
32.8	3039.11	32.81	3039.11	32.85	3039.11	33.25	3039.11	38.61	3039.17
41.09	3039.21	50.38	3039.31	51.18	3039.32	57.49	3039.38	63.26	3039.53
66.00999	3039.59	71.59	3039.66	75	3039.71	76.95	3039.74	80.05	3039.77
91.38	3039.91	92.27	3039.95	93.22	3040	93.23	3040	93.52	3040.03
103.06	3040.97	103.96	3041	113.66	3041.19	114.36	3041.2	114.39	3041.2
118.57	3041.27	122.22	3041.3	122.35	3041.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	12.5	.035	51.18	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12.5	51.18	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3039.90	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3039.67	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3039.67	Flow Area (sq ft)	0.60	21.77
3.87				
E.G. Slope (ft/ft)	0.018911	Area (sq ft)	0.60	21.77
3.87				
Q Total (cfs)	94.00	Flow (cfs)	1.06	86.60
6.34				
Top Width (ft)	62.84	Top Width (ft)	2.90	38.68
21.26				
Vel Total (ft/s)	3.58	Avg. Vel. (ft/s)	1.77	3.98
1.64				
Max Chl Dpth (ft)	0.70	Hydr. Depth (ft)	0.21	0.56
0.18				
Conv. Total (cfs)	683.6	Conv. (cfs)	7.7	629.7
46.1				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	2.93	38.70
21.26				
Min Ch El (ft)	3038.97	Shear (lb/sq ft)	0.24	0.66
0.21				
Alpha	1.15	Stream Power (lb/ft s)	122.35	0.00
0.00				
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	0.08	0.22
0.26				
C & E Loss (ft)	0.01	Cum SA (acres)	0.22	0.39
0.53				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 475

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3041.64	3.470001	3041	9.639999	3040.11	10.42	3040	11.54	3039.83
17.37	3039	19.63	3038.67	21.3	3038.41	23.74	3038	25.38	3037.75
25.53	3037.74	25.79	3037.74	26.18999	3037.73	31.54	3037.57	35.3	3037.51
37.91	3037.5	45.25	3037.63	49.71	3037.64	54.83	3037.78	56.2	3037.79
58.19	3037.83	60.28	3037.84	62.4	3037.86	72.55	3037.83	75	3037.84
81.25	3037.87	83.05	3037.9	84.5	3037.98	84.84	3037.98	85.1	3037.98

85.39999	3037.99	85.73	3037.99	85.83	3037.99	86.11	3037.99	86.24	3037.99
86.39	3037.99	86.52	3038	86.56	3038	86.64	3038	86.7	3038
86.72	3038	86.74	303886.75999		3038	86.92	3038.01	92.29	3039
98.42	3039.6	98.46	3039.6	98.5	3039.61	99.5	3039.69	100.16	3039.74
100.97	3039.78	101.04	3039.79	101.23	3039.8	101.43	3039.82	102.74	3039.9
102.84	3039.91	102.93	3039.92	102.99	3039.92	104.45	3040	104.69	3040
105.32	3040.01	105.73	3040.01	109.44	3040.1	115.44	3040.24	115.5	3040.24
119.74	3040.29	120.17	3040.29						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	25.38	.035	83.05	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
25.38	83.05	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3038.36	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3038.15	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3038.15	Flow Area (sq ft)	0.53	24.66
0.76				
E.G. Slope (ft/ft)	0.023782	Area (sq ft)	0.53	24.66
0.76				
Q Total (cfs)	94.00	Flow (cfs)	1.04	91.65
1.30				
Top Width (ft)	64.87	Top Width (ft)	2.55	57.67
4.65				
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)	1.98	3.72
1.71				
Max Chl Dpth (ft)	0.65	Hydr. Depth (ft)	0.21	0.43
0.16				
Conv. Total (cfs)	609.5	Conv. (cfs)	6.8	594.3
8.4				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	2.58	57.68
4.66				
Min Ch El (ft)	3037.50	Shear (lb/sq ft)	0.30	0.63
0.24				
Alpha	1.03	Stream Power (lb/ft s)	120.17	0.00
0.00				
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	0.08	0.20
0.26				
C & E Loss (ft)	0.00	Cum SA (acres)	0.22	0.36
0.52				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 450

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3042.24.5199966	3042.111.059998		30421.529999		3041.91		5.93	3041
8.529999	3040.56	11.67	3040	15.7	3039.39	18.09	3039	24.18	3038.07
24.65	3038	30.83	3037.01	30.86	3037	30.96	3036.98	30.97	3036.98
30.98	3036.98	31.01	3036.98	37.07	3036	37.22	3036	39.66	3035.98
40.85	3035.96	42.03	3035.95	43.14	3035.93	47.4	3035.97	49.2	3035.93
49.6	3035.93	58.65	3035.99	58.81	3035.99	60.2	3036	71.68	3036.13
74.05	3036.16	74.99	3036.21	75	3036.21	76.78	3036.31	86.35	3036.49
86.5	3036.52	86.75	3036.5487.50999		3036.6	88.5	3036.71	90.1	3037
92.68	3037.47	95.59	3038	102.39	3038.85	102.46	3038.85	102.52	3038.86
102.71	3038.87	106.2	3039	115.3	3039.2	115.35	3039.21	120.1	3039.27
121.21	3039.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	37.07	.035	74.99	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
37.07	74.99	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3036.82	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.24	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3036.58	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3036.58	Flow Area (sq ft)	1.03	21.53
2.30				
E.G. Slope (ft/ft)	0.019593	Area (sq ft)	1.03	21.53
2.30				
Q Total (cfs)	94.00	Flow (cfs)	2.33	87.74
3.93				
Top Width (ft)	53.73	Top Width (ft)	3.57	37.92
12.24				
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)	2.25	4.07
1.71				
Max Chl Dpth (ft)	0.65	Hydr. Depth (ft)	0.29	0.57
0.19				
Conv. Total (cfs)	671.5	Conv. (cfs)	16.6	626.8
28.1				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	3.62	37.92
12.25				
Min Ch El (ft)	3035.93	Shear (lb/sq ft)	0.35	0.69
0.23				
Alpha	1.10	Stream Power (lb/ft s)	121.21	0.00
0.00				
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	0.08	0.19
0.26				
C & E Loss (ft)	0.00	Cum SA (acres)	0.22	0.33
0.52				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 425

INPUT
Description:
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3043.45	2.32	30435.290001	3042.39	7.18	3042	11.68	3041.08	
12.02	3041	12.39	3040.9	15.61	3040.14	16.2	3040	18.64	3039.35
19.96	3039	23.47	3038.04	23.61	3038	23.64	3037.99	27.29	3037
27.35	3036.98	30.94	3036	31.79	3035.76	32.45	3035.56	32.83	3035.43
32.99	3035.43	33.76	3035.38	34.7	3035.3	34.98	3035.24	35.37	3035.16
35.57	3035.12	36.12	3035.05	42.24	3035	43.78	3034.97	47.39	3034.99
48.43	3034.97	54.13	3034.96	54.77	3034.94	68.01	3034.9	68.09	3034.9
68.22	3034.9	68.52	3034.9	69.04	3034.89	75	3034.9	81.19	3034.9
83.28	3034.99	83.54	3034.99	83.93	3034.99	84.29	3035	84.78	3035
85.62	3035.17	86.36	3035.36	88.28	303690.49001		3036.42	93.47	3037
102.37	3037.88	103.3	3038	104.14	3038.04	104.65	3038.06	116.36	3038.38
116.41	3038.38	116.51	3038.38	120.48	3038.44	120.79	3038.44		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	35.57	.035	85.62	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
35.57	85.62	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3035.66	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.24	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3035.42	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3035.42	Flow Area (sq ft)	0.28	23.79
0.12				
E.G. Slope (ft/ft)	0.023104	Area (sq ft)	0.28	23.79
0.12				
Q Total (cfs)	94.00	Flow (cfs)	0.37	93.46
0.18				
Top Width (ft)	53.45	Top Width (ft)	2.47	50.05
0.93				
Vel Total (ft/s)	3.89	Avg. Vel. (ft/s)	1.31	3.93

1.43				
Max Chl Dpth (ft)	0.53	Hydr. Depth (ft)	0.11	0.48
0.13				
Conv. Total (cfs)	618.4	Conv. (cfs)	2.4	614.9
1.2				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	2.50	50.07
0.96				
Min Ch El (ft)	3034.89	Shear (lb/sq ft)	0.16	0.69
0.18				
Alpha	1.02	Stream Power (lb/ft s)	120.79	0.00
0.00				
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	0.08	0.18
0.26				
C & E Loss (ft)	0.00	Cum SA (acres)	0.21	0.31
0.51				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 400

INPUT
Description:
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3040.724.900002		30407.729996	3039.489.839996		3039		12.5	3038.38
14.15	3038	15.5	3037.77	16.14	3037.66	17.56	3037.38	17.85	3037.33
18.21	3037.28	18.34	3037.25	18.47	3037.23	18.56	3037.21	19.34	3037
22.57	3036.12	23.02	3036	26.12	3035.1	26.47	3035	31.32	3034.29
32.23	3034.31	37.57	3034.37	42.53	3034.36	53.12	3034.11	54.75	3034.06
55.49	3034.05	55.78	3034.05	57.6	3034	68.19	3033.88	73.94	3033.88
74.69	3033.88	75	3033.88	80.86	3033.97	82.61	3034	82.83	3034
82.86	3034	82.91	3034	83.03	303483.03999		3034	83.11	3034
83.41	3034.05	83.59	3034.0883.67999		3034.1	83.71	3034.1	83.83	3034.12
83.98	3034.16	84.14	3034.18	88.5	3034.94	88.55	3034.9488.75999		3034.95
89.32	3035	94.11	3035.8	95.29	3036	97.2	3036.3498.00999		3036.48
99.3	3036.72	100.78	3036.98	100.92	3037	101.11	3037.01	101.28	3037.01
101.35	3037.01	102.01	3037.02	103.61	3037.02	108.88	3037.23	114.91	3037.4
114.98	3037.41	115.02	3037.41	117.69	3037.46	118.42	3037.46		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	53.12	.035	84.14	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
53.12	84.14	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3034.81	Element	Left OB Channel

Right OB				
Vel Head (ft)	0.23	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3034.58	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3034.58	Flow Area (sq ft)	6.51	19.54
0.46				
E.G. Slope (ft/ft)	0.017197	Area (sq ft)	6.51	19.54
0.46				
Q Total (cfs)	94.00	Flow (cfs)	13.36	79.89
0.75				
Top Width (ft)	57.08	Top Width (ft)	23.77	31.02
2.29				
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)	2.05	4.09
1.65				
Max Chl Dpth (ft)	0.70	Hydr. Depth (ft)	0.27	0.63
0.20				
Conv. Total (cfs)	716.8	Conv. (cfs)	101.9	609.2
5.7				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	23.80	31.04
2.32				
Min Ch El (ft)	3033.88	Shear (lb/sq ft)	0.29	0.68
0.21				
Alpha	1.18	Stream Power (lb/ft s)	118.42	0.00
0.00				
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.08	0.17
0.26				
C & E Loss (ft)	0.01	Cum SA (acres)	0.21	0.28
0.51				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 375

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3039.59	5.299988	3039.49	3.190002	30	394.779999	3038.76	.410004	3038.41
6.760002	3038.34	8.190002	3038.02	8.230003	3038.01	8.260002	30388	.310005	3037.99
12.65	3037	16.82	3036.3	18.42	30361	8.49001	3035.99	19.48	3035.77
19.99001	3035.65	22.23	3035	23.37	3034.51	24.84	3034	27.41	3033.94
27.86	3033.93	28.08	3033.93	33.76	3033.89	34.62	3033.89	44.38	3033.68
44.68	3033.67	48.77	3033.61	49.38	3033.6	50.12	3033.59	50.97	3033.57
58.35	3033.43	59.36	3033.41	60.61	3033.38	64.4	3033.29	67.36	3033.21
74.82001	30337	4.85001	3033	75	30337	5.10001	3033	76.69	3032.99
76.96001	3032.99	77.43	3032.99	80.33	30338	1.99001	3033	83.17	3033.28
86.09	3034	90.37	3034.94	90.66	3035	90.83	3035.03	90.86	3035.03
90.9	3035.03	91.01	3035.04	94.86	3035.26	97.35001	3035.38	98.43	3035.42
98.78	3035.42	99.04	3035.42	99.08	3035.42	99.13	3035.42	99.3	3035.43

99.38	3035.43	99.45	3035.43	99.58	3035.44	107.35	3035.65	107.72	3035.67
108.27	3035.7	108.94	3035.74	110.41	3035.83	111.14	3035.87	117.94	3035.96
118.36	3035.97	118.47	3035.97	118.57	3035.97	118.77	3035.97	119.01	3035.97
119.36	3035.96	119.78	3035.95	121.33	3035.91				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	58.35	.035	83.17	.04

Bank Sta: Left	Right	Lengths: Left Channel		Right	Coeff Contr.	Expan.
58.35	83.17	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3034.17	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.30	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3033.88	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3033.88	Flow Area (sq ft)	5.29	17.87
0.72				
E.G. Slope (ft/ft)	0.018351	Area (sq ft)	5.29	17.87
0.72				
Q Total (cfs)	94.00	Flow (cfs)	9.98	82.44
1.58				
Top Width (ft)	50.26	Top Width (ft)	23.03	24.82
2.41				
Vel Total (ft/s)	3.94	Avg. Vel. (ft/s)	1.89	4.61
2.20				
Max Chl Dpth (ft)	0.88	Hydr. Depth (ft)	0.23	0.72
0.30				
Conv. Total (cfs)	693.9	Conv. (cfs)	73.7	608.6
11.6				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	23.03	24.86
2.48				
Min Ch El (ft)	3032.99	Shear (lb/sq ft)	0.26	0.82
0.33				
Alpha	1.23	Stream Power (lb/ft s)	121.33	0.00
0.00				
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	0.08	0.16
0.26				
C & E Loss (ft)	0.01	Cum SA (acres)	0.19	0.27
0.51				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 350

INPUT
Description:
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3039.7	2.25	3039.21	3.26001	3039	7.51001	3038.09	7.920006	3038
12.08001	3037.12	12.67001	3037	14.10001	3036.72	17.89001	3036	19.75001	3035.63
22.63	3035.1	23.16	3035.01	23.2	3035	24.97001	3034.66	25.09	3034.64
25.23	3034.62	28.43001	3034	28.49001	3033.99	28.57001	3033.99	29.94	3033.88
40.78001	3033.48	51.23	3033.05	51.85001	3033.03	52.87	3033.01	53.18001	3033
63.13	3032.69	64.06001	3032.67	67.53001	3032.63	74.50001	3032.43	75.00001	3032.42
78.3	3032.48	81.75001	3032.39	82.87001	3032.41	84.12001	3032.43	92.34001	3032.37
94.06001	3032.47	97.11	3032.65	97.43001	3032.69	100.57	3033	100.62	3033
101.37	3033.08	106.22	3033.52	108.62	3033.71	113.2	3034	113.28	3034.01
113.59	3034.01	115.08	3034.08	119.52	3034.27	121.27	3034.27	130.12	3034.28
130.18	3034.28	133.83	3034.24	135.1	3034.22				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	63.13	.035	97.43001	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
63.13	97.43001	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3033.35	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.26	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3033.09	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3033.09	Flow Area (sq ft)	2.63	21.09
0.83				
E.G. Slope (ft/ft)	0.018468	Area (sq ft)	2.63	21.09
0.83				
Q Total (cfs)	94.00	Flow (cfs)	4.59	87.98
1.43				
Top Width (ft)	51.34	Top Width (ft)	12.96	34.30
4.09				
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)	1.74	4.17
1.73				
Max Chl Dpth (ft)	0.72	Hydr. Depth (ft)	0.20	0.61
0.20				
Conv. Total (cfs)	691.7	Conv. (cfs)	33.8	647.4
10.5				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	12.96	34.31
4.11				
Min Ch El (ft)	3032.37	Shear (lb/sq ft)	0.23	0.71
0.23				
Alpha	1.12	Stream Power (lb/ft s)	135.10	0.00
0.00				
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	0.07	0.14
0.26				
C & E Loss (ft)	0.01	Cum SA (acres)	0.18	0.25
0.51				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set

equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 325

INPUT
Description:
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3039.32	1.660004	3039	4.639999	3038.47	7.169998	3038	11.35001	3037.22
12.58	3037	17.51001	3036.03	17.67	3036	17.86	3035.96	18.3	3035.88
21.55	3035.26	23.45	3035	29.42001	3034.16	30.57	3034	31.94	3033.81
37.97	3033	40.81001	3032.61	40.91	3032.61	41.27	3032.6	43.59	3032.54
44.51	3032.5	45.59	3032.46	56.57	3032	63.58	3031.83	65.44	3031.79
68.85001	3031.72	71.79	3031.68	75	3031.67	75.28001	3031.67	81.06001	3031.62
86.95	3031.59	95.75	3031.55	99.51	3031.6	104.43	3031.72	111.34	3032
112.99	3032.31	113.24	3032.32	113.49	3032.32	114.09	3032.33	114.68	3032.34
114.93	3032.34	115.76	3032.33	116.37	3032.35	117.06	3032.38	117.36	3032.39
126.34	3033	126.42	3033.01	126.48	3033.01	126.89	3033.01	127.2	3033.01
131.42	3033.15	132.3	3033.15	142.63	3033.14	142.65	3033.14	142.66	3033.14
147.39	3033.08	150.55	3033.02						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	63.58	.035	104.43	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
63.58	104.43	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3032.40	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3032.17	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3032.17	Flow Area (sq ft)	2.13	21.59
2.22				
E.G. Slope (ft/ft)	0.020215	Area (sq ft)	2.13	21.59
2.22				
Q Total (cfs)	94.00	Flow (cfs)	3.76	85.18
5.06				
Top Width (ft)	59.74	Top Width (ft)	11.07	40.85
7.82				
Vel Total (ft/s)	3.62	Avg. Vel. (ft/s)	1.76	3.95
2.28				
Max Chl Dpth (ft)	0.62	Hydr. Depth (ft)	0.19	0.53
0.28				
Conv. Total (cfs)	661.1	Conv. (cfs)	26.4	599.1
35.6				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	11.08	40.85
7.84				
Min Ch El (ft)	3031.55	Shear (lb/sq ft)	0.24	0.67
0.36				
Alpha	1.11	Stream Power (lb/ft s)	150.55	0.00

0.00					
Frctn Loss (ft)		0.45	Cum Volume (acre-ft)	0.07	0.13
0.25					
C & E Loss (ft)		0.01	Cum SA (acres)	0.18	0.23
0.50					

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 300

INPUT
Description:
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3039.492.830002		30396.389999	3038.338.279999		303811.75999		3037.39	
14.37	303717.32001	3036.56	21.28	303623.25999		3035.73	28.73	3035	
31.77	3034.5936.24001	3034	42.7	3033.13	43.7	303346.57001		3032.61	
50.92	3032	53.24	3031.65	53.27	3031.65	53.35	3031.65	58.31	3031.48
63.41	3031.14	64.33	3031.09	64.39	3031.08	72.02	3031	75	3030.96
75.9	3030.95	76.66	3030.93	86.09	3030.8	88.74	3030.76	92.39	3030.68
98.79	3030.6	105.48	3030.5	112.01	3030.37	113.68	3030.39	115.58	3030.42
123.32	3030.27	123.75	3030.26	124.17	3030.26	129.92	3030.81	131.8	3031
132.32	3031.03	132.5	3031.04	132.56	3031.05	132.7	3031.05	142.22	3031.6
142.36	3031.6	142.48	3031.6	142.55	3031.6	143.39	3031.59	145.46	3031.66
152.92	3031.61	153.97	3031.63	154.34	3031.63	154.73	3031.63	155.93	3031.64
157.13	3031.63	160.3	3031.61	164.75	3031.57	164.8	3031.56	166.05	3031.53
168.62	3031.51	168.69	3031.51	169.61	3031.49	175	3031.34		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	98.79	.035	131.8	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
98.79	131.8	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3031.30	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3031.09	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3031.09	Flow Area (sq ft)	8.07	20.34
0.07				
E.G. Slope (ft/ft)	0.016179	Area (sq ft)	8.07	20.34

0.07				
Q Total (cfs)	94.00	Flow (cfs)	14.49	79.47
0.04				
Top Width (ft)	69.03	Top Width (ft)	34.45	33.01
1.57				
Vel Total (ft/s)	3.30	Avg. Vel. (ft/s)	1.80	3.91
0.59				
Max Chl Dpth (ft)	0.83	Hydr. Depth (ft)	0.23	0.62
0.04				
Conv. Total (cfs)	739.0	Conv. (cfs)	113.9	624.8
0.3				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	34.46	33.05
1.57				
Min Ch El (ft)	3030.26	Shear (lb/sq ft)	0.24	0.62
0.04				
Alpha	1.23	Stream Power (lb/ft s)	175.00	0.00
0.00				
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	0.07	0.12
0.25				
C & E Loss (ft)	0.01	Cum SA (acres)	0.16	0.21
0.50				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 275

INPUT
Description:
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3040.21	1.369995	30	403.779999	3039.68	4.440002	3039.59	5.539993	3039.44
8.199997	3039.05	8.300003	3039.04	8.559998	30	3911.03999	3038.62	12.58	3038.4
15.31	3038	15.97	3037.9	16.48	3037.83	20.57001	3037.21	21.78	3037.03
21.98	3037	23.88	3036.7	24.89	3036.54	28.00999	3036	29.16	3035.79
29.35001	3035.77	31.35001	3035.54	32.10001	3035.44	33.32001	3035.28	35.25999	3035.01
35.33	3035	38.28	3034.59	42.46001	30	3448.89999	3033.09	49.50999	3033
56.17	3032.04	56.48	3032	62.89	3031.08	63.42	30	3163.64999	3030.97
69.89	3030	69.94	3029.97	69.96	3029.97	69.98	3029.97	71.93	3029.95
72.69	3029.95	75	3029.83	76.62	3029.74	80.8	3029.71	89.69	3029.6
95.22	3029.55	101.69	3029.47	107.91	3029.43	114.08	3029.36	123.5	3029.29
126.05	3029.26	128.34	3029.26	128.79	3029	131.81	3029.34	140.54	3029.22
143.73	3029.36	153.51	3029.13	156.72	3029.57	156.94	3029.56	157.41	3029.61
157.84	3029.67	158.15	3029.73	158.58	3029.78	158.77	3029.8	158.84	3029.8
159.11	3029.84	159.29	3029.86	159.42	3029.86	159.66	3029.86	160	3029.84
160.37	3029.79	161.08	3029.86	161.74	3029.81	164.18	3029.74	166.36	3029.72
170.81	3030	170.84	3030	170.9	3030	171.46	3030	173.82	3030
173.84	3030	183.02	3029.76	184.74	3029.8	186.04	3029.82	189.12	3029.77

192 3029.73

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	101.69	.035	156.72	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
101.69	156.72	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3029.95	Element	Left OB	Channel
Vel Head (ft)	0.18	Wt. n-Val.	0.040	0.035
W.S. Elev (ft)	3029.76	Reach Len. (ft)	25.00	25.00
Crit W.S. (ft)	3029.76	Flow Area (sq ft)	3.77	24.87
E.G. Slope (ft/ft)	0.020133	Area (sq ft)	3.77	24.87
Q Total (cfs)	94.00	Flow (cfs)	5.57	88.12
Top Width (ft)	88.27	Top Width (ft)	25.47	55.03
Vel Total (ft/s)	3.24	Avg. Vel. (ft/s)	1.48	3.54
Max Chl Dpth (ft)	0.76	Hydr. Depth (ft)	0.15	0.45
Conv. Total (cfs)	662.5	Conv. (cfs)	39.2	621.0
Length Wtd. (ft)	25.00	Wetted Per. (ft)	25.47	55.16
Min Ch El (ft)	3029.00	Shear (lb/sq ft)	0.19	0.57
Alpha	1.13	Stream Power (lb/ft s)	192.00	0.00
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)	0.07	0.11
C & E Loss (ft)	0.00	Cum SA (acres)	0.15	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 250

INPUT
Description:
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3039.62	4900055	3039.58	7899933	3039.55	1.210007	3039.51	1.740005	3039.44
2	3039.41	2.710007	3039.32	3.770004	3039.18	3.910004	3039.16	4.960007	3039
5.139999	3038.97	5.690002	3038.88	9.419998	3038.26	10.39	3038.09	10.89	3038
14.78999	3037.31	6.49001	303	720.03999	3036.3	21.53	3036	22.44	3035.83
26.99001	3035	31.16	3034.23	32.45	3034	34.17	3033.7	38.16	3033
41.31999	3032.45	42.03999	3032.35	44.94	3032	52.08	3031.19	53.55	3031.03
53.78999	303	160.74001	3030.21	62.53999	3030	66.52	3029.52	70.69	3029
73.28	3028.75	74.42999	3028.72	75	3028.71	75.52	3028.71	76.00999	3028.71
79.21	3028.66	81.45	3028.71	82.57	3028.72	82.86	3028.72	83.16	3028.72
92.65	3028.61	94.97	3028.59	100.89	3028.53	107.16	3028.46	114.72	3028.37
118.64	3028.32	128.83	3028.2	131.5	3028.17	143.59	3028.03	143.94	3028.02
145.75	3028	157.76	3027.84	160.74	3027.81	162.57	3027.81	170.53	3027.79
173.42	3027.94	174.54	3028	174.55	3028	174.57	3028	176.53	3028.15
179.83	3028.29	187.44	3028.7	188.19	3028.69	189.01	3028.67	189.33	3028.66
189.36	3028.66	189.7	3028.65	191.29	3028.61	191.67	3028.61	192.03	3028.61
198	3028.48	198.65	3028.49	199.33	3028.5	201.35	3028.53	203.19	3028.54
204.94	3028.52	205	3028.52	206.14	3028.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	143.59	.035	176.53	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
143.59	176.53	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3028.68	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3028.48	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3028.48	Flow Area (sq ft)	8.61	19.43
1.18				
E.G. Slope (ft/ft)	0.017408	Area (sq ft)	8.61	19.43
1.18				
Q Total (cfs)	94.00	Flow (cfs)	15.64	76.55
1.81				
Top Width (ft)	77.83	Top Width (ft)	38.09	32.94
6.80				
Vel Total (ft/s)	3.22	Avg. Vel. (ft/s)	1.82	3.94
1.53				
Max Chl Dpth (ft)	0.69	Hydr. Depth (ft)	0.23	0.59
0.17				
Conv. Total (cfs)	712.4	Conv. (cfs)	118.6	580.2
13.7				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	38.09	32.95
6.81				
Min Ch El (ft)	3027.79	Shear (lb/sq ft)	0.25	0.64
0.19				
Alpha	1.28	Stream Power (lb/ft s)	206.14	0.00
0.00				
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	0.06	0.09
0.25				

C & E Loss (ft)	0.02	Cum SA (acres)	0.13	0.16	0.49

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 225

INPUT
Description:
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3033.43	4.87999	3033.32	5.970001	3033.27	7.059998	3033.28	9.190002	3033.11
9.580002	3033	15.81	3032.51	22.05	3032	23.5	3031.88	25.33	3031.73
30.28	3031.32	34.19	3031	37.33	3030.74	41.84999	3030.37	41.90999	3030.37
41.95999	3030.36	42.00999	3030.36	42.89999	3030.2	44.14	3030	46.23999	3029.65
48.40999	3029.25	49.86	3029	50.39	3028.91	50.45999	3028.9	51.47	3028.79
54.48999	3028.45	4.95999	3028.35	56.36	3028.25	8.37999	3028	65.51999	3027.46
71.17999	3027	72.95999	3026.9	73.05	3026.89	73.14999	3026.89	74.55	3026.92
75	3026.93	76.03999	3026.95	76.15999	3026.95	77.59999	3027	84.23	3027.23
84.53	3027.24	84.75999	3027.24	86.21999	3027.24	95.77	3027.48	96.43999	3027.49
97.00999	3027.59	97.67999	3027.5	106.01	3027.49	113.12	3027.47	118.78	3027.46
125.55	3027.43	130.98	3027.42	139.53	3027.38	144.22	3027.37	153.68	3027.34
158.31	3027.32	159.47	3027.32	165.7	3027.36	169.33	3027.39	170.82	3027.48
173.21	3027.62	175.95	3027.65	178.32	3027.67	179.9	3028	186.54	3028.42
187.99	3028.42	189.48	3028.4	190.03	3028.39	190.05	3028.39	190.63	3028.38
191.54	3028.37	192.14	3028.37	192.69	3028.39	196.73	3028.34	197.6	3028.36
198.5	3028.38	201.03	3028.44	203.18	3028.47	204.71	3028.46	204.77	3028.46
208.73	3028.43								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.046	5.51999	.035	95.77	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
65.51999	95.77	25	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3027.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.040	0.035	0.040
W.S. Elev (ft)	3027.68	Reach Len. (ft)	25.00	25.00	25.00
Crit W.S. (ft)	3027.68	Flow Area (sq ft)	0.31	14.88	20.26
E.G. Slope (ft/ft)	0.018498	Area (sq ft)	0.31	14.88	20.26
Q Total (cfs)	94.00	Flow (cfs)	0.36	53.52	

40.12					
Top Width (ft)	115.70	Top Width (ft)	2.87	30.25	
82.58					
Vel Total (ft/s)	2.65	Avg. Vel. (ft/s)	1.15	3.60	
1.98					
Max Chl Dpth (ft)	0.79	Hydr. Depth (ft)	0.11	0.49	
0.25					
Conv. Total (cfs)	691.1	Conv. (cfs)	2.6	393.5	
295.0					
Length Wtd. (ft)	25.00	Wetted Per. (ft)	2.88	30.28	
82.59					
Min Ch El (ft)	3026.89	Shear (lb/sq ft)	0.12	0.57	
0.28					
Alpha	1.29	Stream Power (lb/ft s)	208.73	0.00	
0.00					
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	0.06	0.08	
0.25					
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.14	
0.47					

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 200

INPUT
Description:
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3029.027.199997	3029.65	12.47	3029.4	19.25	3029	20.22	3028.95	
31.11	302831.60001	3027.98	31.62	3027.9831.64999		3027.98	31.95	3027.96	
42.53	3027.4546.71001	3027	51.28	3026.72	53.14	3026.64	54.81	3026.57	
66.55	302668.60001	3025.8968.75999		3025.89	68.88	3025.88	68.97	3025.88	
69.02	3025.8869.03999	3025.88	69.06	3025.8869.10001		3025.88	69.17	3025.88	
69.27	3025.89	77.02	3025.63	77.69	3025.62	82.13	3025.59	83.75	3025.62
95.06	3025.79	97.83	3025.85	109.97	3026	111.72	3026.04	112.65	3026.05
113.56	3026.05	115.52	3026.05	118.58	3026.02	118.9	3026.02	121.28	3026
132.58	3025.95	132.93	3025.95	143.96	3025.92	145.27	3025.92	146.6	3025.93
147.46	3025.93	155.6	3026	156.59	3026.02	156.84	3026.02	157.88	3026.01
159.97	3026.01	159.98	3026.01	161.27	3026.01	162.48	3026	163.51	3025.99
169	3025.89	172.46	3025.86	175.68	3025.83	182.6	3025.84	185.16	3025.79
195.77	3025.84	196.81	3025.87	197.92	3025.9	198.04	3025.9	200.16	3026
213.14	3026.63	214.34	3026.69	215.07	3026.7	215.73	3026.71	216.98	3026.71
217.3	3026.72	219.68	3026.69	220.05	3026.7	220.75	3026.71	223.86	3026.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.0468.60001	.035	97.83	.04	

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
68.60001	97.83	25	25	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3026.29	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.12	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3026.16	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3026.16	Flow Area (sq ft)	0.72	13.16
24.17				
E.G. Slope (ft/ft)	0.019622	Area (sq ft)	0.72	13.16
24.17				
Q Total (cfs)	94.00	Flow (cfs)	0.97	45.98
47.05				
Top Width (ft)	140.30	Top Width (ft)	5.39	29.23
105.68				
Vel Total (ft/s)	2.47	Avg. Vel. (ft/s)	1.35	3.49
1.95				
Max Chl Dpth (ft)	0.57	Hydr. Depth (ft)	0.13	0.45
0.23				
Conv. Total (cfs)	671.1	Conv. (cfs)	6.9	328.2
335.9				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	5.40	29.24
105.69				
Min Ch El (ft)	3025.59	Shear (lb/sq ft)	0.16	0.55
0.28				
Alpha	1.29	Stream Power (lb/ft s)	223.86	0.00
0.00				
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)	0.06	0.08
0.23				
C & E Loss (ft)	0.01	Cum SA (acres)	0.11	0.12
0.41				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 175

INPUT
Description:
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3024.09	2.049988	3024.28	10.07999	3025	11.31999	3025.12	13.37999	3025.3
14.12999	3025.35	14.76999	3025.39	20.15999	3025.83	21.09999	3025.84	22.17	3025.84
23.28999	3025.83	23.64999	3025.82	24.01999	3025.82	25.21999	3025.79	29.17999	3025.7
37.42999	3025.47	40.37	3025.42	51.36	3025.13	51.7	3025.12	51.86	3025.12

```
52.00999 3025.1153.25999 3025.05   54.09    3025    54.2    3025   54.62 3024.97
   54.75 3024.9757.29999 3024.79   58.06 3024.74   58.73  3024.758.73999  3024.7
64.12999 3024.45   67.09 3024.4269.96999 3024.43   71.98  3024.5   72.67 3024.52
73.31999 3024.53      75 3024.5885.76999 3024.92   86.37 3024.94    87.2 3024.96
88.14999    3025  100.94  3025.3  102.34 3025.32  103.67 3025.34  104.18 3025.35
  104.53 3025.35  104.95 3025.36   105.5 3025.37  106.29 3025.37  106.79 3025.38
  110.52 3025.46  113.46 3025.51  114.98 3025.51  121.34 3025.56  121.67 3025.56
  129.49 3025.55  132.66 3025.56  139.46 3025.57  140.31 3025.58  141.18 3025.58
  146.25  3025.6  152.53 3025.67  153.79 3025.68  154.17 3025.68  156.06 3025.67
  156.87 3025.68  157.63 3025.68  157.97 3025.68  158.33 3025.68  159.04 3025.68
   159.4 3025.69  160.13 3025.68  160.47 3025.69  161.19 3025.68  164.77 3025.68
  168.76 3025.65  169.59 3025.64  172.89 3025.59  175.07 3025.58  177.16 3025.57
   181.9  3025.6  187.83 3025.52  194.83 3025.59  195.58 3025.62  196.39 3025.65
  196.82 3025.64  203.38    3026  208.36 3026.27  211.01 3026.41  212.48 3026.45
  213.76 3026.49  216.01 3026.51  216.56 3026.52  218.34 3026.52  218.91 3026.53
  219.99 3026.57  225.79 3026.56

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   54.62     .0485.76999     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         54.6285.76999                 25      25      25            .1      .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   21.94 3025.82       F

CROSS SECTION OUTPUT  Profile #Q100


  E.G. Elev (ft)           3025.56    Element                Left OB    Channel
Right OB
  Vel Head (ft)               0.25    Wt. n-Val.               0.040      0.040
  0.040
  W.S. Elev (ft)           3025.30    Reach Len. (ft)          25.00      25.00
  25.00
  Crit W.S. (ft)           3025.30    Flow Area (sq ft)         1.36      20.91
   2.78
  E.G. Slope (ft/ft)      0.021458    Area (sq ft)              9.48      20.91
   2.78
  Q Total (cfs)               94.00    Flow (cfs)                1.99      87.17
   4.84
  Top Width (ft)              69.80    Top Width (ft)           23.26      31.15
  15.39
  Vel Total (ft/s)             3.75    Avg. Vel. (ft/s)          1.46       4.17
   1.74
  Max Chl Dpth (ft)           1.21    Hydr. Depth (ft)          0.14       0.67
   0.18
  Conv. Total (cfs)           641.7    Conv. (cfs)               13.6      595.1
   33.1
  Length Wtd. (ft)            25.00    Wetted Per. (ft)          9.83      31.17
  15.40
  Min Ch El (ft)           3024.42    Shear (lb/sq ft)          0.19       0.90
   0.24
  Alpha                        1.16    Stream Power (lb/ft s)  225.79       0.00
   0.00
  Frctn Loss (ft)              0.38    Cum Volume (acre-ft)      0.06       0.07
   0.23
  C & E Loss (ft)              0.02    Cum SA (acres)            0.10       0.11
   0.38
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 150

INPUT
Description:
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3022.93	1.349976	30231.829987		3023.03	2.809998	3023.08	14.24998	3023.69
20.13998	30242	5.98999	3024.36	26.16998	3024.36	26.39999	3024.36	26.62	3024.36
26.81999	3024.35	27.39999	3024.32	28.56999	3024.36	29.17999	3024.38	29.83998	3024.39
30.39999	3024.39	31.18999	3024.39	35.25999	3024.28	40.65999	3024.26	45.88998	3024.1
50.31999	3024.08	54.35999	3024.04	54.40999	3024.04	54.53999	3024.04	54.76999	3024.04
55.76999	3024.04	57.32999	3024.04	58.68999	3024.03	59.35999	3024.03	59.69998	3024.03
60.62	3024.03	60.63998	3024.03	60.99998	3024.03	61.02998	3024.03	61.37	3024.02
61.49998	3024.02	62.16998	3024.02	62.50999	3024.02	62.60999	3024.02	62.92999	3024.01
63.18999	3024.01	63.37	3024.01	63.45999	3024.01	63.49998	3024.01	63.75999	3024.01
63.92999	3024.01	63.97998	3024.01	64.12999		302464.19998		302464.24998	3024
64.26999		302464.30998		302464.31999		302464.32999		302464.49998	3023.99
64.58998	3023.98	73.37	3023.57	77.03999	3023.41	77.54999	3023.4	77.87	3023.4
78.03999	3023.4	84.70999	3023.55	84.99998	3023.56	85.21999	3023.56	85.37999	3023.56
86.12999	3023.59	86.95999	3023.63	87.09999	3023.63	90.62999	3023.85	90.68999	3023.85
90.77998	3023.86	90.88998	3023.86	93.43999		302495.39999		3024.09	95.49998	3024.09
100.5	3024.29	100.75	3024.29	101.14	3024.3	102.81	3024.35	103.51	3024.37
105.6	3024.4	109.64	3024.48	115.68	3024.58	124.06	3024.64	126.2	3024.66
126.67	3024.65	131.38	3024.66	135.56	3024.65	135.64	3024.65	136.4	3024.64
136.82	3024.63	137.28	3024.62	139.95	3024.54	146.5	3024.55	146.9	3024.53
147.32	3024.52	147.8	3024.51	148.25	3024.5	150.18	3024.5	150.6	3024.5
151.17	3024.49	152.45	3024.48	153.47	3024.48	154.56	3024.46	157.24	3024.41
157.66	3024.4	158.12	3024.4	158.58	3024.4	159.04	3024.41	160.99	3024.45
169.52	3024.28	169.77	3024.28	170.06	3024.29	170.38	3024.29	170.64	3024.28
171.59	3024.28	171.95	3024.26	173.9	3024.28	177.18	3024.33	180.95	3024.22
190.24	3024.34	194.26	3024.3	198.05	3024.32	198.28	3024.32	202.34	3024.36
206.19	3024.36	206.65	3024.35	206.77	3024.35	207.24	3024.35	207.81	3024.35
207.87	3024.35	209	3024.36	209.92	3024.36	211.48	3024.35	212.97	3024.35
213.33	3024.35	218.77	3024.45	219.01	3024.45	221.88	3024.49	224.39	3024.52
225.92	3024.54	235.69	3024.73	236.17	3024.73	236.56	3024.74	238	3024.75
239.37	3024.75	239.54	3024.75	240.63	3024.75	240.68	3024.75	243.71	3024.73
247.56	3024.73	256.39	3024.69	257.17	3024.68	257.94	3024.68	259.8	3024.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	64.58998	.035	90.88998	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
64.58998	90.88998	25	25	25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	29.84	3024.4	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3024.56	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.18	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3024.38	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3024.38	Flow Area (sq ft)	8.06	19.93
6.30				
E.G. Slope (ft/ft)	0.011413	Area (sq ft)	27.77	19.93
6.30				
Q Total (cfs)	94.00	Flow (cfs)	12.47	75.08
6.46				
Top Width (ft)	152.73	Top Width (ft)	62.39	26.30
64.05				
Vel Total (ft/s)	2.74	Avg. Vel. (ft/s)	1.55	3.77
1.03				
Max Chl Dpth (ft)	1.45	Hydr. Depth (ft)	0.24	0.76
0.10				
Conv. Total (cfs)	879.9	Conv. (cfs)	116.7	702.7
60.4				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	33.10	26.32
64.07				
Min Ch El (ft)	3023.40	Shear (lb/sq ft)	0.17	0.54
0.07				
Alpha	1.56	Stream Power (lb/ft s)	259.80	0.00
0.00				
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	0.05	0.05
0.22				
C & E Loss (ft)	0.00	Cum SA (acres)	0.08	0.09
0.36				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 125

INPUT

Description:

Station Elevation Data num= 158

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3020.89.1799927	3020.9	.25	3020.91.769989		3020.993.029999		3021	
3.119995	3021.013.809998	3021.03	5	3021.07	5.5	3021.095.859985		3021.11	
6.089996	3021.126.230011	3021.146.290009		3021.159.880005		3021.310.04999		3021.32	
12.04999	3021.4717.98999	3021.9418.07001		3021.95	18.78	302218.79999		3022	
18.87	302218.95999	302219.00999		3022	19.13	3022	20.7	3022.12	
21.32001	3022.15	31.91	3022.732.39999		3022.72	32.81	3022.73	33.19	3022.74
33.5	3022.74	33.97	3022.73	34.44	3022.72	37.13	3022.83	44.98	3022.86
45.64	3022.8646.25999		3022.87	47.95	3022.8352.21001		3022.6660.75999		3022.72
60.95	3022.6961.25999		3022.6661.57001		3022.65	61.97	3022.6162.10001		3022.61
62.14999	3022.662.24001		3022.665.00999		3022.3465.14999		3022.33	65.56	3022.28
66.00999	3022.23	66.48	3022.18	66.62	3022.17	67.13	3022.12	67.25	3022.11
67.83	3022.07	67.98	3022.0668.10001		3022.0468.17999		3022.04	68.31	3022.03
69.47	3022	69.98	3021.99	74.09	3021.97	75	3021.9778.24001		3021.99
79.83	3022	79.84	3022.03	79.86	3022.03	79.92	3022.0380.64999		3022.04
85.55	3022.52	87.98	3022.66	100.7	3022.88	102.39	3022.91	108.18	3023
116.33	3023.14	117.19	3023.14	126.06	3023.3	129.56	3023.28	132.92	3023.26
136.54	3023.22	142.39	3023	145.61	3022.86	148.92	3022.74	158.37	3022.39
169.86	3022	170.07	3022	170.3	3022	170.57	3022	172.09	3022
172.9	3022	173.17	3022	173.92	3022	175.19	3022	175.42	3022
176.03	3022	176.43	3022	176.47	3022	176.77	3022	177.19	3022
177.4	3022	177.58	3022	177.76	3022	178.17	3022	178.71	3022.03
179.57	3022.08	179.89	3022.1	180.37	3022.13	188.64	3022.62	191	3022.75
196.25	3023	199.44	3023.01	203.49	3023.01	203.53	3023.01	203.55	3023.01
207.11	3023	211.69	3022.95	216.6	3022.93	219.4	3022.95	222.72	3022.98
222.93	3022.99	223.11	3022.99	223.29	3022.99	223.66	3023	223.73	3023
223.76	3023	223.81	3023	225.23	3023.12	229.78	3023.5	234.4	3023.9
235.63	3024	236.17	3024	237.91	3024	238.68	3024	240.35	3024
246.21	3023.17	246.47	3023.15	246.62	3023.14	246.74	3023.13	247.03	3023.11
247.55	3023.09	248.41	3023.05	249.71	3023.01	249.8	3023	249.83	3023
250.07	3023	253.87	3022.99	254.03	3022.99	255.02	3022.94	259.9	3022.86
259.99	3022.86	260.29	3022.87	265.19	3022.86	266.09	3022.87	266.61	3022.87
267.14	3022.86	267.27	3022.86	275	3022.84				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	60.95	.035	85.55	.04	148.92	.035	191	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
65.56	85.55	25	25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	46.22	3022.89	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3022.84	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.	0.035	0.035
0.035				
W.S. Elev (ft)	3022.63	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3022.63	Flow Area (sq ft)	0.63	10.96
14.47				
E.G. Slope (ft/ft)	0.021279	Area (sq ft)	28.18	10.96
14.47				
Q Total (cfs)	94.00	Flow (cfs)	1.16	45.38
47.46				
Top Width (ft)	93.17	Top Width (ft)	34.35	19.99
38.83				

Vel Total (ft/s)	3.61	Avg. Vel. (ft/s)	1.86	4.14	3.28
Max Chl Dpth (ft)	1.74	Hydr. Depth (ft)	0.17	0.55	0.37
Conv. Total (cfs)	644.4	Conv. (cfs)	8.0	311.1	325.4
Length Wtd. (ft)	25.00	Wetted Per. (ft)	3.81	20.05	38.87
Min Ch El (ft)	3021.97	Shear (lb/sq ft)	0.22	0.73	0.49
Alpha	1.06	Stream Power (lb/ft s)	275.00	0.00	0.00
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	0.03	0.05	0.22
C & E Loss (ft)	0.01	Cum SA (acres)	0.05	0.08	0.33

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 100

INPUT
Description:
Station Elevation Data num= 152

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3020.09	4.910004	3020.33	6.579987	3020.4	20.53	3021	23.87	3021.17
30.89999	3021.49	38.02	3021.82	39.50999	3021.87	40.72	3021.9	42.05	3021.92
42.88	3021.95	44.41	3021.95	44.60001	3021.95	44.8	3021.95	48.5	3021.93
49.42	3021.91	49.44	3021.91	49.46001	3021.94	9.49001	3021.95	0.60001	3021.86
63.12	3021.65	63.91	3021.58	64.33	3021.54	64.8	3021.48	66.38	3021.26
66.64999	3021.26	66.66	3021.26	66.67999	3021.26	68.07001	3021	68.17	3020.98
71.21001	3020.94	73.83	3020.89	75	3020.97	6.78999	3020.91	80.89999	3021
80.94	3021	80.95	3021	80.98	3021	83.96001	3021.19	87.47	3021.24
97.84	3021.46	105.96	3021.63	111.27	3021.74	122.9	3021.97	123.18	3021.98
124.56	3022	125.34	3022	125.85	3022	127.28	3022.01	127.3	3022.01
129.23	3022	129.65	3021.99	131.15	3021.95	132.62	3021.91	134.72	3021.83
140.32	3021.63	147.18	3021.35	156.21	3021	157.2	3020.98	158.26	3020.98
158.31	3020.97	158.44	3020.97	161.48	3020.92	162.35	3020.92	165.77	3021
166.15	3021.01	166.24	3021.01	168.76	3021.02	169.2	3021.02	169.57	3021.02
170.05	3021.02	170.2	3021.02	170.65	3021.02	170.8	3021.02	171.19	3021.02
171.31	3021.02	178.37	3021.4	179.47	3021.45	180.17	3021.46	181.55	3021.51
182.19	3021.53	183.03	3021.56	183.61	3021.58	185.39	3021.63	187.37	3021.71

188.7	3021.75	189.05	3021.76	190.64	3021.79	191.97	3021.81	192.71	3021.82
194.29	3021.84	194.82	3021.84	195.33	3021.84	197.05	3021.85	198.84	3021.85
201.21	3021.82	202.95	3021.8	204.69	3021.78	207.29	3021.73	209.47	3021.71
211.19	3021.67	211.52	3021.67	211.9	3021.66	212.25	3021.65	217.3	3021.51
222.93	3021.35	234.71	3021.02	234.89	3021.02	235.02	3021.02	235.03	3021.02
235.15	3021.02	235.57	3021	239.71	3020.91	242.53	3020.91	245.38	3020.92
247.84	3021	253.52	3021.37	253.76	3021.37	254.08	3021.37	254.39	3021.37
254.68	3021.36	255.65	3021.37	256.59	3021.38	256.89	3021.37	257.65	3021.35
258.46	3021.33	259.35	3021.29	259.61	3021.28	260.54	3021.24	262.47	3021.02
262.8	3021.02	263.02	3021.02	263.63	3021.02	263.68	3021.02	263.91	3021.01
264.05	3021.01	264.15	3021.01	264.25	3021	264.34	3021	264.37	3021
264.44	3021	264.49	3021	264.65	3020.98	264.84	3020.96	269.27	3020.79
272.41	3020.68	272.9	3020.67	273.43	3020.65	273.75	3020.64	274.09	3020.63
274.4	3020.63	275	3020.64						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.046	66.6499	.035	83.9600	.04	147.18	.035	178.37	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
66.6499	83.96001	25	25	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	43.78	3021.96	F
197.76	275	3021.86	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3021.73	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.18	Wt. n-Val.	0.040	0.035
0.036				
W.S. Elev (ft)	3021.54	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3021.54	Flow Area (sq ft)	0.36	9.70
18.08				
E.G. Slope (ft/ft)	0.019097	Area (sq ft)	23.59	9.70
44.01				
Q Total (cfs)	94.00	Flow (cfs)	0.53	38.63
54.84				
Top Width (ft)	168.05	Top Width (ft)	34.30	17.31
116.44				
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)	1.47	3.98
3.03				
Max Chl Dpth (ft)	1.45	Hydr. Depth (ft)	0.15	0.56
0.31				
Conv. Total (cfs)	680.2	Conv. (cfs)	3.8	279.6
396.8				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	2.34	17.34
57.68				
Min Ch El (ft)	3020.89	Shear (lb/sq ft)	0.18	0.67
0.37				
Alpha	1.07	Stream Power (lb/ft s)	275.00	0.00
0.00				
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	0.01	0.04
0.20				
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	0.06
0.28				

Warning: The energy equation could not be balanced within the specified number of

iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 75

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3019.31	5.529999	3019.541	7.01001	3020	20.5	3020.13	27.47	3020.39
36.14999	3020.68	37.55	3020.72	38.41	3020.74	39.17999	3020.75	40.62	3020.74
41.08	3020.76	41.78999	3020.77	42.45	3020.78	43.06	3020.78	46.78	3020.73
47.41	3020.72	48.08	3020.71	49.46001	3020.67	49.72	3020.66	50	3020.65
50.58	3020.64	51	3020.61	51.46001	3020.59	52.23	3020.56	60	3020
60.00999	3020	60.02	3020	73.39999	3019.41	73.52	3019.41	74.28	3019.4
75	3019.37	75.00999	3019.377	5.64999	3019.35	80.78999	3019.36	82.58	3019.36
84.96001	3019.5	90.33	3019.829	1.49001	3019.94	92.09	3020	92.13	3020
92.14	3020	92.24001	3020	92.37	3020	92.42	3020	92.47	3020
92.78	3020	93.07001	3020	93.21001	3020	93.38	3020	93.44	3020
93.46001	3020	93.96001	3020.03	96.83	3020.15	105.62	3020.38	111.11	3020.51
116.92	3020.62	117.59	3020.63	118.33	3020.64	119.72	3020.65	120.44	3020.66
121.13	3020.66	121.66	3020.65	126.69	3020.66	127.67	3020.64	128.84	3020.62
129.73	3020.61	130.7	3020.59	131.8	3020.56	135.79	3020.45	141.54	3020.3
148.23	3020.04	148.69	3020.03	149.29	3020	149.52	3020	153.44	3020
154.22	3020	158.02	3020	161	3020.05	164.54	3020.07	166.37	3020.14
174.57	3020.38	175.07	3020.38	175.6	3020.39	175.95	3020.39	181.08	3020.42
186.18	3020.4	188.55	3020.42	189.57	3020.43	189.83	3020.43	190.12	3020.43
190.36	3020.43	199.71	3020.34	200.54	3020.33	204.77	3020.27	215.78	3020.16
217.01	3020.15	221.54	3020.08	221.61	3020.08	225.37	3020	232.65	3019.85
238.72	3019.7	245.31	3019.46	251.31	3019.27	258.93	3019.06	260.64	3019
263.47	3018.86	264.22	3018.81	273.51	3018.31	274.52	3018.25	275	3018.23

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	60	.035	93.46001	.04	141.54	.035	174.57	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
6093.46001		25	25	25	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	43.78	3020.78	F
189.49	275	3020.45	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3020.47	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.22	Wt. n-Val.	0.040	0.035
0.035				
W.S. Elev (ft)	3020.25	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3020.25	Flow Area (sq ft)	0.44	21.56
5.64				
E.G. Slope (ft/ft)	0.015377	Area (sq ft)	11.40	21.56
56.49				
Q Total (cfs)	94.00	Flow (cfs)	0.51	84.61
8.88				
Top Width (ft)	163.84	Top Width (ft)	27.27	33.46
103.12				
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)	1.16	3.92
1.57				
Max Chl Dpth (ft)	2.02	Hydr. Depth (ft)	0.13	0.64
0.16				
Conv. Total (cfs)	758.0	Conv. (cfs)	4.1	682.3
71.6				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	3.50	33.50
34.71				
Min Ch El (ft)	3019.35	Shear (lb/sq ft)	0.12	0.62
0.16				
Alpha	1.22	Stream Power (lb/ft s)	275.00	0.00
0.00				
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.00	0.03
0.17				
C & E Loss (ft)	0.06	Cum SA (acres)	0.02	0.05
0.22				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 50

INPUT
Description:
Station Elevation Data num= 122

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	3019.03	3.540009	3019.14	6.269989	3019.22	16.63	3019.52	22.41	3019.67
26.48	3019.78	28.83	3019.82	29.23	3019.82	29.64999	3019.82	30.72	3019.83
31.75	3019.84	33.92999	3019.76	34.84	3019.75	36.03	3019.73	37.42	3019.68
41.52	3019.58	43.8	3019.52	49.64999	3019.33	60.3	3019.08	60.98	3019
67.81	3018.22	68.03	3018.2	68.22	3018.19	75	3018.01	75.25	3018
77.75	3017.97	79.58	3017.97	79.77	3017.97	80.78999	3017.97	81.02	3017.97
81.74001	3017.98	82.03	3017.98	82.28999	3017.99	82.50999	3017.99	82.53999	3017.99
82.75999	3017.99	82.85001	3017.99	82.91	3018	83	3018	83.03999	3018
83.05	3018	83.14	3018.01	83.67	3018.18	4.25999	3018.12	85.31	3018.24
87.38	3018.48	87.87	3018.53	92.05	3018.63	94.74001	3018.81	96.10001	3018.86
96.94	3018.88	99.09	3018.89	104.34	3018.88	105.91	3018.89	116.11	3018.9
117.15	3018.92	124.47	3018.94	125.09	3018.94	125.46	3018.94	125.88	3018.93
137.93	3018.95	137.96	3018.95	139.29	3018.94	140.14	3018.92	141.25	3018.9
141.66	3018.88	142.27	3018.85	143.71	3018.76	145.36	3018.7	147.14	3018.63
147.33	3018.62	150.37	3018.48	150.62	3018.47	150.87	3018.46	151.04	3018.46
155.16	3018.31	157.74	3018.29	157.89	3018.29	157.99	3018.29	158.04	3018.29
158.07	3018.29	158.17	3018.29	158.42	3018.3	165.48	3018.47	166.12	3018.49
166.82	3018.52	167.3	3018.54	173.44	3018.75	173.84	3018.76	174.26	3018.77
174.64	3018.78	175.77	3018.8	176.68	3018.82	177.02	3018.83	177.37	3018.83
177.75	3018.83	178.72	3018.84	179.12	3018.84	179.54	3018.84	179.97	3018.84
181.29	3018.82	181.74	3018.81	182.72	3018.79	186.76	3018.72	198.02	3018.5
208.58	3018.29	212.85	3018.2	221.52	3018	226.93	3017.84	232.72	3017.66
243.65	3017.31	244.04	3017.3	244.39	3017.28	247.28	3017.27	250.1	3017.27
250.4	3017.29	256.74	3017	259.26	3016.95	260.2	3016.93	260.32	3016.92
272.81	3016.66	275	3016.58						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.04	68.22	.03584	25999	.04	143.71	.035	173.44	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
67.81	87.38	25	25	25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
179.39	275	3018.85	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3018.86	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3018.85	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	3018.85	Flow Area (sq ft)	1.74	15.02
114.89				
E.G. Slope (ft/ft)	0.000420	Area (sq ft)	1.74	15.02
114.89				
Q Total (cfs)	94.00	Flow (cfs)	0.61	10.91
82.48				
Top Width (ft)	166.29	Top Width (ft)	5.52	19.57
141.20				
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.35	0.73
0.72				
Max Chl Dpth (ft)	2.27	Hydr. Depth (ft)	0.32	0.77
0.81				
Conv. Total (cfs)	4585.6	Conv. (cfs)	29.8	532.0
4023.7				
Length Wtd. (ft)	25.00	Wetted Per. (ft)	5.56	19.60
143.54				
Min Ch El (ft)	3017.97	Shear (lb/sq ft)	0.01	0.02
0.02				

Alpha	1.01	Stream Power (lb/ft s)	275.00	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.00	0.02	0.12
C & E Loss (ft)	0.02	Cum SA (acres)	0.01	0.03	0.15

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: One
REACH: River One RS: 25

INPUT
Description:
Station Elevation Data num= 137

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3018.04	2.089996	3018.08	2.609985	3018.13	.170013	3018.11	3.630005	3018.13
7.130005	3018.21	7.440002	3018.22	7.769989	3018.23	17.5	3018.53	22.07001	3018.64
22.27	3018.65	25.91	3018.62	26.00999	3018.62	26.09	3018.62	26.25	3018.62
26.28999	3018.63	26.31	3018.62	26.46001	3018.63	27.78	3018.64	29.05	3018.64
29.13	3018.64	29.32001	3018.64	36.63	3018.49	38.8	3018.43	43.55	3018.32
53.64999	3018.1	54.14	3018.09	54.59	3018.09	58.06	3018	66.19	3017.62
66.34	3017.61	66.58	3017.66	6.85001	3017.59	69.50999	3017.33	72.58	3017.01
72.73	3017.01	73.00999	3017	74.25	3017	75	3017	75.17999	3017
76.07001	3017	77.11	3017	78.00999	3017	79.19	3017.03	79.41	3017.03
79.88	3017.04	82.48	3017.31	85.14	3017.52	85.28999	3017.52	87.59	3017.48
87.82001	3017.47	88.52	3017.45	89.00999	3017.44	89.49001	3017.43	89.75999	3017.43
92.86	3017.47	93.10001	3017.48	93.32001	3017.48	93.82001	3017.49	101.99	3017.61
107.41	3017.76	107.79	3017.77	118.48	3018	119.1	3018.01	119.17	3018.01
129.43	3018.1	135.31	3018.03	137.1	3018	137.57	3018	137.99	3018
139.29	3018	139.47	3018	139.94	3018	140.1	3018	140.76	3017.96
143.3	3017.83	145.24	3017.73	145.69	3017.71	153.72	3017.37	154.06	3017.35
154.31	3017.34	154.48	3017.34	154.55	3017.34	155.32	3017.31	155.39	3017.31
157.49	3017.33	159.95	3017.36	160.13	3017.36	160.39	3017.38	160.7	3017.39
160.94	3017.4	161.43	3017.42	161.78	3017.43	162.44	3017.46	163.08	3017.5
167.77	3017.87	169.83	3017.88	171.97	3017.9	172.8	3017.91	173.74	3017.92
176.44	3017.93	178.03	3017.95	178.32	3017.96	178.51	3017.96	179.1	3017.96
179.32	3017.96	179.95	3017.96	180.18	3017.96	180.27	3017.97	180.93	3017.97
181.15	3017.97	181.19	3017.96	182.38	3017.83	183.12	3017.83	184.07	3017.81
186.95	3017.8	192.78	3017.7	193.31	3017.7	193.87	3017.68	194.29	3017.67
197.7	3017.57	205.1	3017.42	205.8	3017.4	206.5	3017.38	215.23	3017.22
218.13	3017.15	220.1	3017.1	223.73	3017	226.12	3016.93	237.42	3016.6
245.29	3016.38	250.03	3016.24	261.02	3016	261.8	3015.98	261.83	3015.98
261.99	3015.98	275	3015.68						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.046	9.50999	.035	82.48	.04	143.3	.035	167.77	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
66.85001	93.82001	24.49	24.49	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
180.61	275	3017.99	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3018.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.040	0.036	0.036
W.S. Elev (ft)	3017.88	Reach Len. (ft)	24.49	24.49	24.49
Crit W.S. (ft)	3017.88	Flow Area (sq ft)	0.89	16.27	12.75
E.G. Slope (ft/ft)	0.015750	Area (sq ft)	0.89	16.27	110.93
Q Total (cfs)	94.00	Flow (cfs)	1.14	62.95	29.90
Top Width (ft)	172.25	Top Width (ft)	6.18	26.97	139.10
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)	1.28	3.87	2.34
Max Chl Dpth (ft)	2.20	Hydr. Depth (ft)	0.14	0.60	0.28
Conv. Total (cfs)	749.0	Conv. (cfs)	9.1	501.6	238.3
Length Wtd. (ft)	24.49	Wetted Per. (ft)	6.18	27.02	46.08
Min Ch El (ft)	3017.00	Shear (lb/sq ft)	0.14	0.59	0.27
Alpha	1.19	Stream Power (lb/ft s)	275.00	0.00	0.00
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	0.00	0.01	0.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.00	0.02	0.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: One
REACH: River One RS: 0.51

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3017.16	34.38	3017.11	34.52	3017.11	34.61	3017.11	34.7	3017.11
34.8	3017.11	34.95	3017.11	36.37	3017.07	38.71	3017	48.72	3016.7
51.36	3016.5	52.03	3016.44	53.48	3016.38	57.03	3016.2	60	3016.05
60.02	3016.05	64.2	3016.07	64.68	3016.06	65.03	3016.05	65.04	3016.05
65.05	3016.05	65.38	3016.05	69.39	3016.06	69.4	3016.06	71.82	3016.09
71.84	3016.09	72.07	3016.08	72.12	3016.08	72.22	3016.08	72.46	3016.07
72.69	3016.07	78.96	3016.25	83.23	3016.32	88.8	3016.44	89.67	3016.46
93.87	3016.56	97.94	3016.65	99.81	3016.66	108.69	3016.88	109.42	3016.9
110.78	3016.92	111.85	3016.94	112.94	3016.96	114.03	3016.97	115.11	3016.97
115.44	3016.97	116.77	3016.96	118.27	3016.95	118.67	3016.95	129.51	3016.8
130.97	3016.8	132.44	3016.8	134.44	3016.81	135	3016.81	136.39	3016.8
136.95	3016.8	137.54	3016.79	145.48	3016.86	155.35	3016.99	155.77	3017
156.62	3017	156.95	3017.01	157.58	3017	158.73	3017	159.33	3016.99
169.58	3016.75	171.83	3016.72	173.86	3016.69	177.35	3016.67	186.26	3016.64
186.81	3016.63	187.37	3016.62	187.87	3016.61	211.07	3016.17	211.43	3016.16
213.07	3016.12	213.27	3016.12	213.44	3016.11	214.71	3016.1	217.98	3016
219.15	3015.96	235.26	3015.46	235.53	3015.45	235.8	3015.45	246.67	3015.19
249.55	3015.11	253.53	3015	257.67	3014.92	267.95	3014.59	271.23	3014.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	48.72	.035	97.94	.04

Bank Sta: Left Right Coeff Contr. Expan.
48.72 97.94 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
156.62	271.23	3017	F

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	3017.01	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.	0.040	0.035
0.040				
W.S. Elev (ft)	3016.77	Reach Len. (ft)		
Crit W.S. (ft)	3016.77	Flow Area (sq ft)	0.09	23.98
0.47				
E.G. Slope (ft/ft)	0.022016	Area (sq ft)	0.09	23.98
97.45				
Q Total (cfs)	94.00	Flow (cfs)	0.05	93.49
0.46				
Top Width (ft)	160.61	Top Width (ft)	2.40	49.22
108.98				
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)	0.60	3.90
0.97				
Max Chl Dpth (ft)	2.27	Hydr. Depth (ft)	0.04	0.49
0.07				
Conv. Total (cfs)	633.5	Conv. (cfs)	0.4	630.1
3.1				
Length Wtd. (ft)		Wetted Per. (ft)	2.40	49.25

6.40				
Min Ch El (ft)	3016.05	Shear (lb/sq ft)	0.05	0.67
0.10				
Alpha	1.03	Stream Power (lb/ft s)	271.23	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

Warning: Divided flow computed for this cross-section.
Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth).
Water surface set to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

SUMMARY OF MANNING'S N VALUES

River:One

Reach	River Sta.	n1	n2	n3	n4	n5
River One	500	.04	.035	.04		
River One	475	.04	.035	.04		
River One	450	.04	.035	.04		
River One	425	.04	.035	.04		
River One	400	.04	.035	.04		
River One	375	.04	.035	.04		
River One	350	.04	.035	.04		
River One	325	.04	.035	.04		
River One	300	.04	.035	.04		
River One	275	.04	.035	.04		
River One	250	.04	.035	.04		
River One	225	.04	.035	.04		
River One	200	.04	.035	.04		
River One	175	.04	.04	.04		
River One	150	.04	.035	.04		
River One	125	.04	.035	.04	.035	.04
River One	100	.04	.035	.04	.035	.04

River One	75	.04	.035	.04	.035	.04
River One	50	.04	.035	.04	.035	.04
River One	25	.04	.035	.04	.035	.04
River One	0.51	.04	.035	.04		

SUMMARY OF REACH LENGTHS

River: One

Reach	River Sta.	Left	Channel	Right
River One	500	25	25	25
River One	475	25	25	25
River One	450	25	25	25
River One	425	25	25	25
River One	400	25	25	25
River One	375	25	25	25
River One	350	25	25	25
River One	325	25	25	25
River One	300	25	25	25
River One	275	25	25	25
River One	250	25	25	25
River One	225	25	25	25
River One	200	25	25	25
River One	175	25	25	25
River One	150	25	25	25
River One	125	25	25	25
River One	100	25	25	25
River One	75	25	25	25
River One	50	25	25	25
River One	25	24.49	24.49	24.49
River One	0.51			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: One

Reach	River Sta.	Contr.	Expan.
River One	500	.1	.3
River One	475	.1	.3
River One	450	.1	.3
River One	425	.1	.3
River One	400	.1	.3
River One	375	.1	.3
River One	350	.1	.3
River One	325	.1	.3
River One	300	.1	.3
River One	275	.1	.3
River One	250	.1	.3
River One	225	.1	.3

River One	200	.1	.3
River One	175	.1	.3
River One	150	.1	.3
River One	125	.1	.3
River One	100	.1	.3
River One	75	.1	.3
River One	50	.1	.3
River One	25	.1	.3
River One	0.51	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Ex

River: One Reach: River One RS: 500 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 475 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 450 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 425 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 400 Profile: Q100
Warning:The energy equation could not be balanced within the specified number

of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 375 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 350 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 325 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 300 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 275 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program defaulted to critical depth.
River: One Reach: River One RS: 250 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 225 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 200 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: One Reach: River One RS: 175 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: One Reach: River One RS: 150 Profile: Q100
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: One Reach: River One RS: 125 Profile: Q100

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:Divided flow computed for this cross-section.

Warning:The cross-section end points had to be extended vertically for the computed water surface.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: One Reach: River One RS: 100 Profile: Q100

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:Divided flow computed for this cross-section.

Warning:The cross-section end points had to be extended vertically for the computed water surface.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: One Reach: River One RS: 75 Profile: Q100

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:Divided flow computed for this cross-section.

Warning:The cross-section end points had to be extended vertically for the computed water surface.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: One Reach: River One RS: 50 Profile: Q100

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:Divided flow computed for this cross-section.

Warning:The cross-section end points had to be extended vertically for the computed water surface.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: One Reach: River One RS: 25 Profile: Q100

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:Divided flow computed for this cross-section.

Warning:The cross-section end points had to be extended vertically for the computed water surface.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: One Reach: River One RS: 0.51 Profile: Q100

Warning:Divided flow computed for this cross-section.

Warning:Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

ScottsdaleFire05M.rep

HEC-RAS HEC-RAS 5.0.3 September 2016
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: Scottsdale Fire 05MAR
Project File : ScottsdaleFire05M.prj
Run Date and Time: 3/5/2018 2:53:22 PM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : y:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire05M.p02

Geometry Title: Proposed
Geometry File : y:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire05M.g02

Flow Title : Existing
Flow File : y:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire05M.f01

Plan Summary Information:

Number of:	Cross Sections	= 24	Multiple Openings	=	0
	Culverts	= 2	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: Existing
Flow File : y:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire05M.f01

Flow Data (cfs)

River	Reach	RS	Q100	Q10	Q2	25
One	River One	650	94	45		

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
One	River One	Q100		

Normal S = 0.04

GEOMETRY DATA

Geometry Title: Proposed

Geometry File : y:\16535 Scottsdale Fire Station 616\400 Reports & Report Preparation\420 Drainage\Hydraulics\HEC-RAS\ScottsdaleFire05M.g02

CROSS SECTION

RIVER: One
REACH: River One RS: 650

INPUT
Description:
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3047.14	2.050003	3047	3.029999	3046.93	4.860001	3046.74	5.25	3046.68
5.550003	3046.62	11.15001	3046.21	11.51001	3046.17	11.73001	3046.14	12.20001	3046.08
13.10001	3046.03	13.51001	3046	14.15001	3045.93	15.07001	3045.79	15.77	3045.67
16.58	3045.61	17.20001	3045.5	17.57001	3045.47	18.72	3045.31	20.67	3045
21.02	3044.94	21.20001	3044.91	25.31001	3044.15	26.25	3044	28.81001	3043.6
32.61	3043	34.51001	3042.71	34.83	3042.66	38.70001	3042	44.52	3041.24
46.15001	3041	52.21001	3040.22	53.90001	3040	59.87	3039.15	60.94	3039
61.78001	3039	63.34	3038.99	65.57001	3038.99	66.57001	3039	66.87	3039
80.69	3039.34	80.87	3039.34	82.51	3039.37	86.74001	3039.43	92.16	3039.53
97.00001	3039.59	99.08	3039.64	102.62	3039.68	113.1	3039.97	114.24	3040
117.07	3040.06	118.16	3040.08	125.57	3040.18	129.08	3040.26	139.75	3040.4
139.88	3040.4	140.01	3040.41	141.19	3040.46	141.84	3040.5	142.41	3040.54
143.48	3040.63	143.82	3040.64	144.14	3040.66	147.59	3041	154.13	3041.36
156.01	3041.39	161.97	3041.52	163.89	3041.54	163.96	3041.54	166.47	3041.59
168.24	3041.61								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	59.87	.035	92.16	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.87	92.16	25	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 625

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3048.67	5.75	3048.37	5.970001	3048.35	6.309998	3048.33	6.929993	3048.29
7.149994	3048.28	7.529999	3048.25	9.87999	3048	11.48	3047.72	15.45	3047

```
19.25999 3046.3321.09999    3046   24.92 3045.3532.50999    304435.79999 3043.43
    38.2    3043   43.16 3042.13   43.87    3042    45.3 3041.7849.46999    3041
   53.12 3040.4756.46999    3040   61.66 3039.2368.68999 3038.2270.18999    3038
   71.34 3037.9978.03999 3037.83   83.99 3037.76   85.09 3037.7694.64999 3037.94
95.24999 3037.9597.07999    3038  103.18 3038.15  105.26 3038.19  110.74 3038.25
  119.67 3038.24   126.7  3038.3  128.69 3038.33  131.77 3038.46  131.91 3038.48
  132.59 3038.49   133.2 3038.51  133.62 3038.53   133.9 3038.54  134.07 3038.56
  134.23 3038.57  136.56    3039   146.6    3040  147.12    3040  151.76 3040.27
  155.27 3040.35  160.28 3040.49  163.61 3040.57  163.77 3040.57  166.35 3040.61
  167.76 3040.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0468.68999    .035  105.26     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      68.68999  105.26              25      25      25             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 600

INPUT
Description:
Station Elevation Data    num=      56
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    30493.550003    30493.639999 3048.996.490005 3048.738.949997 3048.52
9.559998 3048.47   13.92    3048   25.08    3046   29.34 3045.25   30.92    3045
31.70999 3044.87   37.25    3044   40.21  3043.3   41.43    3043   43.92  3042.4
   45.88    3042   47.74 3041.63   50.82    3041   54.84 3040.33   56.67    3040
    58.9 3039.66   62.94    3039   66.09 3038.52   69.39    3038   72.27 3037.53
   75.34    3037   80.57 3036.18   80.69 3036.17   80.78 3036.17   80.98 3036.16
   81.31 3036.15   81.87 3036.11   82.25  3036.1   82.71 3036.09   83.41 3036.09
   93.89  3036.2   95.34 3036.21     100 3036.28  103.08 3036.32  108.51 3036.38
  116.53 3036.49  125.64 3036.64  129.54 3036.83  132.33 3036.99  132.72    3037
  133.12 3037.04  137.31 3037.61  140.31    3038  142.71 3038.47  145.77    3039
  148.52 3039.14  152.24 3039.32  162.76 3039.55  162.91 3039.55  165.74  3039.6
  167.53 3039.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   80.57    .035  116.53     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        80.57  116.53              25      25      25             .1       .3
```

CROSS SECTION

RIVER: One
REACH: River One RS: 575

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	30496.860001		304910.57999	3048.5616.17999		304818.95999	3047.59		
23.14999	3047	23.97	3046.88	34.98	3045.2135.48999	3045.1436.40999		3045	
38.82999	3044.6	42.55		304443.52999	3043.847.02999		304347.53999	3042.88	
53.27	3041.5	55.37		304158.13999	3040.33	59.48	304060.03999	3039.84	
63.17999	3039	65.16	3038.3969.92999	3037.0670.16999		3037	71.41	3036.73	
72.2	3036.5772.88999		3036.4575.59999		3036	79.31	3035.56	84.66	3035.51
89.96999	3035.27	92.23	3035.2297.48999	3035.1999.52999		3035.2199.99999		3035.21	
111.04	3035.17	113.32	3035.19	124.41	3035.18	125.53	3035.19	126.87	3035.21
131.9	3036	137.03	3037	138.58	3037.15	145.51	3038	145.6	3038
151.51	3038.32	155.26	3038.4	161.85	3038.56	161.93	3038.56	162.08	3038.57
165.01	3038.61	165.4	3038.61						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	84.66	.035	126.87	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
84.66	126.87	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 550

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3047.976.270004		3047.056.650009		3047	7.12001	3046.94	13.94	3046
18.75	3045.3628.79001		3044.26	30.88	3044	36.02	3043.3739.10001		3043
44.22	3042.23	45.88	3042	47.73	3041.7151.31001		304152.56001		3040.76
55.76	3040.0155.81001		3040	56.97	3039.74	57.11	3039.7	57.2	3039.68
57.51	3039.61	59.5	3039	60.41	3038.7763.14001		3038	64.84	3037.5
66.71001	303767.85001		3036.68	70.41	303671.64001		3035.64	73.84	3035
75.48	3034.76	75.98	3034.77	77.75	3034.78	79.47	3034.77	83.52	3034.67
93.94	3034.3898.46001		3034.29	100	3034.28	100.39	3034.28	110.61	3034
111.47	3033.99	111.98	3033.99	112.85	3033.98	114.47	3033.97	116.47	3033.97

```
  118.57 3033.96  121.76 3033.96  123.47 3033.97   124.5 3033.96  124.92 3033.97
  126.17 3033.98  126.42 3033.98  126.87 3033.99  127.13 3033.99  127.64    3034
  128.06 3034.11  128.71 3034.31  131.64    3035  135.71 3035.98  135.77    3036
  135.91 3036.02  137.88 3036.13  139.51 3036.19  144.33    3037   145.1 3037.04
  146.02 3037.07  146.88  3037.1  147.13 3037.11   147.3 3037.11  147.38 3037.12
  147.44 3037.12   149.4 3037.18  149.68 3037.19   150.2 3037.22  157.62  3037.5
  161.35 3037.61   161.5 3037.61  164.66 3037.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .049 8.46001    .035  128.71     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
      98.46001  128.71               25      25      25             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 525

INPUT
Description:
Station Elevation Data    num=      85
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 3044.77.8000031 3044.76.8700104 3044.76    1.25  3044.81.680008 3044.85
1.860001 3044.871.910004 3044.871.990005 3044.882.040009 3044.892.100006 3044.89
2.230011  3044.92.300003  3044.92.580002 3044.93 2.76001 3044.942.980011 3044.94
3.360001 3044.953.470001 3044.964.080002 3044.964.240005 3044.944.710007 3044.94
4.880005 3044.915.300003 3044.885.800003 3044.815.860001  3044.86.060013 3044.78
7.040009 3044.637.710007 3044.54 7.87001 3044.528.070007 3044.48   10.75    3044
   12.69 3043.6618.67001  3042.6   22.11    3042   24.38 3041.62   28.14    3041
   29.75 3040.7534.40001    3040   36.12 3039.7240.67001    303946.85001    3038
48.57001 3037.7353.08001    303754.29001 3036.7959.17001    3036   60.37 3035.79
60.76001 3035.7461.43001 3035.6565.85001    303566.99001 3034.8267.61001  3034.7
   67.91 3034.6369.79001    303471.60001 3033.95   75.13 3033.91   79.02 3033.73
85.08001 3033.6289.07001 3033.6390.04001 3033.63   94.13  3033.6   94.91  3033.6
95.58001 3033.59   96.37 3033.58     100 3033.54  102.16 3033.52  103.16  3033.5
  104.01 3033.48  106.42 3033.44  125.48 3033.01  125.64 3033.01  125.88 3033.02
  129.75    3034  132.06 3034.42  134.99    3035  140.61 3035.97  140.74    3036
  141.06    3036  143.69 3036.11  146.61 3036.22     148 3036.26  149.25  3036.3
  149.83 3036.31   160.1 3036.56  160.23 3036.57  162.67  3036.6  163.85  3036.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   79.02    .035  129.75     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
```

```
        79.02  129.75                25       25       25              .1        .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 500

INPUT
Description:
Station Elevation Data    num=      59
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0  3042.36.559998 3042.29 6.98999 3042.297.610001 3042.258.299988  3042.2
9.289993  3042.19.399994 3042.0910.15999     304210.89999 3041.88   12.67 3041.55
15.09999     304118.06999 3040.4720.14999     3040   22.08 3039.6726.31999     3039
29.17999 3038.5132.50999     3038   38.72     3037   42.02 3036.4544.67999     3036
   47.52 3035.5351.45999     303557.84999 3034.13   58.48 3034.0558.82999     3034
65.39999 3033.15   66.48     303368.06999 3032.9874.38999 3032.78   80.81 3032.62
87.35999 3032.65   88.42 3032.6389.50999 3032.63   91.38 3032.61   91.87 3032.61
97.99999 3032.5699.20999 3032.5799.99999 3032.58  102.63  3032.6  108.91 3032.52
  114.01 3032.57  120.42 3032.65  126.37 3032.83  129.05 3032.86  130.89     3033
  131.06    3033  134.21 3033.46  137.83    3034  139.91  3034.3  144.33     3035
  145.15 3035.01  147.84 3035.18  149.58 3035.21  158.01  3035.4   158.1  3035.4
   162.5 3035.43  166.85 3035.41  166.99  3035.4  167.76 3035.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0468.06999    .035  130.89     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      68.06999  130.89               25       25       25              .1        .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 475

INPUT
Description:
Station Elevation Data    num=      61
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0 3040.013.029999 3040.015.509995     304014.57001 3039.09   15.38     3039
   15.69 3038.97    16.5 3038.89       19 3038.59   19.55 3038.53   20.36 3038.43
   22.27 3038.19   23.64    3038   23.78 3037.98   25.14 3037.7830.03999     3037
   36.45    3036   43.07 3035.09   44.94 3034.84   51.11    3034   56.46 3033.26
   58.44    3033   60.81    3033   63.54 3032.86   64.32    3033   65.09 3032.19
   65.29 3031.87   65.77 3031.86   66.01 3031.91   67.11 3031.92   68.65  3031.9
```

```
  69.21 3031.91   69.98 3031.91   74.84 3031.68   75.75 3031.67   78.46 3031.71
  85.47 3031.65    87.3 3031.63   90.05 3031.62   92.76 3031.62   96.73 3031.66
 102.73  3031.7  118.18 3031.84  123.26 3031.98  123.86 3031.98  125.35 3031.99
 125.93 3031.99  126.55    3032  126.62    3032  129.19 3032.66   130.7    3033
 131.46 3033.07  142.74    3034   142.8 3034.02  143.36 3034.03  143.58 3034.03
 148.11 3034.28  150.94 3034.35  157.91 3034.51  158.02 3034.52  160.45 3034.55
 162.25 3034.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   65.77    .035  126.55     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.77  126.55               25      25      25              .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 450

INPUT
Description:
Station Elevation Data    num=      69
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 3038.38.5900116 3038.331.309998 3038.252.190002 3038.153.529999    3038
7.330002 3037.2312.10001 3036.77   14.39  3036.7   19.83    3036   21.72 3035.77
   28.31    303530.68001 3034.73   30.95 3034.7131.28001 3034.6931.82001 3034.66
    34.8 3034.53   36.97 3034.44   38.16 3034.36   38.41 3034.35   39.19 3034.28
39.39001 3034.2741.18001  3034.1   41.26  3034.1   42.23    3034   42.88 3033.89
49.21001    303352.74001 3032.8752.89001 3032.8759.89001 3032.4962.71001    3033
62.99001 3032.71   63.08 3032.5563.71001 3031.51   64.58 3031.3364.64001 3031.14
   64.65 3031.14   67.59 3031.0568.61001 3030.87   68.97 3030.87   73.73  3030.7
   81.48 3030.81   83.34 3030.8493.46001 3030.99   93.62 3030.9994.46001    3031
99.53001 3031.04  107.16 3031.06  108.07 3031.06  108.54 3031.08  109.24  3031.1
  111.35  3031.2  123.24 3031.24  123.31 3031.25   123.4 3031.25  124.46 3031.27
  124.72 3031.28  125.01 3031.29  125.91 3031.31  126.64 3031.34  133.95    3032
  138.63 3032.41  138.72 3032.41   139.7 3032.44  143.95 3032.77  153.37 3032.92
  153.74 3032.93  154.01 3032.94  158.26    3033  158.63    3033

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   64.65    .035  124.46     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         64.65  124.46               25      25      25              .1       .3

CROSS SECTION
```

RIVER: One
REACH: River One RS: 425

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.27	11.61	3032.38	27.63	3032.5	27.72	3033.46	27.8	3033.79
31.59001	3033.13	4.07001	3032.86	39.50001	3032.64	52.33001	3032.45	2.42001	3032.39
52.49001	3032.39	56.59	3032.23	58.49001	3032.13	60.3	3032.45	60.76001	3031.68
63.85001	3032.17	64.38	3031.14	65.68001	3031.02	82.92001	3029.55	83.91	3029.54
106.33	3029.34	109.18	3029.83	112.59	3029.67	122.72	3029.83	124.41	3030
124.63	3030	128.04	3030.46	131.94	3031	141.4	3031.74	141.59	3031.74
141.76	3031.75	141.85	3031.75	142.64	3031.76	143.78	3031.78	144.94	3031.84
155.69	3031.99	155.79	3031.99	156.34	3032	156.86	3032	160.96	3032.02
161.28	3032.02	166.09	3032.01	166.21	3032				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	65.68001	.035	124.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
65.68001	124.63	18.78	18.78	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 406.22

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.22	14.37001	3032.38	30.86	3032.55	8.17001	3032.56	2.35001	3032.74
63.15	3032.53	66.98	30	33	67.21001	3032.58	67.94	3030.92	73.88	3029.42
86.03001	3027.22	94.35001	3027.25	97.25001	3028.54	100	3028.3	105.31	3027.85
110.01	3028.99	110.12	3029.01	110.24	3029	110.35	3029	111.76	3031.67
114.65	3031.54	128.29	3030	132.84	3030	137.01	3030.56	140.63	3030.87
142.51	3031	143.52	3031.03	144.68	3031.07	145.83	3031.1	149.27	3031.17
153.71	3031.23	161.29	3031.31	161.98	3031.3	163.02	3031.31		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	0	.035	163.02	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	163.02	111.11	111.11	.1	.3

CULVERT

RIVER: One
REACH: River One RS: 375

INPUT
Description:
Distance from Upstream XS = .05
Deck/Roadway Width = 68
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	3031.5	3024	250	3031.5	3024

Upstream Bridge Cross Section Data
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.22	14.37001	3032.38	30.86	3032.55	8.17001	3032.56	2.35001	3032.74
63.15	3032.53	66.98	3033	67.21001	3032.58	67.94	3030.92	73.88	3029.42
86.03001	3027.22	94.35001	3027.25	97.25001	3028.54	100	3028.3	105.31	3027.85
110.01	3028.99	110.12	3029.01	110.24	3029	110.35	3029	111.76	3031.67
114.65	3031.54	128.29	3030	132.84	3030	137.01	3030.56	140.63	3030.87
142.51	3031	143.52	3031.03	144.68	3031.07	145.83	3031.1	149.27	3031.17
153.71	3031.23	161.29	3031.31	161.98	3031.3	163.02	3031.31		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	0	.035	163.02	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	163.02	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	3031.5	3024	250	3031.5	3024

Downstream Bridge Cross Section Data
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.06	3.270004	3032.07	65.41	3032.45	73.02	3032.37	6.75999	3032.3
87.57	3032	88.13	3031.94	88.21	3031.93	104.99	3030.46	106.9	3026.73
107.34	3025.64	108.36	3025.64	129.11	3025.71	129.42	3025.74	130.19	3025.75

```
   131 3025.74  132.12 3025.74  157.11  3025.8  159.44 3025.78  162.77 3025.73
171.61 3025.82  172.63 3025.85  173.74 3025.89  173.88 3025.89  191.24 3026.84
191.82 3026.87  192.14 3026.88  192.41 3026.89   192.9 3026.89  193.02  3026.9
196.77 3026.89   196.9  3026.9  206.55  3026.9  207.21 3026.91  207.74 3026.92
212.54 3026.92  215.42 3026.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    88.1    .035  191.24     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          88.1  191.24             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       3
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                .5      68     .012     .012        0                    .5
       1
Number of Barrels =  5
Upstream   Elevation =  3026.14
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
      80      85      90      95     100
Downstream Elevation =  3025.8
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
     110     115     120     125     130

CROSS SECTION


RIVER: One
REACH: River One          RS: 325
```

INPUT
Description:
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.06	3.270004	3032.07	65.41	3032.45	73.02	3032.37	76.75999	3032.3
87.57	3032	88.13	3031.942	88.21	3031.93	104.99	3030.46	106.9	3026.73
107.34	3025.64	108.36	3025.64	129.11	3025.71	129.42	3025.74	130.19	3025.75
131	3025.74	132.12	3025.74	157.11	3025.8	159.44	3025.78	162.77	3025.73
171.61	3025.82	172.63	3025.85	173.74	3025.89	173.88	3025.89	191.24	3026.84
191.82	3026.87	192.14	3026.88	192.41	3026.89	192.9	3026.89	193.02	3026.9
196.77	3026.89	196.9	3026.9	206.55	3026.9	207.21	3026.91	207.74	3026.92
212.54	3026.92	215.42	3026.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	88.1	.035	191.24	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
88.1	191.24	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 300

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.05	12.16	3032.1	64.81	3032.41	78.84	3032.24	86.46001	3032.11
90.34	3032	103.4	3030.47	104.76	3030.29	104.8	3030.1	106.79	3024.98
114.29	3024.967	118.62	3024.96	121.29	3025.23	128.66	3025.21	137.45	3025.15
140.16	3025.15	140.97	3025.16	154.68	3025.18	163.89	3025.11	173.08	3025
176.13	3024.98	179.55	3024.98	180.38	3024.99	182.37	3025.01	182.65	3025.01
184.52	3025.02	185.17	3025.02	187.18	3025	190.15	3025	191.11	3025.09
191.55	3025.1	191.69	3025.1	195.7	3025.34	198.09	3025.44	199.4	3025.49
199.75	3025.5	207.63	3025.85	209.33	3025.93	213.59	3025.93	214.27	3025.96
214.86	3025.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	114.29	.035	199.4	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
114.29	199.4	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 275

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.19	5.809998	3032.21	29.59999	3032.35	53.12999	3032.07	57.09999	3032
66.81999	3030.78	71.98999	3030.08	72.75999	3025.66	73.31	3024.27	76.21999	3024.261
76.49999	3024.26	81.35999	3024.32	83.34	3024.51	88.56999	3024.48	90.37	3024.45
91.05	3024.43	91.78999	3024.41	96.31	3024.25	98.95999	3024.23	99.67999	3024.2
100.45	3024.17	101.32	3024.15	102	3024.14	102.75	3024.12	103.49	3024.11
103.62	3024.11	105.92	3024.08	107.81	3024.05	109.91	3024	109.98	3024
119.91	3023.73	122	3023.69	123.86	3023.67	124.73	3023.67	126.59	3023.68
130.68	3023.73	134.54	3023.7	145.63	3024	146.61	3024.01	146.93	3024.01
152.87	3024.06	159.19	3024.06	159.87	3024.05	160.7	3024.05	163.7	3024.07
164.82	3024.07	165.98	3024.1	166.38	3024.1	171.07	3024.17	175.18	3024.22
177.68	3024.24	182.15	3024.33	183.3	3024.35	184.27	3024.37	187.4	3024.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.047	6.21999	.035	184.27	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
76.21999	184.27	25	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 250

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3032.11	16.56	3032.25	19.61	3032.26	28.78999	3032.32	41.43999	3032.16
52.15999	3031.57	52.31	3031.13	60.42999	3030.86	69.89999	3029.54	70.37999	3029.54
71.23999	3024.48	71.28999	3024.17	71.39	3023.54	73.73	3023.65	77.17	3023.67
80.93999	3023.65	84.35999	3023.68	91.05	3023.59	93.16	3023.57	95.60999	3023.52
104.57	3023.13	104.77	3023.12	105.13	3023.11	105.29	3023.1	105.44	3023.09
105.93	3023.07	119.21	3022.48	130.16	3022.02	130.82	3022	138.89	3022
139.53	3022.05	145.71	3022.4	146.59	3022.46	146.9	3022.48	151.47	3022.74
155.11	3022.96	155.93	3023	158.17	3023.01	160.97	3023.01	163.18	3023.05
170.9	3023.13	171.88	3023.1	172.85	3023.09	173.85	3023.09	174.62	3023.1
175.64	3023.1	176.67	3023.11	177.04	3023.12	178.09	3023.13	178.43	3023.14

```
  178.84 3023.16  179.92 3023.18  181.79 3023.29  182.86 3023.32  183.86 3023.36
  184.78 3023.39   185.6 3023.43  186.31 3023.46  186.86 3023.49  192.54    3024
  198.17    3024  199.6 3023.96  200.26 3023.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   93.16    .035  160.97     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         93.16  160.97              25      25      25             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 225

INPUT
Description:
Station Elevation Data    num=      77
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    3032 1.730011    3032   11.94 3032.08   18.77    3032   23.09    3032
24.76001 3031.84 37.82001 3030.55   38.34  3030.5   40.16 3027.14 40.21001    3027
   64.47    3027   64.88 3027.37   65.41 3028.58   65.91 3028.52   66.41 3025.52
   66.45 3025.31   66.67 3023.96 66.90001 3022.53   71.94 3022.53 77.96001 3022.57
   84.05 3022.58   89.47 3022.63   89.91 3022.63   91.15 3022.65 92.81001 3022.63
   94.69  3022.6   94.98  3022.6   97.12 3022.51   97.34 3022.51   97.87 3022.49
  127.55    3021  130.92    3021  131.23 3021.01  131.55    3021  131.73    3021
   132.7 3021.01  133.27 3021.01  146.21 3021.77  148.39 3021.89  150.91    3022
  151.17 3022.01  153.54 3022.09  154.67 3022.12  154.72 3022.13  158.34 3022.22
  162.14 3022.27  163.69 3022.28  166.75 3022.28  169.24 3022.26  169.32 3022.26
  171.03 3022.24  171.16 3022.23  171.34 3022.23  181.29 3022.06  181.37 3022.06
  181.84 3022.05  182.19 3022.05  182.61 3022.06  185.08    3022   185.9 3021.97
  188.03 3021.96   189.7 3021.96  195.13    3022   195.4 3022.03  196.35  3022.1
  200.76 3022.42  209.27    3023  211.47 3023.16  211.56 3023.16  213.62 3023.03
  213.79 3023.03  214.35 3023.02  214.46 3023.02  215.65    3023  215.74    3023
  215.89 3022.97  218.16 3022.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04 92.81001    .035  162.14     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      92.81001  162.14              25      25      25             .1       .3

CROSS SECTION
```

RIVER: One
REACH: River One RS: 200

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3027	20.72	3027	21.78	3027.7	23.88	3027.78	24.16	3028
24.63	3028	26.62001	3026.23	26.72	3026	51.34	3026	52.71001	3026.55
53.15001	3027.43	53.65001	3027.33	53.76001	3026.68	53.77	3026.63	53.83	3026.25
53.99001	3025.27	54.62001	3021.39	55.74001	3021.43	61.07001	3021.45	73.5	3021.56
77.72	3021.61	79.28	3021.61	80.84	3021.68	2.57001	3021.57	83.32001	3021.57
83.91	3021.56	91.42	3021.24	91.77	3021.23	92.14	3021.21	92.84	3021.19
96.62	3021	116.22	3020.99	121.73	3020.19	121.92	3020.19	122.22	3020.2
122.84	3020.23	123.86	3020.27	124.6	3020.31	137.15	3020.84	138.86	3020.9
140.26	3020.93	144.74	3021	145	3021	147.38	3021.05	147.52	3021.05
150.74	3021.1	153.72	3021.12	153.98	3021.12	154.25	3021.13	167.29	3021.04
167.59	3021.04	174.85	3021.03	174.93	3021.03	176.87	3021.01	177.51	3021
177.95	3020.99	189.06	3020.81	196.01	3020.71	200.24	3020.69	208.13	3021.74
208.87	3021.72	213.07	3021.33	214.21	3021.25	215.18	3021.2	215.81	3021.66
220.14	3021.67	221.66	3021.67						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	77.72	.035	208.13	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
77.72	208.13	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 175

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3025.97	6.490005	3025.78	25.61	3025.17	26.97	3025.13	27.7	3025.18
28.60001	3025.58	41.46001	3025.23	51.36	3024.15	4.40001	3024.58	54.69	3023.34
54.8	3022.87	55.12001	3020.24	57.09	3020	57.60001	3018.96	4.79001	3019.29
65.74001	3020	67.24001	3020	67.31	3020.38	84.85001	3020.79	1.46001	3020.72
95.97	3020.66	109.76	3020.54	109.92	3020.57	117.54	3020.59	124.41	3020.44
126.07	3020.4	127.79	3020.39	130.03	3020	138.77	3020	138.91	3020.01
139.88	3020.01	139.96	3020.02	144.7	3020.04	145.96	3020.06	154.27	3020.1
154.46	3020.1	154.72	3020.11	154.93	3020.11	168.07	3020.13	168.36	3020.13
170.12	3020.12	179.96	3020.85	187.67	3020.41	188.6	3020.36	203.21	3022.5

```
  203.57 3022.48  219.55 3021.84   229.3  3021.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   54.69    .035   229.3     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         54.69   229.3              6.6     6.6     6.6             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 168.94

INPUT
Description:
Station Elevation Data    num=      48
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 3025.82   11.41 3025.49   23.19  3025.1   27.22 3024.9929.43001 3025.15
29.99001  3025.4      38 3025.18    54.8 3023.24   55.47 3023.3556.21001 3020.14
56.23001 3020.01   56.33    302057.48001 3017.52   61.69 3017.73   63.17  3017.8
66.09001    3020   66.31    302066.73001 3022.4370.40001 3022.52   94.45 3022.74
  112.16 3022.59  113.63 3022.59  114.19 3022.58  114.59 3022.58  115.41 3022.73
  116.24 3022.74  116.96 3022.73  118.92 3017.95  124.72 3018.03  127.25 3022.55
  128.88 3022.55  130.26 3022.33  132.92  3021.8  142.01 3020.18  147.26 3020.56
  153.32 3020.92  153.64 3020.91  159.65 3021.01  166.86 3021.04  171.88 3021.46
   180.9 3020.98  189.18  3022.3  201.33  3021.8  204.11 3021.72  207.98  3021.7
   208.8 3021.65  212.76 3021.39  229.02  3021.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04       0    .035  229.02     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  229.02            76.56   76.56   76.56             .1       .3

CULVERT


RIVER: One
REACH: River One          RS: 150

INPUT
Description:
Distance from Upstream XS =      .5
Deck/Roadway Width        =     48
Weir Coefficient          =    2.6
```

Upstream Deck/Roadway Coordinates

num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	3022.4	3016	250	3022.4	3016

Upstream Bridge Cross Section Data

Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3025.82	11.41	3025.49	23.19	3025.1	27.22	3024.99	29.43001	3025.15
29.99001	3025.4	38	3025.18	54.8	3023.24	55.47	3023.35	56.21001	3020.14
56.23001	3020.01	56.33	3020	57.48001	3017.52	61.69	3017.73	63.17	3017.8
66.09001	3020	66.31	3020	66.73001	3022.43	70.40001	3022.52	94.45	3022.74
112.16	3022.59	113.63	3022.59	114.19	3022.58	114.59	3022.58	115.41	3022.73
116.24	3022.74	116.96	3022.73	118.92	3017.95	124.72	3018.03	127.25	3022.55
128.88	3022.55	130.26	3022.33	132.92	3021.8	142.01	3020.18	147.26	3020.56
153.32	3020.92	153.64	3020.91	159.65	3021.01	166.86	3021.04	171.88	3021.46
180.9	3020.98	189.18	3022.3	201.33	3021.8	204.11	3021.72	207.98	3021.7
208.8	3021.65	212.76	3021.39	229.02	3021.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	0	.035	229.02	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	229.02	.1	.3

Downstream Deck/Roadway Coordinates

num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	3022.4	3016	250	3022.4	3016

Downstream Bridge Cross Section Data

Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3018.3	14.17	3018.03	15.36	3018	22.62001	3017.8	25.25	3017.7
31.34001	3017.36	35.36	3017.32	35.7	3017.28	36.25	3017.25	36.83	3017.22
37.13	3017.24	38.25	3017.01	39.52	3017.01	39.64	3017.43	40.13	3017
42.68001	3016.98	43.89	3018.38	45.98001	3018.75	46.68001	3019.09	46.98001	3017
47.93001	3017.01	48.75	3017	58.11	3017	58.40001	3018.38	58.94	3021
59.99001	3021	62.99001	3020.85	80.64	3019.21	81.23001	3019.28	84.11	3017.83
85.32001	3017.88	86.34001	3017.91	92.81	3018	97.23001	3018.33	101.7	3018.01
103.4	3018.01	106.4	3018	107.3	3018	111.95	3019.64	113.97	3020.36
115.97	3020.89	116.14	3019.16	116.73	3017	126.6	3017	126.93	3018.45
127.51	3021	129.22	3021	133.86	3019.61	139.14	3019.38	154.95	3020.06
154.97	3020	155.04	3020.05	156.23	3020	156.33	3020	161.26	3020.41
166.57	3020.17	179.66	3020.49	208.66	3020.48	214.19	3020.16	234.55	3018.82
238.77	3018.51								

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04       0    .035  238.77     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
            0  238.77             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       3
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                .5      48     .012     .012        0                  .5
       1
Number of Barrels =  4
Upstream   Elevation =  3017.24
Centerline Stations
    Sta.    Sta.    Sta.    Sta.
      58      63     120     125
Downstream Elevation =  3017
Centerline Stations
    Sta.    Sta.    Sta.    Sta.
      51      56     120     125

CROSS SECTION


RIVER: One
REACH: River One          RS: 117.38

INPUT
Description:
Station Elevation Data    num=      61
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  3018.3   14.17 3018.03   15.36    301822.62001  3017.8   25.25  3017.7
31.34001 3017.36   35.36 3017.32    35.7 3017.28   36.25 3017.25   36.83 3017.22
```

```
   37.13 3017.24   38.25 3017.01   39.52 3017.01   39.64 3017.43   40.13    3017
42.68001 3016.98   43.89 3018.3845.98001 3018.7546.68001 3019.0946.98001    3017
47.93001 3017.01   48.75    3017   58.11    301758.40001 3018.38   58.94    3021
59.99001    302162.99001 3020.85   80.64 3019.2181.23001 3019.28   84.11 3017.83
85.32001 3017.8886.34001 3017.91   92.81    301897.23001 3018.33   101.7 3018.01
   103.4 3018.01   106.4    3018   107.3    3018  111.95 3019.64  113.97 3020.36
  115.97 3020.89  116.14 3019.16  116.73    3017   126.6    3017  126.93 3018.45
  127.51    3021  129.22    3021  133.86 3019.61  139.14 3019.38  154.95 3020.06
  154.97    3020  155.04 3020.05  156.23    3020  156.33    3020  161.26 3020.41
  166.57 3020.17  179.66 3020.49  208.66 3020.48  214.19 3020.16  234.55 3018.82
  238.77 3018.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04       0    .035  238.77     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  238.77             17.38   17.38   17.38             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 100

INPUT
Description:
Station Elevation Data    num=      69
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 3017.78.9199829 3017.782.290009  3017.8   11.69 3017.7912.65999  3017.8
   13.28  3017.8   14.61 3017.78   15.67 3017.76   36.06 3017.1840.42999    3017
45.12999 3016.7646.01999 3016.72   46.34 3016.6947.67999  3016.753.12999 3016.58
57.14999 3016.5257.26999 3016.5257.34999 3016.53   59.64 3016.53   60.84 3016.54
      61 3016.5462.40999 3016.49   62.72 3016.4963.37999 3016.47   64.86 3016.46
66.29999 3016.4669.95999 3016.5679.95999 3016.73   82.17 3016.78   83.72 3016.81
91.17999    301791.34999    301799.50999 3017.27   105.7 3017.33   108.4 3017.33
  118.45 3017.16  119.48 3017.16  120.09 3017.15  121.03 3017.15  127.18 3017.04
  127.24 3017.03  127.69    3017  128.65    3017  131.05 3016.99  142.79    3017
  143.92 3017.01   144.3 3017.01  146.82 3017.03  147.44 3017.03  147.62 3017.04
  149.25 3017.04  152.03 3017.02  155.61 3017.02  179.42 3017.79  179.65  3017.8
  179.79 3017.81  181.97 3017.77  203.88 3017.47  205.05 3017.47  206.04 3017.46
  207.51 3017.46  208.38 3017.45  222.55 3018.31  237.02 3019.08  239.16 3018.93
  256.81    3017  258.76 3017.73  259.44 3017.72  260.87 3017.64

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0440.42999    .03591.34999     .04
```

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
40.42999	91.34999	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 75

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3016.25	14.59	3016.03	15.02	3016.02	16.28999	3016.01	26.63	3016.07
31.78999	3016	36.62	3015.34	39.73	3015	40.37	3014.8	42.86	3014
43.48	3013.94	44.08	3014	47.5	3014.63	49.72	3015	51.95999	3015.33
56.81	3015.64	58.95999	3015.76	1.84999	3015.74	65.22	3015.82	66.67999	3015.8
72.73999	3015.78	0.92999	3015.95	82.92	3015.92	93.16	3015.97	94.61	3016
95.36	3016	102.88	3016.12	103.21	3016.12	109.7	3016.13	110.71	3016.12
110.99	3016.12	119.81	3016.19	119.93	3016.19	125.93	3016.16	126.15	3016.16
127.72	3016.17	129.75	3016.2	129.95	3016.21	130.16	3016.21	139.87	3016.31
140.04	3016.32	140.16	3016.31	146.52	3016.41	146.77	3016.41	153.34	3016.31
164.96	3016.34	165.24	3016.34	167	3016.32	167.52	3016.32	169.16	3016.35
173.75	3016.42	174.16	3016.43	175.05	3016.43	193.16	3016.53	193.8	3016.53
197.71	3016.51	198.34	3016.51	198.92	3016.52	204.7	3016.56	206.39	3016.55
207.69	3016.55	214.65	3016.51	237.83	3016.42	245.08	3016.43	258.54	3016.48
259.2	3016.48	266.28	3016.5	267.81	3016.49				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	39.73	.035	49.72	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.73	49.72	25	25	.1	.3

CROSS SECTION

RIVER: One
REACH: River One RS: 50

INPUT
Description:
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3014.77	4.75	3014.68	7.200012	3014.67	10.41	3014.58	15.05002	3014.7
15.87003	3014.65	17.43002	3014.53	19.54001	3014.53	20.98001	3014.48	25.55002	3014
26.23001	3013.93	0.62001	3013	32.45001	3012.98	33.58002	3013	34.50002	3013.39

```
36.42001    301440.67001 3014.1741.56001 3014.2646.63002 3014.6353.00002 3014.49
57.38002 3014.3662.51001 3014.4371.97002 3014.6779.89001    301582.33002 3015.03
87.81001 3015.0895.00002 3015.23   106.4 3015.28  109.41  3015.3  114.27 3015.23
  115.08 3015.24  117.46 3015.22  138.03 3015.41  144.65 3015.58  150.54  3015.4
  151.49  3015.4  154.63 3015.33  156.22 3015.35  158.41 3015.36     167 3015.36
  170.75 3015.48  193.61 3015.45  199.04 3015.56  208.88 3015.63  221.09 3015.48
  223.14 3015.46  229.92 3015.42  230.16 3015.42   230.4 3015.43  236.78 3015.44
  248.05  3015.4  257.19 3015.42  263.33 3015.45  271.38 3015.47  273.29 3015.47
  274.57 3015.45  279.05 3015.42  280.64 3015.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .0425.55002    .03536.42001     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      25.5500236.42001                25      25      25             .1       .3

CROSS SECTION


RIVER: One
REACH: River One          RS: 25

INPUT
Description:
Station Elevation Data    num=      69
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 3013.59 4.76001 3013.53 9.51001 3013.67   13.13 3013.52   17.63    3013
20.36002 3012.0920.73001    301220.81003 3011.9920.96002 3011.9922.92001 3011.94
23.82001 3011.9525.14001    301227.21002 3012.6728.45001    301330.64001 3013.08
   31.63  3013.132.06003  3013.136.04001 3013.1339.47002 3013.1143.23001 3013.26
47.27002  3013.358.21002  3013.762.14001 3013.8565.00002    301466.85002 3014.02
68.03001 3014.0379.91002 3014.3588.39001 3014.4791.09001 3014.5293.82001 3014.46
95.62001 3014.4997.79001 3014.56  103.12 3014.64  109.26 3014.51  115.84 3014.39
  117.78 3014.32  119.19 3014.28  122.37 3014.28  130.31 3014.37  136.31    3014
  141.32 3013.78  143.12 3013.82   144.6 3013.84  145.92 3013.85  155.29 3013.78
  159.41 3013.78  165.75  3013.9  167.97 3013.92  172.24    3014  173.45 3014.01
   174.2    3014  176.82 3013.99  177.44    3014  195.39 3014.63  211.76 3014.74
  215.16 3014.81  218.04 3014.83  220.87 3014.83  225.53 3014.78  246.32 3014.62
  246.82 3014.62  254.01 3014.64   259.2 3014.63  276.01 3014.39  284.51 3014.42
  286.23 3014.44  287.31 3014.44  290.98 3014.46  294.14 3014.43

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   17.63    .03532.06003     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
        17.6332.06003             .1       .3
```

SUMMARY OF MANNING'S N VALUES

River:One

Reach	River Sta.	n1	n2	n3
River One	650	.04	.035	.04
River One	625	.04	.035	.04
River One	600	.04	.035	.04
River One	575	.04	.035	.04
River One	550	.04	.035	.04
River One	525	.04	.035	.04
River One	500	.04	.035	.04
River One	475	.04	.035	.04
River One	450	.04	.035	.04
River One	425	.04	.035	.04
River One	406.22	.04	.035	.04
River One	375	Culvert		
River One	325	.04	.035	.04
River One	300	.04	.035	.04
River One	275	.04	.035	.04
River One	250	.04	.035	.04
River One	225	.04	.035	.04
River One	200	.04	.035	.04
River One	175	.04	.035	.04
River One	168.94	.04	.035	.04
River One	150	Culvert		
River One	117.38	.04	.035	.04
River One	100	.04	.035	.04
River One	75	.04	.035	.04
River One	50	.04	.035	.04
River One	25	.04	.035	.04

SUMMARY OF REACH LENGTHS

River: One

Reach	River Sta.	Left	Channel	Right
River One	650	25	25	25
River One	625	25	25	25
River One	600	25	25	25

River One	575	25	25	25
River One	550	25	25	25
River One	525	25	25	25
River One	500	25	25	25
River One	475	25	25	25
River One	450	25	25	25
River One	425	18.78	18.78	18.78
River One	406.22	111.11	111.11	111.11
River One	375	Culvert		
River One	325	25	25	25
River One	300	25	25	25
River One	275	25	25	25
River One	250	25	25	25
River One	225	25	25	25
River One	200	25	25	25
River One	175	6.6	6.6	6.6
River One	168.94	76.56	76.56	76.56
River One	150	Culvert		
River One	117.38	17.38	17.38	17.38
River One	100	25	25	25
River One	75	25	25	25
River One	50	25	25	25
River One	25			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: One

Reach	River Sta.	Contr.	Expan.
River One	650	.1	.3
River One	625	.1	.3
River One	600	.1	.3
River One	575	.1	.3
River One	550	.1	.3
River One	525	.1	.3
River One	500	.1	.3
River One	475	.1	.3
River One	450	.1	.3
River One	425	.1	.3
River One	406.22	.1	.3
River One	375	Culvert	
River One	325	.1	.3
River One	300	.1	.3
River One	275	.1	.3

```
                                ScottsdaleFire05M.rep
River One           250                .1        .3
River One           225                .1        .3
River One           200                .1        .3
River One           175                .1        .3
River One           168.94             .1        .3
River One           150          Culvert
River One           117.38             .1        .3
River One           100                .1        .3
River One           75                 .1        .3
River One           50                 .1        .3
River One           25                 .1        .3
```

RETENTION CALCULATIONS - FIRST FLUSH RETENTION REQUIREMENT

EEC # 16535; SCOTTSDALE FIRE STATION # 616

Drainage Area	Area "A"	Runoff Coef. "C"	Required Volume "V"	Basin #	Elevation Bottom	Top	Depth	Area Bottom	Area Top	Provided Volume	Drywell Quantities	Percolation Rate	Percolation Time (hrs)
Retention Basin Storage													
FIRST FLUSH RETENTION REQUIREMENTS													
DISTURBED AREA + 10%	43,257	1	1,802	BASIN 1			1.00	333	333	333			
				BASIN 2			1.00	342	342	342			
				BASIN 3			1.00	115	115	115			
				BASIN 4			1.00	278	278	278			
TOTAL			***1,802***	BASIN 5			1.00	236	236	236			
				BASIN 6			1.00	955	955	955			
				BASIN 7			1.00	557	557	557			
First Flush	***43,257***	***1***	***1,802***						***TOTAL***	***2,816***	***0***		

Formulas:

1. $V_R = D/12AC$
   where D=0.50 inches (First Flush Rainfall Depth) and A=area in SF
2. Basin Vol = $0.5(A_{TOP} + A_{BOT})$ x Depth
3. C = 1.0 (First Flush)

RETENTION AS-BUILTS

DETENTION BASIN	RETENTION VOLUME REQUIRED (cf)	RETENTION VOLUME PROVIDED (cf)	AS-BUILT VOLUME(cf)
BASIN 1		333	
BASIN 2		342	
BASIN 3		115	
BASIN 4		278	
BASIN 5		236	
BASIN 6		955	
BASIN 7		557	
TOTAL	1,802	2,816	

RETENTION CALCULATIONS

a. Increasing the percent impervious on the L card to reflect the amount of impervious surfaces that will exist under fully developed conditions
b. Recalculate the time of concentration (**Tc**) based on the proposed drainage system, after full development. Normally there should be a reduction in **Tc** after development
c. The existing condition model must be sub-divided, as necessary, to create concentration points which will match the sub-watershed areas above each proposed storage facility under fully developed conditions
d. Each separate storage facility proposed must be modeled as it will physically exist under fully developed conditions with appropriate routing and combining operations through each basin and through the entire watershed. The modeling of storage capacity provided, as one hypothetical reservoir at the outlet with all the upstream storage arbitrarily combined at this one location, is not acceptable
e. As a minimum, the 2, 10 and 100-year frequency events shall be analyzed
f. Comparison of discharge values for existing and post development conditions must be made at concentration points just downstream from each proposed storage facility; other critical locations such as road crossings; and at points where flows exit the proposed development.

4-1.807 CALCULATION OF RUNOFF VOLUMES

The only accepted method for determining the required stormwater storage volume is the standard formula described below. HEC-1 modeling can be used for storage basin design and analysis, or if a pre-versus post volume difference is needed. City ordinance requires on-site storage of runoff from the 100-year, 2-hour frequency event.

A. Standard Formula for Runoff Volumes

$$Vr = (P/12)\,AC$$

Vr = *Required storage volume in acre-feet.*

P = *Precipitation amount = The depth of the 100-year 2-hour rainfall, from figure in Appendix 4-1D at the site.* 2.92

A = *Area in acres; the developed portion of the entire site in acres, to the centerline of adjacent streets, on which any man made change is planned, including, but not limited to: construction, excavation, filling, grading, paving, or mining.*

C = *Runoff coefficient; Rational Method values from Figure 4.1-4.* 0.86

B. HEC-1 Computer Modeling

The HEC-1 model or similar computer program is not to be used to determine the ordinance required 100-year, 2-hour stormwater storage runoff volumes. The HEC-1 program may be used for the purpose of analyzing storage basin routing or for pre versus post analysis (a six-hour storm; procedures described in Section 4-1.806 paragraphs D and E must be used). Use modified Puls level pool routing option in HEC-1 for hydrograph routing through storage basins and lakes. For permanent lakes assume no available storage below the normal water surface elevation.

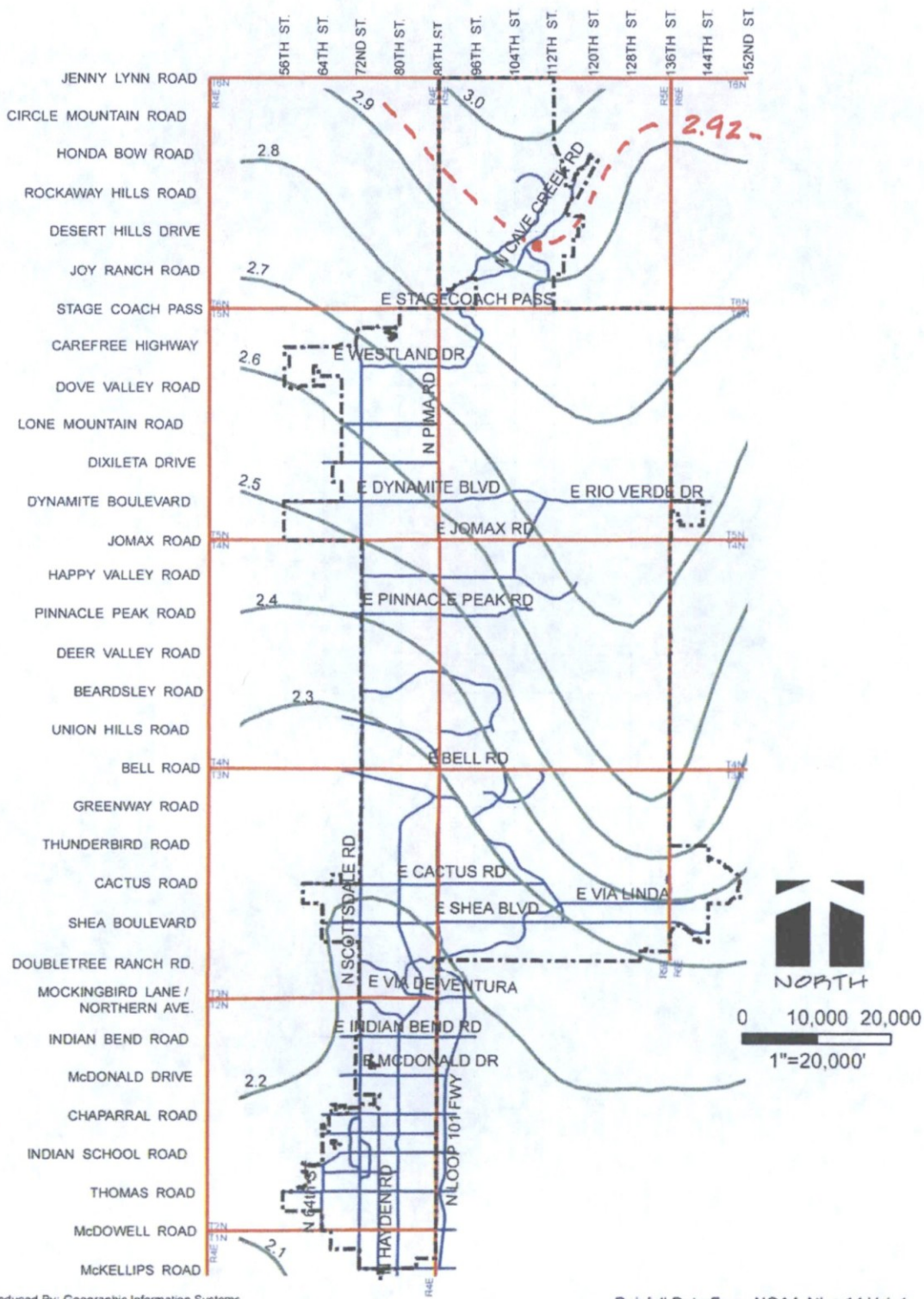
CAUTION: Do not use the built-in orifice equation in the HEC-1 model because errors can result. It is necessary to build a stage discharge table and input to the model.

4-1.808 METHODS FOR ESTIMATING WATER SURFACE ELEVATIONS AND INUNDATION LIMITS

The engineer may use any standard method for the determination of water surface elevations. Only the U.S. Army Corps of Engineers' HEC-2, Water Surface Profiles program and the HEC-RAS, River Analysis System are supported by the City. Prior approval by city staff is required for the use of other methods.

ISOPLUVIALS

100 Year 2 Hour Precipitation in Inches



Map Produced By: Geographic Information Systems
04/03/2009

Rainfall Data From NOAA Atlas 14 Vol. 1

2. Time of Concentration

Time of concentration "**Tc**" is the total time of travel from the most hydraulically remote part of the watershed to the concentration point of interest. The calculation of "Tc" must follow FCDMC Hydrology Manual procedures.

***Note:** **Do not add a standard set amount of time to the estimated "Tc" for lot runoff delay (such as 5 or 10 minutes).** Natural land slopes are too variable in Scottsdale to add a set amount of time for lot runoff.

3. Runoff Coefficients

Use Figure 4.1-4 or equivalent to obtain the runoff coefficients or "**C**" values. Composite "**C**" values for the appropriate zoning category or weighted average values calculated for the specific site are both acceptable approaches.

RUNOFF COEFFICIENTS - "C" VALUE

Land Use	Storm Frequency		
Composite Area-wide Values	2-25 Year	50 Year	100 Year
Commercial & Industrial Areas	0.80	0.83	0.86
Residential Areas-Single Family (average lot size)			
R1-1-1901	0.33	0.50	0.53
R1-130	0.35	0.51	0.59
R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35 (35,000 square feet/lot)	0.40	0.56	0.62
R1-18 (18,000 square feet/lot)	0.43	0.58	0.64
R1-10 (10,000 square feet/lot)	0.47	0.62	0.67
R1-7 (7,000 square feet/lot)	0.51	0.64	0.94
Townhouses (R-2, R-4)	0.63	0.74	0.94
Apartments & Condominiums (R-3, R-5)	0.76	0.83	0.94
Specific Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.90	0.93	0.95
Lawns, golf courses, & parks (grassed areas)	0.20	0.25	0.30
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.37	0.42	045
Desert landscaping (with impervious weed barrier)	0.63	0.73	0.83
Mountain terrain – slopes greater than 10%	0.60	0.70	0.80
Agricultural areas (flood-irrigated fields)	0.16	0.18	0.20

FIGURE 4.1-4 RUNOFF COEFFICIENTS FOR USE WITH RATIONAL METHOD

Culvert Analysis Report
Culvert 1 Pro
(North)

Analysis Component			
Storm Event	Design	Discharge	83.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	83.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	N/A ft

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	4-36 inch Circular	83.00 cfs	3,028.46 ft	6.46 ft/s
Weir	Not Considered	N/A	N/A	N/A

Culvert Analysis Report
Culvert 1 Pro

Component:Culvert-1

Culvert Summary			
Computed Headwater Elevation	3,028.46 ft	Discharge	83.00 cfs
Inlet Control HW Elev.	3,028.25 ft	Tailwater Elevation	N/A ft
Outlet Control HW Elev.	3,028.46 ft	Control Type	Entrance Control
Headwater Depth/Height	0.77		

Grades			
Upstream Invert	3,026.14 ft	Downstream Invert	3,025.80 ft
Length	68.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	1.39 ft
Slope Type	Steep	Normal Depth	1.39 ft
Flow Regime	Supercritical	Critical Depth	1.46 ft
Velocity Downstream	6.46 ft/s	Critical Slope	0.004215 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	4		

Outlet Control Properties			
Outlet Control HW Elev.	3,028.46 ft	Upstream Velocity Head	0.57 ft
Ke	0.50	Entrance Loss	0.29 ft

Inlet Control Properties			
Inlet Control HW Elev.	3,028.25 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	28.3 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Analysis Report
Culvert 2 Pro
(South)

Analysis Component			
Storm Event	Design	Discharge	83.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	83.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	N/A ft

Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	4-36 inch Circular	83.00 cfs	3,019.56 ft	6.46 ft/s
Weir	Not Considered	N/A	N/A	N/A

Culvert Analysis Report
Culvert 2 Pro

Component:Culvert-1

Culvert Summary			
Computed Headwater Elevation	3,019.56 ft	Discharge	83.00 cfs
Inlet Control HW Elev.	3,019.35 ft	Tailwater Elevation	N/A ft
Outlet Control HW Elev.	3,019.56 ft	Control Type	Entrance Control
Headwater Depth/Height	0.77		

Grades			
Upstream Invert	3,017.24 ft	Downstream Invert	3,017.00 ft
Length	48.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	1.39 ft
Slope Type	Steep	Normal Depth	1.39 ft
Flow Regime	Supercritical	Critical Depth	1.46 ft
Velocity Downstream	6.46 ft/s	Critical Slope	0.004215 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	4		

Outlet Control Properties			
Outlet Control HW Elev.	3,019.56 ft	Upstream Velocity Head	0.57 ft
Ke	0.50	Entrance Loss	0.29 ft

Inlet Control Properties			
Inlet Control HW Elev.	3,019.35 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	28.3 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Basin Watersheds - PRE

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: 16535

3/5/2018

ID	Sub Basin Data							Sub Basin Hydrology Summary					
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin ID: 04													
E	0.3	125	32.50	32.20	12.7	0.088	Q (cfs)	0.4	0.5	0.6	0.9	1.1	*1.3*
							C	0.40	0.40	0.40	0.44	0.48	0.50
							CA (ac)	0.11	0.11	0.11	0.12	0.13	0.14
							Volume (ac-ft)	0.0063	0.0068	0.0075	0.0104	0.0119	*0.0136*
							Tc (min)	9	7	7	6	6	6
							i (in/hr)	3.29	4.70	5.80	7.23	8.39	9.48
F	0.2	120	32.50	31.00	66.0	0.091	Q (cfs)	0.2	0.3	0.4	0.5	0.6	*0.8*
							C	0.40	0.40	0.40	0.44	0.48	0.50
							CA (ac)	0.06	0.06	0.06	0.07	0.07	0.08
							Volume (ac-ft)	0.0018	0.0028	0.0037	0.0046	0.0055	*0.0074*
							Tc (min)	5	5	5	5	5	5
							i (in/hr)	3.98	5.36	6.40	7.76	8.81	9.85

* Non default value

Basin Watersheds - POST

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: 16535

3/5/2018

ID	Sub Basin Data							Sub Basin Hydrology Summary					
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin ID: 05													
G	0.3	125	32.50	32.20	12.7	0.044	Q (cfs)	1.0	1.4	1.7	2.0	2.3	2.6
							C	0.95	0.95	0.95	0.95	0.95	0.95
							CA (ac)	0.26	0.26	0.26	0.26	0.26	0.26
							Volume (ac-ft)	0.0101	0.0129	0.0156	0.0184	0.0211	0.0239
							Tc (min)	6	5	5	5	5	5
							i (in/hr)	3.88	5.36	6.40	7.76	8.81	9.85
H	0.2	120	32.50	31.00	66.0	0.045	Q (cfs)	0.6	0.8	0.9	1.1	1.2	1.4
							C	0.95	0.95	0.95	0.95	0.95	0.95
							CA (ac)	0.14	0.14	0.14	0.14	0.14	0.14
							Volume (ac-ft)	0.0055	0.0074	0.0083	0.0101	0.0110	0.0129
							Tc (min)	5	5	5	5	5	5
							i (in/hr)	3.98	5.36	6.40	7.76	8.81	9.85

Basin volume provided in: WS-G is 0.034 ac-ft

WS-H is 0.026 ac-ft

100-yr Discharge From: WS-G will be 0.0 cfs

WS-H will be 0.0 cfs

* Non default value

FIGURE 8

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

EEC, INC.
7740 N. 16TH STREET; SUITE 135
PHOENIX, AZ 85020
PHONE: 602-248-7702
FAX: 602-248-7851

DGN
$TIME$
$DATE$

CITY OF SCOTTSDALE
FIRE STATION # 616
PROJECT NO. BC03
BID NO. XXXXXX

10905 E. LOVING TREE LANE; SCOTTSDALE, AZ 85262
APN 219-60-912A/SECTION 28, T6N, R5E

NO CONFLICT SIGNATURE BLOCK

Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct	Maricopa County Environmental Services Department Water and Waste Management Division
MCESD #	

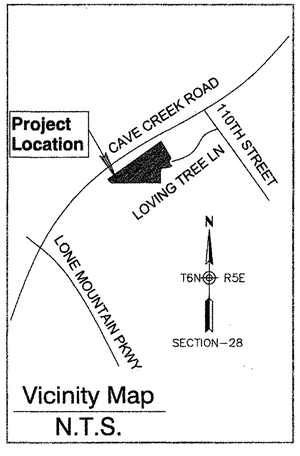
Public Water System ID Number 0407– (and/or) Waste Water System ID Number 0437–
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18; Chapter 4, Article 5; or AAC Title 18; Chapter 9, Article 8; and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: Date Approved:

CC: MCESD FILE; ADEQ
Engineer; AZ. Corp. Commission



Vicinity Map
N.T.S.

90% DBR
MAR. 2018

SHEET INDEX

BENCH MARKS (COS NAVD '88)

No.	Description
1.	THE NORTH 1/4 CORNER OF SECTION 28, TOWNSHIP 6 NORTH, RANGE 5 EAST, BLM MONUMENT ON POST. ELEVATION = 3074.299

City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

SCOTTSDALE FIRE STATION # 616
PROJECT NO. BC03 BID NO. XXXXXX

DR/STAFF APPROVAL NO.

PLAN REVIEW NO.

GENERAL NOTES:

CITY OF SCOTTSDALE FIRE STATION 616
10905 E. LOVING TREE LANE; SCOTTSDALE, ARIZONA 85262
A PORTION OF THE NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 6 NORTH, RANGE 5 EAST OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, SCOTTSDALE, ARIZONA.

GENERAL CONSTRUCTION NOTES FOR CAPITAL PROJECTS

1. All improvement construction shall comply with the latest Maricopa County Association of Governments Standard Specifications and Details for Public Works Construction as amended by the latest version of the City of Scottsdale Supplemental Standard Specifications and Details and City of Scottsdale's Design Standards & Policies Manual (DS&PM). If there is a conflict, the latter shall apply. All facilities construction shall comply with the latest building codes as ammended and adopted by the City of Scottsdale.
2. The engineering designs on these plans are approved by the City in scope and not in detail. If construction quantities are shown on these plans, they are not verified by the City.
3. Based on the information submitted on the plans and associated documents, the City has reviewed and found them to be in accordance with the City's Municipal Code and are acceptable for permit issuance. This acceptance by the City does not authorize violations of any applicable code, ordinance or standard as adopted by the Municipal Code.
4. Approval of the plans by the City is valid for six months. If a permit for the construction has not been issued within six months of review, the plans shall be resubmitted to the City for reapproval.
5. Any deviation from the approved plans shall be reviewed and approved by the City prior to that change being incorporated into the project.
6. A City Capital Projects Inspector will inspect all work within the City rights-of-way, easements and facilities.
7. Any Special Inspection required shall be in addition to any routine inspection by the City.
8. City encroachment and building permits are required for work in public rights-of-way, easements granted for public purposes and facilities. Permits will be issued by the City through the City's One Stop Shop. Copies of all permits shall be retained on-site and shall be available for inspection at all times. Failure to produce the required permits will result in immediate work stoppage until the proper permit documentation is obtained.
9. The contractor shall be responsible for obtaining all necessary permits for salvaging protected native plants prior to the start of construction.
10. Wherever excavation is done contact the Blue Stake Center at (602) 263-1100 two working days before excavation is to begin. The Center will see that the location of the underground utility lines is identified for the project.
11. All excavation and grading which is not in public rights-of-way or in easements granted for public purposes must conform to Section 1803 and Appendix J of the latest International Code Council as adopted and ammended by the City of Scottsdale. A permit for this grading must be secured from the City.
12. Thrust restraint, where required, on all City water lines shall be provided using Megalug mechanical joint restraints or City-approved equal.
13. Any asphalt mix design used on City projects shall have been approved for that use per Section 5-10 the City's DS&PM and appear on the "Approved List of Asphalt Mixes" as distributed by the East Valley Asphalt Committee (EVAC).
14. The Contractor shall be responsible to remove and replace, at no additional cost to the City, any and all pavement, sidewalk, curb and gutter, drainage structures, etc. outside the pay limit that are damaged due to their activities on the project. This includes, but is not limited to, the removal and replacement of newly cracked roadway infrastructure, the removal and replacement of existing cracked roadway infrastructure where the cracks have been enlarged due to the Contractor's operations, the removal and replacement of deformed roadway infrastructure. All sawcuts used for the removal of these items shall be perpendicular and parallel to the centerline controlling that item, or at the direction of the City's Capital Projects Inspector.
15. All Capital Improvement Projects shall meet the procedures and standards for the use of temporary/security fencing around the perimeter of construction sites, as defined in the City's Zoning Ordinance, Article VII, Section 7.700.

NOTE

IN ACCORDANCE WITH AACR18-4-119, ALL MATERIAL ADDED AFTER JAN. 1, 1993 WHICH MAY COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NATIONAL SANITATION FOUNDATION STANDARD 60 AND 61.

GENERAL NOTES FOR SIGNING & PAVEMENT MARKING

1. All pavement markings, signing, and work zone traffic control type and layout need to conform to the latest edition of the Manual on Uniform Traffic Control Devices, http://mutcd.fhwa.dot.gov/index.htm.
2. Work zone traffic control needs to conform to the City of Phoenix "Traffic Barricade Manual" and/or as directed by the City Public Works Inspector or Traffic Engineering Division.
3. Signs are to be installed on telespar prepunched square steel tubing posts per COS Standard Detail No. 2131, www.ScottsdaleAZ.gov/design/COSMAGSupp.
4. Dimensions to signs need to include the sign post, or in the case of multiple posts, the plan view center of the sign.
5. "No Parking" signs shall only be used when the following site conditions exist.
   a. When any right hand lane (curb lane) is 16 feet or wider, or if apaved shoulder area is present.
   b. Where on-street parking could be expected to occur, such as commercial areas where businesses have direct frontage on the street.
   When the above criteria exists "No Parking" signs (R8-3a 12"x18") with an arrow (single direction or bi-directional) below the "P" symbol on the sign to designate the direction of the restriction shall be installed approximately every 350-400 feet along the length of the project. No parking signs shall be installed approximately 5 feet from the back of curb at a 45 degree angle to the curb. Street light poles should be used for sign mounting when a light pole is within 50 feet of the proposed sign location.
6. All longitudinal striping (edge line, lane line, and centerline) shall be 0.090" (90 mil) extruded thermoplastic, unless otherwise noted on the plans.
7. All transverse striping (stop lines, crosswalk lines) shall be a minimum of 0.090" (90 mil) extruded thermoplastic, unless noted otherwise on the plans.
8. All plan view striping dimensions are measured to the center of the line or center of the double line.
9. All pavement symbols, arrows and legends shall be Type 1 permanent, high performance pre-formed pavement tape. (Tape must perform as 3M 380i-ES series or equivalent.)
10. Raised pavement markers (RPMs) shall be used on all striped streets. RPMs shall be installed per COS Standard Detail No. 2132, www.ScottsdaleAZ.gov/design/COSMAGSupp, and ADOT Standard Drawing M-19, with a City approved bituminous adhesive.
11. Blue Type F (2-way reflective) RPMs shall be used to indicate the location of al fire hydrants and remote fire department connections, per COS Standard Detail No. 2363, www.ScottsdaleAZ.gov/design/COSMAGSupp.
12. All existing pavement markings that conflict with proposed markings shall be removed by sandblasting, hydroblasting, or grinding prior to the installation of new pavement markings. Removals shall be to the satisfaction of the City Inspector.
13. ASTM Type IV Sheeting (minimum) shall be used for all warning and regulatory and street name signs. All advance street name and metro signs shall be proposed Type XI sheeting. School warning signs and accompanying placards must be ASTM proposed Type XI fluorescent yellow green sheeting.
14. The contractor is responsible for layout of all pavement markings using control points spaced no more than 50 feet apart. Pavement marking layout shall be approved by Traffic Engineering prior to the application of the final product. All pavement marking drawings are schematic only. The contractor shall follow all dimensions, details, and standards when installing pavement striping, marking and markers.

FLOOD INSURANCE RATE MAP

COMMUNITY NUMBER	PANEL # PANEL DATE	SUFFIX	DATE OF FIRM (Index Date)	FIRM ZONE	BASE FLOOD ELEVATION (In AO Zone, Use Depth)
045012	1310	L	11-04-2015	X	N/A
	10-16-2013				

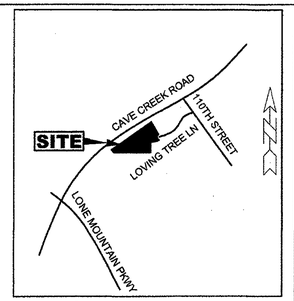
PRIVATE UTILITY NOTES

1. FOR ALL WORK PERFORMED IN THE RIGHT-OF-WAY AND PUBLIC EASEMENTS, MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION (LATEST EDITION INCLUDING LATEST REVISIONS AND CURRENT SUPPLEMENTALS THEREOF PER THE LOCAL JURISDICTION) ARE INCORPORATED INTO THESE PLANS IN THEIR ENTIRETY.
2. ALL WORK PERFORMED ON-SITE SHALL BE IN ACCORDANCE WITH THE UNIFORM PLUMBING CODE. CONTRACTOR SHALL CHECK WITH THE LOCAL JURISDICTION FOR THE LATEST APPROVED EDITION AND ANY LOCAL AMENDMENTS.
3. ALL WORK REQUIRED TO COMPLETE THE CONSTRUCTION COVERED BY THESE PLANS SHALL BE IN ACCORDANCE WITH THE MAG STANDARD SPECIFICATIONS AND DETAILS, 1994 UNIFIED PLUMBING CODE, AND CURRENT SUPPLEMENTS THEREOF PER THE LOCAL JURISDICTION UNLESS SPECIFIED OTHERWISE IN THESE PLANS OR ELSEWHERE. CONTRACTORS SHALL FAMILIARIZE THEMSELVES WITH ALL REQUIRED STANDARD SPECIFICATIONS. DETAILS AND SUPPLEMENTS PRIOR TO BIDDING THE WORK FOR THE CONSTRUCTION COVERED BY THESE PLANS.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL METHODS, SEQUENCING, AND SAFETY USED DURING CONSTRUCTION UNLESS SPECIFICALLY ADDRESSED OTHERWISE IN THESE PLANS OR ELSEWHERE. THE CONTRACTOR IS TO COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS APPLICABLE TO THE CONSTRUCTION COVERED BY THESE PLANS.
6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH ALL PERMITS REQUIRED TO COMPLETE ALL WORK COVERED BY THESE PLANS.
7. THE QUANTITIES AND SITE CONDITIONS DEPICTED IN THESE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND ARE SUBJECT TO ERROR AND OMISSION. CONTRACTORS SHALL SATISFY THEMSELVES AS TO ACTUAL QUANTITIES AND SITE CONDITIONS PRIOR TO BIDDING THE WORK FOR THE CONSTRUCTION COVERED BY THESE PLANS.
8. A REASONABLE EFFORT HAS BEEN MADE TO SHOW THE LOCATIONS OF EXISTING UNDERGROUND FACILITIES AND UTILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND/OR FACILITIES CAUSED DURING THEIR CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL CALL FOR BLUE STAKE (263-1100) PRIOR TO ANY EXCAVATION.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION OF CONSTRUCTION AFFECTING UTILITIES AND THE COORDINATION OF ANY NECESSARY UTILITY RELOCATION WORK.
10. ALL PAVING, GRADING, EXCAVATION, TRENCHING, PIPE BEDDING, AND BACKFILL SHALL COMPLY WITH THE RECOMMENDATIONS SET FORTH IN THE SOILS (GEOTECHNICAL) REPORT FOR THIS PROJECT IN ADDITION TO THE REFERENCED REQUIRED SPECIFICATIONS AND DETAILS.
11. THE CONTRACTOR IS TO VERIFY THE LOCATION AND THE ELEVATIONS OF ALL EXISTING UTILITIES AT POINTS OF TIE-IN PRIOR TO COMMENCING ANY NEW CONSTRUCTION. SHOULD ANY LOCATION OR ELEVATION DIFFER FROM THAT SHOWN ON THESE PLANS, THE CONTRACTOR SHALL CONTACT THE OWNER'S AGENT.
12. CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND SITE LAYOUT WITH ARCHITECTURE'S FINAL SITE PLAN, PLUMBING PLAN, AND FINAL BUILDING DIMENSIONS BEFORE STARTING WORK. REPORT DISCREPANCIES TO OWNER'S AGENT.

LEGAL DESCRIPTION

A PORTION OF NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 6 NORTH, RANGE 5 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, SCOTTSDALE, ARIZONA:

EXCEPT ALL OIL, GAS AND OTHER MINERAL DEPOSITS AS RESERVED IN THE PATENT.



VICINITY MAP N.T.S.

ENGINEER

EEC, INC
7740 N. 16TH STREET, STE. 135
PHOENIX, ARIZONA 85020
TELE: (602) 248-7702
CONTACT: JAKE GRIFFIN
EMAIL: jgriffin@eeccorp.com

ARCHITECT

BRECKENRIDGE GROUP ARCHITECTS/PLANNERS
2740 S. HARDY ROAD
TEMPE, AZ 85282
PHONE: (480) 659-3332
CONTACT: KLINDT BRECKENRIDGE
EMAIL: kbreckenridge@breckenridgearchitects.com

OWNER

CITY OF SCOTTSDALE
7447 E. INDIAN SCHOOL RD, SUITE 205
SCOTTSDALE, AZ 85251
CONTACT: ANNA LEYVA
PHONE: 480-312-7769
EMAIL: aleyva@scottsdaleaz.gov

SITE INFORMATION

SITE ADDRESS: 10905 E. LOVING TREE LANE, SCOTTSDALE, AZ
APN'S: 219-60-912A
ZONING: R1-43
GROSS AREA PER SURVEY: 144,688 SF OR 3.32 AC
LANDFORM: LOWER DESERT
QS#

BENCH MARK

THE NORTH 1/4 CORNER OF SECTION 28, TOWNSHIP 6 NORTH, RANGE 5 EAST, BLM MONUMENT ON POST

ELEVATION = 3074.299 NAVD 88 DATUM

BASIS OF BEARING

A PORTION OF NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 6 NORTH, RANGE 5 EAST.

BEARING = N 89°47'38" E

BENCHMARK CERTIFICATION

I HEREBY CERTIFY THAT ALL ELEVATIONS REPRESENTED ON THIS PLAN ARE BASED ON THE ELEVATION DATUM FOR THE CITY OF SCOTTSDALE BENCHMARK PROVIDED ABOVE.

SURVEY NOTE

THESE PLANS ARE BASED ON BOUNDARY AND TOPOGRAPHIC INFORMATION PREPARED BY MILLER AND SONS SURVEYING, INC. THE ENGINEER, ENGINEERING AND ENVIRONMENTAL CONSULTANTS, INC. ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES ON THESE PLANS ARISING FROM ERRORS WHICH MAY BE WITHIN THE BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN HEREON.

THE EXISTING UTILITIES SHOWN HEREON ARE BASED ON FIELD SURVEYS AND UTILITY MAPS AVAILABLE. SOME UTILITIES MAY NOT BE SHOWN. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITIES (LOCATIONS, SIZES, ELEVATIONS) AFFECTED BY CONSTRUCTION FOR POSSIBLE CONFLICTS. CALL BLUESTAKE PRIOR TO ANY DIGGING.

LEGEND

C.M.U. WALL (4 OR 8 INCH BLOCKS)			
ROAD CENTERLINE		SIGN	
BOUNDARY		WATER METER	
BCHH	BRASS CAP IN HANDHOLE	IRR. CONTROL VALVE	
BCF	BRASS CAP FLUSH	TREE	
FND	FOUND	WATER VALVE	
(M)	MEASURED	BRASS CAP IN HANDHOLE	
SEC	SECTION	BRASS CAP FLUSH	
LF	LINEAR FOOTAGE	SET RBR/CAP RLS#34559 OR AS NOTED	
TW	TOP OF WALL		
G	FINISHED GRADE ELEVATION		
P	PAVEMENT ELEVATION		
C	CONCRETE ELEVATION		
DIP	DUCTILE IRON PIPE		
LF	LOWEST FLOOR ELEVATION		
FF	FINISHED FLOOR ELEVATION		
RCP	REINFORCED CONCRETE PIPE		
INV.	INVERT ELEVATION		

QUANTITIES		
RETAINING WALL	230	LF
SCREEN WALL	308	SY

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

REV.	DATE	DESCRIPTION	CK. BY

CITY OF SCOTTSDALE FIRE STATION #616
10905 E. LOVING TREE LANE
SCOTTSDALE, AZ 85262
LOCATED IN SECTION 28
T 6 N, R 5 E, G&SRM, MARICOPA COUNTY, ARIZONA

SHEET TITLE: GENERAL NOTES/PROJECT INFORMATION

PROJECT TITLE

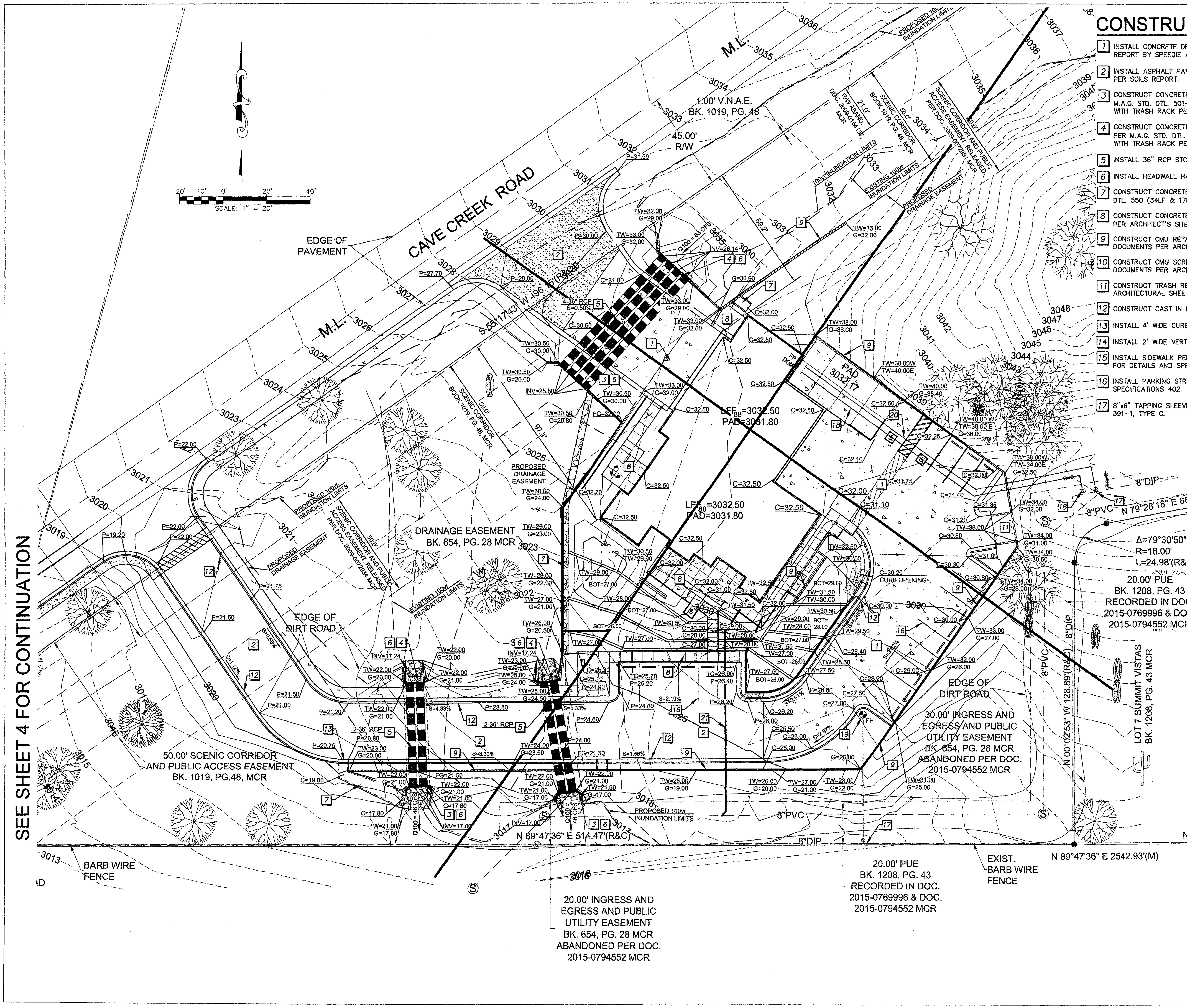
civil engineering • land development
surveying • environmental services
staking • flood control and drainage
transportation

Engineering and Environmental Consultants, Inc.
7740 N. 16th Street, Suite 135 | Phoenix, Arizona 85020
Tel 602.248.7702 | Fax 602.248.7851

DESIGN BY:	JMG
DRAWN BY:	JAR
CHK'D BY:	JMG
DATE:	JANUARY 2018
SCALE:	
EEC NO	16535
DRAWING NO	2 OF 8

CONSTRUCTION NOTES

1. INSTALL CONCRETE DRIVEWAY (8" CONC/COMPACTED SUBGRADE) PER SOILS REPORT BY SPEEDIE AND ASSOCIATES.
2. INSTALL ASPHALT PAVEMENT DRIVEWAY (4" AC/6" ABC/COMPACTED SUBGRADE) PER SOILS REPORT.
3. CONSTRUCT CONCRETE HEADWALL PER M.A.G. STD. DTL. 501-1 (TYPE L & U), WITH TRASH RACK PER M.A.G. STD. DTL. 502-2.
4. CONSTRUCT CONCRETE HEADWALL DROP INLET PER M.A.G. STD. DTL. 501-5 (TYPE L & U), WITH TRASH RACK PER M.A.G. STD. DTL. 502-2.
5. INSTALL 36" RCP STORM DRAIN PIPE.
6. INSTALL HEADWALL HAND RAIL (STEEL)
7. CONSTRUCT CONCRETE SPILLWAY PER M.A.G. STD. DTL. 550 (34LF & 17LF).
8. CONSTRUCT CONCRETE WALKWAY PER ARCHITECT'S SITE PLANS.
9. CONSTRUCT CMU RETAINING WALL, DETAILS TO BE PROVIDED WITH CONSTRUCTION DOCUMENTS PER ARCHITECTURAL AND STRUCTURAL PLANS, STEP AS NECESSARY.
10. CONSTRUCT CMU SCREEN WALL, DETAILS TO BE PROVIDED WITH CONSTRUCTION DOCUMENTS PER ARCHITECTURAL AND STRUCTURAL PLANS, STEP AS NECESSARY.
11. CONSTRUCT TRASH REFUSE ENCLOSURE PER C.O.S. DTL. 2146-1, SEE ARCHITECTURAL SHEET AS3.1.
12. CONSTRUCT CAST IN PLACE CURB PER M.A.G. STD. DTL. 222, TYPE B.
13. INSTALL 4' WIDE CURB OPENING.
14. INSTALL 2' WIDE VERTICAL CURB AND GUTTER PER M.A.G. STD. DTL. 220.
15. INSTALL SIDEWALK PER M.A.G. STD. DTL. 230. SEE ARCHITECTURAL SHEET AS3.1 FOR DETAILS AND SPECIFICATIONS.
16. INSTALL PARKING STRIPING PER CITY OF SCOTTSDALE SUPPLEMENTAL SPECIFICATIONS 402.
17. 8"x6" TAPPING SLEEVE, VALVE BOX AND COVER PER M.A.G. STD. DTL. 340 & 391-1, TYPE C.
18. NEW 2" DOMESTIC WATER METER AND BACKFLOW DEVICE.
19. NEW FIRE HYDRANT PER M.A.G. STD. DTL. 360.
20. 6" DUCTILE IRON PIPE FOR FIRELINE TO BUILDING CONNECTION.
21. INSTALL 4" SEWER TAP PER M.A.G. STD. DTL. 441



SEE SHEET 4 FOR CONTINUATION

CITY OF SCOTTSDALE FIRE STATION #616
10905 E. LOVING TREE LANE
SCOTTSDALE, AZ 85262
LOCATED IN SECTION 28
T 6 N, R 5 E, G&SRM, MARICOPA COUNTY, ARIZONA

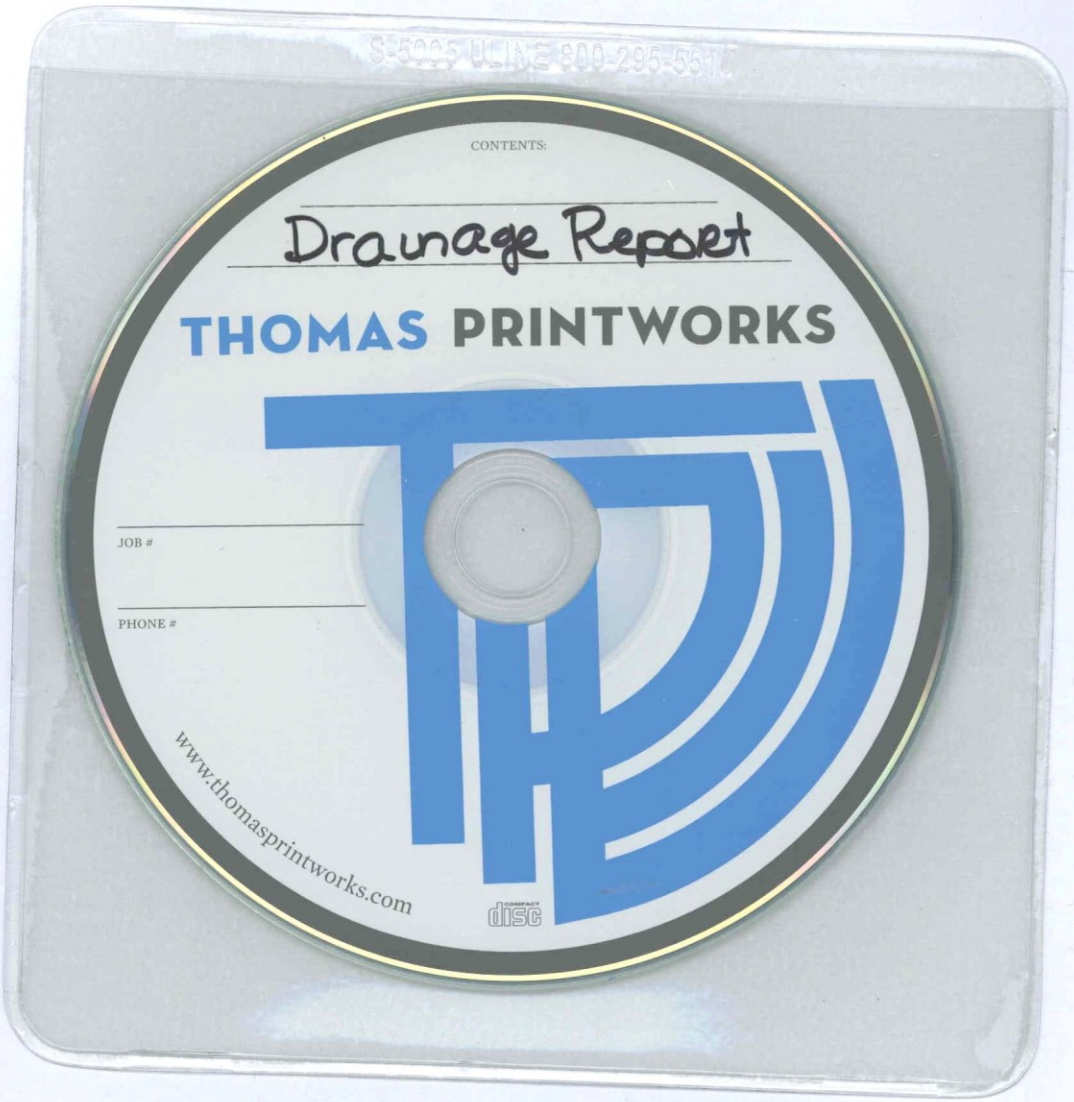
SHEET TITLE: GRADING AND DRAINAGE PLAN

Engineering and Environmental Consultants, Inc.
civil engineering • land development • surveying • environmental services • utilities • flood control and drainage • transportation
7740 N. 16th Street, Suite 135 | Phoenix, Arizona 85020
Tel 602.248.7702 | Fax 602.248.7851

DESIGN BY:	JMG
DRAWN BY:	JAR
CHK'D BY:	JMG
DATE:	JANUARY 2018
SCALE:	
EEC NO	16535
DRAWING NO	3 OF 8

FIGURE 9


CONTENTS:
Scottsdale
Fire Station #10
THOMAS PRINTWORKS
JOB #
PHONE #
www.thomasprintworks.com


S-5995 ULINE 800-295-5510
CONTENTS:
Drainage Report
THOMAS PRINTWORKS
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PHONE #
www.thomasprintworks.com
COMPACT disc