TECHNICAL MEMORANDUM TM002

McMILLEN, LLC

To:	Mike Salzetti, HEA	Project:	Grant Lake Hydroelectric Project
From:	Morton D. McMillen, P.E. Andre Ball, P.E. (WA)	Cc:	Cory Warnock File
Date:	June 6, 2014	Job No:	13-102
Subject:	Grant Creek Hydraulic Analysis		

1.0 INTRODUCTION

McMillen, LLC (McMillen) has been retained by Homer Electric Association, Inc. (HEA) to provide engineering support for the proposed Grant Lake Hydroelectric Project (Project) FERC application. The project would be located near the community of Moose Pass, Alaska, approximately 25 miles north of Seward, Alaska.

1.1 Purpose and Scope

The purpose of this Technical Memorandum (TM) is to present the analyses and results of a hydraulic analysis of Grant Creek. The analysis presented within this TM utilized the available data from previous studies, ongoing studies being conducted by McMillen, and the results of TM 001, Grant Creek Hydrologic Analysis. The primary objectives of this TM are:

- Utilize the cross-sections surveyed for the IFIM study to develop a HEC-RAS model of the Grant Creek channel from near the powerhouse location to near the gage location.
- Determine the water surface profiles along Grant Creek for various flows and develop a tailwater rating curve for the powerhouse tailrace channel and Grant Creek confluence.
- Determine the 100-year flood event water surface elevation at the proposed powerhouse location.

1.2 Project Description

As outlined in the application for a preliminary permit (HEA, 2011) the proposed Project consists of constructing a new 5-Megawatt (approximate) hydroelectric facility on Grant Lake and Grant Creek near Moose Pass, Alaska. The new Project would divert water from Grant Lake and deliver the flow to a powerhouse located near the outlet of the existing Grant Creek natural, incised rock canyon. The Project would include the following major components:

- Diversion structure at the natural outlet of Grant Lake. (under consideration)
- An intake structure in Grant Lake.
- A tunnel extending from the lake intake to just east of the powerhouse.

- A powerhouse with two Francis turbines providing an anticipated combined 5-Megawatt output. The maximum design flow will be approximately 385 cfs.
- Tailrace detention pond.
- Switchyard with disconnect switch and step-up transformer.
- An overhead or underground transmission line.
- A pole mounted disconnect switch where the transmission line intersects the main power distribution line.

1.3 Project Background

Grant Lake has been studied on multiple occasions since the 1950's as a potential hydropower site. The previous work efforts included:

- 1954 – R.W. Beck and Associates preliminary investigation
- 1955 – U.S. Geological Survey (USGS) geological investigations of proposed power sites at Cooper, Grant, Ptarmigan, and Crescent Lake
- 1980 – CH2M Hill prefeasibility study
- 1981 – U.S. Army Corps of Engineers (USACE) National Hydroelectric Power Resources Study
- 1984 – Ebasco Services Project Feasibility Analysis (Ebasco, 1984)
- 2010 – HDR Grant Lake/Falls Creek Hydroelectric Project – Environmental Baseline Studies (HDR, 2010)

On August 6, 2009, Kenai Hydro LLC filed a Pre-Application Document (PAD), along with a Notice of Intent to file an application for an original license for the Grant Lake/Falls Creek project. FERC subsequently approved the use of the Traditional License Process for development of the license application and supporting documents. In 2009-2010, HDR completed a series of environmental baseline studies which were summarized in their report dated January 2010. A second preliminary permit was issued by FERC in 2012.

As part of these previous studies, the hydrologic conditions within the Grant Creek basin were evaluated and flows available to support a hydroelectric facility were evaluated. The most expansive analysis was completed as part of the Ebasco feasibility study. These previous studies and available gage data were used as the basis for the current hydrologic analysis. The subsequent gage data collected in 2009 (HDR, 2010) and 2013 by McMillen, along with the original USGS stream gage data (USGS Station 15246000) served as the basis for the flow estimation.

1.4 Grant Creek Description

Grant Creek is the only natural outlet from Grant Lake and is located at the south end of the lake (Figure 1). Grant Creek is approximately 1 mile long and flows west from Grant Lake and discharges into the narrows that connect the Upper Trail Lake to Lower Trail Lake. The average gradient of Grant Creek is 207 feet per mile. The U.S. Geological Survey (USGS) had previously operated a stream flow gage (Station 15246000) on Grant Creek, but this gage is no longer

operated. Intermittent stream gaging has been conducted on Grant Creek by Ebasco in the early 1980's and HDR in 2009 (Ebasco, 1984) (HDR, 2010). In 2013, McMillen reestablished streamflow measurements at the historic USGS gage location (GC200). McMillen evaluated streamflow statistics for Grant Creek as documented in TM 001 (McMillen, 2014). The mean annual discharge in Grant Creek is 193 cubic feet per second (cfs) and the average channel width is 25 feet. The upper portion of Grant Creek flows through a steep walled, canyon section with multiple waterfalls, abundant bedrock, and large boulders in the channel. The lower portion of the creek is less turbulent, less channelized, and has more gravel shoals (Ebasco 1984). The channel bifurcates near the mouth and has a network of distributaries.

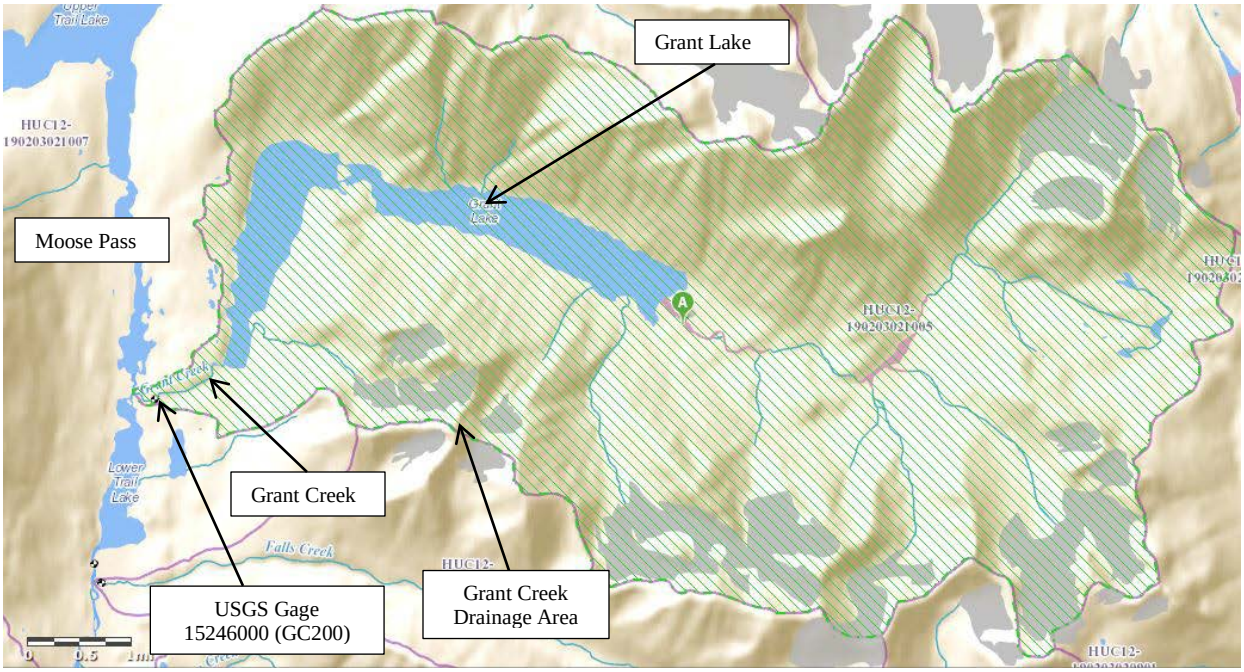

Figure 1. Grant Lake Hydroelectric Project Location Map

2.0 HYDRAULIC DATA SUMMARY

The data sources used to conduct the hydraulic analysis included field surveys and observations, as well as previous reports. During the 2013 fieldwork season, McMillen personnel collected channel cross section information and measured water levels as part of the Water Resources and Instream Flow Incremental Methodology (IFIM) studies. Additional background information about Grant Creek was available in the previous studies completed by Ebasco and HDR. The flood hydrology used for the hydraulic simulation is documented in a separate McMillen technical memorandum, TM 001 Grant Creek Hydrologic Analysis (McMillen, 2014). Table 1. summarizes the peak streamflow statistics for Grant Creek.

Table 1. Grant Creek Peak Streamflow Statistics at the USGS 15246000 Gage Location (GC200)

Analysis Type	Peak streamflow, in cubic feet per second (cfs), for a given recurrence interval in years							
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{200}	Q_{500}
Weighted	961	1,410	1,790	2,350	2,810	3,310	3,860	4,690

3.0 HYDRAULIC ANALYSIS

The Grant Creek hydraulic gradeline was evaluated using HEC-RAS (Version 4.1.0); a one-dimensional hydraulic numerical model developed by the U.S. Army Corps of Engineers (USACE). The HEC-RAS program contains one-dimensional river analysis components for steady flow water surface computations, unsteady flow simulation, movable boundary sediment transport computations, and water quality analysis. The model utilizes common geometric data representation and geometric and hydraulic computation routines. A description of the model development, calibration, and results for Grant Creek are presented in the following paragraphs.

3.1 Model Geometry

The model geometry for the Grant Creek HEC-RAS model was based on the surveyed channel cross sections collected in spring 2013 for an Instream Flow Incremental Methodology (IFIM) study (documented in the Aquatic Resource Study report). An additional survey was performed in fall 2013 to establish a common vertical datum and define the channel slope. In total, eight surveyed cross sections were used, representing a 2,060 foot long portion of Grant Creek.

Table 2 summarizes the cross sections and their associated downstream reach lengths. Figure 2. (attached), shows the IFIM study section locations and can be cross referenced to the cross sections used in the HEC-RAS model by utilizing Table 2. Interpolated cross sections were added to the HEC-RAS model to reduce the distance between cross-sections, which provides a more stable hydraulic model. After interpolating cross-sections, the maximum modeled distance between cross sections was no more than 50 feet. A schematic of the HEC-RAS model geometry for Grant Creek is shown in Appendix A.

Table 2. Grant Creek Surveyed Cross Sections and Reach Lengths

Cross Section Name (IFIM Study)	HEC-RAS Station (ft)	Downstream Reach Length (ft)
T220	50	0
T230	82	32
T300	932	850
T310	1061	129
T400	1381	320
T410	1435	54
T430	1865	430
T510	2110	245

For this analysis, the hydraulic model was set up to represent Grant Creek as a single channel. In one location, there is a side channel that flows to the left of the main channel. The side channel begins downstream of T400 and rejoins the main channel between T300 and T230. At the time of this analysis, the hydraulic information available for the side channel was limited, and thus, the side channel was omitted from this initial hydraulic model. Based on a review of the overall creek hydraulics and controls, the side channel was considered to have minimal impact on the hydraulic gradeline at the area of interest near the proposed powerhouse tailrace location.

3.2 Model Calibration

Observed water surface elevations at the surveyed cross sections were used to calibrate the HEC-RAS model. Five different discharges were simulated, ranging from 17 cfs to 706 cfs. Due to the steep grade of the creek, the model was run in the mixed flow regime with critical depth boundary conditions at the upstream and downstream ends. The mixed flow regime allows the model to determine if the section is supercritical or subcritical. The model computed a subcritical flow regime for most of the reach. The Froude numbers ranged between 0.4 and 0.7 for the upper half of the model.

The model was calibrated by modifying the channel roughness, Manning's 'n', as this was the most uncertain variable that could be adjusted. Any roughness adjustments were done within the range of roughness that is acceptable for the channel conditions (Barnes, 1967 and Brunner, 2010). In addition to modifying the roughness, ineffective flow areas were added to some cross sections, outside of the main channel, to refine the model. The calibration and refinement efforts focused on calibrating the model to best represent the creek in the reach between T410 and T430 since this is where the powerhouse tailrace will join the main channel. The resulting n-values used in the calibrated version of the Grant Creek are shown in Table 3.

Table 3. Grant Creek Modeled Roughness Values

Cross Section Name (IFIM Study)	HEC-RAS Station (ft)	Main Channel Roughness (n)	Overbank Roughness (n)
T220	50	0.07	0.10
T230	82	0.07	0.10
T300	932	0.07	0.10
T310	1061	0.07	0.10
T400	1381	0.07	0.08
T410	1435	0.09	0.15
T430	1865	0.07	0.15
T510	2110	0.07	0.15

The Ebasco report mentions a HEC-2 (HEC-RAS predecessor) model of Grant Lake outlet channel. The roughness values used in that model were n = 0.06 for the main channel and n = 0.10 for the overbank areas. It is unclear if these roughness values were computed based on field data or if they were selected based on reference literature. The new HEC-RAS model described in this memorandum required roughness values (Table 3) that were at the upper end of

acceptable values to bring the modeled water surface elevations closer to the observed water surface elevations. Manning's n-values are known to be higher for mountain streams such as Grant Creek (Barnes, 1967). Furthermore, these calibration measurements were taken at lower flows and it is also known that Manning's n-values for boulder mountain streams are higher for low flows because the roughness creates greater drag relative to streamflow when streamflow depths are lower (Bathurst, 1985 and Whol, 2000). The highest discharge available for the calibration was 706 cfs, whereas the lowest modeled flood flow, the 2-year event, was 961 cfs. The observed and modeled water surface elevations for cross sections T410 and T430 are shown in Figure 3 and Figure 4 respectively. All modeled water surface elevations are within 0.2 feet of the observed water surface elevations.

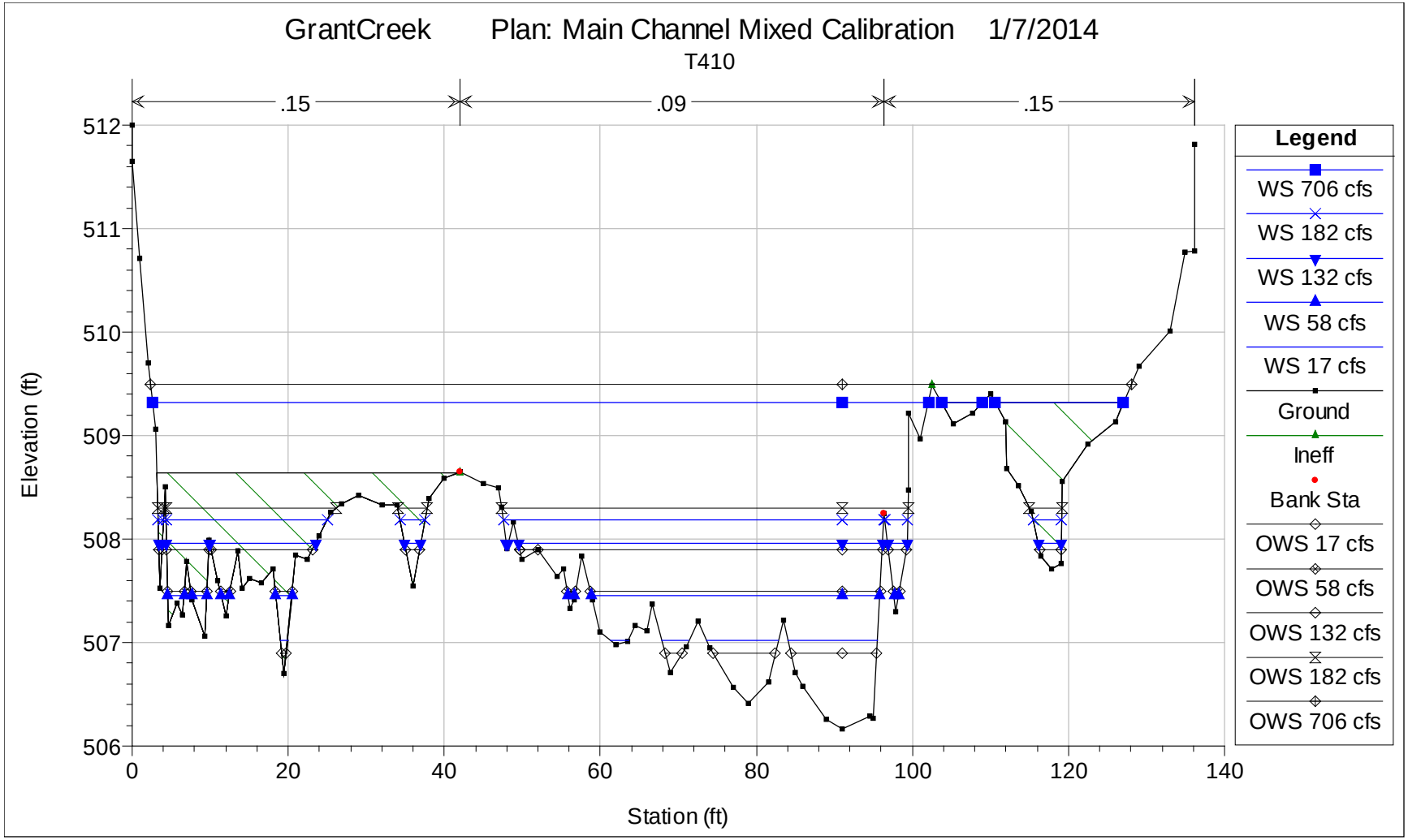

Figure 3. Modeled (WS) vs. Observed Water Surface (OWS) Elevations – Cross Section T410

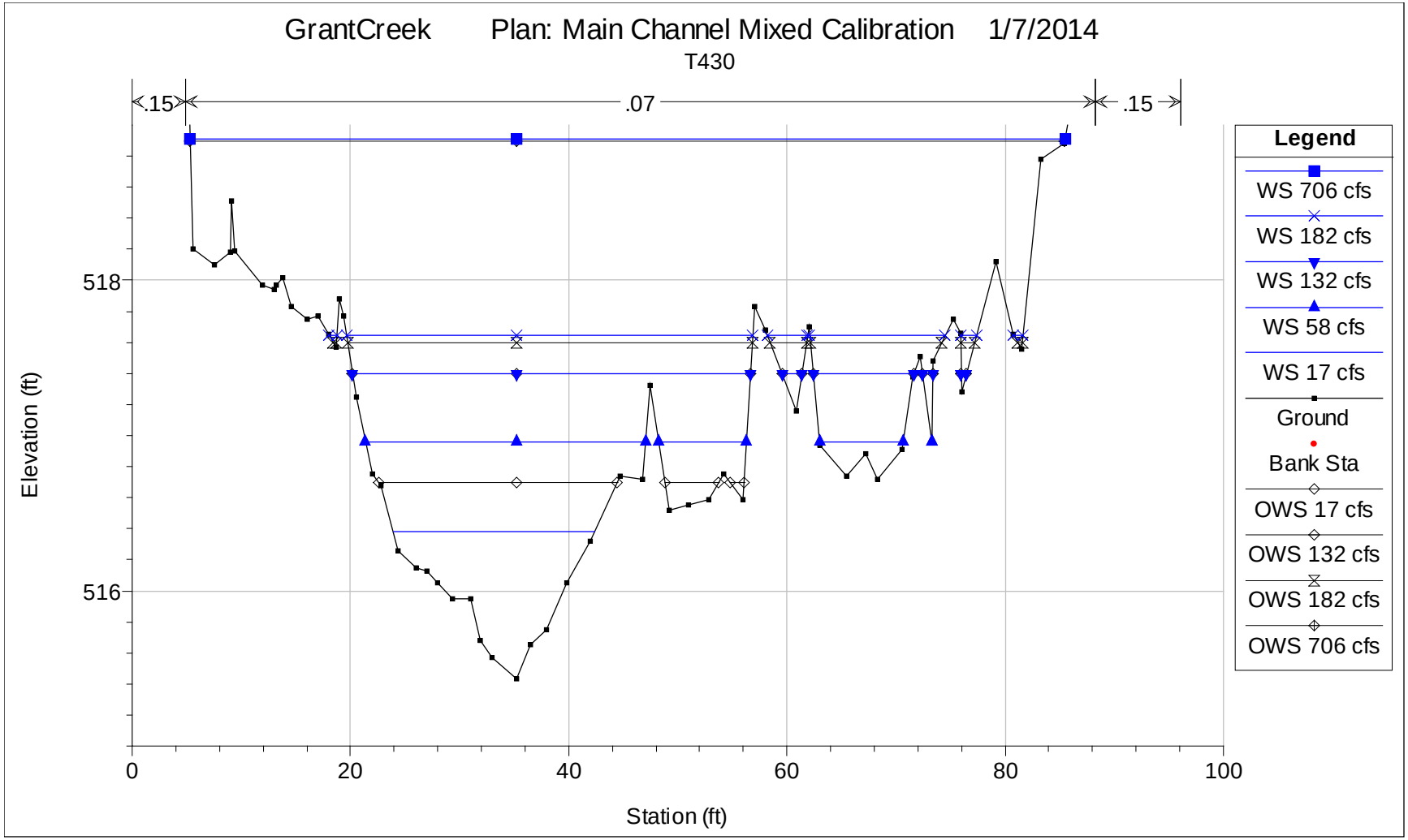

Figure 4. Modeled (WS) vs. Observed Water Surface (OWS) Elevations – Cross Section T430

3.3 Channel Roughness Sensitivity Analysis

As discussed in the Model Calibration section, the roughness values required to calibrate to the known water surface elevations were relatively high. A sensitivity analysis was conducted to evaluate how much influence the channel roughness had on the modeled water surface elevation. A revised model geometry was created that had lower roughness values that coincided more with the roughness values documented for boulder filled mountain streams (Barnes, 1967). For the sensitivity run, all cross sections were assigned roughness values of n = 0.055 for the main channel and n = 0.080 for the overbanks. The sensitivity n-values are lower than the calibrated n-values which will result in lower water surface elevations and higher flow velocities for a given discharge. Table 4 compares the water surface elevations resulting from the 'calibrated' n-values and the 'sensitivity' n-values for cross sections T410 and T430. At lower flows, in the flow range used for calibration, the water surface elevations only vary by a few tenths of a foot. At the 100-year flood discharge, the calibrated n-values result in water surface elevations that are 0.9 and 0.6 feet higher, relative to the sensitivity n-value water surface elevations, for cross sections T410 and T430 respectively. The calibrated n-values are conservative since it is likely that the effective n-values will be lower at flood flow conditions, thus there is confidence that an observed 100-year flood elevation will not exceed the modeled 100-year flood elevation.

Table 4. Water Surface Elevations for Cross Sections T410 and T430 – Channel Roughness Sensitivity Analysis

	T410 (Sta. 1435)		T430 (Sta. 1865)	
	Calibration n-values	Sensitivity n-values	Calibration n-values	Sensitivity n-values
Discharge (cfs)	W.S. Elev. (ft)	W.S. Elev. (ft)	W.S. Elev. (ft)	W.S. Elev. (ft)
17	507.0	506.9	516.4	516.3
58	507.5	507.3	517.0	516.9
132	508.0	507.7	517.4	517.2
182	508.2	507.9	517.6	517.5
706	509.3	509.0	518.9	518.6
961 (2-year)	509.7	509.3	519.3	519.0
3310 (100-year)	512.3	511.4	521.8	521.2

3.4 Model Results

After the HEC-RAS model was calibrated, an additional series of flow scenarios was simulated to represent the 2-year through the 100-year flood discharges. The figures below provide a summary of the results. Figure 5 represent the hydraulic profiles for the different flood magnitudes for Grant Creek.

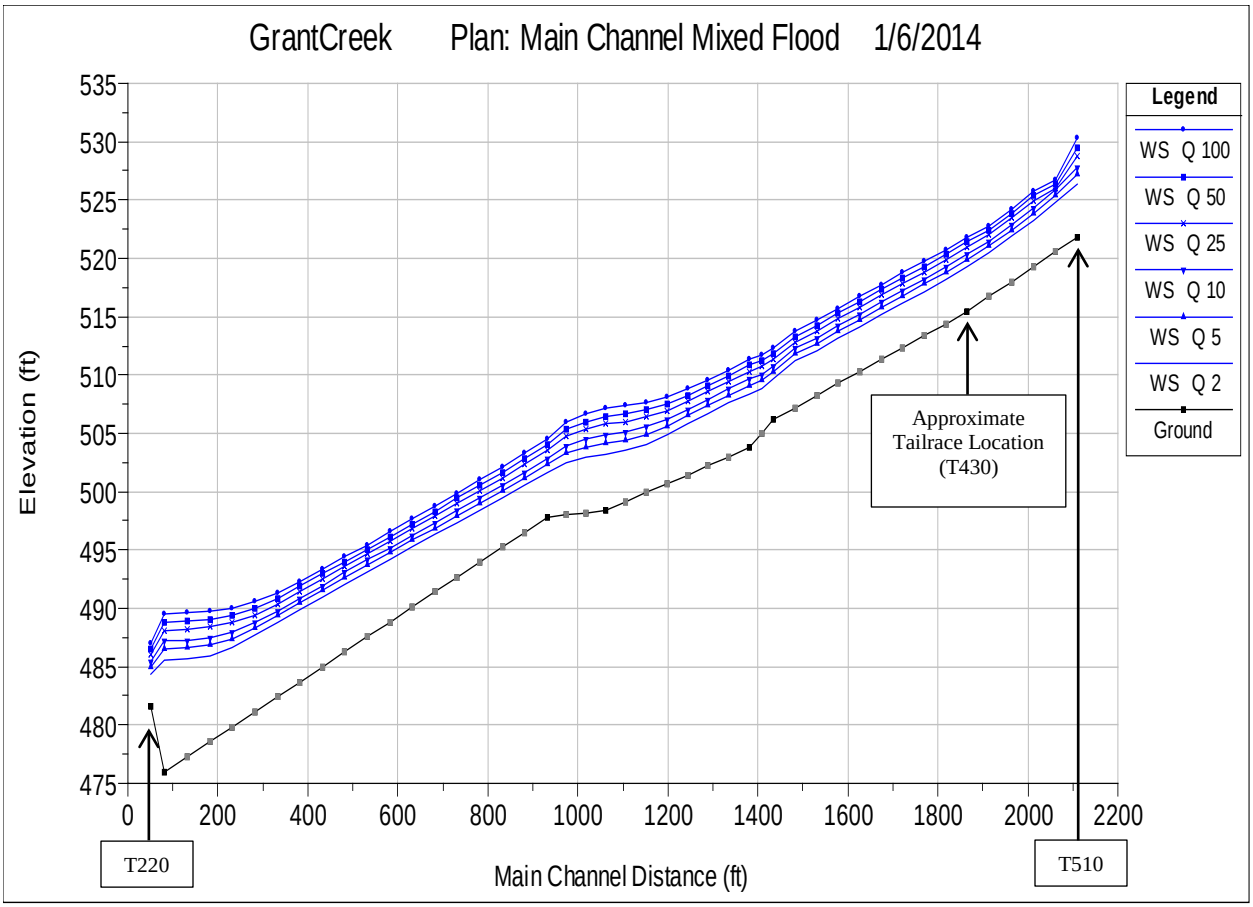

Figure 5. Grant Creek Hydraulic Profiles – 2-year through 100-year Floods

The powerhouse tailrace channel will return flow to Grant Creek near cross section T430 (HEC-RAS Station 1865). Table 5 and Figure 6 provide the flood water levels at the T430 cross section. The flood rating curve for cross section T430 is shown in Figure 7. More detailed water surface elevation information is included in Appendix A.

Table 5. Flood Water Surface Elevations at Cross Section T430

Discharge (cfs)	Flood Frequency	Water Surface Elevation (ft)
961	2-year	519.3
1410	5-year	519.9
1790	10-year	520.4
2350	25-year	521.1
2810	50-year	521.4
3310	100-year	521.8

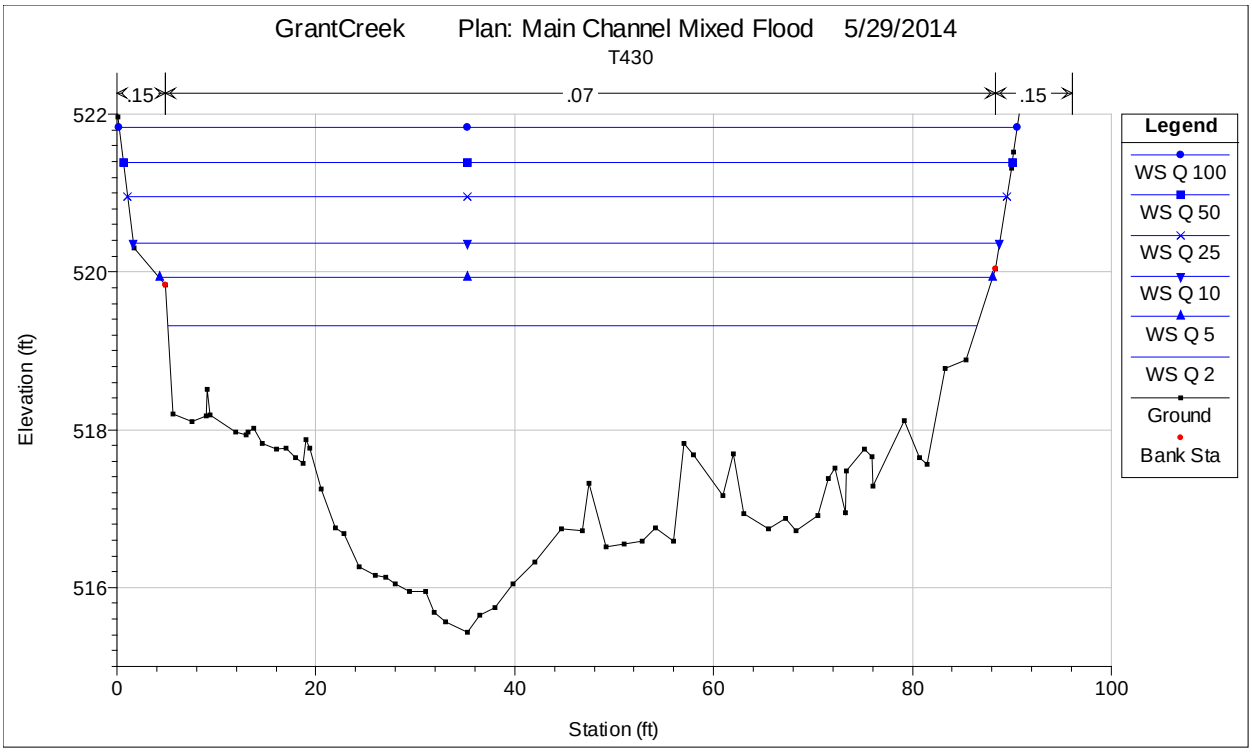

Figure 6. Modeled Flood Water Surface Elevations – Cross Section T430

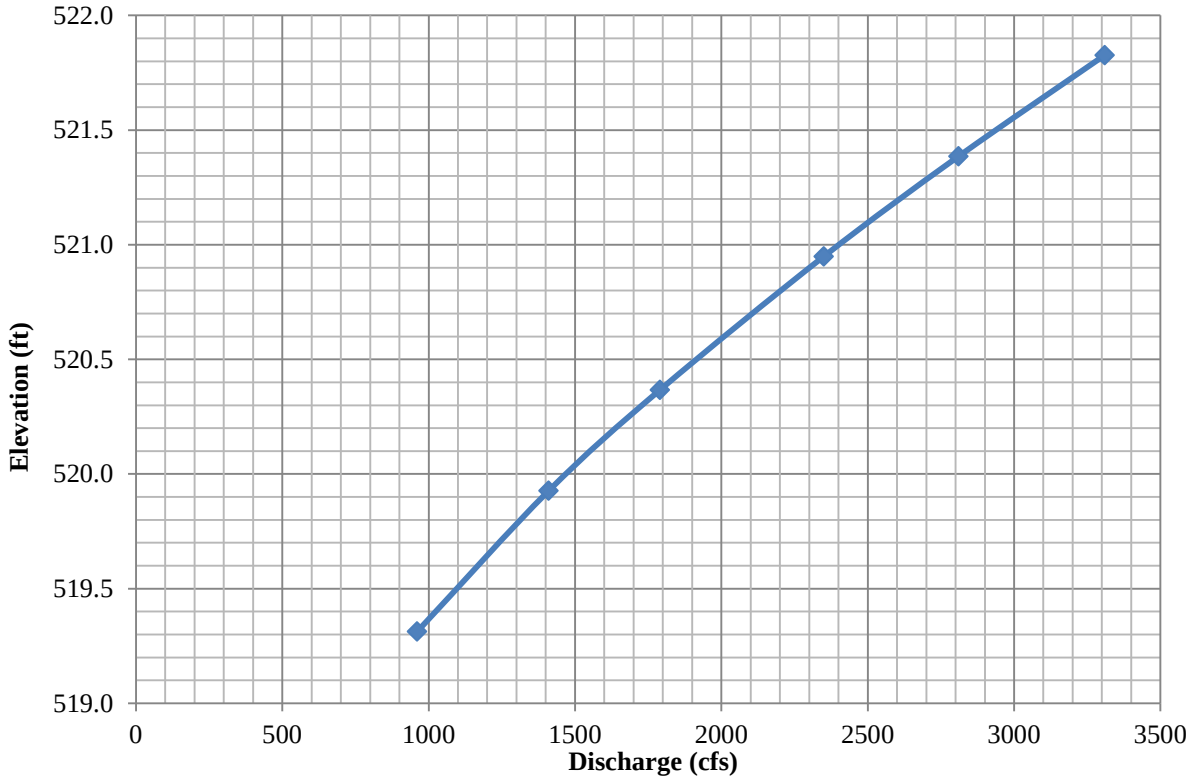

Figure 7. Grant Creek Flood Rating Curve – Cross Section T430

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

This technical memorandum describes the hydraulic model for Grant Creek that will be used for the powerhouse tailrace design. The cross sections and water surface calibration information used in the model were obtained from the 2013 IFIM study. Additional cross-sections were interpolated in the HEC-RAS model to provide shorter distances between modeled cross sections. During the model calibration, the model roughness was adjusted to a relatively high level, while still being considered reasonable, in order to match the observed water surface elevations.

Based on the modeling conducted for this task, the 100-year discharge (3,310 cfs) for Grant Creek is expected to have a water surface elevation of approximately 521.8 feet (depth of 6.4 feet) at the downstream end of the powerhouse tailrace. The water surface elevation associated with the 100-year discharge is located at the top of the extents of the surveyed cross section.

4.2 Recommendations

The hydraulic analysis presented within this TM estimated a water surface elevation of 521.8 feet at the downstream end of the proposed tailrace for the 100-year flood event of 3,310 cfs. This elevation represents a conservative estimate due to the higher n-values used for the model calibration. This elevation, along with the estimated tailwater rating curve, is recommended for use in developing the site grading plan and corresponding flood protection elevations.

5.0 REFERENCES

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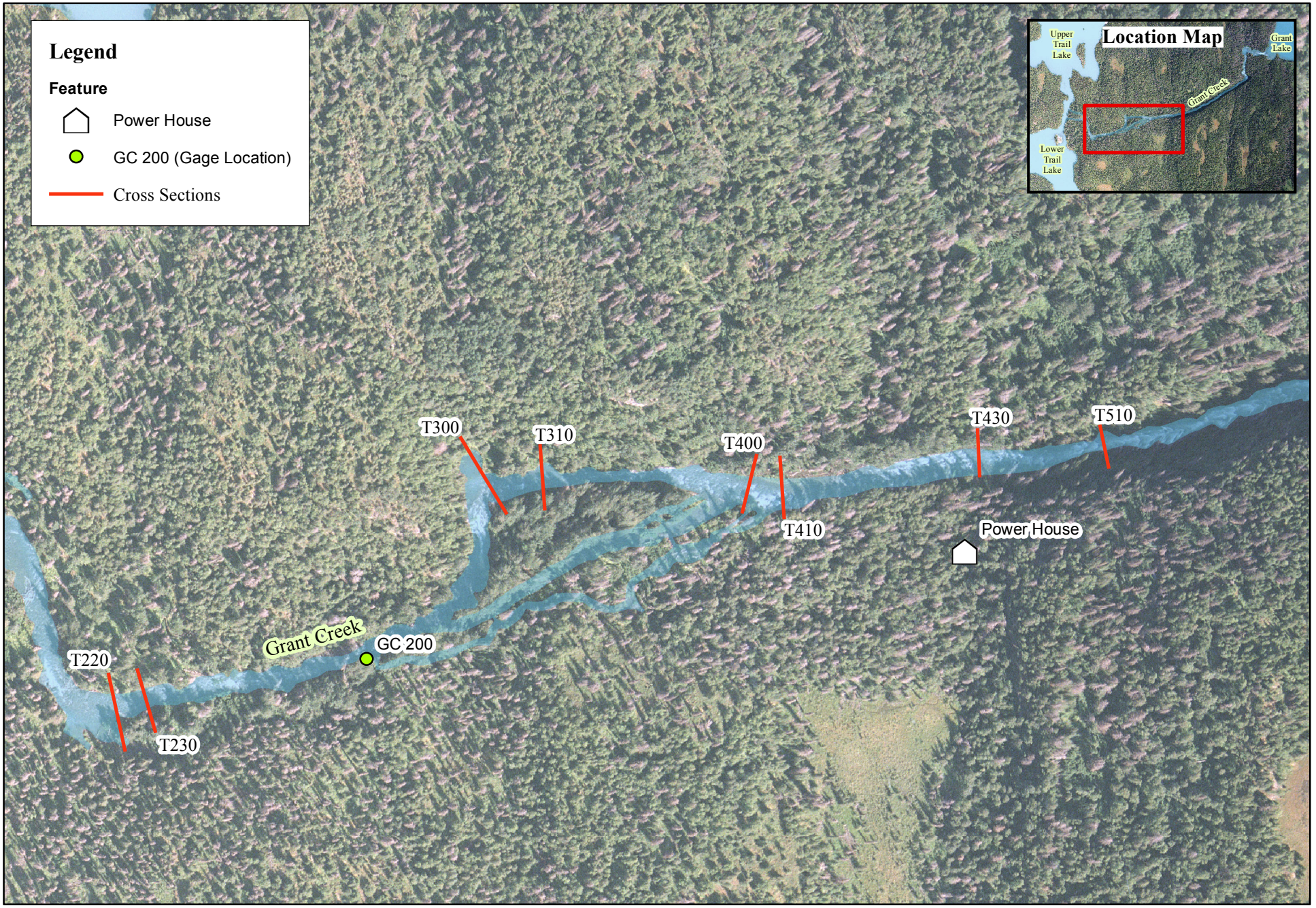
McMillen, 2014. TM 001: Grant Creek Hydrologic Analysis. Prepared for Homer Electric Association.

Whol, E. 2000. Mountain Rivers. (See page 85). American Geophysical Union, Water Resources Monograph:14. 320 p.



REV	DATE	BY	DESCRIPTION

Drawing Scale: 0 40 80 160 240 320 Feet

McMILLEN, LLC
1401 SHORELINE DRIVE
BOISE, ID 83702
OFFICE: 208.342.4214
FAX: 208.342.4216

Developed For:
Homer Electric Association, Inc.
A Touchstone Energy® Cooperative

GRANT LAKE HYDROELECTRIC PROJECT - FERC PROJECT NO. 13212

GRANT LAKE HYDRAULIC ANALYSIS

Figure 2. Instream Flow Study Cross Section Map

DESIGNED	A. Ball
DRAWN	J. Woodbury
CHECKED	A. Ball
ISSUED DATE	05/15/2014
DRAWING	
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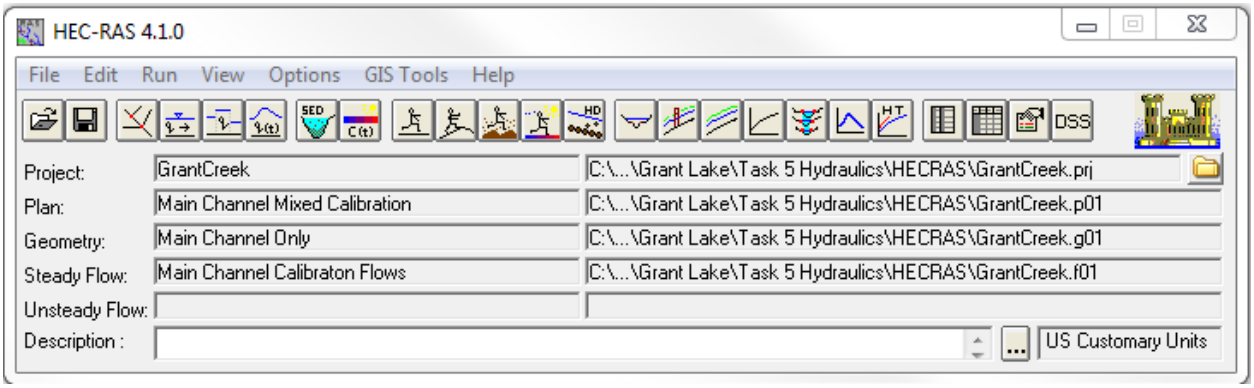
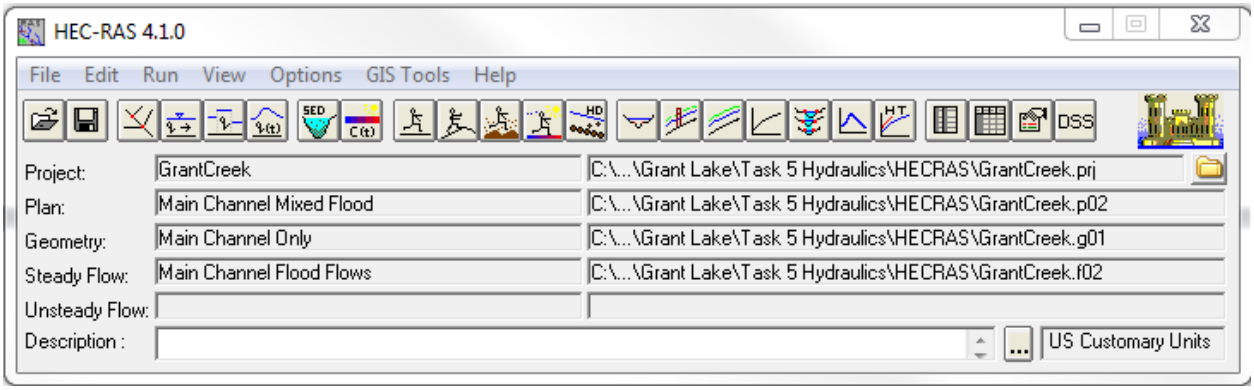
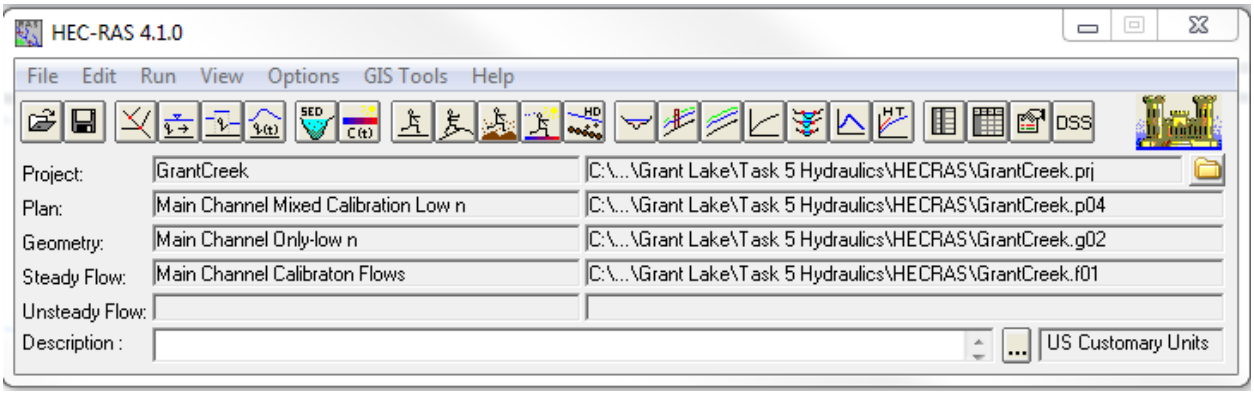
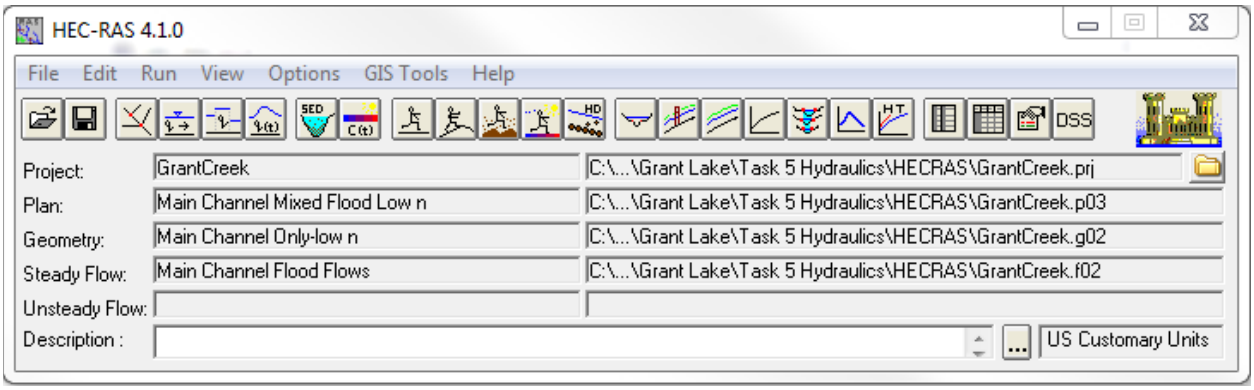
Appendix A: Supplemental HEC-RAS Model Information

HEC-RAS Model Plans

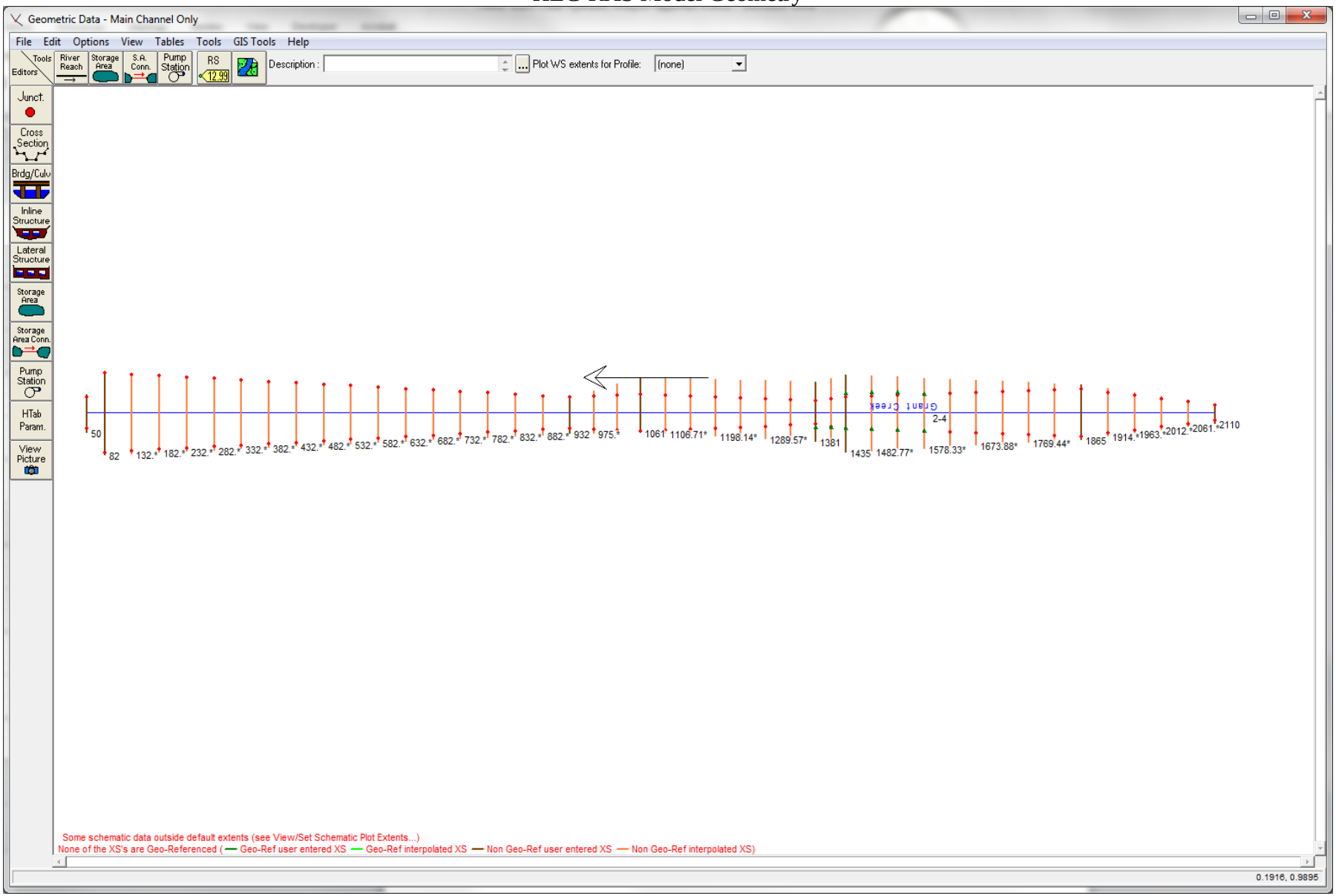


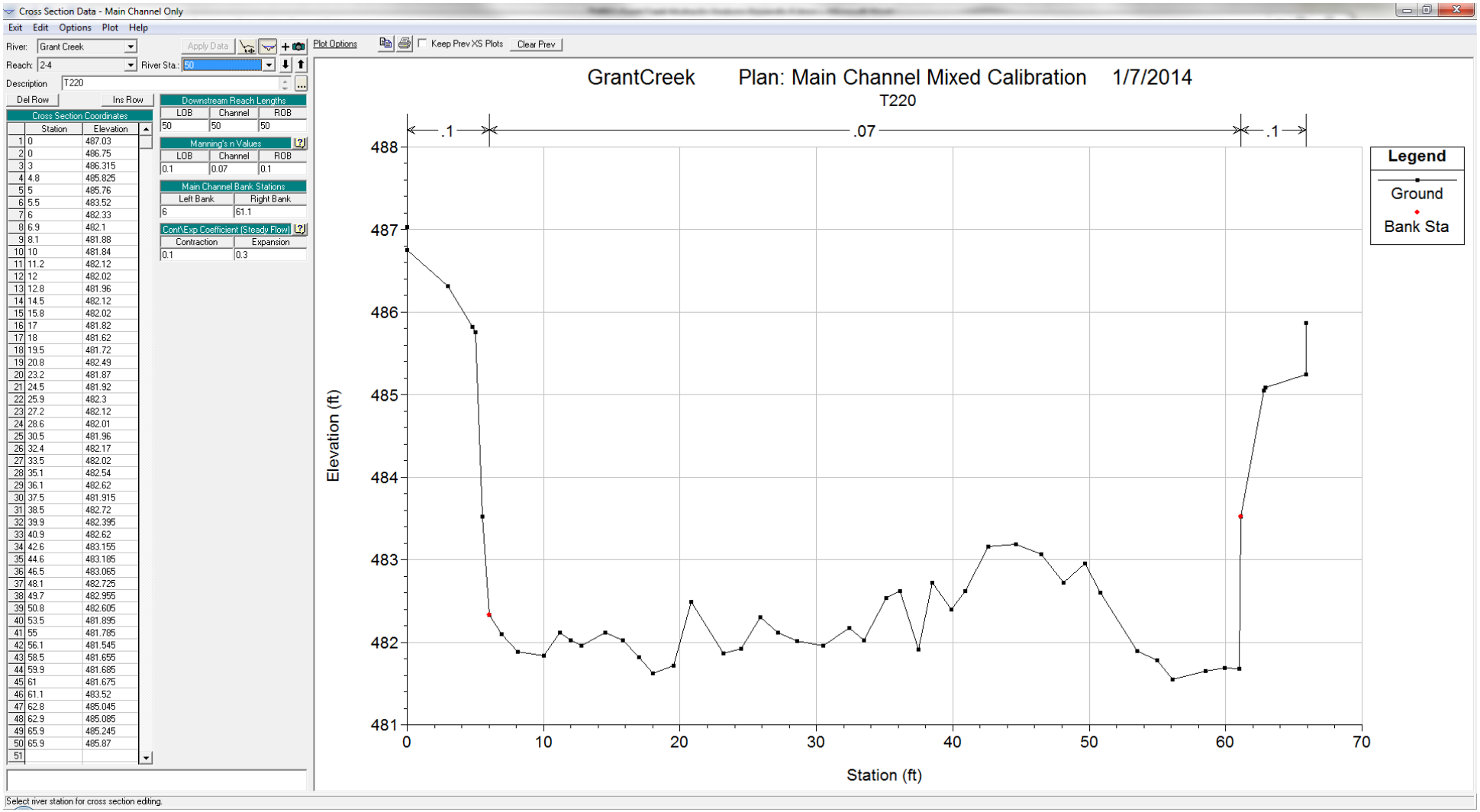






HEC-RAS Model Geometry

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45 61 481.675
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47 62.8 485.045
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Downstream Reach Lengths
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LOB Channel ROB
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Main Channel Bank Stations
Left Bank Right Bank
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Cont\Exp Coefficient (Steady Flow)
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GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
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Bank Sta
Elevation (ft)
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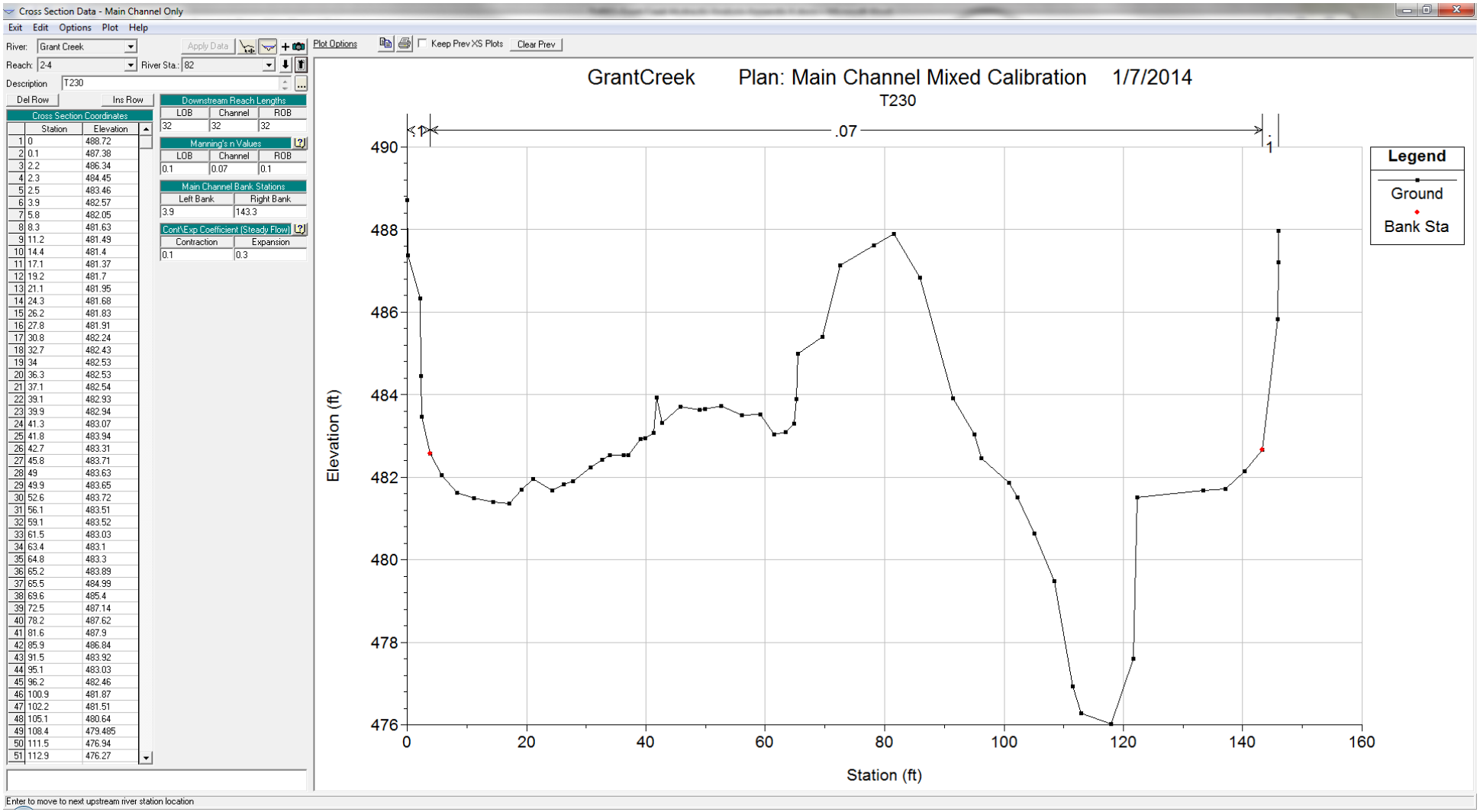
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Manning's n Values
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Main Channel Bank Stations
Left Bank Right Bank
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Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
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Legend
Ground
Bank Sta
Elevation (ft)
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Station (ft)
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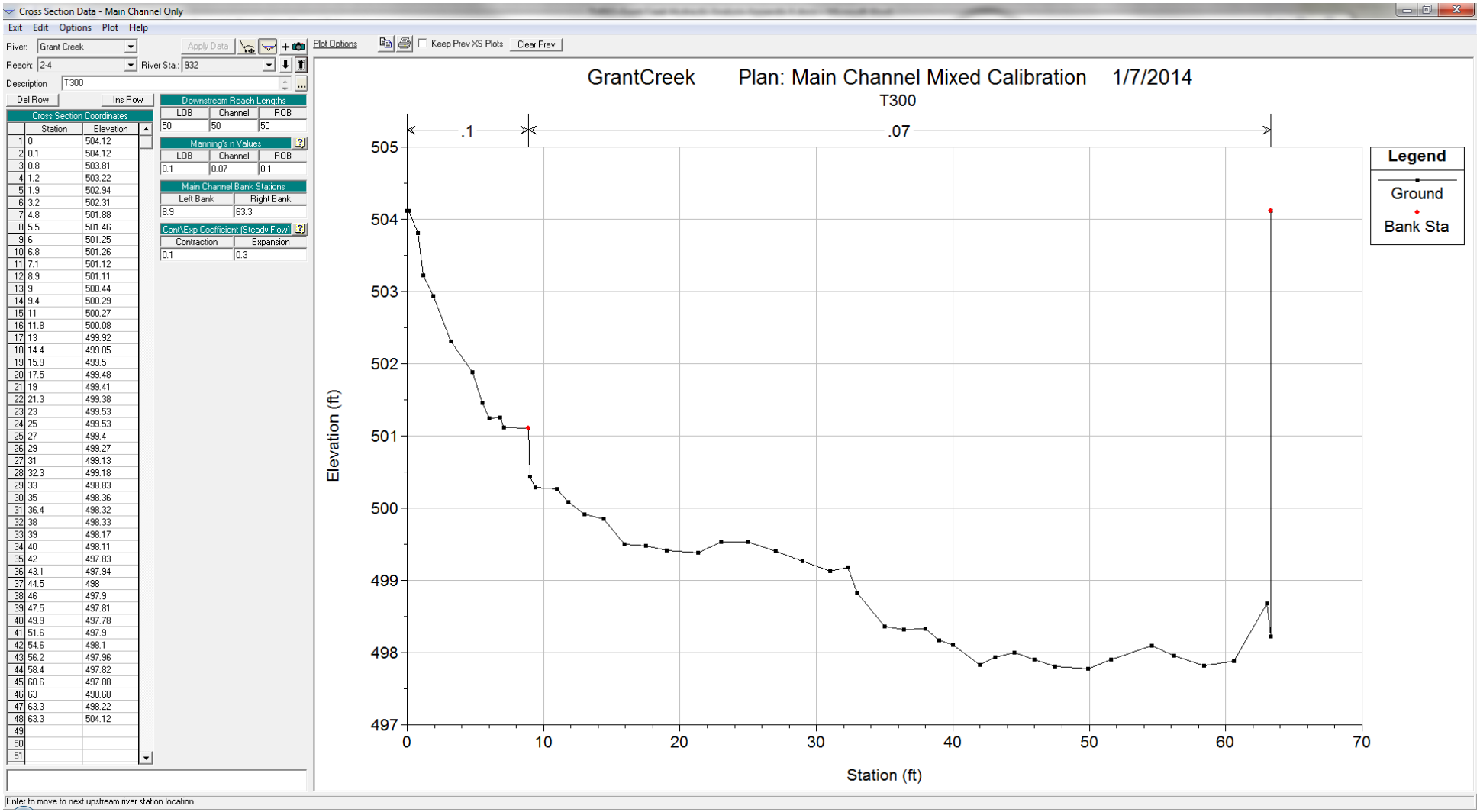
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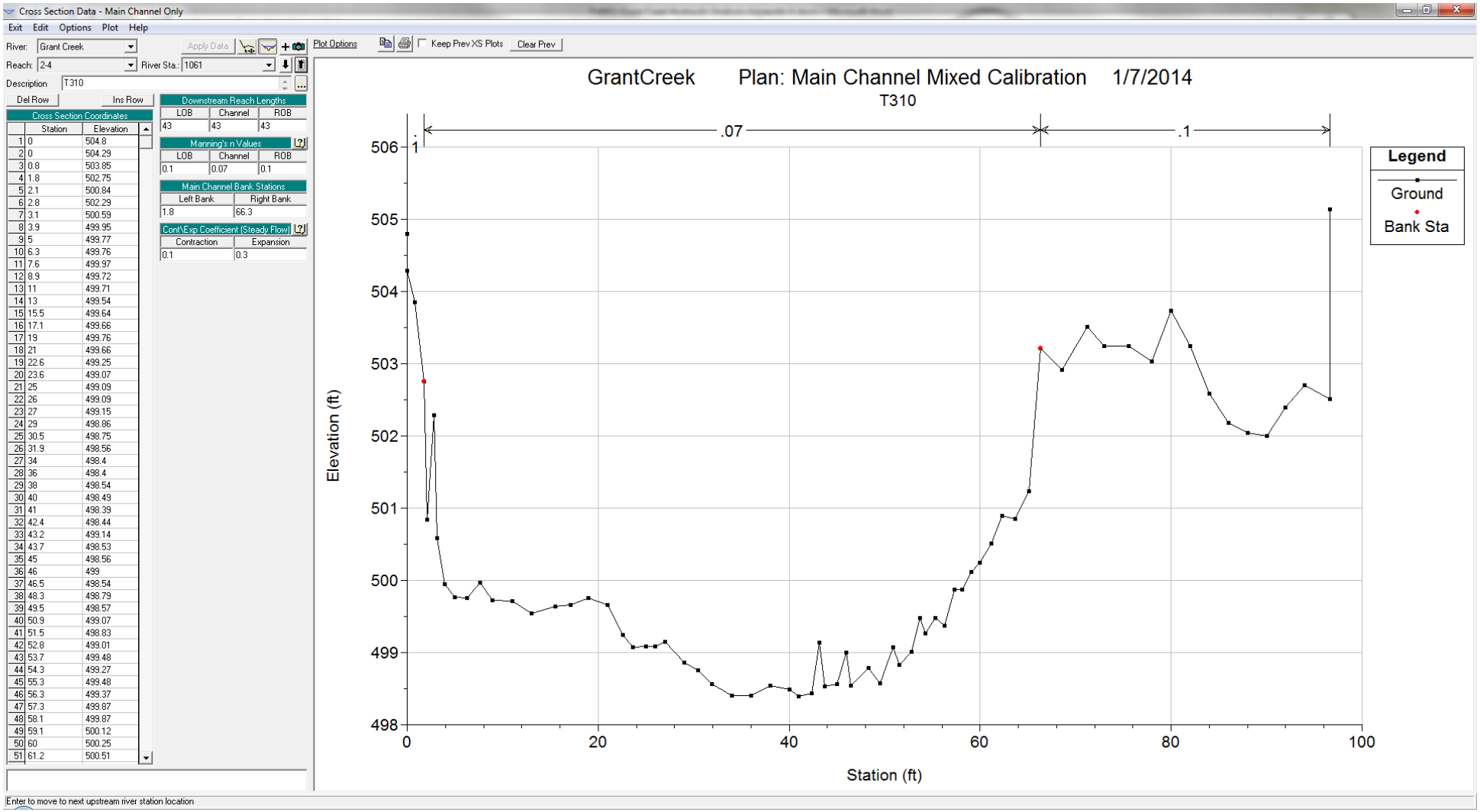
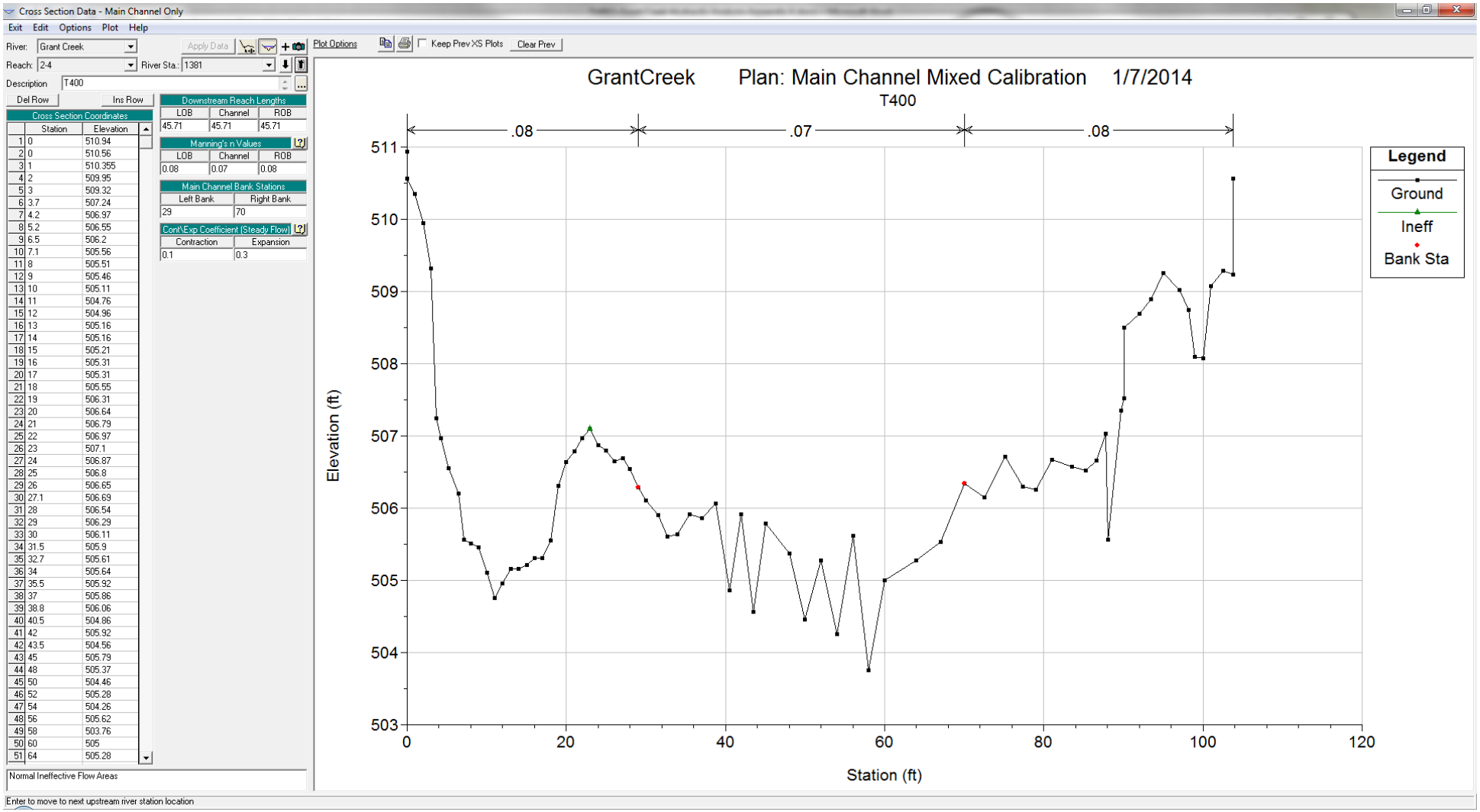
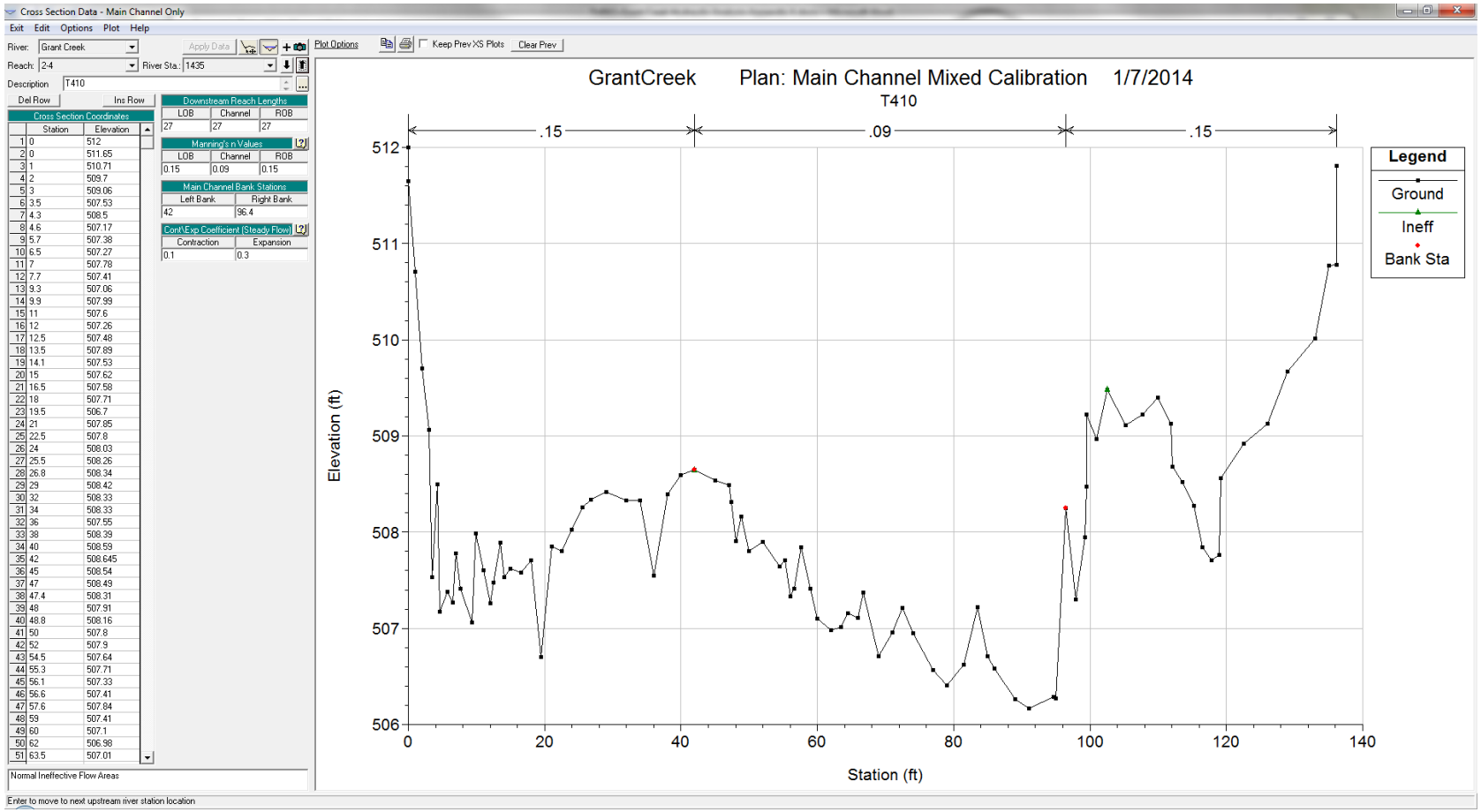
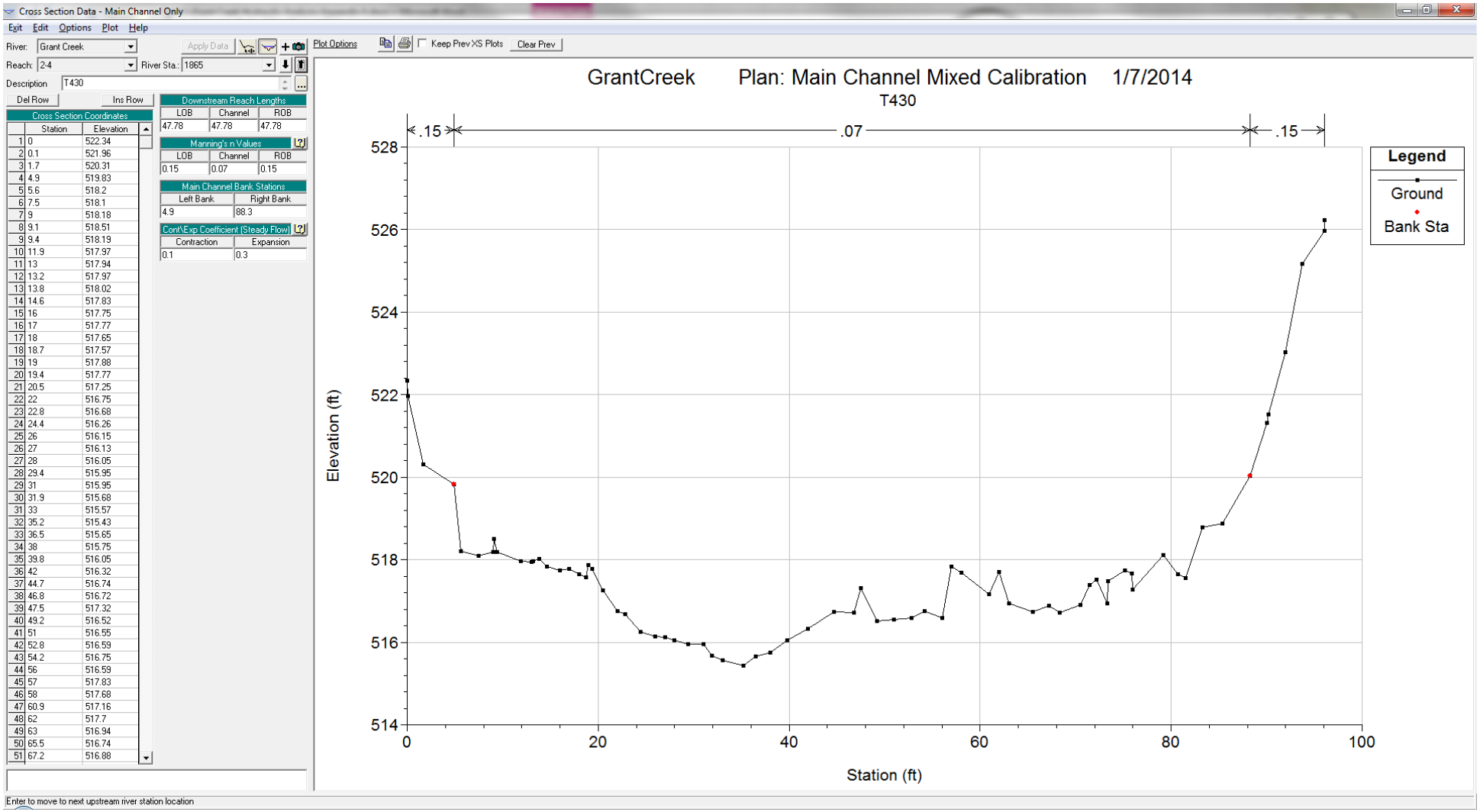
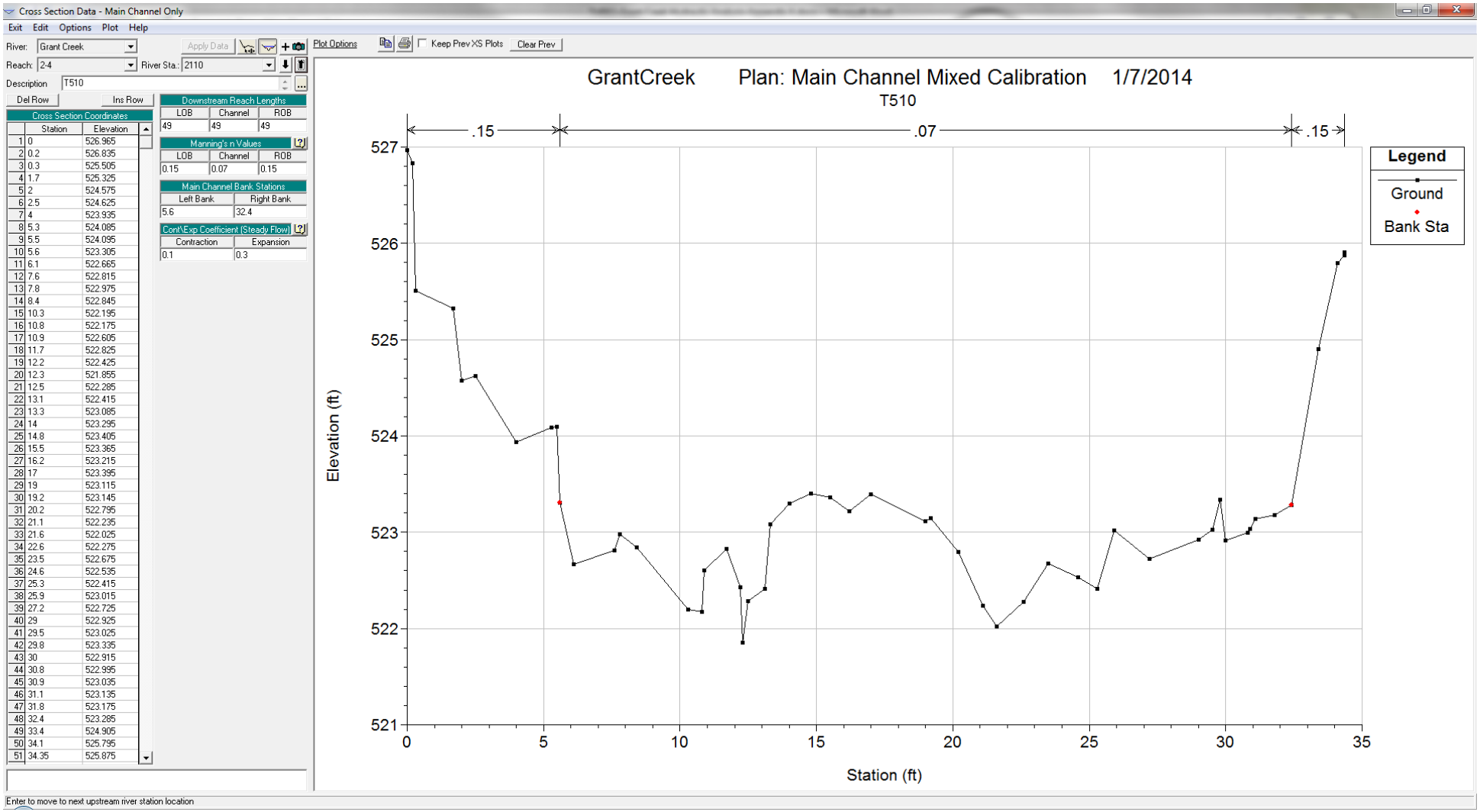
9 6 501.25
10 6.8 501.26
11 7.1 501.12
12 8.9 501.11
13 9 500.44
14 9.4 500.29
15 11 500.27
16 11.8 500.08
17 13 499.92
18 14.4 499.85
19 15.9 499.5
20 17.5 499.48
21 19 499.41
22 21.3 499.38
23 23 499.53
24 25 499.53
25 27 499.4
26 29 499.27
27 31 499.13
28 32.3 499.18
29 33 498.83
30 35 498.36
31 36.4 498.32
32 38 498.33
33 39 498.17
34 40 498.11
35 42 497.83
36 43.1 497.94
37 44.5 498
38 46 497.9
39 47.5 497.81
40 49.9 497.78
41 51.6 497.9
42 54.6 498.1
43 56.2 497.96
44 58.4 497.82
45 60.6 497.88
46 63 498.68
47 63.3 498.22
48 63.3 504.12
49
50
51
Downstream Reach Lengths
LOB Channel ROB
50 50 50
Manning's n Values
LOB Channel ROB
0.1 0.07 0.1
Main Channel Bank Stations
Left Bank Right Bank
8.9 63.3
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T300
.1
.07
Legend
Ground
Bank Sta
Elevation (ft)
505
504
503
502
501
500
499
498
497
0
10
20
30
40
50
60
70
Station (ft)
Enter to move to next upstream river station location


Cross Section Data - Main Channel Only
Exit Edit Options Plot Help
River: Grant Creek
Reach: 2-4
River Sta.: 1061
Description: T310
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 504.8
2 0 504.29
3 0.8 503.85
4 1.8 502.75
5 2.1 500.84
6 2.8 502.29
7 3.1 500.59
8 3.9 499.95
9 5 499.77
10 6.3 499.76
11 7.6 499.97
12 8.9 499.72
13 11 499.71
14 13 499.54
15 15.5 499.64
16 17.1 499.66
17 19 499.76
18 21 499.66
19 22.6 499.25
20 23.6 499.07
21 25 499.09
22 26 499.09
23 27 499.15
24 29 498.86
25 30.5 498.75
26 31.9 498.56
27 34 498.4
28 36 498.4
29 38 498.54
30 40 498.49
31 41 498.39
32 42.4 498.44
33 43.2 499.14
34 43.7 498.53
35 45 498.56
36 46 499
37 46.5 498.54
38 48.3 498.79
39 49.5 498.57
40 50.9 499.07
41 51.5 498.83
42 52.8 499.01
43 53.7 499.48
44 54.3 499.27
45 55.3 499.48
46 56.3 499.37
47 57.3 499.87
48 58.1 499.87
49 59.1 500.12
50 60 500.25
51 61.2 500.51
Downstream Reach Lengths
LOB Channel ROB
43 43 43
Manning's n Values
LOB Channel ROB
0.1 0.07 0.1
Main Channel Bank Stations
Left Bank Right Bank
1.8 66.3
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T310
.07
.1
1
Legend
Ground
Bank Sta
Elevation (ft)
Station (ft)
506
505
504
503
502
501
500
499
498
0
20
40
60
80
100
Enter to move to next upstream river station location


Cross Section Data - Main Channel Only
Exit Edit Options Plot Help
River: Grant Creek
Reach: 2-4
River Sta.: 1381
Description: T400
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
0 510.94
0 510.56
1 510.355
2 509.95
3 509.32
3.7 507.24
4.2 506.97
5.2 506.55
6.5 506.2
7.1 505.56
8 505.51
9 505.46
10 505.11
11 504.76
12 504.96
13 505.16
14 505.16
15 505.21
16 505.31
17 505.31
18 505.55
19 506.31
20 506.64
21 506.79
22 506.97
23 507.1
24 506.87
25 506.8
26 506.65
27.1 506.69
28 506.54
29 506.29
30 506.11
31.5 505.9
32.7 505.61
34 505.64
35.5 505.92
37 505.86
38.8 506.06
40.5 504.86
42 505.92
43.5 504.56
45 505.79
48 505.37
50 504.46
52 505.28
54 504.26
56 505.62
58 503.76
60 505
64 505.28
Downstream Reach Lengths
LOB Channel ROB
45.71 45.71 45.71
Manning's n Values
LOB Channel ROB
0.08 0.07 0.08
Main Channel Bank Stations
Left Bank Right Bank
29 70
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
Normal Ineffective Flow Areas
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T400
.08
.07
.08
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
503
504
505
506
507
508
509
510
511
0
20
40
60
80
100
120
Enter to move to next upstream river station location


Cross Section Data - Main Channel Only
Exit Edit Options Plot Help
River: Grant Creek
Reach: 2-4
River Sta.: 1435
Description T410
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 512
2 0 511.65
3 1 510.71
4 2 509.7
5 3 509.06
6 3.5 507.53
7 4.3 508.5
8 4.6 507.17
9 5.7 507.38
10 6.5 507.27
11 7 507.78
12 7.7 507.41
13 9.3 507.06
14 9.9 507.99
15 11 507.6
16 12 507.26
17 12.5 507.48
18 13.5 507.89
19 14.1 507.53
20 15 507.62
21 16.5 507.58
22 18 507.71
23 19.5 506.7
24 21 507.85
25 22.5 507.8
26 24 508.03
27 25.5 508.26
28 26.8 508.34
29 29 508.42
30 32 508.33
31 34 508.33
32 36 507.55
33 38 508.39
34 40 508.59
35 42 508.645
36 45 508.54
37 47 508.49
38 47.4 508.31
39 48 507.91
40 48.8 508.16
41 50 507.8
42 52 507.9
43 54.5 507.64
44 55.3 507.71
45 56.1 507.33
46 56.6 507.41
47 57.6 507.84
48 59 507.41
49 60 507.1
50 62 506.98
51 63.5 507.01
Downstream Reach Lengths
LOB Channel ROB
27 27 27
Manning's n Values
LOB Channel ROB
0.15 0.09 0.15
Main Channel Bank Stations
Left Bank Right Bank
42 96.4
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
Normal Ineffective Flow Areas
Plot Options
Keep Prev XS Plots
Clear Prev
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T410
.15
.09
.15
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
512
511
510
509
508
507
506
0
20
40
60
80
100
120
140
Enter to move to next upstream river station location


Cross Section Data - Main Channel Only
Exit Edit Options Plot Help
River: Grant Creek
Reach: 2-4
River Sta.: 1865
Description: T430
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 522.34
2 0.1 521.96
3 1.7 520.31
4 4.9 519.83
5 5.6 518.2
6 7.5 518.1
7 9 518.18
8 9.1 518.51
9 9.4 518.19
10 11.9 517.97
11 13 517.94
12 13.2 517.97
13 13.8 518.02
14 14.6 517.83
15 16 517.75
16 17 517.77
17 18 517.65
18 18.7 517.57
19 19 517.88
20 19.4 517.77
21 20.5 517.25
22 22 516.75
23 22.8 516.68
24 24.4 516.26
25 26 516.15
26 27 516.13
27 28 516.05
28 29.4 515.95
29 31 515.95
30 31.9 515.68
31 33 515.57
32 35.2 515.43
33 36.5 515.65
34 38 515.75
35 39.8 516.05
36 42 516.32
37 44.7 516.74
38 46.8 516.72
39 47.5 517.32
40 49.2 516.52
41 51 516.55
42 52.8 516.59
43 54.2 516.75
44 56 516.59
45 57 517.83
46 58 517.68
47 60.9 517.16
48 62 517.7
49 63 516.94
50 65.5 516.74
51 67.2 516.88
Downstream Reach Lengths
LOB Channel ROB
47.78 47.78 47.78
Manning's n Values
LOB Channel ROB
0.15 0.07 0.15
Main Channel Bank Stations
Left Bank Right Bank
4.9 88.3
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T430
.15
.07
.15
Legend
Ground
Bank Sta
Elevation (ft)
528
526
524
522
520
518
516
514
0
20
40
60
80
100
Station (ft)
Enter to move to next upstream river station location


Cross Section Data - Main Channel Only
Exit Edit Options Plot Help
River: Grant Creek
Reach: 2-4
River Sta.: 2110
Description: T510
Apply Data
Plot Options
Keep Prev XS Plots
Clear Prev
Del Row
Ins Row
Cross Section Coordinates
Station Elevation
1 0 526.965
2 0.2 526.835
3 0.3 525.505
4 1.7 525.325
5 2 524.575
6 2.5 524.625
7 4 523.935
8 5.3 524.085
9 5.5 524.095
10 5.6 523.305
11 6.1 522.665
12 7.6 522.815
13 7.8 522.975
14 8.4 522.845
15 10.3 522.195
16 10.8 522.175
17 10.9 522.605
18 11.7 522.825
19 12.2 522.425
20 12.3 521.855
21 12.5 522.285
22 13.1 522.415
23 13.3 523.085
24 14 523.295
25 14.8 523.405
26 15.5 523.365
27 16.2 523.215
28 17 523.395
29 19 523.115
30 19.2 523.145
31 20.2 522.795
32 21.1 522.235
33 21.6 522.025
34 22.6 522.275
35 23.5 522.675
36 24.6 522.535
37 25.3 522.415
38 25.9 523.015
39 27.2 522.725
40 29 522.925
41 29.5 523.025
42 29.8 523.335
43 30 522.915
44 30.8 522.995
45 30.9 523.035
46 31.1 523.135
47 31.8 523.175
48 32.4 523.285
49 33.4 524.905
50 34.1 525.795
51 34.35 525.875
Downstream Reach Lengths
LOB Channel ROB
49 49 49
Manning's n Values
LOB Channel ROB
0.15 0.07 0.15
Main Channel Bank Stations
Left Bank Right Bank
5.6 32.4
Cont\Exp Coefficient (Steady Flow)
Contraction Expansion
0.1 0.3
GrantCreek Plan: Main Channel Mixed Calibration 1/7/2014
T510
.15
.07
.15
Legend
Ground
Bank Sta
Elevation (ft)
Station (ft)
527
526
525
524
523
522
521
0
5
10
15
20
25
30
35
Enter to move to next upstream river station location

HEC-RAS Model Output Tables

HEC-RAS Plan: Calib River: Grant Creek Reach: 2-4

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	2110	17 cfs	17.00	521.86	523.13	522.89	523.19	0.024540	1.83	9.28	19.56	0.47
2-4	2110	58 cfs	58.00	521.86	523.60	523.33	523.72	0.029034	2.80	20.72	27.03	0.56
2-4	2110	132 cfs	132.00	521.86	524.07	523.72	524.31	0.030445	3.95	33.71	28.85	0.62
2-4	2110	182 cfs	182.00	521.86	524.31	523.95	524.63	0.031992	4.55	40.80	29.85	0.66
2-4	2110	706 cfs	706.00	521.86	525.89	525.60	526.96	0.041093	8.37	91.50	34.08	0.84
2-4	2061.*	17 cfs	17.00	520.57	521.88		521.92	0.026630	1.72	9.87	26.22	0.49
2-4	2061.*	58 cfs	58.00	520.57	522.30		522.39	0.025102	2.43	23.90	36.53	0.53
2-4	2061.*	132 cfs	132.00	520.57	522.69		522.87	0.027667	3.41	38.72	38.18	0.60
2-4	2061.*	182 cfs	182.00	520.57	522.90		523.14	0.028089	3.89	46.77	38.39	0.62
2-4	2061.*	706 cfs	706.00	520.57	524.28		525.05	0.033716	7.05	103.67	43.24	0.77
2-4	2012.*	17 cfs	17.00	519.28	520.56		520.61	0.027071	1.80	9.46	24.43	0.51
2-4	2012.*	58 cfs	58.00	519.28	521.00		521.08	0.028557	2.35	24.70	44.60	0.56
2-4	2012.*	132 cfs	132.00	519.28	521.37		521.53	0.027186	3.15	41.92	46.80	0.59
2-4	2012.*	182 cfs	182.00	519.28	521.56		521.76	0.027860	3.57	50.97	47.90	0.61
2-4	2012.*	706 cfs	706.00	519.28	522.84		523.43	0.030322	6.21	114.94	53.13	0.72
2-4	1963.*	17 cfs	17.00	518.00	519.24		519.29	0.027115	1.75	9.72	26.83	0.51
2-4	1963.*	58 cfs	58.00	518.00	519.67		519.76	0.025587	2.36	24.61	40.70	0.53
2-4	1963.*	132 cfs	132.00	518.00	520.11		520.24	0.025275	2.89	45.74	55.53	0.56
2-4	1963.*	182 cfs	182.00	518.00	520.29		520.45	0.025029	3.25	56.01	56.29	0.57
2-4	1963.*	706 cfs	706.00	518.00	521.47		521.96	0.028475	5.61	125.77	60.98	0.69
2-4	1914.*	17 cfs	17.00	516.71	517.71		517.80	0.034552	2.34	7.28	15.76	0.61
2-4	1914.*	58 cfs	58.00	516.71	518.26		518.36	0.032017	2.60	22.29	38.34	0.60
2-4	1914.*	132 cfs	132.00	516.71	518.68		518.85	0.031721	3.24	40.80	49.22	0.63
2-4	1914.*	182 cfs	182.00	516.71	518.91		519.09	0.030729	3.43	53.13	57.58	0.63
2-4	1914.*	706 cfs	706.00	516.71	520.10		520.54	0.028929	5.32	132.69	70.34	0.68
2-4	1865	17 cfs	17.00	515.43	516.38		516.44	0.022287	1.93	8.83	18.49	0.49
2-4	1865	58 cfs	58.00	515.43	516.96		517.04	0.022973	2.29	25.30	41.38	0.52
2-4	1865	132 cfs	132.00	515.43	517.40		517.53	0.022754	2.94	44.88	48.90	0.54
2-4	1865	182 cfs	182.00	515.43	517.64		517.80	0.022756	3.15	57.77	56.37	0.55
2-4	1865	706 cfs	706.00	515.43	518.91		519.25	0.022882	4.70	150.13	80.18	0.61
2-4	1817.22*	17 cfs	17.00	514.40	515.34		515.40	0.021698	1.89	9.01	19.08	0.48
2-4	1817.22*	58 cfs	58.00	514.40	515.86		515.94	0.023196	2.31	25.06	40.54	0.52
2-4	1817.22*	132 cfs	132.00	514.40	516.31		516.44	0.022894	2.92	45.15	49.76	0.54
2-4	1817.22*	182 cfs	182.00	514.40	516.55		516.70	0.023096	3.13	58.16	58.14	0.55
2-4	1817.22*	706 cfs	706.00	514.40	517.81		518.17	0.022801	4.77	148.04	77.56	0.61
2-4	1769.44*	17 cfs	17.00	513.37	514.33		514.37	0.021171	1.71	9.93	23.86	0.47
2-4	1769.44*	58 cfs	58.00	513.37	514.78		514.86	0.022345	2.29	25.34	40.27	0.51
2-4	1769.44*	132 cfs	132.00	513.37	515.23		515.36	0.022405	2.88	45.85	50.95	0.53
2-4	1769.44*	182 cfs	182.00	513.37	515.46		515.61	0.022695	3.12	58.34	58.09	0.55
2-4	1769.44*	706 cfs	706.00	513.37	516.75		517.10	0.021850	4.78	147.71	75.01	0.60
2-4	1721.66*	17 cfs	17.00	512.34	513.28		513.32	0.022968	1.60	10.61	28.64	0.46
2-4	1721.66*	58 cfs	58.00	512.34	513.71		513.79	0.022225	2.22	26.07	41.02	0.49
2-4	1721.66*	132 cfs	132.00	512.34	514.17		514.29	0.021945	2.80	47.11	51.68	0.52
2-4	1721.66*	182 cfs	182.00	512.34	514.39		514.53	0.022298	3.08	59.10	56.96	0.53
2-4	1721.66*	706 cfs	706.00	512.34	515.72		516.07	0.021201	4.73	149.42	72.60	0.58
2-4	1673.88*	17 cfs	17.00	511.31	512.23		512.27	0.021484	1.48	11.48	31.02	0.43
2-4	1673.88*	58 cfs	58.00	511.31	512.66		512.73	0.022296	2.14	27.10	42.53	0.47
2-4	1673.88*	132 cfs	132.00	511.31	513.11		513.23	0.022310	2.73	48.29	52.59	0.50
2-4	1673.88*	182 cfs	182.00	511.31	513.33		513.47	0.022042	3.04	59.95	55.25	0.51
2-4	1673.88*	706 cfs	706.00	511.31	514.71		515.05	0.021194	4.68	151.76	77.76	0.56
2-4	1626.11*	17 cfs	17.00	510.29	511.16		511.19	0.023363	1.49	11.43	30.56	0.43
2-4	1626.11*	58 cfs	58.00	510.29	511.58		511.65	0.022929	2.15	26.98	40.61	0.46
2-4	1626.11*	132 cfs	132.00	510.29	512.06		512.17	0.021955	2.71	48.71	50.20	0.48
2-4	1626.11*	182 cfs	182.00	510.29	512.31		512.44	0.021368	2.94	61.83	55.16	0.49
2-4	1626.11*	706 cfs	706.00	510.29	513.70		514.03	0.021430	4.66	158.07	91.77	0.55
2-4	1578.33*	17 cfs	17.00	509.26	510.12	509.88	510.15	0.020701	1.37	12.37	32.07	0.39
2-4	1578.33*	58 cfs	58.00	509.26	510.55	510.21	510.62	0.020314	2.07	27.98	38.51	0.43
2-4	1578.33*	132 cfs	132.00	509.26	511.03	510.54	511.14	0.021014	2.65	49.87	48.80	0.46
2-4	1578.33*	182 cfs	182.00	509.26	511.30	510.74	511.42	0.021134	2.87	63.45	55.56	0.47
2-4	1578.33*	706 cfs	706.00	509.26	512.68	511.89	513.00	0.021591	4.62	167.63	93.45	0.53
2-4	1530.55*	17 cfs	17.00	508.23	509.03	508.82	509.07	0.024712	1.49	11.43	28.54	0.41
2-4	1530.55*	58 cfs	58.00	508.23	509.53	509.15	509.59	0.023001	2.04	28.41	41.83	0.44
2-4	1530.55*	132 cfs	132.00	508.23	510.03	509.53	510.13	0.021229	2.60	50.75	49.63	0.45
2-4	1530.55*	182 cfs	182.00	508.23	510.28	509.69	510.41	0.021401	2.85	63.88	56.74	0.46
2-4	1530.55*	706 cfs	706.00	508.23	511.65	510.88	511.96	0.021789	4.56	178.64	99.75	0.52

HEC-RAS Plan: Calib River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1482.77*	17 cfs	17.00	507.20	508.06	507.75	508.08	0.017429	1.34	12.72	27.28	0.34
2-4	1482.77*	58 cfs	58.00	507.20	508.57	508.11	508.63	0.017703	1.87	31.04	41.71	0.38
2-4	1482.77*	132 cfs	132.00	507.20	509.10	508.49	509.19	0.018480	2.41	54.91	64.78	0.41
2-4	1482.77*	182 cfs	182.00	507.20	509.34	508.67	509.46	0.018680	2.71	67.79	73.88	0.42
2-4	1482.77*	706 cfs	706.00	507.20	510.79	509.89	511.02	0.017002	4.11	216.07	117.66	0.45
2-4	1435	17 cfs	17.00	506.17	507.02		507.06	0.026805	1.51	11.27	27.28	0.41
2-4	1435	58 cfs	58.00	506.17	507.46		507.53	0.030693	2.22	26.22	45.73	0.47
2-4	1435	132 cfs	132.00	506.17	507.96		508.08	0.030186	2.80	47.71	73.75	0.49
2-4	1435	182 cfs	182.00	506.17	508.18		508.33	0.030328	3.13	59.06	79.75	0.51
2-4	1435	706 cfs	706.00	506.17	509.32		509.78	0.043137	5.59	149.59	121.23	0.67
2-4	1408.*	17 cfs	17.00	504.97	506.12	505.96	506.18	0.039624	1.91	8.92	24.33	0.54
2-4	1408.*	58 cfs	58.00	504.97	506.60	506.34	506.70	0.030728	2.51	23.08	43.14	0.53
2-4	1408.*	132 cfs	132.00	504.97	507.08	506.70	507.24	0.031329	3.15	42.41	62.81	0.56
2-4	1408.*	182 cfs	182.00	504.97	507.31	506.93	507.49	0.031368	3.49	53.17	69.93	0.58
2-4	1408.*	706 cfs	706.00	504.97	508.39	507.98	508.77	0.031163	5.38	165.63	101.30	0.64
2-4	1381	17 cfs	17.00	503.76	505.39	505.07	505.44	0.020526	1.72	9.88	28.42	0.43
2-4	1381	58 cfs	58.00	503.76	505.96	505.56	506.04	0.020245	2.24	25.93	48.69	0.47
2-4	1381	132 cfs	132.00	503.76	506.40	506.00	506.54	0.021555	3.03	44.43	62.34	0.52
2-4	1381	182 cfs	182.00	503.76	506.61	506.18	506.79	0.021822	3.44	55.27	71.60	0.54
2-4	1381	706 cfs	706.00	503.76	507.93	507.16	508.18	0.014253	4.48	182.89	86.63	0.49
2-4	1335.28*	17 cfs	17.00	502.99	504.50		504.55	0.018552	1.66	10.26	21.47	0.42
2-4	1335.28*	58 cfs	58.00	502.99	505.04		505.12	0.019839	2.20	26.88	43.50	0.47
2-4	1335.28*	132 cfs	132.00	502.99	505.48		505.61	0.019120	2.86	48.73	53.10	0.50
2-4	1335.28*	182 cfs	182.00	502.99	505.71		505.86	0.018757	3.18	60.99	55.44	0.51
2-4	1335.28*	706 cfs	706.00	502.99	507.13		507.47	0.016983	5.02	170.66	86.18	0.55
2-4	1289.57*	17 cfs	17.00	502.23	503.57		503.62	0.022182	1.78	9.55	21.05	0.47
2-4	1289.57*	58 cfs	58.00	502.23	504.14		504.21	0.019878	2.20	26.36	39.69	0.48
2-4	1289.57*	132 cfs	132.00	502.23	504.57		504.71	0.020023	2.91	45.35	45.67	0.51
2-4	1289.57*	182 cfs	182.00	502.23	504.79		504.96	0.020395	3.29	55.57	50.09	0.53
2-4	1289.57*	706 cfs	706.00	502.23	506.26		506.65	0.018417	5.23	155.89	85.55	0.57
2-4	1243.85*	17 cfs	17.00	501.46	502.71		502.75	0.016540	1.60	10.60	22.40	0.41
2-4	1243.85*	58 cfs	58.00	501.46	503.22		503.30	0.020225	2.21	26.20	40.12	0.48
2-4	1243.85*	132 cfs	132.00	501.46	503.66		503.78	0.019887	2.88	45.82	46.79	0.51
2-4	1243.85*	182 cfs	182.00	501.46	503.87		504.04	0.020064	3.24	56.23	48.47	0.53
2-4	1243.85*	706 cfs	706.00	501.46	505.33		505.77	0.020219	5.36	140.08	81.72	0.59
2-4	1198.14*	17 cfs	17.00	500.69	501.71		501.77	0.028259	1.94	8.78	21.08	0.53
2-4	1198.14*	58 cfs	58.00	500.69	502.26		502.35	0.020810	2.36	24.59	35.13	0.50
2-4	1198.14*	132 cfs	132.00	500.69	502.73		502.86	0.020498	2.86	46.09	48.94	0.52
2-4	1198.14*	182 cfs	182.00	500.69	502.95		503.11	0.020221	3.22	56.61	49.97	0.53
2-4	1198.14*	706 cfs	706.00	500.69	504.40		504.83	0.020556	5.28	134.02	60.52	0.59
2-4	1152.42*	17 cfs	17.00	499.92	500.95	500.64	500.98	0.011415	1.38	12.32	25.04	0.35
2-4	1152.42*	58 cfs	58.00	499.92	501.40		501.48	0.017552	2.18	26.63	37.92	0.46
2-4	1152.42*	132 cfs	132.00	499.92	501.85		501.97	0.018778	2.74	48.09	51.14	0.50
2-4	1152.42*	182 cfs	182.00	499.92	502.04		502.19	0.020019	3.15	57.69	52.18	0.53
2-4	1152.42*	706 cfs	706.00	499.92	503.54		503.93	0.018439	5.00	141.20	57.35	0.56
2-4	1106.71*	17 cfs	17.00	499.16	499.79		499.89	0.077610	2.65	6.41	20.59	0.84
2-4	1106.71*	58 cfs	58.00	499.16	500.35		500.46	0.028809	2.65	21.87	33.52	0.58
2-4	1106.71*	132 cfs	132.00	499.16	500.88		501.01	0.024071	2.93	45.09	52.47	0.56
2-4	1106.71*	182 cfs	182.00	499.16	501.13		501.28	0.019680	3.09	58.91	54.32	0.52
2-4	1106.71*	706 cfs	706.00	499.16	502.93		503.22	0.012177	4.30	164.00	60.61	0.46
2-4	1061	17 cfs	17.00	498.39	499.29		499.31	0.004738	0.97	17.49	31.10	0.23
2-4	1061	58 cfs	58.00	498.39	499.95		499.98	0.005085	1.30	44.53	54.28	0.25
2-4	1061	132 cfs	132.00	498.39	500.52		500.57	0.004696	1.72	76.81	58.05	0.26
2-4	1061	182 cfs	182.00	498.39	500.80		500.86	0.004827	1.96	93.09	58.98	0.27
2-4	1061	706 cfs	706.00	498.39	502.63		502.81	0.006029	3.38	211.86	75.46	0.33
2-4	1018.*	17 cfs	17.00	498.19	499.08		499.09	0.005322	1.02	16.64	30.34	0.24
2-4	1018.*	58 cfs	58.00	498.19	499.69		499.72	0.006944	1.48	39.12	50.11	0.30
2-4	1018.*	132 cfs	132.00	498.19	500.30		500.35	0.005551	1.81	72.82	58.29	0.29
2-4	1018.*	182 cfs	182.00	498.19	500.58		500.64	0.005503	2.04	89.08	58.99	0.29
2-4	1018.*	706 cfs	706.00	498.19	502.32		502.53	0.006924	3.63	194.68	61.52	0.36
2-4	975.*	17 cfs	17.00	497.98	498.83		498.85	0.005763	1.05	16.14	30.21	0.25
2-4	975.*	58 cfs	58.00	497.98	499.37		499.41	0.007314	1.71	33.90	36.61	0.31
2-4	975.*	132 cfs	132.00	497.98	500.01		500.07	0.007548	2.04	64.76	54.94	0.33
2-4	975.*	182 cfs	182.00	497.98	500.29		500.37	0.007198	2.26	80.48	56.08	0.33
2-4	975.*	706 cfs	706.00	497.98	501.93		502.18	0.009123	4.05	174.73	59.48	0.41

HEC-RAS Plan: Calib River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	932	17 cfs	17.00	497.78	498.39		498.43	0.019781	1.58	10.73	27.35	0.45
2-4	932	58 cfs	58.00	497.78	498.83		498.93	0.019303	2.44	23.72	30.31	0.49
2-4	932	132 cfs	132.00	497.78	499.40		499.55	0.020461	3.14	42.05	38.22	0.53
2-4	932	182 cfs	182.00	497.78	499.71		499.87	0.020262	3.24	56.10	48.30	0.53
2-4	932	706 cfs	706.00	497.78	501.13		501.58	0.022010	5.39	131.10	56.22	0.61
2-4	882.*	17 cfs	17.00	496.50	497.31		497.35	0.023428	1.78	9.56	23.35	0.49
2-4	882.*	58 cfs	58.00	496.50	497.82		497.91	0.021446	2.50	23.19	31.09	0.51
2-4	882.*	132 cfs	132.00	496.50	498.39		498.54	0.020078	3.13	42.15	37.96	0.52
2-4	882.*	182 cfs	182.00	496.50	498.73		498.88	0.019809	3.11	58.53	53.02	0.52
2-4	882.*	706 cfs	706.00	496.50	500.06		500.48	0.021662	5.19	135.99	61.14	0.60
2-4	832.*	17 cfs	17.00	495.22	496.28		496.32	0.018453	1.64	10.35	23.65	0.44
2-4	832.*	58 cfs	58.00	495.22	496.74		496.85	0.021364	2.61	22.26	27.89	0.51
2-4	832.*	132 cfs	132.00	495.22	497.32		497.49	0.022137	3.29	40.13	36.05	0.55
2-4	832.*	182 cfs	182.00	495.22	497.77		497.90	0.019057	2.93	62.07	59.70	0.51
2-4	832.*	706 cfs	706.00	495.22	499.01		499.40	0.021310	5.01	140.96	66.10	0.60
2-4	782.*	17 cfs	17.00	493.94	495.15		495.21	0.028051	1.91	8.90	22.00	0.53
2-4	782.*	58 cfs	58.00	493.94	495.68		495.78	0.021040	2.60	22.31	27.72	0.51
2-4	782.*	132 cfs	132.00	493.94	496.21		496.40	0.021546	3.47	37.99	30.53	0.55
2-4	782.*	182 cfs	182.00	493.94	496.74		496.88	0.022183	2.97	61.27	64.74	0.54
2-4	782.*	706 cfs	706.00	493.94	497.97		498.34	0.020950	4.84	145.93	71.10	0.59
2-4	732.*	17 cfs	17.00	492.66	493.74		493.85	0.025813	2.68	6.35	8.50	0.55
2-4	732.*	58 cfs	58.00	492.66	494.58		494.69	0.022787	2.67	21.70	27.47	0.53
2-4	732.*	132 cfs	132.00	492.66	495.14		495.32	0.021549	3.45	38.30	31.12	0.55
2-4	732.*	182 cfs	182.00	492.66	495.57		495.75	0.022947	3.37	54.07	48.10	0.56
2-4	732.*	706 cfs	706.00	492.66	496.94		497.28	0.020850	4.70	150.25	76.10	0.58
2-4	682.*	17 cfs	17.00	491.38	492.45		492.57	0.025497	2.74	6.20	7.89	0.55
2-4	682.*	58 cfs	58.00	491.38	493.54		493.64	0.019324	2.53	22.97	27.74	0.49
2-4	682.*	132 cfs	132.00	491.38	494.07		494.25	0.021502	3.41	38.72	31.90	0.55
2-4	682.*	182 cfs	182.00	491.38	494.41		494.62	0.022080	3.60	50.54	39.12	0.56
2-4	682.*	706 cfs	706.00	491.38	495.92		496.24	0.020577	4.57	154.89	81.13	0.58
2-4	632.*	17 cfs	17.00	490.10	491.17		491.28	0.025901	2.76	6.17	7.91	0.55
2-4	632.*	58 cfs	58.00	490.10	492.33		492.46	0.029820	2.98	19.48	25.11	0.60
2-4	632.*	132 cfs	132.00	490.10	492.99		493.16	0.021808	3.39	38.96	32.69	0.55
2-4	632.*	182 cfs	182.00	490.10	493.30		493.51	0.022121	3.67	49.60	37.22	0.56
2-4	632.*	706 cfs	706.00	490.10	494.87		495.19	0.021585	4.52	156.49	86.10	0.59
2-4	582.*	17 cfs	17.00	488.82	489.89		490.01	0.025249	2.72	6.24	8.02	0.54
2-4	582.*	58 cfs	58.00	488.82	490.84		491.07	0.025704	3.83	15.13	11.18	0.58
2-4	582.*	132 cfs	132.00	488.82	491.87		492.06	0.022632	3.45	38.24	32.04	0.56
2-4	582.*	182 cfs	182.00	488.82	492.19		492.41	0.021980	3.72	48.98	35.77	0.56
2-4	582.*	706 cfs	706.00	488.82	493.79		494.11	0.021428	4.56	155.13	83.35	0.58
2-4	532.*	17 cfs	17.00	487.54	488.60		488.72	0.026503	2.75	6.17	8.15	0.56
2-4	532.*	58 cfs	58.00	487.54	489.54		489.77	0.026229	3.93	14.76	10.60	0.59
2-4	532.*	132 cfs	132.00	487.54	490.82		490.99	0.020413	3.33	39.68	32.32	0.53
2-4	532.*	182 cfs	182.00	487.54	491.07		491.29	0.022459	3.78	48.20	34.79	0.57
2-4	532.*	706 cfs	706.00	487.54	492.71		493.03	0.021860	4.55	155.49	84.90	0.59
2-4	482.*	17 cfs	17.00	486.25	487.33		487.44	0.024845	2.68	6.34	8.34	0.54
2-4	482.*	58 cfs	58.00	486.25	488.22		488.47	0.026224	4.00	14.52	10.11	0.59
2-4	482.*	132 cfs	132.00	486.25	489.55		489.77	0.029490	3.82	34.52	29.66	0.62
2-4	482.*	182 cfs	182.00	486.25	490.00		490.21	0.020785	3.69	49.26	34.55	0.55
2-4	482.*	706 cfs	706.00	486.25	491.63		491.95	0.021325	4.50	157.02	85.18	0.58
2-4	432.*	17 cfs	17.00	484.97	486.02		486.14	0.027449	2.75	6.18	8.51	0.57
2-4	432.*	58 cfs	58.00	484.97	486.92		487.17	0.026015	4.00	14.49	10.04	0.59
2-4	432.*	132 cfs	132.00	484.97	488.02		488.38	0.025833	4.81	27.44	13.90	0.60
2-4	432.*	182 cfs	182.00	484.97	488.77		489.02	0.027142	4.02	45.22	33.83	0.61
2-4	432.*	706 cfs	706.00	484.97	490.56		490.87	0.021408	4.44	159.15	88.39	0.58
2-4	382.*	17 cfs	17.00	483.69	484.79		484.89	0.022602	2.56	6.65	8.82	0.52
2-4	382.*	58 cfs	58.00	483.69	485.63		485.87	0.025698	3.97	14.60	10.19	0.58
2-4	382.*	132 cfs	132.00	483.69	486.70		487.07	0.026137	4.90	26.92	13.28	0.61
2-4	382.*	182 cfs	182.00	483.69	487.25		487.68	0.025895	5.21	34.91	15.50	0.61
2-4	382.*	706 cfs	706.00	483.69	489.51		489.80	0.021263	4.37	161.84	91.70	0.58
2-4	332.*	17 cfs	17.00	482.41	483.41		483.54	0.032987	2.92	5.83	8.48	0.62
2-4	332.*	58 cfs	58.00	482.41	484.31		484.56	0.027016	4.03	14.40	10.31	0.60
2-4	332.*	132 cfs	132.00	482.41	485.38		485.76	0.026302	4.97	26.57	12.87	0.61
2-4	332.*	182 cfs	182.00	482.41	485.95		486.38	0.025872	5.28	34.46	14.91	0.61
2-4	332.*	706 cfs	706.00	482.41	488.42		488.71	0.022374	4.38	161.37	94.72	0.59

HEC-RAS Plan: Calib River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	282.*	17 cfs	17.00	481.13	482.31		482.39	0.016521	2.29	7.44	9.23	0.45
2-4	282.*	58 cfs	58.00	481.13	483.11		483.33	0.022168	3.75	15.49	10.64	0.55
2-4	282.*	132 cfs	132.00	481.13	484.17		484.52	0.022903	4.75	27.78	12.90	0.57
2-4	282.*	182 cfs	182.00	481.13	484.80		485.18	0.021798	4.99	36.48	14.99	0.56
2-4	282.*	706 cfs	706.00	481.13	487.27		487.59	0.022477	4.52	156.40	87.61	0.59
2-4	232.*	17 cfs	17.00	479.85	482.24		482.25	0.000881	0.84	20.30	11.45	0.11
2-4	232.*	58 cfs	58.00	479.85	482.76		482.83	0.004872	2.19	26.44	12.26	0.26
2-4	232.*	132 cfs	132.00	479.85	483.50		483.70	0.011252	3.63	36.40	14.64	0.41
2-4	232.*	182 cfs	182.00	479.85	484.11		484.36	0.011845	3.95	46.06	16.82	0.42
2-4	232.*	706 cfs	706.00	479.85	486.19		486.50	0.020879	4.48	157.83	84.61	0.58
2-4	182.*	17 cfs	17.00	478.57	482.23		482.23	0.000177	0.46	36.86	14.45	0.05
2-4	182.*	58 cfs	58.00	478.57	482.68		482.70	0.001337	1.33	43.65	15.85	0.14
2-4	182.*	132 cfs	132.00	478.57	483.25		483.35	0.004201	2.47	53.37	17.93	0.25
2-4	182.*	182 cfs	182.00	478.57	483.61		483.75	0.011297	2.98	61.09	35.83	0.40
2-4	182.*	706 cfs	706.00	478.57	485.40		485.62	0.014125	3.82	185.01	94.26	0.48
2-4	132.*	17 cfs	17.00	477.29	482.22		482.23	0.000055	0.29	58.04	18.49	0.03
2-4	132.*	58 cfs	58.00	477.29	482.63		482.64	0.000908	0.86	67.47	38.53	0.11
2-4	132.*	132 cfs	132.00	477.29	483.12		483.15	0.002941	1.41	93.37	63.68	0.21
2-4	132.*	182 cfs	182.00	477.29	483.38		483.42	0.003609	1.64	110.73	70.65	0.23
2-4	132.*	706 cfs	706.00	477.29	485.07		485.18	0.005248	2.66	267.28	112.37	0.30
2-4	82	17 cfs	17.00	476.01	482.22		482.22	0.000033	0.16	107.56	68.16	0.02
2-4	82	58 cfs	58.00	476.01	482.62		482.62	0.000215	0.42	136.89	80.80	0.06
2-4	82	132 cfs	132.00	476.01	483.08		483.09	0.000539	0.75	175.83	88.70	0.09
2-4	82	182 cfs	182.00	476.01	483.33		483.34	0.000736	0.92	198.29	93.67	0.11
2-4	82	706 cfs	706.00	476.01	484.97		485.03	0.001707	1.85	384.35	118.94	0.18
2-4	50	17 cfs	17.00	481.55	482.10	482.10	482.21	0.126642	2.68	6.34	29.08	1.01
2-4	50	58 cfs	58.00	481.55	482.36	482.36	482.58	0.106335	3.70	15.68	38.62	1.02
2-4	50	132 cfs	132.00	481.55	482.67	482.67	483.00	0.091667	4.60	28.73	45.42	1.02
2-4	50	182 cfs	182.00	481.55	482.84	482.84	483.23	0.085592	5.00	36.43	48.12	1.01
2-4	50	706 cfs	706.00	481.55	483.92	483.92	484.78	0.065505	7.48	94.82	56.13	1.01

HEC-RAS Plan: Flood River: Grant Creek Reach: 2-4

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	2110	Q 2	961.00	521.86	526.42	526.21	527.82	0.044334	9.66	109.41	34.12	0.90
2-4	2110	Q 5	1410.00	521.86	527.16	527.14	529.20	0.050323	11.67	134.85	34.35	0.99
2-4	2110	Q 10	1790.00	521.86	527.83	527.83	530.27	0.050053	12.79	157.64	34.35	1.01
2-4	2110	Q 25	2350.00	521.86	528.81	528.81	531.72	0.047164	13.99	191.34	34.35	1.01
2-4	2110	Q 50	2810.00	521.86	529.53	529.53	532.83	0.045914	14.90	216.28	34.35	1.01
2-4	2110	Q 100	3310.00	521.86	530.27	530.27	533.98	0.044969	15.81	241.56	34.35	1.02
2-4	2061.*	Q 2	961.00	520.57	524.75	524.36	525.76	0.035793	8.11	124.22	44.97	0.82
2-4	2061.*	Q 5	1410.00	520.57	525.44	525.15	526.86	0.038825	9.66	155.32	45.66	0.88
2-4	2061.*	Q 10	1790.00	520.57	525.92	525.74	527.70	0.041330	10.81	177.82	46.60	0.92
2-4	2061.*	Q 25	2350.00	520.57	525.98	526.53	528.96	0.068095	14.00	180.46	46.65	1.19
2-4	2061.*	Q 50	2810.00	520.57	526.32	527.11	529.96	0.075395	15.49	196.16	46.70	1.27
2-4	2061.*	Q 100	3310.00	520.57	526.66	527.72	531.01	0.081914	16.94	212.36	46.70	1.34
2-4	2012.*	Q 2	961.00	519.28	523.26		524.04	0.031675	7.11	137.98	54.33	0.76
2-4	2012.*	Q 5	1410.00	519.28	523.89		524.99	0.033865	8.44	172.62	56.05	0.81
2-4	2012.*	Q 10	1790.00	519.28	524.35	523.97	525.71	0.035357	9.39	198.56	56.75	0.85
2-4	2012.*	Q 25	2350.00	519.28	524.94	524.66	526.67	0.037529	10.65	232.04	57.36	0.89
2-4	2012.*	Q 50	2810.00	519.28	525.36	525.16	527.41	0.039253	11.58	256.59	57.87	0.93
2-4	2012.*	Q 100	3310.00	519.28	525.78	525.66	528.18	0.041079	12.53	281.04	58.63	0.96
2-4	1963.*	Q 2	961.00	518.00	521.87		522.51	0.029245	6.40	150.81	63.82	0.72
2-4	1963.*	Q 5	1410.00	518.00	522.46		523.35	0.030778	7.57	188.98	65.65	0.76
2-4	1963.*	Q 10	1790.00	518.00	522.88		523.98	0.032032	8.42	217.08	66.74	0.80
2-4	1963.*	Q 25	2350.00	518.00	523.43	523.01	524.83	0.033648	9.52	254.23	67.96	0.84
2-4	1963.*	Q 50	2810.00	518.00	523.84	523.44	525.48	0.034878	10.33	281.72	68.42	0.86
2-4	1963.*	Q 100	3310.00	518.00	524.24	523.90	526.14	0.036177	11.14	309.15	68.93	0.89
2-4	1914.*	Q 2	961.00	516.71	520.49		521.05	0.029510	6.01	159.99	71.52	0.71
2-4	1914.*	Q 5	1410.00	516.71	521.05		521.82	0.030100	7.02	201.45	75.06	0.74
2-4	1914.*	Q 10	1790.00	516.71	521.46		522.40	0.030685	7.76	232.49	76.54	0.77
2-4	1914.*	Q 25	2350.00	516.71	521.99		523.17	0.031519	8.72	273.59	77.79	0.80
2-4	1914.*	Q 50	2810.00	516.71	522.39		523.76	0.032114	9.41	304.50	78.70	0.82
2-4	1914.*	Q 100	3310.00	516.71	522.79	522.31	524.36	0.032694	10.10	335.89	79.39	0.84
2-4	1865	Q 2	961.00	515.43	519.31		519.74	0.022602	5.26	182.60	81.36	0.62
2-4	1865	Q 5	1410.00	515.43	519.93		520.50	0.022309	6.05	233.12	83.77	0.64
2-4	1865	Q 10	1790.00	515.43	520.37		521.05	0.022186	6.63	270.75	87.09	0.65
2-4	1865	Q 25	2350.00	515.43	520.95		521.79	0.021959	7.37	321.87	88.44	0.66
2-4	1865	Q 50	2810.00	515.43	521.39		522.35	0.021836	7.90	360.66	89.41	0.68
2-4	1865	Q 100	3310.00	515.43	521.83		522.92	0.021738	8.42	400.36	90.34	0.68
2-4	1817.22*	Q 2	961.00	514.40	518.23		518.67	0.022424	5.33	180.38	78.77	0.62
2-4	1817.22*	Q 5	1410.00	514.40	518.84		519.43	0.022211	6.14	230.23	85.76	0.64
2-4	1817.22*	Q 10	1790.00	514.40	519.29		519.99	0.022028	6.74	269.04	87.85	0.65
2-4	1817.22*	Q 25	2350.00	514.40	519.88		520.74	0.021853	7.48	321.50	90.38	0.67
2-4	1817.22*	Q 50	2810.00	514.40	520.32		521.31	0.021731	8.01	361.68	91.67	0.68
2-4	1817.22*	Q 100	3310.00	514.40	520.76		521.88	0.021640	8.54	402.84	92.97	0.69
2-4	1769.44*	Q 2	961.00	513.37	517.17		517.62	0.021544	5.34	179.91	76.28	0.61
2-4	1769.44*	Q 5	1410.00	513.37	517.79		518.39	0.021425	6.19	231.41	87.75	0.63
2-4	1769.44*	Q 10	1790.00	513.37	518.25		518.96	0.021265	6.78	271.83	90.27	0.65
2-4	1769.44*	Q 25	2350.00	513.37	518.85		519.72	0.021103	7.52	326.88	92.98	0.66
2-4	1769.44*	Q 50	2810.00	513.37	519.29		520.29	0.021010	8.06	368.87	94.67	0.67
2-4	1769.44*	Q 100	3310.00	513.37	519.74		520.86	0.021006	8.59	411.78	97.05	0.68
2-4	1721.66*	Q 2	961.00	512.34	516.15		516.59	0.021261	5.31	182.14	84.34	0.60
2-4	1721.66*	Q 5	1410.00	512.34	516.78		517.37	0.021106	6.16	237.80	91.05	0.62
2-4	1721.66*	Q 10	1790.00	512.34	517.25		517.94	0.021019	6.75	280.52	93.67	0.63
2-4	1721.66*	Q 25	2350.00	512.34	517.86		518.71	0.020952	7.49	338.37	96.38	0.65
2-4	1721.66*	Q 50	2810.00	512.34	518.30		519.28	0.021008	8.03	382.70	100.52	0.66
2-4	1721.66*	Q 100	3310.00	512.34	518.76		519.85	0.021035	8.55	428.38	101.54	0.67
2-4	1673.88*	Q 2	961.00	511.31	515.14		515.57	0.021293	5.28	188.69	90.40	0.58
2-4	1673.88*	Q 5	1410.00	511.31	515.78		516.35	0.021220	6.11	247.67	93.51	0.60
2-4	1673.88*	Q 10	1790.00	511.31	516.25		516.93	0.021269	6.70	292.40	97.10	0.62
2-4	1673.88*	Q 25	2350.00	511.31	516.86		517.69	0.021389	7.44	354.28	103.85	0.63
2-4	1673.88*	Q 50	2810.00	511.31	517.31		518.25	0.021443	7.97	401.44	104.85	0.64
2-4	1673.88*	Q 100	3310.00	511.31	517.77		518.82	0.021576	8.49	449.09	106.39	0.66
2-4	1626.11*	Q 2	961.00	510.29	514.13		514.55	0.021404	5.24	197.98	92.58	0.56
2-4	1626.11*	Q 5	1410.00	510.29	514.78		515.33	0.021562	6.07	259.28	99.37	0.59
2-4	1626.11*	Q 10	1790.00	510.29	515.24		515.90	0.021764	6.66	307.89	106.34	0.60
2-4	1626.11*	Q 25	2350.00	510.29	515.85		516.64	0.021912	7.38	373.41	108.63	0.62
2-4	1626.11*	Q 50	2810.00	510.29	516.30		517.20	0.022093	7.91	422.81	111.56	0.63
2-4	1626.11*	Q 100	3310.00	510.29	516.75		517.76	0.022353	8.43	473.03	114.06	0.65
2-4	1578.33*	Q 2	961.00	509.26	513.11	512.27	513.51	0.021702	5.19	208.83	97.68	0.55

HEC-RAS Plan: Flood River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1578.33*	Q 5	1410.00	509.26	513.75	512.84	514.28	0.022010	6.01	275.92	109.24	0.58
2-4	1578.33*	Q 10	1790.00	509.26	514.22	513.26	514.84	0.022243	6.58	327.10	111.86	0.59
2-4	1578.33*	Q 25	2350.00	509.26	514.82	513.80	515.57	0.022537	7.30	396.29	116.55	0.61
2-4	1578.33*	Q 50	2810.00	509.26	515.27	514.18	516.11	0.022820	7.83	448.79	120.50	0.62
2-4	1578.33*	Q 100	3310.00	509.26	515.71	514.58	516.66	0.023020	8.33	502.50	121.66	0.63
2-4	1530.55*	Q 2	961.00	508.23	512.09	511.30	512.47	0.021762	5.11	225.65	109.18	0.54
2-4	1530.55*	Q 5	1410.00	508.23	512.73	511.79	513.21	0.021988	5.88	298.69	117.72	0.56
2-4	1530.55*	Q 10	1790.00	508.23	513.19	512.20	513.76	0.022258	6.43	353.49	120.61	0.57
2-4	1530.55*	Q 25	2350.00	508.23	513.79	512.70	514.47	0.022656	7.13	427.15	125.17	0.59
2-4	1530.55*	Q 50	2810.00	508.23	514.23	513.08	515.00	0.022928	7.63	482.59	127.29	0.60
2-4	1530.55*	Q 100	3310.00	508.23	514.68	513.43	515.53	0.023055	8.10	539.32	127.29	0.61
2-4	1482.77*	Q 2	961.00	507.20	511.24	510.21	511.52	0.017149	4.59	270.44	122.53	0.46
2-4	1482.77*	Q 5	1410.00	507.20	511.84	510.70	512.22	0.018624	5.40	345.87	128.03	0.50
2-4	1482.77*	Q 10	1790.00	507.20	512.28	511.09	512.73	0.019531	5.96	402.05	129.62	0.52
2-4	1482.77*	Q 25	2350.00	507.20	512.84	511.55	513.40	0.020612	6.68	476.32	131.74	0.55
2-4	1482.77*	Q 50	2810.00	507.20	513.27	511.93	513.90	0.021178	7.18	532.45	131.74	0.56
2-4	1482.77*	Q 100	3310.00	507.20	513.71	512.27	514.42	0.021596	7.66	589.97	131.74	0.58
2-4	1435	Q 2	961.00	506.17	509.69		510.25	0.044179	6.29	192.02	127.21	0.70
2-4	1435	Q 5	1410.00	506.17	510.29		510.93	0.040269	6.93	270.97	132.34	0.69
2-4	1435	Q 10	1790.00	506.17	510.76		511.44	0.037395	7.32	332.57	134.02	0.68
2-4	1435	Q 25	2350.00	506.17	511.38		512.13	0.034391	7.80	416.35	135.91	0.67
2-4	1435	Q 50	2810.00	506.17	511.85		512.65	0.032304	8.12	481.29	136.20	0.66
2-4	1435	Q 100	3310.00	506.17	512.34		513.19	0.030561	8.43	547.82	136.20	0.65
2-4	1408.*	Q 2	961.00	504.97	508.84	508.31	509.26	0.028331	5.81	211.24	104.49	0.63
2-4	1408.*	Q 5	1410.00	504.97	509.55	508.76	510.05	0.024789	6.38	290.10	114.62	0.62
2-4	1408.*	Q 10	1790.00	504.97	510.07	509.15	510.62	0.023093	6.78	350.32	118.47	0.61
2-4	1408.*	Q 25	2350.00	504.97	510.74	509.63	511.36	0.021537	7.29	430.11	119.44	0.60
2-4	1408.*	Q 50	2810.00	504.97	511.25	509.96	511.93	0.020627	7.66	490.79	120.00	0.60
2-4	1408.*	Q 100	3310.00	504.97	511.76	510.35	512.50	0.019933	8.03	551.98	120.00	0.60
2-4	1381	Q 2	961.00	503.76	508.40	507.47	508.71	0.014010	4.96	223.94	88.48	0.50
2-4	1381	Q 5	1410.00	503.76	509.13	507.93	509.54	0.013651	5.66	291.84	96.79	0.51
2-4	1381	Q 10	1790.00	503.76	509.64	508.29	510.12	0.013975	6.23	342.94	101.31	0.53
2-4	1381	Q 25	2350.00	503.76	510.32	508.76	510.89	0.013774	6.82	412.08	102.72	0.54
2-4	1381	Q 50	2810.00	503.76	510.83	509.18	511.47	0.013646	7.24	464.83	103.80	0.55
2-4	1381	Q 100	3310.00	503.76	511.34	509.65	512.05	0.013480	7.64	518.09	103.80	0.55
2-4	1335.28*	Q 2	961.00	502.99	507.59		508.00	0.016863	5.58	211.08	88.11	0.56
2-4	1335.28*	Q 5	1410.00	502.99	508.30		508.83	0.017084	6.44	276.79	99.05	0.58
2-4	1335.28*	Q 10	1790.00	502.99	508.79		509.40	0.017211	7.00	326.00	100.49	0.60
2-4	1335.28*	Q 25	2350.00	502.99	509.44		510.17	0.017218	7.70	392.22	101.81	0.61
2-4	1335.28*	Q 50	2810.00	502.99	509.93		510.75	0.017198	8.20	442.65	102.77	0.62
2-4	1335.28*	Q 100	3310.00	502.99	510.44		511.34	0.017063	8.66	494.29	102.77	0.63
2-4	1289.57*	Q 2	961.00	502.23	506.73		507.20	0.017938	5.76	196.94	87.60	0.58
2-4	1289.57*	Q 5	1410.00	502.23	507.42		508.02	0.018055	6.62	261.93	99.39	0.60
2-4	1289.57*	Q 10	1790.00	502.23	507.92		508.59	0.017967	7.16	310.82	99.64	0.61
2-4	1289.57*	Q 25	2350.00	502.23	508.57		509.36	0.017805	7.84	376.60	100.92	0.62
2-4	1289.57*	Q 50	2810.00	502.23	509.07		509.95	0.017589	8.31	427.29	101.74	0.63
2-4	1289.57*	Q 100	3310.00	502.23	509.59		510.55	0.017198	8.73	480.25	101.74	0.63
2-4	1243.85*	Q 2	961.00	501.46	505.83		506.34	0.019235	5.90	182.48	86.75	0.60
2-4	1243.85*	Q 5	1410.00	501.46	506.52		507.17	0.018929	6.71	248.10	98.71	0.61
2-4	1243.85*	Q 10	1790.00	501.46	507.03		507.75	0.018517	7.23	298.08	98.89	0.62
2-4	1243.85*	Q 25	2350.00	501.46	507.72		508.55	0.017748	7.83	366.91	100.07	0.62
2-4	1243.85*	Q 50	2810.00	501.46	508.26		509.15	0.017058	8.22	420.91	100.71	0.62
2-4	1243.85*	Q 100	3310.00	501.46	508.82		509.78	0.016267	8.57	477.78	100.71	0.61
2-4	1198.14*	Q 2	961.00	500.69	504.91		505.45	0.019917	5.89	171.14	84.43	0.60
2-4	1198.14*	Q 5	1410.00	500.69	505.66		506.31	0.018679	6.62	241.11	98.03	0.61
2-4	1198.14*	Q 10	1790.00	500.69	506.21		506.93	0.017592	7.05	295.50	98.24	0.60
2-4	1198.14*	Q 25	2350.00	500.69	506.97		507.76	0.016160	7.54	370.55	99.66	0.59
2-4	1198.14*	Q 50	2810.00	500.69	507.56		508.41	0.015102	7.85	429.47	99.69	0.58
2-4	1198.14*	Q 100	3310.00	500.69	508.18		509.07	0.014157	8.14	490.67	99.69	0.57
2-4	1152.42*	Q 2	961.00	499.92	504.10		504.58	0.017518	5.54	174.87	72.41	0.56
2-4	1152.42*	Q 5	1410.00	499.92	504.93		505.50	0.015662	6.16	251.29	97.23	0.55
2-4	1152.42*	Q 10	1790.00	499.92	505.56		506.18	0.014250	6.50	312.29	97.64	0.54
2-4	1152.42*	Q 25	2350.00	499.92	506.40		507.08	0.012773	6.91	394.87	98.66	0.53
2-4	1152.42*	Q 50	2810.00	499.92	507.04		507.76	0.011896	7.19	457.92	98.66	0.52
2-4	1152.42*	Q 100	3310.00	499.92	507.69		508.46	0.011190	7.48	522.36	98.66	0.51
2-4	1106.71*	Q 2	961.00	499.16	503.54		503.89	0.011589	4.76	205.52	76.64	0.46
2-4	1106.71*	Q 5	1410.00	499.16	504.46		504.88	0.010438	5.31	289.06	96.60	0.46

HEC-RAS Plan: Flood River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1106.71*	Q 10	1790.00	499.16	505.13		505.60	0.009671	5.65	354.48	97.43	0.45
2-4	1106.71*	Q 25	2350.00	499.16	506.02		506.55	0.008950	6.07	441.00	97.63	0.45
2-4	1106.71*	Q 50	2810.00	499.16	506.68		507.26	0.008557	6.38	505.77	97.63	0.44
2-4	1106.71*	Q 100	3310.00	499.16	507.35		507.98	0.008248	6.70	571.42	97.63	0.44
2-4	1061	Q 2	961.00	498.39	503.25		503.48	0.006166	3.82	261.77	89.11	0.34
2-4	1061	Q 5	1410.00	498.39	504.20		504.48	0.006065	4.38	350.70	96.43	0.35
2-4	1061	Q 10	1790.00	498.39	504.88		505.22	0.005971	4.76	417.17	96.60	0.36
2-4	1061	Q 25	2350.00	498.39	505.78		506.18	0.005909	5.24	503.87	96.60	0.37
2-4	1061	Q 50	2810.00	498.39	506.45		506.90	0.005880	5.58	568.56	96.60	0.37
2-4	1061	Q 100	3310.00	498.39	507.13		507.63	0.005859	5.93	634.01	96.60	0.38
2-4	1018.*	Q 2	961.00	498.19	502.92		503.19	0.007327	4.16	232.29	67.03	0.38
2-4	1018.*	Q 5	1410.00	498.19	503.82		504.18	0.007703	4.88	299.94	84.57	0.40
2-4	1018.*	Q 10	1790.00	498.19	504.48		504.92	0.007740	5.35	356.72	85.50	0.41
2-4	1018.*	Q 25	2350.00	498.19	505.35		505.87	0.007774	5.93	430.93	85.50	0.42
2-4	1018.*	Q 50	2810.00	498.19	506.00		506.59	0.007792	6.34	486.33	85.50	0.43
2-4	1018.*	Q 100	3310.00	498.19	506.65		507.32	0.007813	6.75	542.31	85.50	0.43
2-4	975.*	Q 2	961.00	497.98	502.48		502.82	0.009709	4.64	208.28	60.82	0.43
2-4	975.*	Q 5	1410.00	497.98	503.32		503.79	0.010473	5.50	260.16	62.91	0.46
2-4	975.*	Q 10	1790.00	497.98	503.94		504.51	0.010929	6.10	301.69	73.44	0.48
2-4	975.*	Q 25	2350.00	497.98	504.75		505.46	0.011198	6.82	362.00	74.40	0.50
2-4	975.*	Q 50	2810.00	497.98	505.36		506.17	0.011317	7.33	407.31	74.40	0.51
2-4	975.*	Q 100	3310.00	497.98	505.97		506.89	0.011433	7.82	452.97	74.40	0.52
2-4	932	Q 2	961.00	497.78	501.60		502.18	0.022611	6.12	158.21	58.04	0.64
2-4	932	Q 5	1410.00	497.78	502.31		503.11	0.023505	7.17	200.07	60.11	0.67
2-4	932	Q 10	1790.00	497.78	502.84		503.80	0.024121	7.91	231.85	61.19	0.69
2-4	932	Q 25	2350.00	497.78	503.52		504.72	0.024915	8.84	274.33	62.31	0.71
2-4	932	Q 50	2810.00	497.78	504.03		505.41	0.025549	9.52	306.05	63.00	0.73
2-4	932	Q 100	3310.00	497.78	504.53		506.11	0.026269	10.19	337.86	63.30	0.75
2-4	882.*	Q 2	961.00	496.50	500.51		501.05	0.022107	5.89	164.19	62.81	0.63
2-4	882.*	Q 5	1410.00	496.50	501.19		501.93	0.022902	6.90	207.22	64.20	0.66
2-4	882.*	Q 10	1790.00	496.50	501.70		502.59	0.023445	7.61	239.90	65.55	0.68
2-4	882.*	Q 25	2350.00	496.50	502.36		503.47	0.024162	8.51	283.57	66.90	0.70
2-4	882.*	Q 50	2810.00	496.50	502.84		504.13	0.024714	9.16	316.22	67.25	0.72
2-4	882.*	Q 100	3310.00	496.50	503.32		504.79	0.025248	9.83	348.60	68.16	0.74
2-4	832.*	Q 2	961.00	495.22	499.44		499.94	0.021737	5.69	170.02	67.63	0.62
2-4	832.*	Q 5	1410.00	495.22	500.10		500.78	0.022435	6.66	214.34	68.36	0.65
2-4	832.*	Q 10	1790.00	495.22	500.58		501.41	0.022936	7.34	247.83	69.93	0.67
2-4	832.*	Q 25	2350.00	495.22	501.21		502.25	0.023584	8.21	292.63	71.30	0.69
2-4	832.*	Q 50	2810.00	495.22	501.68		502.88	0.024084	8.85	326.10	71.90	0.71
2-4	832.*	Q 100	3310.00	495.22	502.14		503.52	0.024568	9.49	359.41	72.86	0.73
2-4	782.*	Q 2	961.00	493.94	498.39		498.86	0.021412	5.50	175.74	72.50	0.61
2-4	782.*	Q 5	1410.00	493.94	499.01		499.66	0.022030	6.43	221.42	72.89	0.64
2-4	782.*	Q 10	1790.00	493.94	499.48		500.26	0.022498	7.10	255.68	74.26	0.66
2-4	782.*	Q 25	2350.00	493.94	500.09		501.07	0.023080	7.94	301.66	75.64	0.68
2-4	782.*	Q 50	2810.00	493.94	500.54		501.67	0.023535	8.56	335.85	76.62	0.70
2-4	782.*	Q 100	3310.00	493.94	500.99		502.28	0.023968	9.18	370.16	77.38	0.72
2-4	732.*	Q 2	961.00	492.66	497.34		497.78	0.021184	5.33	181.13	77.36	0.60
2-4	732.*	Q 5	1410.00	492.66	497.95		498.55	0.021731	6.24	228.16	77.70	0.63
2-4	732.*	Q 10	1790.00	492.66	498.40		499.13	0.022158	6.88	263.22	78.50	0.65
2-4	732.*	Q 25	2350.00	492.66	498.99		499.90	0.022706	7.70	310.24	80.05	0.67
2-4	732.*	Q 50	2810.00	492.66	499.42		500.48	0.023112	8.31	345.13	81.33	0.69
2-4	732.*	Q 100	3310.00	492.66	499.85		501.07	0.023488	8.90	380.51	82.01	0.71
2-4	682.*	Q 2	961.00	491.38	496.30		496.72	0.020959	5.18	186.46	82.24	0.60
2-4	682.*	Q 5	1410.00	491.38	496.89		497.46	0.021452	6.06	234.80	82.54	0.62
2-4	682.*	Q 10	1790.00	491.38	497.32		498.02	0.021834	6.68	270.77	82.84	0.64
2-4	682.*	Q 25	2350.00	491.38	497.90		498.76	0.022361	7.48	318.67	84.57	0.67
2-4	682.*	Q 50	2810.00	491.38	498.32		499.32	0.022718	8.07	354.39	85.79	0.68
2-4	682.*	Q 100	3310.00	491.38	498.74		499.89	0.023068	8.65	390.74	86.77	0.70
2-4	632.*	Q 2	961.00	490.10	495.27		495.67	0.020838	5.05	191.40	87.14	0.59
2-4	632.*	Q 5	1410.00	490.10	495.84		496.38	0.021234	5.90	241.14	87.40	0.62
2-4	632.*	Q 10	1790.00	490.10	496.26		496.92	0.021578	6.50	278.04	87.50	0.64
2-4	632.*	Q 25	2350.00	490.10	496.82		497.64	0.022073	7.29	326.72	89.20	0.66
2-4	632.*	Q 50	2810.00	490.10	497.22		498.18	0.022393	7.86	363.36	90.38	0.68
2-4	632.*	Q 100	3310.00	490.10	497.63		498.73	0.022722	8.42	400.60	91.53	0.69
2-4	582.*	Q 2	961.00	488.82	494.21		494.60	0.021941	5.01	192.79	92.00	0.60
2-4	582.*	Q 5	1410.00	488.82	494.80		495.31	0.021076	5.75	247.16	92.26	0.61
2-4	582.*	Q 10	1790.00	488.82	495.21		495.83	0.021393	6.34	284.96	92.34	0.63

HEC-RAS Plan: Flood River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	582.*	Q 25	2350.00	488.82	495.75		496.53	0.021825	7.11	334.57	93.68	0.65
2-4	582.*	Q 50	2810.00	488.82	496.14		497.05	0.022120	7.66	372.07	94.99	0.67
2-4	582.*	Q 100	3310.00	488.82	496.54		497.58	0.022428	8.21	410.16	96.19	0.68
2-4	532.*	Q 2	961.00	487.54	493.12		493.51	0.021593	5.05	191.28	88.71	0.60
2-4	532.*	Q 5	1410.00	487.54	493.75		494.24	0.021442	5.66	251.17	97.13	0.61
2-4	532.*	Q 10	1790.00	487.54	494.16		494.76	0.021271	6.20	291.37	97.31	0.63
2-4	532.*	Q 25	2350.00	487.54	494.68		495.43	0.021613	6.94	342.27	98.24	0.65
2-4	532.*	Q 50	2810.00	487.54	495.07		495.94	0.021883	7.48	380.62	99.64	0.66
2-4	532.*	Q 100	3310.00	487.54	495.46		496.45	0.022160	8.01	419.59	100.75	0.68
2-4	482.*	Q 2	961.00	486.25	492.03		492.42	0.021848	5.02	192.22	90.48	0.60
2-4	482.*	Q 5	1410.00	486.25	492.64		493.15	0.022462	5.70	249.06	98.28	0.63
2-4	482.*	Q 10	1790.00	486.25	493.09		493.67	0.021783	6.12	294.89	102.32	0.63
2-4	482.*	Q 25	2350.00	486.25	493.63		494.34	0.021462	6.79	349.56	102.90	0.64
2-4	482.*	Q 50	2810.00	486.25	494.01		494.83	0.021668	7.31	388.93	104.27	0.66
2-4	482.*	Q 100	3310.00	486.25	494.39		495.34	0.021898	7.83	428.89	105.41	0.67
2-4	432.*	Q 2	961.00	484.97	490.95		491.33	0.021740	4.98	193.77	91.81	0.60
2-4	432.*	Q 5	1410.00	484.97	491.54		492.04	0.021755	5.69	249.48	96.16	0.62
2-4	432.*	Q 10	1790.00	484.97	491.98		492.56	0.022530	6.17	292.39	102.71	0.64
2-4	432.*	Q 25	2350.00	484.97	492.56		493.25	0.021757	6.69	354.68	107.86	0.64
2-4	432.*	Q 50	2810.00	484.97	492.95		493.74	0.021502	7.16	397.03	108.85	0.65
2-4	432.*	Q 100	3310.00	484.97	493.33		494.23	0.021599	7.65	438.51	110.10	0.66
2-4	382.*	Q 2	961.00	483.69	489.87		490.25	0.021649	4.93	195.47	93.45	0.60
2-4	382.*	Q 5	1410.00	483.69	490.45		490.94	0.021875	5.64	251.62	98.89	0.62
2-4	382.*	Q 10	1790.00	483.69	490.87		491.45	0.021892	6.15	293.13	101.14	0.63
2-4	382.*	Q 25	2350.00	483.69	491.44		492.14	0.022757	6.73	352.75	110.04	0.66
2-4	382.*	Q 50	2810.00	483.69	491.89		492.66	0.021611	7.04	403.46	113.44	0.65
2-4	382.*	Q 100	3310.00	483.69	492.29		493.15	0.021086	7.46	449.47	114.84	0.66
2-4	332.*	Q 2	961.00	482.41	488.81		489.17	0.021430	4.85	198.77	96.71	0.59
2-4	332.*	Q 5	1410.00	482.41	489.36		489.85	0.021993	5.60	253.00	100.82	0.62
2-4	332.*	Q 10	1790.00	482.41	489.79		490.36	0.021691	6.07	297.00	103.99	0.63
2-4	332.*	Q 25	2350.00	482.41	490.34		491.03	0.021374	6.67	355.83	107.13	0.64
2-4	332.*	Q 50	2810.00	482.41	490.84		491.58	0.020976	6.91	410.98	115.93	0.64
2-4	332.*	Q 100	3310.00	482.41	491.33		492.12	0.019488	7.16	468.32	119.70	0.63
2-4	282.*	Q 2	961.00	481.13	487.74		488.10	0.021380	4.78	201.58	100.03	0.59
2-4	282.*	Q 5	1410.00	481.13	488.28		488.76	0.021331	5.53	256.40	101.96	0.61
2-4	282.*	Q 10	1790.00	481.13	488.75		489.29	0.020498	5.90	305.59	107.18	0.61
2-4	282.*	Q 25	2350.00	481.13	489.40		490.02	0.018439	6.30	376.42	110.42	0.60
2-4	282.*	Q 50	2810.00	481.13	489.98		490.62	0.016721	6.45	440.69	116.26	0.58
2-4	282.*	Q 100	3310.00	481.13	490.54		491.21	0.015567	6.58	509.93	124.96	0.57
2-4	232.*	Q 2	961.00	479.85	486.69		487.03	0.020927	4.69	205.46	103.57	0.58
2-4	232.*	Q 5	1410.00	479.85	487.36		487.77	0.017460	5.13	276.29	105.90	0.56
2-4	232.*	Q 10	1790.00	479.85	487.94		488.38	0.015315	5.33	338.89	111.55	0.53
2-4	232.*	Q 25	2350.00	479.85	488.76		489.22	0.012450	5.51	431.28	115.46	0.50
2-4	232.*	Q 50	2810.00	479.85	489.41		489.89	0.011216	5.60	508.57	123.63	0.48
2-4	232.*	Q 100	3310.00	479.85	490.04		490.54	0.010211	5.71	589.35	130.80	0.47
2-4	182.*	Q 2	961.00	478.57	485.96		486.20	0.012576	3.96	243.76	108.26	0.46
2-4	182.*	Q 5	1410.00	478.57	486.83		487.10	0.009615	4.19	339.19	112.85	0.42
2-4	182.*	Q 10	1790.00	478.57	487.49		487.79	0.008297	4.34	416.49	117.65	0.40
2-4	182.*	Q 25	2350.00	478.57	488.41		488.72	0.006974	4.53	525.75	122.59	0.38
2-4	182.*	Q 50	2810.00	478.57	489.09		489.42	0.006743	4.66	613.12	134.97	0.38
2-4	182.*	Q 100	3310.00	478.57	489.76		490.11	0.005985	4.79	704.51	136.19	0.37
2-4	132.*	Q 2	961.00	477.29	485.68		485.80	0.004707	2.89	335.45	114.31	0.29
2-4	132.*	Q 5	1410.00	477.29	486.59		486.75	0.004342	3.21	444.17	121.59	0.29
2-4	132.*	Q 10	1790.00	477.29	487.29		487.47	0.004039	3.42	529.89	124.57	0.29
2-4	132.*	Q 25	2350.00	477.29	488.23		488.43	0.003925	3.67	650.30	135.98	0.29
2-4	132.*	Q 50	2810.00	477.29	488.92		489.14	0.003731	3.83	747.03	141.08	0.29
2-4	132.*	Q 100	3310.00	477.29	489.61		489.85	0.003460	4.00	844.78	141.14	0.29
2-4	82	Q 2	961.00	476.01	485.58		485.65	0.001890	2.12	457.87	125.02	0.19
2-4	82	Q 5	1410.00	476.01	486.50		486.59	0.002001	2.49	574.86	128.94	0.21
2-4	82	Q 10	1790.00	476.01	487.20		487.31	0.002069	2.73	666.58	134.25	0.21
2-4	82	Q 25	2350.00	476.01	488.13		488.27	0.002191	3.00	798.84	145.96	0.22
2-4	82	Q 50	2810.00	476.01	488.83		488.98	0.002114	3.18	900.58	146.00	0.22
2-4	82	Q 100	3310.00	476.01	489.53		489.70	0.002060	3.37	1002.74	146.00	0.23
2-4	50	Q 2	961.00	481.55	484.31	484.31	485.37	0.060805	8.28	116.99	56.66	1.01
2-4	50	Q 5	1410.00	481.55	484.93	484.93	486.29	0.054971	9.35	152.53	57.49	1.00
2-4	50	Q 10	1790.00	481.55	485.41	485.41	486.98	0.051273	10.07	181.16	60.82	0.99
2-4	50	Q 25	2350.00	481.55	486.06	486.06	487.91	0.047641	10.97	220.43	61.95	0.98

HEC-RAS Plan: Flood River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	50	Q 50	2810.00	481.55	486.53	486.53	488.61	0.046128	11.65	249.94	64.36	0.99
2-4	50	Q 100	3310.00	481.55	487.05	487.05	489.32	0.043423	12.19	283.99	65.90	0.98

HEC-RAS Plan: Calib-Low n River: Grant Creek Reach: 2-4

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	2110	17 cfs	17.00	521.86	523.05	522.89	523.13	0.026340	2.21	7.69	18.53	0.61
2-4	2110	58 cfs	58.00	521.86	523.49	523.33	523.65	0.029926	3.27	17.75	26.95	0.71
2-4	2110	132 cfs	132.00	521.86	523.91	523.72	524.23	0.029951	4.54	29.17	27.26	0.77
2-4	2110	182 cfs	182.00	521.86	524.11	523.95	524.54	0.032008	5.27	34.90	29.29	0.82
2-4	2110	706 cfs	706.00	521.86	525.60	525.60	526.88	0.035322	9.23	81.42	33.65	0.98
2-4	2061.*	17 cfs	17.00	520.57	521.79		521.86	0.025299	2.17	7.85	20.15	0.61
2-4	2061.*	58 cfs	58.00	520.57	522.21		522.33	0.024069	2.79	20.81	35.98	0.65
2-4	2061.*	132 cfs	132.00	520.57	522.56		522.80	0.027156	3.93	33.57	37.79	0.74
2-4	2061.*	182 cfs	182.00	520.57	522.74		523.06	0.027644	4.48	40.64	38.23	0.76
2-4	2061.*	706 cfs	706.00	520.57	523.79	523.89	524.97	0.042443	8.74	82.32	42.61	1.06
2-4	2012.*	17 cfs	17.00	519.28	520.47		520.55	0.028634	2.28	7.45	20.10	0.66
2-4	2012.*	58 cfs	58.00	519.28	520.90		521.02	0.029957	2.84	20.45	41.43	0.71
2-4	2012.*	132 cfs	132.00	519.28	521.24	521.09	521.45	0.027644	3.69	35.79	45.87	0.74
2-4	2012.*	182 cfs	182.00	519.28	521.41		521.68	0.028338	4.18	43.52	46.98	0.77
2-4	2012.*	706 cfs	706.00	519.28	522.52	522.38	523.32	0.030727	7.20	98.34	51.90	0.90
2-4	1963.*	17 cfs	17.00	518.00	519.15		519.23	0.025279	2.20	7.72	20.51	0.63
2-4	1963.*	58 cfs	58.00	518.00	519.58		519.70	0.024375	2.78	20.84	37.32	0.66
2-4	1963.*	132 cfs	132.00	518.00	519.99		520.17	0.024824	3.36	39.32	53.98	0.69
2-4	1963.*	182 cfs	182.00	518.00	520.16		520.38	0.024324	3.74	48.72	55.96	0.71
2-4	1963.*	706 cfs	706.00	518.00	521.20		521.85	0.027692	6.45	109.43	60.37	0.84
2-4	1914.*	17 cfs	17.00	516.71	517.63		517.76	0.036069	2.80	6.07	14.84	0.77
2-4	1914.*	58 cfs	58.00	516.71	518.16		518.31	0.033213	3.12	18.59	36.16	0.77
2-4	1914.*	132 cfs	132.00	516.71	518.53		518.77	0.032451	3.92	33.70	44.70	0.80
2-4	1914.*	182 cfs	182.00	516.71	518.74		519.01	0.031833	4.16	43.78	52.23	0.80
2-4	1914.*	706 cfs	706.00	516.71	519.82	519.64	520.42	0.030087	6.26	112.78	69.46	0.87
2-4	1865	17 cfs	17.00	515.43	516.32		516.39	0.021555	2.24	7.59	17.78	0.60
2-4	1865	58 cfs	58.00	515.43	516.86		516.98	0.022647	2.71	21.37	38.64	0.64
2-4	1865	132 cfs	132.00	515.43	517.24		517.43	0.022805	3.51	37.62	45.63	0.68
2-4	1865	182 cfs	182.00	515.43	517.45		517.68	0.023172	3.85	47.32	50.05	0.70
2-4	1865	706 cfs	706.00	515.43	518.63		519.10	0.022895	5.51	128.18	77.67	0.76
2-4	1817.22*	17 cfs	17.00	514.40	515.27		515.34	0.022561	2.24	7.57	18.28	0.61
2-4	1817.22*	58 cfs	58.00	514.40	515.77		515.88	0.023008	2.71	21.44	39.38	0.65
2-4	1817.22*	132 cfs	132.00	514.40	516.15		516.34	0.022917	3.50	37.74	45.95	0.68
2-4	1817.22*	182 cfs	182.00	514.40	516.36		516.59	0.022707	3.79	48.03	51.11	0.69
2-4	1817.22*	706 cfs	706.00	514.40	517.54		518.02	0.022506	5.56	127.01	75.27	0.75
2-4	1769.44*	17 cfs	17.00	513.37	514.24		514.31	0.020876	2.15	7.90	19.16	0.59
2-4	1769.44*	58 cfs	58.00	513.37	514.68		514.79	0.022632	2.71	21.44	38.68	0.64
2-4	1769.44*	132 cfs	132.00	513.37	515.08		515.26	0.022323	3.43	38.49	47.19	0.67
2-4	1769.44*	182 cfs	182.00	513.37	515.28		515.50	0.022470	3.74	48.71	52.71	0.68
2-4	1769.44*	706 cfs	706.00	513.37	516.46		516.94	0.022388	5.60	126.18	74.15	0.76
2-4	1721.66*	17 cfs	17.00	512.34	513.20		513.26	0.022563	2.02	8.41	23.71	0.60
2-4	1721.66*	58 cfs	58.00	512.34	513.59		513.71	0.022837	2.71	21.42	38.63	0.64
2-4	1721.66*	132 cfs	132.00	512.34	513.98		514.17	0.023506	3.48	37.96	47.43	0.68
2-4	1721.66*	182 cfs	182.00	512.34	514.20		514.42	0.022567	3.73	48.84	53.47	0.69
2-4	1721.66*	706 cfs	706.00	512.34	515.38		515.88	0.022245	5.67	124.45	71.54	0.76
2-4	1673.88*	17 cfs	17.00	511.31	512.16		512.22	0.021293	1.83	9.31	29.21	0.57
2-4	1673.88*	58 cfs	58.00	511.31	512.53		512.64	0.022113	2.65	21.92	39.73	0.63
2-4	1673.88*	132 cfs	132.00	511.31	512.90		513.09	0.021770	3.48	37.90	44.76	0.67
2-4	1673.88*	182 cfs	182.00	511.31	513.12		513.34	0.022468	3.75	48.54	52.65	0.69
2-4	1673.88*	706 cfs	706.00	511.31	514.32		514.83	0.021585	5.71	123.62	69.34	0.75
2-4	1626.11*	17 cfs	17.00	510.29	511.07		511.13	0.024461	1.92	8.83	28.25	0.61
2-4	1626.11*	58 cfs	58.00	510.29	511.44		511.56	0.023306	2.69	21.60	39.83	0.64
2-4	1626.11*	132 cfs	132.00	510.29	511.84		512.03	0.022734	3.46	38.17	47.35	0.68
2-4	1626.11*	182 cfs	182.00	510.29	512.03		512.26	0.022535	3.83	47.46	50.06	0.69
2-4	1626.11*	706 cfs	706.00	510.29	513.25		513.78	0.022107	5.85	121.32	71.98	0.76
2-4	1578.33*	17 cfs	17.00	509.26	510.02	509.88	510.07	0.020364	1.82	9.35	28.13	0.56
2-4	1578.33*	58 cfs	58.00	509.26	510.39	510.21	510.50	0.020746	2.67	21.73	37.20	0.62
2-4	1578.33*	132 cfs	132.00	509.26	510.80	510.54	510.98	0.021194	3.42	38.59	46.32	0.66
2-4	1578.33*	182 cfs	182.00	509.26	510.98	510.74	511.21	0.021353	3.83	47.46	48.20	0.68
2-4	1578.33*	706 cfs	706.00	509.26	512.31	511.89	512.81	0.018512	5.63	126.16	90.91	0.71
2-4	1530.55*	17 cfs	17.00	508.23	508.92	508.82	508.98	0.025396	2.03	8.37	25.26	0.62
2-4	1530.55*	58 cfs	58.00	508.23	509.31	509.15	509.44	0.023553	2.87	20.23	34.33	0.66
2-4	1530.55*	132 cfs	132.00	508.23	509.72	509.53	509.92	0.023264	3.61	36.59	43.60	0.69
2-4	1530.55*	182 cfs	182.00	508.23	509.93	509.69	510.17	0.022177	3.95	46.04	46.64	0.70
2-4	1530.55*	706 cfs	706.00	508.23	511.04	510.88	511.70	0.028685	6.56	108.56	91.46	0.87

HEC-RAS Plan: Calib-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1482.77*	17 cfs	17.00	507.20	507.90	507.75	507.96	0.018546	1.92	8.87	23.13	0.55
2-4	1482.77*	58 cfs	58.00	507.20	508.38	508.11	508.47	0.017266	2.50	23.23	39.04	0.57
2-4	1482.77*	132 cfs	132.00	507.20	508.76	508.49	508.94	0.018195	3.38	39.04	45.19	0.62
2-4	1482.77*	182 cfs	182.00	507.20	509.01	508.67	509.22	0.017821	3.61	50.55	59.97	0.63
2-4	1482.77*	706 cfs	706.00	507.20	510.30	509.89	510.68	0.014331	5.19	159.53	102.53	0.63
2-4	1435	17 cfs	17.00	506.17	506.87		506.94	0.024362	2.19	7.77	20.81	0.62
2-4	1435	58 cfs	58.00	506.17	507.27		507.41	0.029206	3.01	19.27	38.96	0.72
2-4	1435	132 cfs	132.00	506.17	507.66		507.89	0.026873	3.88	34.19	55.16	0.74
2-4	1435	182 cfs	182.00	506.17	507.86		508.14	0.028470	4.27	42.99	69.54	0.78
2-4	1435	706 cfs	706.00	506.17	508.97	508.97	509.67	0.030788	6.87	115.03	107.79	0.90
2-4	1408.*	17 cfs	17.00	504.97	506.03	505.96	506.13	0.038387	2.45	6.93	21.83	0.76
2-4	1408.*	58 cfs	58.00	504.97	506.46	506.34	506.61	0.030209	3.17	18.32	38.64	0.74
2-4	1408.*	132 cfs	132.00	504.97	506.90	506.70	507.13	0.028922	3.88	34.10	58.91	0.76
2-4	1408.*	182 cfs	182.00	504.97	507.08	506.94	507.37	0.028278	4.34	42.35	62.78	0.78
2-4	1408.*	706 cfs	706.00	504.97	508.07	507.97	508.64	0.027368	6.58	132.70	100.85	0.85
2-4	1381	17 cfs	17.00	503.76	505.30	505.07	505.36	0.021500	2.11	8.07	24.52	0.56
2-4	1381	58 cfs	58.00	503.76	505.82	505.56	505.94	0.020277	2.73	21.31	43.69	0.59
2-4	1381	132 cfs	132.00	503.76	506.26	506.00	506.45	0.021213	3.51	37.91	55.89	0.64
2-4	1381	182 cfs	182.00	503.76	506.44	506.19	506.69	0.022135	4.02	46.55	63.50	0.68
2-4	1381	706 cfs	706.00	503.76	507.66	507.20	508.04	0.015313	5.50	160.05	86.54	0.64
2-4	1335.28*	17 cfs	17.00	502.99	504.43		504.49	0.017409	1.95	8.70	19.41	0.51
2-4	1335.28*	58 cfs	58.00	502.99	504.92		505.03	0.019664	2.69	21.81	35.50	0.59
2-4	1335.28*	132 cfs	132.00	502.99	505.34		505.51	0.019235	3.35	41.32	51.94	0.62
2-4	1335.28*	182 cfs	182.00	502.99	505.54		505.75	0.018925	3.73	51.73	53.74	0.63
2-4	1335.28*	706 cfs	706.00	502.99	506.84		507.31	0.016467	5.83	146.10	86.08	0.67
2-4	1289.57*	17 cfs	17.00	502.23	503.48		503.56	0.023672	2.16	7.85	19.51	0.60
2-4	1289.57*	58 cfs	58.00	502.23	503.98		504.10	0.020806	2.78	20.86	32.65	0.61
2-4	1289.57*	132 cfs	132.00	502.23	504.42		504.60	0.020608	3.44	38.42	43.84	0.65
2-4	1289.57*	182 cfs	182.00	502.23	504.62		504.85	0.020387	3.84	47.44	46.24	0.66
2-4	1289.57*	706 cfs	706.00	502.23	505.94	505.56	506.50	0.018740	6.15	128.52	83.87	0.72
2-4	1243.85*	17 cfs	17.00	501.46	502.64	502.43	502.70	0.015107	1.85	9.21	21.10	0.49
2-4	1243.85*	58 cfs	58.00	501.46	503.09		503.20	0.018694	2.71	21.42	32.64	0.59
2-4	1243.85*	132 cfs	132.00	501.46	503.53		503.70	0.018944	3.30	39.99	46.12	0.62
2-4	1243.85*	182 cfs	182.00	501.46	503.71		503.93	0.019874	3.78	48.20	47.06	0.66
2-4	1243.85*	706 cfs	706.00	501.46	504.99		505.59	0.020703	6.27	115.17	64.50	0.75
2-4	1198.14*	17 cfs	17.00	500.69	501.63		501.72	0.032032	2.38	7.13	19.73	0.70
2-4	1198.14*	58 cfs	58.00	500.69	502.13		502.26	0.022642	2.88	20.14	32.60	0.65
2-4	1198.14*	132 cfs	132.00	500.69	502.58		502.76	0.022089	3.41	38.69	48.03	0.67
2-4	1198.14*	182 cfs	182.00	500.69	502.78		503.00	0.021024	3.79	48.07	49.13	0.67
2-4	1198.14*	706 cfs	706.00	500.69	504.05		504.64	0.020948	6.17	114.44	53.99	0.75
2-4	1152.42*	17 cfs	17.00	499.92	500.88	500.64	500.92	0.010613	1.62	10.49	22.72	0.42
2-4	1152.42*	58 cfs	58.00	499.92	501.30	501.02	501.40	0.015604	2.52	22.97	34.40	0.54
2-4	1152.42*	132 cfs	132.00	499.92	501.77	501.44	501.91	0.015623	3.01	43.79	50.63	0.57
2-4	1152.42*	182 cfs	182.00	499.92	501.92	501.62	502.11	0.017762	3.54	51.47	51.53	0.62
2-4	1152.42*	706 cfs	706.00	499.92	503.13		503.69	0.020231	6.00	117.65	56.75	0.73
2-4	1106.71*	17 cfs	17.00	499.16	499.74	499.74	499.89	0.072788	3.08	5.52	19.51	1.02
2-4	1106.71*	58 cfs	58.00	499.16	500.22		500.39	0.033216	3.31	17.51	30.73	0.77
2-4	1106.71*	132 cfs	132.00	499.16	500.67		500.90	0.032752	3.81	34.68	49.25	0.80
2-4	1106.71*	182 cfs	182.00	499.16	500.90		501.14	0.025406	3.90	46.62	52.68	0.73
2-4	1106.71*	706 cfs	706.00	499.16	502.52		502.92	0.012644	5.08	138.93	60.03	0.59
2-4	1061	17 cfs	17.00	498.39	499.21	498.84	499.23	0.004676	1.13	15.06	30.39	0.28
2-4	1061	58 cfs	58.00	498.39	499.79		499.83	0.005650	1.60	36.20	50.21	0.33
2-4	1061	132 cfs	132.00	498.39	500.34		500.41	0.004568	1.98	66.52	57.03	0.32
2-4	1061	182 cfs	182.00	498.39	500.61		500.69	0.004510	2.23	81.79	58.39	0.33
2-4	1061	706 cfs	706.00	498.39	502.28		502.50	0.005394	3.80	186.58	69.78	0.39
2-4	1018.*	17 cfs	17.00	498.19	499.00		499.02	0.005334	1.19	14.25	29.59	0.30
2-4	1018.*	58 cfs	58.00	498.19	499.53		499.58	0.005868	1.80	32.15	38.68	0.35
2-4	1018.*	132 cfs	132.00	498.19	500.12		500.19	0.005537	2.11	62.61	57.32	0.36
2-4	1018.*	182 cfs	182.00	498.19	500.40		500.48	0.005112	2.32	78.54	58.66	0.35
2-4	1018.*	706 cfs	706.00	498.19	502.00		502.26	0.006015	4.03	175.15	61.10	0.42
2-4	975.*	17 cfs	17.00	497.98	498.76		498.78	0.005520	1.21	14.01	29.54	0.31
2-4	975.*	58 cfs	58.00	497.98	499.25		499.31	0.006682	1.95	29.71	35.33	0.38
2-4	975.*	132 cfs	132.00	497.98	499.83		499.92	0.007332	2.40	55.08	51.60	0.41
2-4	975.*	182 cfs	182.00	497.98	500.13		500.23	0.006418	2.54	71.70	55.52	0.39
2-4	975.*	706 cfs	706.00	497.98	501.65		501.96	0.007725	4.46	158.40	57.77	0.47

HEC-RAS Plan: Calib-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	932	17 cfs	17.00	497.78	498.30		498.36	0.022112	2.01	8.47	23.73	0.59
2-4	932	58 cfs	58.00	497.78	498.72		498.85	0.019666	2.86	20.25	29.83	0.61
2-4	932	132 cfs	132.00	497.78	499.17		499.41	0.020589	3.87	34.15	32.75	0.67
2-4	932	182 cfs	182.00	497.78	499.54		499.76	0.020766	3.81	47.83	47.56	0.67
2-4	932	706 cfs	706.00	497.78	500.80		501.41	0.021798	6.23	113.25	54.35	0.76
2-4	882.*	17 cfs	17.00	496.50	497.27		497.33	0.019599	1.96	8.67	23.03	0.56
2-4	882.*	58 cfs	58.00	496.50	497.68		497.82	0.021418	3.04	19.08	27.41	0.64
2-4	882.*	132 cfs	132.00	496.50	498.18		498.40	0.019393	3.79	34.85	33.05	0.65
2-4	882.*	182 cfs	182.00	496.50	498.55		498.76	0.019134	3.69	49.35	48.42	0.64
2-4	882.*	706 cfs	706.00	496.50	499.75		500.31	0.021392	6.00	117.65	59.35	0.75
2-4	832.*	17 cfs	17.00	495.22	496.19		496.26	0.023704	2.08	8.18	22.76	0.61
2-4	832.*	58 cfs	58.00	495.22	496.63		496.77	0.020738	3.04	19.08	26.78	0.63
2-4	832.*	132 cfs	132.00	495.22	497.13		497.37	0.021916	3.92	33.66	33.18	0.69
2-4	832.*	182 cfs	182.00	495.22	497.47		497.71	0.022840	3.93	46.26	46.95	0.70
2-4	832.*	706 cfs	706.00	495.22	498.71		499.24	0.021125	5.79	121.86	64.36	0.74
2-4	782.*	17 cfs	17.00	493.94	494.90		495.04	0.024779	3.05	5.58	8.71	0.67
2-4	782.*	58 cfs	58.00	493.94	495.54		495.69	0.022535	3.13	18.54	26.57	0.66
2-4	782.*	132 cfs	132.00	493.94	496.03		496.29	0.021422	4.05	32.59	29.91	0.68
2-4	782.*	182 cfs	182.00	493.94	496.28		496.60	0.021423	4.54	40.11	30.81	0.70
2-4	782.*	706 cfs	706.00	493.94	497.69		498.18	0.020825	5.60	126.08	69.37	0.73
2-4	732.*	17 cfs	17.00	492.66	493.61		493.77	0.026168	3.23	5.26	7.76	0.69
2-4	732.*	58 cfs	58.00	492.66	494.50		494.64	0.019414	2.98	19.48	26.72	0.61
2-4	732.*	132 cfs	132.00	492.66	494.96		495.21	0.021545	4.02	32.80	30.47	0.68
2-4	732.*	182 cfs	182.00	492.66	495.20		495.52	0.021724	4.52	40.23	31.35	0.70
2-4	732.*	706 cfs	706.00	492.66	496.66		497.13	0.020839	5.45	129.62	74.38	0.73
2-4	682.*	17 cfs	17.00	491.38	492.34		492.50	0.024922	3.21	5.30	7.60	0.68
2-4	682.*	58 cfs	58.00	491.38	493.35		493.52	0.026413	3.27	17.72	26.30	0.70
2-4	682.*	132 cfs	132.00	491.38	493.89		494.14	0.021522	3.99	33.09	31.10	0.68
2-4	682.*	182 cfs	182.00	491.38	494.13		494.44	0.021324	4.45	40.87	32.10	0.70
2-4	682.*	706 cfs	706.00	491.38	495.66		496.09	0.020254	5.26	134.27	79.42	0.71
2-4	632.*	17 cfs	17.00	490.10	491.04		491.21	0.026751	3.28	5.18	7.62	0.70
2-4	632.*	58 cfs	58.00	490.10	491.90		492.22	0.025096	4.49	12.93	10.79	0.72
2-4	632.*	132 cfs	132.00	490.10	492.78		493.04	0.022654	4.08	32.35	30.52	0.70
2-4	632.*	182 cfs	182.00	490.10	493.05		493.36	0.021659	4.42	41.16	33.04	0.70
2-4	632.*	706 cfs	706.00	490.10	494.61		495.04	0.021745	5.28	133.83	83.26	0.73
2-4	582.*	17 cfs	17.00	488.82	489.79		489.94	0.023879	3.14	5.41	7.81	0.67
2-4	582.*	58 cfs	58.00	488.82	490.60		490.93	0.025934	4.64	12.51	10.11	0.73
2-4	582.*	132 cfs	132.00	488.82	491.73		491.97	0.020020	3.91	33.77	30.76	0.66
2-4	582.*	182 cfs	182.00	488.82	491.94		492.26	0.022563	4.49	40.56	32.79	0.71
2-4	582.*	706 cfs	706.00	488.82	493.50		493.95	0.021787	5.36	131.62	79.49	0.73
2-4	532.*	17 cfs	17.00	487.54	488.47		488.64	0.028656	3.32	5.12	7.90	0.73
2-4	532.*	58 cfs	58.00	487.54	489.29		489.64	0.025936	4.72	12.29	9.62	0.74
2-4	532.*	132 cfs	132.00	487.54	490.51		490.81	0.027113	4.37	30.19	28.85	0.75
2-4	532.*	182 cfs	182.00	487.54	490.87		491.17	0.020827	4.38	41.57	32.71	0.68
2-4	532.*	706 cfs	706.00	487.54	492.43		492.87	0.021396	5.32	132.73	80.02	0.73
2-4	482.*	17 cfs	17.00	486.25	487.24		487.38	0.021881	3.02	5.64	8.19	0.64
2-4	482.*	58 cfs	58.00	486.25	487.98		488.33	0.026081	4.75	12.21	9.52	0.74
2-4	482.*	132 cfs	132.00	486.25	488.96		489.47	0.025635	5.72	23.07	13.00	0.76
2-4	482.*	182 cfs	182.00	486.25	489.71	489.01	490.04	0.024860	4.61	39.46	32.53	0.74
2-4	482.*	706 cfs	706.00	486.25	491.37		491.80	0.021283	5.23	135.01	83.43	0.72
2-4	432.*	17 cfs	17.00	484.97	485.87		486.06	0.032538	3.44	4.94	8.01	0.77
2-4	432.*	58 cfs	58.00	484.97	486.69		487.04	0.026116	4.74	12.24	9.65	0.74
2-4	432.*	132 cfs	132.00	484.97	487.65		488.18	0.025979	5.84	22.61	12.42	0.76
2-4	432.*	182 cfs	182.00	484.97	488.15		488.75	0.025618	6.20	29.34	14.46	0.77
2-4	432.*	706 cfs	706.00	484.97	490.30		490.72	0.021850	5.20	135.88	86.63	0.73
2-4	382.*	17 cfs	17.00	483.69	484.72		484.85	0.018259	2.81	6.05	8.58	0.59
2-4	382.*	58 cfs	58.00	483.69	485.41		485.75	0.025376	4.67	12.41	9.83	0.73
2-4	382.*	132 cfs	132.00	483.69	486.34		486.88	0.025914	5.90	22.37	12.02	0.76
2-4	382.*	182 cfs	182.00	483.69	486.84		487.46	0.025831	6.31	28.83	13.82	0.77
2-4	382.*	706 cfs	706.00	483.69	489.17		489.61	0.022250	5.36	131.71	80.97	0.74
2-4	332.*	17 cfs	17.00	482.41	483.23	483.19	483.46	0.045371	3.85	4.41	7.75	0.90
2-4	332.*	58 cfs	58.00	482.41	484.09		484.44	0.027088	4.76	12.19	9.96	0.76
2-4	332.*	132 cfs	132.00	482.41	484.99		485.56	0.026854	6.06	21.80	11.55	0.78
2-4	332.*	182 cfs	182.00	482.41	485.51		486.15	0.026376	6.44	28.26	13.31	0.78
2-4	332.*	706 cfs	706.00	482.41	488.06		488.51	0.021727	5.40	130.72	77.93	0.73

HEC-RAS Plan: Calib-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	282.*	17 cfs	17.00	481.13	482.25		482.34	0.012645	2.47	6.90	8.99	0.50
2-4	282.*	58 cfs	58.00	481.13	482.87		483.18	0.023155	4.48	12.93	10.27	0.70
2-4	282.*	132 cfs	132.00	481.13	483.76		484.28	0.023711	5.81	22.71	11.62	0.73
2-4	282.*	182 cfs	182.00	481.13	484.24		484.87	0.024719	6.34	28.72	13.13	0.76
2-4	282.*	706 cfs	706.00	481.13	486.95		487.41	0.022173	5.42	130.23	78.39	0.74
2-4	232.*	17 cfs	17.00	479.85	482.23		482.24	0.000554	0.84	20.18	11.43	0.11
2-4	232.*	58 cfs	58.00	479.85	482.68		482.76	0.003337	2.28	25.45	12.09	0.28
2-4	232.*	132 cfs	132.00	479.85	483.28		483.52	0.008744	3.97	33.24	13.92	0.45
2-4	232.*	182 cfs	182.00	479.85	483.60		483.96	0.011871	4.80	37.95	14.98	0.53
2-4	232.*	706 cfs	706.00	479.85	485.82		486.29	0.022564	5.53	127.66	75.28	0.75
2-4	182.*	17 cfs	17.00	478.57	482.22		482.23	0.000110	0.46	36.80	14.44	0.05
2-4	182.*	58 cfs	58.00	478.57	482.64		482.67	0.000856	1.35	43.04	15.73	0.14
2-4	182.*	132 cfs	132.00	478.57	483.15		483.25	0.002832	2.56	51.52	17.56	0.26
2-4	182.*	182 cfs	182.00	478.57	483.40		483.56	0.004352	3.24	56.10	18.49	0.33
2-4	182.*	706 cfs	706.00	478.57	485.15		485.44	0.011793	4.33	163.31	86.21	0.55
2-4	132.*	17 cfs	17.00	477.29	482.22		482.22	0.000034	0.29	57.99	18.48	0.03
2-4	132.*	58 cfs	58.00	477.29	482.62		482.63	0.000544	0.87	66.82	36.59	0.11
2-4	132.*	132 cfs	132.00	477.29	483.08		483.11	0.001951	1.46	90.69	62.40	0.21
2-4	132.*	182 cfs	182.00	477.29	483.32		483.37	0.002446	1.70	106.86	69.25	0.24
2-4	132.*	706 cfs	706.00	477.29	484.96		485.08	0.003769	2.78	254.97	112.01	0.32
2-4	82	17 cfs	17.00	476.01	482.22		482.22	0.000021	0.16	107.45	68.11	0.02
2-4	82	58 cfs	58.00	476.01	482.61		482.61	0.000135	0.43	136.12	80.66	0.06
2-4	82	132 cfs	132.00	476.01	483.06		483.07	0.000341	0.76	173.85	87.74	0.09
2-4	82	182 cfs	182.00	476.01	483.30		483.31	0.000472	0.93	195.57	93.12	0.11
2-4	82	706 cfs	706.00	476.01	484.92		484.97	0.001118	1.89	377.34	118.76	0.19
2-4	50	17 cfs	17.00	481.55	482.10	482.10	482.21	0.078182	2.68	6.34	29.08	1.01
2-4	50	58 cfs	58.00	481.55	482.36	482.36	482.58	0.065646	3.70	15.68	38.62	1.02
2-4	50	132 cfs	132.00	481.55	482.67	482.67	483.00	0.056591	4.60	28.73	45.42	1.02
2-4	50	182 cfs	182.00	481.55	482.84	482.84	483.23	0.052847	5.00	36.43	48.12	1.01
2-4	50	706 cfs	706.00	481.55	483.92	483.92	484.78	0.040441	7.48	94.82	56.13	1.01

HEC-RAS Plan: Flood-Low n River: Grant Creek Reach: 2-4

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	2110	Q 2	961.00	521.86	526.20	526.20	527.75	0.033148	10.19	101.80	34.10	0.98
2-4	2110	Q 5	1410.00	521.86	527.10	527.10	529.10	0.031447	11.63	132.78	34.35	0.99
2-4	2110	Q 10	1790.00	521.86	527.78	527.78	530.14	0.030715	12.67	155.97	34.35	1.00
2-4	2110	Q 25	2350.00	521.86	528.70	528.70	531.56	0.029611	13.95	187.77	34.35	1.01
2-4	2110	Q 50	2810.00	521.86	529.42	529.42	532.64	0.028776	14.84	212.29	34.35	1.02
2-4	2110	Q 100	3310.00	521.86	530.13	530.13	533.76	0.028268	15.76	236.85	34.35	1.03
2-4	2061.*	Q 2	961.00	520.57	524.07	524.38	525.75	0.050999	10.43	94.58	42.98	1.19
2-4	2061.*	Q 5	1410.00	520.57	524.56	525.15	527.01	0.058564	12.65	115.68	44.15	1.31
2-4	2061.*	Q 10	1790.00	520.57	524.92	525.73	527.99	0.062955	14.19	131.92	45.16	1.39
2-4	2061.*	Q 25	2350.00	520.57	525.40	526.51	529.34	0.067704	16.13	153.62	45.61	1.47
2-4	2061.*	Q 50	2810.00	520.57	525.76	527.08	530.40	0.070735	17.53	169.99	46.08	1.53
2-4	2061.*	Q 100	3310.00	520.57	526.12	527.66	531.48	0.073008	18.86	187.13	46.70	1.58
2-4	2012.*	Q 2	961.00	519.28	522.89	522.82	523.94	0.032220	8.26	117.62	53.77	0.95
2-4	2012.*	Q 5	1410.00	519.28	523.48	523.48	524.91	0.032199	9.61	150.04	54.77	0.99
2-4	2012.*	Q 10	1790.00	519.28	523.98	523.98	525.64	0.030580	10.39	177.65	56.33	0.99
2-4	2012.*	Q 25	2350.00	519.28	524.55	524.65	526.62	0.031164	11.62	210.17	56.93	1.02
2-4	2012.*	Q 50	2810.00	519.28	524.83	525.15	527.39	0.035422	12.96	226.13	57.19	1.10
2-4	2012.*	Q 100	3310.00	519.28	525.11	525.64	528.23	0.039860	14.32	241.78	57.59	1.18
2-4	1963.*	Q 2	961.00	518.00	521.55	521.38	522.39	0.028609	7.35	130.78	61.22	0.88
2-4	1963.*	Q 5	1410.00	518.00	522.08	521.95	523.24	0.029781	8.67	163.92	64.98	0.93
2-4	1963.*	Q 10	1790.00	518.00	522.20	522.41	523.91	0.040962	10.49	172.31	65.21	1.10
2-4	1963.*	Q 25	2350.00	518.00	522.64	523.01	524.82	0.043366	11.88	200.89	66.11	1.16
2-4	1963.*	Q 50	2810.00	518.00	523.05	523.47	525.49	0.041240	12.56	228.55	67.19	1.16
2-4	1963.*	Q 100	3310.00	518.00	523.49	523.90	526.16	0.038908	13.16	258.34	68.04	1.15
2-4	1914.*	Q 2	961.00	516.71	520.14	519.99	520.92	0.030711	7.08	135.83	70.48	0.90
2-4	1914.*	Q 5	1410.00	516.71	520.63	520.53	521.69	0.032238	8.29	170.08	71.97	0.95
2-4	1914.*	Q 10	1790.00	516.71	520.97	520.95	522.28	0.033273	9.20	194.98	74.55	0.99
2-4	1914.*	Q 25	2350.00	516.71	521.48	521.48	523.07	0.031836	10.11	234.24	76.59	0.99
2-4	1914.*	Q 50	2810.00	516.71	521.80	521.90	523.67	0.033246	11.00	258.47	77.36	1.03
2-4	1914.*	Q 100	3310.00	516.71	522.25	522.30	524.28	0.030848	11.47	293.30	78.37	1.01
2-4	1865	Q 2	961.00	515.43	519.00		519.58	0.022654	6.12	157.02	80.44	0.77
2-4	1865	Q 5	1410.00	515.43	519.53		520.30	0.022351	7.04	200.29	82.00	0.79
2-4	1865	Q 10	1790.00	515.43	519.93		520.84	0.022092	7.67	233.46	83.80	0.81
2-4	1865	Q 25	2350.00	515.43	520.44	520.04	521.56	0.021925	8.52	277.01	87.26	0.83
2-4	1865	Q 50	2810.00	515.43	520.82	520.42	522.11	0.021797	9.13	310.15	88.13	0.84
2-4	1865	Q 100	3310.00	515.43	521.20	520.78	522.66	0.021679	9.72	344.10	89.01	0.85
2-4	1817.22*	Q 2	961.00	514.40	517.90		518.50	0.022449	6.20	155.11	77.83	0.77
2-4	1817.22*	Q 5	1410.00	514.40	518.45		519.24	0.022072	7.12	198.17	79.43	0.79
2-4	1817.22*	Q 10	1790.00	514.40	518.85		519.79	0.022027	7.79	230.45	85.77	0.81
2-4	1817.22*	Q 25	2350.00	514.40	519.36	518.99	520.52	0.021837	8.65	275.04	88.12	0.83
2-4	1817.22*	Q 50	2810.00	514.40	519.74	519.36	521.06	0.021773	9.27	308.73	89.75	0.84
2-4	1817.22*	Q 100	3310.00	514.40	520.11		521.62	0.021837	9.90	342.74	91.18	0.86
2-4	1769.44*	Q 2	961.00	513.37	516.82		517.43	0.022093	6.26	153.50	75.24	0.77
2-4	1769.44*	Q 5	1410.00	513.37	517.38		518.19	0.021859	7.20	196.01	80.01	0.80
2-4	1769.44*	Q 10	1790.00	513.37	517.77	517.39	518.74	0.021841	7.91	229.42	87.70	0.81
2-4	1769.44*	Q 25	2350.00	513.37	518.28	517.92	519.47	0.021873	8.80	274.40	90.42	0.84
2-4	1769.44*	Q 50	2810.00	513.37	518.64	518.33	520.01	0.022011	9.45	308.16	92.40	0.85
2-4	1769.44*	Q 100	3310.00	513.37	519.02	518.74	520.57	0.022108	10.08	342.91	93.63	0.87
2-4	1721.66*	Q 2	961.00	512.34	515.75		516.38	0.022009	6.35	151.33	72.77	0.78
2-4	1721.66*	Q 5	1410.00	512.34	516.30		517.13	0.022016	7.35	194.61	87.70	0.80
2-4	1721.66*	Q 10	1790.00	512.34	516.68	516.38	517.68	0.022108	8.07	228.69	89.82	0.82
2-4	1721.66*	Q 25	2350.00	512.34	517.18	516.91	518.41	0.022193	8.97	274.70	93.05	0.85
2-4	1721.66*	Q 50	2810.00	512.34	517.56	517.31	518.96	0.022186	9.60	310.10	94.99	0.86
2-4	1721.66*	Q 100	3310.00	512.34	517.93	517.70	519.51	0.022272	10.23	345.86	97.13	0.88
2-4	1673.88*	Q 2	961.00	511.31	514.71		515.34	0.021395	6.39	151.07	77.40	0.77
2-4	1673.88*	Q 5	1410.00	511.31	515.23		516.08	0.021903	7.46	196.46	91.24	0.81
2-4	1673.88*	Q 10	1790.00	511.31	515.61	515.34	516.63	0.022001	8.18	231.62	92.86	0.83
2-4	1673.88*	Q 25	2350.00	511.31	516.11	515.87	517.35	0.022113	9.08	278.94	96.24	0.85
2-4	1673.88*	Q 50	2810.00	511.31	516.47	516.27	517.89	0.022504	9.76	313.59	101.01	0.87
2-4	1673.88*	Q 100	3310.00	511.31	516.82	516.67	518.43	0.022874	10.43	350.08	103.79	0.89
2-4	1626.11*	Q 2	961.00	510.29	513.61	513.30	514.28	0.022656	6.61	149.90	90.53	0.79
2-4	1626.11*	Q 5	1410.00	510.29	514.12	513.92	515.01	0.022871	7.66	197.16	92.56	0.83
2-4	1626.11*	Q 10	1790.00	510.29	514.50	514.27	515.55	0.022995	8.39	232.52	94.66	0.85
2-4	1626.11*	Q 25	2350.00	510.29	514.98	514.83	516.26	0.023368	9.32	280.28	104.20	0.88
2-4	1626.11*	Q 50	2810.00	510.29	515.34	515.24	516.78	0.023431	9.96	318.42	106.46	0.89
2-4	1626.11*	Q 100	3310.00	510.29	515.69	515.61	517.31	0.023634	10.60	356.18	107.87	0.91
2-4	1578.33*	Q 2	961.00	509.26	512.58	512.27	513.23	0.021093	6.54	158.88	93.31	0.77

HEC-RAS Plan: Flood-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1578.33*	Q 5	1410.00	509.26	513.11	512.84	513.95	0.021002	7.52	208.84	97.68	0.80
2-4	1578.33*	Q 10	1790.00	509.26	513.48	513.26	514.47	0.021524	8.27	246.12	105.87	0.83
2-4	1578.33*	Q 25	2350.00	509.26	513.93	513.78	515.15	0.022439	9.25	295.29	110.24	0.86
2-4	1578.33*	Q 50	2810.00	509.26	514.22	514.15	515.65	0.023894	10.06	327.92	111.90	0.90
2-4	1578.33*	Q 100	3310.00	509.26	514.56	514.51	516.16	0.024348	10.73	365.89	114.98	0.92
2-4	1530.55*	Q 2	961.00	508.23	511.40	511.30	512.12	0.025570	6.99	154.28	97.11	0.85
2-4	1530.55*	Q 5	1410.00	508.23	511.87	511.80	512.81	0.026437	8.13	199.20	103.52	0.89
2-4	1530.55*	Q 10	1790.00	508.23	512.22	512.19	513.32	0.026587	8.86	239.07	112.33	0.91
2-4	1530.55*	Q 25	2350.00	508.23	512.68	512.68	513.98	0.026432	9.74	291.86	116.97	0.93
2-4	1530.55*	Q 50	2810.00	508.23	513.04	513.04	514.46	0.025636	10.27	335.21	119.64	0.93
2-4	1530.55*	Q 100	3310.00	508.23	513.38	513.38	514.96	0.025815	10.90	375.55	122.66	0.95
2-4	1482.77*	Q 2	961.00	507.20	510.67	510.20	511.13	0.014648	5.84	195.25	112.82	0.66
2-4	1482.77*	Q 5	1410.00	507.20	511.15	510.68	511.76	0.015516	6.78	260.00	121.98	0.70
2-4	1482.77*	Q 10	1790.00	507.20	511.51	511.08	512.23	0.016072	7.45	304.11	124.74	0.72
2-4	1482.77*	Q 25	2350.00	507.20	512.01	511.50	512.86	0.016140	8.20	367.55	128.64	0.74
2-4	1482.77*	Q 50	2810.00	507.20	512.33	511.87	513.31	0.016890	8.85	409.07	129.82	0.77
2-4	1482.77*	Q 100	3310.00	507.20	512.60	512.20	513.75	0.018414	9.64	444.39	131.50	0.81
2-4	1435	Q 2	961.00	506.17	509.33	509.33	510.14	0.028951	7.51	150.20	121.46	0.90
2-4	1435	Q 5	1410.00	506.17	509.90	509.90	510.81	0.024758	8.14	219.69	129.96	0.87
2-4	1435	Q 10	1790.00	506.17	510.25	510.25	511.26	0.024553	8.77	265.00	132.17	0.88
2-4	1435	Q 25	2350.00	506.17	510.64	510.64	511.86	0.026078	9.78	316.57	133.58	0.92
2-4	1435	Q 50	2810.00	506.17	510.99	510.99	512.30	0.025138	10.24	364.60	135.50	0.92
2-4	1435	Q 100	3310.00	506.17	511.42	511.29	512.76	0.022902	10.48	421.85	135.95	0.90
2-4	1408.*	Q 2	961.00	504.97	508.47	508.30	509.09	0.023445	6.95	173.64	101.32	0.82
2-4	1408.*	Q 5	1410.00	504.97	509.11	508.75	509.81	0.019605	7.51	240.49	109.01	0.78
2-4	1408.*	Q 10	1790.00	504.97	509.61	509.13	510.36	0.017439	7.87	296.33	114.92	0.75
2-4	1408.*	Q 25	2350.00	504.97	510.26	509.62	511.08	0.015369	8.31	372.51	118.71	0.73
2-4	1408.*	Q 50	2810.00	504.97	510.75	509.96	511.62	0.014170	8.61	430.99	119.45	0.71
2-4	1408.*	Q 100	3310.00	504.97	511.25	510.33	512.17	0.013198	8.92	491.28	120.00	0.70
2-4	1381	Q 2	961.00	503.76	508.08	507.53	508.54	0.015275	6.13	195.84	86.88	0.65
2-4	1381	Q 5	1410.00	503.76	508.72	508.01	509.32	0.015239	7.04	252.61	91.40	0.68
2-4	1381	Q 10	1790.00	503.76	509.21	508.39	509.91	0.014942	7.64	299.26	98.27	0.68
2-4	1381	Q 25	2350.00	503.76	509.78	508.91	510.65	0.015690	8.58	356.91	101.53	0.72
2-4	1381	Q 50	2810.00	503.76	510.22	509.41	511.20	0.015702	9.15	402.16	102.48	0.73
2-4	1381	Q 100	3310.00	503.76	510.67	509.78	511.77	0.015731	9.71	448.71	103.80	0.74
2-4	1335.28*	Q 2	961.00	502.99	507.25		507.81	0.016299	6.46	181.59	86.22	0.69
2-4	1335.28*	Q 5	1410.00	502.99	507.89		508.59	0.016150	7.38	237.58	92.28	0.71
2-4	1335.28*	Q 10	1790.00	502.99	508.34		509.18	0.016445	8.10	281.28	100.09	0.73
2-4	1335.28*	Q 25	2350.00	502.99	508.92		509.91	0.016455	8.89	339.20	100.70	0.74
2-4	1335.28*	Q 50	2810.00	502.99	509.35		510.46	0.016436	9.46	383.24	101.59	0.76
2-4	1335.28*	Q 100	3310.00	502.99	509.80		511.02	0.016431	10.03	428.42	102.77	0.77
2-4	1289.57*	Q 2	961.00	502.23	506.39		507.03	0.017394	6.69	167.50	85.75	0.71
2-4	1289.57*	Q 5	1410.00	502.23	507.01		507.82	0.017343	7.64	221.99	92.95	0.73
2-4	1289.57*	Q 10	1790.00	502.23	507.46		508.40	0.017397	8.32	265.51	99.41	0.75
2-4	1289.57*	Q 25	2350.00	502.23	508.04		509.13	0.017156	9.08	323.59	99.85	0.76
2-4	1289.57*	Q 50	2810.00	502.23	508.46		509.68	0.017239	9.68	365.73	100.65	0.78
2-4	1289.57*	Q 100	3310.00	502.23	508.88		510.23	0.017386	10.27	408.30	101.74	0.79
2-4	1243.85*	Q 2	961.00	501.46	505.43	505.06	506.17	0.020037	6.98	148.72	84.23	0.76
2-4	1243.85*	Q 5	1410.00	501.46	506.11	505.79	507.00	0.018357	7.78	208.07	94.59	0.75
2-4	1243.85*	Q 10	1790.00	501.46	506.55	506.24	507.57	0.018416	8.46	250.52	98.72	0.77
2-4	1243.85*	Q 25	2350.00	501.46	507.09	506.82	508.30	0.018671	9.33	304.39	98.91	0.79
2-4	1243.85*	Q 50	2810.00	501.46	507.54	507.20	508.86	0.018211	9.84	348.69	99.61	0.80
2-4	1243.85*	Q 100	3310.00	501.46	508.01		509.43	0.017551	10.29	396.19	100.71	0.79
2-4	1198.14*	Q 2	961.00	500.69	504.48		505.23	0.021112	6.96	139.07	62.85	0.77
2-4	1198.14*	Q 5	1410.00	500.69	505.14	504.78	506.11	0.020306	7.95	191.43	94.03	0.78
2-4	1198.14*	Q 10	1790.00	500.69	505.61	505.34	506.70	0.019540	8.55	236.55	98.02	0.79
2-4	1198.14*	Q 25	2350.00	500.69	506.26	505.95	507.46	0.017976	9.14	300.26	98.25	0.78
2-4	1198.14*	Q 50	2810.00	500.69	506.79		508.04	0.016524	9.46	352.15	99.03	0.76
2-4	1198.14*	Q 100	3310.00	500.69	507.35		508.65	0.015041	9.72	408.45	99.69	0.74
2-4	1152.42*	Q 2	961.00	499.92	503.62		504.29	0.019118	6.60	145.58	57.42	0.73
2-4	1152.42*	Q 5	1410.00	499.92	504.35	503.72	505.21	0.017659	7.46	195.74	89.59	0.73
2-4	1152.42*	Q 10	1790.00	499.92	504.92		505.85	0.015854	7.87	249.69	97.19	0.71
2-4	1152.42*	Q 25	2350.00	499.92	505.71		506.69	0.013436	8.21	326.70	97.76	0.67
2-4	1152.42*	Q 50	2810.00	499.92	506.32		507.33	0.011986	8.43	386.95	98.66	0.65
2-4	1152.42*	Q 100	3310.00	499.92	506.95		508.00	0.010815	8.64	449.35	98.66	0.63
2-4	1106.71*	Q 2	961.00	499.16	503.08		503.56	0.011769	5.56	172.95	64.32	0.58
2-4	1106.71*	Q 5	1410.00	499.16	503.92		504.52	0.010547	6.21	238.21	92.41	0.57

HEC-RAS Plan: Flood-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	1106.71*	Q 10	1790.00	499.16	504.57		505.21	0.009434	6.54	299.89	96.84	0.55
2-4	1106.71*	Q 25	2350.00	499.16	505.43		506.12	0.008280	6.92	383.38	97.63	0.54
2-4	1106.71*	Q 50	2810.00	499.16	506.07		506.82	0.007642	7.19	446.57	97.63	0.53
2-4	1106.71*	Q 100	3310.00	499.16	506.73		507.52	0.007151	7.47	510.66	97.63	0.52
2-4	1061	Q 2	961.00	498.39	502.86		503.14	0.005493	4.29	229.62	77.82	0.41
2-4	1061	Q 5	1410.00	498.39	503.75		504.11	0.005374	4.92	307.51	95.71	0.42
2-4	1061	Q 10	1790.00	498.39	504.41		504.83	0.005128	5.29	371.89	96.60	0.42
2-4	1061	Q 25	2350.00	498.39	505.29		505.77	0.004901	5.75	456.43	96.60	0.42
2-4	1061	Q 50	2810.00	498.39	505.95		506.48	0.004769	6.09	519.74	96.60	0.42
2-4	1061	Q 100	3310.00	498.39	506.61		507.20	0.004666	6.43	583.79	96.60	0.42
2-4	1018.*	Q 2	961.00	498.19	502.56		502.89	0.006264	4.59	209.33	62.12	0.44
2-4	1018.*	Q 5	1410.00	498.19	503.40		503.85	0.006533	5.39	266.62	74.42	0.46
2-4	1018.*	Q 10	1790.00	498.19	504.04		504.57	0.006505	5.89	318.99	85.10	0.47
2-4	1018.*	Q 25	2350.00	498.19	504.89		505.52	0.006334	6.47	391.57	85.50	0.48
2-4	1018.*	Q 50	2810.00	498.19	505.53		506.23	0.006216	6.87	446.03	85.50	0.48
2-4	1018.*	Q 100	3310.00	498.19	506.17		506.95	0.006124	7.27	500.98	85.50	0.48
2-4	975.*	Q 2	961.00	497.98	502.17		502.58	0.008077	5.09	189.47	60.31	0.50
2-4	975.*	Q 5	1410.00	497.98	502.97		503.52	0.008523	5.99	237.91	62.19	0.52
2-4	975.*	Q 10	1790.00	497.98	503.56		504.23	0.008770	6.62	275.42	65.97	0.54
2-4	975.*	Q 25	2350.00	497.98	504.35		505.18	0.008868	7.37	332.16	74.40	0.56
2-4	975.*	Q 50	2810.00	497.98	504.95		505.89	0.008801	7.87	376.76	74.40	0.56
2-4	975.*	Q 100	3310.00	497.98	505.56		506.61	0.008721	8.35	422.22	74.40	0.57
2-4	932	Q 2	961.00	497.78	501.22		501.99	0.022415	7.08	135.99	56.41	0.79
2-4	932	Q 5	1410.00	497.78	501.83		502.90	0.023344	8.31	171.54	58.42	0.83
2-4	932	Q 10	1790.00	497.78	502.29	501.95	503.59	0.024014	9.18	198.36	60.01	0.86
2-4	932	Q 25	2350.00	497.78	502.88	502.61	504.50	0.024835	10.27	234.39	61.28	0.89
2-4	932	Q 50	2810.00	497.78	503.32	503.09	505.20	0.025447	11.07	261.55	62.17	0.91
2-4	932	Q 100	3310.00	497.78	503.76	503.60	505.90	0.026063	11.85	288.96	62.47	0.93
2-4	882.*	Q 2	961.00	496.50	500.15		500.87	0.021921	6.81	141.30	61.32	0.78
2-4	882.*	Q 5	1410.00	496.50	500.74		501.72	0.022728	7.99	178.13	63.06	0.82
2-4	882.*	Q 10	1790.00	496.50	501.17		502.37	0.023344	8.83	205.63	64.11	0.84
2-4	882.*	Q 25	2350.00	496.50	501.74	501.44	503.24	0.024075	9.88	242.71	65.64	0.87
2-4	882.*	Q 50	2810.00	496.50	502.16	501.88	503.90	0.024623	10.64	270.63	66.56	0.90
2-4	882.*	Q 100	3310.00	496.50	502.59	502.38	504.58	0.025151	11.39	299.04	67.06	0.91
2-4	832.*	Q 2	961.00	495.22	499.09		499.76	0.021572	6.57	146.43	66.28	0.77
2-4	832.*	Q 5	1410.00	495.22	499.66		500.58	0.022314	7.71	184.44	67.85	0.81
2-4	832.*	Q 10	1790.00	495.22	500.07		501.19	0.022835	8.51	212.81	68.28	0.83
2-4	832.*	Q 25	2350.00	495.22	500.62	500.29	502.02	0.023498	9.53	250.87	70.02	0.86
2-4	832.*	Q 50	2810.00	495.22	501.03	500.71	502.65	0.023992	10.27	279.55	70.86	0.88
2-4	832.*	Q 100	3310.00	495.22	501.44	501.18	503.29	0.024470	10.99	308.81	71.67	0.90
2-4	782.*	Q 2	961.00	493.94	498.05		498.68	0.021238	6.35	151.50	71.25	0.76
2-4	782.*	Q 5	1410.00	493.94	498.59		499.45	0.021918	7.45	190.71	72.70	0.80
2-4	782.*	Q 10	1790.00	493.94	499.00		500.04	0.022378	8.22	220.00	72.88	0.82
2-4	782.*	Q 25	2350.00	493.94	499.53		500.83	0.022992	9.21	259.00	74.42	0.85
2-4	782.*	Q 50	2810.00	493.94	499.92	499.56	501.44	0.023419	9.92	288.55	75.28	0.87
2-4	782.*	Q 100	3310.00	493.94	500.31	500.01	502.05	0.023913	10.62	318.34	76.16	0.89
2-4	732.*	Q 2	961.00	492.66	497.02		497.61	0.021053	6.17	156.16	76.50	0.75
2-4	732.*	Q 5	1410.00	492.66	497.54		498.35	0.021640	7.22	196.61	77.54	0.79
2-4	732.*	Q 10	1790.00	492.66	497.93		498.91	0.022051	7.97	226.78	77.69	0.81
2-4	732.*	Q 25	2350.00	492.66	498.44		499.67	0.022610	8.92	266.73	78.65	0.84
2-4	732.*	Q 50	2810.00	492.66	498.82		500.25	0.022995	9.61	297.04	79.70	0.86
2-4	732.*	Q 100	3310.00	492.66	499.20	498.87	500.84	0.023428	10.30	327.44	80.61	0.88
2-4	682.*	Q 2	961.00	491.38	495.99		496.55	0.020705	5.98	161.16	81.83	0.74
2-4	682.*	Q 5	1410.00	491.38	496.50		497.26	0.021364	7.01	202.45	82.40	0.78
2-4	682.*	Q 10	1790.00	491.38	496.87		497.80	0.021737	7.73	233.48	82.54	0.80
2-4	682.*	Q 25	2350.00	491.38	497.37		498.53	0.022244	8.66	274.49	82.98	0.83
2-4	682.*	Q 50	2810.00	491.38	497.74		499.08	0.022628	9.33	305.41	84.18	0.85
2-4	682.*	Q 100	3310.00	491.38	498.11	497.75	499.65	0.022994	10.00	336.47	85.17	0.87
2-4	632.*	Q 2	961.00	490.10	494.96		495.49	0.021261	5.88	163.87	86.76	0.74
2-4	632.*	Q 5	1410.00	490.10	495.46		496.18	0.021160	6.82	208.00	87.27	0.77
2-4	632.*	Q 10	1790.00	490.10	495.83		496.70	0.021491	7.52	239.88	87.40	0.79
2-4	632.*	Q 25	2350.00	490.10	496.31		497.40	0.021940	8.42	281.99	87.51	0.82
2-4	632.*	Q 50	2810.00	490.10	496.67		497.94	0.022321	9.08	313.33	88.60	0.84
2-4	632.*	Q 100	3310.00	490.10	497.02		498.48	0.022643	9.73	345.16	89.79	0.86
2-4	582.*	Q 2	961.00	488.82	493.87		494.42	0.021616	5.95	161.83	84.60	0.75
2-4	582.*	Q 5	1410.00	488.82	494.44		495.12	0.020912	6.64	213.58	92.14	0.76
2-4	582.*	Q 10	1790.00	488.82	494.79		495.62	0.021269	7.33	246.09	92.26	0.78

HEC-RAS Plan: Flood-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	582.*	Q 25	2350.00	488.82	495.26		496.30	0.021720	8.21	289.12	92.35	0.81
2-4	582.*	Q 50	2810.00	488.82	495.60		496.81	0.022048	8.85	321.00	93.11	0.83
2-4	582.*	Q 100	3310.00	488.82	495.95		497.34	0.022352	9.49	353.57	94.42	0.85
2-4	532.*	Q 2	961.00	487.54	492.79		493.33	0.021732	5.92	162.72	85.76	0.75
2-4	532.*	Q 5	1410.00	487.54	493.35		494.04	0.022357	6.68	212.44	95.37	0.78
2-4	532.*	Q 10	1790.00	487.54	493.75		494.55	0.021304	7.18	251.29	97.13	0.78
2-4	532.*	Q 25	2350.00	487.54	494.21		495.20	0.021507	8.01	295.95	97.36	0.80
2-4	532.*	Q 50	2810.00	487.54	494.54		495.70	0.021801	8.64	328.59	97.76	0.82
2-4	532.*	Q 100	3310.00	487.54	494.88	494.45	496.21	0.022098	9.26	361.82	99.00	0.84
2-4	482.*	Q 2	961.00	486.25	491.71		492.25	0.021631	5.88	163.67	86.41	0.75
2-4	482.*	Q 5	1410.00	486.25	492.24		492.94	0.021710	6.71	211.27	91.70	0.77
2-4	482.*	Q 10	1790.00	486.25	492.64		493.45	0.022469	7.25	248.54	98.17	0.80
2-4	482.*	Q 25	2350.00	486.25	493.16		494.12	0.021501	7.86	301.71	102.38	0.80
2-4	482.*	Q 50	2810.00	486.25	493.50		494.60	0.021567	8.44	336.04	102.71	0.82
2-4	482.*	Q 100	3310.00	486.25	493.82		495.09	0.021859	9.05	369.88	103.58	0.83
2-4	432.*	Q 2	961.00	484.97	490.64		491.16	0.021433	5.80	165.98	88.80	0.74
2-4	432.*	Q 5	1410.00	484.97	491.16		491.84	0.021892	6.65	213.07	94.16	0.77
2-4	432.*	Q 10	1790.00	484.97	491.53		492.34	0.021836	7.24	248.80	96.12	0.79
2-4	432.*	Q 25	2350.00	484.97	492.04		493.01	0.022577	7.91	299.35	104.16	0.82
2-4	432.*	Q 50	2810.00	484.97	492.43		493.50	0.021932	8.33	340.66	107.73	0.82
2-4	432.*	Q 100	3310.00	484.97	492.78		493.99	0.021608	8.85	378.10	108.22	0.83
2-4	382.*	Q 2	961.00	483.69	489.58		490.08	0.021419	5.72	168.42	92.06	0.74
2-4	382.*	Q 5	1410.00	483.69	490.07		490.75	0.021824	6.61	214.15	94.96	0.77
2-4	382.*	Q 10	1790.00	483.69	490.45		491.24	0.021936	7.17	251.00	98.85	0.79
2-4	382.*	Q 25	2350.00	483.69	490.92		491.89	0.022075	7.94	298.35	101.51	0.81
2-4	382.*	Q 50	2810.00	483.69	491.28		492.39	0.022589	8.45	335.74	106.10	0.83
2-4	382.*	Q 100	3310.00	483.69	491.69		492.88	0.022290	8.77	381.27	113.05	0.83
2-4	332.*	Q 2	961.00	482.41	488.51		489.01	0.021443	5.64	170.76	95.41	0.74
2-4	332.*	Q 5	1410.00	482.41	488.99		489.65	0.021576	6.53	216.96	97.25	0.76
2-4	332.*	Q 10	1790.00	482.41	489.35		490.14	0.022094	7.14	252.16	100.70	0.79
2-4	332.*	Q 25	2350.00	482.41	489.83		490.78	0.022006	7.85	301.58	104.22	0.81
2-4	332.*	Q 50	2810.00	482.41	490.20		491.27	0.021529	8.32	340.66	106.12	0.81
2-4	332.*	Q 100	3310.00	482.41	490.68		491.80	0.020251	8.54	391.92	112.54	0.80
2-4	282.*	Q 2	961.00	481.13	487.40		487.91	0.022551	5.75	167.37	94.20	0.76
2-4	282.*	Q 5	1410.00	481.13	487.91		488.56	0.022036	6.49	218.22	100.62	0.77
2-4	282.*	Q 10	1790.00	481.13	488.27		489.04	0.021516	7.05	255.31	101.92	0.78
2-4	282.*	Q 25	2350.00	481.13	488.89		489.73	0.018921	7.41	319.80	107.85	0.75
2-4	282.*	Q 50	2810.00	481.13	489.41		490.29	0.016165	7.52	377.27	110.46	0.71
2-4	282.*	Q 100	3310.00	481.13	490.02		490.89	0.013983	7.52	445.38	117.32	0.67
2-4	232.*	Q 2	961.00	479.85	486.32		486.82	0.020727	5.70	168.93	90.29	0.73
2-4	232.*	Q 5	1410.00	479.85	486.98		487.54	0.017933	6.01	235.57	104.56	0.70
2-4	232.*	Q 10	1790.00	479.85	487.55		488.12	0.014054	6.09	295.99	107.16	0.64
2-4	232.*	Q 25	2350.00	479.85	488.38		488.96	0.010665	6.12	388.17	113.66	0.58
2-4	232.*	Q 50	2810.00	479.85	489.03		489.62	0.008817	6.13	463.71	117.19	0.54
2-4	232.*	Q 100	3310.00	479.85	489.70		490.28	0.008085	6.17	544.81	129.30	0.52
2-4	182.*	Q 2	961.00	478.57	485.72		486.02	0.011052	4.42	218.25	107.36	0.54
2-4	182.*	Q 5	1410.00	478.57	486.59		486.91	0.007500	4.53	313.31	110.37	0.47
2-4	182.*	Q 10	1790.00	478.57	487.27		487.60	0.006287	4.63	390.06	116.59	0.44
2-4	182.*	Q 25	2350.00	478.57	488.18		488.53	0.005050	4.78	498.54	120.78	0.41
2-4	182.*	Q 50	2810.00	478.57	488.87		489.24	0.004698	4.88	584.39	130.87	0.40
2-4	182.*	Q 100	3310.00	478.57	489.55		489.94	0.004213	4.98	676.85	136.17	0.39
2-4	132.*	Q 2	961.00	477.29	485.56		485.70	0.003307	3.01	322.12	113.95	0.31
2-4	132.*	Q 5	1410.00	477.29	486.47		486.64	0.002978	3.32	429.49	121.04	0.31
2-4	132.*	Q 10	1790.00	477.29	487.17		487.36	0.002733	3.52	514.53	124.01	0.30
2-4	132.*	Q 25	2350.00	477.29	488.10		488.32	0.002591	3.77	633.21	133.67	0.30
2-4	132.*	Q 50	2810.00	477.29	488.79		489.03	0.002487	3.92	729.82	141.07	0.30
2-4	132.*	Q 100	3310.00	477.29	489.49		489.75	0.002281	4.08	828.12	141.13	0.29
2-4	82	Q 2	961.00	476.01	485.51		485.58	0.001234	2.16	449.80	124.73	0.20
2-4	82	Q 5	1410.00	476.01	486.43		486.53	0.001295	2.53	566.16	128.55	0.21
2-4	82	Q 10	1790.00	476.01	487.13		487.24	0.001325	2.77	657.24	133.12	0.22
2-4	82	Q 25	2350.00	476.01	488.06		488.20	0.001413	3.04	788.41	145.95	0.23
2-4	82	Q 50	2810.00	476.01	488.76		488.92	0.001355	3.22	890.49	146.00	0.23
2-4	82	Q 100	3310.00	476.01	489.46		489.64	0.001314	3.41	992.92	146.00	0.23
2-4	50	Q 2	961.00	481.55	484.31	484.31	485.37	0.037526	8.28	117.00	56.66	1.01
2-4	50	Q 5	1410.00	481.55	484.93	484.93	486.29	0.033933	9.35	152.54	57.49	1.00
2-4	50	Q 10	1790.00	481.55	485.41	485.41	486.98	0.031668	10.07	181.14	60.82	0.99
2-4	50	Q 25	2350.00	481.55	486.06	486.06	487.91	0.029428	10.97	220.42	61.95	0.98

HEC-RAS Plan: Flood-Low n River: Grant Creek Reach: 2-4 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2-4	50	Q 50	2810.00	481.55	486.53	486.53	488.61	0.028490	11.65	249.95	64.36	0.99
2-4	50	Q 100	3310.00	481.55	487.05	487.05	489.32	0.026735	12.18	284.30	65.90	0.98