

---

***Abingdon Business Park Hydrology  
and Hydraulics Report***

---



---

**ABINGDON BUSINESS PARK  
HYDROLOGY AND HYDRAULICS REPORT**

**Haha Branch and Unnamed Tributaries  
Harford County, Maryland**

---

PREPARED FOR:

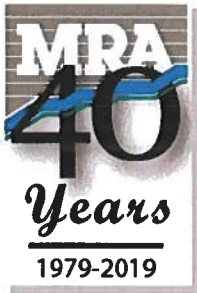
**Harford Investors LLP**  
856 Elkridge Landing Road  
Linthicum, MD 21090  
Attn: Mr. Tom Huber  
410.859.8000 Ext. 12

**CREG Westport I, LLC**  
1343 Ashton Road, Suite B  
Hanover, MD 21076  
Attn: Mr. James P. Lighthizer  
443.883.8187



**Professional Certification**

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Maryland, License No. 52018,  
Expiration Date: 12/12/2019



PREPARED BY:

**MORRIS & RITCHIE ASSOCIATES, INC.**

ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS, AND LANDSCAPE ARCHITECTS  
3445-A Box Hill Corporate Center Drive  
Abingdon, Maryland 21009  
(410) 515-9000  
FAX (410) 515-9002  
MRA Project No. 19872  
CONTACT: Jeremy W. Sandmeier, P.E.

February 25, 2019



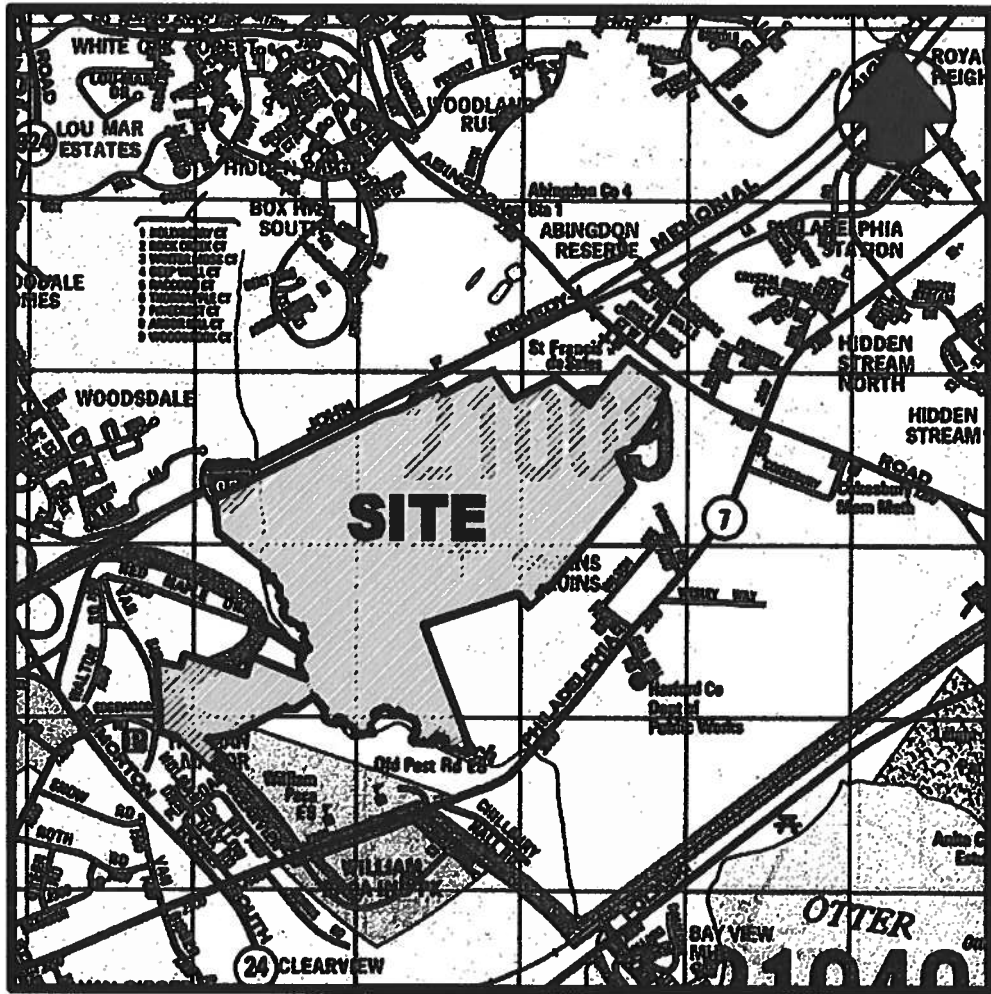


## Table of Contents

VICINITY MAP .....	3
INTRODUCTION.....	4
LAND COVER AND TOPOGRAPHY .....	4
METHODOLOGY.....	4
HYDRAULIC ANALYSIS.....	5
HEC-RAS TABLE 1 SUMMARY .....	6
FIGURES (SITE PHOTOS).....	7
WEB SOIL SURVEY DATA.....	APP A
HARFORD COUNTY ZONING MAPS .....	APP B
HYDROLOGY (TR-55 AND CROSS SECTION DATA).....	APP C
TR-20 OUTPUT .....	APP D
HEC-RAS OUTPUT .....	APP E
DRAINAGE AREA MAP .....	ENCLOSED
HYDROLOGY AND HYDRULIC WORKMAP .....	ENCLOSED



MAP COPYRIGHT © ADC THE MAP PEOPLE (800) 829-6277  
PERMITTED USE NUMBER 21006237  
MAP No. 24 GRID B8-B11 C8-C11 D8-D11 EB-E11



**VICINITY MAP**







## **INTRODUCTION**

Abingdon Business Park is located between Edgewood Road and Abingdon Road, south of I-95, west of the Town of Abingdon in Harford County, Maryland. The site encompasses approximately 326.4 acres. Plans for the development of this site include retail and commercial areas, large scale distribution, warehouse areas and the associated infrastructure (streets, open space, utilities, etc.). Several existing residential developments border the property, including Autumn Run and Pomeroy Manor. The site is accessible to Edgewood Road and Abingdon Road.

The purpose of this report is to present our hydrologic and hydraulic analysis for Haha Branch and two unnamed tributaries from now on called "UT-1" and "UT-2". Haha Branch flows from north to south through the western portion of the site with a drainage area of 837.09 acres. UT-1 and UT-2 combined drainage area is 133.42 acres. The study reach extends from the point where the stream meets the north property line to a point 150 ft. downstream of the existing culvert at Philadelphia Road and into the Bush River (Use I waters). The study along this portion of the stream includes a proposed 220' bridge along Edgewood Road spanning Haha Branch and two proposed culverts crossing the unnamed tributaries.

## **LAND COVER AND TOPOGRAPHY**

The entire on-site area is classified as woods, the off-site areas are 48% residential, 18% commercial, 19% woods, 11% open space and 5% other paved and impervious areas. The site elevations range from a minimum of approximately 18 feet above mean sea level to 160 feet above mean sea level. The Haha Branch exhibits an average bed slope of 0.7% over the 8500-foot length of the study.

Aerial photogrammetry, field survey and County topographic maps were used to study the area.

All elevations published in this report are on the NAVD '88 datum.

## **METHODOLOGY**

### ***HYDROLOGY***

The hydrologic method used in this study is the USDA, NRCS Runoff Curve Number Method. TR-55 was used to calculate curve numbers and times of concentration, which were then input with other data into the TR-20 computer program. The watershed was mapped using the County's topographical maps for off-site areas. The total watershed above Philadelphia Road encompasses approximately 1190 acres.

As prescribed in COMAR, the 2, 10 and 100-year discharges were calculated. All discharges published in this report assume fully developed (i.e., ultimate) conditions within the watershed. As the vast majority of the watershed is developed, the existing land uses plans were used. The estimate of ultimate development runoff from off-site areas not fully built-out was based on current zoning. Soils were taken from the Harford County Soil Survey and off-site zoning was taken from the latest County zoning maps. The zoning and soil survey maps are located in Appendix A of this report.

Supplemental TR-55 computations are provided as Appendix B. The TR-20 output is provided as Appendix C. Our Drainage Area Map is included at the back of this report.





## **HYDRAULICS**

The Army Corps of Engineers' Hydrologic Engineering Center – River Analysis System (HEC-RAS), version 5.0.5., was used to model the water surface profiles along Haha Branch, UT-1 and UT-2. As prescribed in COMAR, the 2, 10 and 100-year storms were modeled. Channel dimensions and Manning's roughness coefficients were based on topographic maps, supplemented by field-run surveys and a visual inspection of the stream channel and over-banks. Refer to Figures 1 through 5 for representative photographs. A subcritical profile was used with critical depth as the upstream and downstream boundary conditions. Critical depth was used due to culvert conditions at each boundary.

As stated above, the Manning's 'n' values used in the HEC-RAS model were based on a visual examination of the stream channel and overbanks. The following is a list of 'n' values used in the hydraulic model:

- 0.035 stream channel, moderate vegetation
- 0.013 concrete pipes and culverts
- 0.1 overbank - heavy stand of timber with little undergrowth

## **HYDRAULIC ANALYSIS**

### **SUMMARY OF HYDRAULIC COMPUTATION RESULTS**

The stream was modeled using a mixed flow regime to determine the water surface elevations within the project. Table 1 below presents a summary of the calculated 100-year water surface elevations. The HEC-RAS summary output, profile, and section plots are provided as Appendix C.

The 100-year water surface elevations are plotted on the Workmap included at the back of this report and summarized in Table 1 below. Table 1 is provided only as a brief summary of the hydraulic analyses – for more detailed information refer to the HEC-RAS output provided in Appendix C. The following report demonstrates the proposed structures pass the 100-year storm event without overtopping in the proposed condition and all increases in WSEL are contained entirely within the subject property. No offsite properties are adversely impacted.

## **PROPOSED STRUCTURES**

Three proposed crossings were analyzed. A bridge crossing the Haha Branch at Edgewood Road will have a span of 220 ft. and three circular piers with 4 ft. of diameter located halfway between the abutments. For the crossing at UT-1, a culvert with 2 concrete pipes with diameters of 5 ft. and 7. is proposed. Lastly, a single 5 ft. diameter concrete pipe has been proposed for the crossing at UT-2.





**Table 1**  
**Summary of 100-Year Water Surface Elevations (WSEL)**

RIVER STATION	ULTIMATE 100-YEAR DISCHARGE (CFS) <sup>2/</sup>	EXISTING 100-YEAR WSEL	PROPOSED 100-YEAR WSEL	Δ WSEL <sup>1/</sup> (FT)
<b>Haha Branch</b>				
9078.4	2745.10	74.15	74.15	-
8779.29	2745.10	71.55	71.55	-
8572.51	2745.10	69.75	69.75	-
8261.16	2745.10	67.35	67.35	-
8100	2745.10	65.51	65.51	-
7810.89	2745.10	63.33	63.33	-
7359.83	2797.70	61.58	61.58	-
7006.74	2797.70	60.47	60.47	-
6757.1	2797.70	59.71	59.71	-
6586.23	2836.80	57.87	57.87	-
6239.67	2836.80	56.14	56.14	-
5866.54	2836.80	54.18	54.18	-
5697.52	2836.80	53.50	53.50	-
5460.15	2836.80	51.26	51.26	-
5278.56	2836.80	48.48	48.48	-
5069.91	2928.30	47.72	47.78	+0.06
5033.47	<b>Proposed Bridge</b>			
4985.35	2928.30	47.53	47.53	-
4738.83	2928.30	46.80	46.80	-
4602.96	2928.30	46.15	46.15	-
4483.54	2928.30	45.28	45.28	-
3955.74	3110.30	41.15	41.15	-
3335.56	3110.30	37.21	37.21	-
2787.62	3110.30	34.38	34.38	-
2077.75	3110.30	28.51	28.51	-
1335.32	3110.30	25.19	25.19	-
597.58	3110.30	23.37	23.37	-
246.87	4483.70	23.03	23.03	-
218.47	4483.70	23.04	23.04	-
214	4483.70	22.92	22.92	-
172	<b>Existing Culvert at Route 7</b>			
161.2561	4483.70	23.06	23.06	-
149.62	4483.70	19.96	19.96	-
131.14	4483.70	18.89	18.89	-
0	4483.70	16.55	16.55	-





RIVER STATION	ULTIMATE 100-YEAR DISCHARGE (CFS) <sup>2/</sup>	EXISTING 100-YEAR WSEL	PROPOSED 100-YEAR WSEL	Δ WSEL <sup>1/</sup> (FT)
<b>Unnamed Tributary Branch - 1</b>				
6060.38	536.70	91.15	91.15	-
5432.19	536.70	79.63	79.63	-
5183.4	536.70	76.22	76.66	+0.44
4840.7	536.70	71.00	76.75	+5.75
4680.49	Proposed Culvert			
4546.75	804.70	66.29	66.61	+0.32
4350.57	804.70	62.84	62.63	-0.21
4132.52	804.70	59.95	59.95	-
3942.05	804.70	56.88	56.88	-
<b>Unnamed Tributary Branch - 2</b>				
442.34	6.30	109.19	109.19	-
351.61	61.30	100.30	100.30	-
262.21	221.30	95.68	90.99	-4.69
188.75	Proposed Culvert			
106.07	221.30	87.87	84.45	-3.47
24.19	221.30	83.62	83.62	-

**Note:**

1. All increases in WSEL are contained entirely within the subject property – no off-site properties are adversely impacted.
2. 'Ultimate Discharge' reflects ultimate conditions per zoning and ignoring any stormwater management facilities.





Figure 1

**Photographs of Typical Reach along the Haha Branch**

















**Figure 2**

**a) Box culvert at I-95 (upstream)**



**b) Box culvert at I-95 (downstream)**







**c) Stream channel upstream of I-95**



**d) Stream channel downstream of I-95**







**Figure 3**

**a) Circular culvert at Route 7 (upstream)**



**b) Circular culvert at Route 7 (downstream)**







Figure 4

**Junction of unnamed tributary and Haha Branch**



Figure 5

**Pipe arch culvert at Four Seasons Drive (downstream)**





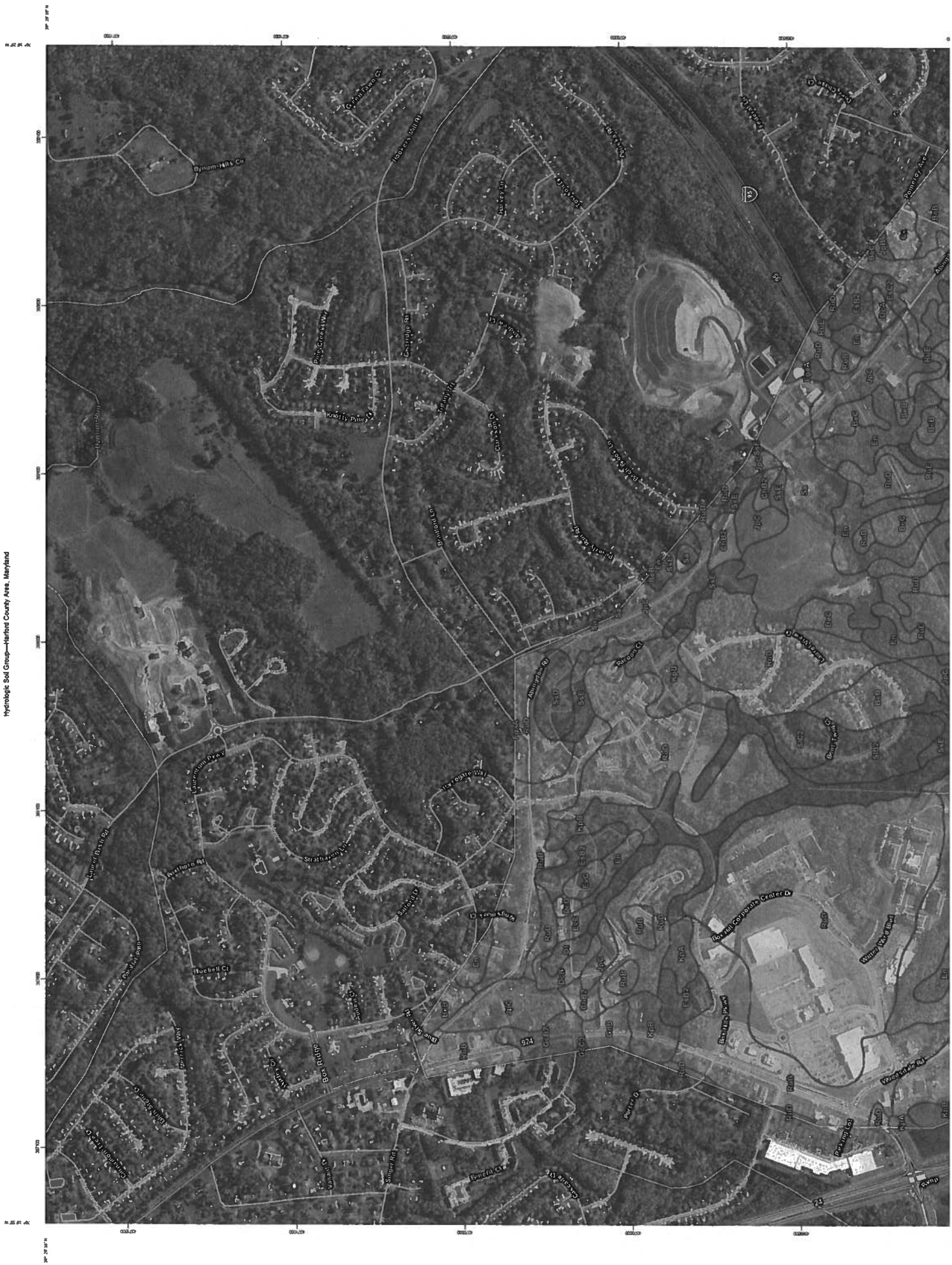


**APPENDIX A**  
**WEB SOIL SURVEY DATA**





Hydrologic Soil Group—Harford County Area, Maryland





### 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

**Water Features**  
 Streams and Canals

**Transportation**  
 Rails   
 Interstate Highways   
 US Routes   
 Major Roads   
 Local Roads

**Background**  
 Aerial Photography

**Soil Rating Points**  
 A   
 A/D   
 B   
 B/D   
 C   
 C/D   
 D   
 Not rated or not available

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 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: Harford County Area, Maryland  
 Survey Area Data: Version 12, Sep 14, 2018

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

Date(s) aerial images were photographed: Jun 16, 2014—Oct 20, 2017

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BeA	Beltsville silt loam, 0 to 2 percent slopes	C	5.7	0.4%
BeB	Beltsville silt loam, 2 to 5 percent slopes	C	176.1	12.0%
BeC	Beltsville silt loam, 5 to 10 percent slopes	C	89.6	6.1%
ChB2	Chillum silt loam, 2 to 5 percent slopes, moderately eroded	C	75.2	5.1%
Cx	Cut and fill land		3.1	0.2%
DcA	Delanco silt loam, 0 to 3 percent slopes	C	4.6	0.3%
DcB	Delanco silt loam, 3 to 8 percent slopes	C	45.3	3.1%
En	Elkton silt loam	C/D	44.3	3.0%
EsB2	Elsinboro loam, 2 to 5 percent slopes, moderately eroded	B	38.7	2.6%
EsC2	Elsinboro loam, 5 to 10 percent slopes, moderately eroded	B	22.3	1.5%
EvC	Evesboro loamy sand, 5 to 15 percent slopes	A	4.3	0.3%
FgaA	Fallsington loams, 0 to 2 percent slopes, Northern Coastal Plain	C/D	11.0	0.7%
GcB2	Glenelg loam, 3 to 8 percent slopes	B	5.5	0.4%
GcC3	Glenelg loam, 8 to 15 percent slopes, severely eroded	B	0.2	0.0%
GnB	Glenville silt loam, 3 to 8 percent slopes	C/D	15.1	1.0%
HcA	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	B/D	101.6	6.9%
JpB	Joppa gravelly sandy loam, 2 to 5 percent slopes	A	0.9	0.1%
JpC	Joppa gravelly sandy loam, 5 to 10 percent slopes	A	94.3	6.4%



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
KpA	Keyport silt loam, 0 to 2 percent slopes	D	17.5	1.2%
KpB	Keyport silt loam, 2 to 5 percent slopes	D	33.4	2.3%
MlaB	Mattapex silt loam, 2 to 5 percent slopes, northern coastal plain	C	6.2	0.4%
Ot	Othello silt loams, 0 to 2 percent slopes, northern coastal plain	C/D	2.1	0.1%
RuB	Russett fine sandy loam, 0 to 5 percent slopes	C	165.3	11.2%
RuD	Russett fine sandy loam, 5 to 15 percent slopes	C	342.4	23.2%
RuE	Russett fine sandy loam, 15 to 30 percent slopes	C	44.1	3.0%
Sa	Sand and gravel pits	A	37.3	2.5%
ShaB	Sassafras sandy loam, 2 to 5 percent slopes, Northern Coastal Plain	B	2.4	0.2%
ShaC	Sassafras sandy loam, 5 to 10 percent slopes, Northern Coastal Plain	B	0.0	0.0%
SIB2	Sassafras loam, 2 to 5 percent slopes	B	13.6	0.9%
SIC2	Sassafras loam, 5 to 10 percent slopes, moderately eroded	B	8.8	0.6%
SsD	Sassafras and Joppa soils, 10 to 15 percent slopes	B	13.1	0.9%
SsE	Sassafras and Joppa soils, 15 to 30 percent slopes	B	24.9	1.7%
WoaB	Woodstown loam, 2 to 5 percent slopes, Northern Coastal Plain	C	24.1	1.6%
<b>Totals for Area of Interest</b>			<b>1,472.9</b>	<b>100.0%</b>





## 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





**APPENDIX B**  
**HARFORD COUNTY ZONING MAPS**





**ZONING CLASSIFICATIONS**

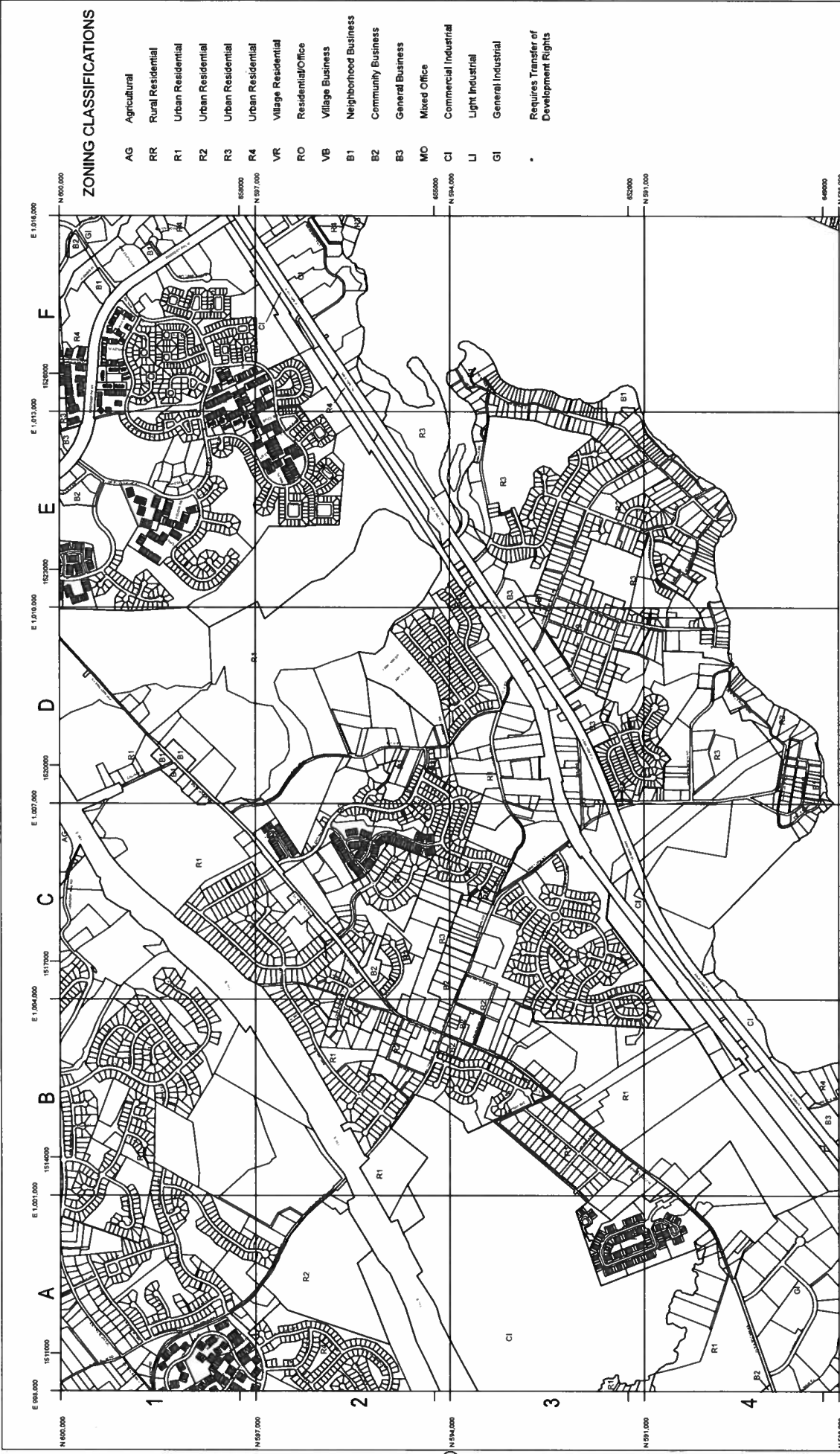
- AG Agricultural
- RR Rural Residential
- R1 Urban Residential
- R2 Urban Residential
- R3 Urban Residential
- R4 Urban Residential
- VR Village Residential
- RD Residential/Office
- VB Village Business
- B1 Neighborhood Business
- B2 Community Business
- B3 General Business
- MO Mixed Office
- CI Commercial Industrial
- LI Light Industrial
- GI General Industrial
- . Requires Transfer of Development Rights



MAP PRODUCED BY  
 HARFORD COUNTY DEPARTMENT OF PLANNING AND ZONING  
 COMMUNITY PLANNING DIVISION  
 1000 W. BALTIMORE AVENUE, SUITE 200  
 HARFORD, MD 21144  
 410.326.7000  
 WWW.HARFORDCOUNTYMD.GOV  
 MAPS AND ZONING INFORMATION  
 SHOULD BE REFERENCED TO THE LATEST EDITION  
 OF THE CODE.

**HARFORD COUNTY 2009 ZONING MAP**  
 DEPARTMENT OF PLANNING AND ZONING





**ZONING CLASSIFICATIONS**

- AG Agricultural
- RR Rural Residential
- R1 Urban Residential
- R2 Urban Residential
- R3 Urban Residential
- R4 Urban Residential
- VR Village Residential
- RC Residential/Office
- VB Village Business
- B1 Neighborhood Business
- B2 Community Business
- B3 General Business
- MC Mixed Office
- CI Commercial Industrial
- LI Light Industrial
- GI General Industrial
- Requires Transfer of Development Rights

MAP PRODUCED BY  
 HARFORD COUNTY DEPARTMENT OF PLANNING AND ZONING  
 1000 BALDWIN STREET, HARFORD COUNTY, MARYLAND  
 21076-1000  
 HARFORD COUNTY DEPARTMENT OF PLANNING AND ZONING  
 1000 BALDWIN STREET, HARFORD COUNTY, MARYLAND  
 21076-1000



57

58

63

61







**APPENDIX C**  
**HYDROLOGY (TR-55 & CROSS SECTIONS DATA)**



WinTR-55 Current Data Description

--- Identification Data ---

User: RFernandez Date: 12/28/2018  
 Project: Abingdon Business Park Units: English  
 SubTitle: #19872 Areal Units: Acres  
 State: Maryland  
 County: Harford NOAA\_C  
 Filename: \\psmc-data\cadfiles\19872\DOCUMENTS\H&H\TR-55\19872 HH-HaHa BRANCH-2018.w55

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
O1		Outlet	162.86	86	0.600
O3		Outlet	122.4	86	.417
O2		Outlet	257.07	81	.651
O4		Outlet	32.26	82	0.309
O5		Outlet	38.48	74	.142
O8		Outlet	78.62	74	.434
O6		Outlet	119.22	94	0.100
O7		Outlet	74.07	94	0.100

Total area: 884.98 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.26	4.19	5.0	6.25	7.34	8.58	2.69

Storm Data Source: Harford NOAA\_C County, MD (NRCS)  
 Rainfall Distribution Type: Type II  
 Dimensionless Unit Hydrograph: <standard>

RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.26	4.19	5.0	6.25	7.34	8.58	2.69

Storm Data Source: Harford NOAA\_C County, MD (NRCS)  
Rainfall Distribution Type: Type II  
Dimensionless Unit Hydrograph: <standard>

RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
O1	162.86	0.600	86	Outlet	
O3	122.40	0.417	86	Outlet	
O2	257.07	0.651	81	Outlet	
O4	32.26	0.309	82	Outlet	
O5	38.48	0.142	74	Outlet	
O8	78.62	0.434	74	Outlet	
O6	119.22	0.100	94	Outlet	
O7	74.07	0.100	94	Outlet	

Total Area: 884.98 (ac)

RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
-----							
O1							
SHEET	100	0.1800	0.011				0.008
SHALLOW	1298	0.0447	0.050				0.106
CHANNEL	2460					4.000	0.171
CHANNEL	4536					4.000	0.315
							Time of Concentration
							0.600
							=====
O3							
SHEET	100	0.1599	0.240				0.103
SHALLOW	158	0.1844	0.050				0.006
CHANNEL	4436					4.000	0.308
							Time of Concentration
							.417
							=====
O2							
SHEET	100	0.0296	0.240				0.201
SHALLOW	248	0.0565	0.025				0.014
SHALLOW	1828	0.0565	0.025				0.105
CHANNEL	4773					4.000	0.331
							Time of Concentration
							.651
							=====
O4							
SHEET	100	0.2749	0.400				0.124
SHALLOW	1002	0.0397	0.050				0.087
CHANNEL	1411					4.000	0.098
							Time of Concentration
							0.309
							=====
O5							
SHEET	100	0.0640	0.011				0.013
SHALLOW	1987	0.0442	0.025				0.129
							Time of Concentration
							.142
							=====
O8							
SHEET	100	0.0150	0.011				0.022
SHALLOW	2091	0.0460	0.050				0.168
CHANNEL	3516					4.000	0.244
							Time of Concentration
							.434
							=====
O6							
User-provided							0.100
							Time of Concentration
							0.100
							=====
O7							
User-provided							0.100
							Time of Concentration
							0.100

RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Sub-Area Time of Concentration Details (continued)

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
-------------------------	------------------------	------------------	-----------------	------------------------	-----------------------------	----------------------	------------------------

-----  
=====



RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
O1	User defined urban (Click button or	A	15.79	76
	User defined urban (Click button or	B	18.12	81
	User defined urban (Click button or	C	99.85	89
	User defined urban (Click button or	D	29.1	87
	Total Area / Weighted Curve Number		162.86	86
		=====	==	
O3	User defined urban (Click button or	B	3.91	75
	User defined urban (Click button or	C	103.43	86
	User defined urban (Click button or	D	15.06	88
	Total Area / Weighted Curve Number		122.4	86
		=====	==	
O2	User defined urban (Click button or	A	20.71	45
	User defined urban (Click button or	B	36.08	71
	User defined urban (Click button or	C	153.77	84
	User defined urban (Click button or	D	46.51	83
	Total Area / Weighted Curve Number		257.07	81
		=====	==	
O4	User defined urban (Click button or	B	1.42	71
	User defined urban (Click button or	C	26.53	82
	User defined urban (Click button or	D	4.31	88
	Total Area / Weighted Curve Number		32.26	82
		=====	==	
O5	User defined urban (Click button or	A	3.62	47
	User defined urban (Click button or	B	2.6	65
	User defined urban (Click button or	C	26.1	77
	User defined urban (Click button or	D	6.16	82
	Total Area / Weighted Curve Number		38.48	74
		=====	==	
O8	User defined urban (Click button or	A	4.59	36
	User defined urban (Click button or	B	3.78	60
	User defined urban (Click button or	C	61.38	76
	User defined urban (Click button or	D	8.87	79
	Total Area / Weighted Curve Number		78.62	74
		=====	==	
O6	Commercial & business	A	7.039	89
	Commercial & business	B	5.01	92
	Commercial & business	C	93.284	94
	Commercial & business	D	13.884	95
	Total Area / Weighted Curve Number		119.22	94
		=====	==	
O7	Commercial & business	A	2.122	89
	Commercial & business	B	5.033	92
	Commercial & business	C	54.778	94
	Commercial & business	D	12.139	95

RFernandez

Abingdon Business Park  
#19872  
Harford NOAA\_C County, Maryland

Sub-Area Land Use and Curve Number Details (continued)

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
-----				
Total Area / Weighted Curve Number			74.07	94
			=====	==



<b>SUB-AREA 1</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	6.758	5.325	42.216	8.409
Open space (good)	0.000	0.000	1.506	2.116
Residential 1/8 acres	5.382	6.091	37.535	2.974
Residential 1/4 acres	1.468	3.955	3.175	7.016
Residential 1/2 acres	0.000	0.159	7.030	0.753
Residential 1 acres	0.536	0.000	0.940	0.000
Woods (fair)	1.641	2.593	7.450	7.833
<b>Total Area (acres)</b>	<b>15.79</b>	<b>18.12</b>	<b>99.85</b>	<b>29.10</b>
<b>Composite CN</b>	<b>76</b>	<b>81</b>	<b>89</b>	<b>87</b>

<b>SUB-AREA 2</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	0.000	0.000	37.731	1.331
Open space (good)	8.254	1.910	20.673	7.100
Paved, open ditches w/right of way	0.000	1.087	6.521	3.447
Residential 1/4 acres	5.380	24.620	69.558	13.286
Residential 2 acres	3.387	2.118	0.950	0.207
Woods (fair)	3.690	6.349	18.340	21.139
<b>Total Area (acres)</b>	<b>20.71</b>	<b>36.08</b>	<b>153.77</b>	<b>46.51</b>
<b>Composite CN</b>	<b>45</b>	<b>71</b>	<b>84</b>	<b>83</b>

<b>SUB-AREA 3</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	0.000	0.000	33.526	2.863
Paved, open ditches w/right of way	0.000	0.000	8.244	1.518
Residential 1/4 acres	0.000	3.912	48.279	7.882
Residential 1/2 acres	0.000	0.000	0.489	0.000
Woods (fair)	0.000	0.000	12.895	2.800
<b>Total Area (acres)</b>	<b>-</b>	<b>3.91</b>	<b>103.43</b>	<b>15.06</b>
<b>Composite CN</b>	<b>-</b>	<b>75</b>	<b>86</b>	<b>88</b>

<b>SUB-AREA 4</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	0.000	0.000	6.321	1.943
Residential 1 acres	0.000	1.239	5.604	0.615
Residential 2 acres	0.000	0.000	12.829	1.751
Paved, open ditches w/right of way	0.000	0.181	1.773	0.000
<b>Total Area (acres)</b>	<b>-</b>	<b>1.42</b>	<b>26.53</b>	<b>4.31</b>
<b>Composite CN</b>	<b>-</b>	<b>71</b>	<b>82</b>	<b>88</b>



<b>SUB-AREA 5</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Residential 1 acres	0.429	0.249	5.673	0.466
Residential 2 acres	3.186	2.351	20.431	5.694
<b>Total Area (acres)</b>	<b>3.62</b>	<b>2.60</b>	<b>26.10</b>	<b>6.16</b>
<b>Composite CN</b>	<b>47</b>	<b>65</b>	<b>77</b>	<b>82</b>

<b>SUB-AREA 6*</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	7.039	5.010	93.284	13.884
<b>Total Area (acres)</b>	<b>7.04</b>	<b>5.01</b>	<b>93.28</b>	<b>13.88</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 7*</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	2.122	5.033	54.778	12.139
<b>Total Area</b>	<b>2.12</b>	<b>5.03</b>	<b>54.78</b>	<b>12.14</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 8</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Impervious	0.000	0.000	5.312	0.000
Open space	0.000	0.000	22.036	0.352
Residential 1/2 acres	0.000	0.000	2.835	0.000
Woods (fair)	4.586	3.782	31.196	8.523
<b>Total Area (acres)</b>	<b>4.59</b>	<b>3.78</b>	<b>61.38</b>	<b>8.87</b>
<b>Composite CN</b>	<b>36</b>	<b>60</b>	<b>76</b>	<b>79</b>

\* On-site areas



<b>SUB-AREA 9</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	3.366	0.867	0.850	0.830
Open space (poor)	19.722	1.760	2.179	5.609
Paved, open ditches w/right of way	0.645	0.000	4.766	0.000
Paved, curbs and storm sewers	4.196	0.379	0.000	0.000
Residential 1 acres	1.366	0.000	0.881	0.503
Woods (fair)	0.693	0.000	19.145	9.566
<b>Total Area (acres)</b>	<b>29.99</b>	<b>3.01</b>	<b>27.82</b>	<b>16.51</b>
<b>Composite CN</b>	<b>73</b>	<b>85</b>	<b>78</b>	<b>83</b>

<b>SUB-AREA 10</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	2.970	0.000	2.964	0.355
<b>Total Area</b>	<b>2.97</b>	<b>0.00</b>	<b>2.96</b>	<b>0.36</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 11*</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	2.386	0.251	34.754	7.145
<b>Total Area</b>	<b>2.39</b>	<b>0.25</b>	<b>34.75</b>	<b>7.14</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 12*</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	0.000	1.178	7.903	5.924
<b>Total Area</b>	<b>0.00</b>	<b>1.18</b>	<b>7.90</b>	<b>5.92</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 13*</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Commercial	0.000	4.522	58.271	11.079
<b>Total Area</b>	<b>0.00</b>	<b>4.52</b>	<b>58.27</b>	<b>11.08</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

<b>SUB-AREA 14</b>				
<b>Land Use</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Residential 1/4 acres	20.799	18.245	58.346	7.371
Residential 1/8 acres	0.000	1.646	27.525	2.432
<b>Total Area</b>	<b>20.80</b>	<b>19.89</b>	<b>85.87</b>	<b>9.80</b>
<b>Composite CN</b>	<b>Calculated with TR-55</b>			

\* On-site areas

## Cross Section for Irregular Section - 1

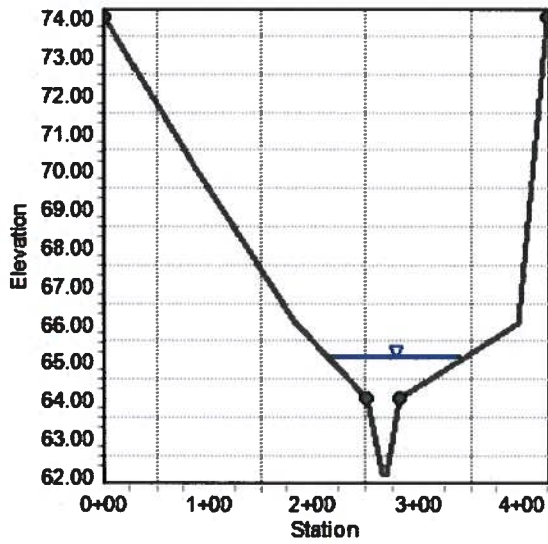
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                            0.00560    ft/ft  
Normal Depth                            3.04        ft  
Discharge                                200.00    ft<sup>3</sup>/s

### Cross Section Image



## Cross Section for Irregular Section - 2

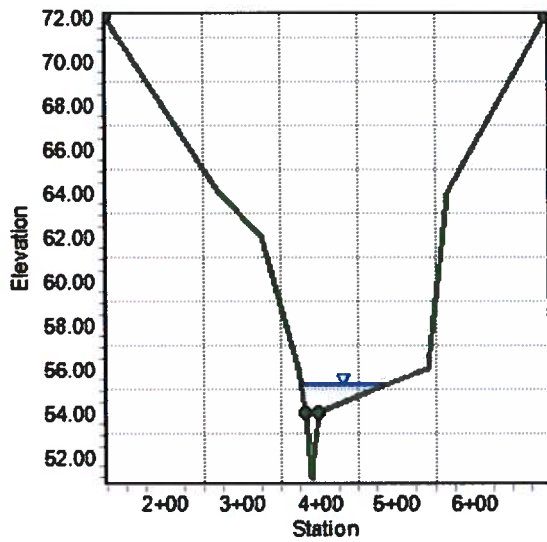
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                            0.00790    ft/ft  
Normal Depth                            4.23        ft  
Discharge                                200.00    ft<sup>3</sup>/s

### Cross Section Image





### Cross Section for Irregular Section - 3

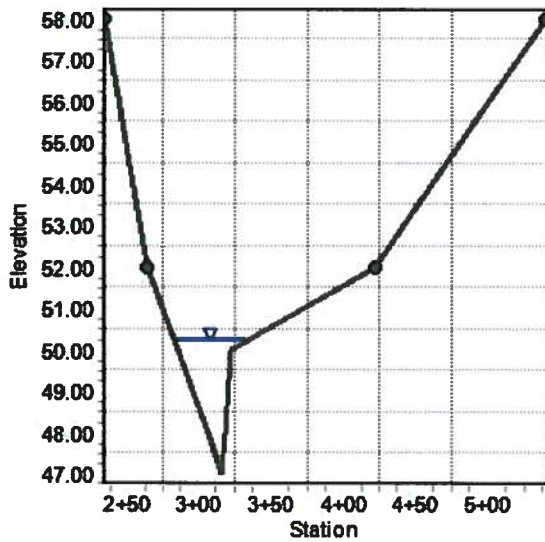
#### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

#### Input Data

Channel Slope    0.00510    ft/ft  
Normal Depth    3.20       ft  
Discharge     200.00    ft<sup>3</sup>/s

#### Cross Section Image



## Cross Section for XSECTN-4

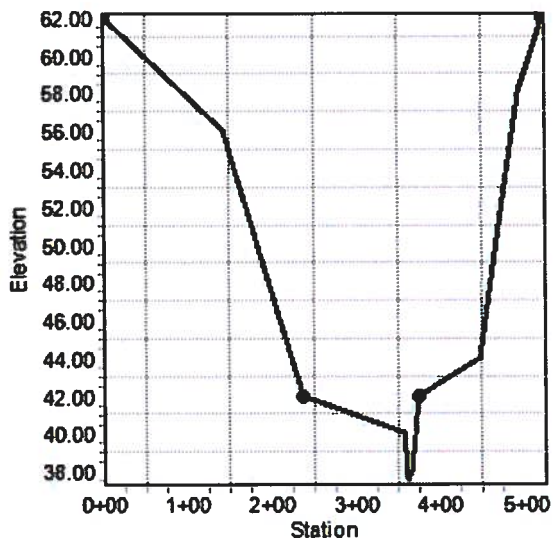
### Project Description

Friction Method                      Manning Formula  
Solve For                                Discharge

### Input Data

Channel Slope                              0.00920    ft/ft  
Normal Depth                                162.50    ft  
Discharge                                    2572545.12    ft<sup>3</sup>/s

### Cross Section Image



## Cross Section for Irregular Section - 5

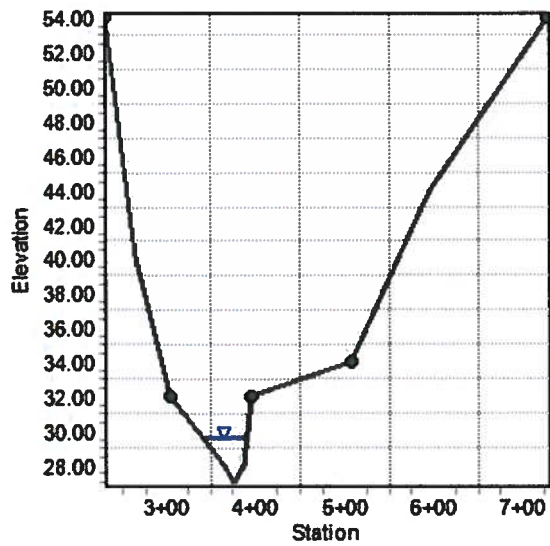
### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

### Input Data

Channel Slope                            0.00540    ft/ft  
Normal Depth                            2.54        ft  
Discharge                                200.00    ft<sup>3</sup>/s

### Cross Section Image



---

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

---

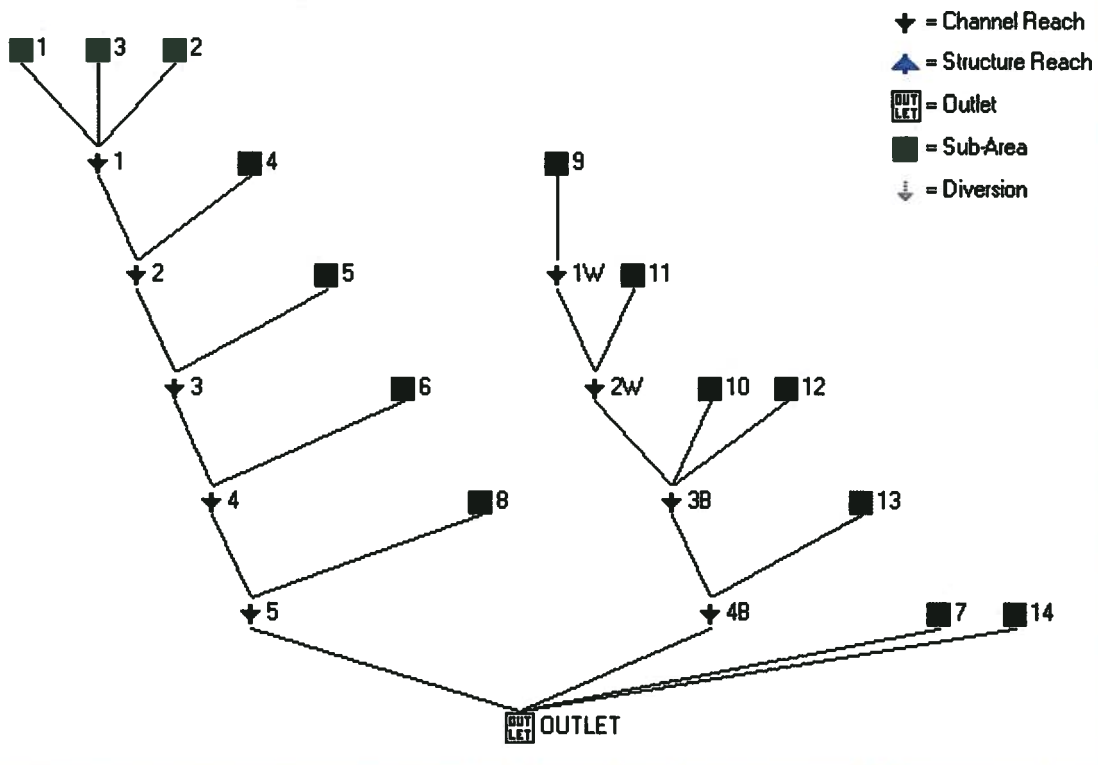


**APPENDIX D**  
**TR-20 OUTPUT**

---

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24

---







WinTR-20 Printed Page File Beginning of Input Data List  
 G:\19872\DOCUMENTS\H&H\TR-20\19872-HahaBranch.inp

WinTR-20: Version 3.20 0 0 .5 0  
 West Ha Ha branch, 5 reaches, 8 sub-areas. Outlet is culvert in route 7  
 Project #19872

SUB-AREA:

1	1	0.2545	86.	0.285	Y
3	1	0.1913	86.	0.417	Y
2	1	0.4017	81.	0.651	Y
4	2	0.0504	82.	.309	Y
5	3	.0601	74.	0.142	Y
8	5	0.1228	74.	.434	Y
6	4	0.1863	94.	0.1	Y
7	OUTLET	0.1157	94.	0.1	Y
9	1W	0.1208	77.	0.266	Y
10	3B	0.0098	92.	0.288	Y
11	2W	0.0696	94.	0.1	Y
12	3B	0.0235	94.	0.16	Y
13	4B	0.1154	94.	0.1	Y
14	OUTLET	0.2131	80.	0.567	Y

STREAM REACH:

5	Outlet	XSECTN-5	3708.22	Y
4	5	XSECTN-4	1078.38	Y
3	4	XSECTN-3	1552.76	Y
2	3	XSECTN-2	773.6	Y
1	2	XSECTN-1	1419.46	Y
1W	2W	XSECTN-1W	1380.	Y
2W	3B	XSECTN-2W	1481.	Y
3B	4B	XSECTN-3B	668.	Y
4B	OUTLET	XSECTN-4B	2535.	Y

STORM ANALYSIS:

2- YEAR	3.26	TYPE II	2
10-YEAR	5.	TYPE II	2
50-YEAR	7.34	TYPE II	2
100-YEAR	8.58	TYPE II	2

STREAM CROSS SECTION:

XSECTN-1W	74.60				
	73.5	0.	0.	0.	0.0149
	73.96	20.	11.78	51.36	
	74.09	40.	19.19	58.21	
	74.20	60.	25.47	60.78	
	74.29	80.	31.26	63.06	
	74.38	100.	36.71	65.13	
	74.45	120.	41.92	67.04	
	74.53	140.	46.94	68.84	
	74.60	160.	51.81	70.54	
	74.66	180.	56.54	72.15	
	74.73	200.	61.16	73.69	
	74.87	250.	72.30	77.29	
	75.01	300.	82.96	80.57	
	75.14	350.	93.25	83.62	
	75.25	400.	103.22	86.48	
	75.36	450.	112.93	89.17	
	75.47	500.	122.40	91.72	
	75.66	600.	140.77	96.46	
	75.84	700.	158.47	100.83	
	76.01	800.	175.61	104.86	
	76.16	900.	191.80	108.17	
	76.31	1000.	207.62	111.30	
	76.44	1100.	223.09	114.28	
	76.57	1200.	238.24	117.13	
XSECTN-2W	56.99				
	55.5	0.	0.	0.	0.0164
	56.16	20.	8.52	24.51	
	56.36	40.	14.04	30.25	
	56.51	60.	18.88	34.51	
	56.63	80.	23.32	38.	
	56.74	100.	27.50	41.02	
	56.83	120.	31.45	43.68	
	56.92	140.	35.24	46.09	
	56.99	160.	38.91	48.30	



	57.06	180.	42.46	50.35	
	57.13	200.	45.92	52.27	
	57.28	250.	54.17	56.59	
	57.42	300.	62.07	60.44	
	57.54	350.	69.60	63.89	
	57.65	400.	76.88	67.06	
	57.75	450.	83.94	70.	
	57.85	500.	90.80	72.74	
	58.03	600.	104.08	77.49	
	58.19	700.	117.24	80.48	
	58.35	800.	129.99	83.29	
	58.50	900.	142.45	85.94	
	58.64	1000.	154.58	88.44	
	58.77	1100.	166.45	90.83	
	58.89	1200.	178.10	93.11	
XSECN-3B	39.09				
	37.55	0.	0.	0.	0.0115
	38.12	20.	11.15	33.92	
	38.32	40.	18.30	37.14	
	38.49	60.	24.64	39.78	
	38.63	80.	30.53	42.08	
	38.76	100.	36.10	44.15	
	38.88	120.	41.44	46.04	
	38.99	140.	46.60	47.80	
	39.09	160.	51.60	49.44	
	39.19	180.	56.46	50.99	
	39.28	200.	61.21	52.46	
	39.49	250.	72.65	55.84	
	39.68	300.	83.61	58.90	
	39.86	350.	94.17	61.70	
	40.06	400.	107.05	67.33	
	40.34	450.	128.42	83.43	
	40.53	500.	145.26	94.20	
	40.82	600.	175.12	110.75	
	41.06	700.	202.49	124.00	
	41.26	800.	228.40	135.35	
	41.43	900.	253.19	145.38	
	41.59	1000.	277.17	154.46	
	41.74	1100.	300.39	162.78	
	41.88	1200.	323.12	170.53	
XSECTN-4B	28.45				
	26.	0.	0.	0.	0.0087
	27.12	20.	8.54	15.18	
	27.46	40.	14.36	19.69	
	27.70	60.	19.46	22.92	
	27.89	80.	24.14	25.53	
	28.06	100.	28.53	27.73	
	28.20	120.	32.67	29.61	
	28.33	140.	36.65	31.30	
	28.45	160.	40.48	32.86	
	28.56	180.	44.20	34.30	
	28.66	200.	47.82	35.64	
	28.90	250.	56.49	38.67	
	29.10	300.	64.72	41.35	
	29.29	350.	72.63	43.77	
	29.46	400.	80.25	45.97	
	29.62	450.	87.64	48.02	
	30.62	500.	195.84	160.34	
	30.77	600.	218.91	160.88	
	30.90	700.	240.63	161.38	
	31.03	800.	261.18	161.86	
	31.15	900.	280.8	162.32	
	31.27	1000.	299.62	162.75	
	31.38	1100.	317.75	163.17	
	31.49	1200.	335.30	163.57	
	31.59	1300.	352.31	163.96	
	31.69	1400.	368.86	164.34	
	31.79	1500.	384.98	164.70	
	31.88	1600.	400.72	165.06	
	31.98	1700.	416.11	165.41	
XSECTN-1	69.				
	62.	0.	0.	0.	0.0056
	63.90	100.	33.86	30.65	
	65.04	200.	119.17	126.08	
	65.38	300.	168.02	157.29	
	65.65	400.	212.55	181.11	
	65.87	500.	254.31	200.89	
	66.05	600.	291.74	214.26	
	66.19	700.	322.58	218.20	

	66.32	800.	352.06	221.90	
	66.57	1000.	407.78	228.73	
	67.11	1500.	534.42	243.55	
	67.56	2000.	649.16	256.23	
	67.97	2500.	755.96	267.50	
	68.34	3000.	856.99	277.74	
	68.69	3500.	953.60	287.18	
	69.	4000.	1046.45	295.98	
XSECTN-2	59.28				
	51.	0.	0.	0.	0.0079
	54.70	100.	56.11	69.90	
	55.23	200.	103.99	109.63	
	55.27	300.	144.91	134.59	
	55.82	400.	182.33	153.92	
	56.03	500.	215.98	167.36	
	56.19	600.	242.04	169.09	
	56.33	700.	266.54	170.69	
	56.47	800.	289.90	172.21	
	56.72	1000.	333.71	175.02	
	57.27	1500.	431.94	181.15	
	57.75	2000.	519.68	186.46	
	58.18	2500.	600.58	191.23	
	58.57	3000.	676.46	195.59	
	58.93	3500.	748.50	199.65	
	59.28	4000.	817.43	203.45	
XSECTN-3	54.96				
	47.	0.	0.	0.	0.0051
	49.37	100.	34.45	29.49	
	50.20	200.	64.16	49.58	
	50.74	300.	100.14	82.64	
	51.06	400.	129.31	101.85	
	51.30	500.	156.06	116.72	
	51.51	600.	181.26	129.17	
	51.69	700.	205.30	140.03	
	51.85	800.	228.44	149.73	
	52.13	1000.	272.84	162.18	
	52.75	1500.	377.60	177.30	
	53.28	2000.	475.66	190.37	
	53.76	2500.	568.94	202.02	
	54.19	3000.	658.50	212.60	
	54.59	3500.	745.04	222.35	
	54.96	4000.	829.05	231.42	
XSECTN-5	34.93				
	27.	0.	0.	0.	0.0054
	28.95	100.	36.73	36.55	
	29.54	200.	61.57	46.96	
	29.97	300.	83.36	54.47	
	30.32	400.	103.36	60.56	
	30.61	500.	122.13	65.76	
	30.88	600.	139.99	70.35	
	31.11	700.	157.12	74.49	
	31.33	800.	173.63	78.28	
	31.72	1000.	205.21	85.04	
	32.82	1500.	324.48	139.93	
	33.47	2000.	428.54	179.51	
	33.95	2500.	521.92	208.73	
	34.30	3000.	596.01	215.59	
	34.62	3500.	665.62	219.92	
	34.93	4000.	732.98	224.04	
XSECTN-4	44.78				
	37.50	0.	0.	0.	0.0092
	40.42	100.	32.97	40.97	
	40.94	200.	62.87	73.39	
	41.24	300.	87.67	91.98	
	41.47	400.	110.28	106.13	
	41.66	500.	131.41	117.83	
	41.82	600.	151.48	127.96	
	41.97	700.	170.70	136.96	
	42.12	800.	192.91	144.25	
	42.42	1000.	237.44	156.70	
	43.03	1500.	340.21	182.21	
	43.52	2000.	435.24	202.97	
	43.94	2500.	524.95	220.78	
	44.25	3000.	593.54	225.61	
	44.53	3500.	655.93	228.32	
	44.78	4000.	715.53	230.88	

West Ha Ha branch, 5 reaches, 8 sub-areas. Outlet is culvert in route 7  
Project #19872

Name of printed page file:  
G:\19872\DOCUMENTS\H&H\TR-20\19872-HahaBranch.out

STORM 2- YEAR

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Elevation (ft)	Peak Time (hr)	Flow Rate (cfs)	Rate (csm)
1	0.255		1.886		12.07	362.6	1424.74
3	0.191		1.885		12.13	226.8	1185.77
2	0.402		1.516		12.27	287.5	715.60
1	0.847	Upstream	1.710	66.30	12.12	783.6	924.65
1	0.847	Downstream	1.710	66.24	12.28	740.3	873.46
4	0.050		1.576		12.08	58.3	1156.98
2	0.898	Upstream	1.702	56.43	12.26	769.8	857.28
2	0.898	Downstream	1.702	56.42	12.34	764.0	850.91
5	0.060		1.074		11.99	57.7	960.08
3	0.958	Upstream	1.663	51.81	12.33	774.1	808.02
3	0.958	Downstream	1.662	51.78	12.44	759.2	792.46
6	0.186		2.601		11.93	454.5	2439.85
4	1.144	Upstream	1.815	42.13	12.44	804.1	702.69
4	1.144	Downstream	1.815	42.12	12.49	800.8	699.83
8	0.123		1.076		12.16	76.9	626.29
5	1.267	Upstream	1.743	31.40	12.49	833.7	657.97
5	1.267	Downstream	1.742	31.37	12.66	818.5	645.96
7	0.116		2.598		11.93	282.3	2439.85
14	0.213		1.447		12.24	158.6	744.19
9	0.121		1.253		12.07	115.9	959.42
1W	0.121	Upstream	1.253	74.44	12.07	115.9	959.42
1W	0.121	Downstream	1.252	74.43	12.15	115.2	953.47
11	0.070		2.593		11.93	169.8	2439.85
2W	0.190	Upstream	1.742	57.14	11.94	204.5	1073.86
2W	0.190	Downstream	1.741	57.14	12.01	203.5	1069.03
10	0.010		1.863		12.05	17.2	1759.50
12	0.023		2.534		11.96	52.1	2214.99
3B	0.224	Upstream	1.830	39.57	12.01	269.8	1206.01
3B	0.224	Downstream	1.827	39.56	12.05	268.0	1198.20
13	0.115		2.598		11.93	281.6	2439.85
4B	0.339	Upstream	2.090	30.27	12.01	482.3	1422.24
4B	0.339	Downstream	2.086	29.94	12.16	466.1	1374.53
OUTLET	1.935		1.821		12.18	1240.7	641.19

STORM 10-YEAR

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Elevation (ft)	Peak Time (hr)	Flow Rate (cfs)	Rate (csm)
1	0.255		3.466		12.06	655.5	2575.75
3	0.191		3.465		12.14	412.4	2155.81
2	0.402		2.985		12.25	573.9	1428.67
1	0.847	Upstream	3.238	67.08	12.12	1475.5	1741.00
1	0.847	Downstream	3.237	67.03	12.22	1426.8	1683.50
4	0.050		3.066		12.08	112.7	2235.51

West Ha Ha branch, 5 reaches, 8 sub-areas. Outlet is culvert in route 7  
Project #19872

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
2	0.898	Upstream	3.228	57.27	12.21	1498.9	1669.34
2	0.898	Downstream	3.228	57.26	12.26	1491.4	1661.02
5	0.060		2.358		11.97	130.2	2166.92
3	0.958	Upstream	3.173	52.77	12.25	1515.4	1581.88
3	0.958	Downstream	3.173	52.73	12.35	1485.7	1550.88
6	0.186		4.307		11.93	730.8	3922.79
4	1.144	Upstream	3.357	43.10	12.34	1568.4	1370.65
4	1.144	Downstream	3.357	43.09	12.40	1559.9	1363.17
8	0.123		2.362		12.16	176.9	1440.43
5	1.267	Upstream	3.260	33.02	12.39	1655.1	1306.21
5	1.267	Downstream	3.259	32.96	12.58	1611.0	1271.38
7	0.116		4.306		11.93	453.9	3922.79
14	0.213		2.891		12.21	322.5	1513.51
9	0.121		2.621		12.06	246.2	2037.71
1W	0.121	Upstream	2.621	74.86	12.06	246.2	2037.71
1W	0.121	Downstream	2.619	74.85	12.14	244.2	2021.33
11	0.070		4.302		11.93	273.0	3922.79
2W	0.190	Upstream	3.234	57.63	12.02	389.3	2044.44
2W	0.190	Downstream	3.234	57.62	12.08	386.8	2031.37
10	0.010		3.590		12.06	28.5	2909.66
12	0.023		4.262		11.96	83.8	3565.10
3B	0.224	Upstream	3.358	40.46	12.01	480.7	2148.99
3B	0.224	Downstream	3.354	40.45	12.07	478.4	2138.46
13	0.115		4.306		11.93	452.7	3922.79
4B	0.339	Upstream	3.678	31.05	12.02	814.7	2402.45
4B	0.339	Downstream	3.675	31.01	12.16	784.2	2312.57
OUTLET	1.935		3.354		12.21	2302.6	1189.98

STORM 50-YEAR

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
1	0.255		5.692		12.05	1054.1	4141.94
3	0.191		5.692		12.11	663.6	3468.67
2	0.402		5.122		12.25	981.3	2442.75
1	0.847	Upstream	5.422	67.91	12.11	2431.4	2868.87
1	0.847	Downstream	5.421	67.86	12.20	2366.7	2792.62
4	0.050		5.225		12.08	188.8	3746.63
2	0.898	Upstream	5.410	58.18	12.20	2499.9	2784.19
2	0.898	Downstream	5.410	58.17	12.22	2487.4	2770.20
5	0.060		4.333		11.97	238.8	3973.77
3	0.958	Upstream	5.343	53.79	12.22	2537.8	2649.10
3	0.958	Downstream	5.342	53.75	12.31	2486.3	2595.34
6	0.186		6.625		11.92	1096.8	5887.33
4	1.144	Upstream	5.551	44.01	12.30	2616.7	2286.72
4	1.144	Downstream	5.551	44.00	12.35	2603.6	2275.25
8	0.123		4.337		12.15	327.0	2663.01
5	1.267	Upstream	5.433	34.17	12.33	2809.3	2217.12
5	1.267	Downstream	5.432	34.12	12.51	2738.3	2161.04

West Ha Ha branch, 5 reaches, 8 sub-areas. Outlet is culvert in route 7  
Project #19872

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
7	0.116		6.625		11.92	681.2	5887.33
14	0.213		5.008		12.23	555.8	2608.32
9	0.121		4.670		12.04	434.4	3596.18
1W	0.121	Upstream	4.670	75.33	12.04	434.4	3596.18
1W	0.121	Downstream	4.669	75.32	12.12	431.9	3575.29
11	0.070		6.623		11.92	409.8	5887.33
2W	0.190	Upstream	5.383	58.12	12.02	658.6	3459.19
2W	0.190	Downstream	5.383	58.12	12.07	654.5	3437.36
10	0.010		6.216		12.05	43.6	4445.01
12	0.023		6.597		11.97	125.8	5353.52
3B	0.224	Upstream	5.547	41.24	12.06	791.9	3540.14
3B	0.224	Downstream	5.544	41.24	12.10	787.7	3521.31
13	0.115		6.625		11.92	679.4	5887.33
4B	0.339	Upstream	5.912	31.57	12.02	1276.1	3763.18
4B	0.339	Downstream	5.910	31.53	12.13	1239.6	3655.56
OUTLET	1.935		5.540		12.21	3848.0	1988.64

STORM 100-YEAR

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
1	0.255		6.894		12.05	1261.4	4956.27
3	0.191		6.893		12.11	796.5	4163.77
2	0.402		6.291		12.27	1195.7	2976.66
1	0.847	Upstream	6.608	68.29	12.10	2936.8	3465.20
1	0.847	Downstream	6.608	68.24	12.19	2865.1	3380.61
4	0.050		6.403		12.07	229.3	4549.45
2	0.898	Upstream	6.596	58.59	12.19	3031.3	3375.95
2	0.898	Downstream	6.596	58.58	12.21	3018.0	3361.18
5	0.060		5.441		11.96	298.6	4968.13
3	0.958	Upstream	6.524	54.25	12.21	3080.4	3215.42
3	0.958	Downstream	6.523	54.20	12.29	3018.4	3150.76
6	0.186		7.858		11.93	1290.8	6928.68
4	1.144	Upstream	6.741	44.35	12.29	3174.7	2774.33
4	1.144	Downstream	6.740	44.34	12.33	3161.3	2762.69
8	0.123		5.445		12.14	410.6	3343.97
5	1.267	Upstream	6.615	34.58	12.31	3436.2	2711.83
5	1.267	Downstream	6.614	34.53	12.48	3358.4	2650.48
7	0.116		7.858		11.93	801.6	6928.68
14	0.213		6.169		12.22	682.0	3200.25
9	0.121		5.807		12.04	536.7	4442.55
1W	0.121	Upstream	5.807	75.54	12.04	536.7	4442.55
1W	0.121	Downstream	5.806	75.53	12.11	533.1	4412.98
11	0.070		7.856		11.93	482.2	6928.68
2W	0.190	Upstream	6.555	58.36	12.03	804.7	4226.20
2W	0.190	Downstream	6.555	58.35	12.08	799.5	4198.86
10	0.010		7.469		12.06	51.3	5239.02
12	0.023		7.836		11.96	148.0	6299.37
3B	0.224	Upstream	6.730	41.53	12.06	962.2	4301.43

West Ha Ha branch, 5 reaches, 8 sub-areas. Outlet is culvert in route 7  
 Project #19872

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Peak Flow -----			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
3B	0.224	Downstream	6.727	41.52	12.10	956.5	4275.71
13	0.115		7.858		11.93	799.6	6928.68
4B	0.339	Upstream	7.112	31.82	12.01	1528.0	4506.16
4B	0.339	Downstream	7.110	31.78	12.12	1488.4	4389.21
OUTLET	1.935		6.726		12.20	4772.2	2466.27





**APPENDIX E**  
**HEC-RAS OUTPUT**

HEC-RAS

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
HA HA WEST BRANC	9078.4	2-yr	Ex	722.80	68.00	71.65	71.21	72.36	0.008147	6.77	106.81	44.61	0.77
HA HA WEST BRANC	9078.4	2-yr	ProposedCirc	722.80	68.00	71.65	71.21	72.36	0.008147	6.77	106.81	44.61	0.77
HA HA WEST BRANC	9078.4	10-yr	Ex	1371.50	68.00	72.74	72.39	73.90	0.009203	8.63	158.95	50.23	0.86
HA HA WEST BRANC	9078.4	10-yr	ProposedCirc	1371.50	68.00	72.74	72.39	73.90	0.009203	8.63	158.95	50.23	0.86
HA HA WEST BRANC	9078.4	100-yr	Ex	2745.10	68.00	74.15	74.15	76.28	0.011794	11.71	234.41	56.86	1.01
HA HA WEST BRANC	9078.4	100-yr	ProposedCirc	2745.10	68.00	74.15	74.15	76.28	0.011794	11.71	234.41	56.86	1.01
HA HA WEST BRANC	8779.29	2-yr	Ex	722.80	65.81	69.54		70.04	0.007003	5.69	126.95	61.73	0.70
HA HA WEST BRANC	8779.29	2-yr	ProposedCirc	722.80	65.81	69.54		70.04	0.007003	5.69	126.95	61.73	0.70
HA HA WEST BRANC	8779.29	10-yr	Ex	1371.50	65.81	70.47	70.05	71.26	0.007794	7.13	202.15	104.22	0.77
HA HA WEST BRANC	8779.29	10-yr	ProposedCirc	1371.50	65.81	70.47	70.05	71.26	0.007794	7.13	202.15	104.22	0.77
HA HA WEST BRANC	8779.29	100-yr	Ex	2745.10	65.81	71.55	71.46	73.01	0.009439	9.86	335.43	142.28	0.90
HA HA WEST BRANC	8779.29	100-yr	ProposedCirc	2745.10	65.81	71.55	71.46	73.01	0.009439	9.86	335.43	142.28	0.90
HA HA WEST BRANC	8572.51	2-yr	Ex	722.80	63.87	67.65	67.65	68.42	0.008589	7.67	174.69	148.99	0.81
HA HA WEST BRANC	8572.51	2-yr	ProposedCirc	722.80	63.87	67.65	67.65	68.42	0.008589	7.67	174.69	148.99	0.81
HA HA WEST BRANC	8572.51	10-yr	Ex	1371.50	63.87	68.55	68.55	69.55	0.008830	9.38	328.63	192.89	0.86
HA HA WEST BRANC	8572.51	10-yr	ProposedCirc	1371.50	63.87	68.55	68.55	69.55	0.008830	9.38	328.63	192.89	0.86
HA HA WEST BRANC	8572.51	100-yr	Ex	2745.10	63.87	69.75	69.75	71.06	0.009409	11.70	584.62	226.23	0.93
HA HA WEST BRANC	8572.51	100-yr	ProposedCirc	2745.10	63.87	69.75	69.75	71.06	0.009409	11.70	584.62	226.23	0.93
HA HA WEST BRANC	8261.16	2-yr	Ex	722.80	61.94	65.28	64.99	65.68	0.006025	5.95	245.22	180.55	0.67
HA HA WEST BRANC	8261.16	2-yr	ProposedCirc	722.80	61.94	65.28	64.99	65.68	0.006025	5.95	245.22	180.55	0.67
HA HA WEST BRANC	8261.16	10-yr	Ex	1371.50	61.94	66.08	65.69	66.65	0.006541	7.48	399.37	206.66	0.73
HA HA WEST BRANC	8261.16	10-yr	ProposedCirc	1371.50	61.94	66.08	65.69	66.65	0.006541	7.48	399.37	206.66	0.73
HA HA WEST BRANC	8261.16	100-yr	Ex	2745.10	61.94	67.35	66.78	68.14	0.006573	9.35	695.47	257.77	0.78
HA HA WEST BRANC	8261.16	100-yr	ProposedCirc	2745.10	61.94	67.35	66.78	68.14	0.006573	9.35	695.47	257.77	0.78
HA HA WEST BRANC	8100	2-yr	Ex	722.80	60.00	63.64	63.64	64.36	0.011728	8.11	201.21	168.15	0.93
HA HA WEST BRANC	8100	2-yr	ProposedCirc	722.80	60.00	63.64	63.64	64.36	0.011728	8.11	201.21	168.15	0.93
HA HA WEST BRANC	8100	10-yr	Ex	1371.50	60.00	64.47	64.47	65.31	0.010888	9.54	359.60	203.74	0.94
HA HA WEST BRANC	8100	10-yr	ProposedCirc	1371.50	60.00	64.47	64.47	65.31	0.010888	9.54	359.60	203.74	0.94
HA HA WEST BRANC	8100	100-yr	Ex	2745.10	60.00	65.51	65.51	66.72	0.012415	12.27	583.67	228.07	1.05
HA HA WEST BRANC	8100	100-yr	ProposedCirc	2745.10	60.00	65.51	65.51	66.72	0.012415	12.27	583.67	228.07	1.05
HA HA WEST BRANC	7810.89	2-yr	Ex	722.80	59.59	61.35	60.99	61.54	0.005770	3.48	208.81	192.26	0.58
HA HA WEST BRANC	7810.89	2-yr	ProposedCirc	722.80	59.59	61.35	60.99	61.54	0.005770	3.48	208.81	192.26	0.58
HA HA WEST BRANC	7810.89	10-yr	Ex	1371.50	59.59	62.14	61.41	62.37	0.003440	3.84	370.25	212.26	0.49
HA HA WEST BRANC	7810.89	10-yr	ProposedCirc	1371.50	59.59	62.14	61.41	62.37	0.003440	3.84	370.25	212.26	0.49
HA HA WEST BRANC	7810.89	100-yr	Ex	2745.10	59.59	63.33	62.13	63.67	0.002694	4.69	632.29	229.16	0.47
HA HA WEST BRANC	7810.89	100-yr	ProposedCirc	2745.10	59.59	63.33	62.13	63.67	0.002694	4.69	632.29	229.16	0.47
HA HA WEST BRANC	7359.83	2-yr	Ex	711.00	55.82	59.55		59.82	0.002819	4.78	321.33	221.53	0.48
HA HA WEST BRANC	7359.83	2-yr	ProposedCirc	711.00	55.82	59.55		59.82	0.002819	4.78	321.33	221.53	0.48
HA HA WEST BRANC	7359.83	10-yr	Ex	1383.10	55.82	60.29		60.74	0.004042	6.59	497.65	252.73	0.59

HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
HA HA WEST BRANC	7359.83	10-yr	ProposedCirc	1383.10	55.82	60.29	60.74	0.004042	6.59	497.65	252.73	0.59	
HA HA WEST BRANC	7359.83	100-yr	Ex	2797.70	55.82	61.58	62.19	0.004394	8.33	842.55	281.19	0.65	
HA HA WEST BRANC	7359.83	100-yr	ProposedCirc	2797.70	55.82	61.58	62.19	0.004394	8.33	842.55	281.19	0.65	
HA HA WEST BRANC	7006.74	2-yr	Ex	711.00	53.89	57.73	58.31	0.006359	8.07	276.01	239.25	0.80	
HA HA WEST BRANC	7006.74	2-yr	ProposedCirc	711.00	53.89	57.73	58.31	0.006359	8.07	276.01	239.25	0.80	
HA HA WEST BRANC	7006.74	10-yr	Ex	1383.10	53.89	58.77	59.20	0.005893	8.19	555.84	279.73	0.70	
HA HA WEST BRANC	7006.74	10-yr	ProposedCirc	1383.10	53.89	58.77	59.20	0.005893	8.19	555.84	279.73	0.70	
HA HA WEST BRANC	7006.74	100-yr	Ex	2797.70	53.89	60.47	60.83	0.003990	8.45	1044.38	296.27	0.61	
HA HA WEST BRANC	7006.74	100-yr	ProposedCirc	2797.70	53.89	60.47	60.83	0.003990	8.45	1044.38	296.27	0.61	
HA HA WEST BRANC	6757.1	2-yr	Ex	711.00	52.17	56.98	55.91	0.002258	3.69	273.36	172.83	0.41	
HA HA WEST BRANC	6757.1	2-yr	ProposedCirc	711.00	52.17	56.98	55.91	0.002258	3.69	273.36	172.83	0.41	
HA HA WEST BRANC	6757.1	10-yr	Ex	1383.10	52.17	58.09	58.36	0.002125	4.57	472.26	184.80	0.42	
HA HA WEST BRANC	6757.1	10-yr	ProposedCirc	1383.10	52.17	58.09	58.36	0.002125	4.57	472.26	184.80	0.42	
HA HA WEST BRANC	6757.1	100-yr	Ex	2797.70	52.17	59.71	60.14	0.002181	5.92	785.28	200.80	0.46	
HA HA WEST BRANC	6757.1	100-yr	ProposedCirc	2797.70	52.17	59.71	60.14	0.002181	5.92	785.28	200.80	0.46	
HA HA WEST BRANC	6586.23	2-yr	Ex	715.15	51.83	55.75	55.66	0.008325	7.43	181.27	140.27	0.80	
HA HA WEST BRANC	6586.23	2-yr	ProposedCirc	715.15	51.83	55.75	55.66	0.008325	7.43	181.27	140.27	0.80	
HA HA WEST BRANC	6586.23	10-yr	Ex	1396.50	51.83	56.61	57.62	0.009559	9.55	312.70	162.92	0.89	
HA HA WEST BRANC	6586.23	10-yr	ProposedCirc	1396.50	51.83	56.61	57.62	0.009559	9.55	312.70	162.92	0.89	
HA HA WEST BRANC	6586.23	100-yr	Ex	2836.80	51.83	57.87	57.87	0.010537	12.28	532.88	183.63	0.99	
HA HA WEST BRANC	6586.23	100-yr	ProposedCirc	2836.80	51.83	57.87	57.87	0.010537	12.28	532.88	183.63	0.99	
HA HA WEST BRANC	6239.67	2-yr	Ex	715.15	49.86	53.62	53.97	0.006142	6.22	292.69	203.59	0.68	
HA HA WEST BRANC	6239.67	2-yr	ProposedCirc	715.15	49.86	53.62	53.97	0.006141	6.22	292.70	203.59	0.68	
HA HA WEST BRANC	6239.67	10-yr	Ex	1396.50	49.86	54.62	54.02	0.005391	7.22	512.19	229.76	0.67	
HA HA WEST BRANC	6239.67	10-yr	ProposedCirc	1396.50	49.86	54.62	54.02	0.005391	7.22	512.19	229.76	0.67	
HA HA WEST BRANC	6239.67	100-yr	Ex	2836.80	49.86	56.14	54.99	0.004860	8.65	879.86	254.61	0.67	
HA HA WEST BRANC	6239.67	100-yr	ProposedCirc	2836.80	49.86	56.14	54.99	0.004860	8.65	879.86	254.61	0.67	
HA HA WEST BRANC	5866.54	2-yr	Ex	715.15	47.78	51.91	52.30	0.004607	5.95	269.13	174.33	0.60	
HA HA WEST BRANC	5866.54	2-yr	ProposedCirc	715.15	47.78	51.91	52.30	0.004607	5.95	269.12	174.33	0.60	
HA HA WEST BRANC	5866.54	10-yr	Ex	1396.50	47.78	52.81	53.37	0.005395	7.66	433.03	187.44	0.68	
HA HA WEST BRANC	5866.54	10-yr	ProposedCirc	1396.50	47.78	52.81	53.37	0.005395	7.66	433.04	187.44	0.68	
HA HA WEST BRANC	5866.54	100-yr	Ex	2836.80	47.78	54.18	55.01	0.006158	9.98	699.58	203.75	0.76	
HA HA WEST BRANC	5866.54	100-yr	ProposedCirc	2836.80	47.78	54.18	55.01	0.006158	9.98	699.58	203.75	0.76	
HA HA WEST BRANC	5697.52	2-yr	Ex	715.15	45.97	51.30	50.64	0.003940	3.95	200.88	135.94	0.51	
HA HA WEST BRANC	5697.52	2-yr	ProposedCirc	715.15	45.97	51.30	50.64	0.003943	3.95	200.82	135.93	0.51	
HA HA WEST BRANC	5697.52	10-yr	Ex	1396.50	45.97	52.17	52.56	0.003921	5.10	327.16	154.69	0.55	
HA HA WEST BRANC	5697.52	10-yr	ProposedCirc	1396.50	45.97	52.17	52.56	0.003921	5.10	327.17	154.69	0.55	
HA HA WEST BRANC	5697.52	100-yr	Ex	2836.80	45.97	53.50	54.14	0.003987	6.71	547.86	176.71	0.59	
HA HA WEST BRANC	5697.52	100-yr	ProposedCirc	2836.80	45.97	53.50	54.14	0.003986	6.71	547.87	176.71	0.59	



HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Cht
HA HA WEST BRANC	5460.15	2-yr	Ex	715.15	45.89	49.39	49.39	50.05	0.011528	8.49	221.74	167.09	0.92
HA HA WEST BRANC	5460.15	2-yr	ProposedCirc	715.15	45.89	49.39	49.39	50.05	0.011528	8.49	221.74	167.09	0.92
HA HA WEST BRANC	5460.15	10-yr	Ex	1396.50	45.89	50.21	50.21	51.06	0.012105	10.43	370.18	190.55	0.99
HA HA WEST BRANC	5460.15	10-yr	ProposedCirc	1396.50	45.89	50.21	50.21	51.06	0.012105	10.43	370.18	190.55	0.99
HA HA WEST BRANC	5460.15	100-yr	Ex	2836.80	45.89	51.26	51.26	52.52	0.014545	13.65	575.49	201.42	1.14
HA HA WEST BRANC	5460.15	100-yr	ProposedCirc	2836.80	45.89	51.26	51.26	52.52	0.014545	13.65	575.49	201.42	1.14
HA HA WEST BRANC	5278.56	2-yr	Ex	715.15	42.05	46.79	45.24	47.05	0.002347	4.15	209.94	133.20	0.41
HA HA WEST BRANC	5278.56	2-yr	ProposedCirc	715.15	42.05	46.72	45.24	46.99	0.002542	4.26	201.02	130.83	0.42
HA HA WEST BRANC	5278.56	10-yr	Ex	1396.50	42.05	47.56	46.55	48.11	0.003883	6.17	323.79	160.45	0.55
HA HA WEST BRANC	5278.56	10-yr	ProposedCirc	1396.50	42.05	47.53	46.55	48.08	0.004018	6.24	318.28	159.24	0.55
HA HA WEST BRANC	5278.56	100-yr	Ex	2836.80	42.05	48.48	48.16	49.69	0.005943	9.48	488.04	196.45	0.76
HA HA WEST BRANC	5278.56	100-yr	ProposedCirc	2836.80	42.05	48.48	48.16	49.68	0.006958	9.48	487.57	196.36	0.76
HA HA WEST BRANC	5089.91	2-yr	Ex	740.90	42.26	46.01	45.00	46.24	0.007006	3.86	195.46	210.55	0.63
HA HA WEST BRANC	5089.91	2-yr	ProposedCirc	740.90	42.26	45.75	45.00	46.10	0.008185	4.73	157.07	123.92	0.70
HA HA WEST BRANC	5089.91	10-yr	Ex	1446.20	42.26	46.48	46.20	46.91	0.008461	5.32	285.21	214.84	0.74
HA HA WEST BRANC	5089.91	10-yr	ProposedCirc	1446.20	42.26	46.64	46.20	46.99	0.008173	4.83	315.61	216.30	0.64
HA HA WEST BRANC	5089.91	100-yr	Ex	2928.30	42.26	47.72	46.98	48.27	0.005029	5.99	525.12	226.31	0.62
HA HA WEST BRANC	5089.91	100-yr	ProposedCirc	2928.30	42.26	47.78	46.98	48.30	0.004691	5.87	536.62	226.85	0.61
HA HA WEST BRANC	4985.35	2-yr	Ex	740.90	41.13	44.84	44.82	45.35	0.016380	5.81	137.00	135.51	0.96
HA HA WEST BRANC	4985.35	2-yr	ProposedCirc	740.90	41.13	44.84	44.82	45.35	0.016380	5.81	137.00	135.51	0.96
HA HA WEST BRANC	4985.35	10-yr	Ex	1446.20	41.13	45.98	45.46	46.31	0.005574	4.73	352.12	215.97	0.61
HA HA WEST BRANC	4985.35	10-yr	ProposedCirc	1446.20	41.13	45.98	45.46	46.31	0.005574	4.73	352.12	215.97	0.61
HA HA WEST BRANC	4985.35	100-yr	Ex	2928.30	41.13	47.53	46.26	47.90	0.002849	5.06	702.07	234.45	0.48
HA HA WEST BRANC	4985.35	100-yr	ProposedCirc	2928.30	41.13	47.53	46.26	47.90	0.002849	5.06	702.07	234.45	0.48
HA HA WEST BRANC	4738.83	2-yr	Ex	740.90	40.00	44.36	44.36	44.50	0.001215	3.29	383.78	179.57	0.31
HA HA WEST BRANC	4738.83	2-yr	ProposedCirc	740.90	40.00	44.36	44.36	44.50	0.001215	3.29	383.78	179.57	0.31
HA HA WEST BRANC	4738.83	10-yr	Ex	1446.20	40.00	45.33	45.33	45.58	0.001712	4.62	562.82	188.69	0.39
HA HA WEST BRANC	4738.83	10-yr	ProposedCirc	1446.20	40.00	45.33	45.33	45.58	0.001712	4.62	562.82	188.69	0.39
HA HA WEST BRANC	4738.83	100-yr	Ex	2928.30	40.00	46.80	46.80	47.26	0.002286	6.47	851.94	204.25	0.47
HA HA WEST BRANC	4738.83	100-yr	ProposedCirc	2928.30	40.00	46.80	46.80	47.26	0.002286	6.47	851.94	204.25	0.47
HA HA WEST BRANC	4602.96	2-yr	Ex	740.90	40.77	43.58	43.45	44.07	0.013383	7.19	226.98	185.47	0.95
HA HA WEST BRANC	4602.96	2-yr	ProposedCirc	740.90	40.77	43.58	43.45	44.07	0.013383	7.19	226.98	185.47	0.95
HA HA WEST BRANC	4602.96	10-yr	Ex	1446.20	40.77	44.95	44.95	45.13	0.007909	7.55	443.10	210.99	0.79
HA HA WEST BRANC	4602.96	10-yr	ProposedCirc	1446.20	40.77	44.65	44.65	45.13	0.007909	7.55	443.10	210.99	0.79
HA HA WEST BRANC	4602.96	100-yr	Ex	2928.30	40.77	46.15	46.15	46.76	0.006309	8.93	774.16	228.76	0.75
HA HA WEST BRANC	4602.96	100-yr	ProposedCirc	2928.30	40.77	46.15	46.15	46.76	0.006309	8.93	774.16	228.76	0.75
HA HA WEST BRANC	4483.54	2-yr	Ex	740.90	37.97	42.52	41.82	43.10	0.005471	6.29	170.25	151.79	0.65
HA HA WEST BRANC	4483.54	2-yr	ProposedCirc	740.90	37.97	42.52	41.82	43.10	0.005471	6.29	170.25	151.79	0.65

HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
HA HA WEST BRANC	4483.54	10-yr	Ex	1446.20	37.97	43.66	43.23	44.37	0.005030	7.51	373.56	202.65	0.65
HA HA WEST BRANC	4483.54	10-yr	ProposedCirc	1446.20	37.97	43.66	43.23	44.37	0.005030	7.51	373.56	202.65	0.65
HA HA WEST BRANC	4483.54	100-yr	Ex	2928.30	37.97	45.28	46.11	46.11	0.004559	8.93	735.11	234.83	0.66
HA HA WEST BRANC	4483.54	100-yr	ProposedCirc	2928.30	37.97	45.28	46.11	46.11	0.004559	8.93	735.11	234.83	0.66
HA HA WEST BRANC	3955.74	2-yr	Ex	763.50	33.95	38.21	37.84	39.11	0.010808	7.63	103.67	73.67	0.88
HA HA WEST BRANC	3955.74	2-yr	ProposedCirc	763.50	33.95	38.21	37.84	39.11	0.010808	7.63	103.67	73.67	0.88
HA HA WEST BRANC	3955.74	10-yr	Ex	1509.00	33.95	39.36	39.36	40.70	0.009916	9.55	209.67	109.93	0.90
HA HA WEST BRANC	3955.74	10-yr	ProposedCirc	1509.00	33.95	39.36	39.36	40.70	0.009916	9.55	209.67	109.93	0.90
HA HA WEST BRANC	3955.74	100-yr	Ex	3110.30	33.95	41.15	41.15	42.89	0.003324	11.53	454.74	158.27	0.88
HA HA WEST BRANC	3955.74	100-yr	ProposedCirc	3110.30	33.95	41.15	41.15	42.89	0.003324	11.53	454.74	158.27	0.88
HA HA WEST BRANC	3335.56	2-yr	Ex	763.50	31.59	34.79	34.22	35.05	0.004040	4.22	228.44	164.66	0.53
HA HA WEST BRANC	3335.56	2-yr	ProposedCirc	763.50	31.59	34.79	34.22	35.05	0.004040	4.22	228.44	164.66	0.53
HA HA WEST BRANC	3335.56	10-yr	Ex	1509.00	31.59	35.75	34.91	36.14	0.003763	5.30	393.95	182.41	0.55
HA HA WEST BRANC	3335.56	10-yr	ProposedCirc	1509.00	31.59	35.75	34.91	36.14	0.003763	5.30	393.95	182.41	0.55
HA HA WEST BRANC	3335.56	100-yr	Ex	3110.30	31.59	37.21	36.02	37.83	0.003682	6.87	684.10	215.84	0.58
HA HA WEST BRANC	3335.56	100-yr	ProposedCirc	3110.30	31.59	37.21	36.02	37.83	0.003682	6.87	684.10	215.84	0.58
HA HA WEST BRANC	2787.62	2-yr	Ex	763.50	27.36	32.04	31.75	32.64	0.004908	6.84	244.34	211.08	0.63
HA HA WEST BRANC	2787.62	2-yr	ProposedCirc	763.50	27.36	32.04	31.75	32.64	0.004908	6.84	244.34	211.08	0.63
HA HA WEST BRANC	2787.62	10-yr	Ex	1509.00	27.36	33.01	32.79	33.74	0.005485	8.46	455.35	226.42	0.70
HA HA WEST BRANC	2787.62	10-yr	ProposedCirc	1509.00	27.36	33.01	32.79	33.74	0.005485	8.46	455.35	226.42	0.70
HA HA WEST BRANC	2787.62	100-yr	Ex	3110.30	27.36	34.38	33.97	35.35	0.006259	10.76	778.08	244.18	0.78
HA HA WEST BRANC	2787.62	100-yr	ProposedCirc	3110.30	27.36	34.38	33.97	35.35	0.006259	10.76	778.08	244.18	0.78
HA HA WEST BRANC	2077.75	2-yr	Ex	763.50	23.57	26.19	26.19	26.91	0.015701	6.85	112.11	83.54	1.00
HA HA WEST BRANC	2077.75	2-yr	ProposedCirc	763.50	23.57	26.19	26.19	26.91	0.015701	6.85	112.11	83.54	1.00
HA HA WEST BRANC	2077.75	10-yr	Ex	1509.00	23.57	27.06	27.06	28.12	0.012473	8.34	200.91	119.39	0.96
HA HA WEST BRANC	2077.75	10-yr	ProposedCirc	1509.00	23.57	27.06	27.06	28.12	0.012473	8.34	200.91	119.39	0.96
HA HA WEST BRANC	2077.75	100-yr	Ex	3110.30	23.57	28.51	28.51	29.97	0.009502	10.04	422.41	186.97	0.91
HA HA WEST BRANC	2077.75	100-yr	ProposedCirc	3110.30	23.57	28.51	28.51	29.97	0.009502	10.04	422.41	186.97	0.91
HA HA WEST BRANC	1335.32	2-yr	Ex	763.50	18.56	22.73	21.68	22.93	0.002179	4.09	341.74	183.71	0.42
HA HA WEST BRANC	1335.32	2-yr	ProposedCirc	763.50	18.56	22.73	21.68	22.93	0.002179	4.09	341.74	183.71	0.42
HA HA WEST BRANC	1335.32	10-yr	Ex	1509.00	18.56	23.83	22.56	24.15	0.002437	5.34	554.59	201.66	0.47
HA HA WEST BRANC	1335.32	10-yr	ProposedCirc	1509.00	18.56	23.83	22.56	24.15	0.002437	5.34	554.59	201.66	0.47
HA HA WEST BRANC	1335.32	100-yr	Ex	3110.30	18.56	25.19	23.75	25.78	0.003370	7.60	838.93	217.08	0.57
HA HA WEST BRANC	1335.32	100-yr	ProposedCirc	3110.30	18.56	25.19	23.75	25.78	0.003370	7.60	838.93	217.08	0.57
HA HA WEST BRANC	597.58	2-yr	Ex	763.50	15.65	19.48	19.48	20.19	0.009060	8.17	230.19	180.09	0.84
HA HA WEST BRANC	597.58	2-yr	ProposedCirc	763.50	15.65	19.48	19.48	20.19	0.009060	8.17	230.19	180.09	0.84
HA HA WEST BRANC	597.58	10-yr	Ex	1509.00	15.65	20.39	20.39	21.25	0.009321	9.92	416.47	216.36	0.89
HA HA WEST BRANC	597.58	10-yr	ProposedCirc	1509.00	15.65	20.39	20.39	21.25	0.009321	9.92	416.47	216.36	0.89
HA HA WEST BRANC	597.58	100-yr	Ex	3110.30	15.65	23.37	23.37	23.76	0.002745	7.87	1108.27	248.55	0.53
HA HA WEST BRANC	597.58	100-yr	ProposedCirc	3110.30	15.65	23.37	23.37	23.76	0.002745	7.87	1108.27	248.55	0.53



HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Ctl
HA HA WEST BRANC	597.58	100-yr	ProposedCirc	3110.30	15.65	23.37		23.76	0.002745	7.87	1108.27	248.55	0.53
Downstream	246.87	2-yr	Ex	1217.30	13.74	19.50	17.69	19.76	0.001705	5.01	501.61	155.90	0.40
Downstream	246.87	2-yr	ProposedCirc	1217.30	13.74	19.50	17.69	19.76	0.001705	5.01	501.61	155.90	0.40
Downstream	246.87	10-yr	Ex	2223.40	13.74	20.44	18.78	21.01	0.003044	7.51	660.55	190.05	0.55
Downstream	246.87	10-yr	ProposedCirc	2223.40	13.74	20.44	18.78	21.01	0.003044	7.51	660.55	190.05	0.55
Downstream	246.87	100-yr	Ex	4483.70	13.74	23.03		23.73	0.002646	8.92	1230.03	234.92	0.54
Downstream	246.87	100-yr	ProposedCirc	4483.70	13.74	23.03		23.73	0.002646	8.92	1230.03	234.92	0.54
Downstream	218.47	2-yr	Ex	1217.30	12.30	19.32		19.58	0.001404	4.84	582.92	255.71	0.36
Downstream	218.47	2-yr	ProposedCirc	1217.30	12.30	19.32		19.58	0.001404	4.84	582.92	255.71	0.36
Downstream	218.47	10-yr	Ex	2223.40	12.30	20.18		20.67	0.002374	6.93	827.45	311.32	0.49
Downstream	218.47	10-yr	ProposedCirc	2223.40	12.30	20.18		20.67	0.002374	6.93	827.45	311.32	0.49
Downstream	218.47	100-yr	Ex	4483.70	12.30	23.04		23.40	0.001441	6.93	1945.47	428.51	0.40
Downstream	218.47	100-yr	ProposedCirc	4483.70	12.30	23.04		23.40	0.001441	6.93	1945.47	428.51	0.40
Downstream	214	2-yr	Ex	1217.30	12.07	19.35	16.44	19.56	0.000845	4.26	627.00	214.86	0.29
Downstream	214	2-yr	ProposedCirc	1217.30	12.07	19.35	16.44	19.56	0.000845	4.26	627.00	214.86	0.29
Downstream	214	10-yr	Ex	2223.40	12.07	20.19	17.74	20.66	0.001685	6.52	830.89	270.36	0.42
Downstream	214	10-yr	ProposedCirc	2223.40	12.07	20.19	17.74	20.66	0.001685	6.52	830.89	270.36	0.42
Downstream	214	100-yr	Ex	4483.70	12.07	22.92	19.93	23.39	0.001413	7.35	1799.33	396.00	0.41
Downstream	214	100-yr	ProposedCirc	4483.70	12.07	22.92	19.93	23.39	0.001413	7.35	1799.33	396.00	0.41
Downstream	172		Culvert										
Downstream	161.2561	2-yr	Ex	1217.30	8.90	17.43		17.57	0.000388	3.06	511.93	156.57	0.20
Downstream	161.2561	2-yr	ProposedCirc	1217.30	8.90	17.43		17.57	0.000388	3.06	511.93	156.57	0.20
Downstream	161.2561	10-yr	Ex	2223.40	8.90	19.52		19.74	0.000483	4.03	924.48	242.89	0.23
Downstream	161.2561	10-yr	ProposedCirc	2223.40	8.90	19.52		19.74	0.000483	4.03	924.48	242.89	0.23
Downstream	161.2561	100-yr	Ex	4483.70	8.90	23.06		23.34	0.000469	4.91	1854.54	264.00	0.24
Downstream	161.2561	100-yr	ProposedCirc	4483.70	8.90	23.06		23.34	0.000469	4.91	1854.54	264.00	0.24
Downstream	149.62	2-yr	Ex	1217.30	10.00	16.49		17.48	0.006290	7.98	154.48	48.03	0.72
Downstream	149.62	2-yr	ProposedCirc	1217.30	10.00	16.49		17.48	0.006290	7.98	154.48	48.03	0.72
Downstream	149.62	10-yr	Ex	2223.40	10.00	17.98	17.37	19.59	0.006762	10.29	245.82	71.33	0.79
Downstream	149.62	10-yr	ProposedCirc	2223.40	10.00	17.98	17.37	19.59	0.006762	10.29	245.82	71.33	0.79
Downstream	149.62	100-yr	Ex	4483.70	10.00	19.96	19.96	23.05	0.008825	14.52	387.48	71.56	0.95
Downstream	149.62	100-yr	ProposedCirc	4483.70	10.00	19.96	19.96	23.05	0.008825	14.52	387.48	71.56	0.95
Downstream	131.14	2-yr	Ex	1217.30	9.97	16.03	15.58	17.23	0.009062	8.77	138.86	42.64	0.85
Downstream	131.14	2-yr	ProposedCirc	1217.30	9.97	16.03	15.58	17.23	0.009062	8.77	138.86	42.64	0.85
Downstream	131.14	10-yr	Ex	2223.40	9.97	17.31	17.31	19.31	0.009964	11.41	219.77	83.71	0.94
Downstream	131.14	10-yr	ProposedCirc	2223.40	9.97	17.31	17.31	19.31	0.009964	11.41	219.77	83.71	0.94
Downstream	131.14	100-yr	Ex	4483.70	9.97	18.89	20.02	22.65	0.013475	16.14	419.29	172.30	1.14
Downstream	131.14	100-yr	ProposedCirc	4483.70	9.97	18.89	20.02	22.65	0.013475	16.14	419.29	172.30	1.14

HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Downstream	0	2-yr	Ex	1217.30	9.81	14.96	14.96	16.08	0.008195	8.76	208.33	160.34	0.82
Downstream	0	2-yr	ProposedCirc	1217.30	9.81	14.96	14.96	16.08	0.008195	8.76	208.33	160.34	0.82
Downstream	0	10-yr	Ex	2223.40	9.81	15.55	16.32	17.75	0.014209	12.76	312.53	194.12	1.10
Downstream	0	10-yr	ProposedCirc	2223.40	9.81	15.55	16.32	17.75	0.014209	12.76	312.53	194.12	1.10
Downstream	0	100-yr	Ex	4483.70	9.81	16.55	17.79	20.45	0.021415	18.10	545.07	256.16	1.40
Downstream	0	100-yr	ProposedCirc	4483.70	9.81	16.55	17.79	20.45	0.021415	18.10	545.07	256.16	1.40



HEC-RAS River: UT-1 Reach: UNNAMED TRIBUTAR

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
UNNAMED TRIBUTAR	6060.38	2-yr	Ex	115.90	89.07	90.06	90.06	90.37	0.021634	4.49	25.87	44.12	1.01
UNNAMED TRIBUTAR	6060.38	2-yr	ProposedCirc	115.90	89.07	90.06	90.06	90.37	0.020229	4.40	26.42	44.48	0.98
UNNAMED TRIBUTAR	6060.38	10-yr	Ex	246.20	89.07	90.47	90.47	90.96	0.017267	5.65	46.41	56.12	0.99
UNNAMED TRIBUTAR	6060.38	10-yr	ProposedCirc	246.20	89.07	90.47	90.47	90.96	0.017267	5.65	46.41	56.12	0.99
UNNAMED TRIBUTAR	6060.38	100-yr	Ex	536.70	89.07	91.15	91.15	91.91	0.013873	7.12	91.51	76.09	0.96
UNNAMED TRIBUTAR	6060.38	100-yr	ProposedCirc	536.70	89.07	91.15	91.15	91.91	0.013873	7.12	91.51	76.09	0.96
UNNAMED TRIBUTAR	5432.19	2-yr	Ex	115.90	77.92	78.95	78.85	79.16	0.015095	3.73	31.07	51.29	0.85
UNNAMED TRIBUTAR	5432.19	2-yr	ProposedCirc	115.90	77.92	78.94	78.85	79.16	0.015808	3.81	30.46	50.54	0.86
UNNAMED TRIBUTAR	5432.19	10-yr	Ex	246.20	77.92	79.28	79.25	79.65	0.017265	4.88	50.87	66.80	0.95
UNNAMED TRIBUTAR	5432.19	10-yr	ProposedCirc	246.20	77.92	79.38	79.25	79.67	0.012101	4.36	57.44	69.87	0.81
UNNAMED TRIBUTAR	5432.19	100-yr	Ex	536.70	77.92	79.63	79.78	80.47	0.024953	7.37	76.32	79.12	1.21
UNNAMED TRIBUTAR	5432.19	100-yr	ProposedCirc	536.70	77.92	79.63	79.78	80.47	0.024953	7.37	76.32	79.12	1.21
UNNAMED TRIBUTAR	5183.4	2-yr	Ex	115.90	74.10	75.20	75.12	75.44	0.014870	3.93	29.49	44.77	0.85
UNNAMED TRIBUTAR	5183.4	2-yr	ProposedCirc	115.90	74.10	75.20	75.12	75.44	0.014237	3.88	29.90	44.99	0.83
UNNAMED TRIBUTAR	5183.4	10-yr	Ex	246.20	74.10	75.63	75.51	76.02	0.012561	5.02	50.76	54.00	0.85
UNNAMED TRIBUTAR	5183.4	10-yr	ProposedCirc	246.20	74.10	75.51	75.51	76.00	0.018062	5.61	44.90	51.67	1.00
UNNAMED TRIBUTAR	5183.4	100-yr	Ex	536.70	74.10	76.22	76.18	76.95	0.013465	6.95	86.51	66.34	0.95
UNNAMED TRIBUTAR	5183.4	100-yr	ProposedCirc	536.70	74.10	76.66	76.18	77.10	0.006018	5.43	117.46	75.10	0.66
UNNAMED TRIBUTAR	4840.7	2-yr	Ex	204.50	67.50	69.14	69.13	69.79	0.017288	6.48	31.55	23.66	0.99
UNNAMED TRIBUTAR	4840.7	2-yr	ProposedCirc	204.50	67.50	69.13	69.13	69.79	0.017767	6.54	31.28	23.65	1.00
UNNAMED TRIBUTAR	4840.7	10-yr	Ex	389.30	67.50	70.09	70.09	70.81	0.017110	6.81	57.19	73.00	1.00
UNNAMED TRIBUTAR	4840.7	10-yr	ProposedCirc	389.30	67.50	70.88	70.09	71.18	0.003975	4.39	90.44	93.34	0.52
UNNAMED TRIBUTAR	4840.7	100-yr	Ex	804.70	67.50	71.00	71.00	72.15	0.014206	8.60	95.86	94.76	0.99
UNNAMED TRIBUTAR	4840.7	100-yr	ProposedCirc	804.70	67.50	76.75	71.00	76.83	0.000204	2.35	411.46	141.12	0.15
UNNAMED TRIBUTAR	4546.75	2-yr	Ex	204.50	62.30	64.81	64.81	65.46	0.012649	6.62	34.38	30.19	0.90
UNNAMED TRIBUTAR	4546.75	2-yr	ProposedCirc	204.50	62.30	64.81	64.81	65.46	0.012649	6.62	34.38	30.19	0.90
UNNAMED TRIBUTAR	4546.75	10-yr	Ex	389.30	62.30	65.45	65.58	66.42	0.013064	8.35	56.73	40.06	0.97
UNNAMED TRIBUTAR	4546.75	10-yr	ProposedCirc	389.30	62.30	65.58	65.58	66.40	0.010388	7.73	62.25	42.14	0.87
UNNAMED TRIBUTAR	4546.75	100-yr	Ex	804.70	62.30	66.29	66.61	67.84	0.014870	10.96	93.87	51.16	1.09
UNNAMED TRIBUTAR	4546.75	100-yr	ProposedCirc	804.70	62.30	66.61	66.61	67.76	0.009709	9.46	109.39	54.10	0.90
UNNAMED TRIBUTAR	4350.57	2-yr	Ex	204.50	61.30	62.27	62.14	62.48	0.011623	3.74	54.96	76.97	0.77
UNNAMED TRIBUTAR	4350.57	2-yr	ProposedCirc	204.50	61.30	62.27	62.14	62.48	0.011623	3.74	54.96	76.97	0.77
UNNAMED TRIBUTAR	4350.57	10-yr	Ex	389.30	61.30	62.60	62.48	62.97	0.012095	4.89	81.60	82.74	0.83
UNNAMED TRIBUTAR	4350.57	10-yr	ProposedCirc	389.30	61.30	62.32	62.48	63.00	0.033154	6.63	59.22	77.92	1.31
UNNAMED TRIBUTAR	4350.57	100-yr	Ex	804.70	61.30	62.84	63.07	63.88	0.026152	8.23	101.98	86.90	1.27
UNNAMED TRIBUTAR	4350.57	100-yr	ProposedCirc	804.70	61.30	62.63	63.07	64.12	0.046738	9.81	84.30	83.31	1.64
UNNAMED TRIBUTAR	4132.52	2-yr	Ex	204.50	57.71	58.82	58.82	59.22	0.019766	5.05	40.53	52.07	1.01
UNNAMED TRIBUTAR	4132.52	2-yr	ProposedCirc	204.50	57.71	58.82	58.82	59.22	0.019766	5.05	40.53	52.07	1.01
UNNAMED TRIBUTAR	4132.52	10-yr	Ex	389.30	57.71	59.26	59.26	59.81	0.017459	5.98	65.54	62.86	1.00
UNNAMED TRIBUTAR	4132.52	10-yr	ProposedCirc	389.30	57.71	59.26	59.26	59.81	0.017478	5.98	65.52	62.85	1.00
UNNAMED TRIBUTAR	4132.52	100-yr	Ex	804.70	57.71	59.95	59.95	60.80	0.014574	7.41	114.57	76.78	0.99



HEC-RAS River UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
UNNAMED TRIBUTAR	4132.52	100-yr	ProposedCirc	804.70	57.71	59.95	59.95	60.80	0.014574	7.41	114.57	76.78	0.99
UNNAMED TRIBUTAR	3942.05	2-yr	Ex	204.50	53.90	55.80	55.30	56.00	0.005328	3.60	56.77	45.06	0.57
UNNAMED TRIBUTAR	3942.05	2-yr	ProposedCirc	204.50	53.90	55.80	55.30	56.00	0.005328	3.60	56.77	45.06	0.57
UNNAMED TRIBUTAR	3942.05	10-yr	Ex	389.30	53.90	56.28	55.87	56.65	0.006820	4.89	80.26	52.59	0.67
UNNAMED TRIBUTAR	3942.05	10-yr	ProposedCirc	389.30	53.90	56.28	55.87	56.65	0.006820	4.89	80.26	52.59	0.67
UNNAMED TRIBUTAR	3942.05	100-yr	Ex	804.70	53.90	56.88	56.69	57.72	0.010273	7.37	114.59	62.04	0.87
UNNAMED TRIBUTAR	3942.05	100-yr	ProposedCirc	804.70	53.90	56.88	56.69	57.72	0.010273	7.37	114.59	62.04	0.87
UNNAMED TRIBUTAR	3861.66	2-yr	Ex	204.50	53.80	54.86	54.86	55.24	0.020123	4.92	41.53	56.06	1.01
UNNAMED TRIBUTAR	3861.66	2-yr	ProposedCirc	204.50	53.80	54.86	54.86	55.24	0.020123	4.92	41.53	56.06	1.01
UNNAMED TRIBUTAR	3861.66	10-yr	Ex	389.30	53.80	55.29	55.29	55.80	0.018083	5.73	67.36	67.36	1.01
UNNAMED TRIBUTAR	3861.66	10-yr	ProposedCirc	389.30	53.80	55.29	55.29	55.80	0.018083	5.73	67.36	67.36	1.01
UNNAMED TRIBUTAR	3861.66	100-yr	Ex	804.70	53.80	55.94	55.94	56.68	0.015695	6.92	117.11	84.21	1.00
UNNAMED TRIBUTAR	3861.66	100-yr	ProposedCirc	804.70	53.80	55.94	55.94	56.68	0.015695	6.92	117.11	84.21	1.00
UNNAMED TRIBUTAR	3691.9	2-yr	Ex	204.50	50.47	51.40	51.19	51.52	0.007634	2.81	72.83	110.51	0.61
UNNAMED TRIBUTAR	3691.9	2-yr	ProposedCirc	204.50	50.47	51.40	51.19	51.52	0.007634	2.81	72.83	110.51	0.61
UNNAMED TRIBUTAR	3691.9	10-yr	Ex	389.30	50.47	51.71	51.47	51.91	0.008306	3.57	109.05	122.93	0.67
UNNAMED TRIBUTAR	3691.9	10-yr	ProposedCirc	389.30	50.47	51.71	51.47	51.91	0.008306	3.57	109.05	122.93	0.67
UNNAMED TRIBUTAR	3691.9	100-yr	Ex	804.70	50.47	51.67	51.92	52.59	0.040398	7.71	104.36	121.40	1.47
UNNAMED TRIBUTAR	3691.9	100-yr	ProposedCirc	804.70	50.47	51.67	51.92	52.59	0.040398	7.71	104.36	121.40	1.47
UNNAMED TRIBUTAR	3532.17	2-yr	Ex	204.50	48.45	49.28	49.28	49.53	0.023310	3.99	51.24	106.02	1.01
UNNAMED TRIBUTAR	3532.17	2-yr	ProposedCirc	204.50	48.45	49.28	49.28	49.53	0.023310	3.99	51.24	106.02	1.01
UNNAMED TRIBUTAR	3532.17	10-yr	Ex	389.30	48.45	49.55	49.55	49.90	0.020600	4.76	82.43	125.40	1.01
UNNAMED TRIBUTAR	3532.17	10-yr	ProposedCirc	389.30	48.45	49.55	49.55	49.90	0.020600	4.76	82.43	125.40	1.01
UNNAMED TRIBUTAR	3532.17	100-yr	Ex	804.70	48.45	50.00	50.00	50.54	0.016326	5.91	145.13	156.76	0.98
UNNAMED TRIBUTAR	3532.17	100-yr	ProposedCirc	804.70	48.45	50.00	50.00	50.54	0.016326	5.91	145.13	156.76	0.98
UNNAMED TRIBUTAR	3199.6	2-yr	Ex	269.80	43.51	44.98	44.67	45.15	0.005963	3.40	94.06	111.98	0.58
UNNAMED TRIBUTAR	3199.6	2-yr	ProposedCirc	269.80	43.51	44.98	44.67	45.15	0.005963	3.40	94.06	111.98	0.58
UNNAMED TRIBUTAR	3199.6	10-yr	Ex	480.70	43.51	45.30	45.02	45.60	0.007437	4.54	132.75	126.33	0.68
UNNAMED TRIBUTAR	3199.6	10-yr	ProposedCirc	480.70	43.51	45.30	45.02	45.60	0.007437	4.54	132.75	126.33	0.68
UNNAMED TRIBUTAR	3199.6	100-yr	Ex	962.20	43.51	45.94	45.62	46.44	0.007726	5.96	221.39	149.95	0.74
UNNAMED TRIBUTAR	3199.6	100-yr	ProposedCirc	962.20	43.51	45.94	45.62	46.44	0.007726	5.96	221.39	149.95	0.74
UNNAMED TRIBUTAR	3046.54	2-yr	Ex	269.80	39.75	42.99	42.87	43.79	0.013058	7.18	40.74	65.19	0.91
UNNAMED TRIBUTAR	3046.54	2-yr	ProposedCirc	269.80	39.75	42.99	42.87	43.79	0.013058	7.18	40.74	65.19	0.91
UNNAMED TRIBUTAR	3046.54	10-yr	Ex	480.70	39.75	43.85	43.85	44.39	0.008191	6.69	165.93	201.08	0.75
UNNAMED TRIBUTAR	3046.54	10-yr	ProposedCirc	480.70	39.75	43.85	43.85	44.39	0.008191	6.69	165.93	201.08	0.75
UNNAMED TRIBUTAR	3046.54	100-yr	Ex	962.20	39.75	44.51	44.51	45.15	0.008978	8.20	319.88	246.38	0.82
UNNAMED TRIBUTAR	3046.54	100-yr	ProposedCirc	962.20	39.75	44.51	44.51	45.15	0.008978	8.20	319.88	246.38	0.82
UNNAMED TRIBUTAR	2787.44	2-yr	Ex	269.80	37.89	40.34	40.34	40.82	0.009545	5.84	76.86	127.67	0.79
UNNAMED TRIBUTAR	2787.44	2-yr	ProposedCirc	269.80	37.89	40.34	40.34	40.82	0.009545	5.84	76.86	127.67	0.79
UNNAMED TRIBUTAR	2787.44	10-yr	Ex	480.70	37.89	40.62	40.83	41.48	0.015251	8.17	114.58	142.23	1.02

HEC-RAS River: UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
UNNAMED TRIBUTAR	2787.44	10-yr	ProposedCirc	480.70	37.89	40.62	40.83	41.48	0.015251	8.17	114.58	142.23	1.02
UNNAMED TRIBUTAR	2787.44	100-yr	Ex	962.20	37.89	41.42	41.56	42.35	0.012779	9.38	244.67	181.56	0.99
UNNAMED TRIBUTAR	2787.44	100-yr	ProposedCirc	962.20	37.89	41.42	41.56	42.35	0.012779	9.38	244.67	181.56	0.99
UNNAMED TRIBUTAR	2713.23	2-yr	Ex	269.80	37.59	39.92	39.08	40.05	0.002803	2.98	90.50	64.06	0.42
UNNAMED TRIBUTAR	2713.23	2-yr	ProposedCirc	269.80	37.59	39.92	39.08	40.05	0.002803	2.98	90.50	64.06	0.42
UNNAMED TRIBUTAR	2713.23	10-yr	Ex	480.70	37.59	40.48	39.60	40.68	0.002855	3.67	174.38	159.74	0.45
UNNAMED TRIBUTAR	2713.23	10-yr	ProposedCirc	480.70	37.59	40.48	39.60	40.68	0.002855	3.67	174.38	159.74	0.45
UNNAMED TRIBUTAR	2713.23	100-yr	Ex	962.20	37.59	41.47	40.51	41.74	0.002499	4.45	338.17	170.40	0.45
UNNAMED TRIBUTAR	2713.23	100-yr	ProposedCirc	962.20	37.59	41.47	40.51	41.74	0.002499	4.45	338.17	170.40	0.45
UNNAMED TRIBUTAR	2531.71	2-yr	Ex	482.30	35.81	38.48	38.46	38.99	0.009586	6.04	124.54	147.35	0.80
UNNAMED TRIBUTAR	2531.71	2-yr	ProposedCirc	482.30	35.81	38.48	38.46	38.99	0.009586	6.04	124.54	147.35	0.80
UNNAMED TRIBUTAR	2531.71	10-yr	Ex	814.70	35.81	39.01	38.93	39.63	0.009443	7.01	204.14	156.52	0.83
UNNAMED TRIBUTAR	2531.71	10-yr	ProposedCirc	814.70	35.81	39.01	38.93	39.63	0.009443	7.01	204.14	156.52	0.83
UNNAMED TRIBUTAR	2531.71	100-yr	Ex	1528.00	35.81	39.67	39.67	40.66	0.011615	9.23	311.35	168.43	0.96
UNNAMED TRIBUTAR	2531.71	100-yr	ProposedCirc	1528.00	35.81	39.67	39.67	40.66	0.011615	9.23	311.35	168.43	0.96
UNNAMED TRIBUTAR	2016.68	2-yr	Ex	482.30	29.92	32.60	32.60	33.32	0.012698	6.90	82.49	76.14	0.92
UNNAMED TRIBUTAR	2016.68	2-yr	ProposedCirc	482.30	29.92	32.60	32.60	33.32	0.012698	6.90	82.49	76.14	0.92
UNNAMED TRIBUTAR	2016.68	10-yr	Ex	814.70	29.92	33.24	33.24	34.17	0.011842	8.06	137.06	95.60	0.93
UNNAMED TRIBUTAR	2016.68	10-yr	ProposedCirc	814.70	29.92	33.24	33.24	34.17	0.011842	8.06	137.06	95.60	0.93
UNNAMED TRIBUTAR	2016.68	100-yr	Ex	1528.00	29.92	34.46	34.48	35.54	0.008566	9.08	299.40	176.29	0.85
UNNAMED TRIBUTAR	2016.68	100-yr	ProposedCirc	1528.00	29.92	34.46	34.48	35.54	0.008566	9.08	299.40	176.29	0.85
UNNAMED TRIBUTAR	1743.01	2-yr	Ex	482.30	25.97	28.76	27.65	28.94	0.002851	3.55	160.82	79.63	0.45
UNNAMED TRIBUTAR	1743.01	2-yr	ProposedCirc	482.30	25.97	28.76	27.65	28.94	0.002851	3.55	160.82	79.63	0.45
UNNAMED TRIBUTAR	1743.01	10-yr	Ex	814.70	25.97	29.66	28.27	29.89	0.002732	4.00	239.62	95.64	0.45
UNNAMED TRIBUTAR	1743.01	10-yr	ProposedCirc	814.70	25.97	29.66	28.27	29.89	0.002732	4.00	239.62	95.64	0.45
UNNAMED TRIBUTAR	1743.01	100-yr	Ex	1528.00	25.97	30.76	29.24	31.10	0.002865	4.99	410.60	205.50	0.49
UNNAMED TRIBUTAR	1743.01	100-yr	ProposedCirc	1528.00	25.97	30.76	29.24	31.10	0.002865	4.99	410.60	205.50	0.49
UNNAMED TRIBUTAR	1553.11	2-yr	Ex	482.30	23.94	27.77		28.18	0.005735	5.23	103.63	53.86	0.63
UNNAMED TRIBUTAR	1553.11	2-yr	ProposedCirc	482.30	23.94	27.77		28.18	0.005735	5.23	103.63	53.86	0.63
UNNAMED TRIBUTAR	1553.11	10-yr	Ex	814.70	23.94	28.62	27.86	29.16	0.005250	6.05	190.42	156.35	0.63
UNNAMED TRIBUTAR	1553.11	10-yr	ProposedCirc	814.70	23.94	28.62	27.86	29.16	0.005250	6.05	190.42	156.35	0.63
UNNAMED TRIBUTAR	1553.11	100-yr	Ex	1528.00	23.94	29.81		30.42	0.004273	6.90	404.75	202.47	0.61
UNNAMED TRIBUTAR	1553.11	100-yr	ProposedCirc	1528.00	23.94	29.81		30.42	0.004273	6.90	404.75	202.47	0.61
UNNAMED TRIBUTAR	1301.22	2-yr	Ex	482.30	23.56	27.17		27.35	0.001855	3.45	139.91	53.61	0.37
UNNAMED TRIBUTAR	1301.22	2-yr	ProposedCirc	482.30	23.56	27.17		27.35	0.001855	3.45	139.91	53.61	0.37
UNNAMED TRIBUTAR	1301.22	10-yr	Ex	814.70	23.56	27.88		28.20	0.002545	4.55	181.10	81.62	0.45
UNNAMED TRIBUTAR	1301.22	10-yr	ProposedCirc	814.70	23.56	27.88		28.20	0.002545	4.55	181.10	81.62	0.45
UNNAMED TRIBUTAR	1301.22	100-yr	Ex	1528.00	23.56	28.92	27.50	29.48	0.003206	6.13	334.18	181.90	0.53
UNNAMED TRIBUTAR	1301.22	100-yr	ProposedCirc	1528.00	23.56	28.92	27.50	29.48	0.003206	6.13	334.18	181.90	0.53
UNNAMED TRIBUTAR	1154.47	2-yr	Ex	482.30	23.33	26.09	26.09	26.68	0.018230	6.19	77.92	68.92	1.03

HEC-RAS River UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
UNNAMED TRIBUTAR	1154.47	2-yr	ProposedCirc	482.30	23.33	26.09	26.09	26.68	0.018230	6.19	77.92	68.92	1.03
UNNAMED TRIBUTAR	1154.47	10-yr	Ex	814.70	23.33	26.59	26.59	27.39	0.016184	7.18	113.74	74.35	1.02
UNNAMED TRIBUTAR	1154.47	10-yr	ProposedCirc	814.70	23.33	26.59	26.59	27.39	0.016184	7.18	113.74	74.35	1.02
UNNAMED TRIBUTAR	1154.47	100-yr	Ex	1528.00	23.33	27.46	27.46	28.57	0.013820	8.45	182.42	83.79	1.00
UNNAMED TRIBUTAR	1154.47	100-yr	ProposedCirc	1528.00	23.33	27.46	27.46	28.57	0.013820	8.45	182.42	83.79	1.00
UNNAMED TRIBUTAR	714.29	2-yr	Ex	482.30	19.82	22.65	21.80	22.88	0.004253	3.83	125.90	76.79	0.53
UNNAMED TRIBUTAR	714.29	2-yr	ProposedCirc	482.30	19.82	22.65	21.80	22.88	0.004253	3.83	125.90	76.79	0.53
UNNAMED TRIBUTAR	714.29	10-yr	Ex	814.70	19.82	24.43	22.48	24.54	0.001033	2.71	302.24	116.80	0.28
UNNAMED TRIBUTAR	714.29	10-yr	ProposedCirc	814.70	19.82	24.43	22.48	24.54	0.001033	2.71	302.24	116.80	0.28
UNNAMED TRIBUTAR	714.29	100-yr	Ex	1528.00	19.82	27.46	23.39	27.54	0.000290	2.34	774.03	165.13	0.17
UNNAMED TRIBUTAR	714.29	100-yr	ProposedCirc	1528.00	19.82	27.46	23.39	27.54	0.000290	2.34	774.03	165.13	0.17
UNNAMED TRIBUTAR	635.01	2-yr	Ex	482.30	16.00	22.47	20.53	22.68	0.001578	4.55	223.33	68.63	0.34
UNNAMED TRIBUTAR	635.01	2-yr	ProposedCirc	482.30	16.00	22.47	20.53	22.68	0.001578	4.55	223.33	68.63	0.34
UNNAMED TRIBUTAR	635.01	10-yr	Ex	814.70	16.00	24.19	21.40	24.43	0.001443	5.20	352.30	83.28	0.34
UNNAMED TRIBUTAR	635.01	10-yr	ProposedCirc	814.70	16.00	24.19	21.40	24.43	0.001443	5.20	352.30	83.28	0.34
UNNAMED TRIBUTAR	635.01	100-yr	Ex	1528.00	16.00	27.22	22.77	27.49	0.001140	5.81	651.78	114.06	0.32
UNNAMED TRIBUTAR	635.01	100-yr	ProposedCirc	1528.00	16.00	27.22	22.77	27.49	0.001140	5.81	651.78	114.06	0.32
UNNAMED TRIBUTAR	533.66		Culvert										
UNNAMED TRIBUTAR	373.83	2-yr	Ex	482.30	16.00	20.42	20.24	21.43	0.008541	8.54	83.90	41.69	0.82
UNNAMED TRIBUTAR	373.83	2-yr	ProposedCirc	482.30	16.00	20.42	20.24	21.43	0.008541	8.54	83.90	41.69	0.82
UNNAMED TRIBUTAR	373.83	10-yr	Ex	814.70	16.00	21.29	21.29	22.83	0.010052	10.81	122.65	47.15	0.93
UNNAMED TRIBUTAR	373.83	10-yr	ProposedCirc	814.70	16.00	21.29	21.29	22.83	0.010052	10.81	122.65	47.15	0.93
UNNAMED TRIBUTAR	373.83	100-yr	Ex	1528.00	16.00	22.98	22.98	25.08	0.009600	13.21	209.76	55.51	0.96
UNNAMED TRIBUTAR	373.83	100-yr	ProposedCirc	1528.00	16.00	22.98	22.98	25.08	0.009600	13.21	209.76	55.51	0.96
UNNAMED TRIBUTAR	286.21	2-yr	Ex	482.30	15.98	20.50	19.52	20.76	0.003435	5.40	231.13	127.98	0.52
UNNAMED TRIBUTAR	286.21	2-yr	ProposedCirc	482.30	15.98	20.50	19.52	20.76	0.003435	5.40	231.13	127.98	0.52
UNNAMED TRIBUTAR	286.21	10-yr	Ex	814.70	15.98	21.51	20.10	21.78	0.002909	5.92	366.47	140.51	0.50
UNNAMED TRIBUTAR	286.21	10-yr	ProposedCirc	814.70	15.98	21.51	20.10	21.78	0.002909	5.92	366.47	140.51	0.50
UNNAMED TRIBUTAR	286.21	100-yr	Ex	1528.00	15.98	23.82	21.30	24.04	0.001587	5.80	717.72	160.96	0.40
UNNAMED TRIBUTAR	286.21	100-yr	ProposedCirc	1528.00	15.98	23.82	21.30	24.04	0.001587	5.80	717.72	160.96	0.40
UNNAMED TRIBUTAR	176.69	2-yr	Ex	616.50	15.94	19.28	19.28	20.06	0.010393	8.15	149.28	98.87	0.88
UNNAMED TRIBUTAR	176.69	2-yr	ProposedCirc	616.50	15.94	19.28	19.28	20.06	0.010393	8.15	149.28	98.87	0.88
UNNAMED TRIBUTAR	176.69	10-yr	Ex	1097.80	15.94	20.18	20.00	21.13	0.009642	9.53	240.08	103.53	0.89
UNNAMED TRIBUTAR	176.69	10-yr	ProposedCirc	1097.80	15.94	20.18	20.00	21.13	0.009642	9.53	240.08	103.53	0.89
UNNAMED TRIBUTAR	176.69	100-yr	Ex	2121.20	15.94	23.13	23.13	23.74	0.003301	8.34	590.22	133.42	0.58
UNNAMED TRIBUTAR	176.69	100-yr	ProposedCirc	2121.20	15.94	23.13	23.13	23.74	0.003301	8.34	590.22	133.42	0.58



HEC-RAS River: UT-2 Reach: UNNAMED TRIB-2

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
UNNAMED TRIB-2	442.34	2-yr	UT-X	20.60	108.21	108.83	108.83	109.00	0.026406	3.33	6.19	18.46	1.01
UNNAMED TRIB-2	442.34	2-yr	UT-P	20.60	108.21	108.83	108.83	109.00	0.026406	3.33	6.19	18.46	1.01
UNNAMED TRIB-2	442.34	10-yr	UT-X	34.10	108.21	108.98	108.98	109.19	0.024680	3.68	9.26	22.49	1.01
UNNAMED TRIB-2	442.34	10-yr	UT-P	34.10	108.21	108.98	108.98	109.19	0.024680	3.68	9.26	22.49	1.01
UNNAMED TRIB-2	442.34	100-yr	UT-X	61.30	108.21	109.19	109.19	109.46	0.022775	4.14	14.79	28.36	1.01
UNNAMED TRIB-2	442.34	100-yr	UT-P	61.30	108.21	109.19	109.19	109.46	0.022775	4.14	14.79	28.36	1.01
UNNAMED TRIB-2	351.61	2-yr	UT-X	20.60	99.21	99.90	99.90	100.09	0.025463	3.53	5.84	15.46	1.01
UNNAMED TRIB-2	351.61	2-yr	UT-P	20.60	99.21	99.90	99.90	100.09	0.025463	3.53	5.84	15.46	1.01
UNNAMED TRIB-2	351.61	10-yr	UT-X	34.10	99.21	100.05	100.05	100.30	0.023408	4.00	8.55	18.24	1.01
UNNAMED TRIB-2	351.61	10-yr	UT-P	34.10	99.21	100.05	100.05	100.30	0.023408	4.00	8.55	18.24	1.01
UNNAMED TRIB-2	351.61	100-yr	UT-X	61.30	99.21	100.30	100.30	100.64	0.018686	4.70	13.44	21.32	0.97
UNNAMED TRIB-2	351.61	100-yr	UT-P	61.30	99.21	100.30	100.30	100.64	0.018686	4.70	13.44	21.32	0.97
UNNAMED TRIB-2	262.21	2-yr	UT-X	76.90	93.90	94.92	94.92	95.28	0.020405	4.86	15.82	21.89	1.01
UNNAMED TRIB-2	262.21	2-yr	UT-P	76.90	88.00	89.85	89.85	90.39	0.018543	5.89	13.05	11.99	1.00
UNNAMED TRIB-2	262.21	10-yr	UT-X	124.60	93.90	95.22	95.22	95.68	0.018967	5.44	22.90	25.30	1.01
UNNAMED TRIB-2	262.21	10-yr	UT-P	124.60	88.00	90.29	90.29	90.98	0.017611	6.64	18.77	13.71	1.00
UNNAMED TRIB-2	262.21	100-yr	UT-X	221.30	93.90	95.68	95.68	96.27	0.017359	6.18	35.82	30.56	1.01
UNNAMED TRIB-2	262.21	100-yr	UT-P	221.30	88.00	90.99	90.99	91.88	0.016396	7.57	29.24	16.39	1.00
UNNAMED TRIB-2	188.75	2-yr	UT-X	76.90	90.69	91.45	91.45	91.72	0.022436	4.14	18.55	35.20	1.01
UNNAMED TRIB-2	188.75	10-yr	UT-X	124.60	90.69	91.67	91.67	92.01	0.020894	4.66	26.77	40.43	1.01
UNNAMED TRIB-2	188.75	100-yr	UT-X	221.30	90.69	92.01	92.01	92.44	0.019331	5.30	41.79	49.18	1.01
UNNAMED TRIB-2	106.07	2-yr	UT-X	76.90	85.97	87.11	87.11	87.48	0.020355	4.90	15.68	21.37	1.01
UNNAMED TRIB-2	106.07	2-yr	UT-P	76.90	79.44	83.32	81.24	83.36	0.000483	1.53	50.16	22.72	0.18
UNNAMED TRIB-2	106.07	10-yr	UT-X	124.60	85.97	87.41	87.41	87.88	0.018875	5.51	22.65	25.36	1.01
UNNAMED TRIB-2	106.07	10-yr	UT-P	124.60	79.44	83.77	81.67	83.84	0.000727	2.06	60.44	24.87	0.23
UNNAMED TRIB-2	106.07	100-yr	UT-X	221.30	85.97	87.87	87.87	88.50	0.014809	6.40	35.98	31.93	0.96
UNNAMED TRIB-2	106.07	100-yr	UT-P	221.30	79.44	84.45	82.34	84.58	0.001129	2.88	76.90	28.13	0.29
UNNAMED TRIB-2	24.19	2-yr	UT-X	76.90	81.75	82.82	82.82	83.21	0.020101	4.98	15.43	20.29	1.01
UNNAMED TRIB-2	24.19	2-yr	UT-P	76.90	81.75	82.82	82.82	83.21	0.020058	4.98	15.44	20.30	1.01
UNNAMED TRIB-2	24.19	10-yr	UT-X	124.60	81.75	83.13	83.13	83.62	0.018597	5.63	22.14	22.84	1.01
UNNAMED TRIB-2	24.19	10-yr	UT-P	124.60	81.75	83.13	83.13	83.63	0.018017	5.69	22.01	22.79	1.00
UNNAMED TRIB-2	24.19	100-yr	UT-X	221.30	81.75	83.62	83.62	84.27	0.017057	6.47	34.21	26.76	1.01
UNNAMED TRIB-2	24.19	100-yr	UT-P	221.30	81.75	83.62	83.62	84.29	0.015759	6.61	34.24	26.77	0.99

HEC-RAS

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
HA HA WEST BRANC	9078.4	2-yr	Ex	72.36	71.65	0.71	2.26	0.06		722.80		44.61
HA HA WEST BRANC	9078.4	2-yr	ProposedCirc	72.36	71.65	0.71	2.26	0.06		722.80		44.61
HA HA WEST BRANC	9078.4	10-yr	Ex	73.90	72.74	1.16	2.53	0.11		1371.50		50.23
HA HA WEST BRANC	9078.4	10-yr	ProposedCirc	73.90	72.74	1.16	2.53	0.11		1371.50		50.23
HA HA WEST BRANC	9078.4	100-yr	Ex	76.28	74.15	2.13			0.01	2745.08	0.01	56.86
HA HA WEST BRANC	9078.4	100-yr	ProposedCirc	76.28	74.15	2.13			0.01	2745.08	0.01	56.86
HA HA WEST BRANC	8779.29	2-yr	Ex	70.04	69.54	0.50	1.59	0.03		722.80		61.73
HA HA WEST BRANC	8779.29	2-yr	ProposedCirc	70.04	69.54	0.50	1.59	0.03		722.80		61.73
HA HA WEST BRANC	8779.29	10-yr	Ex	71.26	70.47	0.79	1.69	0.02	6.75	1364.64	0.11	104.22
HA HA WEST BRANC	8779.29	10-yr	ProposedCirc	71.26	70.47	0.79	1.69	0.02	6.75	1364.64	0.11	104.22
HA HA WEST BRANC	8779.29	100-yr	Ex	73.01	71.55	1.46	1.91	0.05	87.83	2653.22	4.05	142.28
HA HA WEST BRANC	8779.29	100-yr	ProposedCirc	73.01	71.55	1.46	1.91	0.05	87.83	2653.22	4.05	142.28
HA HA WEST BRANC	8572.51	2-yr	Ex	68.42	67.65	0.77	2.18	0.11	60.52	609.60	52.69	148.99
HA HA WEST BRANC	8572.51	2-yr	ProposedCirc	68.42	67.65	0.77	2.18	0.11	60.52	609.60	52.69	148.99
HA HA WEST BRANC	8572.51	10-yr	Ex	69.55	68.55	1.00	2.29	0.13	171.77	987.47	212.27	192.89
HA HA WEST BRANC	8572.51	10-yr	ProposedCirc	69.55	68.55	1.00	2.29	0.13	171.77	987.47	212.27	192.89
HA HA WEST BRANC	8572.51	100-yr	Ex	71.06	69.75	1.31	2.34	0.15	526.43	1635.75	582.92	226.23
HA HA WEST BRANC	8572.51	100-yr	ProposedCirc	71.06	69.75	1.31	2.34	0.15	526.43	1635.75	582.92	226.23
HA HA WEST BRANC	8261.16	2-yr	Ex	65.68	65.28	0.41	1.30	0.03	17.33	526.24	179.23	180.55
HA HA WEST BRANC	8261.16	2-yr	ProposedCirc	65.68	65.28	0.41	1.30	0.03	17.33	526.24	179.23	180.55
HA HA WEST BRANC	8261.16	10-yr	Ex	66.65	66.08	0.58	1.31	0.03	66.16	877.86	427.48	206.66
HA HA WEST BRANC	8261.16	10-yr	ProposedCirc	66.65	66.08	0.58	1.31	0.03	66.16	877.86	427.48	206.66
HA HA WEST BRANC	8261.16	100-yr	Ex	68.14	67.35	0.80	1.38	0.04	247.96	1527.46	969.68	257.77
HA HA WEST BRANC	8261.16	100-yr	ProposedCirc	68.14	67.35	0.80	1.38	0.04	247.96	1527.46	969.68	257.77
HA HA WEST BRANC	8100	2-yr	Ex	64.36	63.64	0.72	2.25	0.16	66.92	497.83	158.05	168.15
HA HA WEST BRANC	8100	2-yr	ProposedCirc	64.36	63.64	0.72	2.25	0.16	66.92	497.83	158.05	168.15
HA HA WEST BRANC	8100	10-yr	Ex	65.31	64.47	0.84	1.58	0.18	201.45	789.32	380.74	203.74
HA HA WEST BRANC	8100	10-yr	ProposedCirc	65.31	64.47	0.84	1.58	0.18	201.45	789.32	380.74	203.74
HA HA WEST BRANC	8100	100-yr	Ex	66.72	65.51	1.22	1.39	0.26	532.95	1342.65	869.51	228.07
HA HA WEST BRANC	8100	100-yr	ProposedCirc	66.72	65.51	1.22	1.39	0.26	532.95	1342.65	869.51	228.07
HA HA WEST BRANC	7810.89	2-yr	Ex	61.54	61.35	0.19	1.72	0.01	0.04	722.28	0.48	192.26
HA HA WEST BRANC	7810.89	2-yr	ProposedCirc	61.54	61.35	0.19	1.72	0.01	0.04	722.28	0.48	192.26
HA HA WEST BRANC	7810.89	10-yr	Ex	62.37	62.14	0.23	1.61	0.02	4.09	1361.94	5.47	212.26
HA HA WEST BRANC	7810.89	10-yr	ProposedCirc	62.37	62.14	0.23	1.61	0.02	4.09	1361.94	5.47	212.26
HA HA WEST BRANC	7810.89	100-yr	Ex	63.67	63.33	0.34	1.45	0.03	28.03	2691.14	25.93	229.16
HA HA WEST BRANC	7810.89	100-yr	ProposedCirc	63.67	63.33	0.34	1.45	0.03	28.03	2691.14	25.93	229.16



HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frictn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
HA HA WEST BRANC	7359.83	2-yr	Ex	59.82	59.55	0.27	1.48	0.03	173.38	529.85	7.77	221.53
HA HA WEST BRANC	7359.83	2-yr	ProposedCirc	59.82	59.55	0.27	1.48	0.03	173.38	529.85	7.77	221.53
HA HA WEST BRANC	7359.83	10-yr	Ex	60.74	60.29	0.45	1.54	0.00	456.43	901.23	25.44	252.73
HA HA WEST BRANC	7359.83	10-yr	ProposedCirc	60.74	60.29	0.45	1.54	0.00	456.43	901.23	25.44	252.73
HA HA WEST BRANC	7359.83	100-yr	Ex	62.19	61.58	0.61	1.29	0.08	1187.29	1518.74	91.66	281.19
HA HA WEST BRANC	7359.83	100-yr	ProposedCirc	62.19	61.58	0.61	1.29	0.08	1187.29	1518.74	91.66	281.19
HA HA WEST BRANC	7006.74	2-yr	Ex	58.31	57.73	0.58	0.95	0.12	65.20	398.99	246.81	239.25
HA HA WEST BRANC	7006.74	2-yr	ProposedCirc	58.31	57.73	0.58	0.95	0.12	65.20	398.99	246.81	239.25
HA HA WEST BRANC	7006.74	10-yr	Ex	59.20	58.77	0.43	0.79	0.05	205.14	537.13	640.82	279.73
HA HA WEST BRANC	7006.74	10-yr	ProposedCirc	59.20	58.77	0.43	0.79	0.05	205.14	537.13	640.82	279.73
HA HA WEST BRANC	7006.74	100-yr	Ex	60.83	60.47	0.36	0.68	0.01	528.92	778.09	1490.69	296.27
HA HA WEST BRANC	7006.74	100-yr	ProposedCirc	60.83	60.47	0.36	0.68	0.01	528.92	778.09	1490.69	296.27
HA HA WEST BRANC	6757.1	2-yr	Ex	57.17	56.98	0.19	0.66	0.05	0.66	641.93	68.41	172.83
HA HA WEST BRANC	6757.1	2-yr	ProposedCirc	57.17	56.98	0.19	0.66	0.05	0.66	641.93	68.41	172.83
HA HA WEST BRANC	6757.1	10-yr	Ex	58.36	58.09	0.27	0.66	0.07	7.88	1144.48	230.74	184.80
HA HA WEST BRANC	6757.1	10-yr	ProposedCirc	58.36	58.09	0.27	0.66	0.07	7.88	1144.48	230.74	184.80
HA HA WEST BRANC	6757.1	100-yr	Ex	60.14	59.71	0.43	0.69	0.10	43.29	2145.20	609.21	200.80
HA HA WEST BRANC	6757.1	100-yr	ProposedCirc	60.14	59.71	0.43	0.69	0.10	43.29	2145.20	609.21	200.80
HA HA WEST BRANC	6586.23	2-yr	Ex	56.46	55.75	0.70	2.38	0.11	30.88	582.76	101.51	140.27
HA HA WEST BRANC	6586.23	2-yr	ProposedCirc	56.46	55.75	0.70	2.38	0.11	30.88	582.76	101.51	140.27
HA HA WEST BRANC	6586.23	10-yr	Ex	57.62	56.61	1.02	2.33	0.19	104.14	985.80	306.55	162.92
HA HA WEST BRANC	6586.23	10-yr	ProposedCirc	57.62	56.61	1.02	2.33	0.19	104.14	985.80	306.55	162.92
HA HA WEST BRANC	6586.23	100-yr	Ex	59.34	57.87	1.47	2.25	0.29	301.41	1718.69	816.70	183.63
HA HA WEST BRANC	6586.23	100-yr	ProposedCirc	59.34	57.87	1.47	2.25	0.29	301.41	1718.69	816.70	183.63
HA HA WEST BRANC	6239.67	2-yr	Ex	53.97	53.62	0.35	1.68	0.00	0.93	399.60	314.62	203.59
HA HA WEST BRANC	6239.67	2-yr	ProposedCirc	53.97	53.62	0.35	1.68	0.00	0.93	399.60	314.62	203.59
HA HA WEST BRANC	6239.67	10-yr	Ex	55.02	54.62	0.40	1.63	0.02	9.52	638.96	748.02	229.76
HA HA WEST BRANC	6239.67	10-yr	ProposedCirc	55.02	54.62	0.40	1.63	0.02	9.52	638.96	748.02	229.76
HA HA WEST BRANC	6239.67	100-yr	Ex	56.63	56.14	0.50	1.59	0.03	47.84	1084.56	1704.40	254.61
HA HA WEST BRANC	6239.67	100-yr	ProposedCirc	56.63	56.14	0.50	1.59	0.03	47.84	1084.56	1704.40	254.61
HA HA WEST BRANC	5866.54	2-yr	Ex	52.30	51.91	0.38	0.71	0.04	17.69	491.41	206.05	174.33
HA HA WEST BRANC	5866.54	2-yr	ProposedCirc	52.30	51.91	0.38	0.71	0.04	17.69	491.41	206.05	174.33
HA HA WEST BRANC	5866.54	10-yr	Ex	53.37	52.81	0.56	0.76	0.05	65.19	821.46	509.85	187.44
HA HA WEST BRANC	5866.54	10-yr	ProposedCirc	53.37	52.81	0.56	0.76	0.05	65.19	821.46	509.85	187.44
HA HA WEST BRANC	5866.54	100-yr	Ex	55.01	54.18	0.84	0.81	0.06	193.04	1442.19	1201.57	203.75

HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
HA HA WEST BRANC	5866.54	100-yr	ProposedCirc	55.01	54.18	0.84	0.81	0.06	193.04	1442.19	1201.57	203.75
HA HA WEST BRANC	5697.52	2-yr	Ex	51.54	51.30	0.24	1.45	0.04	10.11	699.18	5.86	135.94
HA HA WEST BRANC	5697.52	2-yr	ProposedCirc	51.54	51.30	0.24	1.45	0.04	10.10	699.19	5.86	135.93
HA HA WEST BRANC	5697.52	10-yr	Ex	52.56	52.17	0.39	1.46	0.05	45.70	1328.88	21.93	154.69
HA HA WEST BRANC	5697.52	10-yr	ProposedCirc	52.56	52.17	0.39	1.46	0.05	45.70	1328.87	21.93	154.69
HA HA WEST BRANC	5697.52	100-yr	Ex	54.14	53.50	0.64	1.56	0.06	157.90	2604.06	74.85	178.71
HA HA WEST BRANC	5697.52	100-yr	ProposedCirc	54.14	53.50	0.64	1.56	0.06	157.90	2604.06	74.85	178.71
HA HA WEST BRANC	5460.15	2-yr	Ex	50.05	49.39	0.66	0.81	0.12	305.39	407.21	2.55	167.09
HA HA WEST BRANC	5460.15	2-yr	ProposedCirc	50.05	49.39	0.66	0.85	0.12	305.39	407.21	2.55	167.09
HA HA WEST BRANC	5460.15	10-yr	Ex	51.06	50.21	0.84	1.15	0.09	730.78	656.62	9.11	190.55
HA HA WEST BRANC	5460.15	10-yr	ProposedCirc	51.06	50.21	0.84	1.17	0.09	730.78	656.62	9.11	190.55
HA HA WEST BRANC	5460.15	100-yr	Ex	52.52	51.26	1.26	1.76	0.02	1687.88	1120.82	28.11	201.42
HA HA WEST BRANC	5460.15	100-yr	ProposedCirc	52.52	51.26	1.26	1.77	0.02	1687.88	1120.82	28.11	201.42
HA HA WEST BRANC	5278.56	2-yr	Ex	47.05	46.79	0.26	0.79	0.01	3.50	695.25	16.39	133.20
HA HA WEST BRANC	5278.56	2-yr	ProposedCirc	46.99	46.72	0.27	0.88	0.01	3.17	698.26	13.72	130.83
HA HA WEST BRANC	5278.56	10-yr	Ex	48.11	47.56	0.55	1.16	0.03	15.31	1284.76	96.44	160.45
HA HA WEST BRANC	5278.56	10-yr	ProposedCirc	48.08	47.53	0.56	1.03	0.06	14.90	1288.03	93.57	159.24
HA HA WEST BRANC	5278.56	100-yr	Ex	49.69	48.48	1.20	1.22	0.20	46.36	2432.20	358.24	196.45
HA HA WEST BRANC	5278.56	100-yr	ProposedCirc	49.68	48.48	1.21	1.18	0.21	46.29	2432.68	357.83	196.36
HA HA WEST BRANC	5069.91	2-yr	Ex	46.24	46.01	0.23	0.87	0.03	0.92	739.58	0.40	210.55
HA HA WEST BRANC	5069.91	2-yr	ProposedCirc	46.10	45.75	0.35	0.10	0.01	740.60	740.60	0.30	123.92
HA HA WEST BRANC	5069.91	10-yr	Ex	46.91	46.48	0.43	0.57	0.03	14.29	1431.14	0.77	214.84
HA HA WEST BRANC	5069.91	10-yr	ProposedCirc	46.99	46.64	0.36	0.11	0.03	18.16	1427.26	0.78	216.30
HA HA WEST BRANC	5069.91	100-yr	Ex	48.27	47.72	0.54	0.31	0.05	73.58	2852.96	1.76	226.31
HA HA WEST BRANC	5069.91	100-yr	ProposedCirc	48.30	47.78	0.52	0.06	0.01	74.96	2851.57	1.77	226.85
HA HA WEST BRANC	4985.35	2-yr	Ex	45.35	44.84	0.52	0.74	0.11	9.84	727.41	3.64	135.51
HA HA WEST BRANC	4985.35	2-yr	ProposedCirc	45.35	44.84	0.52	0.74	0.11	9.84	727.41	3.64	135.51
HA HA WEST BRANC	4985.35	10-yr	Ex	46.31	45.98	0.33	0.70	0.02	46.68	1378.06	21.46	215.97
HA HA WEST BRANC	4985.35	10-yr	ProposedCirc	46.31	45.98	0.33	0.70	0.02	46.68	1378.06	21.46	215.97
HA HA WEST BRANC	4985.35	100-yr	Ex	47.90	47.53	0.37	0.63	0.01	145.37	2708.25	74.68	234.45
HA HA WEST BRANC	4985.35	100-yr	ProposedCirc	47.90	47.53	0.37	0.63	0.01	145.37	2708.25	74.68	234.45
HA HA WEST BRANC	4738.83	2-yr	Ex	44.50	44.36	0.14	0.39	0.04	5.87	596.78	138.26	179.57
HA HA WEST BRANC	4738.83	2-yr	ProposedCirc	44.50	44.36	0.14	0.39	0.04	5.87	596.78	138.26	179.57
HA HA WEST BRANC	4738.83	10-yr	Ex	45.58	45.33	0.25	0.43	0.02	19.04	1075.36	351.80	188.69
HA HA WEST BRANC	4738.83	10-yr	ProposedCirc	45.58	45.33	0.25	0.43	0.02	19.04	1075.36	351.80	188.69



HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
HA HA WEST BRANC	4738.83	100-yr	Ex	47.26	46.80	0.46	0.48	0.02	65.91	2010.94	851.45	204.25
HA HA WEST BRANC	4738.83	100-yr	ProposedCirc	47.26	46.80	0.46	0.48	0.02	65.91	2010.94	851.45	204.25
HA HA WEST BRANC	4602.96	2-yr	Ex	44.07	43.58	0.50	0.97	0.01	181.65	436.67	122.58	185.47
HA HA WEST BRANC	4602.96	2-yr	ProposedCirc	44.07	43.58	0.50	0.97	0.01	181.65	436.67	122.58	185.47
HA HA WEST BRANC	4602.96	10-yr	Ex	45.13	44.65	0.48	0.73	0.02	447.85	731.82	266.53	210.99
HA HA WEST BRANC	4602.96	10-yr	ProposedCirc	45.13	44.65	0.48	0.73	0.02	447.85	731.82	266.53	210.99
HA HA WEST BRANC	4602.96	100-yr	Ex	46.76	46.15	0.62	0.63	0.02	1021.20	1319.25	587.85	228.76
HA HA WEST BRANC	4602.96	100-yr	ProposedCirc	46.76	46.15	0.62	0.63	0.02	1021.20	1319.25	587.85	228.76
HA HA WEST BRANC	4483.54	2-yr	Ex	43.10	42.52	0.58	3.95	0.03	41.13	697.77	2.00	151.79
HA HA WEST BRANC	4483.54	2-yr	ProposedCirc	43.10	42.52	0.58	3.95	0.03	41.13	697.77	2.00	151.79
HA HA WEST BRANC	4483.54	10-yr	Ex	44.37	43.66	0.71	3.60	0.06	247.40	1157.74	41.06	202.65
HA HA WEST BRANC	4483.54	10-yr	ProposedCirc	44.37	43.66	0.71	3.60	0.06	247.40	1157.74	41.06	202.65
HA HA WEST BRANC	4483.54	100-yr	Ex	46.11	45.28	0.83	3.13	0.09	765.11	1921.93	241.26	234.83
HA HA WEST BRANC	4483.54	100-yr	ProposedCirc	46.11	45.28	0.83	3.13	0.09	765.11	1921.93	241.26	234.83
HA HA WEST BRANC	3955.74	2-yr	Ex	39.11	38.21	0.90	3.86	0.19	1.42	762.04	0.04	73.67
HA HA WEST BRANC	3955.74	2-yr	ProposedCirc	39.11	38.21	0.90	3.86	0.19	1.42	762.04	0.04	73.67
HA HA WEST BRANC	3955.74	10-yr	Ex	40.70	39.36	1.34	3.56	0.29	77.36	1425.26	6.38	109.93
HA HA WEST BRANC	3955.74	10-yr	ProposedCirc	40.70	39.36	1.34	3.56	0.29	77.36	1425.26	6.38	109.93
HA HA WEST BRANC	3955.74	100-yr	Ex	42.89	41.15	1.74	3.26	0.34	448.33	2603.48	58.49	158.27
HA HA WEST BRANC	3955.74	100-yr	ProposedCirc	42.89	41.15	1.74	3.26	0.34	448.33	2603.48	58.49	158.27
HA HA WEST BRANC	3335.56	2-yr	Ex	35.05	34.79	0.26	2.38	0.03	2.16	717.19	44.15	164.66
HA HA WEST BRANC	3335.56	2-yr	ProposedCirc	35.05	34.79	0.26	2.38	0.03	2.16	717.19	44.15	164.66
HA HA WEST BRANC	3335.56	10-yr	Ex	36.14	35.75	0.39	2.37	0.03	17.08	1336.89	155.03	182.41
HA HA WEST BRANC	3335.56	10-yr	ProposedCirc	36.14	35.75	0.39	2.37	0.03	17.08	1336.89	155.03	182.41
HA HA WEST BRANC	3335.56	100-yr	Ex	37.83	37.21	0.62	2.45	0.04	84.47	2601.26	424.57	215.84
HA HA WEST BRANC	3335.56	100-yr	ProposedCirc	37.83	37.21	0.62	2.45	0.04	84.47	2601.26	424.57	215.84
HA HA WEST BRANC	2787.62	2-yr	Ex	32.64	32.04	0.59	5.71	0.01	4.23	620.70	138.57	211.08
HA HA WEST BRANC	2787.62	2-yr	ProposedCirc	32.64	32.04	0.59	5.71	0.01	4.23	620.70	138.57	211.08
HA HA WEST BRANC	2787.62	10-yr	Ex	33.74	33.01	0.73	5.59	0.03	33.09	973.20	502.71	226.42
HA HA WEST BRANC	2787.62	10-yr	ProposedCirc	33.74	33.01	0.73	5.59	0.03	33.09	973.20	502.71	226.42
HA HA WEST BRANC	2787.62	100-yr	Ex	35.35	34.38	0.97	5.33	0.05	125.99	1609.02	1375.29	244.18
HA HA WEST BRANC	2787.62	100-yr	ProposedCirc	35.35	34.38	0.97	5.33	0.05	125.99	1609.02	1375.29	244.18
HA HA WEST BRANC	2077.75	2-yr	Ex	26.91	26.19	0.73	3.35	0.16	0.24	763.23	0.03	83.54
HA HA WEST BRANC	2077.75	2-yr	ProposedCirc	26.91	26.19	0.73	3.35	0.16	0.24	763.23	0.03	83.54
HA HA WEST BRANC	2077.75	10-yr	Ex	28.12	27.06	1.06	3.36	0.22	22.49	1484.05	2.46	119.39





HEC-RAS (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Downstream	161.2561	2-yr	Ex	17.57	17.43	0.14	0.01	0.08	4.30	1168.90	44.10	156.57
Downstream	161.2561	2-yr	ProposedCirc	17.57	17.43	0.14	0.01	0.08	4.30	1168.90	44.10	156.57
Downstream	161.2561	10-yr	Ex	19.74	19.52	0.23	0.01	0.14	68.40	1977.33	177.67	242.89
Downstream	161.2561	10-yr	ProposedCirc	19.74	19.52	0.23	0.01	0.14	68.40	1977.33	177.67	242.89
Downstream	161.2561	100-yr	Ex	23.34	23.06	0.28	0.01	0.28	381.59	3314.89	787.22	264.00
Downstream	161.2561	100-yr	ProposedCirc	23.34	23.06	0.28	0.01	0.28	381.59	3314.89	787.22	264.00
Downstream	149.62	2-yr	Ex	17.48	16.49	0.99	0.23	0.02	0.11	1216.39	0.81	48.03
Downstream	149.62	2-yr	ProposedCirc	17.48	16.49	0.99	0.23	0.02	0.11	1216.39	0.81	48.03
Downstream	149.62	10-yr	Ex	19.59	17.98	1.61	0.24	0.04	4.84	2179.33	39.23	71.33
Downstream	149.62	10-yr	ProposedCirc	19.59	17.98	1.61	0.24	0.04	4.84	2179.33	39.23	71.33
Downstream	149.62	100-yr	Ex	23.05	19.96	3.09	0.32	0.07	37.50	4219.45	226.75	71.56
Downstream	149.62	100-yr	ProposedCirc	23.05	19.96	3.09	0.32	0.07	37.50	4219.45	226.75	71.56
Downstream	131.14	2-yr	Ex	17.23	16.03	1.19	1.13	0.02	0.00	1217.30	0.00	42.64
Downstream	131.14	2-yr	ProposedCirc	17.23	16.03	1.19	1.13	0.02	0.00	1217.30	0.00	42.64
Downstream	131.14	10-yr	Ex	19.31	17.31	2.00	1.53	0.02	12.95	2192.40	18.05	83.71
Downstream	131.14	10-yr	ProposedCirc	19.31	17.31	2.00	1.53	0.02	12.95	2192.40	18.05	83.71
Downstream	131.14	100-yr	Ex	22.65	18.89	3.76	2.19	0.01	114.99	4159.24	209.47	172.30
Downstream	131.14	100-yr	ProposedCirc	22.65	18.89	3.76	2.19	0.01	114.99	4159.24	209.47	172.30
Downstream	0	2-yr	Ex	16.08	14.96	1.12			26.77	1139.83	50.70	160.34
Downstream	0	2-yr	ProposedCirc	16.08	14.96	1.12			26.77	1139.83	50.70	160.34
Downstream	0	10-yr	Ex	17.75	15.55	2.21			103.92	1933.62	185.86	194.12
Downstream	0	10-yr	ProposedCirc	17.75	15.55	2.21			103.92	1933.62	185.86	194.12
Downstream	0	100-yr	Ex	20.45	16.55	3.90			416.63	3405.26	661.81	256.16
Downstream	0	100-yr	ProposedCirc	20.45	16.55	3.90			416.63	3405.26	661.81	256.16

HEC-RAS River UT-1 Reach: UNNAMED TRIBUTAR

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
UNNAMED TRIBUTAR	6060.38	2-yr	Ex	90.37	90.06	0.31	11.19	0.03	0.01	115.89	0.00	44.12
UNNAMED TRIBUTAR	6060.38	2-yr	ProposedCirc	90.37	90.07	0.30	11.19	0.02	0.01	115.88	0.01	44.48
UNNAMED TRIBUTAR	6060.38	10-yr	Ex	90.96	90.47	0.49	10.85	0.04	1.52	243.78	0.90	56.12
UNNAMED TRIBUTAR	6060.38	10-yr	ProposedCirc	90.96	90.47	0.49	9.01	0.06	1.52	243.78	0.90	56.12
UNNAMED TRIBUTAR	6060.38	100-yr	Ex	91.91	91.15	0.75	11.44	0.01	14.79	513.12	8.79	76.09
UNNAMED TRIBUTAR	6060.38	100-yr	ProposedCirc	91.91	91.15	0.75	11.44	0.01	14.79	513.12	8.79	76.09
UNNAMED TRIBUTAR	5432.19	2-yr	Ex	79.16	78.95	0.22	3.73	0.00		115.90		51.29
UNNAMED TRIBUTAR	5432.19	2-yr	ProposedCirc	79.16	78.94	0.23	3.73	0.00		115.90		50.54
UNNAMED TRIBUTAR	5432.19	10-yr	Ex	79.65	79.28	0.37	3.64	0.00		246.05	0.15	66.80
UNNAMED TRIBUTAR	5432.19	10-yr	ProposedCirc	79.67	79.38	0.29	3.64	0.02		245.76	0.44	69.87
UNNAMED TRIBUTAR	5432.19	100-yr	Ex	80.47	79.63	0.84	3.46	0.01	0.24	532.90	3.57	79.12
UNNAMED TRIBUTAR	5432.19	100-yr	ProposedCirc	80.47	79.63	0.84	2.33	0.06	0.24	532.90	3.57	79.12
UNNAMED TRIBUTAR	5183.4	2-yr	Ex	75.44	75.20	0.24	5.60	0.04	0.00	115.90		44.77
UNNAMED TRIBUTAR	5183.4	2-yr	ProposedCirc	75.44	75.20	0.23	5.60	0.04	0.00	115.90		44.99
UNNAMED TRIBUTAR	5183.4	10-yr	Ex	76.02	75.63	0.39	5.17	0.03	0.98	245.00	0.22	54.00
UNNAMED TRIBUTAR	5183.4	10-yr	ProposedCirc	76.00	75.51	0.49	2.16	0.06	0.56	245.54	0.10	51.67
UNNAMED TRIBUTAR	5183.4	100-yr	Ex	76.95	76.22	0.73	4.76	0.04	9.44	524.40	2.87	66.34
UNNAMED TRIBUTAR	5183.4	100-yr	ProposedCirc	77.10	76.66	0.44	0.15	0.11	15.99	515.60	5.11	75.10
UNNAMED TRIBUTAR	4840.7	2-yr	Ex	69.79	69.14	0.65	4.32	0.00		204.50		23.66
UNNAMED TRIBUTAR	4840.7	2-yr	ProposedCirc	69.79	69.13	0.66				204.50		23.65
UNNAMED TRIBUTAR	4840.7	10-yr	Ex	70.81	70.09	0.72	4.37	0.02		389.29	0.01	73.00
UNNAMED TRIBUTAR	4840.7	10-yr	ProposedCirc	71.18	70.88	0.30				388.21	1.09	93.34
UNNAMED TRIBUTAR	4840.7	100-yr	Ex	72.15	71.00	1.14	4.27	0.04		801.80	2.90	94.76
UNNAMED TRIBUTAR	4840.7	100-yr	ProposedCirc	76.83	76.75	0.08				753.88	50.82	141.12
UNNAMED TRIBUTAR	4546.75	2-yr	Ex	65.46	64.81	0.65	2.38	0.13	1.33	193.66	9.51	30.19
UNNAMED TRIBUTAR	4546.75	2-yr	ProposedCirc	65.46	64.81	0.65	2.38	0.13	1.33	193.66	9.51	30.19
UNNAMED TRIBUTAR	4546.75	10-yr	Ex	66.42	65.45	0.97	2.20	0.13	6.33	337.79	45.18	40.06
UNNAMED TRIBUTAR	4546.75	10-yr	ProposedCirc	66.40	65.58	0.82	3.35	0.04	7.15	331.11	51.04	42.14
UNNAMED TRIBUTAR	4546.75	100-yr	Ex	67.84	66.29	1.55	3.79	0.15	22.80	604.87	177.04	51.16
UNNAMED TRIBUTAR	4546.75	100-yr	ProposedCirc	67.76	66.61	1.14	3.59	0.03	26.32	576.78	201.60	54.10
UNNAMED TRIBUTAR	4350.57	2-yr	Ex	62.48	62.27	0.22	3.25	0.02	0.13	204.36	0.01	76.97
UNNAMED TRIBUTAR	4350.57	2-yr	ProposedCirc	62.48	62.27	0.22	3.25	0.02	0.13	204.36	0.01	76.97
UNNAMED TRIBUTAR	4350.57	10-yr	Ex	62.97	62.60	0.37	3.14	0.02	1.19	387.69	0.41	82.74
UNNAMED TRIBUTAR	4350.57	10-yr	ProposedCirc	63.00	62.32	0.68	5.12	0.04	0.37	388.89	0.04	77.92
UNNAMED TRIBUTAR	4350.57	100-yr	Ex	63.88	62.84	1.04	3.01	0.02	4.32	798.35	2.04	86.90
UNNAMED TRIBUTAR	4350.57	100-yr	ProposedCirc	64.12	62.63	1.49	3.01	0.02	2.70	801.00	0.99	83.31



HEC-RAS River UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
UNNAMED TRIBUTAR	4132.52	2-yr	Ex	59.22	58.82	0.40	1.76	0.06		204.50		52.07
UNNAMED TRIBUTAR	4132.52	2-yr	ProposedCirc	59.22	58.82	0.40	1.76	0.06		204.50		52.07
UNNAMED TRIBUTAR	4132.52	10-yr	Ex	59.81	59.26	0.56	1.97	0.06		389.06	0.24	62.86
UNNAMED TRIBUTAR	4132.52	10-yr	ProposedCirc	59.81	59.26	0.56	1.97	0.06		389.06	0.24	62.85
UNNAMED TRIBUTAR	4132.52	100-yr	Ex	60.80	59.95	0.84	2.31	0.00	0.11	797.00	7.59	76.78
UNNAMED TRIBUTAR	4132.52	100-yr	ProposedCirc	60.80	59.95	0.84	2.31	0.00	0.11	797.00	7.59	76.78
UNNAMED TRIBUTAR	3942.05	2-yr	Ex	56.00	55.80	0.20	0.75	0.02		204.50		45.06
UNNAMED TRIBUTAR	3942.05	2-yr	ProposedCirc	56.00	55.80	0.20	0.75	0.02		204.50		45.06
UNNAMED TRIBUTAR	3942.05	10-yr	Ex	56.65	56.28	0.37	0.84	0.01	0.16	389.09	0.04	52.59
UNNAMED TRIBUTAR	3942.05	10-yr	ProposedCirc	56.65	56.28	0.37	0.84	0.01	0.16	389.09	0.04	52.59
UNNAMED TRIBUTAR	3942.05	100-yr	Ex	57.72	56.88	0.84	1.01	0.03	4.18	799.41	1.10	62.04
UNNAMED TRIBUTAR	3942.05	100-yr	ProposedCirc	57.72	56.88	0.84	1.01	0.03	4.18	799.41	1.10	62.04
UNNAMED TRIBUTAR	3861.66	2-yr	Ex	55.24	54.86	0.38	1.99	0.08		204.50		56.06
UNNAMED TRIBUTAR	3861.66	2-yr	ProposedCirc	55.24	54.86	0.38	1.99	0.08		204.50		56.06
UNNAMED TRIBUTAR	3861.66	10-yr	Ex	55.80	55.29	0.51	2.00	0.09		389.30		67.36
UNNAMED TRIBUTAR	3861.66	10-yr	ProposedCirc	55.80	55.29	0.51	2.00	0.09		389.30		67.36
UNNAMED TRIBUTAR	3861.66	100-yr	Ex	56.68	55.94	0.74	4.07	0.02	0.45	804.25		84.21
UNNAMED TRIBUTAR	3861.66	100-yr	ProposedCirc	56.68	55.94	0.74	4.07	0.02	0.45	804.25		84.21
UNNAMED TRIBUTAR	3691.9	2-yr	Ex	51.52	51.40	0.12	1.97	0.01		204.50		110.51
UNNAMED TRIBUTAR	3691.9	2-yr	ProposedCirc	51.52	51.40	0.12	1.97	0.01		204.50		110.51
UNNAMED TRIBUTAR	3691.9	10-yr	Ex	51.91	51.71	0.20	1.99	0.02		389.30		122.93
UNNAMED TRIBUTAR	3691.9	10-yr	ProposedCirc	51.91	51.71	0.20	1.99	0.02		389.30		122.93
UNNAMED TRIBUTAR	3691.9	100-yr	Ex	52.59	51.67	0.92	1.96	0.02		804.70		121.40
UNNAMED TRIBUTAR	3691.9	100-yr	ProposedCirc	52.59	51.67	0.92	1.96	0.02		804.70		121.40
UNNAMED TRIBUTAR	3532.17	2-yr	Ex	49.53	49.28	0.25	3.20	0.02		204.50		106.02
UNNAMED TRIBUTAR	3532.17	2-yr	ProposedCirc	49.53	49.28	0.25	3.20	0.02		204.50		106.02
UNNAMED TRIBUTAR	3532.17	10-yr	Ex	49.90	49.55	0.35	3.67	0.02	0.33	388.97		125.40
UNNAMED TRIBUTAR	3532.17	10-yr	ProposedCirc	49.90	49.55	0.35	3.67	0.02	0.33	388.97		125.40
UNNAMED TRIBUTAR	3532.17	100-yr	Ex	50.54	50.00	0.54	3.49	0.01	6.51	796.12	2.08	156.76
UNNAMED TRIBUTAR	3532.17	100-yr	ProposedCirc	50.54	50.00	0.54	3.49	0.01	6.51	796.12	2.08	156.76
UNNAMED TRIBUTAR	3199.6	2-yr	Ex	45.15	44.98	0.17	1.30	0.06	2.13	257.36	10.31	111.98
UNNAMED TRIBUTAR	3199.6	2-yr	ProposedCirc	45.15	44.98	0.17	1.30	0.06	2.13	257.36	10.31	111.98
UNNAMED TRIBUTAR	3199.6	10-yr	Ex	45.60	45.30	0.30	1.19	0.02	5.11	449.39	26.20	126.33
UNNAMED TRIBUTAR	3199.6	10-yr	ProposedCirc	45.60	45.30	0.30	1.19	0.02	5.11	449.39	26.20	126.33
UNNAMED TRIBUTAR	3199.6	100-yr	Ex	46.44	45.94	0.50	1.27	0.01	15.31	863.95	82.94	149.95

HEC-RAS River: UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
UNNAMED TRIBUTAR	3199.6	100-yr	ProposedCirc	46.44	45.94	0.50	1.27	0.01	15.31	863.95	82.94	149.95
UNNAMED TRIBUTAR	3046.54	2-yr	Ex	43.79	42.99	0.80	2.87	0.09	0.88	268.80	0.11	65.19
UNNAMED TRIBUTAR	3046.54	2-yr	ProposedCirc	43.79	42.99	0.80	2.87	0.09	0.88	268.80	0.11	65.19
UNNAMED TRIBUTAR	3046.54	10-yr	Ex	44.39	43.85	0.54	2.89	0.03	82.06	371.67	26.96	201.08
UNNAMED TRIBUTAR	3046.54	10-yr	ProposedCirc	44.39	43.85	0.54	2.89	0.03	82.06	371.67	26.96	201.08
UNNAMED TRIBUTAR	3046.54	100-yr	Ex	45.15	44.51	0.64	2.78	0.03	263.75	577.72	120.73	246.38
UNNAMED TRIBUTAR	3046.54	100-yr	ProposedCirc	45.15	44.51	0.64	2.78	0.03	263.75	577.72	120.73	246.38
UNNAMED TRIBUTAR	2787.44	2-yr	Ex	40.82	40.34	0.48	0.35	0.10	14.29	244.67	10.83	127.67
UNNAMED TRIBUTAR	2787.44	2-yr	ProposedCirc	40.82	40.34	0.48	0.35	0.10	14.29	244.67	10.83	127.67
UNNAMED TRIBUTAR	2787.44	10-yr	Ex	41.48	40.62	0.86	0.35	0.12	52.70	398.52	29.48	142.23
UNNAMED TRIBUTAR	2787.44	10-yr	ProposedCirc	41.48	40.62	0.86	0.35	0.12	52.70	398.52	29.48	142.23
UNNAMED TRIBUTAR	2787.44	100-yr	Ex	42.35	41.42	0.93	0.33	0.15	216.72	642.59	102.89	181.56
UNNAMED TRIBUTAR	2787.44	100-yr	ProposedCirc	42.35	41.42	0.93	0.33	0.15	216.72	642.59	102.89	181.56
UNNAMED TRIBUTAR	2713.23	2-yr	Ex	40.05	39.92	0.14	1.02	0.04	0.00	269.80		64.06
UNNAMED TRIBUTAR	2713.23	2-yr	ProposedCirc	40.05	39.92	0.14	1.02	0.04	0.00	269.80		64.06
UNNAMED TRIBUTAR	2713.23	10-yr	Ex	40.68	40.48	0.20	1.01	0.04	25.10	455.54	0.06	159.74
UNNAMED TRIBUTAR	2713.23	10-yr	ProposedCirc	40.68	40.48	0.20	1.01	0.04	25.10	455.54	0.06	159.74
UNNAMED TRIBUTAR	2713.23	100-yr	Ex	41.74	41.47	0.26	1.01	0.07	142.58	818.59	1.03	170.40
UNNAMED TRIBUTAR	2713.23	100-yr	ProposedCirc	41.74	41.47	0.26	1.01	0.07	142.58	818.59	1.03	170.40
UNNAMED TRIBUTAR	2531.71	2-yr	Ex	38.99	38.48	0.51	5.65	0.02	47.68	434.62		147.35
UNNAMED TRIBUTAR	2531.71	2-yr	ProposedCirc	38.99	38.48	0.51	5.65	0.02	47.68	434.62		147.35
UNNAMED TRIBUTAR	2531.71	10-yr	Ex	39.63	39.01	0.62	5.43	0.03	156.90	657.43	0.37	156.52
UNNAMED TRIBUTAR	2531.71	10-yr	ProposedCirc	39.63	39.01	0.62	5.43	0.03	156.90	657.43	0.37	156.52
UNNAMED TRIBUTAR	2531.71	100-yr	Ex	40.66	39.67	0.99	5.11	0.01	401.55	1120.93	5.53	168.43
UNNAMED TRIBUTAR	2531.71	100-yr	ProposedCirc	40.66	39.67	0.99	5.11	0.01	401.55	1120.93	5.53	168.43
UNNAMED TRIBUTAR	2016.68	2-yr	Ex	33.32	32.60	0.72	1.44	0.16	12.86	469.44		76.14
UNNAMED TRIBUTAR	2016.68	2-yr	ProposedCirc	33.32	32.60	0.72	1.44	0.16	12.86	469.44		76.14
UNNAMED TRIBUTAR	2016.68	10-yr	Ex	34.17	33.24	0.93	1.36	0.21	61.27	752.23	1.20	95.60
UNNAMED TRIBUTAR	2016.68	10-yr	ProposedCirc	34.17	33.24	0.93	1.36	0.21	61.27	752.23	1.20	95.60
UNNAMED TRIBUTAR	2016.68	100-yr	Ex	35.54	34.46	1.09	1.25	0.22	210.93	1290.28	26.79	176.29
UNNAMED TRIBUTAR	2016.68	100-yr	ProposedCirc	35.54	34.46	1.09	1.25	0.22	210.93	1290.28	26.79	176.29
UNNAMED TRIBUTAR	1743.01	2-yr	Ex	28.94	28.76	0.18	0.74	0.02	47.53	434.77		79.63
UNNAMED TRIBUTAR	1743.01	2-yr	ProposedCirc	28.94	28.76	0.18	0.74	0.02	47.53	434.77		79.63
UNNAMED TRIBUTAR	1743.01	10-yr	Ex	29.89	29.66	0.23	0.70	0.03	77.73	736.97		95.64
UNNAMED TRIBUTAR	1743.01	10-yr	ProposedCirc	29.89	29.66	0.23	0.70	0.03	77.73	736.97		95.64



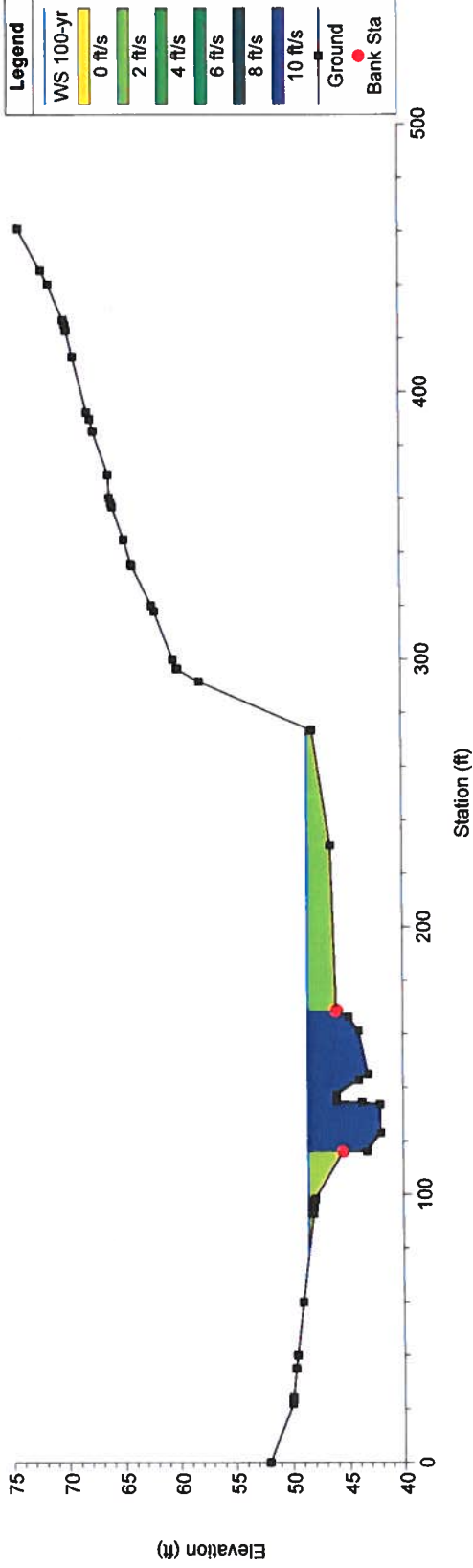
HEC-RAS River UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
UNNAMED TRIBUTAR	1743.01	100-yr	Ex	31.10	30.76	0.35	0.66	0.03	162.18	1365.54	0.28	205.50
UNNAMED TRIBUTAR	1743.01	100-yr	ProposedCirc	31.10	30.76	0.35	0.66	0.03	162.18	1365.54	0.28	205.50
UNNAMED TRIBUTAR	1553.11	2-yr	Ex	28.18	27.77	0.41	0.76	0.07	18.40	463.90		53.86
UNNAMED TRIBUTAR	1553.11	2-yr	ProposedCirc	28.18	27.77	0.41	0.76	0.07	18.40	463.90		53.86
UNNAMED TRIBUTAR	1553.11	10-yr	Ex	29.16	28.62	0.54	0.89	0.06	40.81	766.84	7.05	156.35
UNNAMED TRIBUTAR	1553.11	10-yr	ProposedCirc	29.16	28.62	0.54	0.89	0.06	40.81	766.84	7.05	156.35
UNNAMED TRIBUTAR	1553.11	100-yr	Ex	30.42	29.81	0.61	0.93	0.01	209.40	1242.99	75.61	202.47
UNNAMED TRIBUTAR	1553.11	100-yr	ProposedCirc	30.42	29.81	0.61	0.93	0.01	209.40	1242.99	75.61	202.47
UNNAMED TRIBUTAR	1301.22	2-yr	Ex	27.35	27.17	0.19	0.63	0.04		482.26	0.04	53.61
UNNAMED TRIBUTAR	1301.22	2-yr	ProposedCirc	27.35	27.17	0.19	0.63	0.04		482.26	0.04	53.61
UNNAMED TRIBUTAR	1301.22	10-yr	Ex	28.20	27.88	0.32	0.77	0.05	0.06	813.95	0.69	81.62
UNNAMED TRIBUTAR	1301.22	10-yr	ProposedCirc	28.20	27.88	0.32	0.77	0.05	0.06	813.95	0.69	81.62
UNNAMED TRIBUTAR	1301.22	100-yr	Ex	29.48	28.92	0.56	0.86	0.05	63.54	1460.10	4.36	181.90
UNNAMED TRIBUTAR	1301.22	100-yr	ProposedCirc	29.48	28.92	0.56	0.86	0.05	63.54	1460.10	4.36	181.90
UNNAMED TRIBUTAR	1154.47	2-yr	Ex	26.68	26.09	0.60	3.40	0.11		482.30	0.00	66.92
UNNAMED TRIBUTAR	1154.47	2-yr	ProposedCirc	26.68	26.09	0.60	3.40	0.11		482.30	0.00	66.92
UNNAMED TRIBUTAR	1154.47	10-yr	Ex	27.39	26.59	0.80	1.16	0.21		814.47	0.23	74.35
UNNAMED TRIBUTAR	1154.47	10-yr	ProposedCirc	27.39	26.59	0.80	1.16	0.21		814.47	0.23	74.35
UNNAMED TRIBUTAR	1154.47	100-yr	Ex	28.57	27.46	1.11	0.39	0.31		1525.63	2.37	83.79
UNNAMED TRIBUTAR	1154.47	100-yr	ProposedCirc	28.57	27.46	1.11	0.39	0.31		1525.63	2.37	83.79
UNNAMED TRIBUTAR	714.29	2-yr	Ex	22.88	22.65	0.23	0.19	0.01		482.30		76.79
UNNAMED TRIBUTAR	714.29	2-yr	ProposedCirc	22.88	22.65	0.23	0.19	0.01		482.30		76.79
UNNAMED TRIBUTAR	714.29	10-yr	Ex	24.54	24.43	0.11	0.10	0.01	0.02	814.35	0.33	116.80
UNNAMED TRIBUTAR	714.29	10-yr	ProposedCirc	24.54	24.43	0.11	0.10	0.01	0.02	814.35	0.33	116.80
UNNAMED TRIBUTAR	714.29	100-yr	Ex	27.54	27.46	0.08	0.04	0.02	2.65	1456.77	68.58	165.13
UNNAMED TRIBUTAR	714.29	100-yr	ProposedCirc	27.54	27.46	0.08	0.04	0.02	2.65	1456.77	68.58	165.13
UNNAMED TRIBUTAR	635.01	2-yr	Ex	22.68	22.47	0.21			171.40	298.38	12.52	66.63
UNNAMED TRIBUTAR	635.01	2-yr	ProposedCirc	22.68	22.47	0.21			171.40	298.38	12.52	66.63
UNNAMED TRIBUTAR	635.01	10-yr	Ex	24.43	24.19	0.24			339.88	443.44	31.37	83.28
UNNAMED TRIBUTAR	635.01	10-yr	ProposedCirc	24.43	24.19	0.24			339.88	443.44	31.37	83.28
UNNAMED TRIBUTAR	635.01	100-yr	Ex	27.49	27.22	0.26			702.69	698.86	126.45	114.06
UNNAMED TRIBUTAR	635.01	100-yr	ProposedCirc	27.49	27.22	0.26			702.69	698.86	126.45	114.06
UNNAMED TRIBUTAR	533.66			Culvert								
UNNAMED TRIBUTAR	373.83	2-yr	Ex	21.43	20.42	1.01	0.45	0.23	9.26	428.36	44.69	41.69

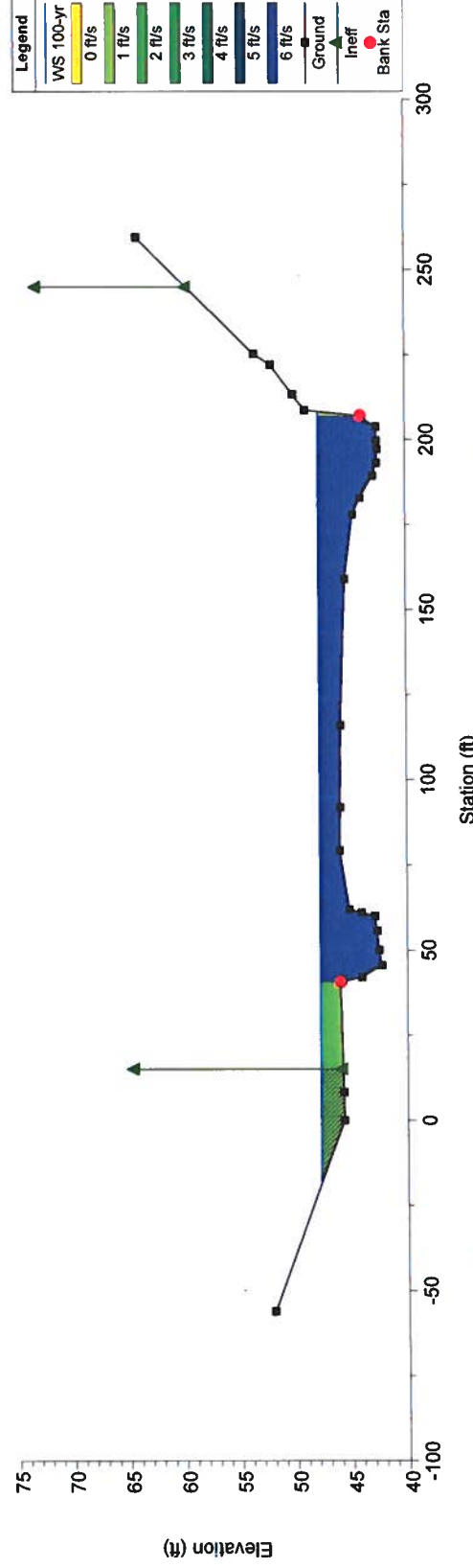
HEC-RAS River: UT-1 Reach: UNNAMED TRIBUTAR (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
UNNAMED TRIBUTAR	373.83	2-yr	ProposedCirc	21.43	20.42	1.01	0.45	0.23	9.26	428.36	44.69	41.69
UNNAMED TRIBUTAR	373.83	10-yr	Ex	22.83	21.29	1.53	0.43	0.38	25.89	682.52	106.29	47.15
UNNAMED TRIBUTAR	373.83	10-yr	ProposedCirc	22.83	21.29	1.53	0.43	0.38	25.89	682.52	106.29	47.15
UNNAMED TRIBUTAR	373.83	100-yr	Ex	25.08	22.98	2.11	0.28	0.57	78.45	1166.91	282.64	55.51
UNNAMED TRIBUTAR	373.83	100-yr	ProposedCirc	25.08	22.98	2.11	0.28	0.57	78.45	1166.91	282.64	55.51
UNNAMED TRIBUTAR	286.21	2-yr	Ex	20.76	20.50	0.26	0.65	0.05	169.50	265.74	47.06	127.98
UNNAMED TRIBUTAR	286.21	2-yr	ProposedCirc	20.76	20.50	0.26	0.65	0.05	169.50	265.74	47.06	127.98
UNNAMED TRIBUTAR	286.21	10-yr	Ex	21.78	21.51	0.27	0.58	0.07	332.46	378.67	103.57	140.51
UNNAMED TRIBUTAR	286.21	10-yr	ProposedCirc	21.78	21.51	0.27	0.58	0.07	332.46	378.67	103.57	140.51
UNNAMED TRIBUTAR	286.21	100-yr	Ex	24.04	23.82	0.22	0.26	0.04	678.32	567.62	282.06	160.96
UNNAMED TRIBUTAR	286.21	100-yr	ProposedCirc	24.04	23.82	0.22	0.26	0.04	678.32	567.62	282.06	160.96
UNNAMED TRIBUTAR	176.69	2-yr	Ex	20.06	19.28	0.78	0.00	0.15	157.78	457.02	1.70	98.87
UNNAMED TRIBUTAR	176.69	2-yr	ProposedCirc	20.06	19.28	0.78	0.00	0.15	157.78	457.02	1.70	98.87
UNNAMED TRIBUTAR	176.69	10-yr	Ex	21.13	20.18	0.95	0.00	0.11	375.56	715.61	6.63	103.53
UNNAMED TRIBUTAR	176.69	10-yr	ProposedCirc	21.13	20.18	0.95	0.00	0.11	375.56	715.61	6.63	103.53
UNNAMED TRIBUTAR	176.69	100-yr	Ex	23.74	23.13	0.62	0.00	0.01	941.73	1143.95	35.53	133.42
UNNAMED TRIBUTAR	176.69	100-yr	ProposedCirc	23.74	23.13	0.62	0.00	0.01	941.73	1143.95	35.53	133.42

19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 5278.56

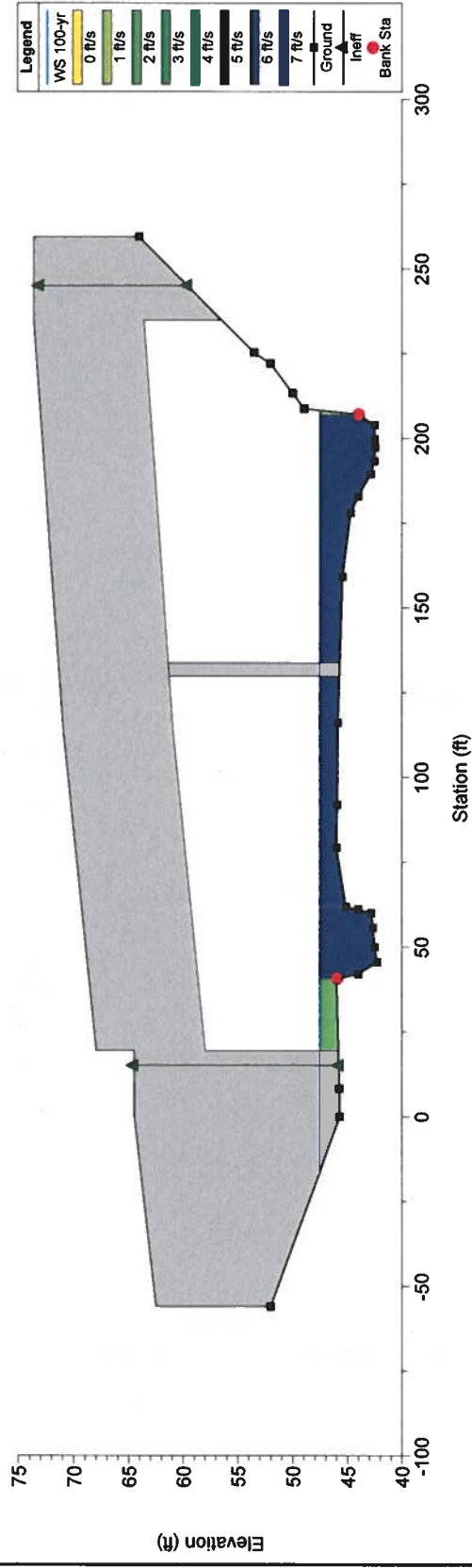


19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 5069.91

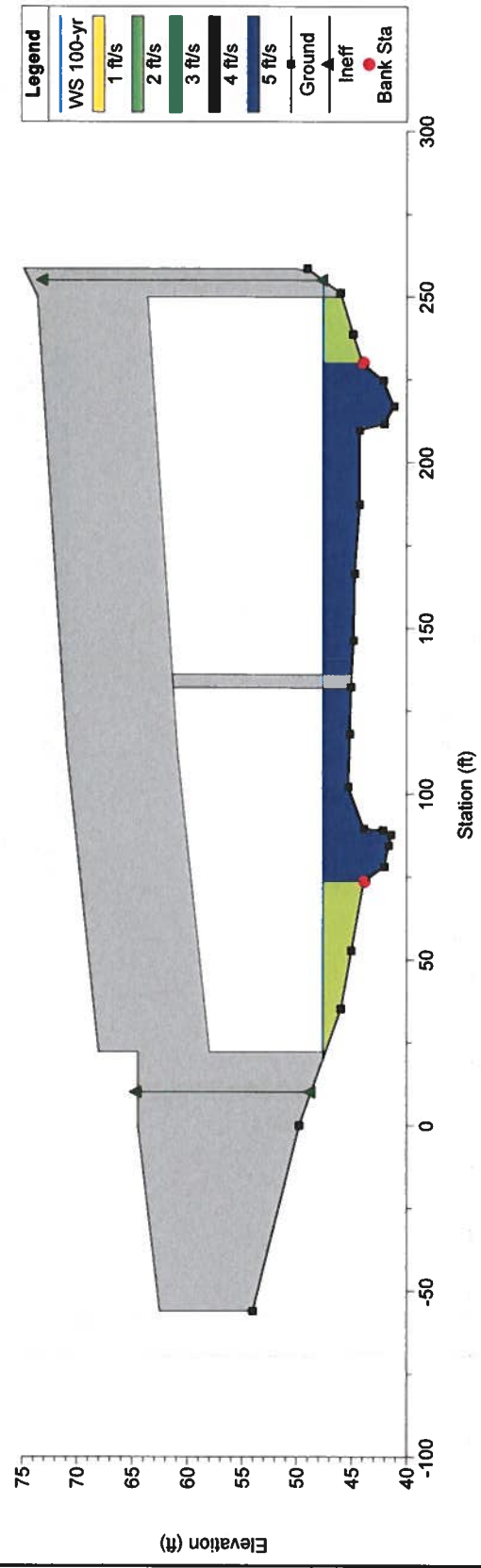




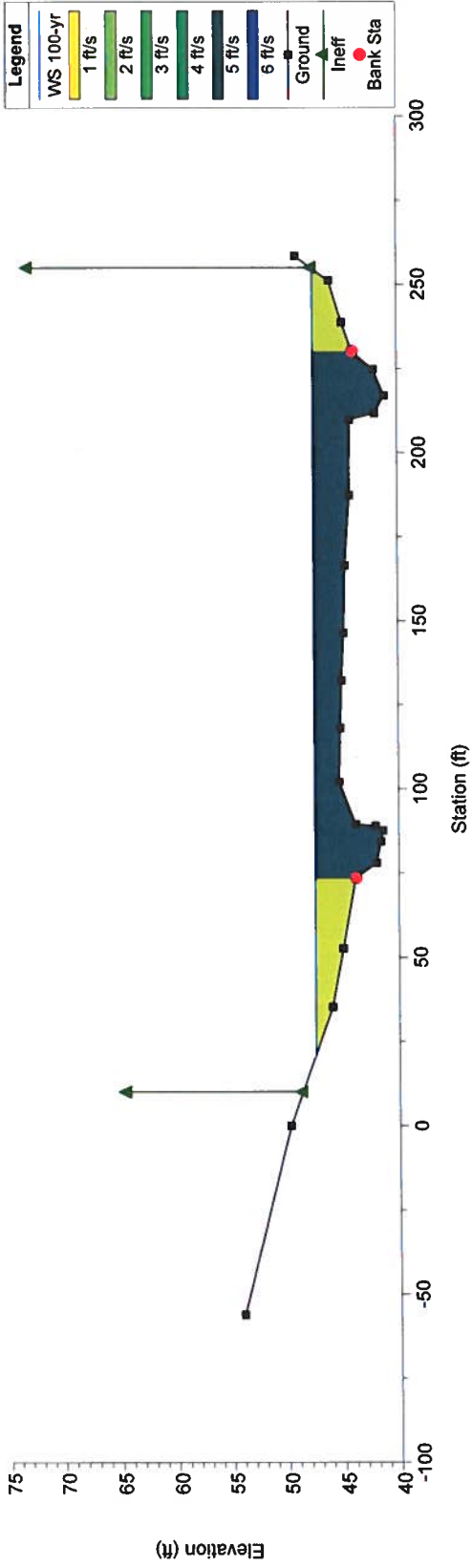
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 5033.47 BR



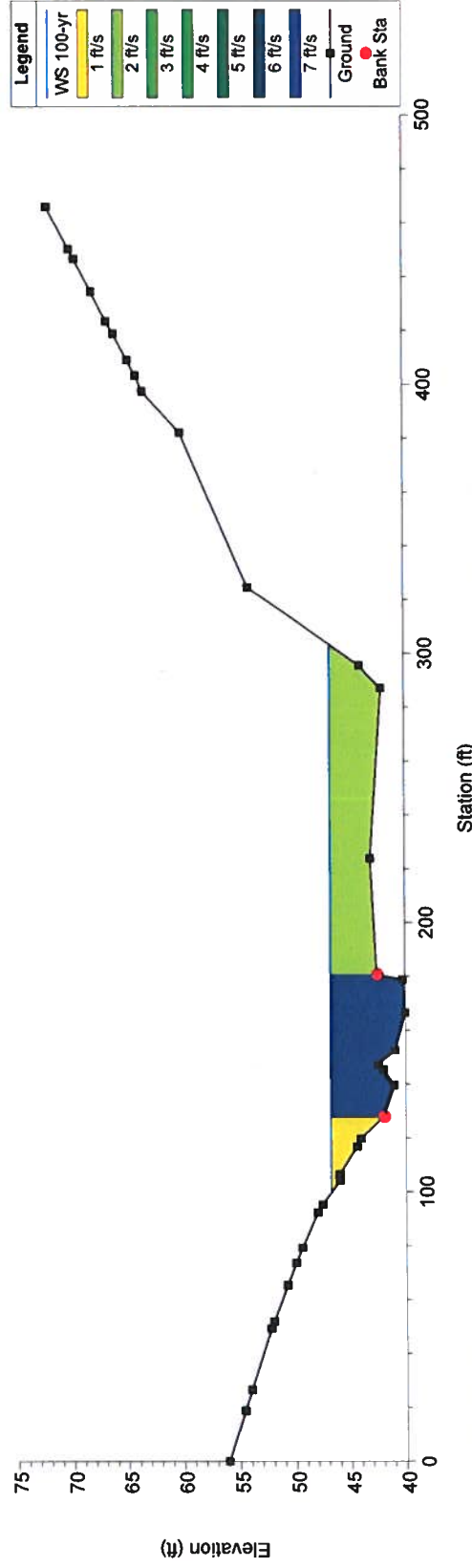
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 5033.47 BR



19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 4985.35



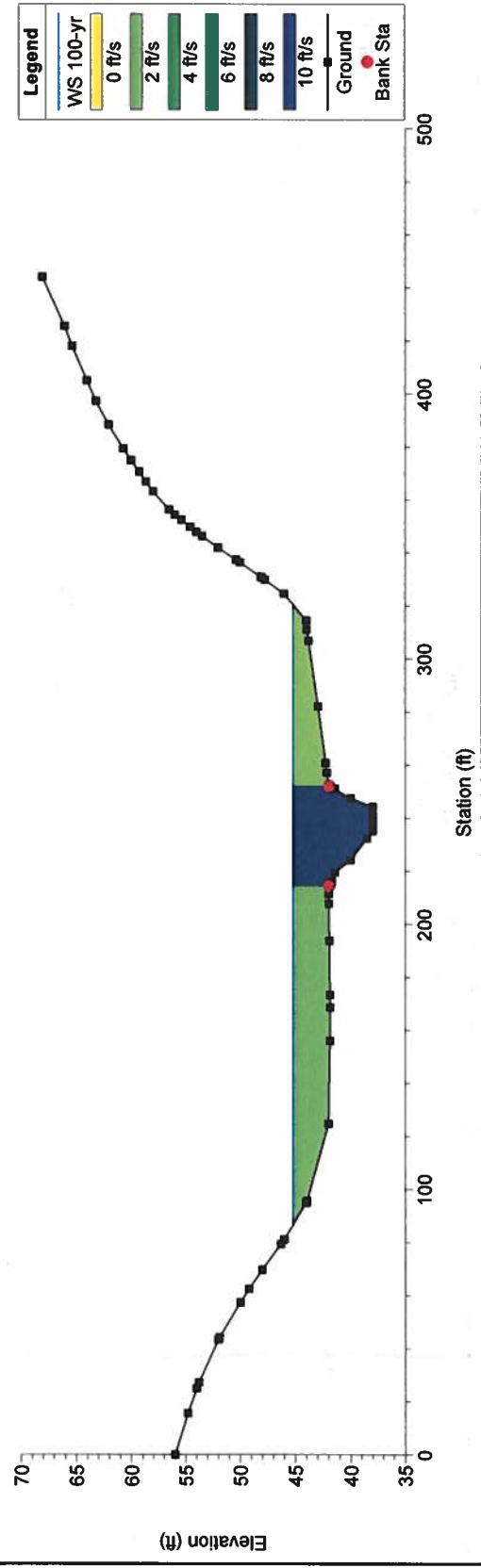
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 4738.83



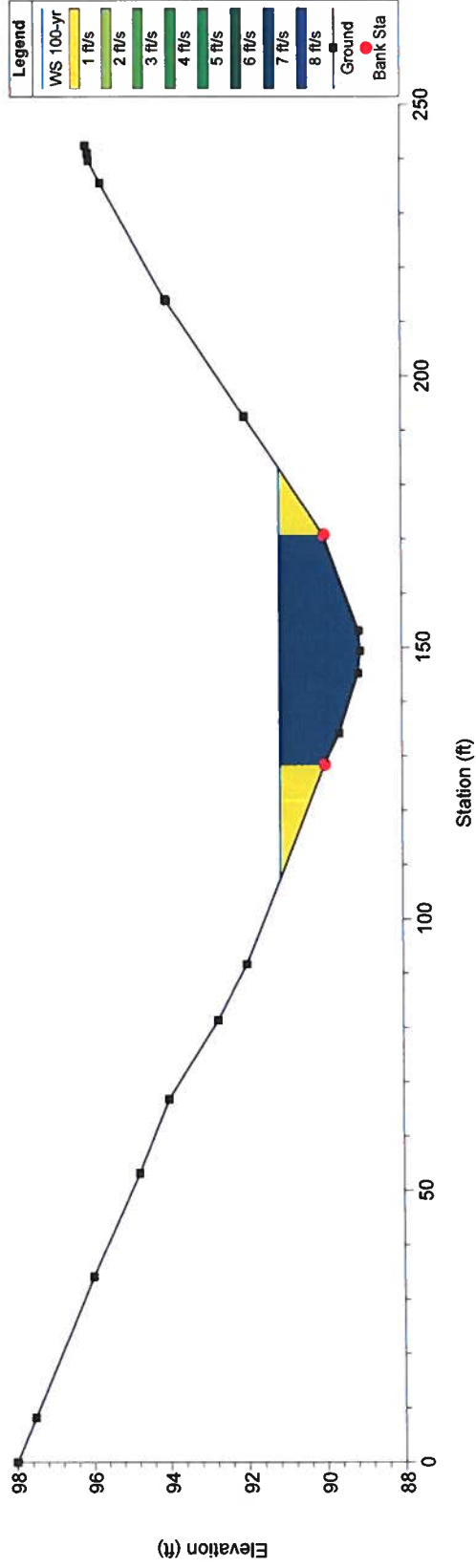
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 4602.96



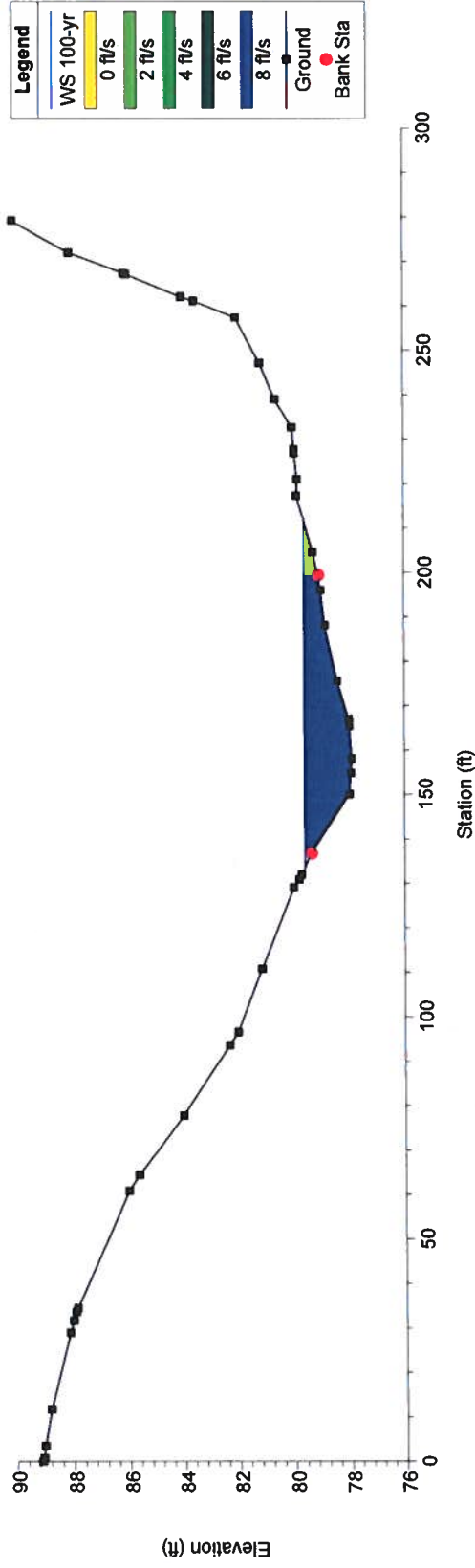
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = HA HA WEST BRANC Reach = HA HA WEST BRANC RS = 4483.54



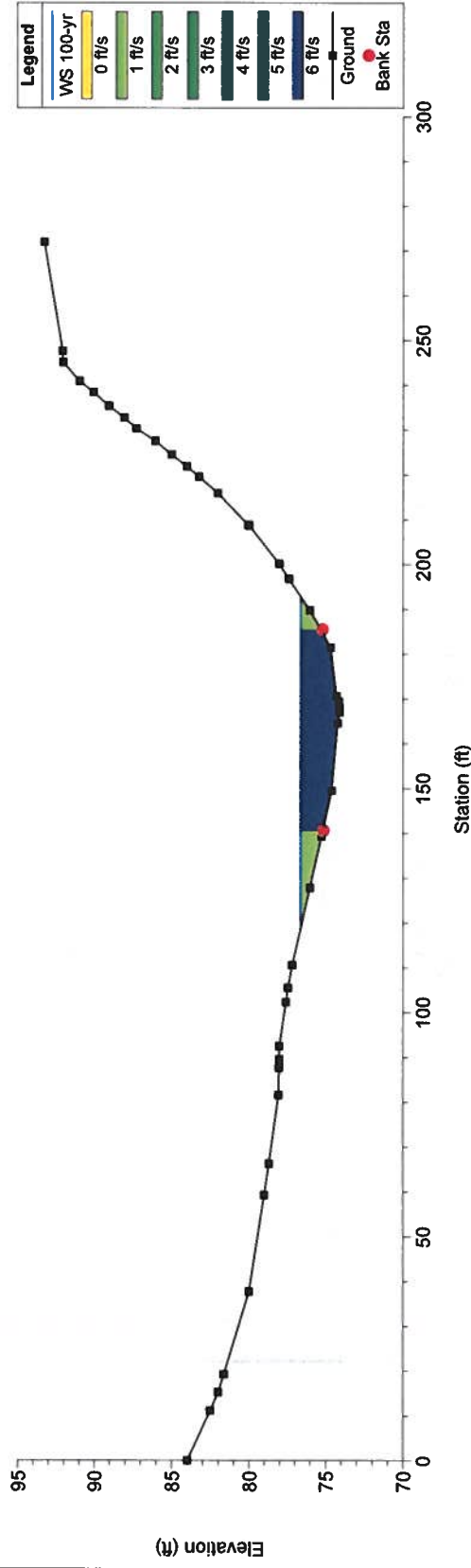
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 6060.38



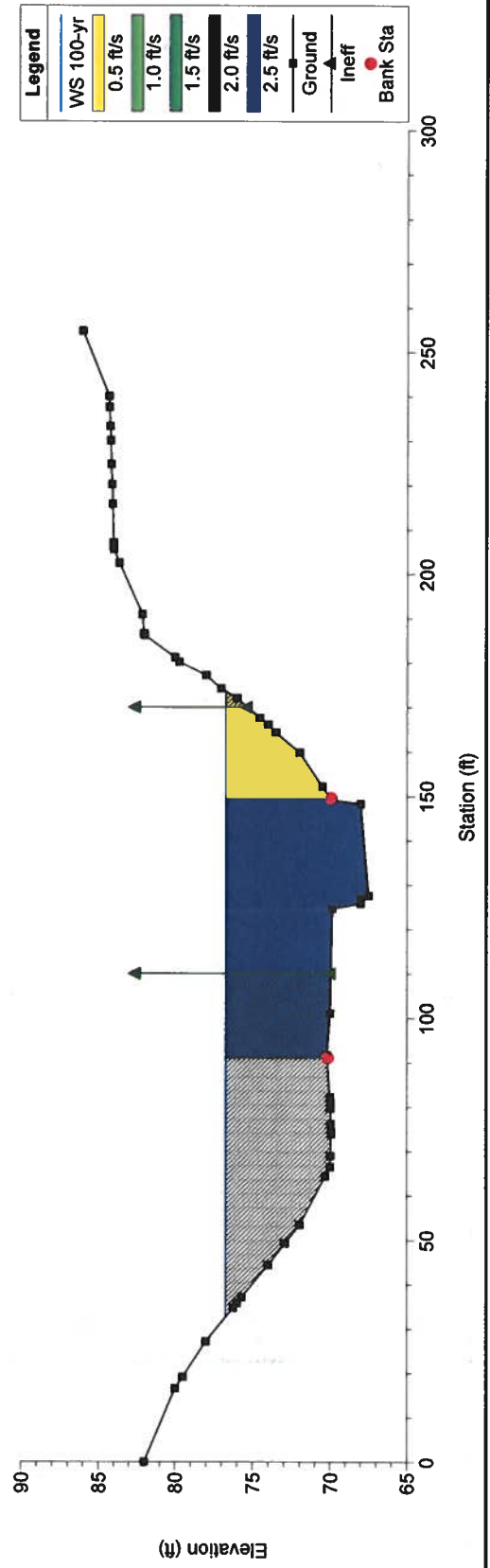
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 5432.19



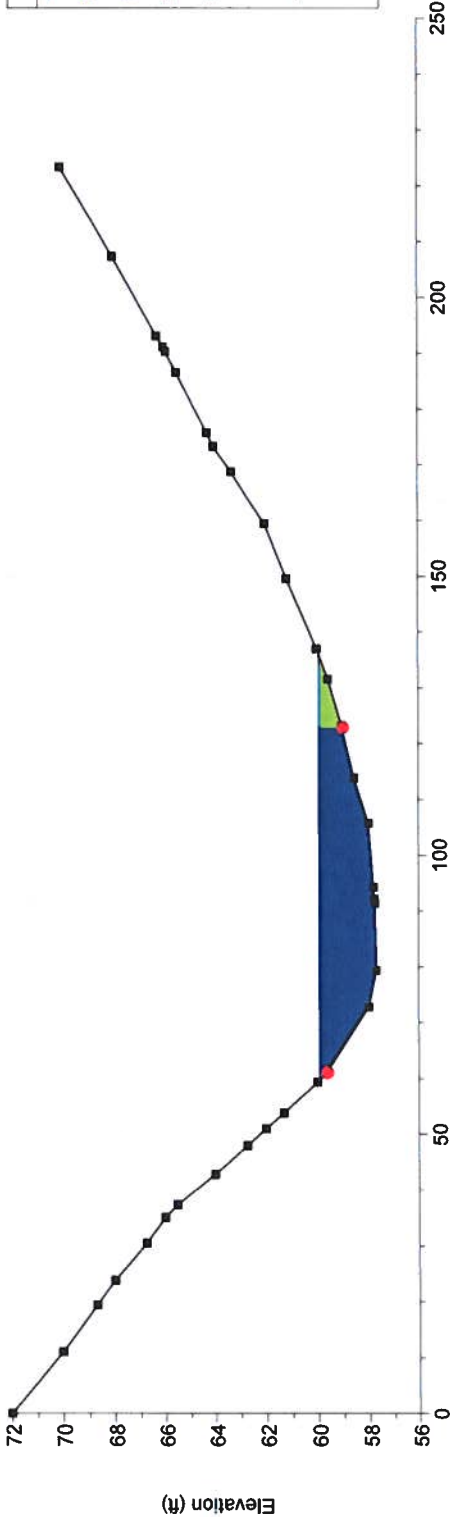
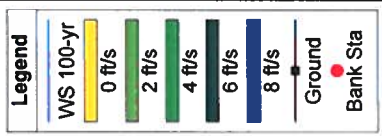
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 5183.4



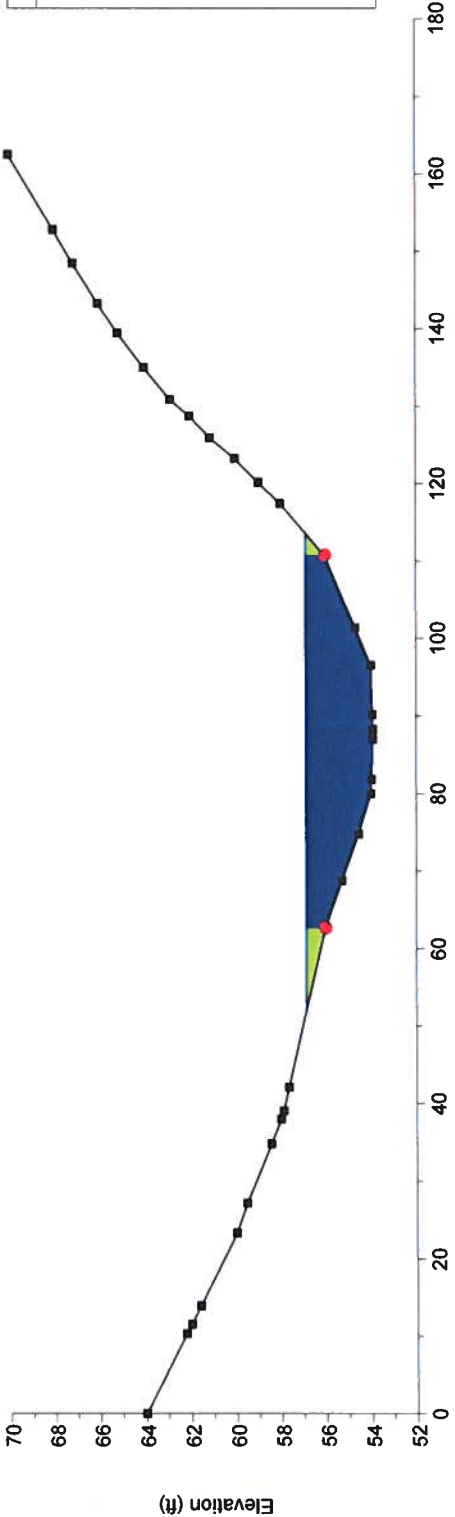
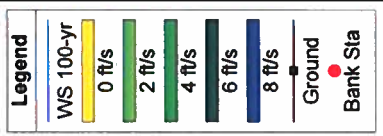
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 4840.7



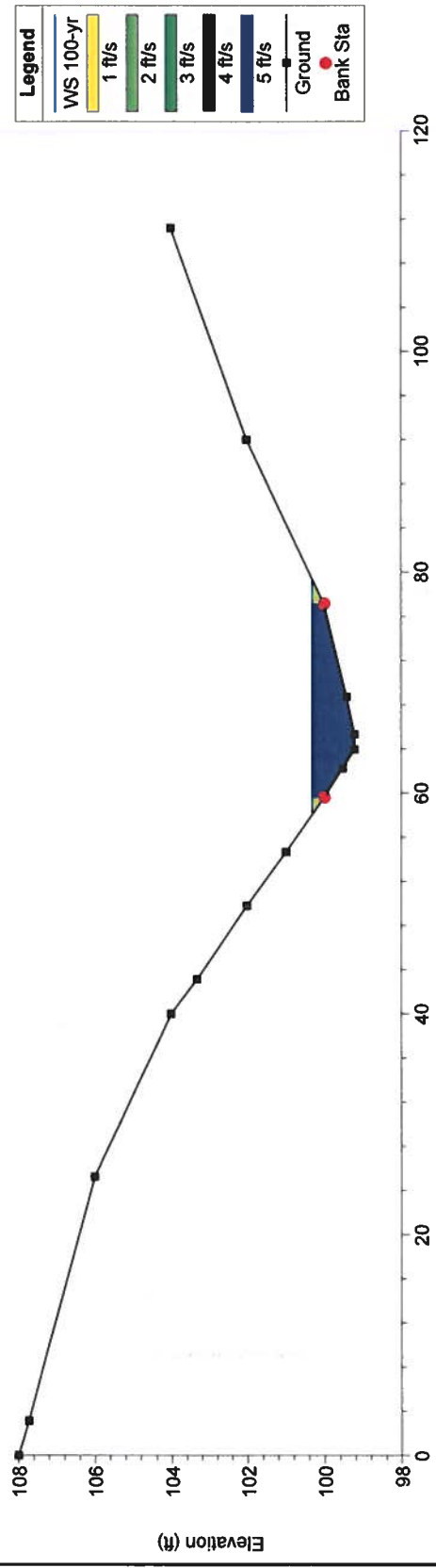
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 4132.52



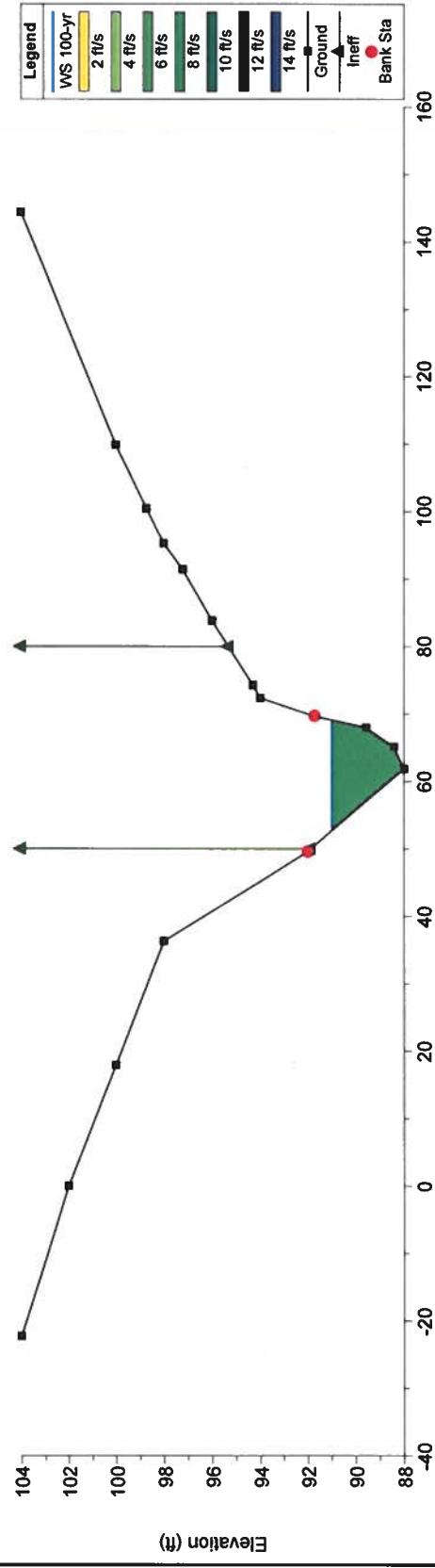
19872-AbingdonHH Plan: ProposedCircular 1/22/2019  
 River = UT-1 Reach = UNNAMED TRIBUTAR RS = 3942.05



19872-Unnamed\_Trib-2 Plan: Plan 02 1/16/2019  
 River = UT-2 Reach = UNNAMED TRIB-2 RS = 351.61

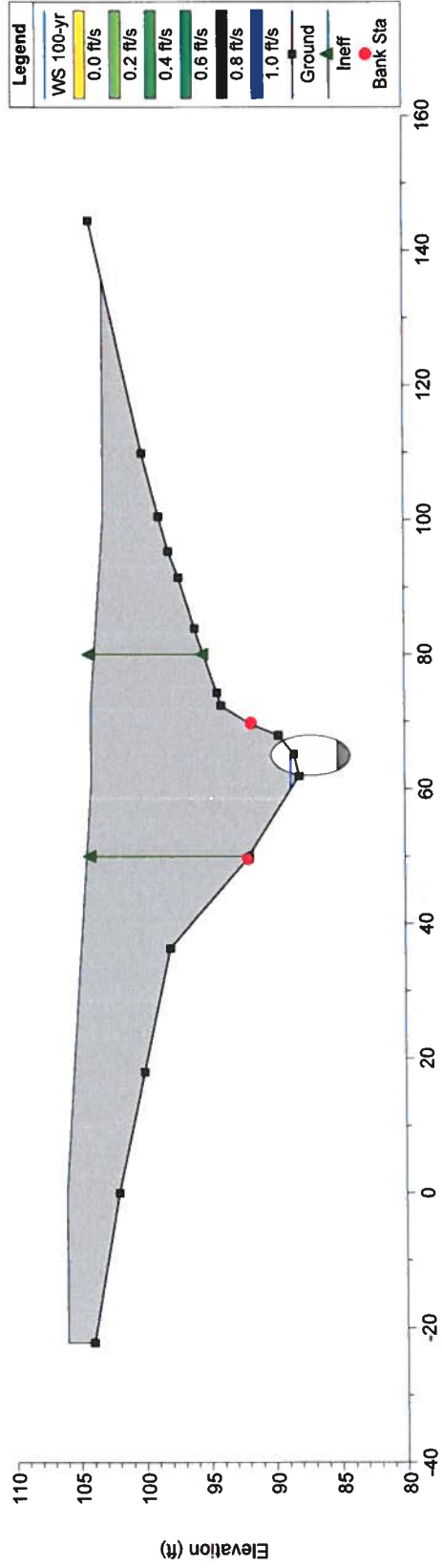


19872-Unnamed\_Trib-2 Plan: Plan 02 1/16/2019  
 River = UT-2 Reach = UNNAMED TRIB-2 RS = 262.21





19872-Unnamed\_Trib-2 Plan: Plan 02 1/16/2019  
 River = UT-2 Reach = UNNAMED TRIB-2 RS = 188.75 Culv



19872-Unnamed\_Trib-2 Plan: Plan 02 1/16/2019  
 River = UT-2 Reach = UNNAMED TRIB-2 RS = 188.75 Culv

