

DRAFT MODELING TECHNICAL MEMORANDUM

Project name **Feasibility & Design of Floodplain Reconnection of Buffalo Creek**
Project no. **1940102804**
Client **Buffalo Niagara Waterkeepers**
Memo No. **1**
Version **1**
To **Katherine Winkler, Senior Project Manager, Buffalo Niagara Waterkeeper**
From **Ramboll Americas Engineering Solutions, Inc.**
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1 Introduction

1.1 Background

This project is located along Buffalo Creek in the Town of West Seneca, NY (Town) upstream of the confluence with Cayuga Creek. The Town is located just outside of Buffalo, NY and covers an area of approximately 21 square miles. It is transected by nine (9) major highways, including the NY State Thruway, which makes it an ideal location for both residential and commercial development. The Town has experienced a long history of flooding damages and impacts associated with rapid snowmelt, heavy rainfall, and ice jams. Some of the largest of these impacts are cited as occurring along the Buffalo Creek corridor.

The Lexington Green neighborhood sits along a bend in Buffalo Creek approximately 0.7 miles upstream of its confluence with Cayuga Creek at the Harlem Road Bridge. Buffalo Creek runs along the north and east sides of the neighborhood over a length of approximately 0.45 miles. The neighborhood was developed in the mid-1960s on top of the former Buffalo Creek channel, which was filled with gravel and excavated materials from a sediment control project. Approximately 90 homes were built within the neighborhood, all of which are still occupied as of 2022.

Historically, the neighborhood has been susceptible to flooding since its development in the mid-1960s, particularly ice jams in the late winter to early spring. During the period from March 1979 to January 2014, the neighborhood did not experience any major flood events. In the winter of 2014, two 1-percent annual exceedance probability (AEP) storm events (i.e., 100-year recurrence interval) occurred within 6 weeks of each other in January and February causing a combined damage estimate of \$1.2 million (USACE 2016). In the winter of 2019, a significant ice-jam flooding event caused the evacuation of the School Street Neighborhood. Most recently, in the winter of 2022, a severe flooding event caused emergency evacuations of several neighborhoods in the Town of West Seneca along Buffalo Creek.

1.2 Objectives

Ramboll was tasked with identifying opportunities for reconnecting Buffalo Creek to its floodplain to address reoccurring residential open-water and ice-jam flooding, improve flood resiliency, and to develop preliminary designs based on verified on-the-ground opportunities in the vicinity of the Lexington Green neighborhood. Ramboll performed a preliminary analysis of flood mitigation benefits from flood benches along Buffalo Creek in the vicinity of the Lexington Greene neighborhood. The purpose of this technical memorandum is to provide a summary of the evaluated flood bench scenarios.

2 Methodology

2.1 Hydrologic & Hydraulic (H&H) Model

The effective FEMA H&H model was obtained and evaluated for this modeling effort. According to the Flood Insurance Study (FIS) for Erie County, NY (2021), the H&H analysis for Buffalo Creek in the Town of West Seneca was completed by FEMA in 1976 and then revised and updated in 1992.

The H&H model developed by FEMA was created using the United States Army Corps of Engineers (USACE) Hydrologic Engineering Center River Analysis System (HECRAS) program (USACE 2021). The effective FEMA model was clipped down to the project area beginning at the confluence of Buffalo Creek

and Cayuga Creek to form the Buffalo River (river station 0+00) and extending upstream to the Buffalo Airfield (river station 205+00) (Figure 1).

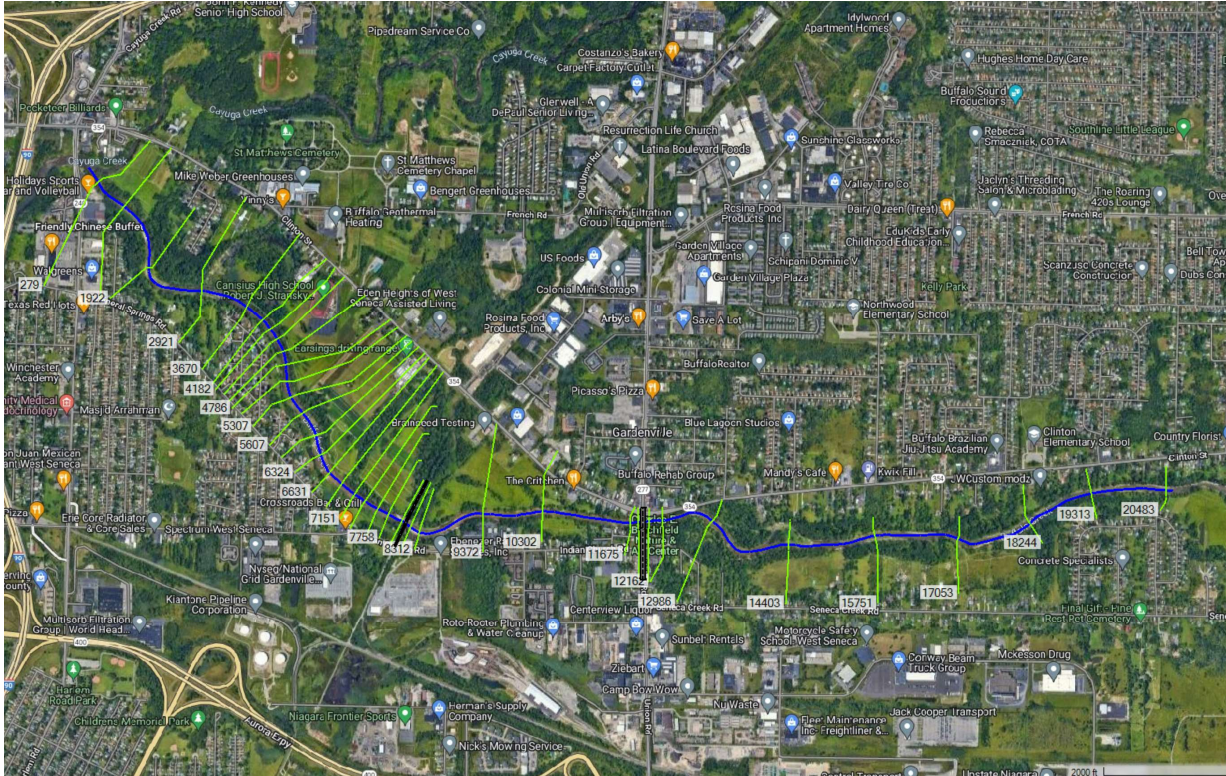


Figure 1. HEC-RAS Hydrologic & Hydraulic Model layout for Buffalo Creek.

2.2 Existing Conditions Model

The FEMA effective H&H model was obtained by Ramboll and used to develop the existing conditions model. Due to the age of the effective FEMA model (first developed in 1976), the overbank terrain and Manning's n values were outdated and, in some areas, incorrect due to land cover changes over time.

Using the latest LiDAR digital elevation model (DEM) and land cover data, the geometry from each cross section in the effective FEMA model had the overbank and channel geometries cut from the DEM terrain and the Manning's n value roughness coefficients assigned based on land cover type (NYSOITS 2019; USGS 2021). Since the DEM is a hydro-corrected model, any areas with open channels and water were assigned a single elevation across the channel since the LiDAR technology used to collect the terrain data cannot penetrate water accurately. As a result, the minimum channel elevation of each cross section was modified to match the channel elevation from the effective FEMA model or FIS profile plot.

In addition, 12 cross sections were added to the effective model between river stations 36+50 and 80+00 to provide the necessary starting and ending positions for the different flood bench scenarios. These new cross sections had their overbank and channel terrains set to the DEM data and the minimum channel elevations were modified to match the channel elevation from the FEMA effective model and FIS profile plot.

2.3 Model Input Data

The following data was obtained and utilized for the H&H modeling efforts:

- FEMA effective H&H model for Buffalo Creek (FEMA 2021)
- FEMA peak discharges (FEMA 2021)
- USGS *StreamStats* peak discharges (USGS 2021)
- New York State Digital Ortho-Imagery Program imagery (NYSOITS 2021)
- National Land Cover Database (NLCD) data (USGS 2021)
- NYSDOT bridge data (NYSDOT 2019)
- New York State 1-meter LiDAR digital elevation model (DEM) data with vertical accuracy of 19.6-centimeters (7.7 inches) in the North American Vertical Datum of 1988 (NAVD88) (NYSOITS 2019)

The hydrologic input data that was used by FEMA in the effective conditions model was peak discharges calculated using the methodology outlined in USGS Water Resources Investigations (WRI) 79-83 (USGS 1979), for un-gaged sites on gaged streams. For the western region of New York, the following equation is used:

$$Q = K(DA)^x(St + 10)^y$$

Where Q is the stream discharge; DA is the drainage area; St is the percent of total drainage area stored in lakes, ponds and swamps; and K, x and y are variables of the frequency with specific values assigned based on the recurrence interval. For the western flood-frequency region, New York, which includes Buffalo Creek, the 1-percent AEP values for K, x, and y are 49,900, 0.733, and 2.03, respectively. Calculated peak discharges were then adjusted using regression equations calculated at the gage station at Gardenville (FEMA 2021).

In the FIS, only the 1-percent AEP event was determined by FEMA, which was 16,000 cubic feet per second (cfs). To evaluate existing and proposed conditions along Buffalo Creek, it was necessary to obtain discharge data for the 10-, 2-, 1-, and 0.2- percent AEP events (10, 50, 100, and 500-year recurrence intervals). Hydrologic data was obtained from the USGS *StreamStats* software since there was limited available FEMA data for Buffalo Creek within the project area.

The USGS *StreamStats* v4.10.1 software (<https://streamstats.usgs.gov/ss/>) is a map-based web application that provides an assortment of analytical tools that are useful for water resources planning and management, and engineering purposes. The primary purpose of *StreamStats* is to provide estimates of streamflow statistics for user-selected un-gaged sites on streams and for USGS stream gages, which are locations where streamflow data are collected (Ries et al. 2017, USGS 2022). Table 1 displays the peak streamflow data obtained from *StreamStats* for Buffalo Creek at the confluence with Cayuga Creek.

Table 1. USGS StreamStats Peak Streamflow for Buffalo Creek.

Location	Drainage Area (sq miles)	River Station (ft)	Peak Discharges (cfs)			
			10-Percent	2-Percent	1-Percent	0.2-Percent
Confluence with Cayuga Creek	146	0+00	7,990	11,800	13,600	18,000

2.4 Boundary Conditions

Downstream boundary conditions from the effective FEMA H&H model for Buffalo Creek used the Normal Depth method (FEMA 2021). Normal depth was calculated using the friction slope (S_f in Manning's equation), which is the slope of the energy grade line, and can be estimated by measuring the slope of the bed at the downstream reach (USACE 2022). For this model, the slope between the last three cross sections was used and calculated to be 0.00012.

2.5 Survey Data

Field staff from Ramboll performed a field visit on November 2, 2022, where overbank and in-channel survey data and streambank assessments were performed. Four locations in the vicinity of the Lexington Green neighborhood and Canisius High School fields were surveyed. Figure 2 displays the field survey locations along Buffalo Creek.

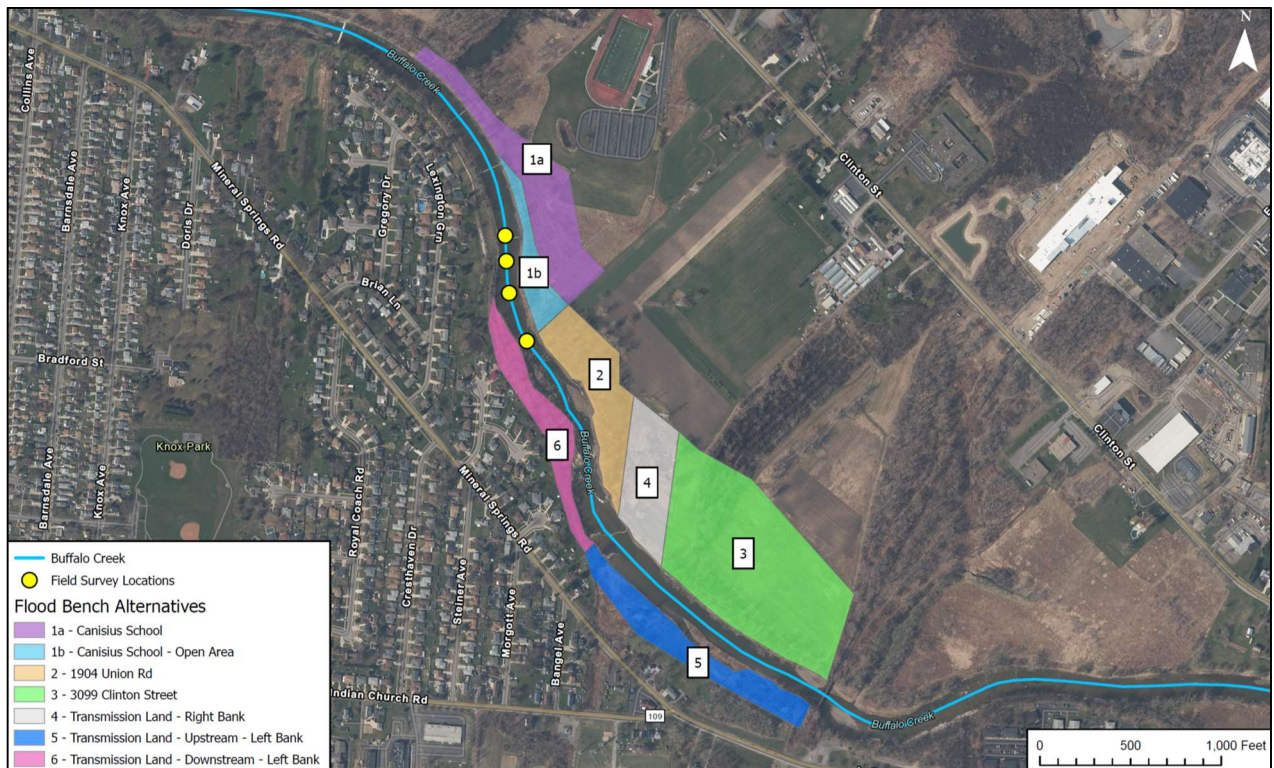


Figure 2. Field survey locations along Buffalo Creek.



Field surveys involved field staff using surveying and leveling equipment to measure land surface elevations perpendicularly across the creek channel from one overbank area to the other at the four identified locations from Figure 2. In addition, stream bank assessments were performed at each location to determine the condition and locations of overbank zones (e.g., toe, bank, overbank, transitional, and upland zones).

This survey data was incorporated into the H&H model for Buffalo Creek by modifying the cross-section geometry in the HEC-RAS model to match the field surveyed elevations. Attachment A contains the field notes from the field staff.

2.6 Overbank Modifications

Through public engagement and a meeting with Canisius High School, it was identified that the school is in the process of constructing two baseball fields, a practice field, and tennis courts in the open area adjacent to Buffalo Creek. The site plans and drawings for this construction was provided to Ramboll and incorporated into the H&H model for Buffalo Creek.

Since the new construction includes fill in the overbank area adjacent to Buffalo Creek, blocked obstructions were used in the H&H model to simulate the new fill and grade of the overbank area. Attachment B contains the site plans for the development.

2.7 Flood Bench Scenarios

Potential flood bench locations were identified using input received from the public engagement meeting and contact with individual property owners. Highland Planning, the public outreach and engagement sub-contractor for this project, took the lead in contacting and engaging with property owners to gauge interest in being included in this project. A public engagement meeting took place on August 22, 2022, where project members from Ramboll discussed the project goals and potential property owner participation.

Based on discussions and participation by the community and property owners, six potential flood bench configurations were identified along Buffalo Creek within the project area. Table 2 summarizes the different identified flood bench configurations with descriptions. Figure 3 displays the locations and extents of each flood bench scenario.

Table 2. Summary Table of Proposed Flood Bench Configurations

Flood Bench ID	Description
1a	Western portion of the Canisius School tax parcel
1b	Western portion of the Canisius School tax parcel (outside of proposed site plans)
2	Western portion of the 1904 Union Rd tax parcel
3	Western portion of the 3099 Clinton Street tax parcel
4	Western portion of the Transmission Land (Right Bank) tax parcel
5	Western portion of the Transmission Land (Upstream – Left Bank) tax parcel
6	Western portion of the Transmission Land (Downstream - Left Bank) tax parcel

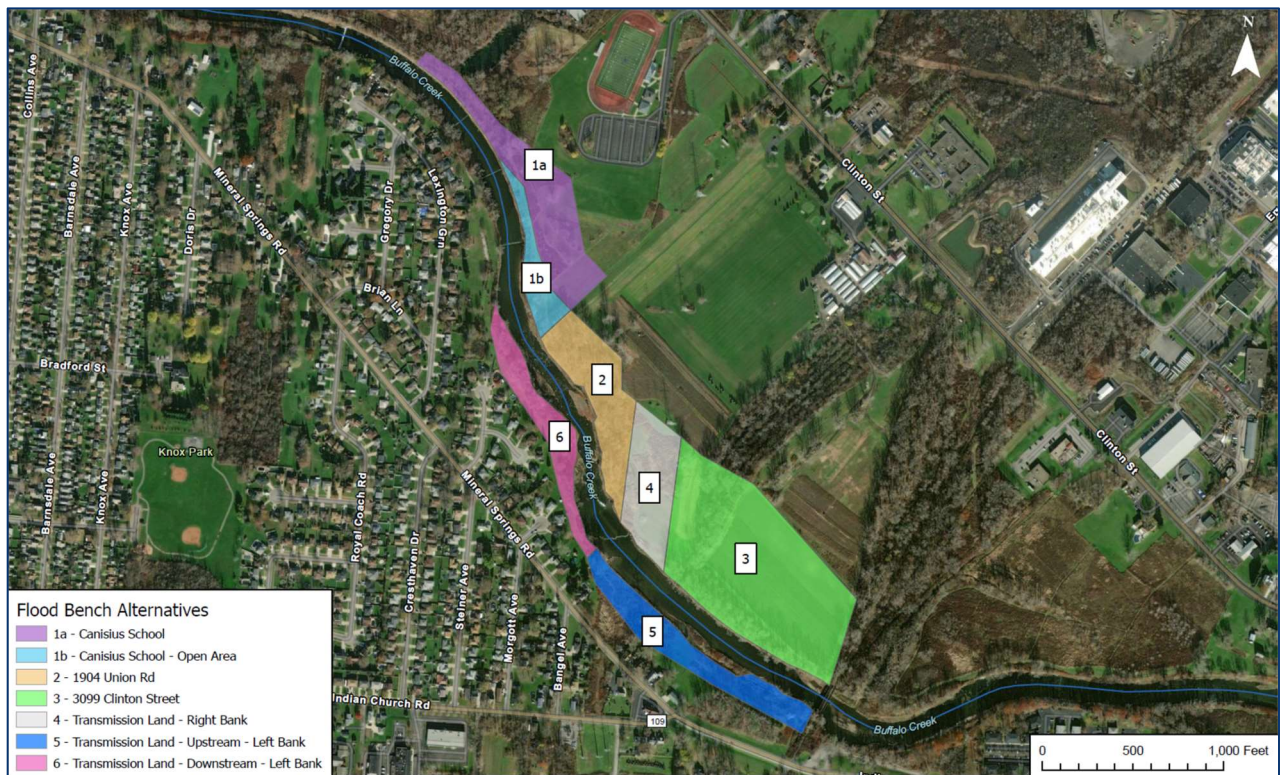


Figure 3. Location map of Buffalo Creek and the flood bench scenarios.

Based on the six identified flood bench locations, ten flood bench scenarios of different configurations were developed and modeled using the HEC-RAS modeling software. Table 3 outlines the ten flood bench scenarios.



Table 3. Summary table of modeled flood bench scenarios.

Scenario ID	Flood Bench Configurations
1	1a
2	1b
3	1b + 2
4	2 & 3
5	1b + 2 + 3
6	2 + 3 + 4
7	1b + 2 + 3 + 4
8	5 + 6
9	1b + 2 + 3 + 4 + 5 + 6

The modified effective FEMA model, referred to hereafter as the existing conditions model, and the proposed scenario model were run using the FEMA FIS peak discharge data. Attachment C contains the HEC-RAS model simulation results for the existing conditions models.

2.8 Proposed Scenario Modeling

Using the HEC-RAS modeling software, proposed conditions models were developed for each flood bench configuration based on the existing conditions model developed from the FEMA effective model. To model flood bench scenarios, terrain modifications were made to each cross section that intersected a proposed flood bench. Figure 3 displays an example cross section where the overbank terrain was modified to represent a flood bench.

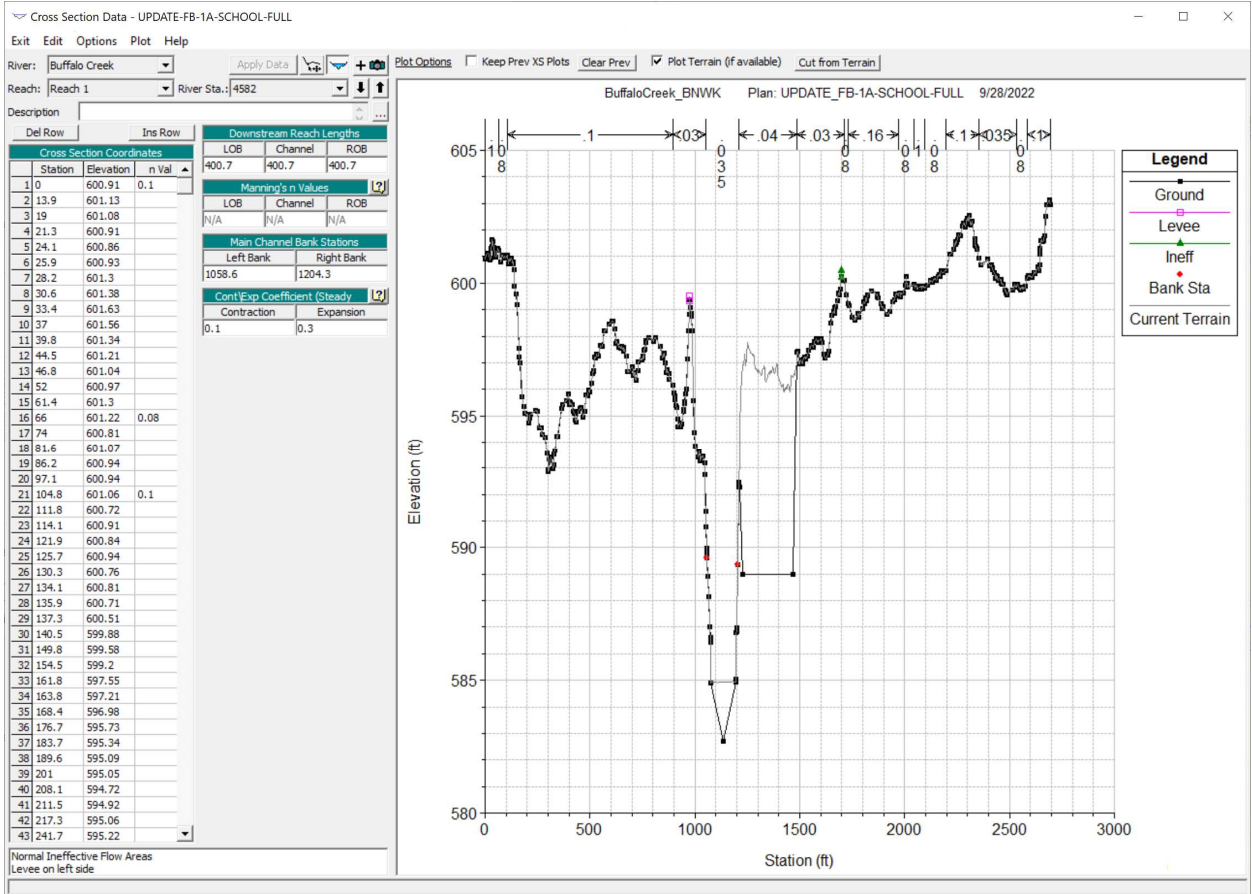


Figure 4. Example Cross-Section from HEC-RAS Depicting a Flood Bench.

3 Results

3.1 Effective FEMA versus Existing Conditions Models

Table 4 outlines the results of the effective FEMA and Existing Conditions models.

Table 4. HEC-RAS Model Results for the FEMA FIS 1-Percent Peak Discharge

River Station (ft) Effective/Existing	Water Surface Elevation (ft NAVD88)		
	Effective FEMA	Existing Conditions	Difference Effective - Existing
20473/20483	635.1	634.5	0.6
19313	631.8	631.6	0.2
18263/18244	629.9	629.9	0.0
17053	628.0	627.5	0.5
15733/15751	625.2	624.4	0.8
14399/14403	623.3	623.0	0.3



River Station (ft) Effective/Existing	Water Surface Elevation (ft NAVD88)		
	Effective FEMA	Existing Conditions	Difference Effective - Existing
12984/12986	622.1	621.8	0.3
11955/12162	618.3	619.0	-0.7
11899/11955	618.2	618.2	0.0
11850/11860	Union Rd		
11826/11789	617.5	615.9	1.6
11682/11675	617.5	616.2	1.3
10330/10302	614.5	613.0	1.6
9376/9372	610.1	608.1	2.0
8312	607.8	608.1	-0.3
8081/8145	606.6	607.7	-1.2
8050/8049	Railroad Bridge		
8016/7984	606.4	606.6	-0.3
7906	606.3	N/A	N/A
7758	N/A	606.3	N/A
7564	N/A	605.9	N/A
7340	N/A	605.5	N/A
7140/7151	603.3	604.9	-1.6
6890	N/A	604.3	N/A
6631	N/A	602.8	N/A
6324	N/A	601.7	N/A
6009/6015	599.5	600.1	-0.6
5607	N/A	599.1	N/A
5307	N/A	598.4	N/A
5051	N/A	597.6	N/A
4785/4786	597.8	596.6	1.2
4582	N/A	595.7	N/A
4363	N/A	594.6	N/A
4182	N/A	594.0	N/A
3997	N/A	593.5	N/A
3686/3670	594.0	593.5	0.5
2949/2921	592.7	591.4	1.3
1922/1922	591.5	590.8	0.7
866/833	589.6	590.0	-0.4
279	588.9	588.9	0.0



The differences between the effective and existing conditions models are a result of multiple factors, including:

- Updated overbank and channel geometry using the most current DEM available
- Updated Manning’s n values in the overbank areas to represent land use changes over time in the watershed
- The additional cross-sections in the project area providing more consistent and higher resolution hydraulic calculations and output data

3.2 Scenario Modeling Results

Table 5 summarizes the results of the flood bench scenario modeling between the Existing and Proposed Conditions Models.

Table 5. Results of the Proposed Conditions Models.

Scenario ID	Flood Bench Configurations	Reductions in Water Surface Elevations (ft NAVD88)			
		10-Percent	2-Percent	1-Percent	0.2-Percent
1	1a	0.4	0.6	0.7	0.7
2	1b	0.4	0.5	0.6	0.6
3	1b + 2	0.8	1.2	1.2	1.3
4	2 + 3	1.4	1.6	1.6	1.6
5	1b + 2 + 3	1.4	1.6	1.6	1.6
6	2 + 3 + 4	1.5	2.0	2.2	2.4
7	1b + 2 + 3 + 4	1.5	2.0	2.2	2.5
8	5 + 6	0.6	0.7	0.7	0.7
9	1b + 2 + 3 + 4 + 5 + 6	1.6	2.2	2.4	2.8

Figures 4 through 12 display the HECRAS profile plot results for each flood bench scenario compared to the existing conditions water surface elevations (WSELs).

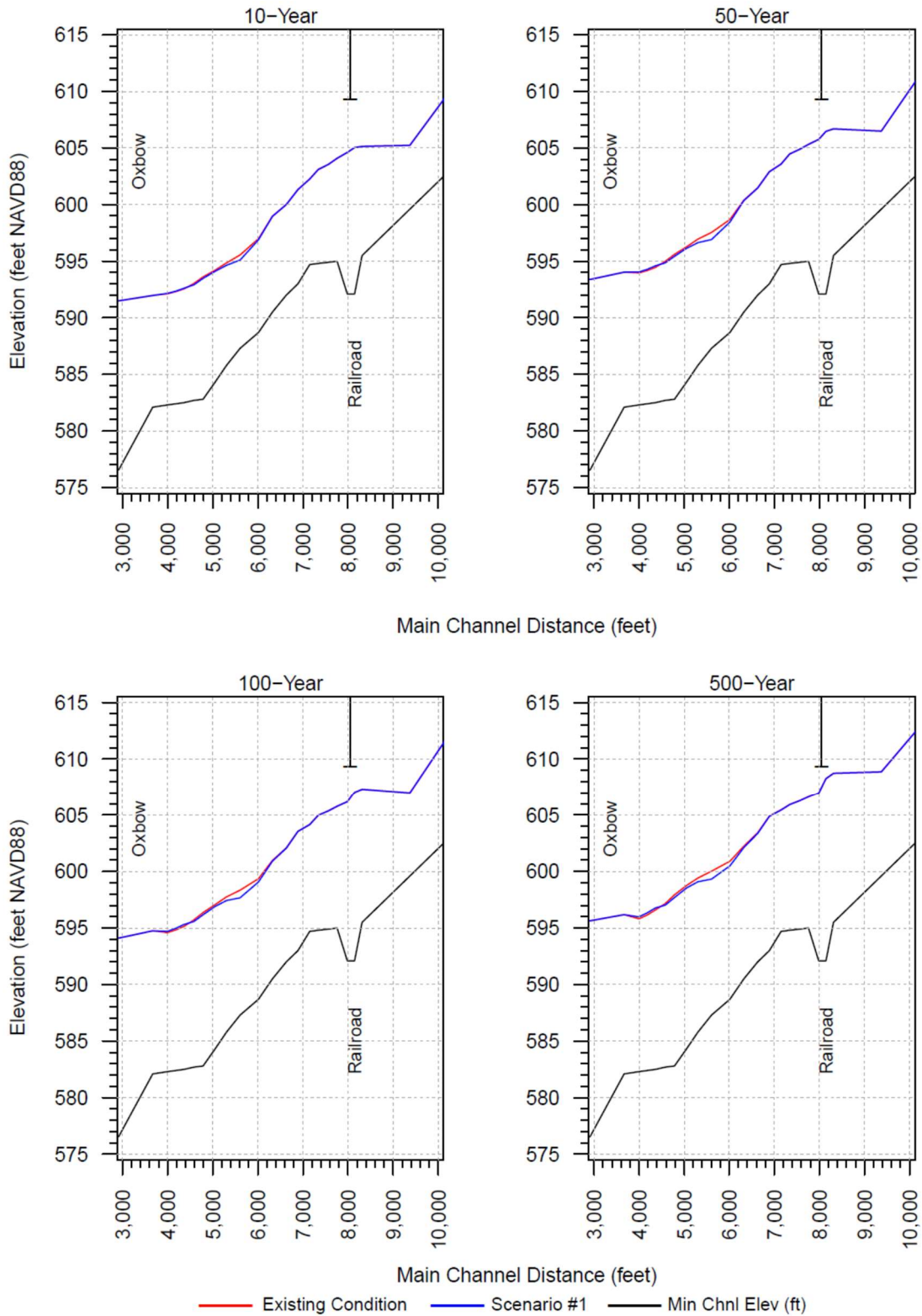


Figure 5. HEC-RAS Model Results for Flood Bench Scenario #1.

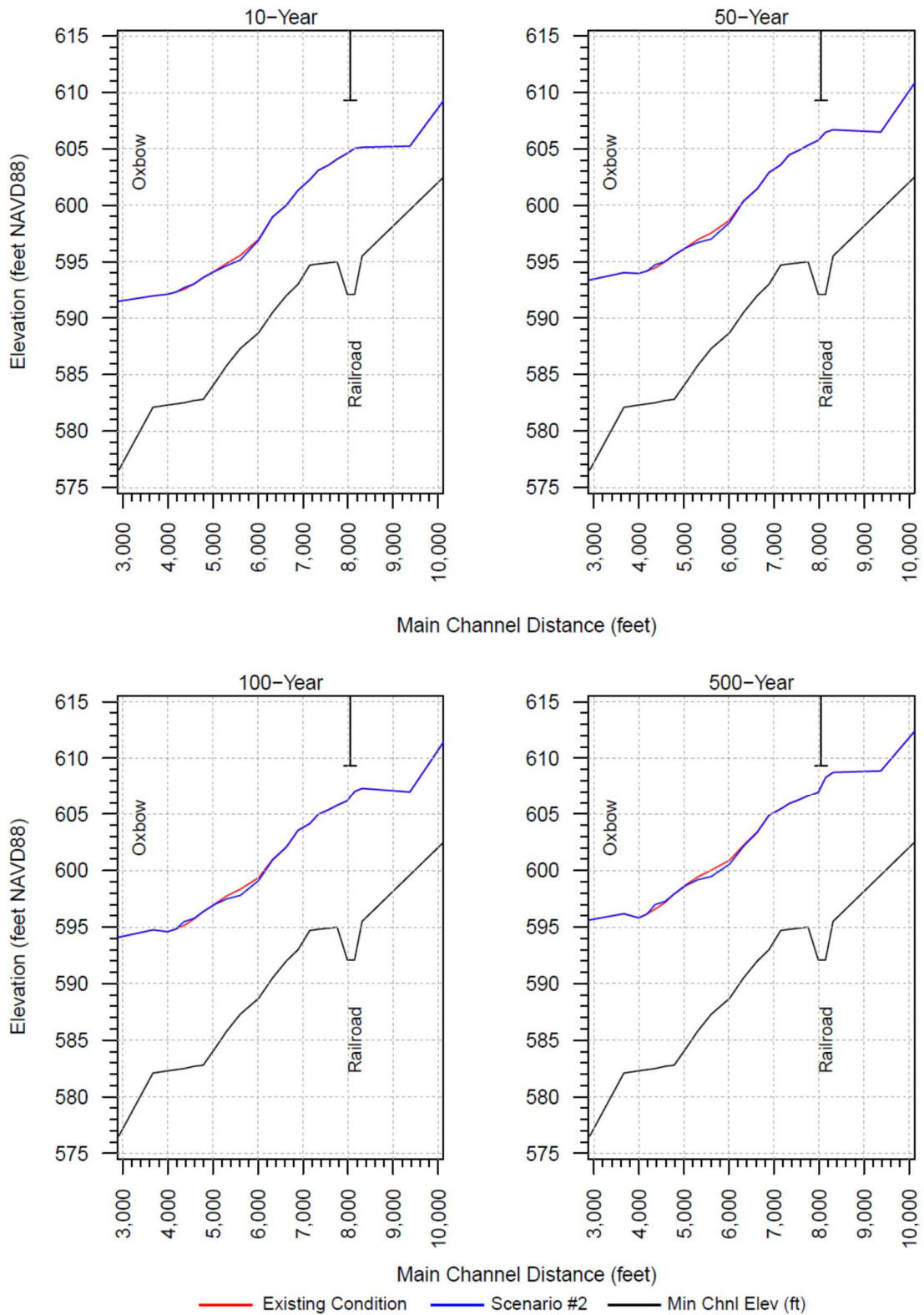


Figure 6. HEC-RAS Model Results for Flood Bench Scenario #2.

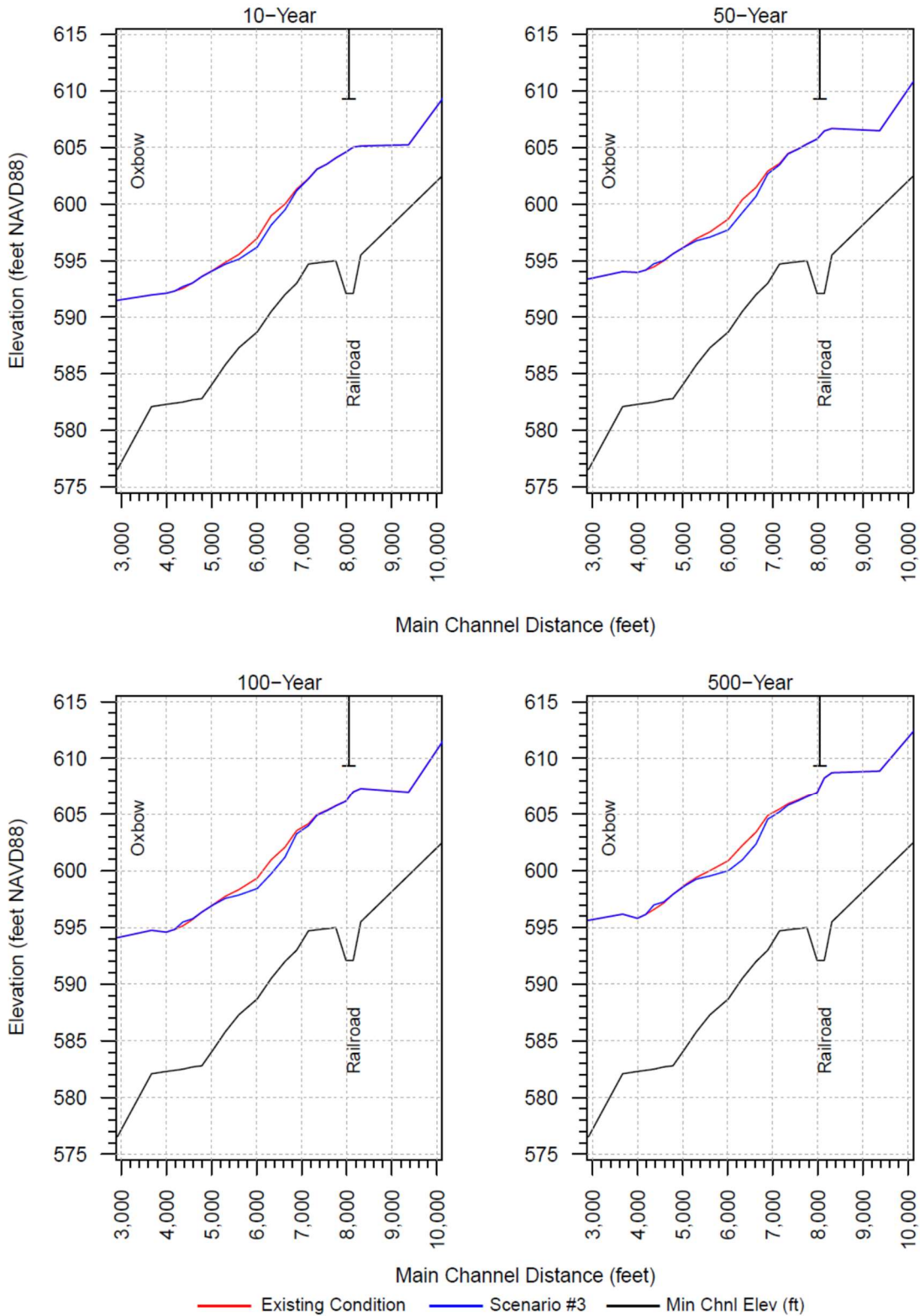


Figure 7. HEC-RAS Model Results for Flood Bench Scenario #3.

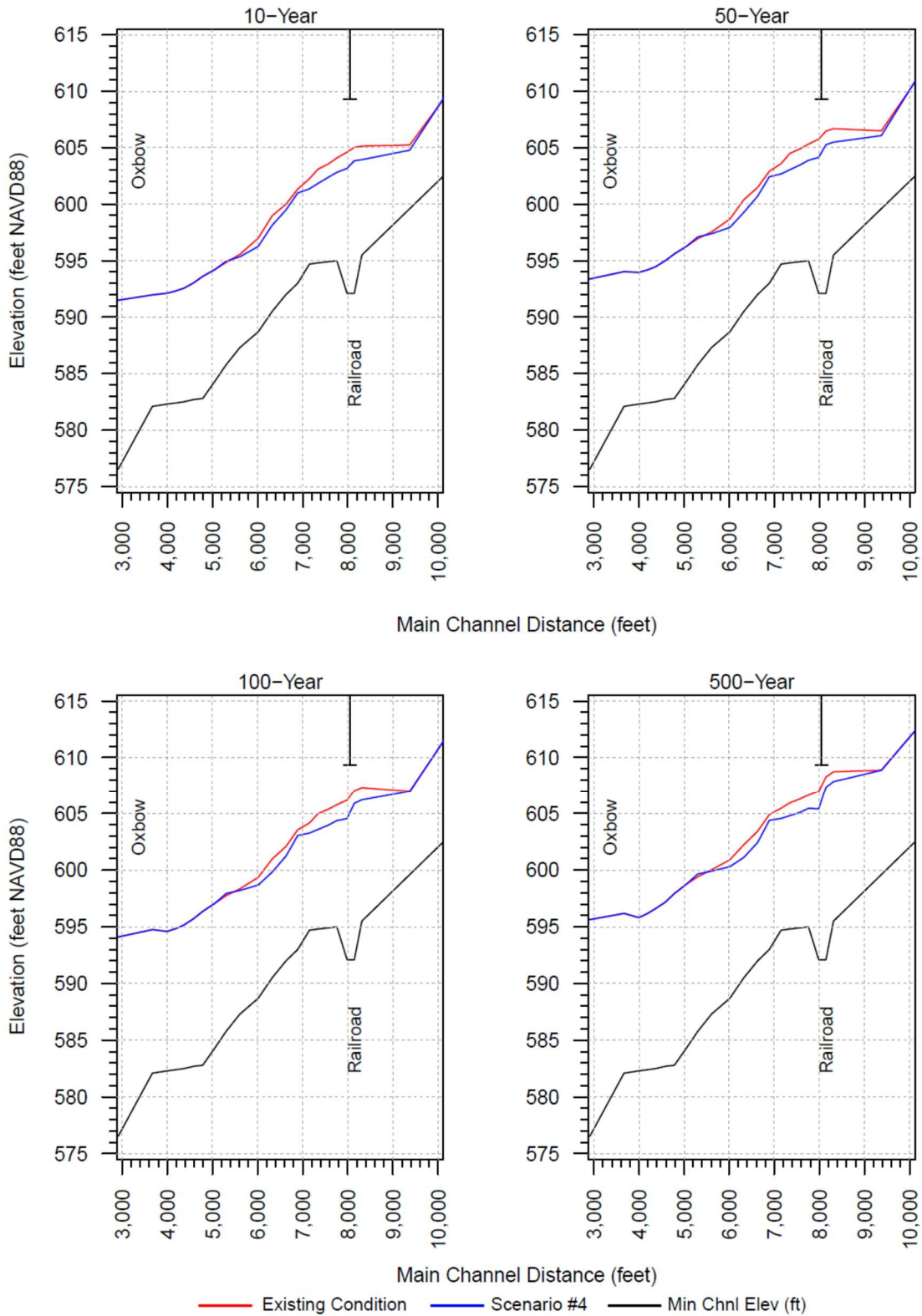


Figure 8. HEC-RAS Model Results for Flood Bench Scenario #4.

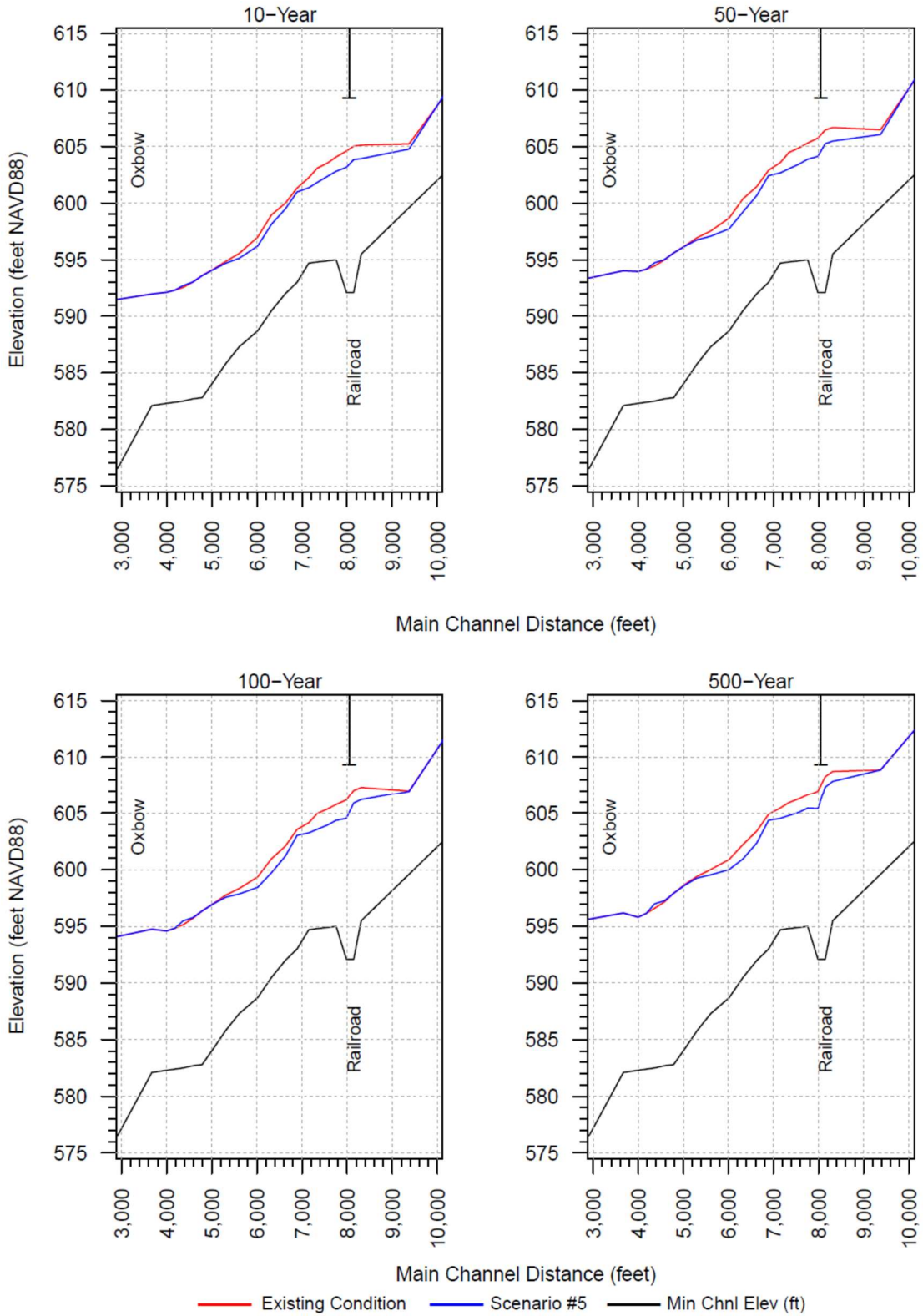


Figure 9. HEC-RAS Model Results for Flood Bench Scenario #5 .

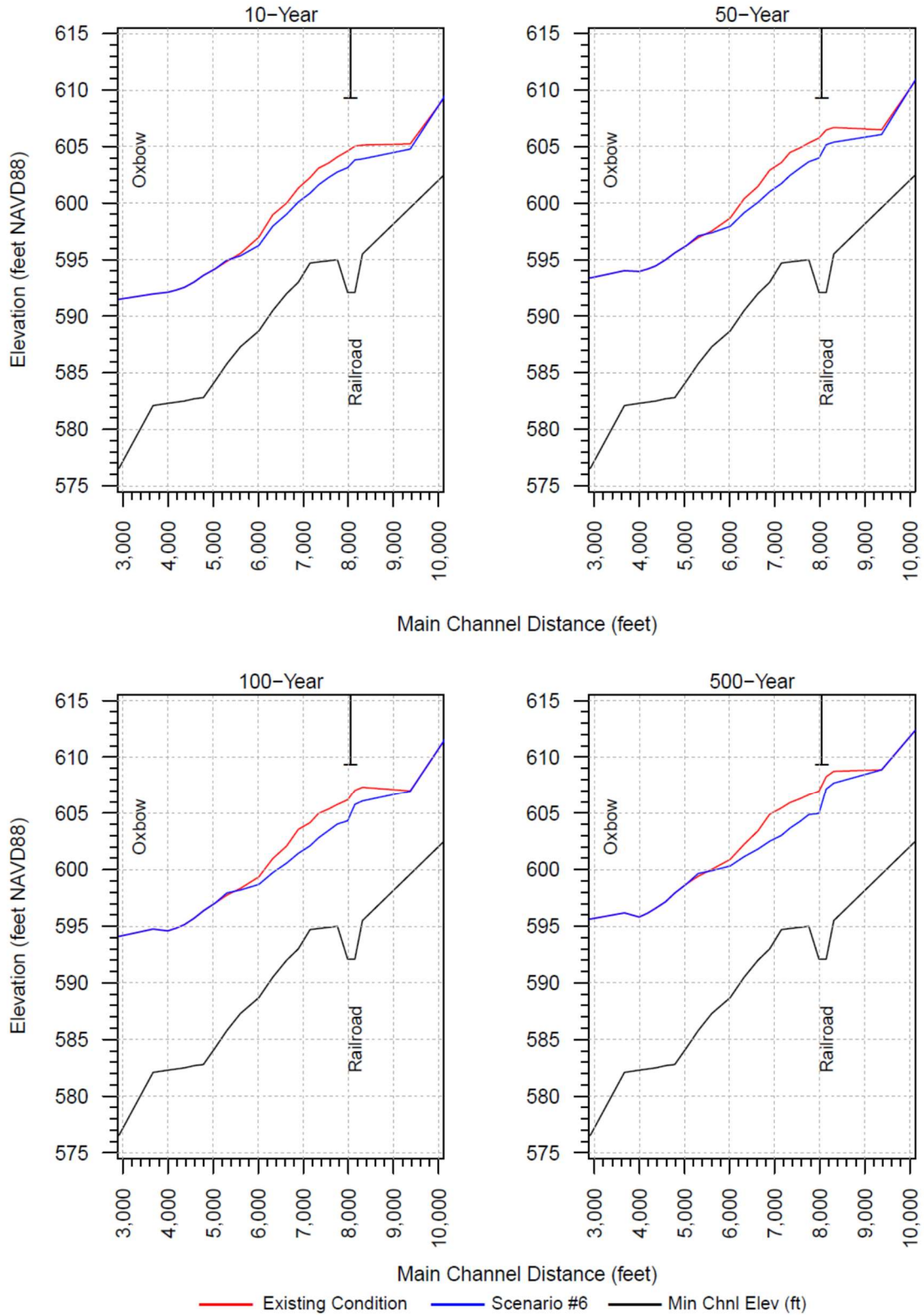


Figure 10. HEC-RAS Model Results for Flood Bench Scenario #6.

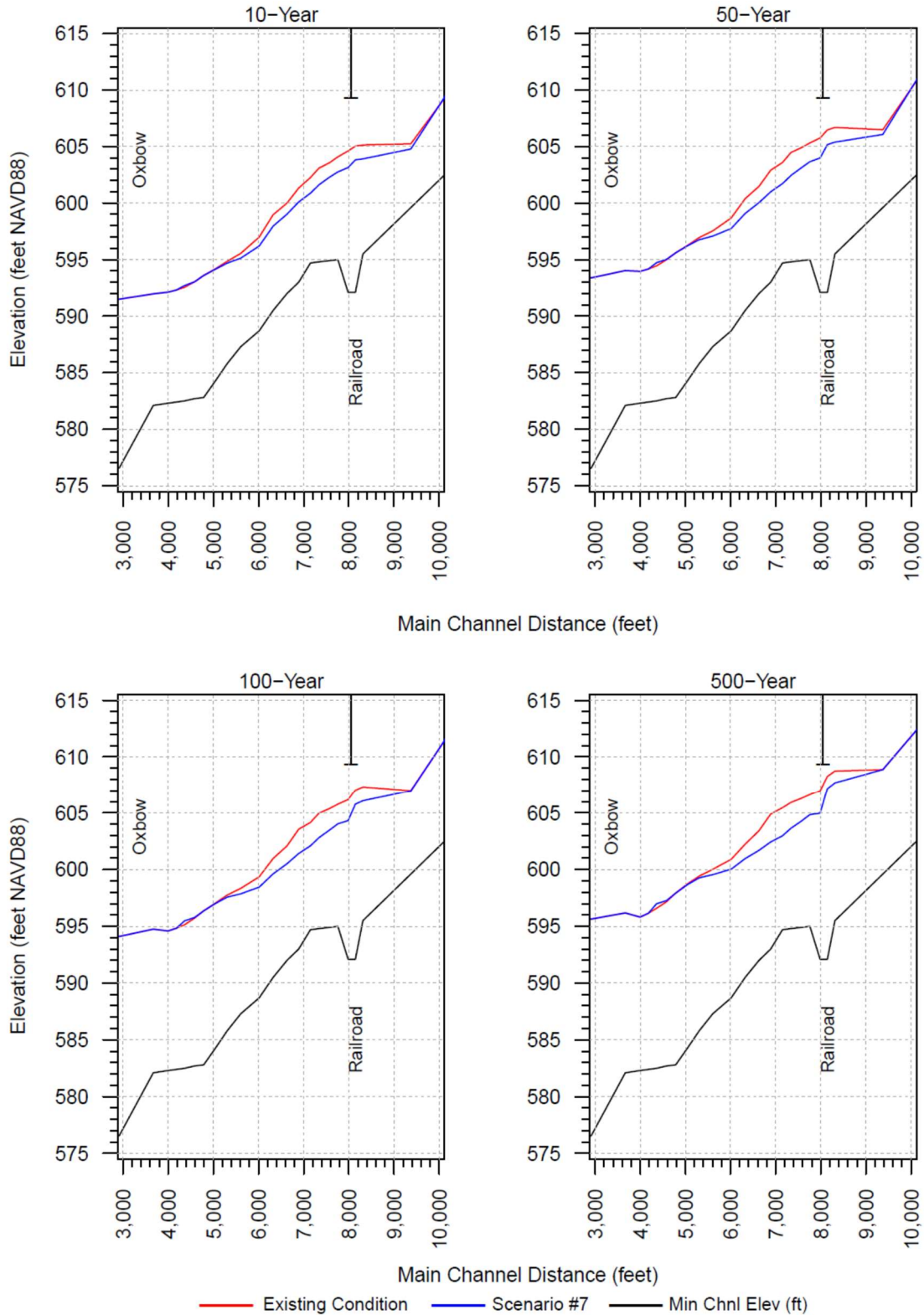


Figure 11. HEC-RAS Model Results for Flood Bench Scenario #7.

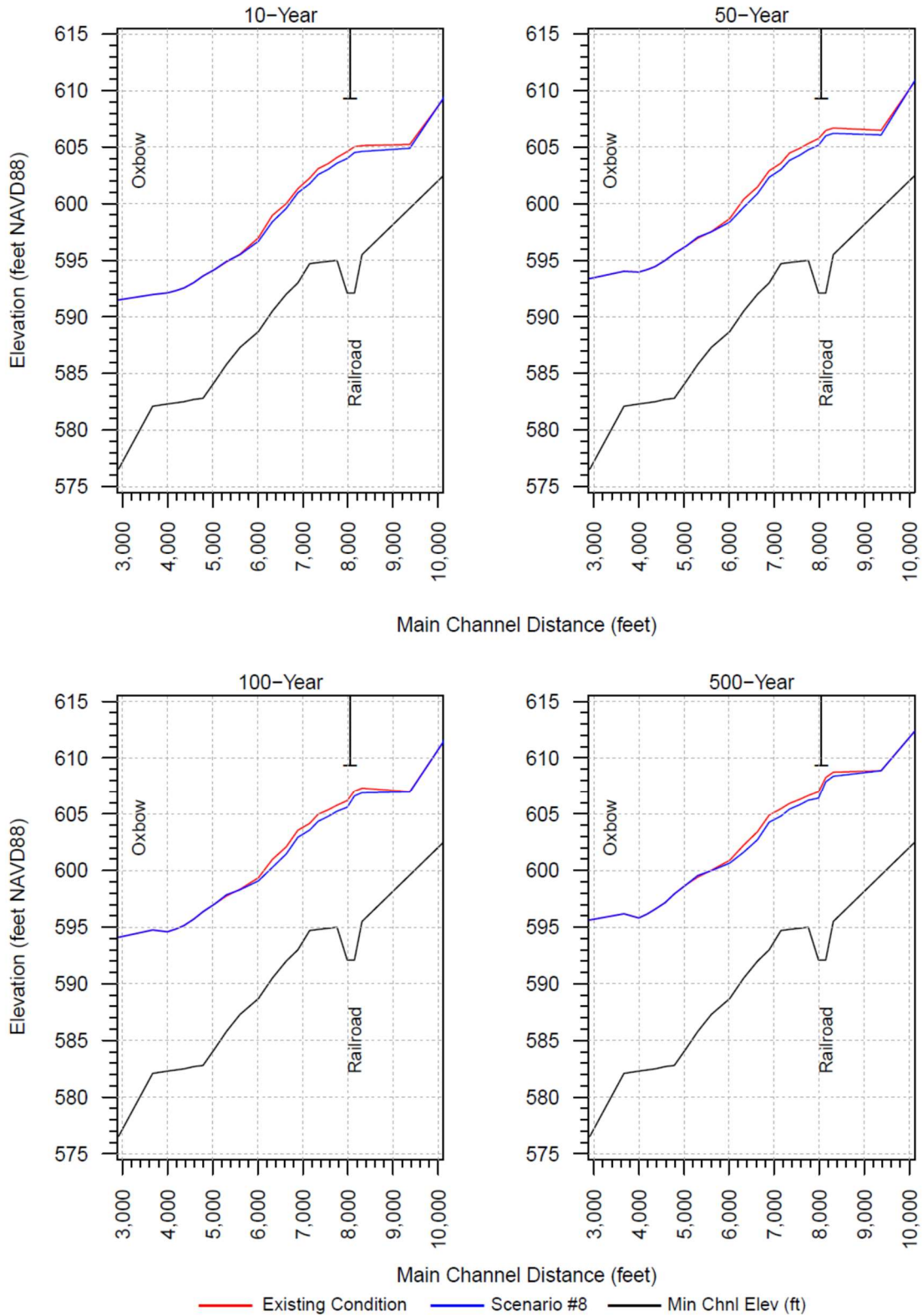


Figure 12. HEC-RAS Model Results for Flood Bench Scenario #8.

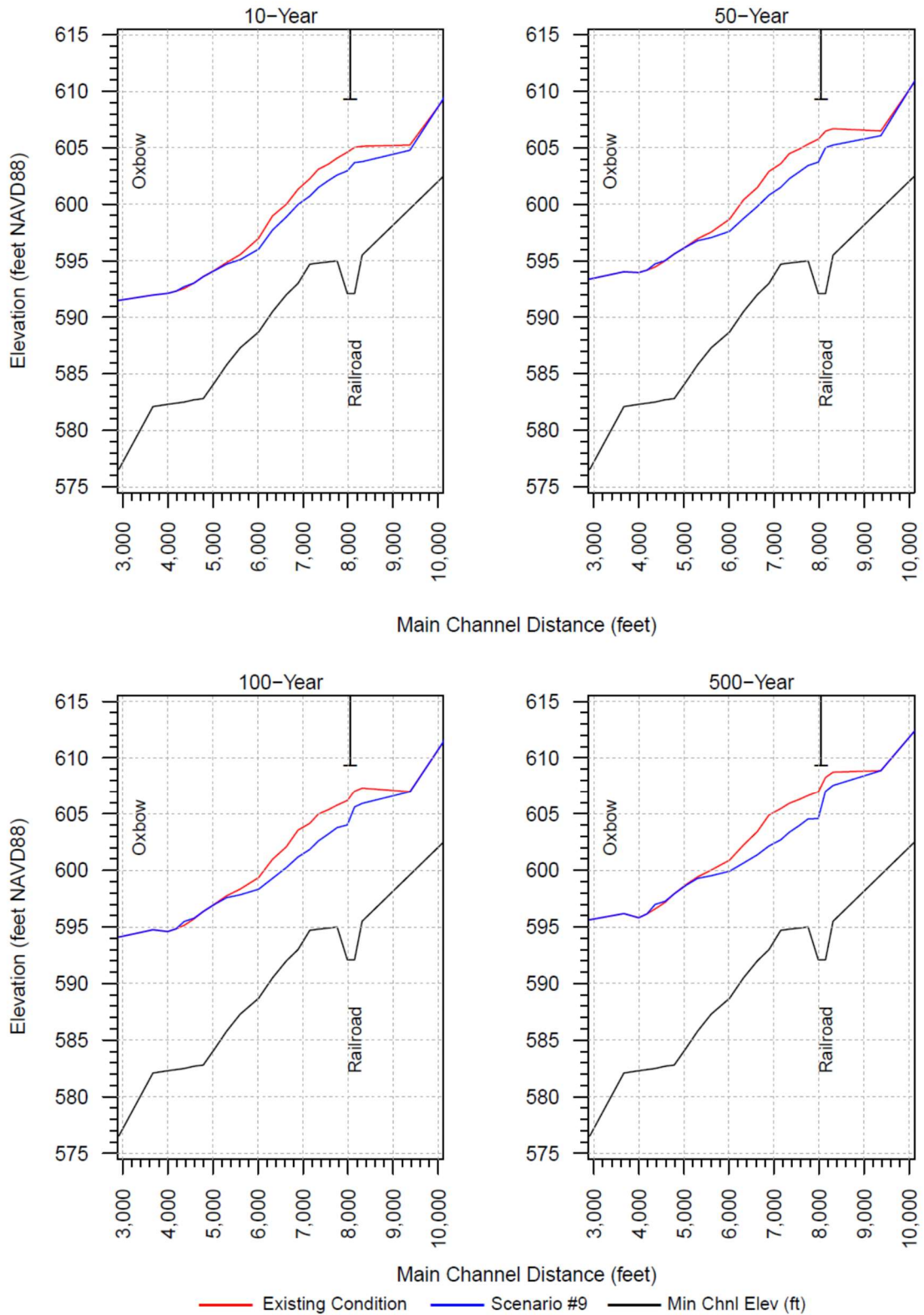


Figure 13. HEC-RAS Model Results for Flood Bench Scenario #9.

4 Conclusion

Based on the results of the H&H modeling, there are multiple flood bench configurations that could provide significant flood mitigation benefits to the Lexington Green neighborhood and surrounding areas. The top three scenarios that produced the largest reduction of water surface elevations were:

1. **Scenario #9:** Up to 2.8-ft of modeled water surface elevation reductions
2. **Scenario #7:** Up to 2.5-ft of modeled water surface elevation reductions
3. **Scenario #6:** Up to 2.4-ft of modeled water surface elevation reductions

Scenario #9 involved utilizing flood benches from all 6 proposed locations, while Scenario #7 involved flood benches 1b, 2, 3, and 4 and Scenario #6 involved flood benches 2, 3, and 4. None of the remaining scenarios exceeded 2-ft of water surface elevation reductions, with Scenarios #1, 2, and 8 producing the lowest water surface elevation reductions of less than 1-ft.

The common element between the top three scenarios was the involvement of flood benches 2, 3, and 4. As of November 2022, the landowners for flood benches 2 and 3 have expressed interest in pursuing flood mitigation projects on their properties, such as the proposed flood benches.

Flood bench 4 involves land owned by National Grid and contains utility equipment and transmission lines. Any flood mitigation project involving this land would require permission and coordination with National Grid. As of November 2022, the project team and Buffalo Niagara Waterkeepers were in contact with company representatives regarding potential interest in pursuing a flood mitigation project.

Flood benches 1a and 1b involve land owned by Canisius High School. As of November 2022, the school has started construction on the two new baseball fields, practice field, and tennis courts. Flood bench 1a would involve land being used for this new construction and, as such, would most likely not be supported by the school. Flood bench 1b does not involve land impacted by the new construction and may be potentially supported by the school. As of November 2022, the project team and Buffalo Niagara Waterkeepers were in discussions with school representatives regarding potential interest in pursuing a flood mitigation project, such as flood bench 1b.

Based on the analysis performed in this study, the Project Team recommends Scenario #6 be considered for advancement. Scenario #6 provided significant and measurable flood mitigation benefits based on the H&H modeling simulations and requires the least number of property owner participants. In addition, the property owners for flood benches 2 and 3 have expressed interest in participating in the project during individual and the public engagement meeting. Figure 14 displays the location and extent of the flood benches for Scenario #6. Attachment D displays a sectional view for the flood benches that comprise Scenario #6.

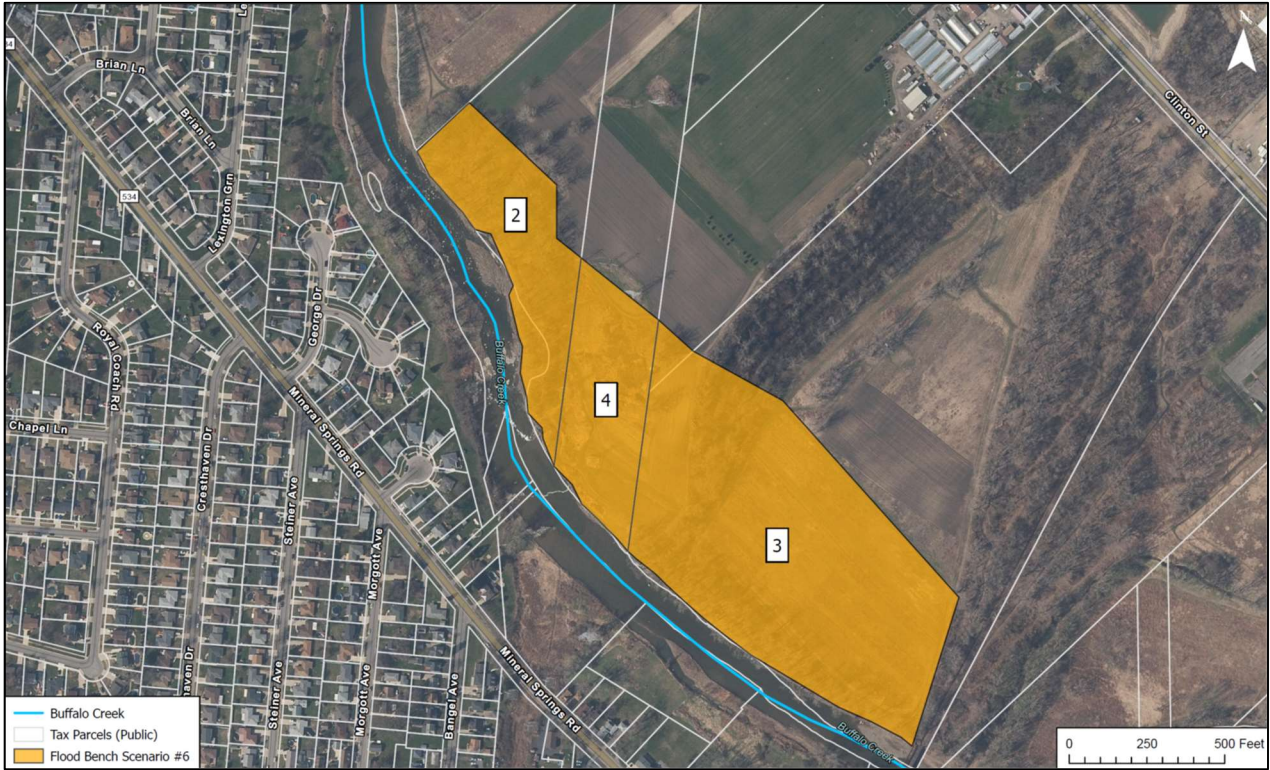


Figure 14. Flood bench locations and extent for Scenario #6.

There are some potential constraints to Scenario #6 that should be considered by the Project Team and community moving forward. The property owner of flood bench 4 is National Grid, which has transmission line equipment and towers within the proposed flood bench area. Coordination and buy-in from National Grid, in conjunction with design plans that mitigate any impacts to their utility equipment and towers, would be necessary to progress Scenario #6. The availability of potential State and/or Federal funding through grants, loans, awards, etc. would also need to be considered. Finally, the Oxbow along Buffalo Creek downstream of the Lexington Green neighborhood is a protected wetland so coordination with the New York State Department of Environmental Conservation (NYSDEC) would be necessary for any flood mitigation project along Buffalo Creek in the project area.

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ATTACHMENT A: FIELD NOTES

November 2nd - Buffalo Creek field work

Personnel - Lexi Hackford & Michelle McEntire

Benchmark was sill #5 - crest elevation of 585.7' based on USACE Document attached

Survey Point #1

BS	HI	FS	ELEV.	Description
14.7'			585.7'	BM = Crest of Sill #5
	600.40'			
		15.8'	584.60'	Bottom of Creek (upstream of sill)
		16.0'	584.4'	Bottom of Creek (downstream of sill)
		13.5'	586.9'	Bank full Elev. (Top Bank Zone)
		11.3'	589.1'	Overbank Elev. (Top of Overbank)
		4.5'	595.9'	Upland Elev. (where surveyor laser was)

* These water bottom elevations were taken from 30'-40' out into the water with Michelle standing on the sill.

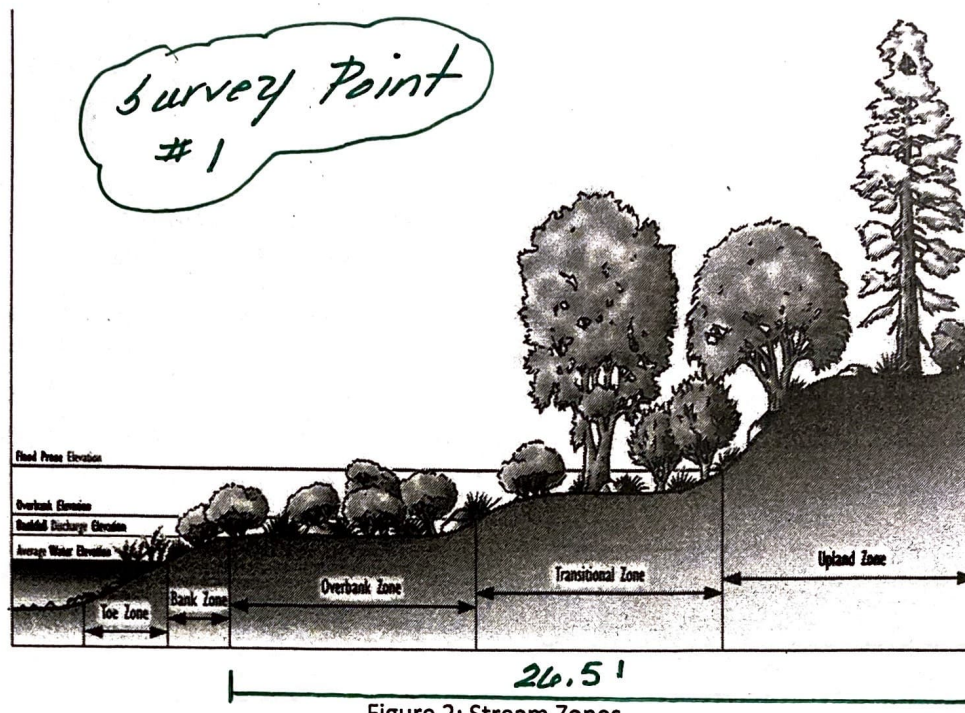


Figure 2: Stream Zones

Step 3 – Bank Soil Composition

Instructions: Visually and tactilely (i.e., using your hands / trowel) assess the relative size of the bank material. Record the type of stratification using the Soil Stratification in the figure below. Assign percent of sub-reach length to each material category. Note that cohesive banks are composed of soil, which has a certain percentage of silt and clay. Non-cohesive banks lack silt and clay, though can be a mixture of sands, gravel, cobbles, etc. Table 1 contains descriptions and lengths associated with each sediment class. Using Figure 1, columns 3 and 4 as reference for recording observations on bank stratification and composition.

GPS enabled pictures should be taken from a head on view that clearly shows any stratification.

Table 1. Grain size descriptions

Type	Cohesive		Non-Cohesive		
	Silt / Clay (soil)	Sand	Gravel	Cobble	Boulder
Grain Size	< 0.062 mm	0.063 to 2 mm	2 to 64 mm	64 to 256 mm	256 + mm
Description	Fine texture, cohesive, smooth when rubbed between fingers	Fine sugar to kosher salt sized particles	Peppercorn to egg sized	Baseball to grapefruit sized	Melon sized and larger

Step 4 – Bank Angle and Shape

Instructions: The bank angle categories are as follows: Mild (0°-30°), Moderate (30°-60°), Steep (60°-90°), and Overhang (> 90°). Evaluate percent of each sub-reach having each bank angle category. Bank Shape is focused on the potential for or evidence of erosion. Record the "shape" using Figure 1, column 2.

The top of Sill #5 was used as the benchmark for the second survey location.

Survey #2
Point

<u>BS</u>	<u>HI</u>	<u>FS</u>	<u>Elev.</u>	<u>Description</u>
12.8'			585.7'	Bm = Crest of Sill #5
	598.50'			
		9.9'	588.6'	Bottom of creek right @ edge
		8.7'	589.8'	Top of bank
		6.8'	591.7'	Bankfull Elev. (Top of Bank Zone)
		4.1'	594.4'	Overbank Elev. (where survey laser was)

Unfortunately, no length measurements were taken @ this spot due to the density of the trees & grass.

There wasn't a clear overbank, transitional & upland zone. One zone covered all three of zones & was very gradually sloping.

To get to the next creek survey location, we needed to use an intermediate survey location to get us down the creek

<u>BS</u>	<u>HI</u>	<u>FS</u>	<u>Elev.</u>	<u>Description</u>
	598.50'	6.9'	591.6'	location / spot where survey equip. will be moved to.

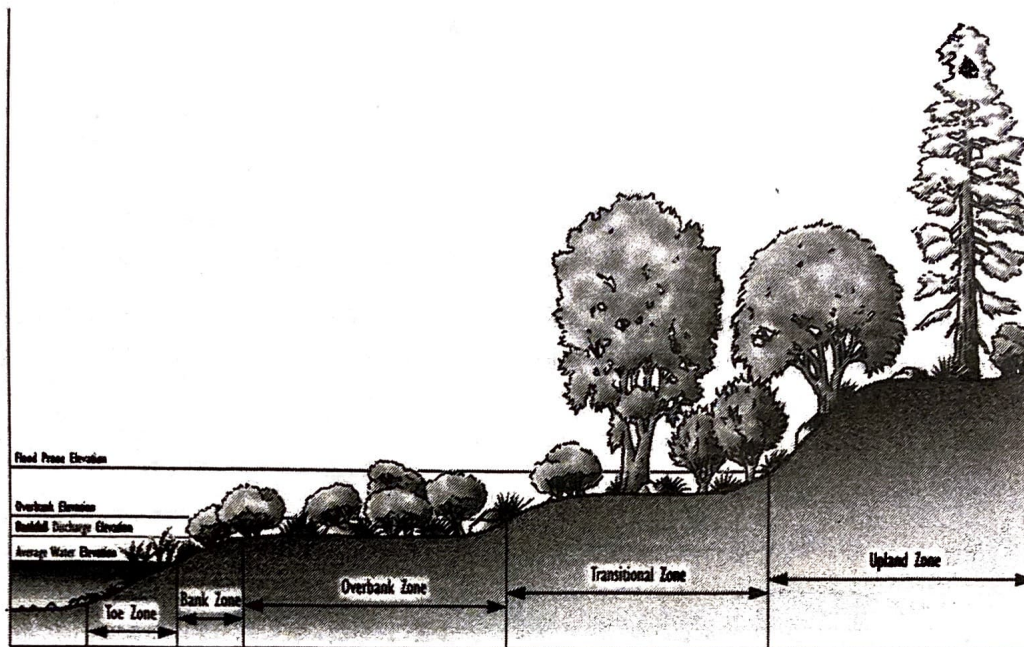
survey equipment was now moved to this location. Instrument Height was 4.2'. To get to the next creek survey location, we needed to move the survey equip. again

<u>BS</u>	<u>HI</u>	<u>FS</u>	<u>Elev.</u>	<u>Description</u>
	$= 591.6' + 4.2'$ $= 595.8'$	5.7'	590.1'	location / spot where the survey equip. was moved to.

Survey location #3

Survey location #4

<u>BS</u>	<u>HI</u>	<u>FS</u>	<u>Elev.</u>	<u>Descriptions</u>
	= 590.1' + 4.2'			
	= 594.3'			
		12.8'	581.5'	In the water along the bank
		10.8'	583.5'	Bank full Elev. (Top of Bank zone)
		7.1'	587.2'	Overbank Elev. (Top of overbank)
		5.6'	588.7'	Upland Elev. (closer to where the survey equip. was)



29.5'

Figure 2: Stream Zones

Step 3 – Bank Soil Composition

62.0'

Instructions: Visually and tactilely (i.e., using your hands / trowel) assess the relative size of the bank material. Record the type of stratification using the Soil Stratification in the figure below. Assign percent of sub-reach length to each material category. Note that cohesive banks are composed of soil, which has a certain percentage of silt and clay. Non-cohesive banks lack silt and clay, though can be a mixture of sands, gravel, cobbles, etc. Table 1 contains descriptions and lengths associated with each sediment class. Using Figure 1, columns 3 and 4 as reference for recording observations on bank stratification and composition.

GPS enabled pictures should be taken from a head on view that clearly shows any stratification.

Table 1. Grain size descriptions

Type	Cohesive		Non-Cohesive		
	Silt / Clay (soil)	Sand	Gravel	Cobble	Boulder
Grain Size	< 0.062 mm	0.063 to 2 mm	2 to 64 mm	64 to 256 mm	256 + mm
Description	Fine texture, cohesive, smooth when rubbed between fingers	Fine sugar to kosher salt sized particles	Peppercorn to egg sized	Baseball to grapefruit sized	Melon sized and larger

Step 4 – Bank Angle and Shape

Instructions: The bank angle categories are as follows: Mild (0°-30°), Moderate (30°-60°), Steep (60°-90°), and Overhang (> 90°). Evaluate percent of each sub-reach having each bank angle category. Bank Shape is focused on the potential for or evidence of erosion. Record the “shape” using Figure 1, column 2.

Stream Assessment Protocol Form

~~Step 1~~ — ~~Wollman Pebble Count~~ — use additional form

Location 1

Step 2 — Bank Vegetation Assessment: Record Percentage of Bank Covered by Ground Cover, record presence of absence of roots in, on or exposed.

Zone	Percent Coverage	Description
Bank	90/10	grasses, bushes / Rock
Stream Edge	100%	grasses
Overbank	90/10	few exposed roots grasses, bushes / Rock

Step 3 — Bank Soil Assessment: Count the total number of stratifications, record the total and then complete the table to record the type from Table 1 of the instructions and description of relevant features.

Number of total Stratifications 2

Stratification No.	Type	Description
1 (bottom)	cohesive	dark, clay /
2	boulder	boulders, patches that look like concrete

Step 4 – Bank Angle: Select one of the following and record the type in the space provided

Bank Angle Type	Check the appropriate One Below
Mild (0°-30°)	
Moderate (30°-60°)	<input checked="" type="checkbox"/>
Steep (60°-90°)	
Overhang (> 90°)	

Record the Type per the figure provided in the instructions Medium

Step 5 – Evidence of Bank Failure / Bed Stability: Selected one of the following and record the type and provide and relevant description.

Bank Angle Type	Check the appropriate One Below	Type	Description
Low (0 – 25%)			
Moderate (25 – 50%)	<input checked="" type="checkbox"/>	C	Some exposed roots, no fresh erosion
High (50 – 75%)			
Severe (70 – 100%)			

Step 4 – Bank Angle: Select one of the following and record the type in the space provided

Bank Angle Type	Check the appropriate One Below
Mild (0°-30°)	
Moderate (30°-60°)	<input checked="" type="checkbox"/>
Steep (60°-90°)	
Overhang (> 90°)	

Record the Type per the figure provided in the instructions LOW

Step 5 – Evidence of Bank Failure / Bed Stability: Selected one of the following and record the type and provide and relevant description.

Bank Angle Type	Check the appropriate One Below	Type	Description
Low (0 – 25%)	<input checked="" type="checkbox"/>	S C	no exposed roots or evidence of erosion
Moderate (25 – 50%)			
High (50 – 75%)			
Severe (70 – 100%)			

Stream Assessment Protocol Form

~~Step 1 – Wollman Pebble Count – use additional form~~

Survey point 3 (Location ²⁰¹⁵ led #4 on Survey notes)

Step 2 – Bank Vegetation Assessment: Record Percentage of Bank Covered by Ground Cover, record presence of absence of roots in, on or exposed.

Zone	Percent Coverage	Description
Bank	70/30	70% grasses 30% dirt/rock trail a few roots exposed from overbank trees
Stream Edge	90/10	grasses / rock
Overbank	90/10	grasses / trees no exposed roots

Step 3 – Bank Soil Assessment: Count the total number of stratifications, record the total and then complete the table to record the type from Table 1 of the instructions and description of relevant features.

Number of total Stratifications 1

Stratification No.	Type	Description
1	cohesive	Clay loam with scattered boulders

Step 4 – Bank Angle: Select one of the following and record the type in the space provided

Bank Angle Type	Check the appropriate One Below
Mild (0°-30°)	<input checked="" type="checkbox"/>
Moderate (30°-60°)	<input type="checkbox"/>
Steep (60°-90°)	<input type="checkbox"/>
Overhang (> 90°)	<input type="checkbox"/>

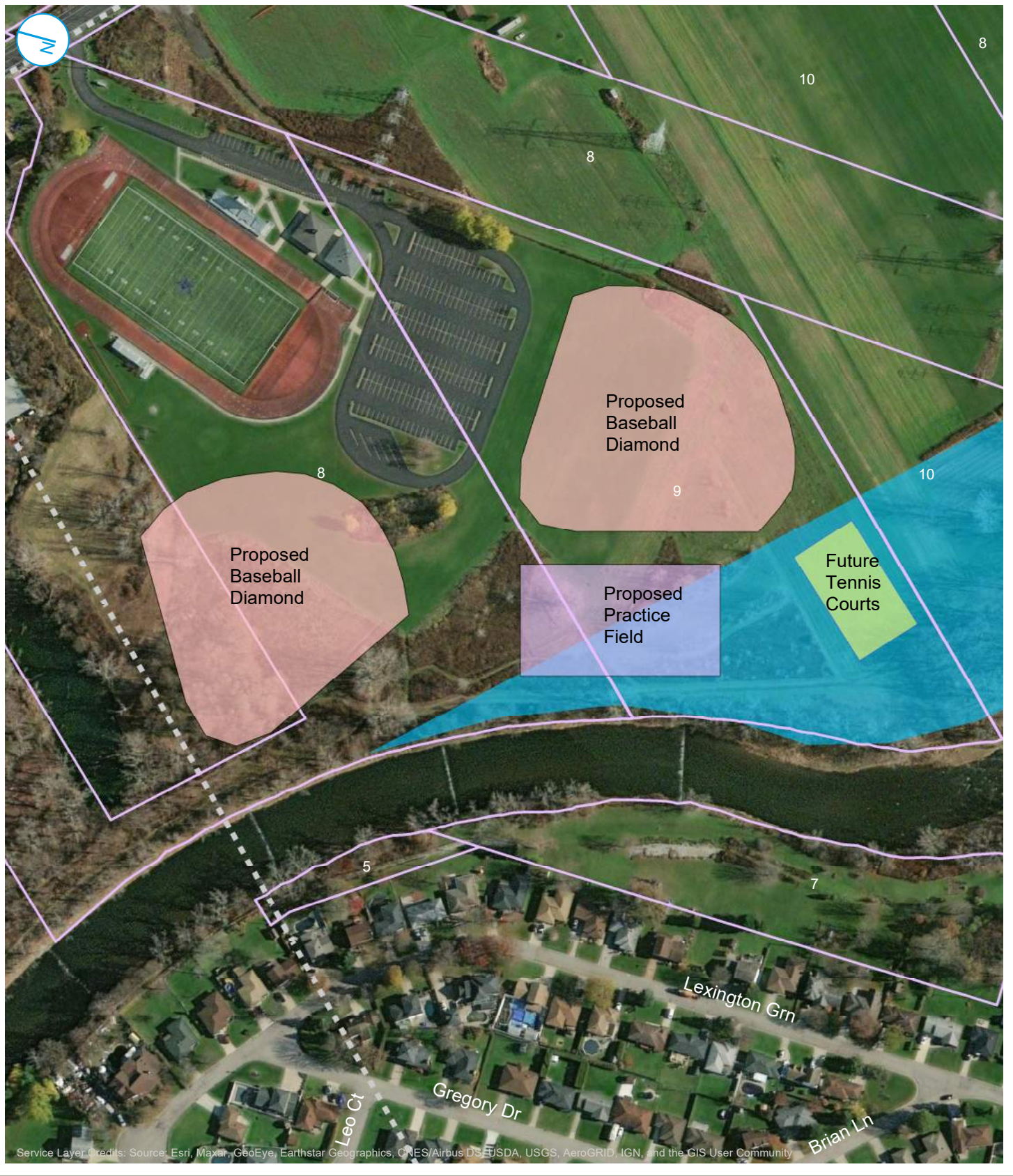
Record the Type per the figure provided in the instructions low

Step 5 – Evidence of Bank Failure / Bed Stability: Selected one of the following and record the type and provide and relevant description.

Bank Angle Type	Check the appropriate One Below	Type	Description
Low (0 – 25%)	<input checked="" type="checkbox"/>	High A	minor root exposure (single) tree
Moderate (25 – 50%)	<input type="checkbox"/>		
High (50 – 75%)	<input type="checkbox"/>		
Severe (70 – 100%)	<input type="checkbox"/>		



ATTACHMENT B: CANISIUS HIGH SCHOOL DEVELOPMENT PROJECT



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Approx. Location of Baseball Diamonds
- Approx. Location of Tennis Courts
- Approx. Location of Practice Field
- Proposed Flood Bench Footprint

**BUFFALO CREEK FLOODPLAIN
RECONNECTION STUDY**
APPROXIMATE LOCATION OF NEW CANISIUS
HIGH SCHOOL BASEBALL DIAMONDS



West Seneca
New York

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY





ATTACHMENT C: HEC-RAS MODEL SIMULATION OUTPUT

Feasibility & Design of Floodplain Reconnection of Buffalo Creek

1-D HEC-RAS Hydraulic & Hydrologic Model - Existing & Proposed Conditions
Buffalo Creek - Town of West Seneca, Erie County, NY
Ramboll Americas Engineering Solutions, Inc.

November 09, 2022

Contents

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Flood Scenario #3	29
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Flood Scenario #7	53
Flood Scenario #8	59
Flood Scenario #9	65

FEMA Effective Model

Plan: Existing_Conditions_BC
Geometry: Existing_Conditions_BC
Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-BC ONLY
Date: November 2022

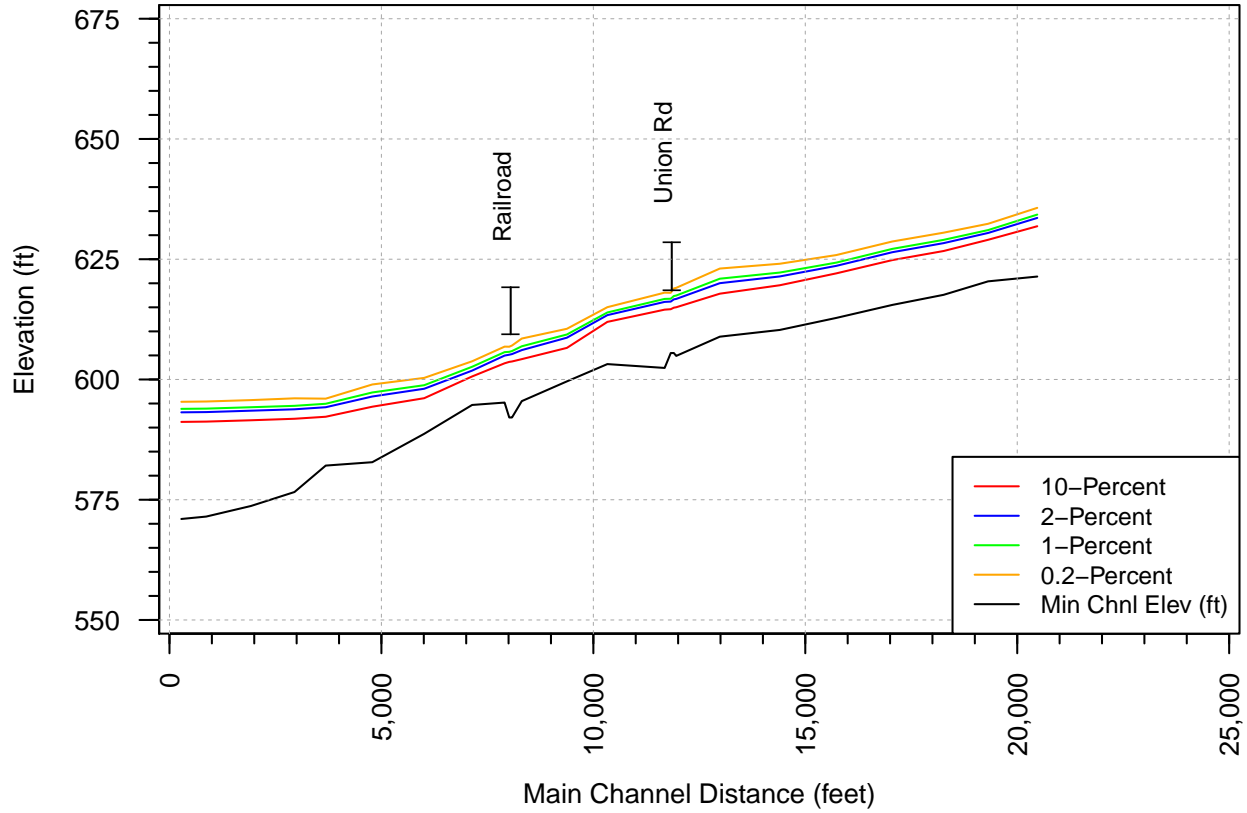


Figure 1: Effective FEMA Profile Plot

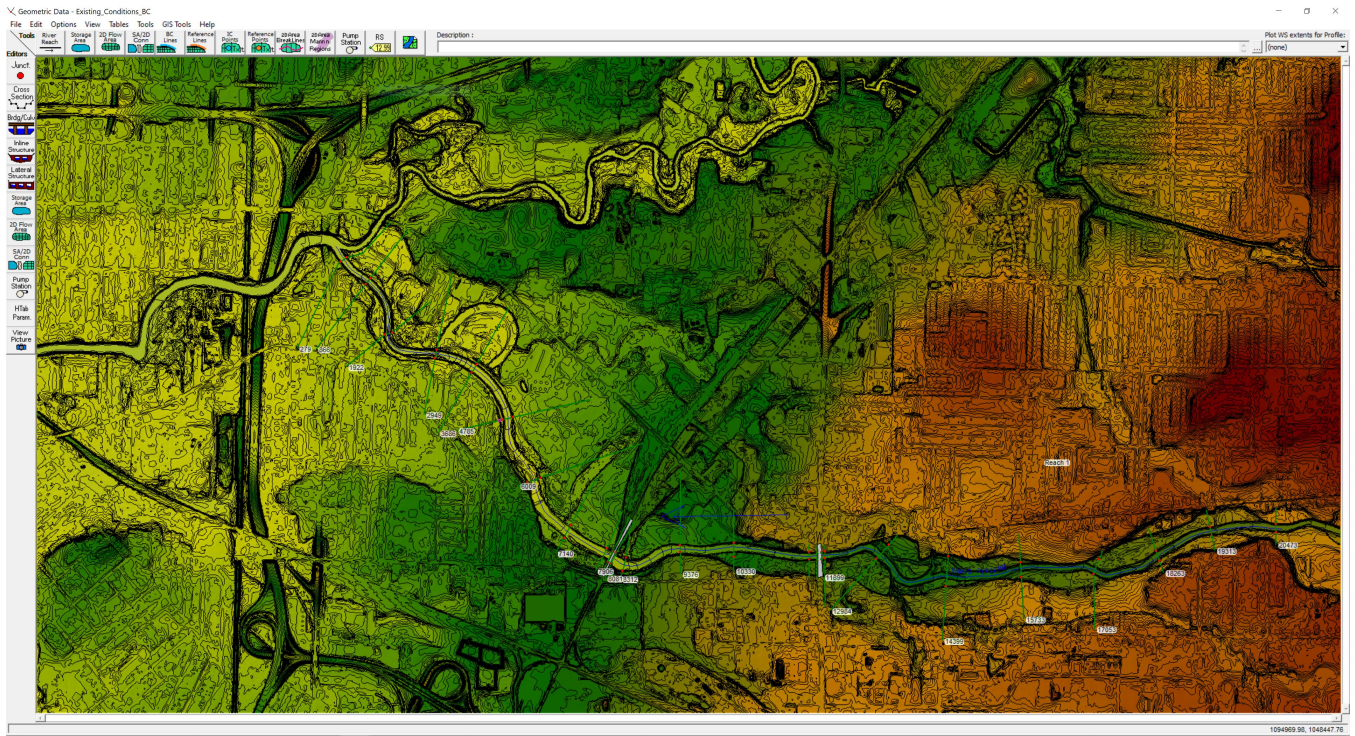


Figure 2: Terrain Map

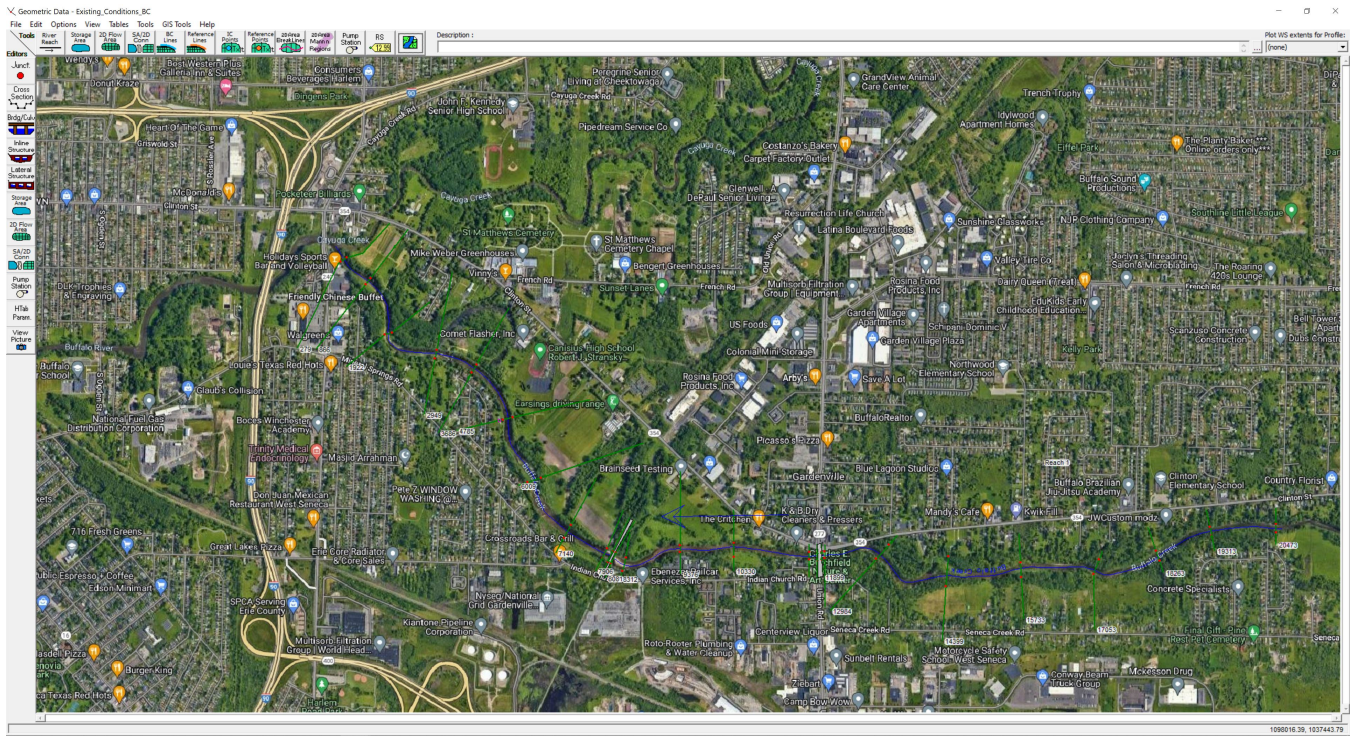


Figure 3: Aerial Map

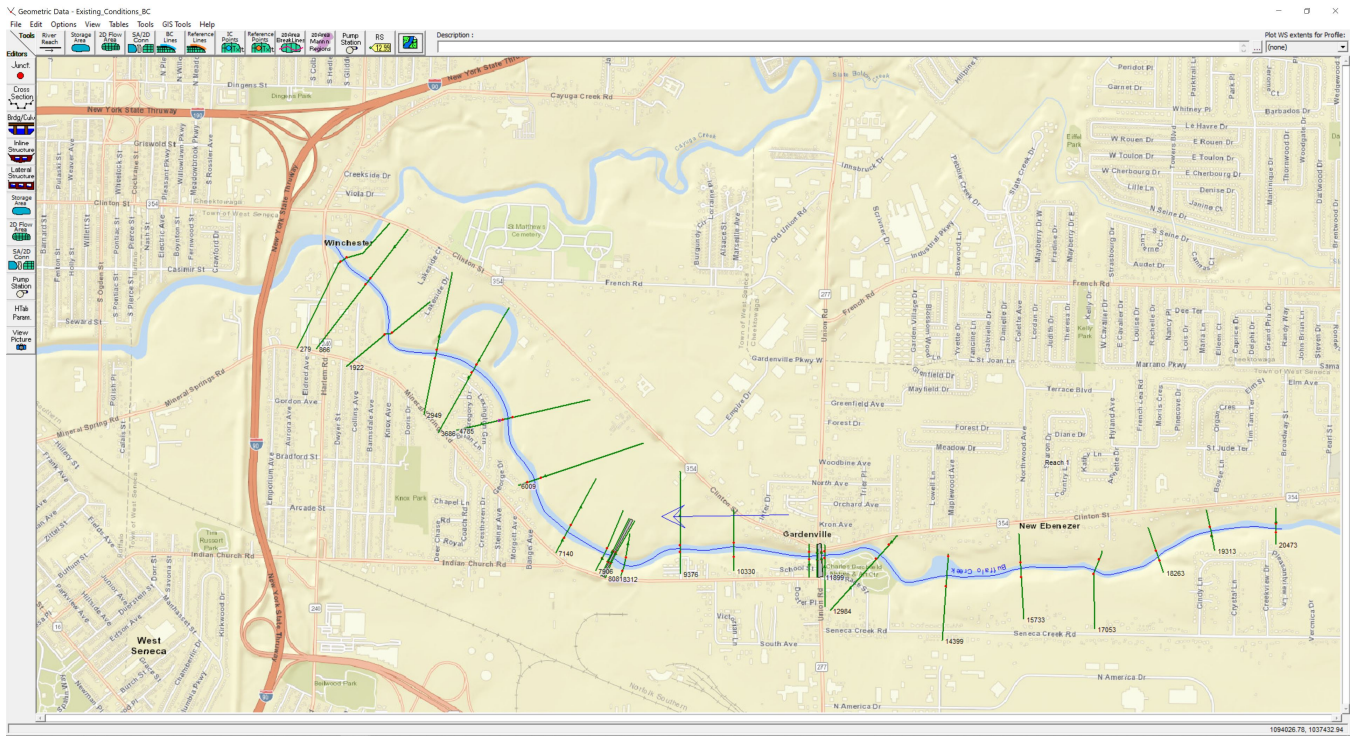


Figure 4: Street Map

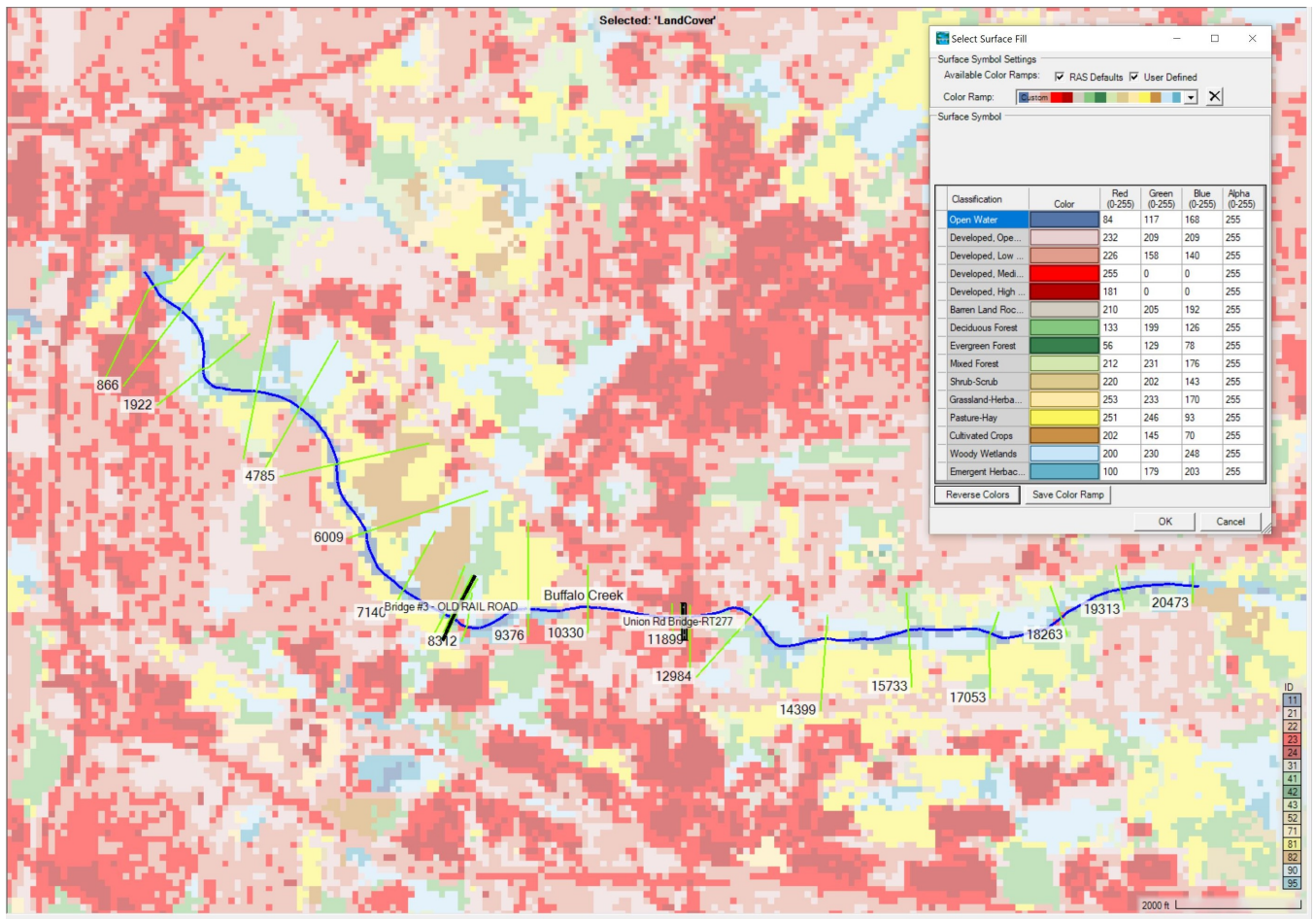


Figure 5: Land Cover Map

Steady Flow Data - USGS SS BF,10,2,1,0.2-Percent-BC ONLY

File Options Help

Description : USGS Streamstats peak discharges for bankfull (BF), 10-, 2-, 1-, and 0.2-percent Apply Data

Enter/Edit Number of Profiles (32000 max): 5 Reach Boundary Conditions ...

Locations of Flow Data Changes

River: Buffalo Creek Add Multiple...

Reach: Reach 1 River Sta.: 20473 Add A Flow Change Location

Flow Change Location			Profile Names and Flow Rates				
River	Reach	RS	BF	10-Percent	2-Percent	1-Percent	0.2-Percent
1 Buffalo Creek	Reach 1	20473	3190	7990	11800	13600	18000

Steady Flow Boundary Conditions

Set boundary for all profiles Set boundary for one profile at a time

Available External Boundary Condition Types

Known W.S. Critical Depth Normal Depth Rating Curve Delete

Selected Boundary Condition Locations and Types

River	Reach	Profile	Upstream	Downstream
Buffalo Creek	Reach 1	all		Normal Depth S = 0.00012

Steady Flow Reach-Storage Area Optimization ... OK Cancel Help

Enter to accept data changes.

Figure 6: Steady Flow Data

Table 1: Effective FEMA HEC-RAS Output

Alternative	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
Effective (FEMA)			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Effective (FEMA)	20473	10-Percent	7990	621.4	631.86	627.21	632.43	0.001879	6.06	1357.15	185.89	0.36
Effective (FEMA)	20473	2-Percent	11800	621.4	633.59	628.68	634.42	0.0022	7.37	1814.85	337.27	0.4
Effective (FEMA)	20473	1-Percent	13600	621.4	634.28	629.31	635.2	0.002304	7.86	2050.38	348.33	0.41
Effective (FEMA)	20473	0.2-Percent	18000	621.4	635.68	630.7	636.83	0.002546	8.93	2545.61	430.52	0.44
Effective (FEMA)												
Effective (FEMA)	19313	10-Percent	7990	620.4	629.04	626.42	629.94	0.002401	7.64	1188.06	371.96	0.5
Effective (FEMA)	19313	2-Percent	11800	620.4	630.46	627.85	631.63	0.002578	8.93	1736.04	393.96	0.54
Effective (FEMA)	19313	1-Percent	13600	620.4	631.06	628.77	632.32	0.002611	9.4	1973.09	435.77	0.55
Effective (FEMA)	19313	0.2-Percent	18000	620.4	632.37	630.34	633.81	0.002617	10.3	2686.88	616.08	0.56
Effective (FEMA)												
Effective (FEMA)	18263	10-Percent	7990	617.6	626.71		627.1	0.002735	5.31	1958.7	490.71	0.35
Effective (FEMA)	18263	2-Percent	11800	617.6	628.35		628.77	0.002437	5.76	2775.42	505.97	0.34
Effective (FEMA)	18263	1-Percent	13600	617.6	629.03		629.47	0.002368	5.97	3120.59	528.93	0.34
Effective (FEMA)	18263	0.2-Percent	18000	617.6	630.52		631	0.002222	6.37	3962.61	582.35	0.34
Effective (FEMA)												
Effective (FEMA)	17053	10-Percent	7990	615.5	624.82		625.08	0.00109	4.14	2123.56	507.77	0.28
Effective (FEMA)	17053	2-Percent	11800	615.5	626.46		626.79	0.001151	4.7	3050.49	590.59	0.29
Effective (FEMA)	17053	1-Percent	13600	615.5	627.15		627.5	0.00116	4.91	3461.86	606.87	0.29
Effective (FEMA)	17053	0.2-Percent	18000	615.5	628.69		629.08	0.001157	5.31	4423.83	643.35	0.29
Effective (FEMA)												
Effective (FEMA)	15733	10-Percent	7990	612.8	622.06		622.48	0.004504	5.23	1595.1	339.76	0.38
Effective (FEMA)	15733	2-Percent	11800	612.8	623.62		624.15	0.004205	5.93	2138.64	356.94	0.39
Effective (FEMA)	15733	1-Percent	13600	612.8	624.3		624.87	0.004065	6.19	2384.91	364.46	0.39
Effective (FEMA)	15733	0.2-Percent	18000	612.8	625.87		626.53	0.003756	6.7	2969.53	381.71	0.38
Effective (FEMA)												
Effective (FEMA)	14399	10-Percent	7990	610.3	619.59		619.72	0.001125	2.94	2736.44	557.25	0.23
Effective (FEMA)	14399	2-Percent	11800	610.3	621.42		621.58	0.001029	3.18	3784.79	603.21	0.21
Effective (FEMA)	14399	1-Percent	13600	610.3	622.23		622.39	0.000985	3.27	4284.67	642.12	0.21
Effective (FEMA)	14399	0.2-Percent	18000	610.3	624.06		624.24	0.000889	3.45	5542.19	730.19	0.2
Effective (FEMA)												
Effective (FEMA)	12984	10-Percent	7990	608.9	617.84	613.62	618.05	0.001233	3.67	2389.78	893.91	0.25
Effective (FEMA)	12984	2-Percent	11800	608.9	620.02	614.63	620.21	0.000912	3.67	4326.06	1181.3	0.22
Effective (FEMA)	12984	1-Percent	13600	608.9	620.95	615.06	621.13	0.000811	3.66	5176.31	1272.6	0.21
Effective (FEMA)	12984	0.2-Percent	18000	608.9	623.06	615.87	623.2	0.000601	3.52	8370.15	1572.53	0.18
Effective (FEMA)												
Effective (FEMA)	11955	10-Percent	7990	604.9	615.01	612.1	616.18	0.002568	8.69	924.84	115.44	0.53
Effective (FEMA)	11955	2-Percent	11800	604.9	616.75	613.77	618.5	0.002969	10.6	1129.59	119.54	0.59
Effective (FEMA)	11955	1-Percent	13600	604.9	617.45	614.48	619.47	0.003147	11.42	1214.02	121.18	0.61
Effective (FEMA)	11955	0.2-Percent	18000	604.9	619.05	616.1	621.72	0.003466	13.14	1411.27	174.44	0.66
Effective (FEMA)												
Effective (FEMA)	11899	10-Percent	7990	605.5	614.93	611.65	616	0.002119	8.3	962.79	130.86	0.49
Effective (FEMA)	11899	2-Percent	11800	605.5	616.66	613.28	618.28	0.002537	10.24	1152.61	132.99	0.56
Effective (FEMA)	11899	1-Percent	13600	605.5	617.35	613.99	619.25	0.002724	11.07	1228.72	133.85	0.58

Table 1: Effective FEMA HEC-RAS Output (continued)

Alternative	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
Effective (FEMA)	11899	0.2-Percent	18000	605.5	618.92	615.6	621.48	0.003076	12.84	1401.69	135.79	0.63
Effective (FEMA)												
Effective (FEMA)	11850		Bridge									
Effective (FEMA)												
Effective (FEMA)	11826	10-Percent	7990	605.5	614.61	611.66	615.77	0.002395	8.61	928.14	131.85	0.52
Effective (FEMA)	11826	2-Percent	11800	605.5	616.19	613.28	617.97	0.002953	10.71	1101.34	134.59	0.6
Effective (FEMA)	11826	1-Percent	13600	605.5	616.79	614	618.9	0.003231	11.65	1167.3	135.63	0.63
Effective (FEMA)	11826	0.2-Percent	18000	605.5	618.02	615.6	620.99	0.003927	13.82	1302.64	137.77	0.71
Effective (FEMA)												
Effective (FEMA)	11682	10-Percent	7990	602.4	614.52	609.67	615.17	0.002389	6.46	1244.8	137.5	0.37
Effective (FEMA)	11682	2-Percent	11800	602.4	616.13	611.29	617.16	0.003083	8.14	1470.57	142.89	0.43
Effective (FEMA)	11682	1-Percent	13600	602.4	616.75	611.96	617.98	0.00341	8.88	1560.12	144.97	0.46
Effective (FEMA)	11682	0.2-Percent	18000	602.4	618.05	613.45	619.78	0.0042	10.57	1754.16	166.09	0.52
Effective (FEMA)												
Effective (FEMA)	10330	10-Percent	7990	603.2	611.97		612.43	0.001675	5.51	1681.17	500.21	0.41
Effective (FEMA)	10330	2-Percent	11800	603.2	613.38		613.93	0.001754	6.17	2513.69	604.81	0.41
Effective (FEMA)	10330	1-Percent	13600	603.2	613.93		614.52	0.001803	6.46	2844.33	615.96	0.42
Effective (FEMA)	10330	0.2-Percent	18000	603.2	615.03		615.73	0.001957	7.17	3547.28	655.76	0.43
Effective (FEMA)												
Effective (FEMA)	9376	10-Percent	7990	599.6	606.57	606.57	609.01	0.010011	12.55	651.58	155	0.98
Effective (FEMA)	9376	2-Percent	11800	599.6	608.69	608.69	610.92	0.006184	12.33	1297.68	464.97	0.81
Effective (FEMA)	9376	1-Percent	13600	599.6	609.35	609.35	611.54	0.005661	12.51	1638.94	592.59	0.79
Effective (FEMA)	9376	0.2-Percent	18000	599.6	610.54	610.54	612.73	0.005125	13.07	2398.05	784.81	0.77
Effective (FEMA)												
Effective (FEMA)	8312	10-Percent	7990	595.5	604.23	600.89	604.39	0.000756	3.61	3135.86	632.92	0.25
Effective (FEMA)	8312	2-Percent	11800	595.5	606.11	601.75	606.28	0.000667	3.83	4339.99	653.38	0.23
Effective (FEMA)	8312	1-Percent	13600	595.5	606.9	602.03	607.08	0.000643	3.93	4860.2	665.8	0.23
Effective (FEMA)	8312	0.2-Percent	18000	595.5	608.51	602.74	608.71	0.000631	4.25	5952.7	691.15	0.23
Effective (FEMA)												
Effective (FEMA)	8081	10-Percent	7990	592.1	603.74	599	604.19	0.000323	5.4	1479.58	233.07	0.32
Effective (FEMA)	8081	2-Percent	11800	592.1	605.28	600.29	606	0.000411	6.79	1738.93	244.39	0.37
Effective (FEMA)	8081	1-Percent	13600	592.1	605.91	600.81	606.75	0.000449	7.38	1844.06	248.98	0.39
Effective (FEMA)	8081	0.2-Percent	18000	592.1	607.06	602.02	608.27	0.000565	8.84	2037.19	257.42	0.45
Effective (FEMA)												
Effective (FEMA)	8050		Bridge									
Effective (FEMA)												
Effective (FEMA)	8016	10-Percent	7990	592.1	603.66	598.99	604.12	0.000333	5.45	1466.03	233.94	0.33
Effective (FEMA)	8016	2-Percent	11800	592.1	605.15	600.28	605.88	0.000429	6.87	1717.01	264.05	0.38
Effective (FEMA)	8016	1-Percent	13600	592.1	605.75	600.81	606.62	0.000472	7.48	1817.67	278.07	0.4
Effective (FEMA)	8016	0.2-Percent	18000	592.1	606.81	602.03	608.07	0.000605	9.02	1995.37	302.82	0.46
Effective (FEMA)												
Effective (FEMA)	7906	10-Percent	7990	595.2	603.36	600.11	603.99	0.001755	6.38	1284.81	286.01	0.43
Effective (FEMA)	7906	2-Percent	11800	595.2	604.97	601.4	605.78	0.001809	7.35	2134.95	730.62	0.45
Effective (FEMA)	7906	1-Percent	13600	595.2	605.68	601.95	606.51	0.001742	7.58	2600.53	813.62	0.44

Table 1: Effective FEMA HEC-RAS Output (continued)

Alternative	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
Effective (FEMA)	7906	0.2-Percent	18000	595.2	606.83	603.33	607.83	0.001868	8.5	3426.86	972.67	0.47
Effective (FEMA)												
Effective (FEMA)	7140	10-Percent	7990	594.7	600.63	599.43	601.78	0.005315	8.59	930.3	195.64	0.68
Effective (FEMA)	7140	2-Percent	11800	594.7	601.84	600.65	603.41	0.005866	10.09	1255.46	331.54	0.73
Effective (FEMA)	7140	1-Percent	13600	594.7	602.64	601.26	604.13	0.006453	9.9	1550.2	623.25	0.75
Effective (FEMA)	7140	0.2-Percent	18000	594.7	603.78	602.8	605.44	0.005804	10.58	2105.54	1027.17	0.73
Effective (FEMA)												
Effective (FEMA)	6009	10-Percent	7990	588.7	596.11	594.44	596.92	0.00342	7.23	1104.75	220.4	0.57
Effective (FEMA)	6009	2-Percent	11800	588.7	598.07	595.55	598.94	0.002619	7.47	1588.04	256.46	0.52
Effective (FEMA)	6009	1-Percent	13600	588.7	598.81	596.01	599.73	0.002442	7.72	1777.71	289.52	0.51
Effective (FEMA)	6009	0.2-Percent	18000	588.7	600.33	597.14	601.42	0.00223	8.39	2205.07	681.84	0.5
Effective (FEMA)												
Effective (FEMA)	4785	10-Percent	7990	582.8	594.34	589.35	594.77	0.000978	5.29	1534.76	231.35	0.33
Effective (FEMA)	4785	2-Percent	11800	582.8	596.46	590.78	597.03	0.000955	6.1	2102.1	335.63	0.34
Effective (FEMA)	4785	1-Percent	13600	582.8	597.3	591.38	597.9	0.000921	6.32	2781.05	1006.88	0.34
Effective (FEMA)	4785	0.2-Percent	18000	582.8	598.96	592.72	599.63	0.000915	6.91	4099.26	1398.68	0.34
Effective (FEMA)												
Effective (FEMA)	3686	10-Percent	7990	582.1	592.25	589.39	593.13	0.002378	7.52	1062.29	1099.81	0.5
Effective (FEMA)	3686	2-Percent	11800	582.1	594.23	590.84	595.39	0.002416	8.63	1366.84	1160.4	0.52
Effective (FEMA)	3686	1-Percent	13600	582.1	594.95	591.47	596.26	0.002498	9.18	1482.31	1182.96	0.53
Effective (FEMA)	3686	0.2-Percent	18000	582.1	596.01	592.86	597.84	0.003036	10.88	1721.6	1404.47	0.6
Effective (FEMA)												
Effective (FEMA)	2949	10-Percent	7990	576.6	591.83	583.94	592.1	0.000685	4.29	2306.47	579.23	0.22
Effective (FEMA)	2949	2-Percent	11800	576.6	593.8	585.69	594.18	0.000832	5.24	3153.84	1214.54	0.25
Effective (FEMA)	2949	1-Percent	13600	576.6	594.52	586.46	594.96	0.000903	5.64	3583.47	1392.58	0.26
Effective (FEMA)	2949	0.2-Percent	18000	576.6	596.08	587.96	596.42	0.00074	5.47	7419.76	1531.34	0.24
Effective (FEMA)												
Effective (FEMA)	1922	10-Percent	7990	573.7	591.52		591.61	0.000286	2.79	5489.86	928.94	0.13
Effective (FEMA)	1922	2-Percent	11800	573.7	593.51		593.61	0.00031	3.18	7392.46	990.68	0.14
Effective (FEMA)	1922	1-Percent	13600	573.7	594.23		594.34	0.000328	3.36	8115.49	1014.92	0.14
Effective (FEMA)	1922	0.2-Percent	18000	573.7	595.71		595.83	0.000369	3.77	10136.03	1635.61	0.16
Effective (FEMA)												
Effective (FEMA)	866	10-Percent	7990	571.5	591.24	580.81	591.37	0.000179	3.24	5406.25	1379.65	0.15
Effective (FEMA)	866	2-Percent	11800	571.5	593.22	582.7	593.36	0.000184	3.58	8790.22	2043.24	0.16
Effective (FEMA)	866	1-Percent	13600	571.5	593.94	583.47	594.08	0.000188	3.72	10396.74	2429.35	0.16
Effective (FEMA)	866	0.2-Percent	18000	571.5	595.42	585.09	595.56	0.00019	3.97	14133.19	2539.3	0.16
Effective (FEMA)												
Effective (FEMA)	279	10-Percent	7990	571	591.18	579.99	591.27	0.00012	2.78	4691.54	1038.63	0.13
Effective (FEMA)	279	2-Percent	11800	571	593.17	581.73	593.26	0.00012	3.02	6871.17	1257.66	0.13
Effective (FEMA)	279	1-Percent	13600	571	593.89	582.44	593.98	0.00012	3.1	7946.67	1792.75	0.13
Effective (FEMA)	279	0.2-Percent	18000	571	595.36	584	595.46	0.00012	3.27	11127.4	2319.49	0.13

Existing Conditions Model

Plan: Existing_Conditions_UPDATE_BC
Geometry: Existing_Conditions_UPDATE_BC
Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC
Date: November 2022

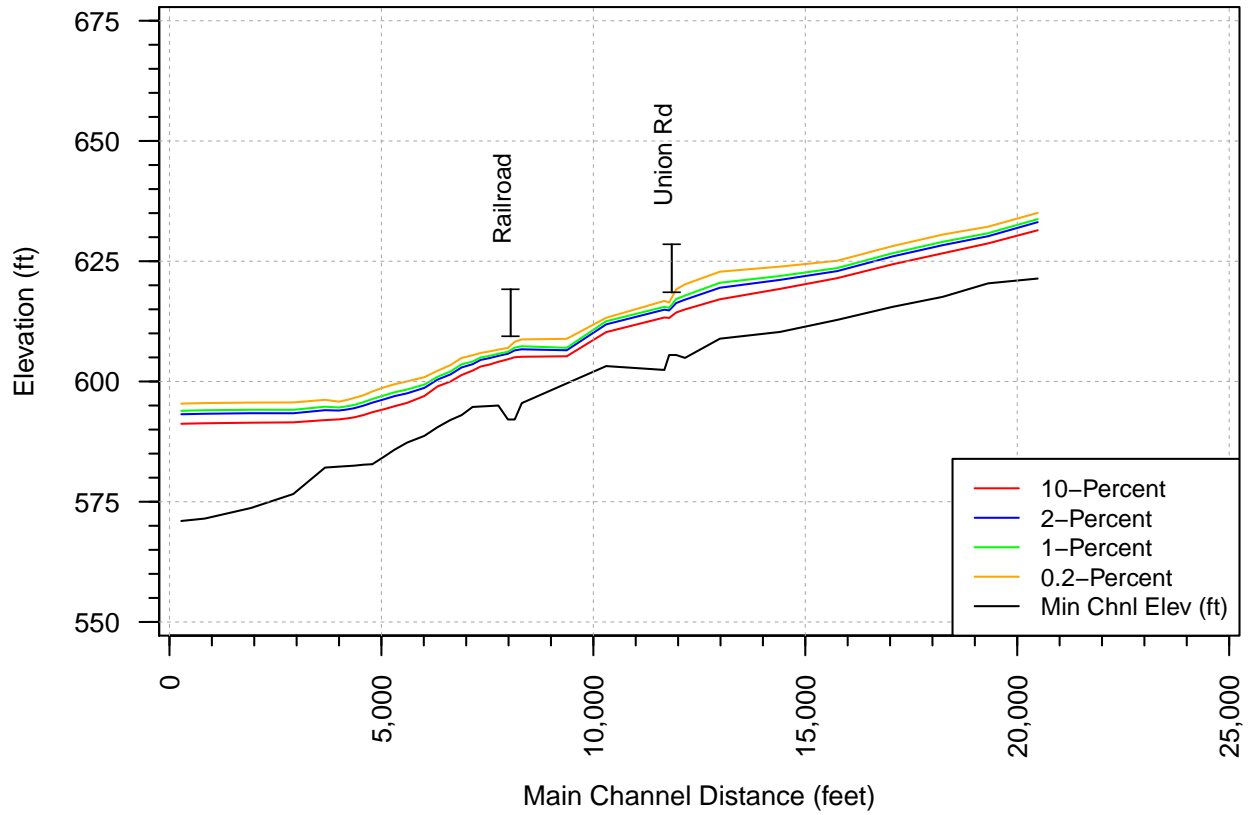


Figure 7: Existing Conditions Profile Plot

Table 2: Existing Conditions HEC-RAS Output

Alternative	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
Existing	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
Existing	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
Existing	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
Existing	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
Existing	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.14	306.61	0.56
Existing	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
Existing	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
Existing	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
Existing	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.22	467.86	0.44
Existing	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
Existing	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
Existing	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
Existing	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.27	449.95	0.46
Existing	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
Existing	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
Existing	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
Existing	15751	10-Percent	7990	612.8	621.48		622.31	0.002376	7.65	1275.64	297.31	0.5
Existing	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
Existing	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.58	360.25	0.54
Existing	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
Existing	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.3	539.57	0.4
Existing	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.7	572.17	0.37
Existing	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.74	594.17	0.36
Existing	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
Existing	12986	10-Percent	7990	608.9	617.09		617.64	0.001416	6.23	1736.27	495.45	0.39
Existing	12986	2-Percent	11800	608.9	619.49		620	0.001016	6.31	3498.64	888.93	0.35
Existing	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.68	920.06	0.33
Existing	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
Existing	12162	10-Percent	7990	604.9	614.98		616.12	0.002284	8.62	955.8	117.56	0.5
Existing	12162	2-Percent	11800	604.9	617.01		618.63	0.002504	10.32	1205.03	134.66	0.55
Existing	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1326.02	158.14	0.56
Existing	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
Existing	11955	10-Percent	7990	605.5	614.34	611.72	615.59	0.00286	8.95	895.71	113.2	0.56
Existing	11955	2-Percent	11800	605.5	616.31	613.35	618.05	0.003008	10.62	1120.3	115.54	0.59
Existing	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.31	121.14	0.6
Existing	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
Existing	11860 Union Rd		Bridge									
Existing	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004409	10.13	789.56	110.22	0.66
Existing	11789	2-Percent	11800	605.5	614.77	613.12	617.12	0.005034	12.32	962.04	111.86	0.73
Existing	11789	1-Percent	13600	605.5	615.3	613.85	618.08	0.005496	13.38	1021.68	112.36	0.77
Existing	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
Existing	11675	10-Percent	7990	602.4	613.3		614.14	0.001656	7.39	1090.08	125.8	0.43
Existing	11675	2-Percent	11800	602.4	614.93		616.25	0.002073	9.24	1299.03	129.76	0.5
Existing	11675	1-Percent	13600	602.4	615.51		617.09	0.002307	10.09	1374.63	131.08	0.53

Table 2: Existing Conditions HEC-RAS Output (continued)

Alternative	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
Existing	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
Existing	10302	10-Percent	7990	603.2	610.26		611.22	0.002817	7.94	1106.57	291.38	0.54
Existing	10302	2-Percent	11800	603.2	611.87	609.46	613	0.002633	8.87	1797.88	548.48	0.54
Existing	10302	1-Percent	13600	603.2	612.52	610.2	613.66	0.002497	9.09	2170.27	588.78	0.54
Existing	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
Existing	9372	10-Percent	7990	599.6	605.24	604.78	607.03	0.007893	10.72	748.14	158.9	0.86
Existing	9372	2-Percent	11800	599.6	606.49	606.07	608.92	0.00795	12.53	955	197.18	0.89
Existing	9372	1-Percent	13600	599.6	607	606.96	609.69	0.007957	13.23	1068.29	247.65	0.91
Existing	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
Existing	8312	10-Percent	7990	595.5	605.14		605.3	0.000447	3.66	3982.49	730.2	0.22
Existing	8312	2-Percent	11800	595.5	606.69		606.91	0.000496	4.32	5182.56	800.71	0.24
Existing	8312	1-Percent	13600	595.5	607.32		607.57	0.000514	4.59	5693.51	807.29	0.25
Existing	8312	0.2-Percent	18000	595.5	608.74		609.04	0.000546	5.15	6853.89	828.65	0.26
Existing	8145	10-Percent	7990	592.1	605.04	597.15	605.24	0.000278	3.63	2202.52	345.65	0.19
Existing	8145	2-Percent	11800	592.1	606.47	598.29	606.82	0.000414	4.77	2471.67	453.22	0.23
Existing	8145	1-Percent	13600	592.1	607.04	598.79	607.47	0.000477	5.27	2578.56	465.95	0.25
Existing	8145	0.2-Percent	18000	592.1	608.27	599.9	608.91	0.000627	6.4	2810.89	492.36	0.29
Existing	8049 Railroad Bridge	Bridge										
Existing	7984	10-Percent	7990	592.1	604.61	599.55	605.03	0.000804	5.23	1554.94	372.48	0.3
Existing	7984	2-Percent	11800	592.1	605.76	600.86	606.47	0.001171	6.83	1764.87	507.96	0.37
Existing	7984	1-Percent	13600	592.1	606.17	601.43	607.05	0.00136	7.56	1841.3	526.78	0.41
Existing	7984	0.2-Percent	18000	592.1	606.97	602.7	608.28	0.001866	9.29	1990.1	563.49	0.48
Existing	7758	10-Percent	7990	595	604.09	600.48	604.59	0.001188	5.98	1571.37	590.44	0.37
Existing	7758	2-Percent	11800	595	605.32	601.71	605.9	0.001253	6.73	2401.71	885.57	0.38
Existing	7758	1-Percent	13600	595	605.76	602.23	606.36	0.001276	7	2722.65	917.78	0.39
Existing	7758	0.2-Percent	18000	595	606.62	604.85	607.29	0.001392	7.72	3400.69	1141.81	0.41
Existing	7564	10-Percent	7990	594.9	603.55		604.07	0.001331	6.15	1647.47	654.17	0.38
Existing	7564	2-Percent	11800	594.9	604.89		605.36	0.001164	6.38	2709.59	899.14	0.37
Existing	7564	1-Percent	13600	594.9	605.36		605.81	0.001127	6.48	3143.56	968.77	0.37
Existing	7564	0.2-Percent	18000	594.9	606.27		606.71	0.001077	6.72	4186.33	1347.21	0.36
Existing	7340	10-Percent	7990	594.8	603.1		603.51	0.001239	5.71	1796.74	632.06	0.37
Existing	7340	2-Percent	11800	594.8	604.48		604.87	0.001105	6.03	2955.05	1060.08	0.36
Existing	7340	1-Percent	13600	594.8	604.97		605.34	0.001032	6.05	3489.11	1124.56	0.35
Existing	7340	0.2-Percent	18000	594.8	605.92		606.27	0.000944	6.16	4762.97	1555.32	0.34
Existing	7151	10-Percent	7990	594.7	602.26		602.83	0.001746	6.18	1483.84	452.43	0.43
Existing	7151	2-Percent	11800	594.7	603.59		604.23	0.001694	6.89	2380.89	921.79	0.43
Existing	7151	1-Percent	13600	594.7	604.15		604.76	0.001543	6.88	3000.98	1347.09	0.42
Existing	7151	0.2-Percent	18000	594.7	605.45		605.83	0.000991	6.07	5425.2	2124.72	0.34
Existing	6890	10-Percent	7990	593	601.33	598.69	601.9	0.001834	6.22	1454.46	1740.54	0.43
Existing	6890	2-Percent	11800	593	602.91	600.03	603.4	0.001356	6.2	2450.65	2170.96	0.39
Existing	6890	1-Percent	13600	593	603.55	601.1	604.01	0.001183	6.1	2961	2253.58	0.37
Existing	6890	0.2-Percent	18000	593	604.89	602.34	605.32	0.00096	6.05	4024.04	2355.92	0.34
Existing	6631	10-Percent	7990	592	600	597.85	600.7	0.002435	6.7	1205.33	234.04	0.49
Existing	6631	2-Percent	11800	592	601.48	598.95	602.37	0.002359	7.68	1623.36	394.71	0.5

Table 2: Existing Conditions HEC-RAS Output (continued)

Alternative	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
Existing	6631	1-Percent	13600	592	602.08	599.43	603.05	0.00232	8.04	1823.38	528.99	0.51
Existing	6631	0.2-Percent	18000	592	603.42	600.53	604.48	0.002135	8.57	2348.22	702.52	0.5
Existing	6324	10-Percent	7990	590.5	598.97	595.72	599.5	0.001478	5.88	1400.44	263.72	0.39
Existing	6324	2-Percent	11800	590.5	600.39	596.88	601.12	0.001634	7	1779.79	393.51	0.43
Existing	6324	1-Percent	13600	590.5	600.97	597.36	601.8	0.001689	7.44	1938.67	449.81	0.44
Existing	6324	0.2-Percent	18000	590.5	602.23	598.58	603.26	0.001812	8.41	2285.02	613.67	0.46
Existing	6015	10-Percent	7990	588.7	596.99		597.94	0.003251	8.13	1099.3	283.66	0.58
Existing	6015	2-Percent	11800	588.7	598.68		599.65	0.002567	8.49	1624.39	329.87	0.53
Existing	6015	1-Percent	13600	588.7	599.36		600.35	0.00239	8.66	1856.92	357.28	0.52
Existing	6015	0.2-Percent	18000	588.7	600.9		601.88	0.002007	8.86	2577.6	513.4	0.49
Existing	5607	10-Percent	7990	587.3	595.55	592.95	596.15	0.001824	6.71	1344.94	274.28	0.44
Existing	5607	2-Percent	11800	587.3	597.54	594.02	598.2	0.001489	7.14	2087.52	440.22	0.42
Existing	5607	1-Percent	13600	587.3	598.34	594.71	598.99	0.001374	7.25	2438.43	444.34	0.41
Existing	5607	0.2-Percent	18000	587.3	600.02	595.81	600.69	0.00123	7.61	3218.07	495.11	0.39
Existing	5307	10-Percent	7990	585.8	594.85		595.32	0.001136	5.73	1523.04	273.7	0.36
Existing	5307	2-Percent	11800	585.8	596.95		597.49	0.001006	6.29	2276.17	402.5	0.35
Existing	5307	1-Percent	13600	585.8	597.75		598.33	0.000987	6.56	2601.53	409.9	0.35
Existing	5307	0.2-Percent	18000	585.8	599.42		600.08	0.000993	7.23	3391.44	515.05	0.36
Existing	5051	10-Percent	7990	584.3	594.2	590.41	594.7	0.001202	5.74	1436.22	206.59	0.36
Existing	5051	2-Percent	11800	584.3	596.26	591.62	596.91	0.001151	6.57	1948.53	301.22	0.37
Existing	5051	1-Percent	13600	584.3	597.06	592.13	597.76	0.00113	6.86	2225.73	360.37	0.37
Existing	5051	0.2-Percent	18000	584.3	598.75	593.33	599.52	0.001078	7.39	2838.24	366.48	0.37
Existing	4786	10-Percent	7990	582.8	593.61	589.12	594.17	0.001084	5.97	1354.02	162.68	0.35
Existing	4786	2-Percent	11800	582.8	595.6	590.5	596.36	0.001161	7.07	1761.02	226.8	0.38
Existing	4786	1-Percent	13600	582.8	596.36	591.06	597.2	0.001191	7.49	1953.77	261.47	0.39
Existing	4786	0.2-Percent	18000	582.8	597.93	592.42	598.95	0.001261	8.38	2367.37	266.15	0.41
Existing	4582	10-Percent	7990	582.7	593.03	589.02	593.66	0.001319	6.37	1278.39	165.23	0.38
Existing	4582	2-Percent	11800	582.7	594.99	590.43	595.82	0.001372	7.45	1675.35	219.76	0.41
Existing	4582	1-Percent	13600	582.7	595.71	591.03	596.65	0.001416	7.92	1836.98	225.28	0.42
Existing	4582	0.2-Percent	18000	582.7	597.16	592.41	598.35	0.00156	9.01	2174.87	252.83	0.45
Existing	4363	10-Percent	7990	582.5	592.55	588.33	593.14	0.001221	6.16	1312.26	164.05	0.37
Existing	4363	2-Percent	11800	582.5	594.45	589.72	595.28	0.00134	7.37	1652.17	369.96	0.4
Existing	4363	1-Percent	13600	582.5	595.14	590.3	596.08	0.00141	7.89	1836.59	549.17	0.42
Existing	4363	0.2-Percent	18000	582.5	596.59	591.65	597.72	0.0015	8.82	2375.41	958.21	0.44
Existing	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
Existing	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
Existing	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
Existing	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
Existing	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
Existing	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
Existing	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
Existing	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
Existing	3670 Oxbow	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
Existing	3670 Oxbow	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 2: Existing Conditions HEC-RAS Output (continued)

Alternative	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
Existing	3670 Oxbow	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
Existing	3670 Oxbow	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
Existing	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
Existing	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
Existing	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
Existing	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
Existing	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
Existing	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
Existing	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
Existing	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
Existing	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
Existing	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
Existing	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
Existing	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
Existing	279 Buffalo River	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
Existing	279 Buffalo River	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
Existing	279 Buffalo River	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
Existing	279 Buffalo River	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #1

Flood Bench Configuration: 1a

Plan: UPDATE-FB-1A-SCHOOL-FULL

Geometry: UPDATE-FB-1A-SCHOOL-FULL

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022

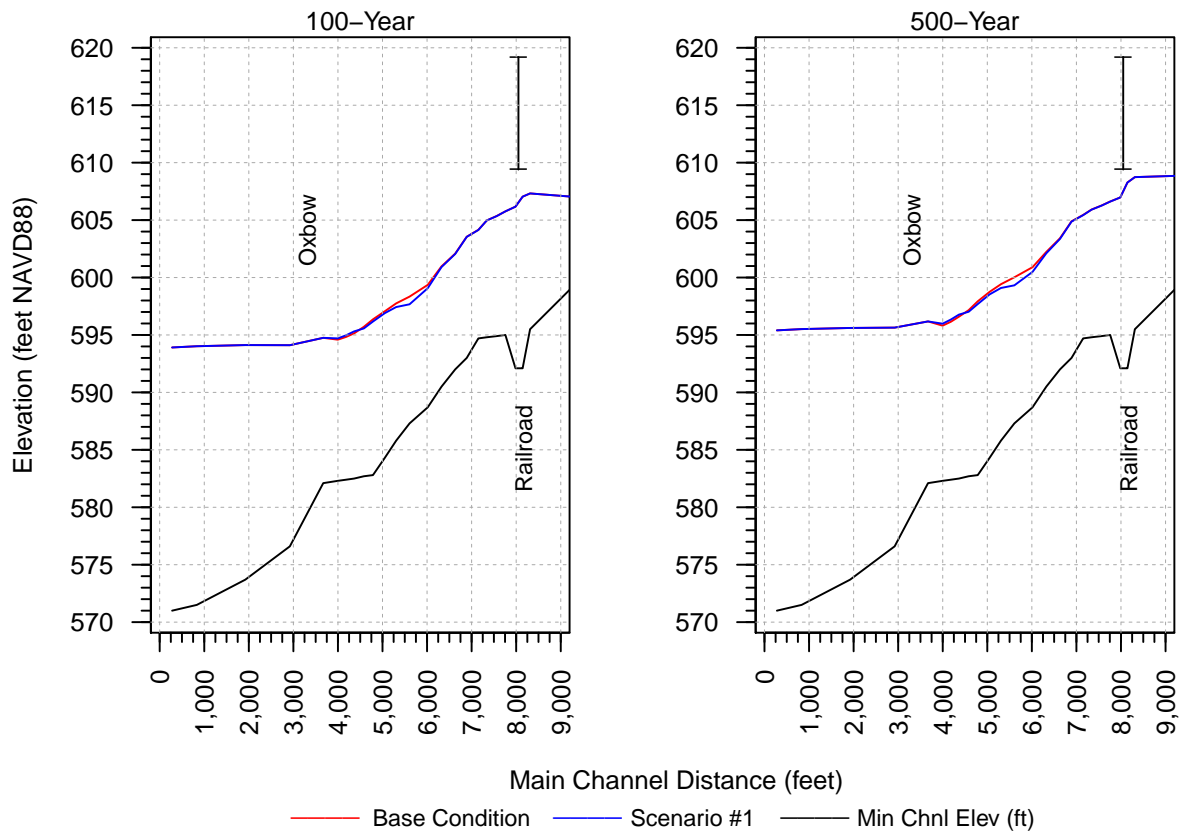
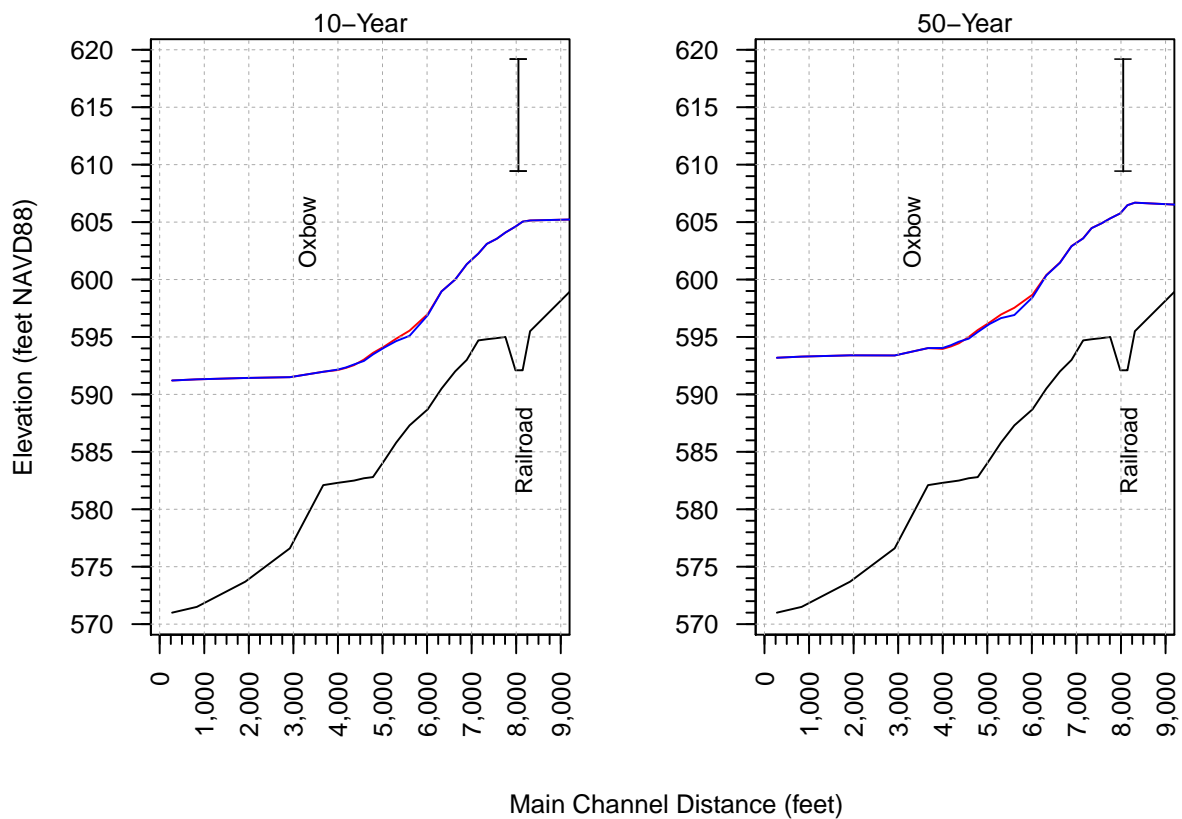


Figure 8: Flood Scenario #1 (1a) Profile Plot

Table 3: Flood Scenario 1 HEC-RAS Output

Scenario	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
1 (1a)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
1 (1a)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
1 (1a)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
1 (1a)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
1 (1a)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.14	306.61	0.56
1 (1a)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
1 (1a)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
1 (1a)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
1 (1a)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.22	467.86	0.44
1 (1a)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
1 (1a)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
1 (1a)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
1 (1a)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.27	449.95	0.46
1 (1a)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
1 (1a)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
1 (1a)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
1 (1a)	15751	10-Percent	7990	612.8	621.48		622.31	0.002376	7.65	1275.64	297.31	0.5
1 (1a)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
1 (1a)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.58	360.25	0.54
1 (1a)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
1 (1a)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.3	539.57	0.4
1 (1a)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.7	572.17	0.37
1 (1a)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.74	594.17	0.36
1 (1a)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
1 (1a)	12986	10-Percent	7990	608.9	617.09		617.64	0.001416	6.23	1736.27	495.45	0.39
1 (1a)	12986	2-Percent	11800	608.9	619.49		620	0.001016	6.31	3498.58	888.92	0.35
1 (1a)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.68	920.06	0.33
1 (1a)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
1 (1a)	12162	10-Percent	7990	604.9	614.98		616.12	0.002284	8.62	955.8	117.56	0.5
1 (1a)	12162	2-Percent	11800	604.9	617.01		618.63	0.002504	10.32	1205.03	134.66	0.55
1 (1a)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1326.02	158.14	0.56
1 (1a)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
1 (1a)	11955	10-Percent	7990	605.5	614.34	611.72	615.59	0.00286	8.95	895.71	113.2	0.56
1 (1a)	11955	2-Percent	11800	605.5	616.31	613.35	618.05	0.003009	10.62	1120.29	115.54	0.59
1 (1a)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.31	121.14	0.6
1 (1a)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
1 (1a)	11860 Union Rd		Bridge									
1 (1a)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004409	10.13	789.56	110.22	0.66
1 (1a)	11789	2-Percent	11800	605.5	614.77	613.12	617.12	0.005033	12.32	962.05	111.86	0.73
1 (1a)	11789	1-Percent	13600	605.5	615.3	613.85	618.08	0.005496	13.38	1021.68	112.36	0.77
1 (1a)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
1 (1a)	11675	10-Percent	7990	602.4	613.3		614.14	0.001656	7.39	1090.08	125.8	0.43
1 (1a)	11675	2-Percent	11800	602.4	614.93		616.25	0.002073	9.24	1299.04	129.76	0.5
1 (1a)	11675	1-Percent	13600	602.4	615.51		617.09	0.002307	10.09	1374.63	131.08	0.53

Table 3: Flood Scenario 1 HEC-RAS Output (continued)

Scenario	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
1 (1a)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
1 (1a)	10302	10-Percent	7990	603.2	610.26		611.22	0.002817	7.94	1106.57	291.38	0.54
1 (1a)	10302	2-Percent	11800	603.2	611.87	609.46	613	0.002633	8.87	1797.91	548.48	0.54
1 (1a)	10302	1-Percent	13600	603.2	612.52	610.2	613.66	0.002497	9.09	2170.45	588.79	0.54
1 (1a)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
1 (1a)	9372	10-Percent	7990	599.6	605.24	604.78	607.03	0.007893	10.72	748.14	158.9	0.86
1 (1a)	9372	2-Percent	11800	599.6	606.49	606.07	608.92	0.007952	12.54	954.93	197.16	0.89
1 (1a)	9372	1-Percent	13600	599.6	607	606.96	609.69	0.007959	13.23	1068.15	247.61	0.91
1 (1a)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
1 (1a)	8312	10-Percent	7990	595.5	605.14		605.3	0.000447	3.66	3982.49	730.2	0.22
1 (1a)	8312	2-Percent	11800	595.5	606.69		606.91	0.000496	4.32	5182.27	800.7	0.24
1 (1a)	8312	1-Percent	13600	595.5	607.32		607.57	0.000514	4.59	5693.06	807.28	0.25
1 (1a)	8312	0.2-Percent	18000	595.5	608.74		609.04	0.000546	5.15	6851.87	828.63	0.26
1 (1a)	8145	10-Percent	7990	592.1	605.04	597.15	605.24	0.000278	3.63	2202.52	345.65	0.19
1 (1a)	8145	2-Percent	11800	592.1	606.47	598.29	606.82	0.000414	4.77	2471.59	453.21	0.23
1 (1a)	8145	1-Percent	13600	592.1	607.04	598.79	607.47	0.000477	5.27	2578.45	465.94	0.25
1 (1a)	8145	0.2-Percent	18000	592.1	608.27	599.9	608.91	0.000627	6.4	2810.41	492.28	0.29
1 (1a)	8049 Railroad Bridge		Bridge									
1 (1a)	7984	10-Percent	7990	592.1	604.61	599.55	605.03	0.000804	5.23	1554.94	372.48	0.3
1 (1a)	7984	2-Percent	11800	592.1	605.76	600.86	606.47	0.001171	6.83	1764.78	507.95	0.37
1 (1a)	7984	1-Percent	13600	592.1	606.17	601.43	607.05	0.001361	7.56	1841.13	526.75	0.41
1 (1a)	7984	0.2-Percent	18000	592.1	606.97	602.7	608.28	0.001868	9.29	1989.39	563.35	0.48
1 (1a)	7758	10-Percent	7990	595	604.09	600.48	604.59	0.001188	5.98	1571.34	590.41	0.37
1 (1a)	7758	2-Percent	11800	595	605.32	601.71	605.9	0.001254	6.73	2401.18	885.54	0.38
1 (1a)	7758	1-Percent	13600	595	605.76	602.23	606.36	0.001277	7	2721.57	917.69	0.39
1 (1a)	7758	0.2-Percent	18000	595	606.61	604.85	607.29	0.001397	7.73	3395.29	1140.52	0.41
1 (1a)	7564	10-Percent	7990	594.9	603.55		604.07	0.001331	6.15	1647.43	654.15	0.38
1 (1a)	7564	2-Percent	11800	594.9	604.89		605.36	0.001165	6.38	2708.55	899.02	0.37
1 (1a)	7564	1-Percent	13600	594.9	605.35		605.81	0.001129	6.49	3141.43	968.37	0.37
1 (1a)	7564	0.2-Percent	18000	594.9	606.26		606.71	0.001083	6.74	4174.91	1343.31	0.36
1 (1a)	7340	10-Percent	7990	594.8	603.1		603.51	0.00124	5.71	1796.62	632	0.37
1 (1a)	7340	2-Percent	11800	594.8	604.47		604.87	0.001106	6.04	2953.3	1060	0.36
1 (1a)	7340	1-Percent	13600	594.8	604.97		605.34	0.001035	6.05	3485.68	1123.93	0.35
1 (1a)	7340	0.2-Percent	18000	594.8	605.91		606.26	0.000951	6.18	4745.18	1546.07	0.34
1 (1a)	7151	10-Percent	7990	594.7	602.26		602.83	0.001747	6.18	1483.73	452.38	0.43
1 (1a)	7151	2-Percent	11800	594.7	603.58		604.23	0.001699	6.89	2377.29	920.52	0.43
1 (1a)	7151	1-Percent	13600	594.7	604.14		604.75	0.001552	6.9	2990.26	1334.34	0.42
1 (1a)	7151	0.2-Percent	18000	594.7	605.43		605.82	0.001008	6.11	5379.74	2119.22	0.35
1 (1a)	6890	10-Percent	7990	593	601.33	598.69	601.9	0.001835	6.22	1454.17	1740.37	0.43
1 (1a)	6890	2-Percent	11800	593	602.9	600.03	603.4	0.001363	6.21	2444.81	2170.09	0.39
1 (1a)	6890	1-Percent	13600	593	603.54	601.1	604	0.001192	6.11	2950.92	2250.71	0.37
1 (1a)	6890	0.2-Percent	18000	593	604.87	602.34	605.3	0.000974	6.08	4002.05	2355.19	0.34
1 (1a)	6631	10-Percent	7990	592	600	597.85	600.7	0.002438	6.7	1204.97	234.02	0.49
1 (1a)	6631	2-Percent	11800	592	601.46	598.95	602.36	0.002382	7.7	1617.57	392.54	0.51

Table 3: Flood Scenario 1 HEC-RAS Output (continued)

Scenario	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
1 (1a)	6631	1-Percent	13600	592	602.05	599.43	603.03	0.002358	8.08	1811.52	514.16	0.51
1 (1a)	6631	0.2-Percent	18000	592	603.36	600.53	604.44	0.002199	8.65	2321.89	668.81	0.51
1 (1a)	6324	10-Percent	7990	590.5	598.96	595.72	599.49	0.001481	5.88	1399.54	263.71	0.39
1 (1a)	6324	2-Percent	11800	590.5	600.35	596.88	601.09	0.001661	7.03	1770.07	383.22	0.43
1 (1a)	6324	1-Percent	13600	590.5	600.91	597.36	601.75	0.001732	7.5	1922.33	447.16	0.44
1 (1a)	6324	0.2-Percent	18000	590.5	602.11	598.58	603.18	0.001889	8.52	2253.76	573.23	0.47
1 (1a)	6015	10-Percent	7990	588.7	596.89		597.9	0.003463	8.31	1072.51	281.23	0.59
1 (1a)	6015	2-Percent	11800	588.7	598.45		599.52	0.002913	8.86	1549.27	324.97	0.56
1 (1a)	6015	1-Percent	13600	588.7	599.07		600.17	0.002774	9.11	1754.66	339.57	0.56
1 (1a)	6015	0.2-Percent	18000	588.7	600.49		601.64	0.002447	9.51	2367.28	508.91	0.54
1 (1a)	5607	10-Percent	7990	587.3	595.1	592.95	595.81	0.002344	7.28	1224.25	256.1	0.5
1 (1a)	5607	2-Percent	11800	587.3	596.91	594.02	597.74	0.00203	7.95	1810.85	435.98	0.48
1 (1a)	5607	1-Percent	13600	587.3	597.67	594.71	598.5	0.00186	8.06	2144.82	440.83	0.47
1 (1a)	5607	0.2-Percent	18000	587.3	599.32	595.81	600.16	0.001611	8.36	2884.18	467.4	0.45
1 (1a)	5307	10-Percent	7990	585.8	594.64		594.94	0.000867	4.92	2008.79	391.56	0.31
1 (1a)	5307	2-Percent	11800	585.8	596.64		596.97	0.000703	5.16	2801.31	400.4	0.29
1 (1a)	5307	1-Percent	13600	585.8	597.43		597.77	0.000674	5.31	3118.1	406.5	0.29
1 (1a)	5307	0.2-Percent	18000	585.8	599.09		599.48	0.000654	5.76	3873.03	497.13	0.29
1 (1a)	5051	10-Percent	7990	584.3	594.1	590.63	594.46	0.000959	5.08	1778.9	300.25	0.32
1 (1a)	5051	2-Percent	11800	584.3	596.13	591.74	596.55	0.000851	5.6	2393.15	308.41	0.32
1 (1a)	5051	1-Percent	13600	584.3	596.9	592.19	597.37	0.000841	5.86	2656.32	359.62	0.32
1 (1a)	5051	0.2-Percent	18000	584.3	598.53	593.1	599.08	0.000833	6.42	3248.48	365.81	0.33
1 (1a)	4786	10-Percent	7990	582.8	593.48	589.18	593.98	0.001038	5.79	1482.51	206.56	0.34
1 (1a)	4786	2-Percent	11800	582.8	595.43	590.6	596.09	0.001069	6.71	1956.67	259.32	0.36
1 (1a)	4786	1-Percent	13600	582.8	596.17	591.15	596.89	0.001096	7.1	2148.6	261.01	0.37
1 (1a)	4786	0.2-Percent	18000	582.8	597.69	592.4	598.58	0.001182	8.01	2547.48	265.38	0.39
1 (1a)	4582	10-Percent	7990	582.7	592.91	589.03	593.49	0.001278	6.21	1377.43	202.9	0.38
1 (1a)	4582	2-Percent	11800	582.7	594.85	590.54	595.58	0.001278	7.13	1834.24	252.63	0.39
1 (1a)	4582	1-Percent	13600	582.7	595.57	591.12	596.38	0.001306	7.54	2016.63	255.42	0.4
1 (1a)	4582	0.2-Percent	18000	582.7	597.02	592.29	598.03	0.001408	8.5	2390.54	259.66	0.42
1 (1a)	4363	10-Percent	7990	582.5	592.61	588.6	593.01	0.000898	5.31	1699.48	251.53	0.32
1 (1a)	4363	2-Percent	11800	582.5	594.59	589.88	595.09	0.000891	6.06	2225.88	476.05	0.33
1 (1a)	4363	1-Percent	13600	582.5	595.31	590.37	595.87	0.000917	6.42	2449.41	634.61	0.34
1 (1a)	4363	0.2-Percent	18000	582.5	596.77	591.45	597.46	0.000991	7.24	3039.12	1052.98	0.36
1 (1a)	4182	10-Percent	7990	582.4	592.35	588.44	592.82	0.001061	5.69	1526.98	219.8	0.34
1 (1a)	4182	2-Percent	11800	582.4	594.28	589.77	594.9	0.001088	6.61	1974.52	320.53	0.36
1 (1a)	4182	1-Percent	13600	582.4	594.97	590.3	595.67	0.001134	7.04	2165.03	449.01	0.37
1 (1a)	4182	0.2-Percent	18000	582.4	596.34	591.45	597.24	0.001268	8.05	2566.77	662.13	0.4
1 (1a)	3997	10-Percent	7990	582.3	592.16	587.76	592.63	0.001002	5.63	1509.42	232.42	0.34
1 (1a)	3997	2-Percent	11800	582.3	594.04	589.24	594.7	0.001082	6.67	1900.75	243.83	0.36
1 (1a)	3997	1-Percent	13600	582.3	594.7	589.77	595.45	0.001156	7.17	2050.82	284.39	0.38
1 (1a)	3997	0.2-Percent	18000	582.3	595.98	591.01	596.99	0.001358	8.35	2395.48	550.38	0.42
1 (1a)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
1 (1a)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 3: Flood Scenario 1 HEC-RAS Output (continued)

Scenario	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
1 (1a)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
1 (1a)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
1 (1a)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
1 (1a)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
1 (1a)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
1 (1a)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
1 (1a)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
1 (1a)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
1 (1a)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
1 (1a)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
1 (1a)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
1 (1a)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
1 (1a)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
1 (1a)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
1 (1a)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
1 (1a)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
1 (1a)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
1 (1a)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #2

Flood Bench Configuration: 1b

Plan: UPDATE-FB-1B-SCHOOL-OPEN

Geometry: UPDATE-FB-1B-SCHOOL-OPEN

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022

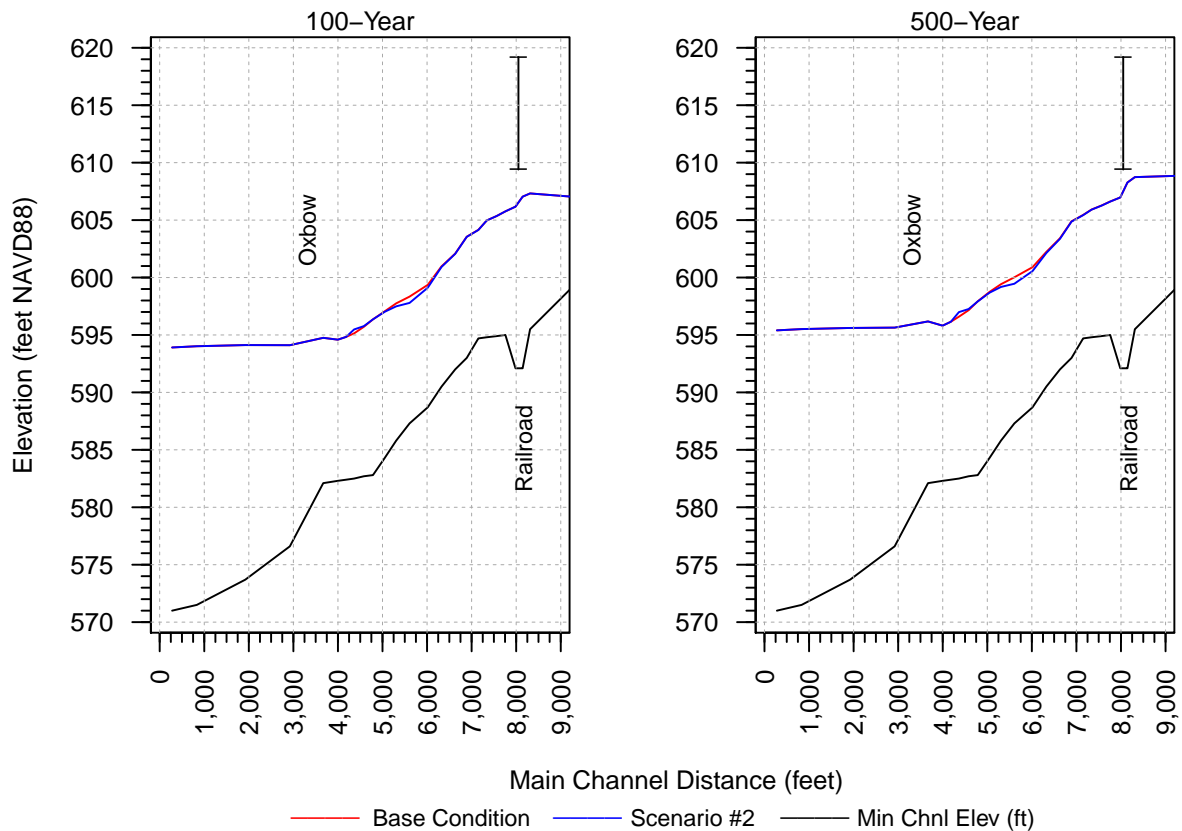
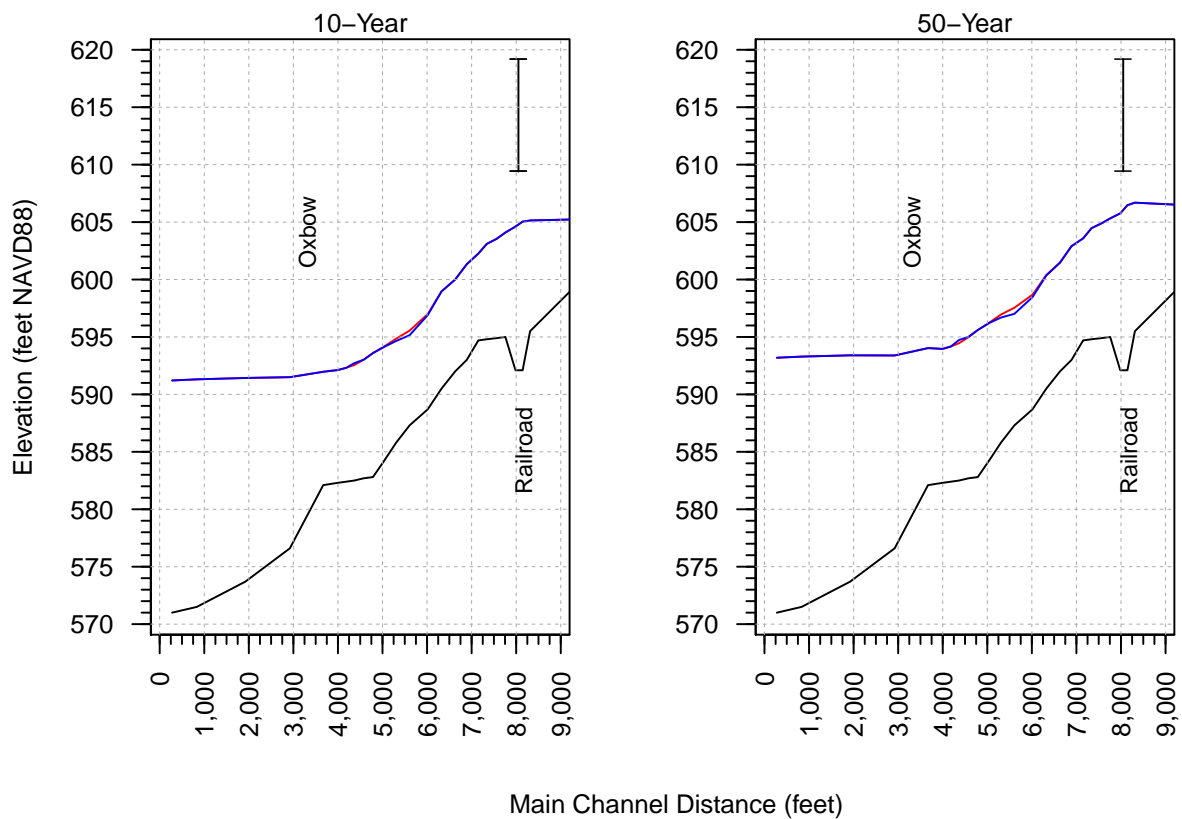


Figure 9: Flood Scenario #2 (1b) Profile Plot

Table 4: Flood Scenario 2 HEC-RAS Output

Scenario	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
2 (1b)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
2 (1b)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
2 (1b)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
2 (1b)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
2 (1b)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.14	306.61	0.56
2 (1b)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
2 (1b)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
2 (1b)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
2 (1b)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.22	467.86	0.44
2 (1b)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
2 (1b)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
2 (1b)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
2 (1b)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.27	449.95	0.46
2 (1b)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
2 (1b)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
2 (1b)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
2 (1b)	15751	10-Percent	7990	612.8	621.48		622.31	0.002376	7.65	1275.64	297.31	0.5
2 (1b)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
2 (1b)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.58	360.25	0.54
2 (1b)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
2 (1b)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.3	539.57	0.4
2 (1b)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.7	572.17	0.37
2 (1b)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.74	594.17	0.36
2 (1b)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
2 (1b)	12986	10-Percent	7990	608.9	617.09		617.64	0.001416	6.23	1736.27	495.45	0.39
2 (1b)	12986	2-Percent	11800	608.9	619.49		620	0.001016	6.31	3498.64	888.93	0.35
2 (1b)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.68	920.06	0.33
2 (1b)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
2 (1b)	12162	10-Percent	7990	604.9	614.98		616.12	0.002284	8.62	955.8	117.56	0.5
2 (1b)	12162	2-Percent	11800	604.9	617.01		618.63	0.002504	10.32	1205.03	134.66	0.55
2 (1b)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1326.02	158.14	0.56
2 (1b)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
2 (1b)	11955	10-Percent	7990	605.5	614.34	611.72	615.59	0.00286	8.95	895.71	113.2	0.56
2 (1b)	11955	2-Percent	11800	605.5	616.31	613.35	618.05	0.003008	10.62	1120.3	115.54	0.59
2 (1b)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.31	121.14	0.6
2 (1b)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
2 (1b)	11860 Union Rd		Bridge									
2 (1b)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004409	10.13	789.56	110.22	0.66
2 (1b)	11789	2-Percent	11800	605.5	614.77	613.12	617.12	0.005034	12.32	962.04	111.86	0.73
2 (1b)	11789	1-Percent	13600	605.5	615.3	613.85	618.08	0.005496	13.38	1021.68	112.36	0.77
2 (1b)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
2 (1b)	11675	10-Percent	7990	602.4	613.3		614.14	0.001656	7.39	1090.08	125.8	0.43
2 (1b)	11675	2-Percent	11800	602.4	614.93		616.25	0.002073	9.24	1299.03	129.76	0.5
2 (1b)	11675	1-Percent	13600	602.4	615.51		617.09	0.002307	10.09	1374.63	131.08	0.53

Table 4: Flood Scenario 2 HEC-RAS Output (continued)

Scenario	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
2 (1b)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
2 (1b)	10302	10-Percent	7990	603.2	610.26		611.22	0.002817	7.94	1106.57	291.38	0.54
2 (1b)	10302	2-Percent	11800	603.2	611.87	609.46	613	0.002633	8.87	1797.94	548.49	0.54
2 (1b)	10302	1-Percent	13600	603.2	612.52	610.2	613.66	0.002497	9.09	2170.45	588.79	0.54
2 (1b)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
2 (1b)	9372	10-Percent	7990	599.6	605.24	604.78	607.03	0.007893	10.72	748.14	158.9	0.86
2 (1b)	9372	2-Percent	11800	599.6	606.49	606.07	608.92	0.007951	12.53	954.94	197.16	0.89
2 (1b)	9372	1-Percent	13600	599.6	607	606.96	609.69	0.007959	13.23	1068.15	247.61	0.91
2 (1b)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
2 (1b)	8312	10-Percent	7990	595.5	605.14		605.3	0.000447	3.66	3982.49	730.2	0.22
2 (1b)	8312	2-Percent	11800	595.5	606.69		606.91	0.000496	4.32	5182.31	800.7	0.24
2 (1b)	8312	1-Percent	13600	595.5	607.32		607.57	0.000514	4.59	5693.16	807.28	0.25
2 (1b)	8312	0.2-Percent	18000	595.5	608.74		609.04	0.000546	5.15	6851.97	828.63	0.26
2 (1b)	8145	10-Percent	7990	592.1	605.04	597.15	605.24	0.000278	3.63	2202.52	345.65	0.19
2 (1b)	8145	2-Percent	11800	592.1	606.47	598.29	606.82	0.000414	4.77	2471.61	453.21	0.23
2 (1b)	8145	1-Percent	13600	592.1	607.04	598.79	607.47	0.000477	5.27	2578.47	465.94	0.25
2 (1b)	8145	0.2-Percent	18000	592.1	608.27	599.9	608.91	0.000627	6.4	2810.44	492.29	0.29
2 (1b)	8049 Railroad Bridge		Bridge									
2 (1b)	7984	10-Percent	7990	592.1	604.61	599.55	605.03	0.000804	5.23	1554.94	372.48	0.3
2 (1b)	7984	2-Percent	11800	592.1	605.76	600.86	606.47	0.001171	6.83	1764.79	507.95	0.37
2 (1b)	7984	1-Percent	13600	592.1	606.17	601.43	607.05	0.001361	7.56	1841.16	526.76	0.41
2 (1b)	7984	0.2-Percent	18000	592.1	606.97	602.7	608.28	0.001868	9.29	1989.45	563.36	0.48
2 (1b)	7758	10-Percent	7990	595	604.09	600.48	604.59	0.001188	5.98	1571.34	590.41	0.37
2 (1b)	7758	2-Percent	11800	595	605.32	601.71	605.9	0.001254	6.73	2401.23	885.54	0.38
2 (1b)	7758	1-Percent	13600	595	605.76	602.23	606.36	0.001277	7	2721.75	917.71	0.39
2 (1b)	7758	0.2-Percent	18000	595	606.61	604.85	607.29	0.001396	7.73	3395.8	1140.62	0.41
2 (1b)	7564	10-Percent	7990	594.9	603.55		604.07	0.001331	6.15	1647.43	654.15	0.38
2 (1b)	7564	2-Percent	11800	594.9	604.89		605.36	0.001165	6.38	2708.66	899.03	0.37
2 (1b)	7564	1-Percent	13600	594.9	605.36		605.81	0.001129	6.49	3141.72	968.42	0.37
2 (1b)	7564	0.2-Percent	18000	594.9	606.26		606.71	0.001082	6.74	4175.98	1343.67	0.36
2 (1b)	7340	10-Percent	7990	594.8	603.1		603.51	0.00124	5.71	1796.62	632	0.37
2 (1b)	7340	2-Percent	11800	594.8	604.47		604.87	0.001106	6.04	2953.5	1060.01	0.36
2 (1b)	7340	1-Percent	13600	594.8	604.97		605.34	0.001034	6.05	3486.09	1124	0.35
2 (1b)	7340	0.2-Percent	18000	594.8	605.91		606.26	0.000951	6.18	4746.88	1547.01	0.34
2 (1b)	7151	10-Percent	7990	594.7	602.26		602.83	0.001747	6.18	1483.73	452.38	0.43
2 (1b)	7151	2-Percent	11800	594.7	603.58		604.23	0.001698	6.89	2377.63	920.64	0.43
2 (1b)	7151	1-Percent	13600	594.7	604.14		604.75	0.001551	6.9	2991.48	1335.8	0.42
2 (1b)	7151	0.2-Percent	18000	594.7	605.43		605.82	0.001007	6.11	5384.27	2119.85	0.35
2 (1b)	6890	10-Percent	7990	593	601.33	598.69	601.9	0.001835	6.22	1454.26	1740.42	0.43
2 (1b)	6890	2-Percent	11800	593	602.9	600.03	603.4	0.001362	6.21	2445.34	2170.17	0.39
2 (1b)	6890	1-Percent	13600	593	603.54	601.1	604	0.001191	6.11	2952.13	2251.1	0.37
2 (1b)	6890	0.2-Percent	18000	593	604.87	602.34	605.3	0.000973	6.08	4004.29	2355.27	0.34
2 (1b)	6631	10-Percent	7990	592	600	597.85	600.7	0.002437	6.7	1205.09	234.03	0.49
2 (1b)	6631	2-Percent	11800	592	601.46	598.95	602.36	0.00238	7.7	1618.11	392.64	0.51

Table 4: Flood Scenario 2 HEC-RAS Output (continued)

Scenario	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
2 (1b)	6631	1-Percent	13600	592	602.06	599.43	603.03	0.002353	8.07	1812.95	514.65	0.51
2 (1b)	6631	0.2-Percent	18000	592	603.37	600.53	604.44	0.002192	8.64	2324.65	672.17	0.51
2 (1b)	6324	10-Percent	7990	590.5	598.96	595.72	599.5	0.00148	5.88	1399.83	263.71	0.39
2 (1b)	6324	2-Percent	11800	590.5	600.35	596.88	601.1	0.001658	7.03	1770.99	384.28	0.43
2 (1b)	6324	1-Percent	13600	590.5	600.92	597.36	601.76	0.001727	7.49	1924.35	447.49	0.44
2 (1b)	6324	0.2-Percent	18000	590.5	602.13	598.58	603.19	0.00188	8.51	2257.05	578.74	0.47
2 (1b)	6015	10-Percent	7990	588.7	596.9		597.9	0.003446	8.3	1074.52	281.41	0.59
2 (1b)	6015	2-Percent	11800	588.7	598.47		599.53	0.002868	8.82	1558.28	325.49	0.56
2 (1b)	6015	1-Percent	13600	588.7	599.11		600.2	0.002715	9.04	1768.83	341.81	0.55
2 (1b)	6015	0.2-Percent	18000	588.7	600.56		601.68	0.002362	9.39	2404.29	510.46	0.53
2 (1b)	5607	10-Percent	7990	587.3	595.15	592.95	595.85	0.00228	7.22	1236.91	263.85	0.49
2 (1b)	5607	2-Percent	11800	587.3	597.01	594.02	597.8	0.001936	7.82	1852.27	436.73	0.47
2 (1b)	5607	1-Percent	13600	587.3	597.79	594.71	598.58	0.001765	7.91	2193.82	441.35	0.46
2 (1b)	5607	0.2-Percent	18000	587.3	599.46	595.81	600.26	0.001525	8.2	2948.4	470.43	0.44
2 (1b)	5307	10-Percent	7990	585.8	594.65		594.97	0.000909	5.04	1917.63	357.54	0.32
2 (1b)	5307	2-Percent	11800	585.8	596.69		597.04	0.00074	5.31	2697.13	400.68	0.3
2 (1b)	5307	1-Percent	13600	585.8	597.49		597.86	0.00071	5.48	3020.1	407.06	0.3
2 (1b)	5307	0.2-Percent	18000	585.8	599.18		599.59	0.000692	5.96	3792.58	499.63	0.3
2 (1b)	5051	10-Percent	7990	584.3	594.16	590.65	594.5	0.000908	4.97	1816.04	300.41	0.32
2 (1b)	5051	2-Percent	11800	584.3	596.23	591.74	596.63	0.000799	5.46	2445.11	309.95	0.31
2 (1b)	5051	1-Percent	13600	584.3	597.02	592.17	597.46	0.000786	5.71	2720.16	360.18	0.31
2 (1b)	5051	0.2-Percent	18000	584.3	598.68	593.1	599.2	0.000777	6.25	3323.59	366.28	0.32
2 (1b)	4786	10-Percent	7990	582.8	593.59	589.2	594.05	0.000961	5.61	1529.05	204.32	0.33
2 (1b)	4786	2-Percent	11800	582.8	595.6	590.62	596.2	0.00098	6.49	2019.05	257.76	0.35
2 (1b)	4786	1-Percent	13600	582.8	596.36	591.18	597.02	0.001002	6.87	2216.06	261.45	0.35
2 (1b)	4786	0.2-Percent	18000	582.8	597.92	592.38	598.74	0.001073	7.72	2627.34	266.09	0.37
2 (1b)	4582	10-Percent	7990	582.7	593.03	589.04	593.59	0.001217	6.12	1392.34	198.09	0.37
2 (1b)	4582	2-Percent	11800	582.7	595.02	590.54	595.73	0.001204	7	1861.56	250.23	0.38
2 (1b)	4582	1-Percent	13600	582.7	595.77	591.11	596.55	0.001226	7.39	2048.66	253.68	0.39
2 (1b)	4582	0.2-Percent	18000	582.7	597.26	592.29	598.23	0.001315	8.32	2432.66	259.57	0.41
2 (1b)	4363	10-Percent	7990	582.5	592.71	588.54	593.12	0.000913	5.39	1641.92	237.07	0.32
2 (1b)	4363	2-Percent	11800	582.5	594.73	589.87	595.26	0.000906	6.17	2161.48	491.57	0.33
2 (1b)	4363	1-Percent	13600	582.5	595.48	590.39	596.06	0.000927	6.52	2387.73	683.43	0.34
2 (1b)	4363	0.2-Percent	18000	582.5	596.99	591.52	597.7	0.000983	7.29	3058.42	1123.5	0.36
2 (1b)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
2 (1b)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
2 (1b)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
2 (1b)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
2 (1b)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
2 (1b)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
2 (1b)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
2 (1b)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
2 (1b)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
2 (1b)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 4: Flood Scenario 2 HEC-RAS Output (continued)

Scenario	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
2 (1b)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
2 (1b)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
2 (1b)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
2 (1b)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
2 (1b)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
2 (1b)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
2 (1b)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
2 (1b)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
2 (1b)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
2 (1b)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
2 (1b)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
2 (1b)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
2 (1b)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
2 (1b)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
2 (1b)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
2 (1b)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
2 (1b)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
2 (1b)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #3

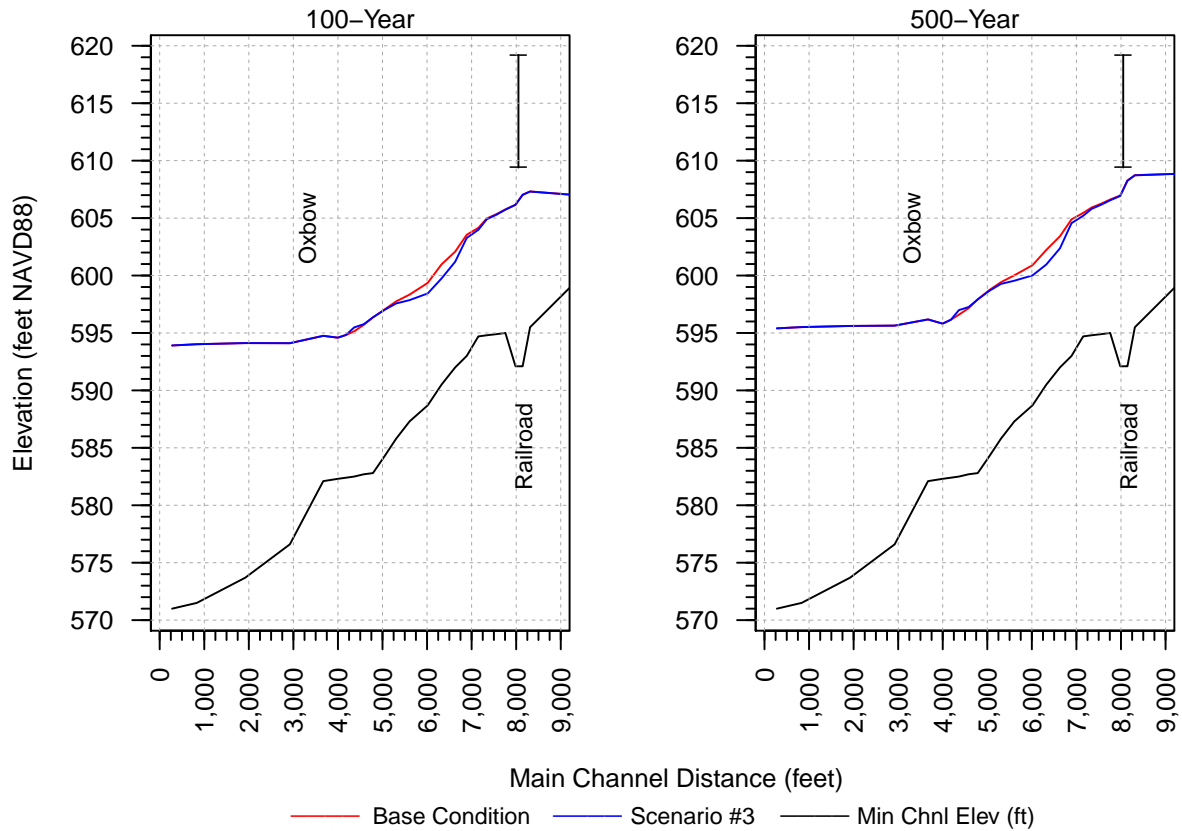
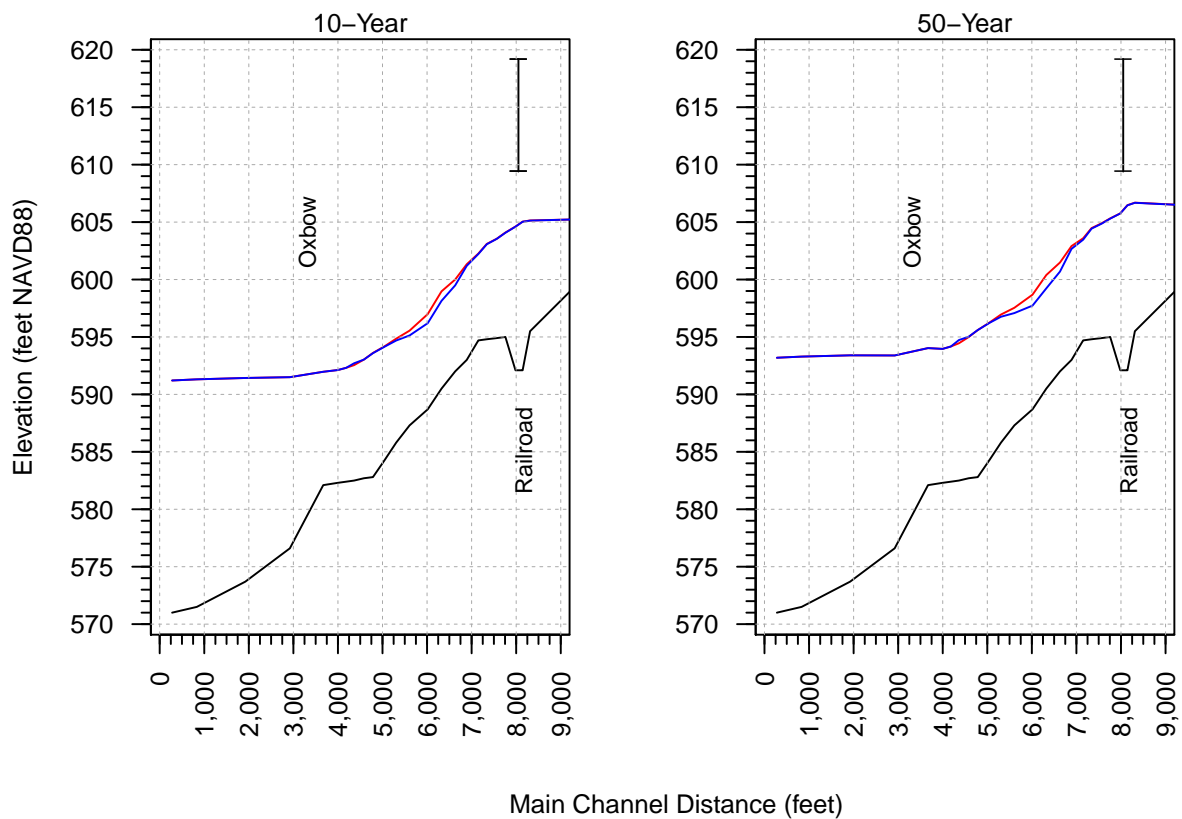
Flood Bench Configuration: 1b + 2

Plan: UPDATE-FB-1B+2-SCHOOL+UNION

Geometry: UPDATE-FB-1B+2-SCHOOL+UNION

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022



— Base Condition — Scenario #3 — Min Chnl Elev (ft)

Figure 10: Flood Scenario #3 (1b+2) Profile Plot

Table 5: Flood Scenario 3 HEC-RAS Output

Scenario	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
3 (1b+2)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
3 (1b+2)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
3 (1b+2)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
3 (1b+2)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
3 (1b+2)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.14	306.61	0.56
3 (1b+2)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
3 (1b+2)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
3 (1b+2)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
3 (1b+2)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.22	467.86	0.44
3 (1b+2)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
3 (1b+2)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
3 (1b+2)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
3 (1b+2)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.27	449.95	0.46
3 (1b+2)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
3 (1b+2)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
3 (1b+2)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
3 (1b+2)	15751	10-Percent	7990	612.8	621.48		622.31	0.002376	7.65	1275.64	297.31	0.5
3 (1b+2)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
3 (1b+2)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
3 (1b+2)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
3 (1b+2)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.3	539.57	0.4
3 (1b+2)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.7	572.17	0.37
3 (1b+2)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.67	594.16	0.36
3 (1b+2)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
3 (1b+2)	12986	10-Percent	7990	608.9	617.09		617.64	0.001416	6.23	1736.24	495.42	0.39
3 (1b+2)	12986	2-Percent	11800	608.9	619.49		620	0.001016	6.31	3498.58	888.92	0.35
3 (1b+2)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.57	920.06	0.33
3 (1b+2)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
3 (1b+2)	12162	10-Percent	7990	604.9	614.98		616.12	0.002284	8.62	955.79	117.56	0.5
3 (1b+2)	12162	2-Percent	11800	604.9	617.01		618.63	0.002504	10.32	1205.03	134.66	0.55
3 (1b+2)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.98	158.12	0.56
3 (1b+2)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
3 (1b+2)	11955	10-Percent	7990	605.5	614.34	611.72	615.59	0.00286	8.95	895.69	113.2	0.56
3 (1b+2)	11955	2-Percent	11800	605.5	616.31	613.35	618.05	0.003009	10.62	1120.29	115.54	0.59
3 (1b+2)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.27	121.13	0.6
3 (1b+2)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
3 (1b+2)	11860 Union Rd		Bridge									
3 (1b+2)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.00441	10.13	789.54	110.22	0.66
3 (1b+2)	11789	2-Percent	11800	605.5	614.77	613.12	617.12	0.005034	12.32	962	111.86	0.73
3 (1b+2)	11789	1-Percent	13600	605.5	615.3	613.85	618.08	0.005498	13.39	1021.52	112.36	0.77
3 (1b+2)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
3 (1b+2)	11675	10-Percent	7990	602.4	613.3		614.14	0.001656	7.39	1090.07	125.8	0.43
3 (1b+2)	11675	2-Percent	11800	602.4	614.93		616.25	0.002073	9.24	1298.99	129.76	0.5
3 (1b+2)	11675	1-Percent	13600	602.4	615.51		617.08	0.002308	10.09	1374.45	131.08	0.53

Table 5: Flood Scenario 3 HEC-RAS Output (continued)

Scenario	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
3 (1b+2)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
3 (1b+2)	10302	10-Percent	7990	603.2	610.26		611.22	0.002813	7.94	1107.3	292.29	0.54
3 (1b+2)	10302	2-Percent	11800	603.2	611.88	609.46	613	0.002627	8.87	1800.25	548.94	0.54
3 (1b+2)	10302	1-Percent	13600	603.2	612.53	610.2	613.67	0.002485	9.07	2175.95	588.9	0.54
3 (1b+2)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
3 (1b+2)	9372	10-Percent	7990	599.6	605.24	604.78	607.03	0.007922	10.73	747.32	158.88	0.86
3 (1b+2)	9372	2-Percent	11800	599.6	606.48	606.07	608.92	0.007995	12.56	953.03	196.55	0.9
3 (1b+2)	9372	1-Percent	13600	599.6	606.99	606.96	609.69	0.00804	13.27	1063.6	246.36	0.91
3 (1b+2)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
3 (1b+2)	8312	10-Percent	7990	595.5	605.13		605.3	0.000448	3.66	3977.5	729.99	0.22
3 (1b+2)	8312	2-Percent	11800	595.5	606.68		606.9	0.000498	4.33	5173.91	800.62	0.24
3 (1b+2)	8312	1-Percent	13600	595.5	607.31		607.56	0.000518	4.6	5680.45	807.09	0.25
3 (1b+2)	8312	0.2-Percent	18000	595.5	608.72		609.02	0.000551	5.16	6832.4	828.49	0.26
3 (1b+2)	8145	10-Percent	7990	592.1	605.03	597.15	605.24	0.000279	3.63	2201.23	345.42	0.19
3 (1b+2)	8145	2-Percent	11800	592.1	606.46	598.29	606.81	0.000415	4.78	2469.59	452.94	0.23
3 (1b+2)	8145	1-Percent	13600	592.1	607.02	598.79	607.45	0.000479	5.28	2575.45	465.57	0.25
3 (1b+2)	8145	0.2-Percent	18000	592.1	608.25	599.9	608.89	0.000631	6.42	2805.79	491.82	0.29
3 (1b+2)	8049 Railroad Bridge		Bridge									
3 (1b+2)	7984	10-Percent	7990	592.1	604.6	599.55	605.02	0.000806	5.24	1553.52	372.31	0.3
3 (1b+2)	7984	2-Percent	11800	592.1	605.75	600.86	606.46	0.001177	6.84	1762.38	507.54	0.37
3 (1b+2)	7984	1-Percent	13600	592.1	606.15	601.43	607.03	0.00137	7.58	1837.36	526.22	0.41
3 (1b+2)	7984	0.2-Percent	18000	592.1	606.93	602.7	608.26	0.001888	9.32	1982.65	562.06	0.48
3 (1b+2)	7758	10-Percent	7990	595	604.07	600.48	604.58	0.001196	5.99	1564.85	584.87	0.37
3 (1b+2)	7758	2-Percent	11800	595	605.3	601.71	605.88	0.001269	6.76	2387.08	884.7	0.39
3 (1b+2)	7758	1-Percent	13600	595	605.73	602.23	606.34	0.001296	7.04	2700.45	915.45	0.39
3 (1b+2)	7758	0.2-Percent	18000	595	606.55	604.85	607.25	0.001437	7.82	3346.13	1126.89	0.42
3 (1b+2)	7564	10-Percent	7990	594.9	603.54		604.05	0.001341	6.17	1636.84	650.92	0.38
3 (1b+2)	7564	2-Percent	11800	594.9	604.86		605.34	0.001189	6.43	2681.88	895.78	0.37
3 (1b+2)	7564	1-Percent	13600	594.9	605.31		605.78	0.001163	6.57	3099.11	960.35	0.37
3 (1b+2)	7564	0.2-Percent	18000	594.9	606.18		606.65	0.001142	6.89	4068.35	1305.37	0.37
3 (1b+2)	7340	10-Percent	7990	594.8	603.07		603.49	0.001258	5.75	1781.54	621.73	0.37
3 (1b+2)	7340	2-Percent	11800	594.8	604.43		604.84	0.001143	6.12	2906.06	1058.1	0.36
3 (1b+2)	7340	1-Percent	13600	594.8	604.9		605.29	0.001081	6.16	3415.87	1102.49	0.36
3 (1b+2)	7340	0.2-Percent	18000	594.8	605.8		606.18	0.001024	6.37	4580.31	1475.91	0.35
3 (1b+2)	7151	10-Percent	7990	594.7	602.22		602.8	0.001795	6.24	1463.61	445.92	0.43
3 (1b+2)	7151	2-Percent	11800	594.7	603.47		604.16	0.001829	7.09	2276	894.29	0.45
3 (1b+2)	7151	1-Percent	13600	594.7	603.98		604.66	0.001729	7.19	2794.23	1168.51	0.44
3 (1b+2)	7151	0.2-Percent	18000	594.7	605.2		605.67	0.001211	6.59	4902.47	2033.81	0.38
3 (1b+2)	6890	10-Percent	7990	593	601.19	598.69	601.8	0.002024	6.43	1387.64	1693.38	0.45
3 (1b+2)	6890	2-Percent	11800	593	602.67	600.03	603.24	0.001591	6.58	2268.35	2115.88	0.42
3 (1b+2)	6890	1-Percent	13600	593	603.27	601.1	603.8	0.001419	6.53	2734.96	2219.11	0.4
3 (1b+2)	6890	0.2-Percent	18000	593	604.56	602.34	605.05	0.001149	6.47	3758.24	2343.73	0.37
3 (1b+2)	6631	10-Percent	7990	592	599.49	597.85	600.33	0.003349	7.38	1091.69	219.63	0.57
3 (1b+2)	6631	2-Percent	11800	592	600.69	598.95	601.88	0.003596	8.78	1384	328.8	0.61

Table 5: Flood Scenario 3 HEC-RAS Output (continued)

Scenario	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
3 (1b+2)	6631	1-Percent	13600	592	601.2	599.43	602.51	0.003619	9.27	1538.66	373.64	0.62
3 (1b+2)	6631	0.2-Percent	18000	592	602.37	600.53	603.89	0.003524	10.14	1930.26	545.6	0.63
3 (1b+2)	6324	10-Percent	7990	590.5	598.14	595.72	598.7	0.00195	6.21	1424.27	310.39	0.44
3 (1b+2)	6324	2-Percent	11800	590.5	599.23	597.16	600.02	0.002281	7.48	1766.96	319.73	0.49
3 (1b+2)	6324	1-Percent	13600	590.5	599.74	597.59	600.62	0.00233	7.91	1929.71	328.23	0.5
3 (1b+2)	6324	0.2-Percent	18000	590.5	600.96	598.51	602.01	0.002328	8.72	2320.92	497.25	0.51
3 (1b+2)	6015	10-Percent	7990	588.7	596.2		596.89	0.003327	7.51	1385.04	443.81	0.57
3 (1b+2)	6015	2-Percent	11800	588.7	597.73		598.34	0.002248	7.3	2106.56	485.17	0.49
3 (1b+2)	6015	1-Percent	13600	588.7	598.44		599.02	0.001913	7.18	2448.97	489.87	0.46
3 (1b+2)	6015	0.2-Percent	18000	588.7	600.01		600.57	0.001442	7.06	3230.24	503.57	0.41
3 (1b+2)	5607	10-Percent	7990	587.3	595.13	593.15	595.44	0.001219	5.27	2043.85	514.32	0.36
3 (1b+2)	5607	2-Percent	11800	587.3	597.08	593.92	597.35	0.000807	5.08	3052.05	522.39	0.3
3 (1b+2)	5607	1-Percent	13600	587.3	597.86	594.25	598.14	0.000726	5.1	3464.13	525.18	0.29
3 (1b+2)	5607	0.2-Percent	18000	587.3	599.55	594.87	599.84	0.000631	5.3	4362.86	553.04	0.28
3 (1b+2)	5307	10-Percent	7990	585.8	594.69		594.92	0.000676	4.36	2377.13	479.75	0.27
3 (1b+2)	5307	2-Percent	11800	585.8	596.76		596.98	0.000514	4.44	3374.42	488.12	0.25
3 (1b+2)	5307	1-Percent	13600	585.8	597.57		597.8	0.000486	4.55	3770.62	492.14	0.24
3 (1b+2)	5307	0.2-Percent	18000	585.8	599.27		599.53	0.000461	4.89	4697.89	579.26	0.24
3 (1b+2)	5051	10-Percent	7990	584.3	594.16	590.65	594.5	0.000908	4.97	1816.04	300.41	0.32
3 (1b+2)	5051	2-Percent	11800	584.3	596.23	591.74	596.63	0.000799	5.46	2445.11	309.95	0.31
3 (1b+2)	5051	1-Percent	13600	584.3	597.02	592.17	597.46	0.000786	5.71	2720.16	360.18	0.31
3 (1b+2)	5051	0.2-Percent	18000	584.3	598.68	593.1	599.2	0.000777	6.25	3323.59	366.28	0.32
3 (1b+2)	4786	10-Percent	7990	582.8	593.59	589.2	594.05	0.000961	5.61	1529.05	204.32	0.33
3 (1b+2)	4786	2-Percent	11800	582.8	595.6	590.62	596.2	0.00098	6.49	2019.05	257.76	0.35
3 (1b+2)	4786	1-Percent	13600	582.8	596.36	591.18	597.02	0.001002	6.87	2216.06	261.45	0.35
3 (1b+2)	4786	0.2-Percent	18000	582.8	597.92	592.38	598.74	0.001073	7.72	2627.34	266.09	0.37
3 (1b+2)	4582	10-Percent	7990	582.7	593.03	589.04	593.59	0.001217	6.12	1392.34	198.09	0.37
3 (1b+2)	4582	2-Percent	11800	582.7	595.02	590.54	595.73	0.001204	7	1861.56	250.23	0.38
3 (1b+2)	4582	1-Percent	13600	582.7	595.77	591.11	596.55	0.001226	7.39	2048.66	253.68	0.39
3 (1b+2)	4582	0.2-Percent	18000	582.7	597.26	592.29	598.23	0.001315	8.32	2432.66	259.57	0.41
3 (1b+2)	4363	10-Percent	7990	582.5	592.71	588.54	593.12	0.000913	5.39	1641.92	237.07	0.32
3 (1b+2)	4363	2-Percent	11800	582.5	594.73	589.87	595.26	0.000906	6.17	2161.48	491.57	0.33
3 (1b+2)	4363	1-Percent	13600	582.5	595.48	590.39	596.06	0.000927	6.52	2387.73	683.43	0.34
3 (1b+2)	4363	0.2-Percent	18000	582.5	596.99	591.52	597.7	0.000983	7.29	3058.42	1123.5	0.36
3 (1b+2)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
3 (1b+2)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
3 (1b+2)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
3 (1b+2)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
3 (1b+2)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
3 (1b+2)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
3 (1b+2)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
3 (1b+2)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
3 (1b+2)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
3 (1b+2)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 5: Flood Scenario 3 HEC-RAS Output (continued)

Scenario	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
3 (1b+2)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
3 (1b+2)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
3 (1b+2)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
3 (1b+2)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
3 (1b+2)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
3 (1b+2)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
3 (1b+2)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
3 (1b+2)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
3 (1b+2)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
3 (1b+2)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
3 (1b+2)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
3 (1b+2)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
3 (1b+2)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
3 (1b+2)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
3 (1b+2)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
3 (1b+2)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
3 (1b+2)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
3 (1b+2)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #4

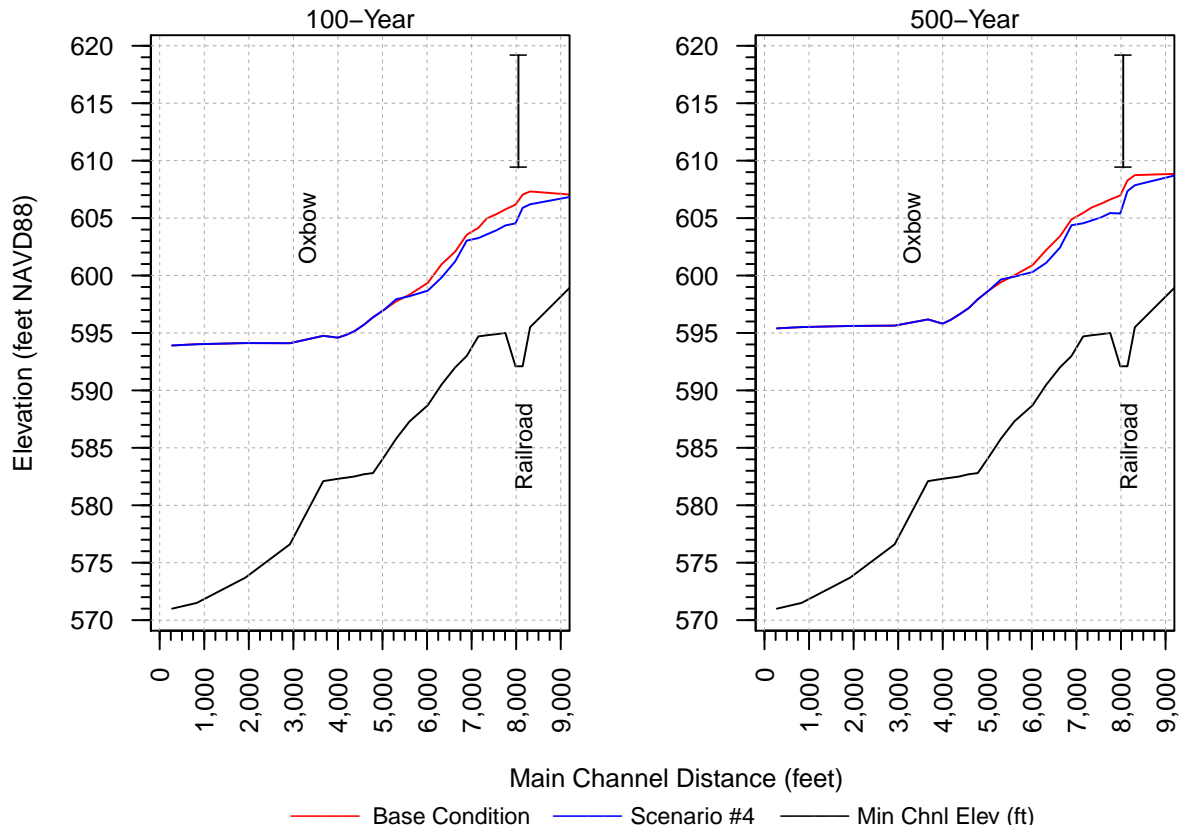
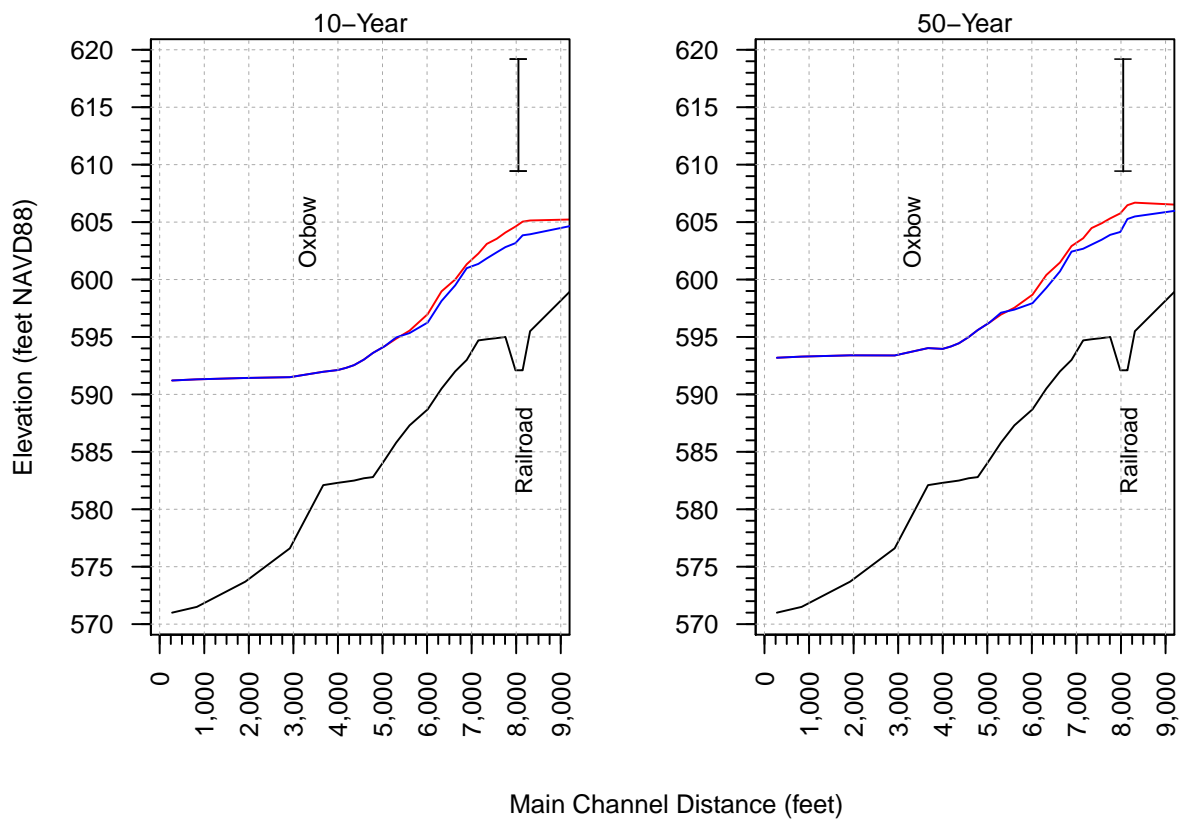
Flood Bench Configuration: 2 + 3

Plan: UPDATE-FB-2+3-UNION+CLINTON

Geometry: UPDATE-FB-2+3-UNION+CLINTON

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022



— Base Condition — Scenario #4 — Min Chnl Elev (ft)

Figure 11: Flood Scenario #4 (2+3) Profile Plot

Table 6: Flood Scenario 4 HEC-RAS Output

Scenario	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
4 (2+3)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
4 (2+3)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
4 (2+3)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
4 (2+3)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
4 (2+3)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
4 (2+3)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
4 (2+3)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
4 (2+3)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
4 (2+3)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
4 (2+3)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
4 (2+3)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
4 (2+3)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
4 (2+3)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
4 (2+3)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
4 (2+3)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
4 (2+3)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
4 (2+3)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
4 (2+3)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
4 (2+3)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
4 (2+3)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
4 (2+3)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
4 (2+3)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
4 (2+3)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
4 (2+3)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
4 (2+3)	12986	10-Percent	7990	608.9	617.09		617.64	0.001417	6.23	1736.03	495.23	0.39
4 (2+3)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
4 (2+3)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
4 (2+3)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
4 (2+3)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.66	117.56	0.5
4 (2+3)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.74	134.63	0.55
4 (2+3)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
4 (2+3)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
4 (2+3)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002862	8.96	895.5	113.2	0.56
4 (2+3)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.92	115.53	0.59
4 (2+3)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
4 (2+3)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
4 (2+3)	11860 Union Rd		Bridge									
4 (2+3)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004418	10.14	789.07	110.21	0.66
4 (2+3)	11789	2-Percent	11800	605.5	614.75	613.12	617.12	0.005056	12.33	960.74	111.85	0.73
4 (2+3)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
4 (2+3)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
4 (2+3)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.54	125.79	0.43
4 (2+3)	11675	2-Percent	11800	602.4	614.92		616.24	0.002081	9.25	1297.57	129.74	0.5
4 (2+3)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 6: Flood Scenario 4 HEC-RAS Output (continued)

Scenario	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
4 (2+3)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
4 (2+3)	10302	10-Percent	7990	603.2	610.48		611.37	0.002505	7.65	1175.86	345.04	0.51
4 (2+3)	10302	2-Percent	11800	603.2	612.06	609.46	613.1	0.002394	8.59	1900.99	568.72	0.52
4 (2+3)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
4 (2+3)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
4 (2+3)	9372	10-Percent	7990	599.6	604.78	604.78	606.96	0.011022	11.85	675.35	156.98	1
4 (2+3)	9372	2-Percent	11800	599.6	606.07	606.07	608.89	0.010151	13.5	880.47	161.34	1
4 (2+3)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
4 (2+3)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
4 (2+3)	8312	10-Percent	7990	595.5	603.94		604.2	0.00082	4.47	3131.96	697.64	0.3
4 (2+3)	8312	2-Percent	11800	595.5	605.49		605.82	0.000826	5.12	4247.17	748.23	0.31
4 (2+3)	8312	1-Percent	13600	595.5	606.2		606.54	0.000806	5.33	4791.85	794.5	0.31
4 (2+3)	8312	0.2-Percent	18000	595.5	607.86		608.24	0.00074	5.69	6130.08	815.63	0.3
4 (2+3)	8145	10-Percent	7990	592.1	603.85	597.15	604.1	0.000398	4.04	1979.2	263.12	0.22
4 (2+3)	8145	2-Percent	11800	592.1	605.27	598.29	605.69	0.00057	5.26	2245.28	350.63	0.27
4 (2+3)	8145	1-Percent	13600	592.1	605.89	598.79	606.41	0.000638	5.75	2363.3	424.47	0.29
4 (2+3)	8145	0.2-Percent	18000	592.1	607.35	599.9	608.08	0.000775	6.82	2637.65	472.71	0.32
4 (2+3)	8049 Railroad Bridge		Bridge									
4 (2+3)	7984	10-Percent	7990	592.1	603.17	599.55	603.78	0.001431	6.24	1297.73	219.45	0.39
4 (2+3)	7984	2-Percent	11800	592.1	604.14	600.86	605.16	0.002093	8.16	1471.03	343.08	0.49
4 (2+3)	7984	1-Percent	13600	592.1	604.54	601.43	605.78	0.002386	8.97	1543.34	371.05	0.52
4 (2+3)	7984	0.2-Percent	18000	592.1	605.4	602.7	607.19	0.00307	10.81	1699.94	488.39	0.6
4 (2+3)	7758	10-Percent	7990	595	602.82	601.27	603.1	0.001057	5.05	2343.3	710.66	0.34
4 (2+3)	7758	2-Percent	11800	595	603.89	601.98	604.2	0.001055	5.54	3105.06	739.59	0.34
4 (2+3)	7758	1-Percent	13600	595	604.36	602.25	604.69	0.001036	5.7	3446.22	800.62	0.34
4 (2+3)	7758	0.2-Percent	18000	595	605.44	602.81	605.8	0.000987	6.03	4228.38	889.99	0.34
4 (2+3)	7564	10-Percent	7990	594.9	602.37		602.64	0.001138	5.11	2365.61	742.51	0.35
4 (2+3)	7564	2-Percent	11800	594.9	603.46		603.75	0.001082	5.5	3177.26	757.4	0.35
4 (2+3)	7564	1-Percent	13600	594.9	603.95		604.25	0.00104	5.62	3556.4	790.74	0.34
4 (2+3)	7564	0.2-Percent	18000	594.9	605.08		605.39	0.000926	5.77	4544.25	947.08	0.33
4 (2+3)	7340	10-Percent	7990	594.8	601.84		602.13	0.001348	5.28	2354.1	864.7	0.37
4 (2+3)	7340	2-Percent	11800	594.8	603.04		603.3	0.001056	5.25	3447.27	989.11	0.34
4 (2+3)	7340	1-Percent	13600	594.8	603.58		603.82	0.000955	5.23	3993.86	1055.84	0.33
4 (2+3)	7340	0.2-Percent	18000	594.8	604.79		605.02	0.000753	5.1	5303.49	1097.02	0.3
4 (2+3)	7151	10-Percent	7990	594.7	601.36		601.57	0.001071	4.39	2627.07	871.15	0.33
4 (2+3)	7151	2-Percent	11800	594.7	602.68		602.87	0.000781	4.31	3880.22	998.2	0.29
4 (2+3)	7151	1-Percent	13600	594.7	603.26		603.44	0.000697	4.29	4478.38	1099.75	0.28
4 (2+3)	7151	0.2-Percent	18000	594.7	604.55		604.72	0.000541	4.2	6193.56	1818.87	0.25
4 (2+3)	6890	10-Percent	7990	593	600.99	599.04	601.11	0.000652	3.57	3243.08	1872.66	0.26
4 (2+3)	6890	2-Percent	11800	593	602.43	599.53	602.55	0.000448	3.42	4904.01	2139.65	0.22
4 (2+3)	6890	1-Percent	13600	593	603.04	599.74	603.15	0.000396	3.39	5617.5	2196.94	0.21
4 (2+3)	6890	0.2-Percent	18000	593	604.38	600.18	604.49	0.00032	3.37	7206.65	2334.84	0.19
4 (2+3)	6631	10-Percent	7990	592	599.49	597.85	600.33	0.003353	7.38	1091.21	478.37	0.57
4 (2+3)	6631	2-Percent	11800	592	600.71	598.95	601.89	0.003571	8.76	1387.79	568.93	0.61

Table 6: Flood Scenario 4 HEC-RAS Output (continued)

Scenario	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
4 (2+3)	6631	1-Percent	13600	592	601.23	599.43	602.52	0.003572	9.23	1546.21	587.51	0.62
4 (2+3)	6631	0.2-Percent	18000	592	602.43	600.53	603.92	0.003416	10.04	1954.26	706.2	0.62
4 (2+3)	6324	10-Percent	7990	590.5	598.13	595.72	598.69	0.001961	6.22	1421.33	310.33	0.44
4 (2+3)	6324	2-Percent	11800	590.5	599.27	597.16	600.05	0.002225	7.42	1781.87	319.78	0.49
4 (2+3)	6324	1-Percent	13600	590.5	599.82	597.59	600.67	0.002237	7.81	1956.12	335.18	0.49
4 (2+3)	6324	0.2-Percent	18000	590.5	601.11	598.51	602.12	0.002178	8.54	2371.73	504.94	0.5
4 (2+3)	6015	10-Percent	7990	588.7	596.26		596.92	0.003156	7.37	1411.89	444.22	0.56
4 (2+3)	6015	2-Percent	11800	588.7	597.94		598.49	0.001964	6.95	2205.94	486.32	0.46
4 (2+3)	6015	1-Percent	13600	588.7	598.68		599.2	0.001657	6.82	2568.55	491.99	0.43
4 (2+3)	6015	0.2-Percent	18000	588.7	600.3		600.81	0.001257	6.73	3378.05	507.78	0.38
4 (2+3)	5607	10-Percent	7990	587.3	595.34	593.15	595.61	0.001057	5	2147.26	515.3	0.34
4 (2+3)	5607	2-Percent	11800	587.3	597.38	593.92	597.63	0.00069	4.8	3212.32	523.39	0.28
4 (2+3)	5607	1-Percent	13600	587.3	598.2	594.25	598.44	0.000624	4.84	3637.94	526.41	0.27
4 (2+3)	5607	0.2-Percent	18000	587.3	599.9	594.87	600.17	0.000553	5.07	4562.11	568.88	0.26
4 (2+3)	5307	10-Percent	7990	585.8	594.96		595.16	0.00058	4.13	2504.06	480.77	0.25
4 (2+3)	5307	2-Percent	11800	585.8	597.11		597.31	0.000441	4.21	3547.23	489.88	0.23
4 (2+3)	5307	1-Percent	13600	585.8	597.94		598.15	0.00042	4.33	3954.66	499.38	0.23
4 (2+3)	5307	0.2-Percent	18000	585.8	599.66		599.9	0.000402	4.66	4927.78	588.01	0.23
4 (2+3)	5051	10-Percent	7990	584.3	594.2	590.41	594.7	0.001202	5.74	1436.22	206.59	0.36
4 (2+3)	5051	2-Percent	11800	584.3	596.26	591.62	596.91	0.001151	6.57	1948.53	301.22	0.37
4 (2+3)	5051	1-Percent	13600	584.3	597.06	592.13	597.76	0.00113	6.86	2225.73	360.37	0.37
4 (2+3)	5051	0.2-Percent	18000	584.3	598.75	593.33	599.52	0.001078	7.39	2838.24	366.48	0.37
4 (2+3)	4786	10-Percent	7990	582.8	593.61	589.12	594.17	0.001084	5.97	1354.02	162.68	0.35
4 (2+3)	4786	2-Percent	11800	582.8	595.6	590.5	596.36	0.001161	7.07	1761.02	226.8	0.38
4 (2+3)	4786	1-Percent	13600	582.8	596.36	591.06	597.2	0.001191	7.49	1953.77	261.47	0.39
4 (2+3)	4786	0.2-Percent	18000	582.8	597.93	592.42	598.95	0.001261	8.38	2367.37	266.15	0.41
4 (2+3)	4582	10-Percent	7990	582.7	593.03	589.02	593.66	0.001319	6.37	1278.39	165.23	0.38
4 (2+3)	4582	2-Percent	11800	582.7	594.99	590.43	595.82	0.001372	7.45	1675.35	219.76	0.41
4 (2+3)	4582	1-Percent	13600	582.7	595.71	591.03	596.65	0.001416	7.92	1836.98	225.28	0.42
4 (2+3)	4582	0.2-Percent	18000	582.7	597.16	592.41	598.35	0.00156	9.01	2174.87	252.83	0.45
4 (2+3)	4363	10-Percent	7990	582.5	592.55	588.33	593.14	0.001221	6.16	1312.26	164.05	0.37
4 (2+3)	4363	2-Percent	11800	582.5	594.45	589.72	595.28	0.00134	7.37	1652.17	369.96	0.4
4 (2+3)	4363	1-Percent	13600	582.5	595.14	590.3	596.08	0.00141	7.89	1836.59	549.17	0.42
4 (2+3)	4363	0.2-Percent	18000	582.5	596.59	591.65	597.72	0.0015	8.82	2375.41	958.21	0.44
4 (2+3)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
4 (2+3)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
4 (2+3)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
4 (2+3)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
4 (2+3)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
4 (2+3)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
4 (2+3)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
4 (2+3)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
4 (2+3)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
4 (2+3)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 6: Flood Scenario 4 HEC-RAS Output (continued)

Scenario	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
4 (2+3)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
4 (2+3)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
4 (2+3)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
4 (2+3)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
4 (2+3)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
4 (2+3)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
4 (2+3)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
4 (2+3)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
4 (2+3)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
4 (2+3)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
4 (2+3)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
4 (2+3)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
4 (2+3)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
4 (2+3)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
4 (2+3)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
4 (2+3)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
4 (2+3)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
4 (2+3)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #5

Flood Bench Configuration: 1b + 2 + 3

Plan: UPDATE-FB-1b+2+3-SCHOOL+UNION+CLINTON
Geometry: UPDATE-FB-1b+2+3-SCHOOL+UNION+CLINTON
Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC
Date: November 2022

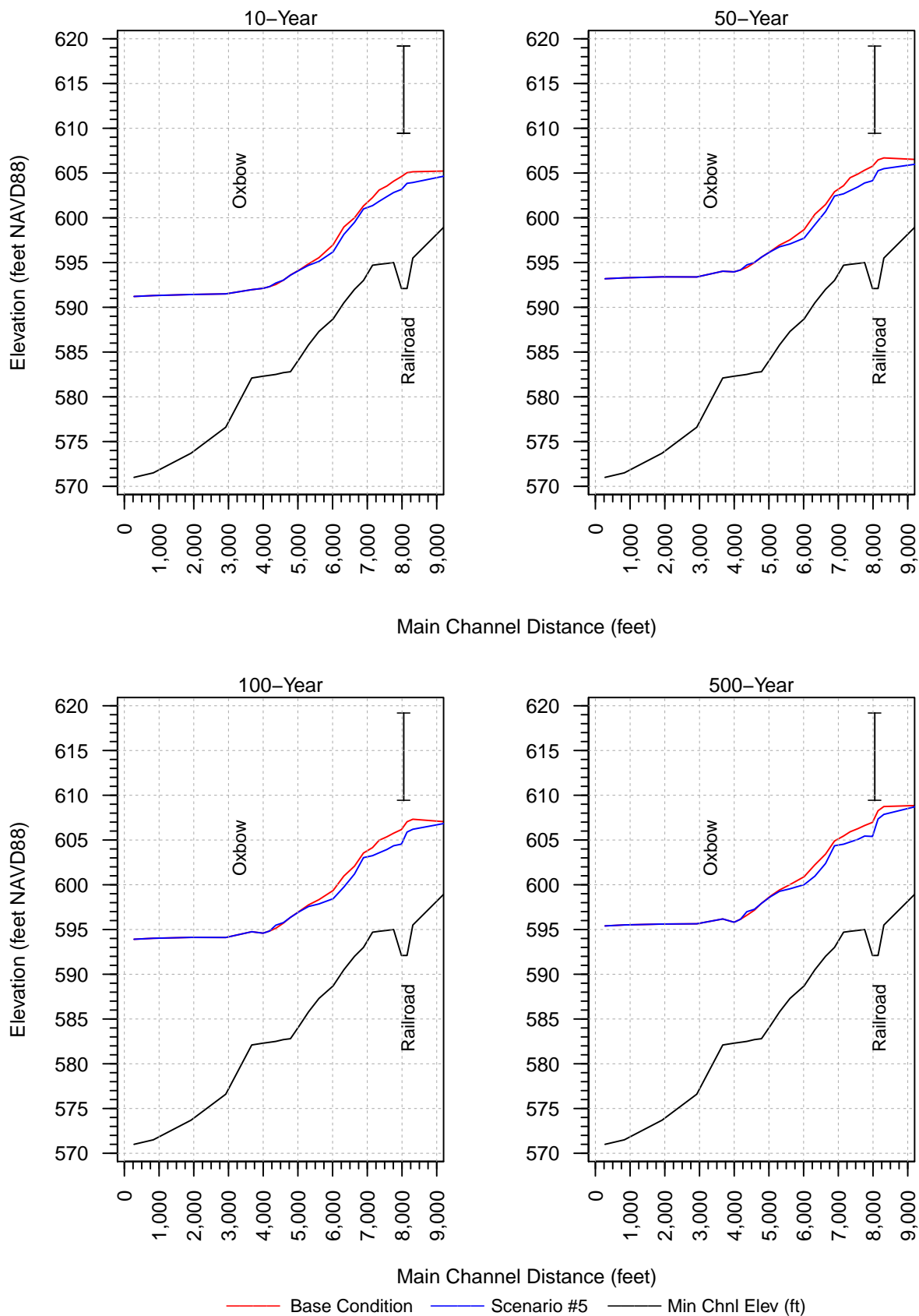


Figure 12: Flood Scenario #5 (1b+2+3) Profile Plot

Table 7: Flood Scenario 5 HEC-RAS Output

Scenario	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
5 (1b+2+3)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
5 (1b+2+3)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
5 (1b+2+3)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
5 (1b+2+3)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
5 (1b+2+3)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
5 (1b+2+3)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
5 (1b+2+3)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
5 (1b+2+3)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
5 (1b+2+3)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
5 (1b+2+3)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
5 (1b+2+3)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
5 (1b+2+3)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
5 (1b+2+3)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
5 (1b+2+3)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
5 (1b+2+3)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
5 (1b+2+3)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
5 (1b+2+3)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
5 (1b+2+3)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
5 (1b+2+3)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
5 (1b+2+3)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
5 (1b+2+3)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
5 (1b+2+3)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
5 (1b+2+3)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
5 (1b+2+3)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
5 (1b+2+3)	12986	10-Percent	7990	608.9	617.09		617.64	0.001417	6.23	1736.03	495.23	0.39
5 (1b+2+3)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
5 (1b+2+3)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
5 (1b+2+3)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
5 (1b+2+3)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.66	117.56	0.5
5 (1b+2+3)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.74	134.63	0.55
5 (1b+2+3)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
5 (1b+2+3)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
5 (1b+2+3)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002862	8.96	895.5	113.2	0.56
5 (1b+2+3)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.92	115.53	0.59
5 (1b+2+3)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
5 (1b+2+3)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
5 (1b+2+3)	11860 Union Rd		Bridge									
5 (1b+2+3)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004418	10.14	789.07	110.21	0.66
5 (1b+2+3)	11789	2-Percent	11800	605.5	614.75	613.12	617.12	0.005056	12.33	960.74	111.85	0.73
5 (1b+2+3)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
5 (1b+2+3)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
5 (1b+2+3)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.54	125.79	0.43
5 (1b+2+3)	11675	2-Percent	11800	602.4	614.92		616.24	0.002081	9.25	1297.57	129.74	0.5
5 (1b+2+3)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 7: Flood Scenario 5 HEC-RAS Output (continued)

Scenario	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
5 (1b+2+3)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
5 (1b+2+3)	10302	10-Percent	7990	603.2	610.48		611.37	0.002505	7.65	1175.86	345.04	0.51
5 (1b+2+3)	10302	2-Percent	11800	603.2	612.06	609.46	613.1	0.002394	8.59	1900.99	568.72	0.52
5 (1b+2+3)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
5 (1b+2+3)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
5 (1b+2+3)	9372	10-Percent	7990	599.6	604.78	604.78	606.96	0.011022	11.85	675.35	156.98	1
5 (1b+2+3)	9372	2-Percent	11800	599.6	606.07	606.07	608.89	0.010151	13.5	880.47	161.34	1
5 (1b+2+3)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
5 (1b+2+3)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
5 (1b+2+3)	8312	10-Percent	7990	595.5	603.94		604.2	0.00082	4.47	3131.96	697.64	0.3
5 (1b+2+3)	8312	2-Percent	11800	595.5	605.49		605.82	0.000826	5.12	4246.76	748.22	0.31
5 (1b+2+3)	8312	1-Percent	13600	595.5	606.2		606.54	0.000807	5.33	4790.78	794.39	0.31
5 (1b+2+3)	8312	0.2-Percent	18000	595.5	607.86		608.23	0.000741	5.69	6127.24	815.58	0.3
5 (1b+2+3)	8145	10-Percent	7990	592.1	603.85	597.15	604.1	0.000398	4.04	1979.2	263.12	0.22
5 (1b+2+3)	8145	2-Percent	11800	592.1	605.26	598.29	605.69	0.00057	5.26	2245.17	350.61	0.27
5 (1b+2+3)	8145	1-Percent	13600	592.1	605.89	598.79	606.41	0.000638	5.76	2363.04	424.36	0.29
5 (1b+2+3)	8145	0.2-Percent	18000	592.1	607.35	599.9	608.07	0.000775	6.83	2636.97	472.65	0.32
5 (1b+2+3)	8049 Railroad Bridge	10-Percent	7990	592.1	603.17	599.55	603.78	0.001431	6.24	1297.73	219.45	0.39
5 (1b+2+3)	7984	2-Percent	11800	592.1	604.14	600.86	605.16	0.002094	8.16	1470.85	343.01	0.49
5 (1b+2+3)	7984	1-Percent	13600	592.1	604.54	601.43	605.78	0.002388	8.98	1542.94	371	0.52
5 (1b+2+3)	7984	0.2-Percent	18000	592.1	605.4	602.7	607.19	0.003078	10.82	1698.51	487.32	0.6
5 (1b+2+3)	7758	10-Percent	7990	595	602.82	601.27	603.1	0.001057	5.05	2343.3	710.66	0.34
5 (1b+2+3)	7758	2-Percent	11800	595	603.89	601.98	604.2	0.001056	5.54	3104.05	739.46	0.34
5 (1b+2+3)	7758	1-Percent	13600	595	604.36	602.25	604.69	0.001038	5.71	3444.02	799.41	0.34
5 (1b+2+3)	7758	0.2-Percent	18000	595	605.44	602.81	605.79	0.000992	6.04	4221.23	889.75	0.34
5 (1b+2+3)	7564	10-Percent	7990	594.9	602.37		602.64	0.001138	5.11	2365.7	742.51	0.35
5 (1b+2+3)	7564	2-Percent	11800	594.9	603.45		603.75	0.001083	5.5	3175.78	757.23	0.35
5 (1b+2+3)	7564	1-Percent	13600	594.9	603.94		604.25	0.001043	5.62	3553.17	790.51	0.34
5 (1b+2+3)	7564	0.2-Percent	18000	594.9	605.07		605.38	0.000933	5.78	4532.49	942.97	0.33
5 (1b+2+3)	7340	10-Percent	7990	594.8	601.84		602.13	0.001348	5.28	2354.37	864.7	0.37
5 (1b+2+3)	7340	2-Percent	11800	594.8	603.04		603.3	0.001058	5.25	3444.5	988.83	0.34
5 (1b+2+3)	7340	1-Percent	13600	594.8	603.57		603.82	0.000959	5.24	3987.8	1055.6	0.33
5 (1b+2+3)	7340	0.2-Percent	18000	594.8	604.78		605.01	0.00076	5.12	5286.82	1096.6	0.3
5 (1b+2+3)	7151	10-Percent	7990	594.7	601.36		601.57	0.00107	4.39	2627.55	871.16	0.33
5 (1b+2+3)	7151	2-Percent	11800	594.7	602.68		602.87	0.000783	4.32	3876.5	998.07	0.29
5 (1b+2+3)	7151	1-Percent	13600	594.7	603.25		603.43	0.0007	4.3	4470.32	1099.15	0.28
5 (1b+2+3)	7151	0.2-Percent	18000	594.7	604.53		604.7	0.000547	4.22	6160.74	1802.72	0.25
5 (1b+2+3)	6890	10-Percent	7990	593	600.99	599.04	601.11	0.000651	3.57	3244	1872.88	0.26
5 (1b+2+3)	6890	2-Percent	11800	593	602.43	599.53	602.54	0.000449	3.42	4898.61	2139.55	0.22
5 (1b+2+3)	6890	1-Percent	13600	593	603.03	599.74	603.14	0.000398	3.39	5607.31	2194.2	0.21
5 (1b+2+3)	6890	0.2-Percent	18000	593	604.36	600.18	604.47	0.000324	3.39	7183.04	2333.64	0.19
5 (1b+2+3)	6631	10-Percent	7990	592	599.49	597.85	600.33	0.003349	7.38	1091.69	478.4	0.57
5 (1b+2+3)	6631	2-Percent	11800	592	600.69	598.95	601.88	0.003596	8.78	1384	568.66	0.61

Table 7: Flood Scenario 5 HEC-RAS Output (continued)

Scenario	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
5 (1b+2+3)	6631	1-Percent	13600	592	601.2	599.43	602.51	0.003619	9.27	1538.66	586.26	0.62
5 (1b+2+3)	6631	0.2-Percent	18000	592	602.37	600.53	603.89	0.003524	10.14	1930.26	701.53	0.63
5 (1b+2+3)	6324	10-Percent	7990	590.5	598.14	595.72	598.7	0.00195	6.21	1424.27	310.39	0.44
5 (1b+2+3)	6324	2-Percent	11800	590.5	599.23	597.16	600.02	0.002281	7.48	1766.96	319.73	0.49
5 (1b+2+3)	6324	1-Percent	13600	590.5	599.74	597.59	600.62	0.00233	7.91	1929.71	328.23	0.5
5 (1b+2+3)	6324	0.2-Percent	18000	590.5	600.96	598.51	602.01	0.002328	8.72	2320.92	497.25	0.51
5 (1b+2+3)	6015	10-Percent	7990	588.7	596.2		596.89	0.003327	7.51	1385.04	443.81	0.57
5 (1b+2+3)	6015	2-Percent	11800	588.7	597.73		598.34	0.002248	7.3	2106.56	485.17	0.49
5 (1b+2+3)	6015	1-Percent	13600	588.7	598.44		599.02	0.001913	7.18	2448.97	489.87	0.46
5 (1b+2+3)	6015	0.2-Percent	18000	588.7	600.01		600.57	0.001442	7.06	3230.24	503.57	0.41
5 (1b+2+3)	5607	10-Percent	7990	587.3	595.13	593.15	595.44	0.001219	5.27	2043.85	514.32	0.36
5 (1b+2+3)	5607	2-Percent	11800	587.3	597.08	593.92	597.35	0.000807	5.08	3052.05	522.39	0.3
5 (1b+2+3)	5607	1-Percent	13600	587.3	597.86	594.25	598.14	0.000726	5.1	3464.13	525.18	0.29
5 (1b+2+3)	5607	0.2-Percent	18000	587.3	599.55	594.87	599.84	0.000631	5.3	4362.86	553.04	0.28
5 (1b+2+3)	5307	10-Percent	7990	585.8	594.69		594.92	0.000676	4.36	2377.13	479.75	0.27
5 (1b+2+3)	5307	2-Percent	11800	585.8	596.76		596.98	0.000514	4.44	3374.42	488.12	0.25
5 (1b+2+3)	5307	1-Percent	13600	585.8	597.57		597.8	0.000486	4.55	3770.62	492.14	0.24
5 (1b+2+3)	5307	0.2-Percent	18000	585.8	599.27		599.53	0.000461	4.89	4697.89	579.26	0.24
5 (1b+2+3)	5051	10-Percent	7990	584.3	594.16	590.65	594.5	0.000908	4.97	1816.04	300.41	0.32
5 (1b+2+3)	5051	2-Percent	11800	584.3	596.23	591.74	596.63	0.000799	5.46	2445.11	309.95	0.31
5 (1b+2+3)	5051	1-Percent	13600	584.3	597.02	592.17	597.46	0.000786	5.71	2720.16	360.18	0.31
5 (1b+2+3)	5051	0.2-Percent	18000	584.3	598.68	593.1	599.2	0.000777	6.25	3323.59	366.28	0.32
5 (1b+2+3)	4786	10-Percent	7990	582.8	593.59	589.2	594.05	0.000961	5.61	1529.05	204.32	0.33
5 (1b+2+3)	4786	2-Percent	11800	582.8	595.6	590.62	596.2	0.00098	6.49	2019.05	257.76	0.35
5 (1b+2+3)	4786	1-Percent	13600	582.8	596.36	591.18	597.02	0.001002	6.87	2216.06	261.45	0.35
5 (1b+2+3)	4786	0.2-Percent	18000	582.8	597.92	592.38	598.74	0.001073	7.72	2627.34	266.09	0.37
5 (1b+2+3)	4582	10-Percent	7990	582.7	593.03	589.04	593.59	0.001217	6.12	1392.34	198.09	0.37
5 (1b+2+3)	4582	2-Percent	11800	582.7	595.02	590.54	595.73	0.001204	7	1861.56	250.23	0.38
5 (1b+2+3)	4582	1-Percent	13600	582.7	595.77	591.11	596.55	0.001226	7.39	2048.66	253.68	0.39
5 (1b+2+3)	4582	0.2-Percent	18000	582.7	597.26	592.29	598.23	0.001315	8.32	2432.66	259.57	0.41
5 (1b+2+3)	4363	10-Percent	7990	582.5	592.71	588.54	593.12	0.000913	5.39	1641.92	237.07	0.32
5 (1b+2+3)	4363	2-Percent	11800	582.5	594.73	589.87	595.26	0.000906	6.17	2161.48	491.57	0.33
5 (1b+2+3)	4363	1-Percent	13600	582.5	595.48	590.39	596.06	0.000927	6.52	2387.73	683.43	0.34
5 (1b+2+3)	4363	0.2-Percent	18000	582.5	596.99	591.52	597.7	0.000983	7.29	3058.42	1123.5	0.36
5 (1b+2+3)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
5 (1b+2+3)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
5 (1b+2+3)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
5 (1b+2+3)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
5 (1b+2+3)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
5 (1b+2+3)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
5 (1b+2+3)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
5 (1b+2+3)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
5 (1b+2+3)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
5 (1b+2+3)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 7: Flood Scenario 5 HEC-RAS Output (continued)

Scenario	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
5 (1b+2+3)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
5 (1b+2+3)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
5 (1b+2+3)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
5 (1b+2+3)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
5 (1b+2+3)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
5 (1b+2+3)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
5 (1b+2+3)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
5 (1b+2+3)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
5 (1b+2+3)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
5 (1b+2+3)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
5 (1b+2+3)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
5 (1b+2+3)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
5 (1b+2+3)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
5 (1b+2+3)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
5 (1b+2+3)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
5 (1b+2+3)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
5 (1b+2+3)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
5 (1b+2+3)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #6

Flood Bench Configuration: 2 + 3 + 4

Plan: UPDATE-FB-2+3+4-UNION+CLINT+UTILI

Geometry: UPDATE-FB-2+3+4-UNION+CLINT+UTILI

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022

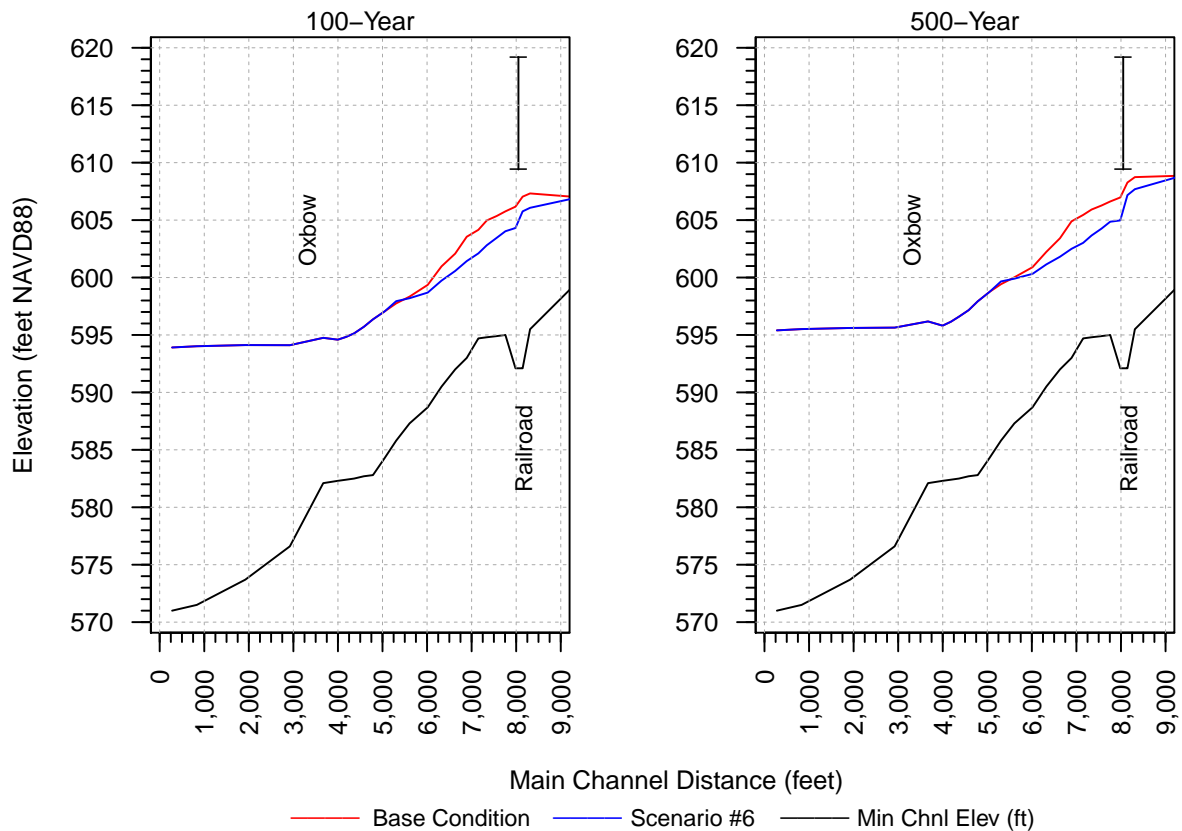
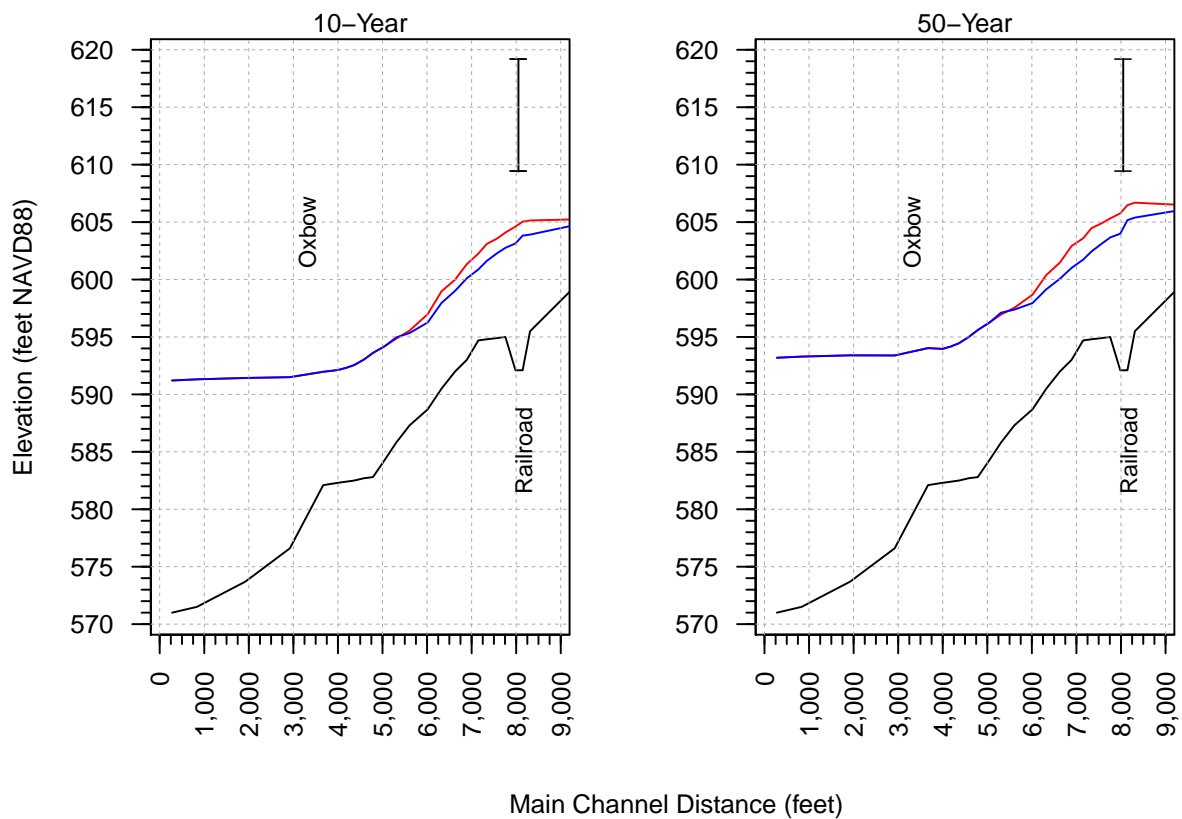


Figure 13: Flood Scenario #6 (2+3+4) Profile Plot

Table 8: Flood Scenario 6 HEC-RAS Output

Scenario	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
6 (2+3+4)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
6 (2+3+4)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
6 (2+3+4)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
6 (2+3+4)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
6 (2+3+4)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
6 (2+3+4)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
6 (2+3+4)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
6 (2+3+4)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
6 (2+3+4)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
6 (2+3+4)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
6 (2+3+4)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
6 (2+3+4)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
6 (2+3+4)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
6 (2+3+4)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
6 (2+3+4)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
6 (2+3+4)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
6 (2+3+4)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
6 (2+3+4)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
6 (2+3+4)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
6 (2+3+4)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
6 (2+3+4)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
6 (2+3+4)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
6 (2+3+4)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
6 (2+3+4)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
6 (2+3+4)	12986	10-Percent	7990	608.9	617.09		617.64	0.001417	6.23	1736.03	495.23	0.39
6 (2+3+4)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
6 (2+3+4)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
6 (2+3+4)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
6 (2+3+4)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.66	117.56	0.5
6 (2+3+4)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.74	134.63	0.55
6 (2+3+4)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
6 (2+3+4)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
6 (2+3+4)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002862	8.96	895.5	113.2	0.56
6 (2+3+4)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.92	115.53	0.59
6 (2+3+4)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
6 (2+3+4)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
6 (2+3+4)	11860 Union Rd		Bridge									
6 (2+3+4)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004418	10.14	789.07	110.21	0.66
6 (2+3+4)	11789	2-Percent	11800	605.5	614.75	613.12	617.12	0.005056	12.33	960.74	111.85	0.73
6 (2+3+4)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
6 (2+3+4)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
6 (2+3+4)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.54	125.79	0.43
6 (2+3+4)	11675	2-Percent	11800	602.4	614.92		616.24	0.002081	9.25	1297.57	129.74	0.5
6 (2+3+4)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 8: Flood Scenario 6 HEC-RAS Output (continued)

Scenario	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
6 (2+3+4)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
6 (2+3+4)	10302	10-Percent	7990	603.2	610.48		611.37	0.002505	7.65	1175.86	345.04	0.51
6 (2+3+4)	10302	2-Percent	11800	603.2	612.06	609.46	613.1	0.002394	8.59	1900.99	568.72	0.52
6 (2+3+4)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
6 (2+3+4)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
6 (2+3+4)	9372	10-Percent	7990	599.6	604.78	604.78	606.96	0.011022	11.85	675.35	156.98	1
6 (2+3+4)	9372	2-Percent	11800	599.6	606.07	606.07	608.89	0.010151	13.5	880.47	161.34	1
6 (2+3+4)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
6 (2+3+4)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
6 (2+3+4)	8312	10-Percent	7990	595.5	603.91		604.17	0.000834	4.5	3111.22	697.33	0.3
6 (2+3+4)	8312	2-Percent	11800	595.5	605.39		605.73	0.000864	5.2	4173.39	744.96	0.31
6 (2+3+4)	8312	1-Percent	13600	595.5	606.07		606.43	0.000853	5.43	4687.7	786.79	0.31
6 (2+3+4)	8312	0.2-Percent	18000	595.5	607.69		608.08	0.000787	5.81	5988.43	812.9	0.31
6 (2+3+4)	8145	10-Percent	7990	592.1	603.82	597.15	604.07	0.000401	4.05	1973.62	262.54	0.22
6 (2+3+4)	8145	2-Percent	11800	592.1	605.17	598.29	605.6	0.000586	5.3	2226.69	348.48	0.27
6 (2+3+4)	8145	1-Percent	13600	592.1	605.76	598.79	606.28	0.000661	5.82	2338.17	412.95	0.29
6 (2+3+4)	8145	0.2-Percent	18000	592.1	607.17	599.9	607.91	0.000809	6.91	2603.29	468.86	0.33
6 (2+3+4)	8049 Railroad Bridge	Bridge										
6 (2+3+4)	7984	10-Percent	7990	592.1	603.14	599.55	603.74	0.001456	6.27	1290.85	218.39	0.4
6 (2+3+4)	7984	2-Percent	11800	592.1	603.99	600.86	605.05	0.002224	8.31	1443.41	331.69	0.5
6 (2+3+4)	7984	1-Percent	13600	592.1	604.31	601.43	605.62	0.002602	9.22	1501.92	366.27	0.54
6 (2+3+4)	7984	0.2-Percent	18000	592.1	604.97	602.7	606.94	0.003567	11.32	1621.73	409.76	0.64
6 (2+3+4)	7758	10-Percent	7990	595	602.76	601.27	603.05	0.001108	5.14	2301.49	710.29	0.34
6 (2+3+4)	7758	2-Percent	11800	595	603.66	601.98	604.02	0.001233	5.88	2940.69	729.5	0.37
6 (2+3+4)	7758	1-Percent	13600	595	604.03	602.25	604.41	0.00128	6.17	3204.59	757.22	0.38
6 (2+3+4)	7758	0.2-Percent	18000	595	604.86	602.81	605.31	0.001359	6.78	3800.71	864.34	0.4
6 (2+3+4)	7564	10-Percent	7990	594.9	602.27		602.56	0.001235	5.27	2294.86	741.96	0.36
6 (2+3+4)	7564	2-Percent	11800	594.9	603.11		603.47	0.001379	6.03	2919.38	747.37	0.39
6 (2+3+4)	7564	1-Percent	13600	594.9	603.46		603.85	0.001435	6.34	3178.46	757.43	0.4
6 (2+3+4)	7564	0.2-Percent	18000	594.9	604.26		604.72	0.001495	6.9	3812.95	836.02	0.41
6 (2+3+4)	7340	10-Percent	7990	594.8	601.62		601.97	0.001681	5.75	2160.41	863.66	0.41
6 (2+3+4)	7340	2-Percent	11800	594.8	602.45		602.84	0.001695	6.3	2884.99	888.79	0.42
6 (2+3+4)	7340	1-Percent	13600	594.8	602.81		603.21	0.001676	6.48	3224.6	966.68	0.42
6 (2+3+4)	7340	0.2-Percent	18000	594.8	603.66		604.07	0.001573	6.75	4085.71	1059.49	0.42
6 (2+3+4)	7151	10-Percent	7990	594.7	600.88		601.19	0.001731	5.26	2209.49	867.81	0.41
6 (2+3+4)	7151	2-Percent	11800	594.7	601.73		602.07	0.001679	5.73	2948.81	901.78	0.41
6 (2+3+4)	7151	1-Percent	13600	594.7	602.1		602.45	0.00163	5.88	3304.39	972.73	0.41
6 (2+3+4)	7151	0.2-Percent	18000	594.7	603.02		603.38	0.001429	6.02	4225.96	1063.45	0.39
6 (2+3+4)	6890	10-Percent	7990	593	600.1	599.03	600.34	0.001444	4.78	2431.96	1202.88	0.37
6 (2+3+4)	6890	2-Percent	11800	593	601.01	599.51	601.27	0.001323	5.1	3339.75	1879.26	0.37
6 (2+3+4)	6890	1-Percent	13600	593	601.43	599.71	601.69	0.001223	5.13	3813.06	2035.41	0.36
6 (2+3+4)	6890	0.2-Percent	18000	593	602.5	600.16	602.74	0.000958	5.03	5052.9	2141.07	0.32
6 (2+3+4)	6631	10-Percent	7990	592	599.02	598.11	599.36	0.002069	5.45	2015.61	767.74	0.44
6 (2+3+4)	6631	2-Percent	11800	592	600.07	598.65	600.41	0.001699	5.64	2823.1	772.58	0.41

Table 8: Flood Scenario 6 HEC-RAS Output (continued)

Scenario	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
6 (2+3+4)	6631	1-Percent	13600	592	600.57	598.89	600.91	0.001528	5.65	3225.62	843.45	0.4
6 (2+3+4)	6631	0.2-Percent	18000	592	601.81	599.38	602.14	0.001155	5.54	4295.57	864.39	0.36
6 (2+3+4)	6324	10-Percent	7990	590.5	597.96	595.72	598.3	0.001454	5.25	2041.94	662.66	0.38
6 (2+3+4)	6324	2-Percent	11800	590.5	599.15	597.31	599.5	0.00129	5.59	2830.64	666.57	0.37
6 (2+3+4)	6324	1-Percent	13600	590.5	599.73	597.6	600.09	0.001174	5.62	3222.79	668.5	0.36
6 (2+3+4)	6324	0.2-Percent	18000	590.5	601.14	598.19	601.49	0.000946	5.64	4168.99	673.14	0.33
6 (2+3+4)	6015	10-Percent	7990	588.7	596.26		596.85	0.002877	7.04	1511.66	485.31	0.53
6 (2+3+4)	6015	2-Percent	11800	588.7	597.95		598.43	0.001735	6.54	2378.3	525.84	0.43
6 (2+3+4)	6015	1-Percent	13600	588.7	598.69		599.15	0.001458	6.41	2770.68	530.6	0.4
6 (2+3+4)	6015	0.2-Percent	18000	588.7	600.32		600.75	0.001105	6.32	3641.38	541.6	0.36
6 (2+3+4)	5607	10-Percent	7990	587.3	595.34	593.15	595.6	0.001048	4.98	2155.35	515.3	0.33
6 (2+3+4)	5607	2-Percent	11800	587.3	597.38	593.91	597.63	0.000685	4.79	3220.39	523.39	0.28
6 (2+3+4)	5607	1-Percent	13600	587.3	598.2	594.25	598.44	0.00062	4.83	3646.01	526.41	0.27
6 (2+3+4)	5607	0.2-Percent	18000	587.3	599.9	594.91	600.17	0.00055	5.06	4570.15	568.89	0.26
6 (2+3+4)	5307	10-Percent	7990	585.8	594.96		595.16	0.00058	4.13	2504.06	480.77	0.25
6 (2+3+4)	5307	2-Percent	11800	585.8	597.11		597.31	0.000441	4.21	3547.23	489.88	0.23
6 (2+3+4)	5307	1-Percent	13600	585.8	597.94		598.15	0.00042	4.33	3954.66	499.38	0.23
6 (2+3+4)	5307	0.2-Percent	18000	585.8	599.66		599.9	0.000402	4.66	4927.78	588.01	0.23
6 (2+3+4)	5051	10-Percent	7990	584.3	594.2	590.41	594.7	0.001202	5.74	1436.22	206.59	0.36
6 (2+3+4)	5051	2-Percent	11800	584.3	596.26	591.62	596.91	0.001151	6.57	1948.53	301.22	0.37
6 (2+3+4)	5051	1-Percent	13600	584.3	597.06	592.13	597.76	0.00113	6.86	2225.73	360.37	0.37
6 (2+3+4)	5051	0.2-Percent	18000	584.3	598.75	593.33	599.52	0.001078	7.39	2838.24	366.48	0.37
6 (2+3+4)	4786	10-Percent	7990	582.8	593.61	589.12	594.17	0.001084	5.97	1354.02	162.68	0.35
6 (2+3+4)	4786	2-Percent	11800	582.8	595.6	590.5	596.36	0.001161	7.07	1761.02	226.8	0.38
6 (2+3+4)	4786	1-Percent	13600	582.8	596.36	591.06	597.2	0.001191	7.49	1953.77	261.47	0.39
6 (2+3+4)	4786	0.2-Percent	18000	582.8	597.93	592.42	598.95	0.001261	8.38	2367.37	266.15	0.41
6 (2+3+4)	4582	10-Percent	7990	582.7	593.03	589.02	593.66	0.001319	6.37	1278.39	165.23	0.38
6 (2+3+4)	4582	2-Percent	11800	582.7	594.99	590.43	595.82	0.001372	7.45	1675.35	219.76	0.41
6 (2+3+4)	4582	1-Percent	13600	582.7	595.71	591.03	596.65	0.001416	7.92	1836.98	225.28	0.42
6 (2+3+4)	4582	0.2-Percent	18000	582.7	597.16	592.41	598.35	0.00156	9.01	2174.87	252.83	0.45
6 (2+3+4)	4363	10-Percent	7990	582.5	592.55	588.33	593.14	0.001221	6.16	1312.26	164.05	0.37
6 (2+3+4)	4363	2-Percent	11800	582.5	594.45	589.72	595.28	0.00134	7.37	1652.17	369.96	0.4
6 (2+3+4)	4363	1-Percent	13600	582.5	595.14	590.3	596.08	0.00141	7.89	1836.59	549.17	0.42
6 (2+3+4)	4363	0.2-Percent	18000	582.5	596.59	591.65	597.72	0.0015	8.82	2375.41	958.21	0.44
6 (2+3+4)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
6 (2+3+4)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
6 (2+3+4)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
6 (2+3+4)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
6 (2+3+4)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
6 (2+3+4)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
6 (2+3+4)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
6 (2+3+4)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
6 (2+3+4)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
6 (2+3+4)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.64	1230.59	0.28

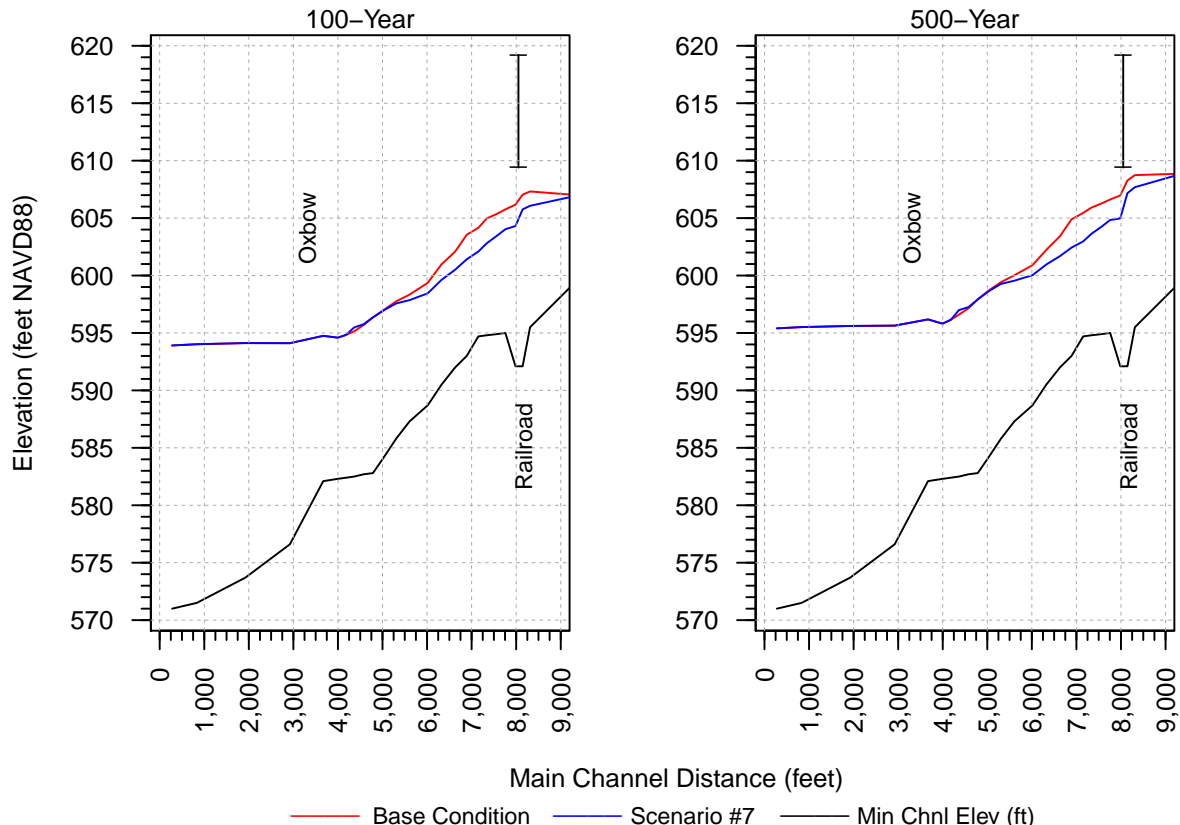
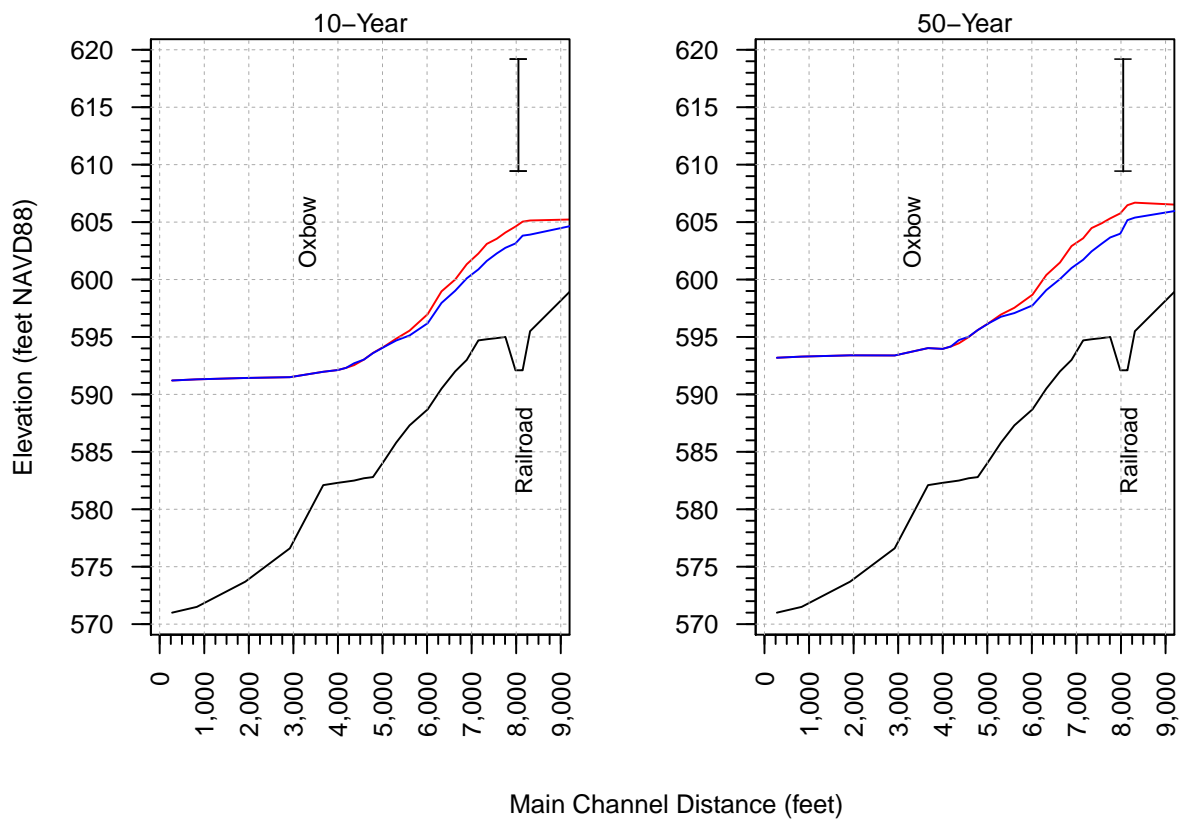
Table 8: Flood Scenario 6 HEC-RAS Output (continued)

Scenario	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
6 (2+3+4)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.8	1256.34	0.28
6 (2+3+4)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
6 (2+3+4)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
6 (2+3+4)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
6 (2+3+4)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
6 (2+3+4)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
6 (2+3+4)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
6 (2+3+4)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
6 (2+3+4)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
6 (2+3+4)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
6 (2+3+4)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
6 (2+3+4)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
6 (2+3+4)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
6 (2+3+4)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
6 (2+3+4)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
6 (2+3+4)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
6 (2+3+4)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
6 (2+3+4)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #7

Flood Bench Configuration: 1b + 2 + 3 + 4

Plan: UPDATE-FB-1b+2+3+4-SCH+UNION+CLINT+UTILI
Geometry: UPDATE-FB-1b+2+3+4-SCH+UNION+CLINT+UTILI
Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC
Date: November 2022



— Base Condition — Scenario #7 — Min Chnl Elev (ft)

Figure 14: Flood Scenario #7 (1b+2+3+4) Profile Plot

Table 9: Flood Scenario 7 HEC-RAS Output

Scenario	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
7 (1b+2+3+4)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
7 (1b+2+3+4)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
7 (1b+2+3+4)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
7 (1b+2+3+4)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
7 (1b+2+3+4)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
7 (1b+2+3+4)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
7 (1b+2+3+4)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
7 (1b+2+3+4)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
7 (1b+2+3+4)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
7 (1b+2+3+4)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
7 (1b+2+3+4)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
7 (1b+2+3+4)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
7 (1b+2+3+4)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
7 (1b+2+3+4)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
7 (1b+2+3+4)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
7 (1b+2+3+4)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
7 (1b+2+3+4)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
7 (1b+2+3+4)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
7 (1b+2+3+4)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
7 (1b+2+3+4)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
7 (1b+2+3+4)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
7 (1b+2+3+4)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
7 (1b+2+3+4)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
7 (1b+2+3+4)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
7 (1b+2+3+4)	12986	10-Percent	7990	608.9	617.09		617.64	0.001417	6.23	1736.03	495.23	0.39
7 (1b+2+3+4)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
7 (1b+2+3+4)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
7 (1b+2+3+4)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
7 (1b+2+3+4)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.66	117.56	0.5
7 (1b+2+3+4)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.74	134.63	0.55
7 (1b+2+3+4)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
7 (1b+2+3+4)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
7 (1b+2+3+4)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002862	8.96	895.5	113.2	0.56
7 (1b+2+3+4)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.92	115.53	0.59
7 (1b+2+3+4)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
7 (1b+2+3+4)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
7 (1b+2+3+4)	11860 Union Rd		Bridge									
7 (1b+2+3+4)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004418	10.14	789.07	110.21	0.66
7 (1b+2+3+4)	11789	2-Percent	11800	605.5	614.75	613.12	617.12	0.005056	12.33	960.74	111.85	0.73
7 (1b+2+3+4)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
7 (1b+2+3+4)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
7 (1b+2+3+4)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.54	125.79	0.43
7 (1b+2+3+4)	11675	2-Percent	11800	602.4	614.92		616.24	0.002081	9.25	1297.57	129.74	0.5
7 (1b+2+3+4)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 9: Flood Scenario 7 HEC-RAS Output (continued)

Scenario	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
7 (1b+2+3+4)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
7 (1b+2+3+4)	10302	10-Percent	7990	603.2	610.48		611.37	0.002505	7.65	1175.86	345.04	0.51
7 (1b+2+3+4)	10302	2-Percent	11800	603.2	612.06	609.46	613.1	0.002394	8.59	1900.99	568.72	0.52
7 (1b+2+3+4)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
7 (1b+2+3+4)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
7 (1b+2+3+4)	9372	10-Percent	7990	599.6	604.78	604.78	606.96	0.011022	11.85	675.35	156.98	1
7 (1b+2+3+4)	9372	2-Percent	11800	599.6	606.07	606.07	608.89	0.010151	13.5	880.47	161.34	1
7 (1b+2+3+4)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
7 (1b+2+3+4)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
7 (1b+2+3+4)	8312	10-Percent	7990	595.5	603.91		604.17	0.000834	4.5	3111.22	697.33	0.3
7 (1b+2+3+4)	8312	2-Percent	11800	595.5	605.39		605.73	0.000864	5.2	4173.21	744.96	0.31
7 (1b+2+3+4)	8312	1-Percent	13600	595.5	606.07		606.43	0.000853	5.43	4687.17	786.75	0.31
7 (1b+2+3+4)	8312	0.2-Percent	18000	595.5	607.69		608.08	0.000788	5.81	5986.54	812.86	0.31
7 (1b+2+3+4)	8145	10-Percent	7990	592.1	603.82	597.15	604.07	0.000401	4.05	1973.62	262.54	0.22
7 (1b+2+3+4)	8145	2-Percent	11800	592.1	605.17	598.29	605.6	0.000586	5.3	2226.64	348.48	0.27
7 (1b+2+3+4)	8145	1-Percent	13600	592.1	605.76	598.79	606.28	0.000661	5.82	2338.06	412.78	0.29
7 (1b+2+3+4)	8145	0.2-Percent	18000	592.1	607.17	599.9	607.91	0.00081	6.92	2602.83	468.81	0.33
7 (1b+2+3+4)	8049 Railroad Bridge		Bridge									
7 (1b+2+3+4)	7984	10-Percent	7990	592.1	603.14	599.55	603.74	0.001456	6.27	1290.85	218.39	0.4
7 (1b+2+3+4)	7984	2-Percent	11800	592.1	603.99	600.86	605.05	0.002224	8.31	1443.35	331.65	0.5
7 (1b+2+3+4)	7984	1-Percent	13600	592.1	604.31	601.43	605.62	0.002603	9.22	1501.72	366.25	0.54
7 (1b+2+3+4)	7984	0.2-Percent	18000	592.1	604.97	602.7	606.93	0.003576	11.33	1620.52	407.9	0.65
7 (1b+2+3+4)	7758	10-Percent	7990	595	602.76	601.27	603.05	0.001108	5.14	2301.49	710.29	0.34
7 (1b+2+3+4)	7758	2-Percent	11800	595	603.66	601.98	604.02	0.001233	5.88	2940.34	729.49	0.37
7 (1b+2+3+4)	7758	1-Percent	13600	595	604.03	602.25	604.41	0.001281	6.18	3203.41	756.95	0.38
7 (1b+2+3+4)	7758	0.2-Percent	18000	595	604.84	602.81	605.3	0.001366	6.79	3793.33	863.64	0.4
7 (1b+2+3+4)	7564	10-Percent	7990	594.9	602.27		602.56	0.001235	5.27	2294.86	741.96	0.36
7 (1b+2+3+4)	7564	2-Percent	11800	594.9	603.11		603.47	0.00138	6.03	2918.74	747.36	0.39
7 (1b+2+3+4)	7564	1-Percent	13600	594.9	603.45		603.85	0.001438	6.34	3176.43	757.2	0.4
7 (1b+2+3+4)	7564	0.2-Percent	18000	594.9	604.25		604.7	0.001509	6.92	3799.75	833.32	0.41
7 (1b+2+3+4)	7340	10-Percent	7990	594.8	601.62		601.97	0.001681	5.75	2160.41	863.66	0.41
7 (1b+2+3+4)	7340	2-Percent	11800	594.8	602.45		602.84	0.001698	6.3	2883.09	887.63	0.42
7 (1b+2+3+4)	7340	1-Percent	13600	594.8	602.81		603.2	0.001684	6.49	3218.82	966.31	0.43
7 (1b+2+3+4)	7340	0.2-Percent	18000	594.8	603.64		604.05	0.001603	6.8	4057.21	1058.35	0.42
7 (1b+2+3+4)	7151	10-Percent	7990	594.7	600.88		601.19	0.001731	5.26	2209.49	867.81	0.41
7 (1b+2+3+4)	7151	2-Percent	11800	594.7	601.72		602.06	0.001686	5.74	2944.52	901.26	0.41
7 (1b+2+3+4)	7151	1-Percent	13600	594.7	602.09		602.44	0.001646	5.9	3292.4	972.08	0.41
7 (1b+2+3+4)	7151	0.2-Percent	18000	594.7	602.97		603.34	0.001476	6.09	4176.58	1053.86	0.4
7 (1b+2+3+4)	6890	10-Percent	7990	593	600.1	599.03	600.34	0.001444	4.78	2432.02	1202.93	0.37
7 (1b+2+3+4)	6890	2-Percent	11800	593	601	599.51	601.26	0.001336	5.12	3327.97	1875.59	0.37
7 (1b+2+3+4)	6890	1-Percent	13600	593	601.41	599.71	601.67	0.001247	5.17	3786.04	2029.6	0.36
7 (1b+2+3+4)	6890	0.2-Percent	18000	593	602.43	600.16	602.68	0.001008	5.12	4966.37	2139.46	0.33
7 (1b+2+3+4)	6631	10-Percent	7990	592	599.02	598.11	599.36	0.002069	5.44	2015.66	767.74	0.44
7 (1b+2+3+4)	6631	2-Percent	11800	592	600.04	598.65	600.39	0.001736	5.68	2802.68	772.46	0.42

Table 9: Flood Scenario 7 HEC-RAS Output (continued)

Scenario	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
7 (1b+2+3+4)	6631	1-Percent	13600	592	600.51	598.89	600.87	0.001589	5.73	3181.14	836.23	0.4
7 (1b+2+3+4)	6631	0.2-Percent	18000	592	601.69	599.38	602.04	0.001243	5.68	4191.73	863.75	0.37
7 (1b+2+3+4)	6324	10-Percent	7990	590.5	597.96	595.72	598.3	0.001452	5.25	2042.5	662.66	0.38
7 (1b+2+3+4)	6324	2-Percent	11800	590.5	599.08	597.31	599.45	0.001349	5.68	2786.74	666.35	0.38
7 (1b+2+3+4)	6324	1-Percent	13600	590.5	599.62	597.6	600	0.001255	5.75	3150.67	668.14	0.37
7 (1b+2+3+4)	6324	0.2-Percent	18000	590.5	600.96	598.19	601.34	0.001037	5.82	4046.08	672.54	0.34
7 (1b+2+3+4)	6015	10-Percent	7990	588.7	596.2		596.82	0.003049	7.19	1480.28	484.94	0.55
7 (1b+2+3+4)	6015	2-Percent	11800	588.7	597.75		598.27	0.00199	6.87	2270.38	524.78	0.46
7 (1b+2+3+4)	6015	1-Percent	13600	588.7	598.45		598.95	0.001684	6.74	2641.54	528.95	0.43
7 (1b+2+3+4)	6015	0.2-Percent	18000	588.7	600.03		600.51	0.001267	6.63	3483.63	539.62	0.38
7 (1b+2+3+4)	5607	10-Percent	7990	587.3	595.13	593.15	595.43	0.001208	5.24	2051.94	514.32	0.36
7 (1b+2+3+4)	5607	2-Percent	11800	587.3	597.08	593.91	597.35	0.000801	5.06	3060.11	522.39	0.3
7 (1b+2+3+4)	5607	1-Percent	13600	587.3	597.86	594.25	598.14	0.000722	5.09	3472.2	525.18	0.29
7 (1b+2+3+4)	5607	0.2-Percent	18000	587.3	599.55	594.91	599.84	0.000627	5.29	4370.9	553.04	0.28
7 (1b+2+3+4)	5307	10-Percent	7990	585.8	594.69		594.92	0.000676	4.36	2377.13	479.75	0.27
7 (1b+2+3+4)	5307	2-Percent	11800	585.8	596.76		596.98	0.000514	4.44	3374.42	488.12	0.25
7 (1b+2+3+4)	5307	1-Percent	13600	585.8	597.57		597.8	0.000486	4.55	3770.62	492.14	0.24
7 (1b+2+3+4)	5307	0.2-Percent	18000	585.8	599.27		599.53	0.000461	4.89	4697.89	579.26	0.24
7 (1b+2+3+4)	5051	10-Percent	7990	584.3	594.16	590.65	594.5	0.000908	4.97	1816.04	300.41	0.32
7 (1b+2+3+4)	5051	2-Percent	11800	584.3	596.23	591.74	596.63	0.000799	5.46	2445.11	309.95	0.31
7 (1b+2+3+4)	5051	1-Percent	13600	584.3	597.02	592.17	597.46	0.000786	5.71	2720.16	360.18	0.31
7 (1b+2+3+4)	5051	0.2-Percent	18000	584.3	598.68	593.1	599.2	0.000777	6.25	3323.59	366.28	0.32
7 (1b+2+3+4)	4786	10-Percent	7990	582.8	593.59	589.2	594.05	0.000961	5.61	1529.05	204.32	0.33
7 (1b+2+3+4)	4786	2-Percent	11800	582.8	595.6	590.62	596.2	0.00098	6.49	2019.05	257.76	0.35
7 (1b+2+3+4)	4786	1-Percent	13600	582.8	596.36	591.18	597.02	0.001002	6.87	2216.06	261.45	0.35
7 (1b+2+3+4)	4786	0.2-Percent	18000	582.8	597.92	592.38	598.74	0.001073	7.72	2627.34	266.09	0.37
7 (1b+2+3+4)	4582	10-Percent	7990	582.7	593.03	589.04	593.59	0.001217	6.12	1392.34	198.09	0.37
7 (1b+2+3+4)	4582	2-Percent	11800	582.7	595.02	590.54	595.73	0.001204	7	1861.56	250.23	0.38
7 (1b+2+3+4)	4582	1-Percent	13600	582.7	595.77	591.11	596.55	0.001226	7.39	2048.66	253.68	0.39
7 (1b+2+3+4)	4582	0.2-Percent	18000	582.7	597.26	592.29	598.23	0.001315	8.32	2432.66	259.57	0.41
7 (1b+2+3+4)	4363	10-Percent	7990	582.5	592.71	588.54	593.12	0.000913	5.39	1641.92	237.07	0.32
7 (1b+2+3+4)	4363	2-Percent	11800	582.5	594.73	589.87	595.26	0.000906	6.17	2161.48	491.57	0.33
7 (1b+2+3+4)	4363	1-Percent	13600	582.5	595.48	590.39	596.06	0.000927	6.52	2387.73	683.43	0.34
7 (1b+2+3+4)	4363	0.2-Percent	18000	582.5	596.99	591.52	597.7	0.000983	7.29	3058.42	1123.5	0.36
7 (1b+2+3+4)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
7 (1b+2+3+4)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
7 (1b+2+3+4)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
7 (1b+2+3+4)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
7 (1b+2+3+4)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
7 (1b+2+3+4)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
7 (1b+2+3+4)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
7 (1b+2+3+4)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
7 (1b+2+3+4)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
7 (1b+2+3+4)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 9: Flood Scenario 7 HEC-RAS Output (continued)

Scenario	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
7 (1b+2+3+4)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
7 (1b+2+3+4)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
7 (1b+2+3+4)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
7 (1b+2+3+4)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
7 (1b+2+3+4)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
7 (1b+2+3+4)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
7 (1b+2+3+4)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
7 (1b+2+3+4)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
7 (1b+2+3+4)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
7 (1b+2+3+4)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
7 (1b+2+3+4)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
7 (1b+2+3+4)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
7 (1b+2+3+4)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
7 (1b+2+3+4)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
7 (1b+2+3+4)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
7 (1b+2+3+4)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
7 (1b+2+3+4)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
7 (1b+2+3+4)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #8

Flood Bench Configuration: 5 + 6

Plan: UPDATE-FB-5+6-UTILITY-UP+DOWN-LEFT

Geometry: UPDATE-FB-5+6-UTILITY-UP+DOWN-LEFT

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022

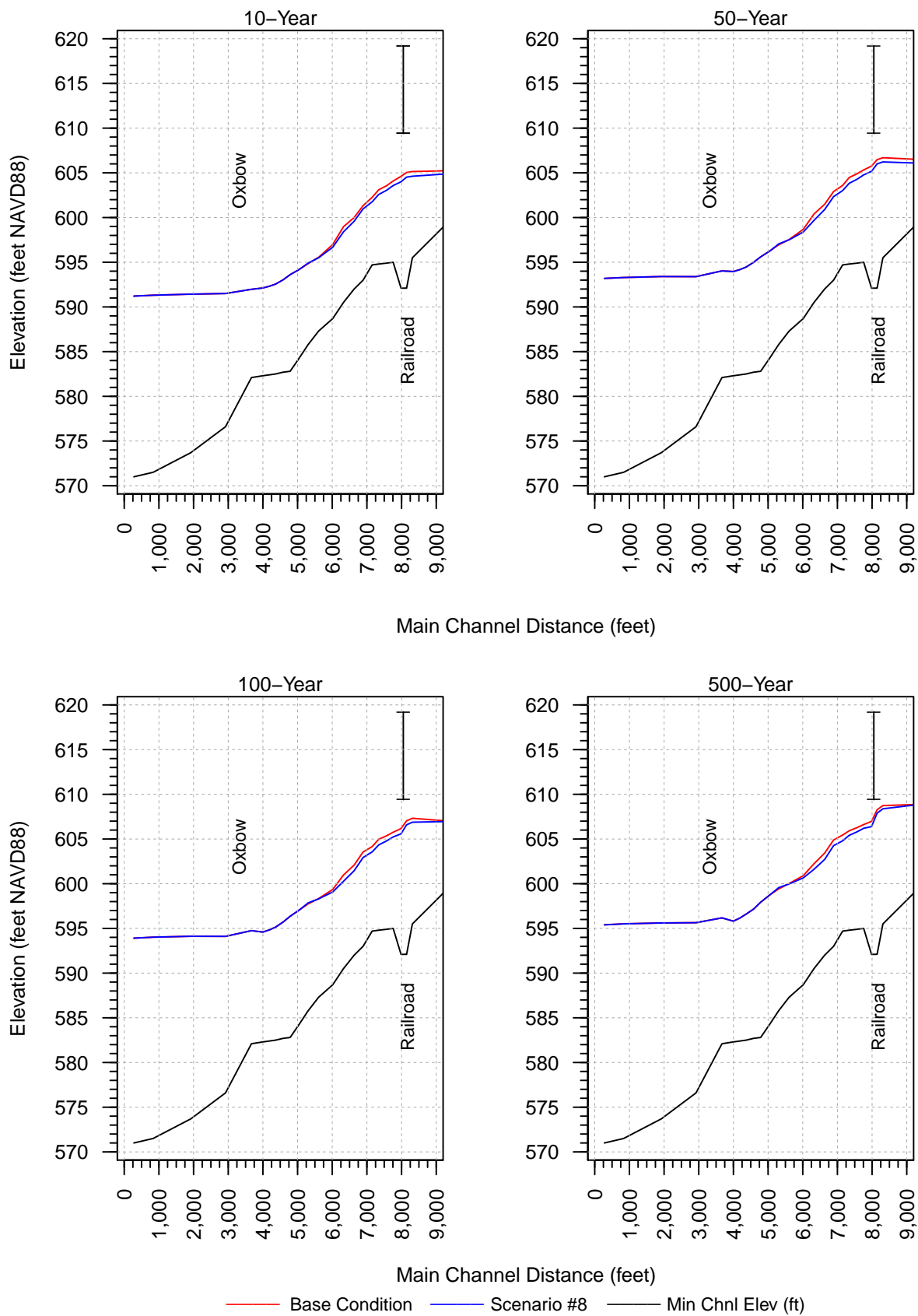


Figure 15: Flood Scenario #8 (5+6) Profile Plot

Table 10: Flood Scenario 8 HEC-RAS Output

Scenario	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
8 (5+6)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
8 (5+6)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
8 (5+6)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
8 (5+6)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
8 (5+6)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
8 (5+6)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
8 (5+6)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
8 (5+6)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
8 (5+6)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
8 (5+6)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
8 (5+6)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
8 (5+6)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
8 (5+6)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
8 (5+6)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
8 (5+6)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
8 (5+6)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
8 (5+6)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
8 (5+6)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
8 (5+6)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
8 (5+6)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
8 (5+6)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
8 (5+6)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
8 (5+6)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
8 (5+6)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
8 (5+6)	12986	10-Percent	7990	608.9	617.09		617.64	0.001416	6.23	1736.09	495.28	0.39
8 (5+6)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
8 (5+6)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
8 (5+6)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
8 (5+6)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.69	117.56	0.5
8 (5+6)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.75	134.63	0.55
8 (5+6)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
8 (5+6)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
8 (5+6)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002861	8.96	895.56	113.2	0.56
8 (5+6)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.93	115.53	0.59
8 (5+6)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
8 (5+6)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
8 (5+6)	11860 Union Rd		Bridge									
8 (5+6)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004416	10.14	789.17	110.21	0.66
8 (5+6)	11789	2-Percent	11800	605.5	614.76	613.12	617.12	0.005055	12.33	960.8	111.85	0.73
8 (5+6)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
8 (5+6)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
8 (5+6)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.64	125.79	0.43
8 (5+6)	11675	2-Percent	11800	602.4	614.92		616.24	0.00208	9.24	1297.64	129.74	0.5
8 (5+6)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 10: Flood Scenario 8 HEC-RAS Output (continued)

Scenario	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
8 (5+6)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
8 (5+6)	10302	10-Percent	7990	603.2	610.42		611.33	0.002587	7.73	1155.84	322.87	0.52
8 (5+6)	10302	2-Percent	11800	603.2	612.05	609.46	613.1	0.002403	8.6	1896.93	568.55	0.52
8 (5+6)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
8 (5+6)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
8 (5+6)	9372	10-Percent	7990	599.6	604.9	604.78	606.97	0.010108	11.55	693.47	157.47	0.96
8 (5+6)	9372	2-Percent	11800	599.6	606.08	606.07	608.89	0.010059	13.46	882.96	161.39	0.99
8 (5+6)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
8 (5+6)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
8 (5+6)	8312	10-Percent	7990	595.5	604.62		604.82	0.000573	3.97	3609.06	708.21	0.25
8 (5+6)	8312	2-Percent	11800	595.5	606.22		606.48	0.000601	4.61	4810.25	796.84	0.27
8 (5+6)	8312	1-Percent	13600	595.5	606.88		607.16	0.00061	4.86	5338.27	803	0.27
8 (5+6)	8312	0.2-Percent	18000	595.5	608.38		608.71	0.000617	5.36	6553.45	823.41	0.28
8 (5+6)	8145	10-Percent	7990	592.1	604.52	597.15	604.75	0.000324	3.79	2105.43	320.91	0.2
8 (5+6)	8145	2-Percent	11800	592.1	606	598.29	606.38	0.000467	4.95	2383.16	433.12	0.25
8 (5+6)	8145	1-Percent	13600	592.1	606.59	598.79	607.05	0.000533	5.45	2493.94	456.19	0.26
8 (5+6)	8145	0.2-Percent	18000	592.1	607.89	599.9	608.56	0.000683	6.57	2739.44	485.14	0.3
8 (5+6)	8049 Railroad Bridge		Bridge									
8 (5+6)	7984	10-Percent	7990	592.1	604	599.55	604.49	0.001013	5.62	1446.29	333.45	0.34
8 (5+6)	7984	2-Percent	11800	592.1	605.17	600.86	605.97	0.001433	7.27	1656.34	454.41	0.41
8 (5+6)	7984	1-Percent	13600	592.1	605.58	601.43	606.56	0.001652	8.02	1732.01	498.22	0.44
8 (5+6)	7984	0.2-Percent	18000	592.1	606.39	602.7	607.86	0.002228	9.8	1880.97	531.84	0.52
8 (5+6)	7758	10-Percent	7990	595	603.58	600.75	604	0.001166	5.68	1765.57	517.4	0.36
8 (5+6)	7758	2-Percent	11800	595	604.77	601.96	605.25	0.001232	6.42	2597.86	895.83	0.38
8 (5+6)	7758	1-Percent	13600	595	605.23	602.4	605.73	0.001219	6.6	2989.94	961	0.38
8 (5+6)	7758	0.2-Percent	18000	595	606.2	603.63	606.71	0.001191	6.96	3836.31	1005.24	0.38
8 (5+6)	7564	10-Percent	7990	594.9	603.04		603.48	0.001328	5.88	1760.5	580.98	0.38
8 (5+6)	7564	2-Percent	11800	594.9	604.28		604.73	0.001241	6.29	2728.26	888.08	0.38
8 (5+6)	7564	1-Percent	13600	594.9	604.78		605.21	0.00117	6.34	3188.47	956.78	0.37
8 (5+6)	7564	0.2-Percent	18000	594.9	605.8		606.21	0.001063	6.48	4206.16	1148.27	0.36
8 (5+6)	7340	10-Percent	7990	594.8	602.58		602.92	0.001219	5.41	1918.63	557.34	0.36
8 (5+6)	7340	2-Percent	11800	594.8	603.83		604.21	0.001158	5.88	2801.8	838.11	0.36
8 (5+6)	7340	1-Percent	13600	594.8	604.34		604.72	0.001113	6	3285.38	1061.04	0.36
8 (5+6)	7340	0.2-Percent	18000	594.8	605.41		605.77	0.000978	6.07	4510.8	1368.02	0.34
8 (5+6)	7151	10-Percent	7990	594.7	601.76		602.25	0.001806	5.96	1615.56	495.11	0.43
8 (5+6)	7151	2-Percent	11800	594.7	603.02		603.57	0.001697	6.56	2385.25	758.37	0.43
8 (5+6)	7151	1-Percent	13600	594.7	603.56		604.11	0.001601	6.68	2847.1	923.97	0.42
8 (5+6)	7151	0.2-Percent	18000	594.7	604.8		605.27	0.001237	6.48	4620	1951.07	0.38
8 (5+6)	6890	10-Percent	7990	593	600.97	599.04	601.35	0.001515	5.43	1792.8	1612.24	0.39
8 (5+6)	6890	2-Percent	11800	593	602.34	599.89	602.75	0.00132	5.82	2559.51	2043.63	0.38
8 (5+6)	6890	1-Percent	13600	593	602.93	600.26	603.34	0.001221	5.89	3000.3	2173.66	0.37
8 (5+6)	6890	0.2-Percent	18000	593	604.26	601.08	604.67	0.001027	5.99	4050.43	2326.3	0.35
8 (5+6)	6631	10-Percent	7990	592	599.58	597.98	600.22	0.002637	6.62	1311.82	303.24	0.51
8 (5+6)	6631	2-Percent	11800	592	600.89	598.94	601.7	0.002555	7.55	1712.09	357.49	0.52

Table 10: Flood Scenario 8 HEC-RAS Output (continued)

Scenario	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
8 (5+6)	6631	1-Percent	13600	592	601.45	599.33	602.33	0.002518	7.91	1885.08	391.95	0.52
8 (5+6)	6631	0.2-Percent	18000	592	602.71	600.25	603.75	0.002421	8.64	2330.78	569.64	0.52
8 (5+6)	6324	10-Percent	7990	590.5	598.4	595.89	598.9	0.001668	5.9	1486.39	323.05	0.41
8 (5+6)	6324	2-Percent	11800	590.5	599.68	597.02	600.35	0.001787	6.9	1928.75	356.62	0.44
8 (5+6)	6324	1-Percent	13600	590.5	600.27	597.43	600.99	0.001772	7.22	2136.33	447.5	0.44
8 (5+6)	6324	0.2-Percent	18000	590.5	601.61	598.5	602.44	0.001713	7.84	2614.81	588.64	0.45
8 (5+6)	6015	10-Percent	7990	588.7	596.68		597.36	0.002808	7.3	1360.52	391.88	0.53
8 (5+6)	6015	2-Percent	11800	588.7	598.38		599	0.001945	7.2	2057.87	427.06	0.46
8 (5+6)	6015	1-Percent	13600	588.7	599.08		599.71	0.001739	7.22	2364.65	441.4	0.44
8 (5+6)	6015	0.2-Percent	18000	588.7	600.65		601.26	0.001422	7.33	3203.25	606.4	0.41
8 (5+6)	5607	10-Percent	7990	587.3	595.5	593.07	595.92	0.001409	5.87	1640.26	345.06	0.39
8 (5+6)	5607	2-Percent	11800	587.3	597.51	593.97	597.94	0.00108	6.06	2520.6	508.9	0.35
8 (5+6)	5607	1-Percent	13600	587.3	598.3	594.38	598.74	0.000987	6.13	2927.75	511.89	0.34
8 (5+6)	5607	0.2-Percent	18000	587.3	599.98	595.27	600.44	0.000867	6.38	3791.69	522.27	0.33
8 (5+6)	5307	10-Percent	7990	585.8	594.91		595.27	0.000929	5.21	1814.73	351.72	0.32
8 (5+6)	5307	2-Percent	11800	585.8	597.05		597.43	0.00076	5.5	2755.62	478.86	0.3
8 (5+6)	5307	1-Percent	13600	585.8	597.86		598.26	0.00073	5.68	3149.5	484.78	0.3
8 (5+6)	5307	0.2-Percent	18000	585.8	599.56		600	0.000702	6.12	3985.14	519.96	0.3
8 (5+6)	5051	10-Percent	7990	584.3	594.2	590.41	594.7	0.001202	5.74	1436.22	206.59	0.36
8 (5+6)	5051	2-Percent	11800	584.3	596.26	591.62	596.91	0.001151	6.57	1948.53	301.22	0.37
8 (5+6)	5051	1-Percent	13600	584.3	597.06	592.13	597.76	0.00113	6.86	2225.73	360.37	0.37
8 (5+6)	5051	0.2-Percent	18000	584.3	598.75	593.33	599.52	0.001078	7.39	2838.24	366.48	0.37
8 (5+6)	4786	10-Percent	7990	582.8	593.61	589.12	594.17	0.001084	5.97	1354.02	162.68	0.35
8 (5+6)	4786	2-Percent	11800	582.8	595.6	590.5	596.36	0.001161	7.07	1761.02	226.8	0.38
8 (5+6)	4786	1-Percent	13600	582.8	596.36	591.06	597.2	0.001191	7.49	1953.77	261.47	0.39
8 (5+6)	4786	0.2-Percent	18000	582.8	597.93	592.42	598.95	0.001261	8.38	2367.37	266.15	0.41
8 (5+6)	4582	10-Percent	7990	582.7	593.03	589.02	593.66	0.001319	6.37	1278.39	165.23	0.38
8 (5+6)	4582	2-Percent	11800	582.7	594.99	590.43	595.82	0.001372	7.45	1675.35	219.76	0.41
8 (5+6)	4582	1-Percent	13600	582.7	595.71	591.03	596.65	0.001416	7.92	1836.98	225.28	0.42
8 (5+6)	4582	0.2-Percent	18000	582.7	597.16	592.41	598.35	0.00156	9.01	2174.87	252.83	0.45
8 (5+6)	4363	10-Percent	7990	582.5	592.55	588.33	593.14	0.001221	6.16	1312.26	164.05	0.37
8 (5+6)	4363	2-Percent	11800	582.5	594.45	589.72	595.28	0.00134	7.37	1652.17	369.96	0.4
8 (5+6)	4363	1-Percent	13600	582.5	595.14	590.3	596.08	0.00141	7.89	1836.59	549.17	0.42
8 (5+6)	4363	0.2-Percent	18000	582.5	596.59	591.65	597.72	0.0015	8.82	2375.41	958.21	0.44
8 (5+6)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
8 (5+6)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
8 (5+6)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
8 (5+6)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
8 (5+6)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
8 (5+6)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
8 (5+6)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
8 (5+6)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
8 (5+6)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
8 (5+6)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 10: Flood Scenario 8 HEC-RAS Output (continued)

Scenario	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
8 (5+6)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
8 (5+6)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
8 (5+6)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
8 (5+6)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
8 (5+6)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
8 (5+6)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
8 (5+6)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
8 (5+6)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
8 (5+6)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
8 (5+6)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
8 (5+6)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
8 (5+6)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
8 (5+6)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
8 (5+6)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
8 (5+6)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
8 (5+6)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
8 (5+6)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
8 (5+6)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13

Flood Scenario #9

Flood Bench Configuration: 1b + 2 + 3 + 4 + 5 + 6

Plan: UPDATE-FB-1b+2+3+4+5+6-FULL-SUITE

Geometry: UPDATE-FB-1b+2+3+4+5+6-FULL-SUITE

Steady Flow Data: USGS BF,10,2,1,0.2-PERCENT-UPDATE-BC

Date: November 2022

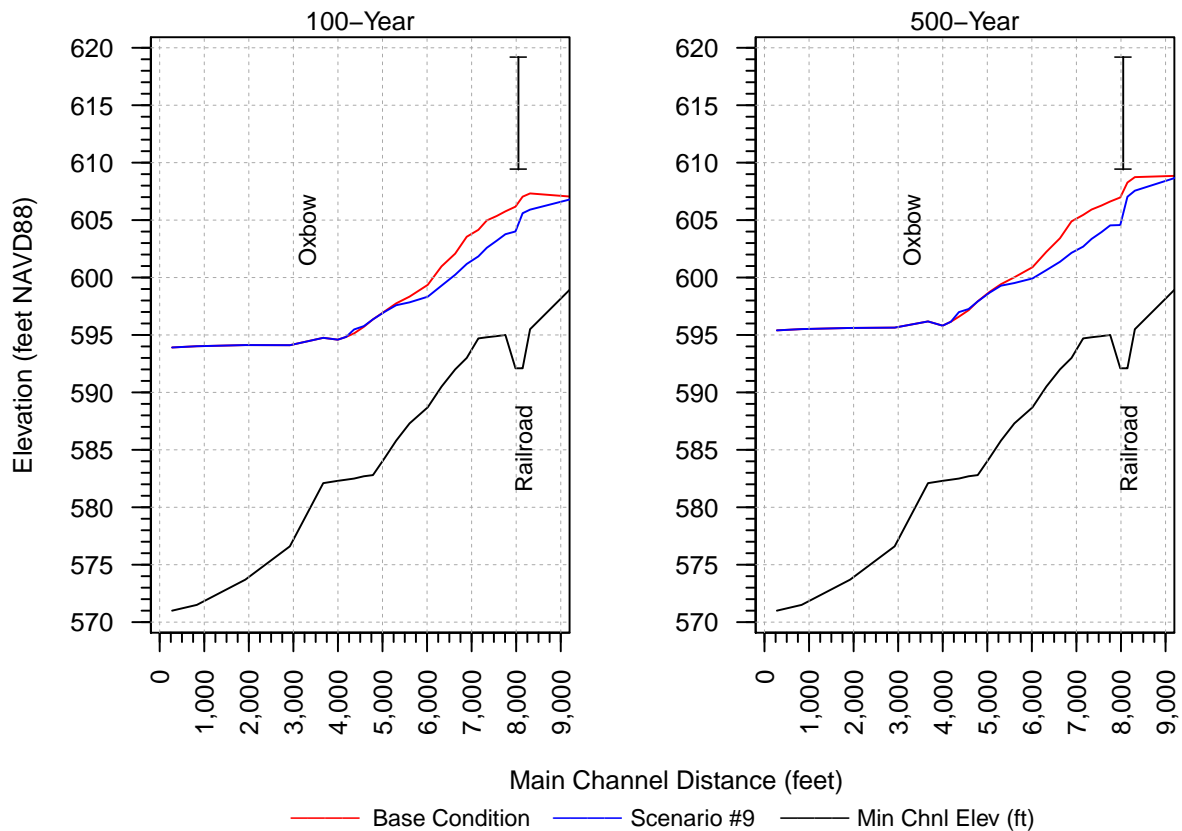
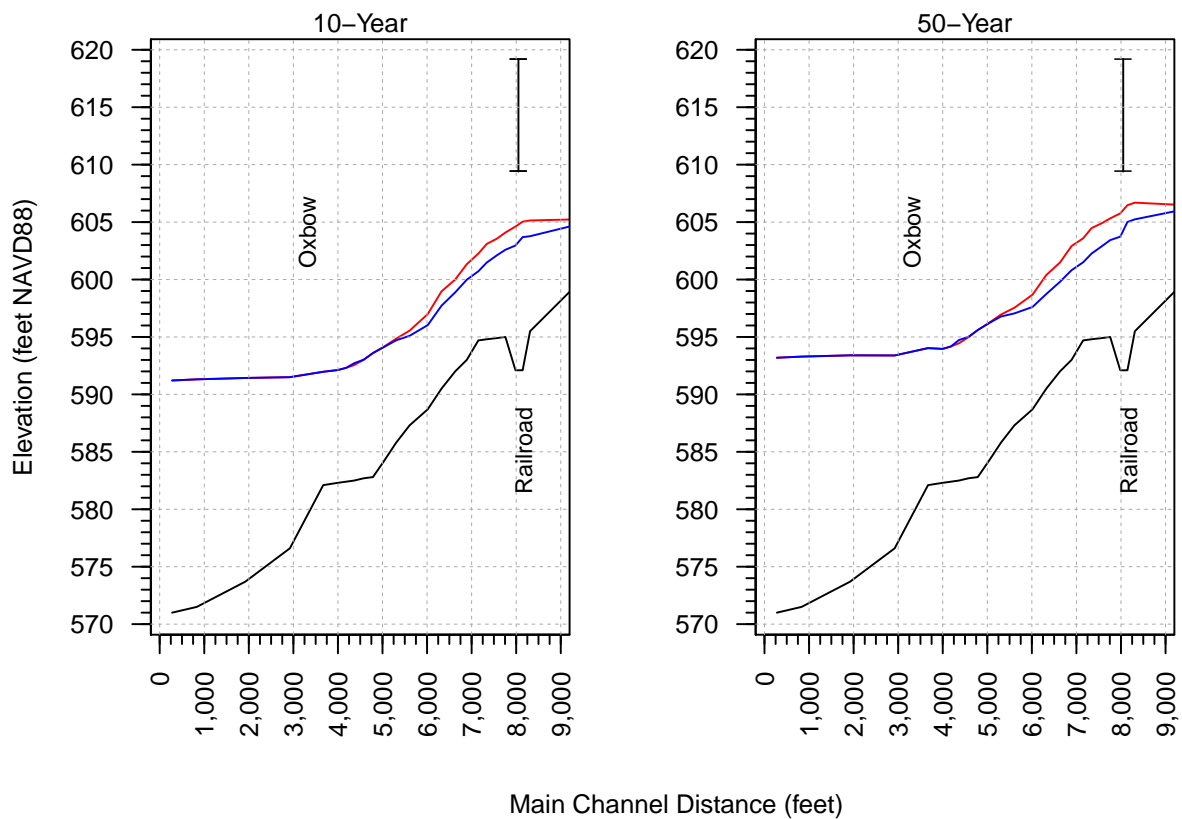


Figure 16: Flood Scenario #9 (1b+2+3+4+5+6) Profile Plot

Table 11: Flood Scenario 9 HEC-RAS Output

Scenario	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
9 (1b+2+3+4+5+6)	20483	10-Percent	7990	621.4	631.44		632.23	0.00152	7.14	1149.93	159.75	0.42
9 (1b+2+3+4+5+6)	20483	2-Percent	11800	621.4	633.13		634.27	0.001801	8.71	1502.7	283.71	0.47
9 (1b+2+3+4+5+6)	20483	1-Percent	13600	621.4	633.75		635.03	0.001907	9.3	1683.22	292.19	0.49
9 (1b+2+3+4+5+6)	20483	0.2-Percent	18000	621.4	635.05		636.62	0.002117	10.53	2068.6	300.59	0.52
9 (1b+2+3+4+5+6)	19313	10-Percent	7990	620.4	628.71		629.8	0.002908	8.44	1044.16	306.63	0.56
9 (1b+2+3+4+5+6)	19313	2-Percent	11800	620.4	630.2		631.56	0.003003	9.73	1584.75	383.6	0.58
9 (1b+2+3+4+5+6)	19313	1-Percent	13600	620.4	630.82		632.26	0.002981	10.15	1839	441.87	0.59
9 (1b+2+3+4+5+6)	19313	0.2-Percent	18000	620.4	632.18	630.62	633.75	0.002879	10.93	2522.14	587.78	0.59
9 (1b+2+3+4+5+6)	18244	10-Percent	7990	617.6	626.65		627.29	0.001757	6.95	1777.24	467.86	0.44
9 (1b+2+3+4+5+6)	18244	2-Percent	11800	617.6	628.34		629.05	0.001639	7.65	2590.92	496.45	0.44
9 (1b+2+3+4+5+6)	18244	1-Percent	13600	617.6	629.04		629.77	0.001597	7.92	2942.21	525.34	0.44
9 (1b+2+3+4+5+6)	18244	0.2-Percent	18000	617.6	630.55		631.34	0.001514	8.46	3805.28	582.51	0.44
9 (1b+2+3+4+5+6)	17053	10-Percent	7990	615.5	624.35		625.09	0.001916	7.31	1642.29	449.96	0.46
9 (1b+2+3+4+5+6)	17053	2-Percent	11800	615.5	625.99		626.9	0.001963	8.38	2445.93	516.05	0.48
9 (1b+2+3+4+5+6)	17053	1-Percent	13600	615.5	626.65		627.63	0.001977	8.8	2794.51	525.92	0.49
9 (1b+2+3+4+5+6)	17053	0.2-Percent	18000	615.5	628.13		629.25	0.001985	9.65	3589.78	557.64	0.5
9 (1b+2+3+4+5+6)	15751	10-Percent	7990	612.8	621.48		622.31	0.002377	7.65	1275.62	297.31	0.5
9 (1b+2+3+4+5+6)	15751	2-Percent	11800	612.8	622.94		624	0.002512	8.9	1759.86	349.52	0.53
9 (1b+2+3+4+5+6)	15751	1-Percent	13600	612.8	623.57		624.72	0.002518	9.34	1985.54	360.25	0.54
9 (1b+2+3+4+5+6)	15751	0.2-Percent	18000	612.8	625.09		626.39	0.002415	10.12	2545.4	374.73	0.54
9 (1b+2+3+4+5+6)	14403	10-Percent	7990	610.3	619.25		619.71	0.001482	6.2	2234.26	539.57	0.4
9 (1b+2+3+4+5+6)	14403	2-Percent	11800	610.3	621.12		621.56	0.001194	6.45	3263.52	572.17	0.37
9 (1b+2+3+4+5+6)	14403	1-Percent	13600	610.3	621.93		622.37	0.001093	6.52	3734.63	594.15	0.36
9 (1b+2+3+4+5+6)	14403	0.2-Percent	18000	610.3	623.88		624.29	0.00087	6.53	5014.3	708.31	0.33
9 (1b+2+3+4+5+6)	12986	10-Percent	7990	608.9	617.09		617.64	0.001417	6.23	1736.03	495.23	0.39
9 (1b+2+3+4+5+6)	12986	2-Percent	11800	608.9	619.48		619.99	0.001017	6.31	3497.77	888.88	0.35
9 (1b+2+3+4+5+6)	12986	1-Percent	13600	608.9	620.52		620.99	0.000867	6.22	4438.4	920.05	0.33
9 (1b+2+3+4+5+6)	12986	0.2-Percent	18000	608.9	622.83		623.23	0.000643	6.07	6623.01	966.59	0.29
9 (1b+2+3+4+5+6)	12162	10-Percent	7990	604.9	614.98		616.12	0.002285	8.62	955.66	117.56	0.5
9 (1b+2+3+4+5+6)	12162	2-Percent	11800	604.9	617.01		618.63	0.002506	10.32	1204.74	134.63	0.55
9 (1b+2+3+4+5+6)	12162	1-Percent	13600	604.9	617.86		619.71	0.002579	11.01	1325.92	158.1	0.56
9 (1b+2+3+4+5+6)	12162	0.2-Percent	18000	604.9	620.19	615.89	622.17	0.002287	11.67	2144.46	464.7	0.54
9 (1b+2+3+4+5+6)	11955	10-Percent	7990	605.5	614.34	611.72	615.58	0.002862	8.96	895.5	113.2	0.56
9 (1b+2+3+4+5+6)	11955	2-Percent	11800	605.5	616.3	613.35	618.05	0.003012	10.62	1119.92	115.53	0.59
9 (1b+2+3+4+5+6)	11955	1-Percent	13600	605.5	617.14	614.06	619.11	0.003059	11.29	1217.22	121.11	0.6
9 (1b+2+3+4+5+6)	11955	0.2-Percent	18000	605.5	619.16	615.65	621.59	0.003014	12.55	1459.52	154.88	0.62
9 (1b+2+3+4+5+6)	11860 Union Rd		Bridge									
9 (1b+2+3+4+5+6)	11789	10-Percent	7990	605.5	613.21	611.45	614.81	0.004418	10.14	789.07	110.21	0.66
9 (1b+2+3+4+5+6)	11789	2-Percent	11800	605.5	614.75	613.12	617.12	0.005056	12.33	960.74	111.85	0.73
9 (1b+2+3+4+5+6)	11789	1-Percent	13600	605.5	615.29	613.85	618.08	0.005503	13.39	1021.27	112.36	0.77
9 (1b+2+3+4+5+6)	11789	0.2-Percent	18000	605.5	616.4	615.46	620.28	0.00662	15.82	1147.98	117.14	0.86
9 (1b+2+3+4+5+6)	11675	10-Percent	7990	602.4	613.29		614.14	0.001658	7.4	1089.54	125.79	0.43
9 (1b+2+3+4+5+6)	11675	2-Percent	11800	602.4	614.92		616.24	0.002081	9.25	1297.57	129.74	0.5
9 (1b+2+3+4+5+6)	11675	1-Percent	13600	602.4	615.51		617.08	0.00231	10.09	1374.17	131.07	0.53

Table 11: Flood Scenario 9 HEC-RAS Output (continued)

Scenario	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
9 (1b+2+3+4+5+6)	11675	0.2-Percent	18000	602.4	616.75		618.98	0.00285	12.02	1539.74	137.59	0.6
9 (1b+2+3+4+5+6)	10302	10-Percent	7990	603.2	610.48		611.37	0.002505	7.65	1175.86	345.04	0.51
9 (1b+2+3+4+5+6)	10302	2-Percent	11800	603.2	612.06	609.46	613.1	0.002394	8.59	1900.99	568.72	0.52
9 (1b+2+3+4+5+6)	10302	1-Percent	13600	603.2	612.55	610.2	613.67	0.002466	9.05	2184.57	589.07	0.53
9 (1b+2+3+4+5+6)	10302	0.2-Percent	18000	603.2	613.23	612.13	614.7	0.003059	10.58	2588.13	602.95	0.6
9 (1b+2+3+4+5+6)	9372	10-Percent	7990	599.6	604.78	604.78	606.96	0.011022	11.85	675.35	156.98	1
9 (1b+2+3+4+5+6)	9372	2-Percent	11800	599.6	606.07	606.07	608.89	0.010151	13.5	880.47	161.34	1
9 (1b+2+3+4+5+6)	9372	1-Percent	13600	599.6	606.96	606.96	609.69	0.008171	13.34	1056.49	244.39	0.92
9 (1b+2+3+4+5+6)	9372	0.2-Percent	18000	599.6	608.87	608.87	611.04	0.005014	12.39	1721.36	525.34	0.75
9 (1b+2+3+4+5+6)	8312	10-Percent	7990	595.5	603.77		604.05	0.000899	4.61	3018.02	695.93	0.31
9 (1b+2+3+4+5+6)	8312	2-Percent	11800	595.5	605.24		605.59	0.00093	5.33	4055.54	735.75	0.32
9 (1b+2+3+4+5+6)	8312	1-Percent	13600	595.5	605.91		606.28	0.000914	5.56	4562.1	773.05	0.32
9 (1b+2+3+4+5+6)	8312	0.2-Percent	18000	595.5	607.56		607.97	0.000825	5.9	5883.79	810.63	0.32
9 (1b+2+3+4+5+6)	8145	10-Percent	7990	592.1	603.69	597.15	603.95	0.000419	4.1	1948.56	259.94	0.22
9 (1b+2+3+4+5+6)	8145	2-Percent	11800	592.1	605.01	598.29	605.46	0.000613	5.37	2196.85	344.66	0.28
9 (1b+2+3+4+5+6)	8145	1-Percent	13600	592.1	605.6	598.79	606.14	0.000691	5.89	2307.53	382.67	0.3
9 (1b+2+3+4+5+6)	8145	0.2-Percent	18000	592.1	607.03	599.9	607.79	0.000836	6.98	2577.81	465.86	0.33
9 (1b+2+3+4+5+6)	8049 Railroad Bridge		Bridge									
9 (1b+2+3+4+5+6)	7984	10-Percent	7990	592.1	602.96	599.55	603.6	0.001574	6.42	1259.48	197.13	0.41
9 (1b+2+3+4+5+6)	7984	2-Percent	11800	592.1	603.73	600.86	604.86	0.002466	8.58	1397.4	307.82	0.52
9 (1b+2+3+4+5+6)	7984	1-Percent	13600	592.1	604.01	601.43	605.42	0.002922	9.55	1448.31	334.68	0.57
9 (1b+2+3+4+5+6)	7984	0.2-Percent	18000	592.1	604.57	602.7	606.72	0.004134	11.84	1548.61	371.7	0.69
9 (1b+2+3+4+5+6)	7758	10-Percent	7990	595	602.59	601.29	602.86	0.001116	5.07	2455.9	845.94	0.34
9 (1b+2+3+4+5+6)	7758	2-Percent	11800	595	603.43	601.93	603.75	0.001221	5.73	3171.37	856.25	0.37
9 (1b+2+3+4+5+6)	7758	1-Percent	13600	595	603.77	602.17	604.11	0.001261	6	3463.79	858.51	0.37
9 (1b+2+3+4+5+6)	7758	0.2-Percent	18000	595	604.54	602.68	604.94	0.001324	6.54	4125	925.71	0.39
9 (1b+2+3+4+5+6)	7564	10-Percent	7990	594.9	602.1		602.37	0.001238	5.19	2432.35	873.43	0.36
9 (1b+2+3+4+5+6)	7564	2-Percent	11800	594.9	602.88		603.21	0.001364	5.87	3124.59	885.95	0.38
9 (1b+2+3+4+5+6)	7564	1-Percent	13600	594.9	603.21		603.56	0.001406	6.14	3411.5	887.9	0.39
9 (1b+2+3+4+5+6)	7564	0.2-Percent	18000	594.9	603.96		604.36	0.001454	6.64	4077.48	896.63	0.4
9 (1b+2+3+4+5+6)	7340	10-Percent	7990	594.8	601.48		601.79	0.001588	5.51	2304.36	999.1	0.4
9 (1b+2+3+4+5+6)	7340	2-Percent	11800	594.8	602.26		602.6	0.001627	6.05	3083.36	1015.12	0.41
9 (1b+2+3+4+5+6)	7340	1-Percent	13600	594.8	602.59		602.94	0.001618	6.23	3416.46	1025.94	0.41
9 (1b+2+3+4+5+6)	7340	0.2-Percent	18000	594.8	603.36		603.73	0.001537	6.51	4225.24	1063.45	0.41
9 (1b+2+3+4+5+6)	7151	10-Percent	7990	594.7	600.72		601.02	0.001818	5.28	2283.63	992.8	0.42
9 (1b+2+3+4+5+6)	7151	2-Percent	11800	594.7	601.5		601.83	0.001762	5.72	3061.79	1006.14	0.42
9 (1b+2+3+4+5+6)	7151	1-Percent	13600	594.7	601.84		602.18	0.001715	5.87	3413.68	1069.72	0.42
9 (1b+2+3+4+5+6)	7151	0.2-Percent	18000	594.7	602.69		603.04	0.001507	6	4340.13	1097.53	0.4
9 (1b+2+3+4+5+6)	6890	10-Percent	7990	593	599.98	598.99	600.19	0.001332	4.52	2700.18	1321.23	0.36
9 (1b+2+3+4+5+6)	6890	2-Percent	11800	593	600.81	599.42	601.03	0.001246	4.84	3620.78	1861.82	0.35
9 (1b+2+3+4+5+6)	6890	1-Percent	13600	593	601.18	599.6	601.41	0.001187	4.92	4049.41	2014.65	0.35
9 (1b+2+3+4+5+6)	6890	0.2-Percent	18000	593	602.15	599.98	602.37	0.000991	4.95	5168.03	2127.58	0.33
9 (1b+2+3+4+5+6)	6631	10-Percent	7990	592	598.88	598.09	599.22	0.002199	5.5	2048.66	845.94	0.45
9 (1b+2+3+4+5+6)	6631	2-Percent	11800	592	599.8	598.61	600.15	0.001896	5.77	2835.56	856.03	0.43

Table 11: Flood Scenario 9 HEC-RAS Output (continued)

Scenario	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
9 (1b+2+3+4+5+6)	6631	1-Percent	13600	592	600.24	598.8	600.59	0.001736	5.81	3210.9	857.65	0.42
9 (1b+2+3+4+5+6)	6631	0.2-Percent	18000	592	601.37	599.27	601.71	0.001352	5.75	4180.42	861.85	0.38
9 (1b+2+3+4+5+6)	6324	10-Percent	7990	590.5	597.72	596.49	598.07	0.001593	5.35	2061.06	735.16	0.39
9 (1b+2+3+4+5+6)	6324	2-Percent	11800	590.5	598.74	597.24	599.12	0.001492	5.78	2823.27	749.48	0.39
9 (1b+2+3+4+5+6)	6324	1-Percent	13600	590.5	599.29	597.51	599.65	0.001346	5.78	3230.46	751.41	0.38
9 (1b+2+3+4+5+6)	6324	0.2-Percent	18000	590.5	600.64	598.04	600.98	0.001042	5.69	4247.51	756.23	0.34
9 (1b+2+3+4+5+6)	6015	10-Percent	7990	588.7	596.03		596.55	0.002877	6.84	1659.35	616.79	0.53
9 (1b+2+3+4+5+6)	6015	2-Percent	11800	588.7	597.61		598	0.001632	6.14	2650.48	629.48	0.41
9 (1b+2+3+4+5+6)	6015	1-Percent	13600	588.7	598.33		598.69	0.00134	5.95	3102.29	631.7	0.38
9 (1b+2+3+4+5+6)	6015	0.2-Percent	18000	588.7	599.92		600.26	0.000976	5.77	4110.18	636.64	0.34
9 (1b+2+3+4+5+6)	5607	10-Percent	7990	587.3	595.1	593.12	595.33	0.001017	4.8	2313.36	587.06	0.33
9 (1b+2+3+4+5+6)	5607	2-Percent	11800	587.3	597.05	593.76	597.26	0.00065	4.55	3461.91	591.63	0.27
9 (1b+2+3+4+5+6)	5607	1-Percent	13600	587.3	597.84	594.06	598.05	0.000581	4.55	3929.87	593.48	0.26
9 (1b+2+3+4+5+6)	5607	0.2-Percent	18000	587.3	599.52	594.64	599.75	0.000497	4.7	4931.13	597.42	0.25
9 (1b+2+3+4+5+6)	5307	10-Percent	7990	585.8	594.71		594.89	0.000593	4.09	2642.68	557.67	0.26
9 (1b+2+3+4+5+6)	5307	2-Percent	11800	585.8	596.78		596.95	0.000433	4.08	3802.83	564.24	0.23
9 (1b+2+3+4+5+6)	5307	1-Percent	13600	585.8	597.59		597.77	0.000404	4.15	4261.73	566.81	0.22
9 (1b+2+3+4+5+6)	5307	0.2-Percent	18000	585.8	599.29		599.5	0.000373	4.4	5235.41	580.22	0.22
9 (1b+2+3+4+5+6)	5051	10-Percent	7990	584.3	594.16	590.65	594.5	0.000908	4.97	1816.04	300.41	0.32
9 (1b+2+3+4+5+6)	5051	2-Percent	11800	584.3	596.23	591.74	596.63	0.000799	5.46	2445.11	309.95	0.31
9 (1b+2+3+4+5+6)	5051	1-Percent	13600	584.3	597.02	592.17	597.46	0.000786	5.71	2720.16	360.18	0.31
9 (1b+2+3+4+5+6)	5051	0.2-Percent	18000	584.3	598.68	593.1	599.2	0.000777	6.25	3323.59	366.28	0.32
9 (1b+2+3+4+5+6)	4786	10-Percent	7990	582.8	593.59	589.2	594.05	0.000961	5.61	1529.05	204.32	0.33
9 (1b+2+3+4+5+6)	4786	2-Percent	11800	582.8	595.6	590.62	596.2	0.00098	6.49	2019.05	257.76	0.35
9 (1b+2+3+4+5+6)	4786	1-Percent	13600	582.8	596.36	591.18	597.02	0.001002	6.87	2216.06	261.45	0.35
9 (1b+2+3+4+5+6)	4786	0.2-Percent	18000	582.8	597.92	592.38	598.74	0.001073	7.72	2627.34	266.09	0.37
9 (1b+2+3+4+5+6)	4582	10-Percent	7990	582.7	593.03	589.04	593.59	0.001217	6.12	1392.34	198.09	0.37
9 (1b+2+3+4+5+6)	4582	2-Percent	11800	582.7	595.02	590.54	595.73	0.001204	7	1861.56	250.23	0.38
9 (1b+2+3+4+5+6)	4582	1-Percent	13600	582.7	595.77	591.11	596.55	0.001226	7.39	2048.66	253.68	0.39
9 (1b+2+3+4+5+6)	4582	0.2-Percent	18000	582.7	597.26	592.29	598.23	0.001315	8.32	2432.66	259.57	0.41
9 (1b+2+3+4+5+6)	4363	10-Percent	7990	582.5	592.71	588.54	593.12	0.000913	5.39	1641.92	237.07	0.32
9 (1b+2+3+4+5+6)	4363	2-Percent	11800	582.5	594.73	589.87	595.26	0.000906	6.17	2161.48	491.57	0.33
9 (1b+2+3+4+5+6)	4363	1-Percent	13600	582.5	595.48	590.39	596.06	0.000927	6.52	2387.73	683.43	0.34
9 (1b+2+3+4+5+6)	4363	0.2-Percent	18000	582.5	596.99	591.52	597.7	0.000983	7.29	3058.42	1123.5	0.36
9 (1b+2+3+4+5+6)	4182	10-Percent	7990	582.4	592.31	588.27	592.91	0.001282	6.23	1296.47	164.95	0.38
9 (1b+2+3+4+5+6)	4182	2-Percent	11800	582.4	594.17	589.64	595.03	0.001413	7.48	1626.48	243.93	0.41
9 (1b+2+3+4+5+6)	4182	1-Percent	13600	582.4	594.83	590.22	595.81	0.001505	8.04	1777.42	377.88	0.43
9 (1b+2+3+4+5+6)	4182	0.2-Percent	18000	582.4	596.15	591.56	597.41	0.001703	9.23	2152.41	632.12	0.46
9 (1b+2+3+4+5+6)	3997	10-Percent	7990	582.3	592.12	587.76	592.67	0.001125	5.95	1352.94	190.66	0.36
9 (1b+2+3+4+5+6)	3997	2-Percent	11800	582.3	593.96	589.1	594.76	0.001283	7.22	1664.48	223.99	0.39
9 (1b+2+3+4+5+6)	3997	1-Percent	13600	582.3	594.59	589.64	595.53	0.001394	7.82	1802.75	281.59	0.41
9 (1b+2+3+4+5+6)	3997	0.2-Percent	18000	582.3	595.81	590.98	597.1	0.001689	9.23	2124.72	512.9	0.46
9 (1b+2+3+4+5+6)	3670	10-Percent	7990	582.1	591.97		592.32	0.000786	5.14	3197.67	1118.11	0.3
9 (1b+2+3+4+5+6)	3670	2-Percent	11800	582.1	594.03		594.34	0.000623	5.24	5655.63	1230.59	0.28

Table 11: Flood Scenario 9 HEC-RAS Output (continued)

Scenario	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
9 (1b+2+3+4+5+6)	3670	1-Percent	13600	582.1	594.75		595.07	0.000605	5.39	6554.79	1256.34	0.28
9 (1b+2+3+4+5+6)	3670	0.2-Percent	18000	582.1	596.18		596.52	0.000604	5.81	8437.7	1373.85	0.28
9 (1b+2+3+4+5+6)	2921	10-Percent	7990	576.6	591.5		591.86	0.000498	4.85	1852.73	452.33	0.25
9 (1b+2+3+4+5+6)	2921	2-Percent	11800	576.6	593.39		593.87	0.000588	5.82	3296.29	1158.38	0.28
9 (1b+2+3+4+5+6)	2921	1-Percent	13600	576.6	594.11		594.6	0.000591	6.04	4255.27	1414.15	0.28
9 (1b+2+3+4+5+6)	2921	0.2-Percent	18000	576.6	595.64		596.08	0.000535	6.15	6446.61	1446.59	0.27
9 (1b+2+3+4+5+6)	1922	10-Percent	7990	573.7	591.43		591.52	0.000159	3.15	6696.9	1308.98	0.15
9 (1b+2+3+4+5+6)	1922	2-Percent	11800	573.7	593.4		593.49	0.000151	3.34	9344.27	1355.68	0.14
9 (1b+2+3+4+5+6)	1922	1-Percent	13600	573.7	594.12		594.22	0.000152	3.45	10348.69	1409.83	0.15
9 (1b+2+3+4+5+6)	1922	0.2-Percent	18000	573.7	595.61		595.71	0.00016	3.74	12703.76	1786.97	0.15
9 (1b+2+3+4+5+6)	833	10-Percent	7990	571.5	591.31		591.38	0.000094	2.65	5431.72	1295.17	0.11
9 (1b+2+3+4+5+6)	833	2-Percent	11800	571.5	593.29		593.36	0.000089	2.77	8382.02	1690.87	0.11
9 (1b+2+3+4+5+6)	833	1-Percent	13600	571.5	594.02		594.08	0.000088	2.82	9641.88	1774.35	0.11
9 (1b+2+3+4+5+6)	833	0.2-Percent	18000	571.5	595.51		595.58	0.000087	2.96	12526.76	2314.31	0.11
9 (1b+2+3+4+5+6)	279	10-Percent	7990	571	591.21	580.11	591.3	0.00012	2.8	4718.34	1042.68	0.13
9 (1b+2+3+4+5+6)	279	2-Percent	11800	571	593.19	581.81	593.28	0.00012	3.04	6888.45	1267.82	0.13
9 (1b+2+3+4+5+6)	279	1-Percent	13600	571	593.91	582.54	594	0.00012	3.12	7968.79	1787.95	0.13
9 (1b+2+3+4+5+6)	279	0.2-Percent	18000	571	595.4	584.12	595.5	0.00012	3.29	11205.39	2338.5	0.13



ATTACHMENT D: FLOOD BENCH SECTIONAL VIEW