ROCKAWAY RIVER AND DEN BROOK
DENVILLE TOWNSHIP
MORRIS COUNTY, NEW JERSEY
CAP SECTION 205
FLOOD RISK MANAGEMENT STUDY

APPENDIX A
HYDROLOGY AND HYDRAULICS

September 2023

U.S. Army Corps of Engineers
North Atlantic Division New York and Baltimore Districts
In partnership with the New Jersey Department of Environmental Protection

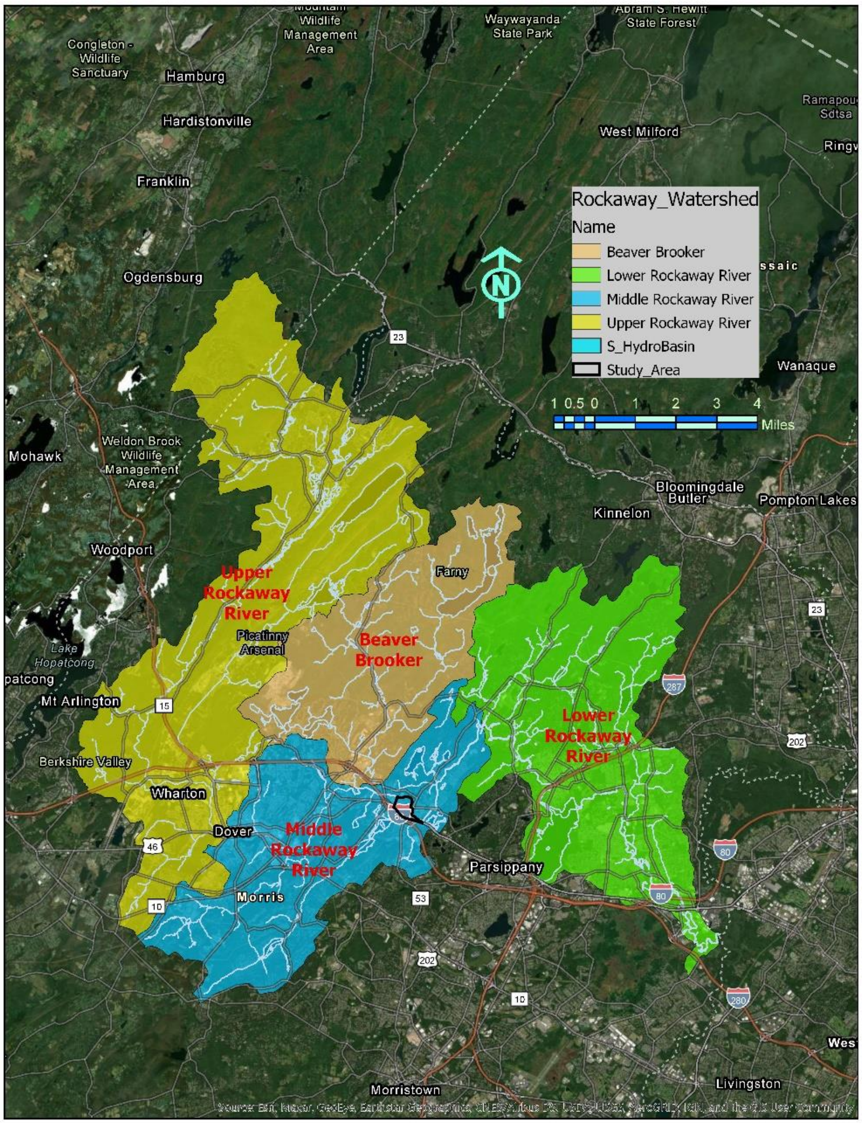
Table of Contents

List of Figures & Tables

1 Introduction

The project area is located along the Rockaway River within the Middle Rockaway River watershed. Figure 1 below shows the watershed boundary for the Middle Rockaway River Basin. This Continuing Authorities Program (CAP) Section 205 Flood Risk Management study area is located within the Township of Denville, New Jersey. This study identified the current risk for flooding and proposed ways to minimize the impact from flood events, preliminarily determine environmental and economic impact from various levels of flooding, and suggest structural and nonstructural alternatives that could help minimize damage to life and property.

Figure 1: Watershed Boundary Map



Hydrologic analysis was performed using the Hydrologic Modeling System (HEC-HMS) model developed as part of the May 2017 Passaic River Flood Risk Management Project Study. The Passaic River study HEC-HMS model was calibrated for the Tropical Storm Irene flood. The HEC-HMS was used for determining peak discharge at various locations along the Rockaway River. Hydraulic analysis was performed using a HEC-RAS (Hydraulic Engineering Center's River Analysis System) model, version 5.0.7. River and cross-sectional geometry data were obtained from field survey for the main channel and extracted from the New Jersey State LiDAR collected in 2006.

2 Hydrology Analysis

The HEC-HMS hydrologic model used for this Flood Risk Management study was developed as part of the May 2017 Passaic River Flood Risk Management Study. Federal Emergency Management Agency (FEMA) HEC-HMS models of the Passaic River watersheds were updated for the 2017 study. A separate model was furnished for each of the following watersheds: Upper Passaic, Whippany River, Rockaway River, Pompton River (which consist of Ramapo, Pequannock and Wanaque sub-watersheds), Central Passaic, Lower Passaic and Saddle River. The 2017 hydrologic analysis updated input parameters as necessary and calibrated the models to observed flood hydrographs at the many relevant USGS stream gages within each watershed for the August 27 – September 5 2011 (Tropical Cyclone Irene) storm and flood. The HEC-HMS model was validated against Tropical Storm Irene and remains valid for existing condition. Details on the HMS model development and calibration is available from "Appendix H - Hydrology & Hydraulics of the General Re-evaluation Report, dated May 2017". Nine frequencies were modeled as shown in Table 1.

Table 1: Peak Discharge for Rockaway River and Den Brook

Location	HEC RAS Cross Section	500 yr Discharge (CFS)	200 yr Discharge (CFS)	100 yr Discharge (CFS)	50 yr Discharge (CFS)	25 yr Discharge (CFS)	10 yr Discharge (CFS)	5 yr Discharge (CFS)	2 yr Discharge (CFS)	TS Irene (Aug 2011) Discharge (CFS)
Rockaway below Beaver Brook	35756	17510	13290	10660	8480	6530	4380	3070	1790	8460
Den Brook at mouth	781	2450	1820	1600	1460	1140	720	390	210	1860

3 Hydraulic Analaysis

3.1 Background and Study Purposes

In the northwest corner of the Township of Denville, New Jersey, the neighborhoods along Rockaway River and Den Brook, a tributary of the Rockaway River, have been identified as a high-risk flood zone or 1% Annual Exceedance Probability (AEP) (100-year equivalent) inundation extant according to the effective and preliminary Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) dated October 17, 1984 and August 22, 2017 respectively. Some of the residential structures are located within FEMA's designated floodway. These neighborhoods consist of high-density residential and non-residential structures and critical infrastructure with dense and vulnerable population. In the effective and preliminary FIRM significant areas along Rockaway River were identified as high-risk flood zones with residents and property owners being at risk.

3.2 Previous Studies

Flooding in the Rockaway River watershed has been studied in the past. A list and brief description of previous investigations is provided below.

a. USACE Upper Rockaway River, New Jersey Flood Damage Reduction and Ecosystem Restoration, Alternative Plan Formulation Report, June 2008
b. Hatch Mott MacDonald, Flood Risk Reduction Program, Alternative Action Plan, Denville Township, New Jersey, April 2014
c. FEMA, Hydrologic & Hydraulic Analysis Technical Support Data Notebook, Task Order HSFE02-09-J-0001 for Passaic River Watershed Hydrologic & Hydraulic Study, New Jersey, December 2012
d. Hatch Mott MacDonald, Flood Mitigation Report, Township of Denville, Morris County, New Jersey, September 2016

HEC-RAS version 5.0.7 was used for generating the geometry file for the hydraulic model. River and cross-sectional geometry data were obtained from field survey for the main channel and overland area extracted from the NJ LiDAR collected in 2006. Cross-section geometries for the approximate study reaches were also obtained from the NJ LiDAR terrain dataset. The horizontal coordinate system for the project DEM is New Jersey State Plane and the vertical datum is the North American Vertical Datum of 1988 (NAVD88).

HEC-RAS was used to develop a geo-referenced hydraulic model for Rockaway River and Den Brook. This model was used to compute flood water surface elevations for the existing conditions 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, 0.2% AEP (2-, 5-, 10-, 25-, 50-, 100-, 200- and 500-year equivalents) inundation events. The HEC-RAS Mapper processing utilities were used to assist in the development of cross-sections and the mapping of the floodplain. All elevations in the modeling and mapping are referenced to the NAVD88 vertical datum with a horizontal coordinate system of New Jersey State Plane.

3.3 Topographic Data

The HEC-RAS Mapper pre-processor was used to develop cross-sections for this study. The overbank portions of the cross-sections are from the NJ LiDAR. The "wet sections" of the cross-sections were input based upon the site-specific field survey data used in the Upper Rockaway River FDR Feasibility Study 2008 hydraulic analysis. For intermediate cross-sections between cross sections the channel dimensions were interpolated from surveyed sections. The source of channel data for each cross section is listed in the description box in the geometric data editor, along with any correlation between effective FEMA cross-sections. The updated HEC-RAS model reflects cross-sections generated by the HEC-RAS Mapper program as outlined above.

3.4 Bridge/Culvert Geometry

Data for bridge/culvert geometry were obtained from the 2008 Army Corps of Engineers Upper Rockaway River Study. A summary of the bridge/culvert locations included in the HEC-RAS model is shown in Table 2.

Table 1: Bridge/Culvert included in HEC-RAS Model

Bridge/Culvert Name	Reaches	River Station of Bridge Centerline
Diamond Springs Road	Rockaway River-Reach 2	29917
Savage Road	Rockaway River-Reach 2	34829
Interstate 80	Rockaway River-Reach 2	35454
Pocono Road	Rockaway River-Reach 1	24775
Access Road	Rockaway River-Reach 1	23720
Bush Road	Rockaway River-Reach 1	17322
Route 46	Den Brook	241
East Main Street	Den Brook	2302

3.5 Manning's Roughness Values

Roughness factors (Manning's "n" coefficients) were chosen based upon engineering judgment, land use, previous hydraulic studies, aerial photography, and field observation. "n" value of 0.150-0.200 is considered high due to heavy obstructions such as large trees or for buildings, where "n" value of 0.013 is considered low and is used for paved surfaces such as roads and parking lots. For Rockaway River and Den Brook, channel "n" values range from 0.040-0.045 and overbank n values for ranged from 0.013 for roadways to 0.150 for areas with buildings obstructing flow.

3.6 Ineffective Flow Area and Obstructions

Ineffective flow areas were set appropriately at bridges and other areas where flood flow would not be effective. Obstructions in the model represent buildings that would occupy storage space for floodwaters.

3.7 Contraction/Expansion Coefficients

Contraction/expansion values for the cross-sections at bridges were set at the FEMA recommended values of .3 and .5, respectively. All other cross-sections were assigned contraction/expansion coefficients of .1 and .3, respectively.

3.8 Reach Boundary Conditions

For the HEC-RAS model, normal depth was used as the downstream reach boundary condition. A normal depth slope of .0014 was input into the HEC-RAS model based upon the developed channel profile.

3.9 Model Calibration

The model was developed for the reconstitution of the 27-28 August 2011 (Tropical Storm Irene) flood event. High water marks that were recorded during the August 2011 reference flood were used for the calibration and verification of the existing conditions model. The existing conditions water surface profiles for this study were developed using the calibrated HEC-RAS model.

3.10 Sea Level Change

Sea level change does not impact flooding within the Township of Denville as the area is located further inland away from the Atlantic Ocean. Additional details of climate assessments and sea level rise information is available from Exhibit- 4. Future without Project Conditions (FWOP) Water Surface Elevations will remain same as Existing Condition.

4 Existing-Conditions (Baselines) Analysis

An existing-conditions HEC-RAS model was developed to determine flood elevations at the time of this study and to be used as a baseline to determine the benefits and impacts of flood mitigation measures in future phases of the Rockaway River hydraulic study.

The existing-conditions geo-referenced steady-state HEC-RAS model for Rockaway River is split into three geometric files, flow files, and plan files. The plan file "Existing Conditions" contains the geometry and flows from the existing HEC-HMS model for normal, riverine flow conditions. The existing channel of the Rockaway River within the study area can be divided into three reaches. Although the reaches are not necessarily independent from each other in a hydraulic sense, they are different in physical characteristics and are therefore described according to those characteristics: Rockaway River Reach 1, Rockaway River Reach 2, and Den Brook Reach.

The first reach on Rockaway River extends from the I-80 Hwy (HEC-RAS River Station 35627) to the confluence with Den Brook (HEC-RAS River Station 28164), and all within Township of Denville. This reach also contains three bridges. All of these structures contribute to backwater effects under flood conditions. This reach is a major damage area within the Township of Denville.

The second reach along Rockaway River extends from the confluence with Den Brook to just upstream of the confluence with Stoney Brook (HEC-RAS River Station 10176). Also within the reach are three bridges.

The Den Brook is a short reach extending from the confluence with Rockaway River to approximately 660 feet downstream of State Route 53 (East Main Street). Den Brook enters the Rockaway River and contributes to flooding within the Township of Denville. For the purposes of this study, one bridge was modeled on the Den Brook. Den Brook is also affected by backwater up to the Indian Lake Dam. During floods greater than the 100-year event (1% event), flow from the main stem of the Rockaway River backs up into Den Brook and discharges back over the dam into Indian Lake.

The flood profiles for Rockaway River and Den Brook are provided in Exhibit-1. Detailed HEC-RAS output tables are located in Exhibit-2.

5 Structural Alternatives for Flood Mitigation

Proposed structural alternatives typically consist of constructed barriers that protect areas of development include levees, floodwalls, and detention basins. Floodwalls and levees are intended to provide protection against flooding to residential and commercial buildings, municipal buildings, and critical infrastructures by keeping out floodwaters from reaching these structures.

5.1 Alternative 1a: 1% AEP (100-yr) Level of Performance (LOP) with 10 Stop Log Structures

Alternative 1a is the design of a floodwall around the partial perimeter of the project area exposed to high floodwaters depth from the Rockaway River and Den Brook. This alternative should provide protection against the 1% AEP flood event.

The proposed structural alternative is designed for protection against 1% AEP flood event and is modeled in the HEC-RAS model as "Proposed Conditions-Alternative 1a" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model.

The floodwall elevations have been computed by adding a freeboard of 3.0 feet on top of the computed 100-year flood water surface elevations at the respective HEC-RAS river stations. Freeboard of 3.5 feet was added to the computed WSEL for River Stations immediate upstream and downstream of bridges/culverts sections.

5.2 Alternative 1b: 1% AEP(100-yr) LOP with 6 Stop Log Structures

Alternative 1b is a modification of Alternative 1a. All flood control structures are identical except the number of closures planned. Details of closure locations are shown in Exhibit-3 mapping.

The proposed structural alternative is designed for protection against 1%AEP flood event and is modeled in the HEC-RAS model as "ProposedConditions_Alternative1b" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model.

This alternative would provide for flood reduction through the downtown Denville area by designing a floodwall on a portion of the flows from the Rockaway River and Den Brook. The floodwall elevations have been computed by adding a freeboard of 3.0 feet on top of the computed 1% AEP flood event water surface elevations at the respective HEC-RAS river stations. Freeboard of 3.5 feet was added to the computed WSEL for River Stations immediate upstream and downstream of bridges/culverts sections.

5.3 Alternative 1c: 2% AEP (50-yr) LOP with 10 Stop Log Structures

Alternative 1c is a modification of Alternative 1a. All the flood control structures are identical with the exception of their heights because Alternative 1c was designed for the 2% AEP flood event with floodwaters of much lower heights than that of the 100-year storm (1% event). Details of closure locations are shown in Exhibit-3 mapping.

The proposed structural alternative is designed for protection against 2% AEP flood event and is modeled in the HEC-RAS model as "ProposedConditions_Alternative1c" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model.

This alternative would provide for flood reduction through the downtown Denville area by designing a floodwall on a portion of the flows from the Rockaway River and Den Brook. The floodwall elevations have been computed by adding a freeboard of 3.0 feet on top of the computed 2% AEP flood event water surface elevations at the respective HEC-RAS river stations. Freeboard of 3.5 feet was added to the computed WSEL for River Stations immediate upstream and downstream of bridges/culverts sections.

5.4 Alternative 1d: 2% AEP (50-yr) LOP with 6 Stop Log Structures

Alternative 1d is a modification of Alternative 1c. All the flood protection structures and dimensions remain the same as in Alternative 1c except the removal of closure structures I03, I04, I05 and I06.

The proposed structural alternative is designed for protection against 2% AEP flood event and it would be modeled similarly as for the Alternative 1c plan. The proposed structural alternative is designed for protection against 2% AEP flood event and is modeled in the HEC-RAS model as "ProposedConditions_Alternative_1d" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model. The removal of above closure structures would not affect the mapped area, and the resulting 50-year flood WSEL.

5.5 Alternative 1e: 4% AEP (25-yr) LOP with 8 Stop Log Structures

Alternative 1e is a modification of Alternative 1a. All the flood control structures are identical with the exception of their heights because Alternative 1e was designed for the 4% AEP storm event with floodwaters of far lower heights than that of the 1% AEP. For this alternative, the first sub-segment of the floodwall has an average height of 9.57 feet above grade. The second sub-segment of the floodwall has an average height of 6.44 feet above grade and the third sub-segment of the floodwall has an average height of 5.39 feet above grade. The floodwall segment along Route 46 averages 3.69 feet above grade. Due to the low elevation of the water level under this alternative, closure structure I07and I08 were not needed and had to be eliminated from this option.

The proposed structural alternative is designed for protection 4% AEP flood event and it would be modeled similarly as for the Alternative 1c plan. The proposed structural alternative is designed for protection against 4% AEP flood event and is modeled in the HEC-RAS model as "ProposedConditions_Alternative_1e" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model.

5.6 Alternative 1f: 4% AEP (25-yr) LOP with 4 Stop Log Structures

Alternative 1f is a modification of Alternative 1e. All the flood protection structures and dimensions remain the same as in Alternative 1f except the removal of closure structures I03, I04, I05 and I06.

The proposed structural alternative is designed for protection against 4% AEP flood event and it would be modeled similarly as for the Alternative 1c plan. The proposed structural alternative is designed for protection against 4% AEP flood event and is modeled in the HEC-RAS model as "ProposedConditions_Alternative_1f" plan. The HEC-RAS is modeled as a Steady-state, one-dimensional model.

5.7 Alternative 2a: 4% AEP (25-yr) LOP, with 4-Stop Log Structures

Alternative 2a is the design of flood control protection for a flood prone perimeter area within the overall project area created by the 4% AEP storm inundation floodwaters. Freeboard of 0.5 feet was added to the 4% AEP event profile to design the proposed line of protection.

The design of flood control protection for a select designated perimeter within the project area associated with the 4% AEP storm event to keep floodwaters from inundating that area. The protection consists of a combination raising of five roads serving as a protective line, jersey barrier along second avenue and partial floodwall along the Rockaway River and floodwall along Route 46.
The model for the proposed design alternative where the flood reduction system is designed for a 4% AEP flood event, which is titled "ProposedConditions_Alternative2a" was kept as a steady-state, one-dimensional model, since the flooding in this area is one-dimensional in nature and for modeling purposes, to maintain the consistency with the riverine model.

This alternative would provide for flood reduction through the downtown Denville area by Raising the 2nd Avenue Road preventing flooding from the Rockaway River. The floodwall elevations have been estimated by adding a freeboard of 0.5 feet at the computed 4% AEP flood water. Surface elevations at the respective RAS stations. A freeboard of 1.0 feet at the immediate upstream and downstream of the bridges stations.

5.8 Alternative 2b: 4% AEP (25-yr) LOP, with 4-Stop Log Structures

Alternative 2b is a modification of alternative 2a. Alternative 2b removes the protection line, which is represented by a Jersey barrier structure, from Second Avenue and takes it further east near the Rockaway River. Additionally, 0.5 ft freeboard was added to the 4% AEP event profile to design the proposed line of protection, including Corey Road, and Orchard Street.

The design of flood control protection for a select designated perimeter within the project area is associated with the 4% AEP storm event will prevent inundating the respective area. The protection consists of a combination of raising 5 (five) roads serving as a protective line, and floodwalls along the Rockaway River and Route 46.

The model for the proposed design alternative where the flood reduction system is designed for a 4% AEP flood event, which is titled "ProposedConditions_Alternative2b" was kept as a steady-state, one-dimensional model, since the flooding in this area is one-dimensional in nature and for modeling purposes, to maintain the consistency with the riverine model.

This alternative would provide for flood reduction through the downtown Denville area by Raising the 2nd Avenue Road prevents flooding from the Rockaway River. Road Raisings remain the same as in Alternative 2a. Also the construction of a back wall along Rockaway from Diamond Springs Road Bridge, and the removal of 2nd Avenue barrier construction. The floodwall and road elevations have been estimated by adding freeboard of 0.5 feet at the computed 4% AEP event flood water. Surface elevations at the respective RAS stations. For the same reason, a freeboard of 1.0 feet at the bridges upstream and downstream was also added.

5.9 Alternative 2b Sensitivity: 4% AEP (25-yr) LOP, with 2-Stop Log Structures

Alternative 2b sensitivity plan is a modification of Alternative 2b. In Alternative 2b sensitivity, the elevating of Orchard Street and Diamond Spring Road are eliminated. Snyder Road is raised to a top height of 4.28 feet. All other flood protection structures remain the same as Alternative 2b. Additionally, 0.5 ft freeboard was added to the 4% AEP event profile to proposed line of protection, including Corey Road, and Orchard Street.

The model for the proposed design alternative where the flood reduction system is designed for a 4% AEP flood, which is titled "ProposedCond_Alt2b_sensitivity" was kept as a steady-state, one-dimensional model due to the fact the flooding in this area is one-dimensional in nature and for modeling purposes, to maintain the consistency with the riverine model.

5.10 Alternative 3: 4% AEP (25-yr) LOP, Divert Flow with a 8'x20' box culvert

The design of flood control protection by rerouting floodwaters associated with the 4% AEP storm event using an 8'x20' box culvert to divert floodwaters equivalent to the 10% AEP storm event from inundating the project area. The diversion structure is located approximately 75 feet upstream of HEC-RAS River Station 34260, and will divert floodwater into the three-sided open bottom by-pass box culvert of approximately 6,600 linear feet and discharge that floodwater through an outlet structure designed to reduce excessive energy while discharging the waters.

The model for the proposed design alternative where the flood reduction system is designed for a 4% AEP flood event, which is titled "ProposedConditions_Alternative3" was kept as a steady-state, one-dimensional model, since the flooding in this area is one-dimensional in nature and for modeling purposes, to maintain the consistency with the riverine model.

For the existing conditions, and all design alternatives the flood profiles for Rockaway River and Den Brook are provided in Exhibit-1. Detailed HEC-RAS output tables are located in Exhibit-2, respectively.

6 Floodplain Mapping

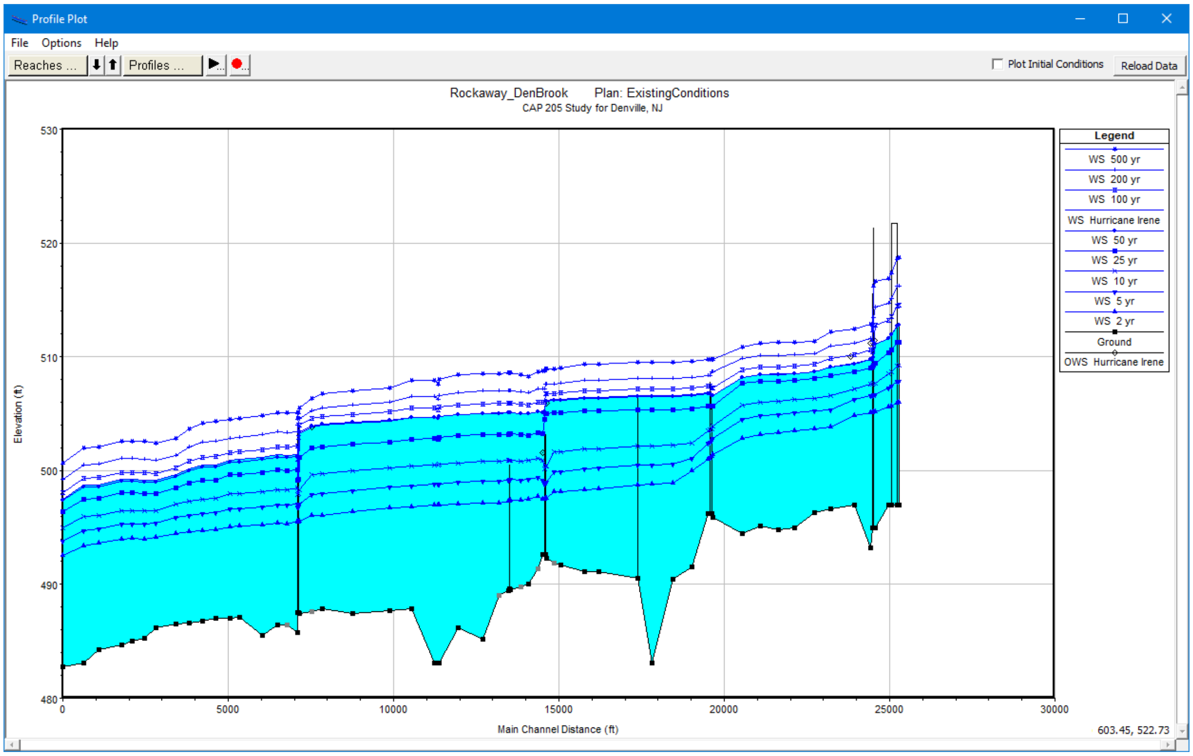
The results of the existing-conditions HEC-RAS modeling for Rockaway River was used to create digital floodplain inundation, depth grids, and water surface elevation grids for all storm events included in this investigation. The HEC-GeoRAS postprocessor and the project DEM were used to delineate the floodplain boundaries and develop the depth and water surface elevation grids.

All mapping products are provided digitally in GIS shapefile and raster format. Exhibit-3 contains flood mapping for existing conditions and with-project condition alternatives.

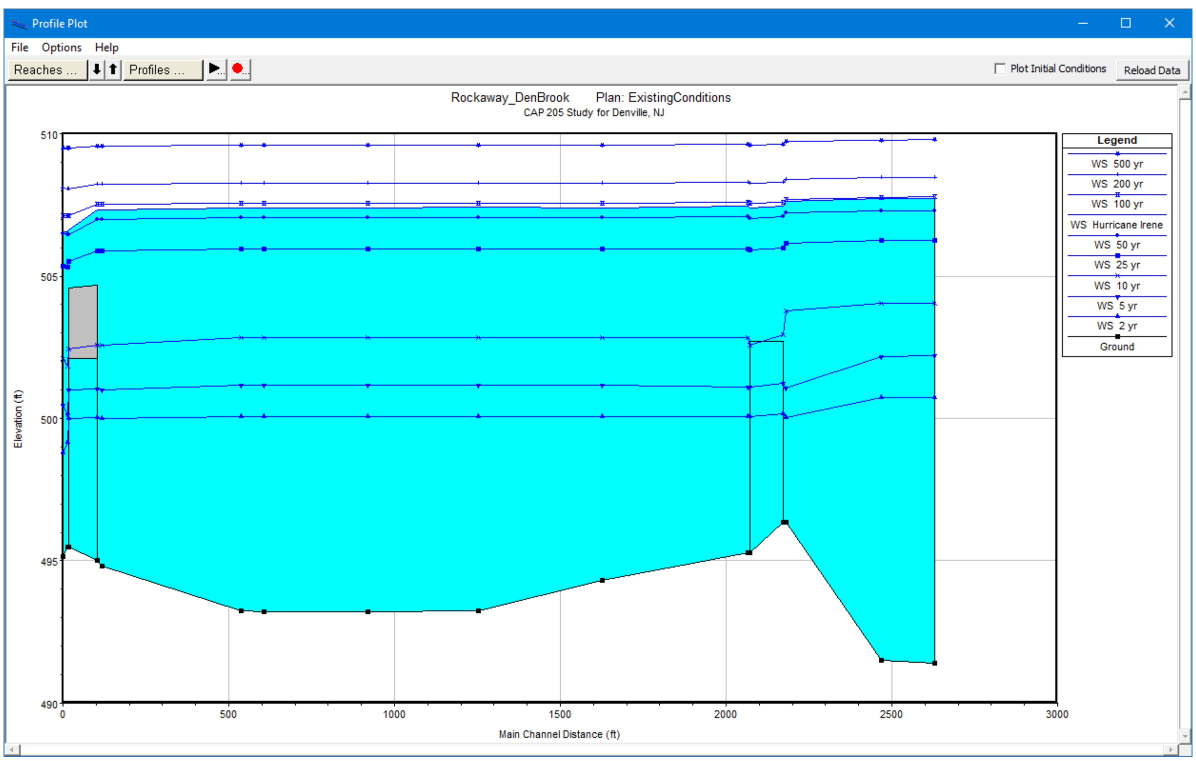
EXHIBIT – 1

HYDRAULIC ANALYSIS

Exhibit-1: Hydraulic Analysis
CAP Section 205 Feasibility Study for Denville, New Jersey

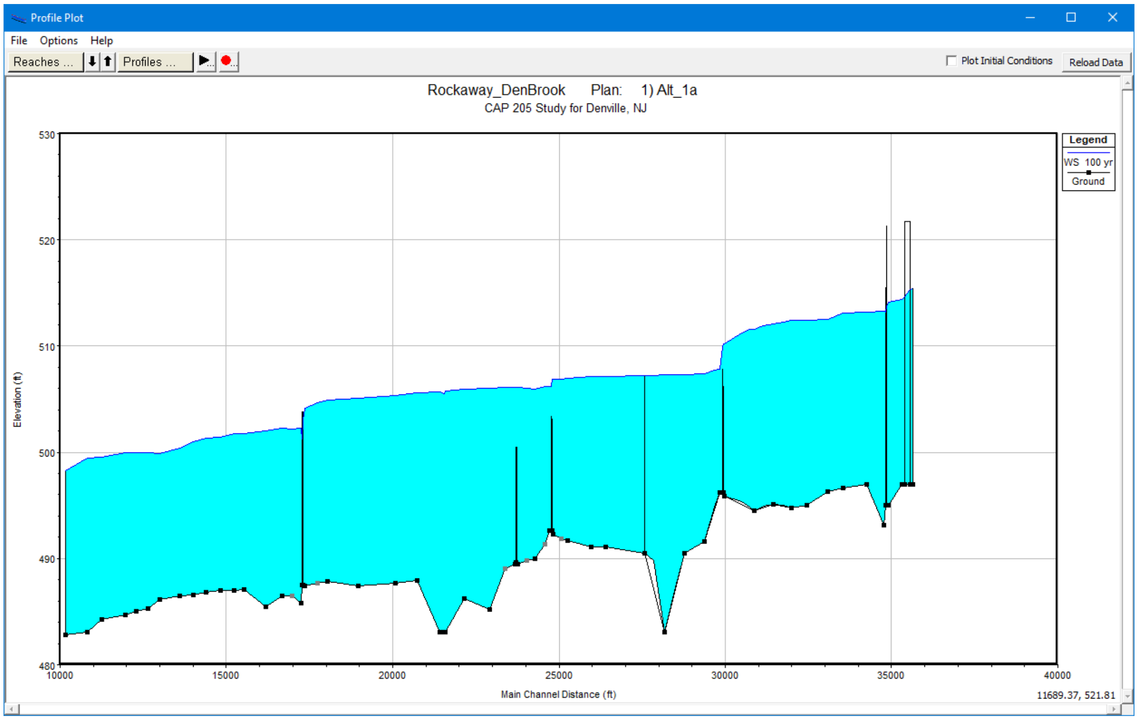


Existing Condition profiles for Rockaway River

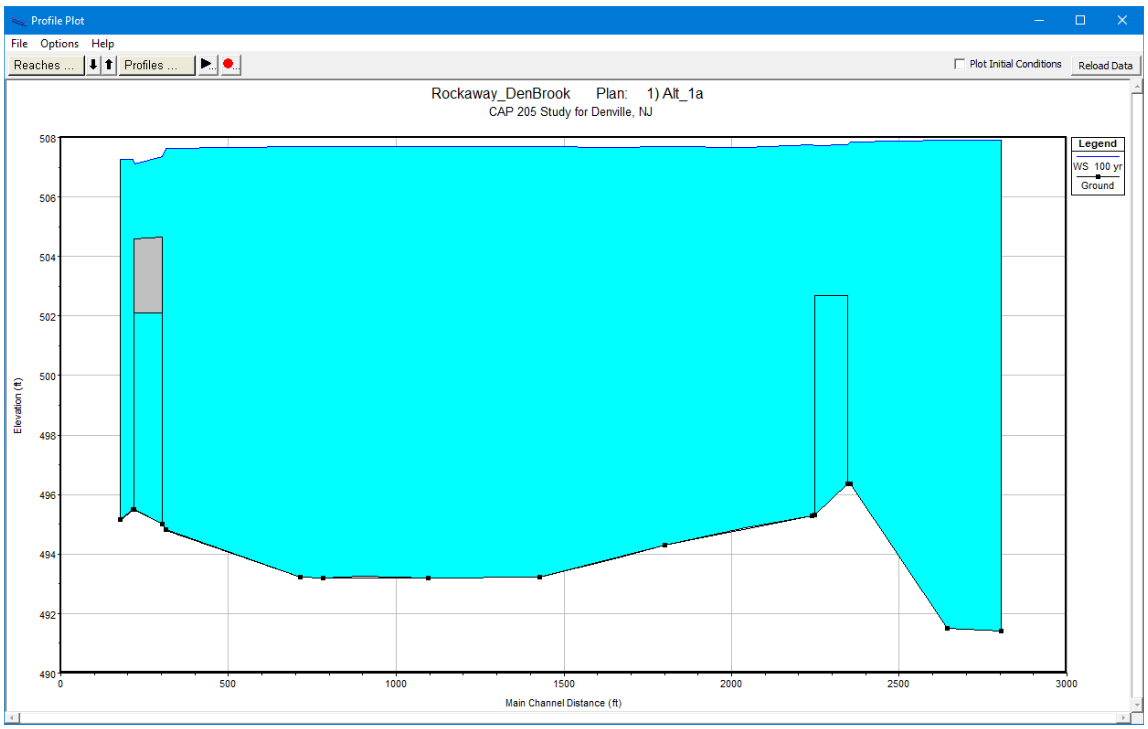


Existing Condition profiles for Den Brook

Exhibit-1: Hydraulic Analysis
CAP Section 205 Feasibility Study for Denville, New Jersey



Alt-1a: Proposed Condition 100-year profile for Rockaway River, with 10-stop log structures



Alt-1a: Proposed Condition 100-year profile for Den Brook, with 10-stop log structures

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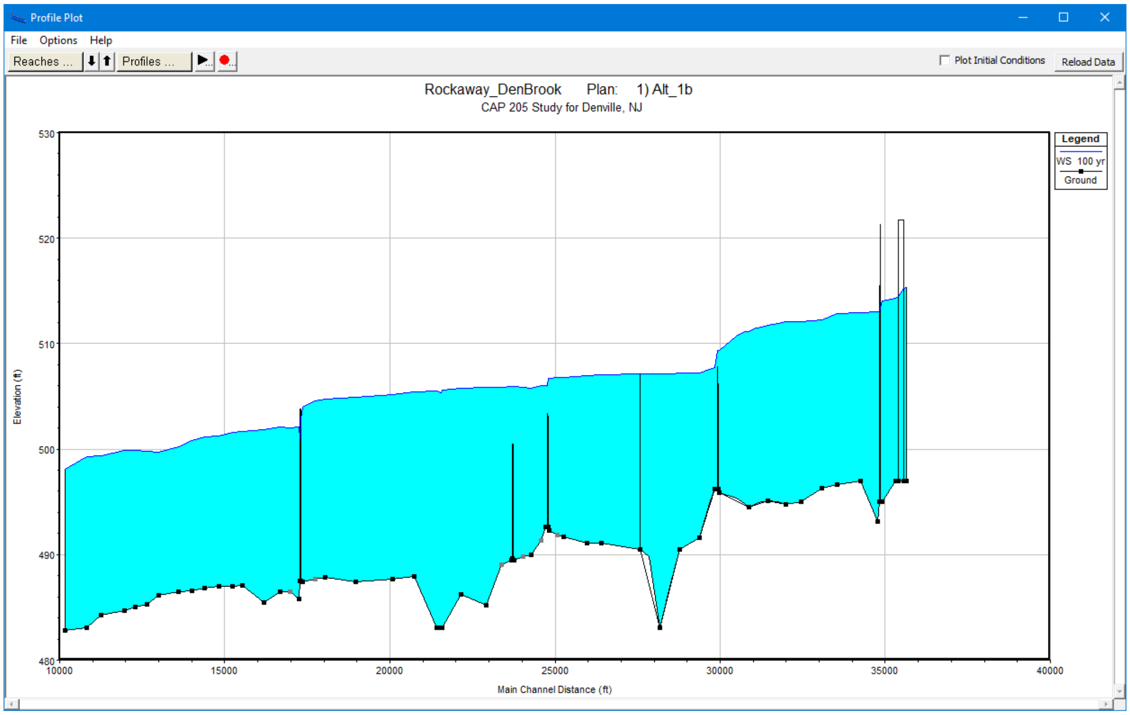
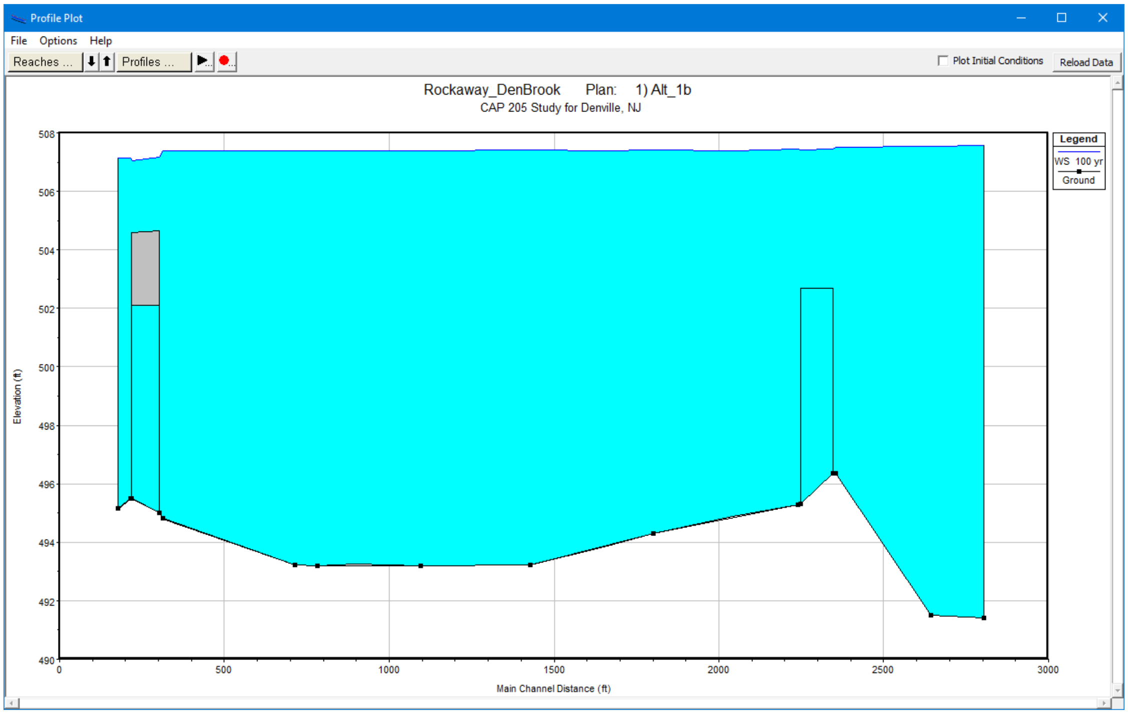
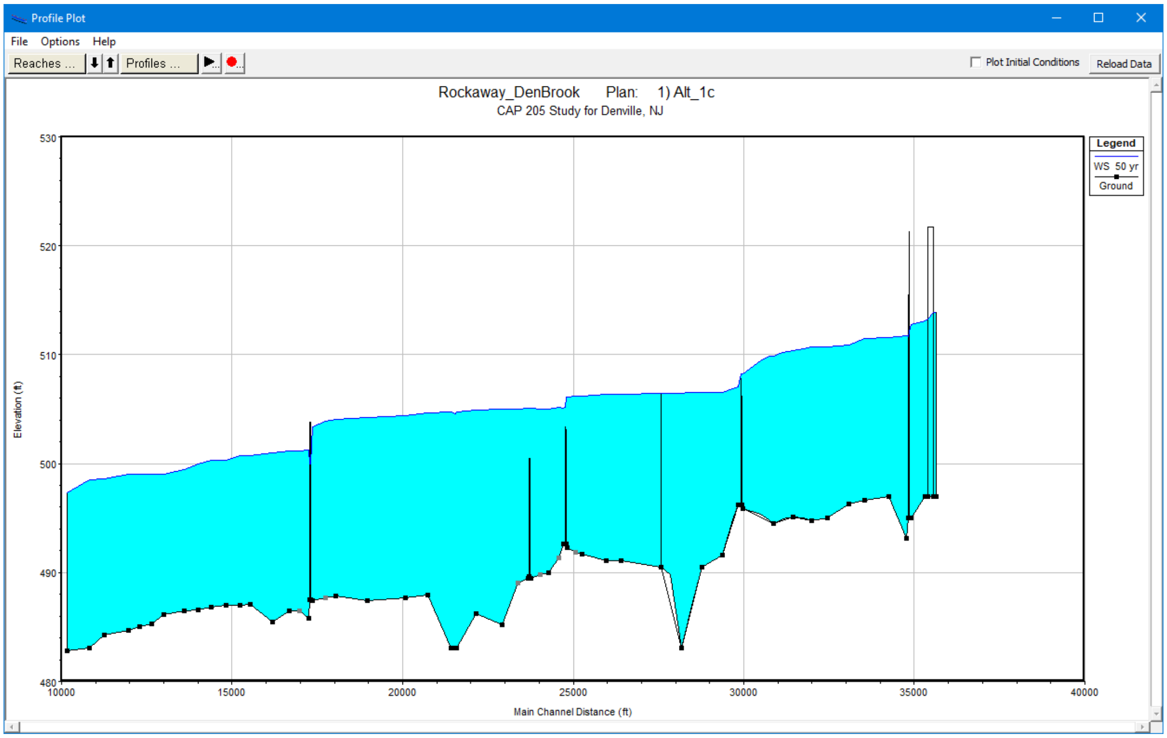


Alt-1b: Proposed Condition 100-year profile for Rockaway River, with 6-stop log structures

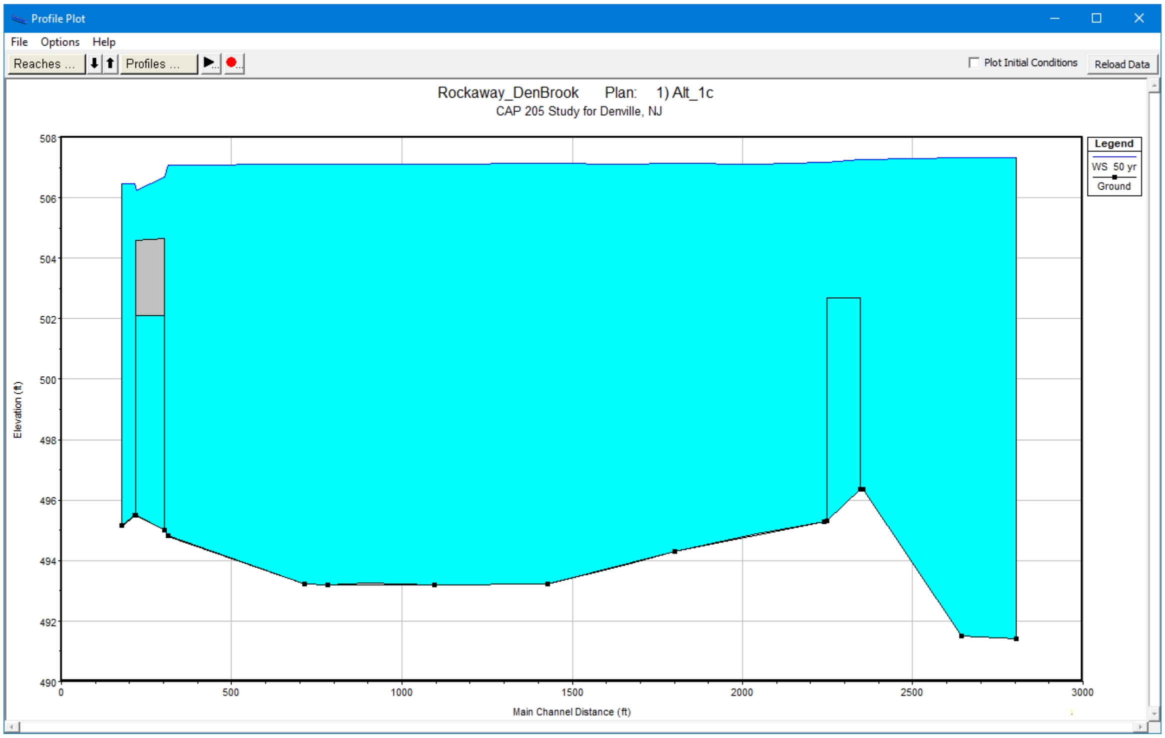


Alt-1b: Proposed Condition 100-year profile for Den Brook, with 6-stop log structures

Exhibit-1: Hydraulic Analysis
CAP Section 205 Feasibility Study for Denville, New Jersey



Alt-1c: Proposed Condition 50-year profile for Rockaway River, with 10-stop log structures



Alt-1c: Proposed Condition 50-year profile for Den Brook, with 10-stop log structures

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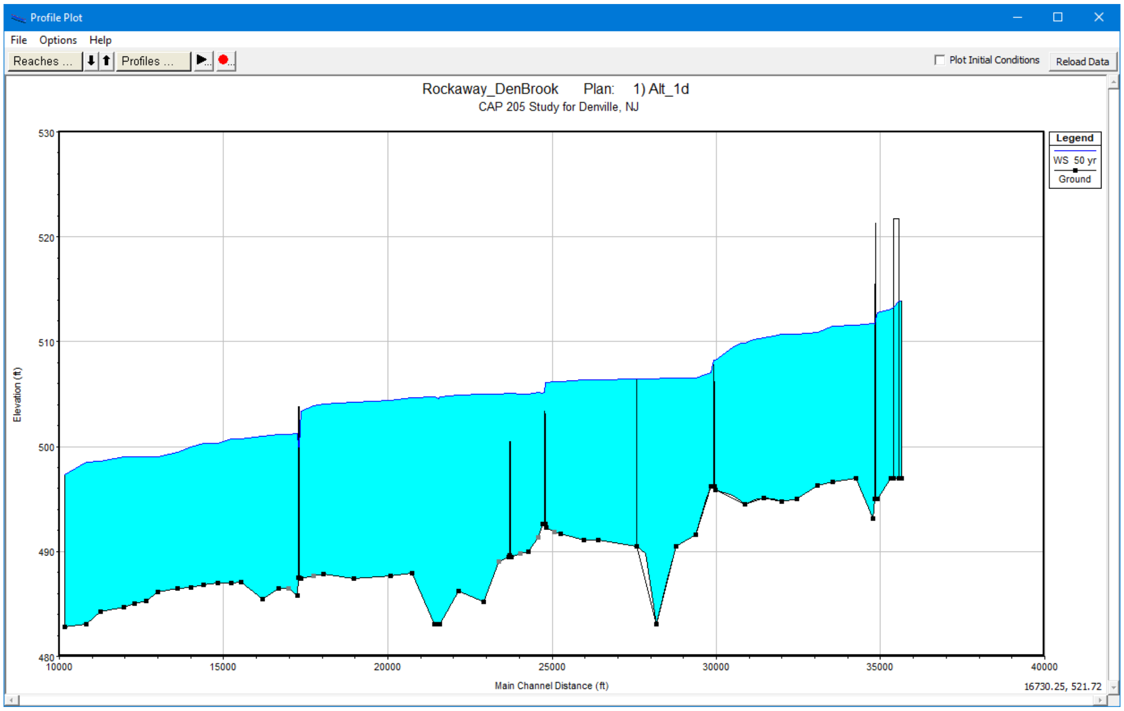
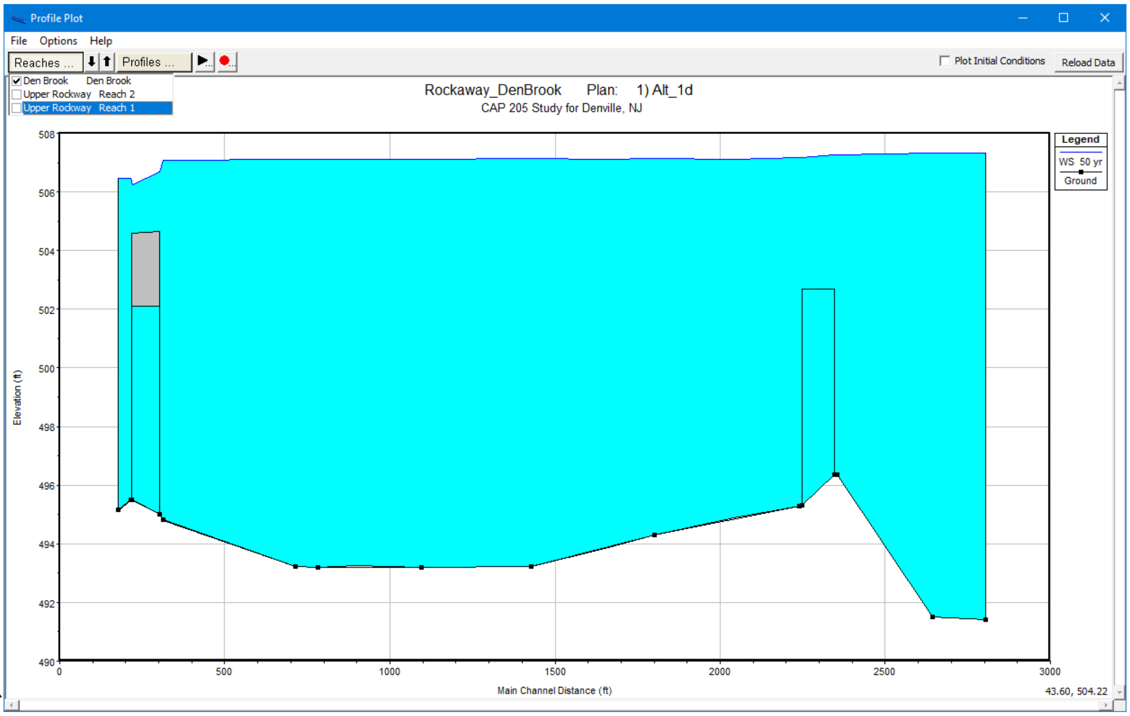
CAP Section 205 Feasibility Study for Denville, New Jersey

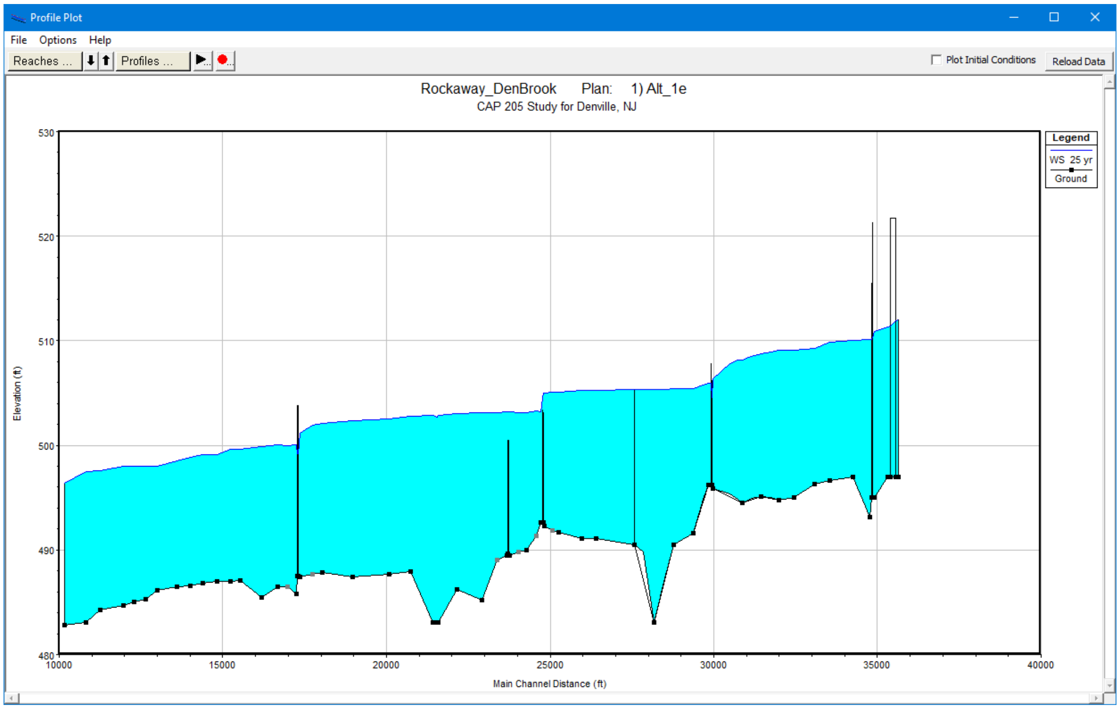


Alt-1d: Proposed Condition 50-year profile for Rockaway River, with 6-stop log structures

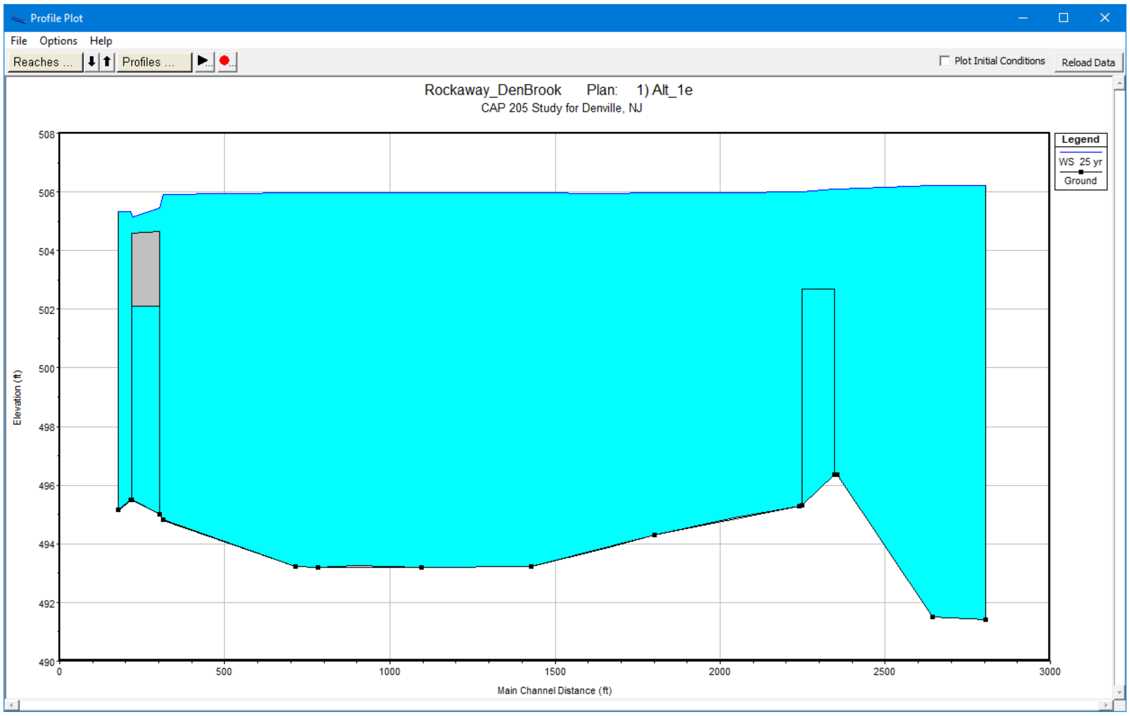


Alt-1d: Proposed Condition 50-year profile for Den Brook, with 6-stop log structures

Exhibit-1: Hydraulic Analysis
CAP Section 205 Feasibility Study for Denville, New Jersey



Alt-1e: Proposed Condition 25-year profile for Rockaway River, with 8-stop log structures



Alt-1e: Proposed Condition 25-year profile for Den Brook, with 8-stop log structures

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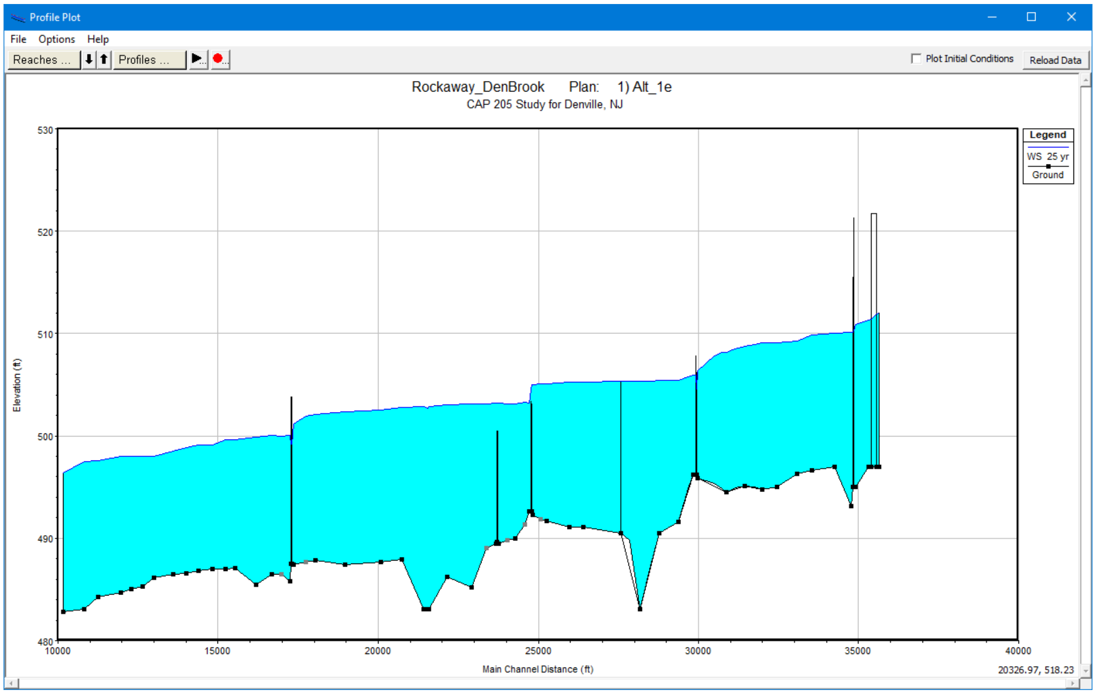
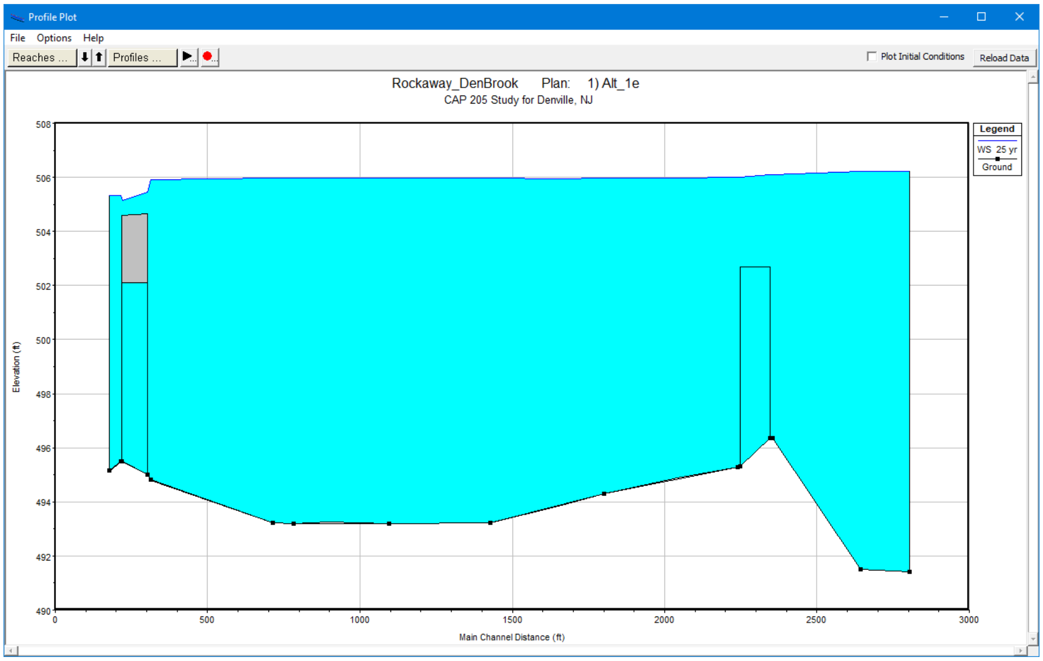


Alt-1f: Proposed Condition 25-year profile for Rockaway River, with 4-stop log structures



Alt-1f: Proposed Condition 25-year profile for Den Brook, with 4-stop log structures

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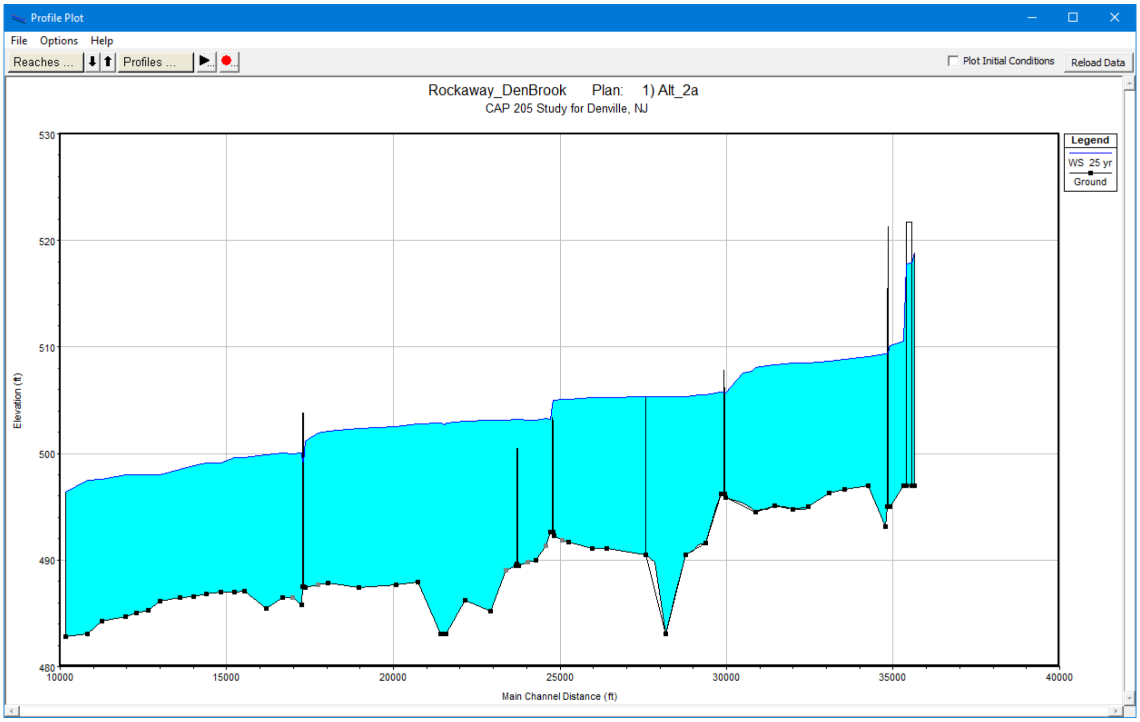
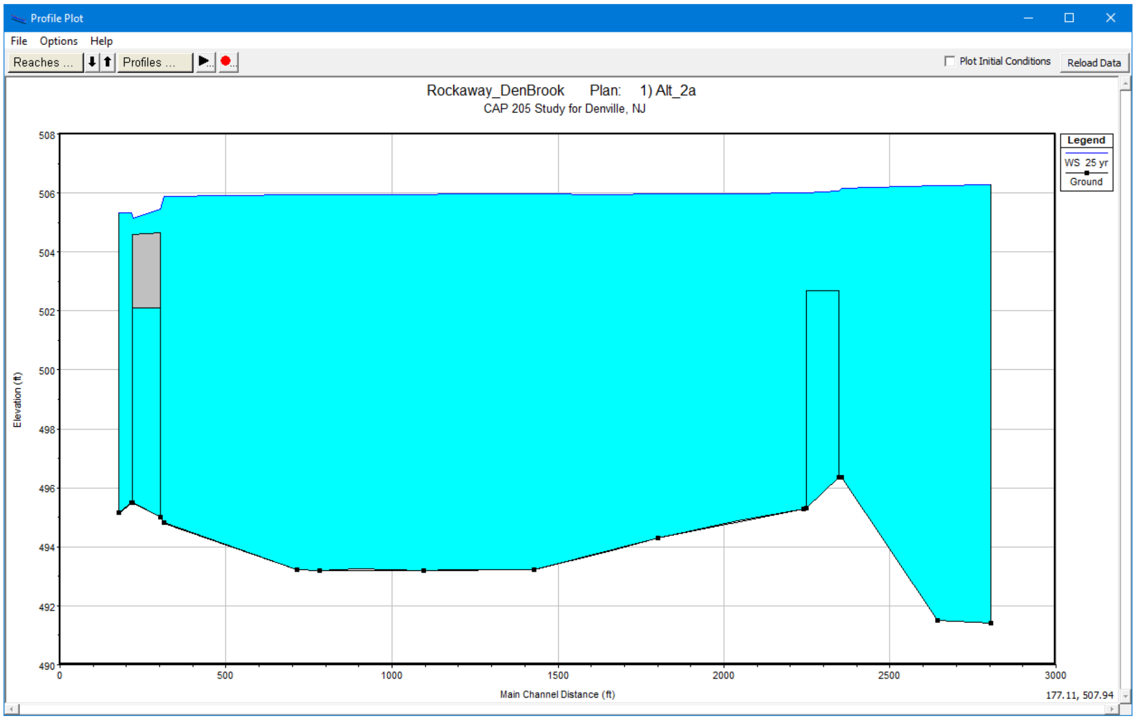


Alt-2a: Proposed Condition 25-year profile for Rockaway River



Alt-2a: Proposed Condition 25-year profile for Den Brook

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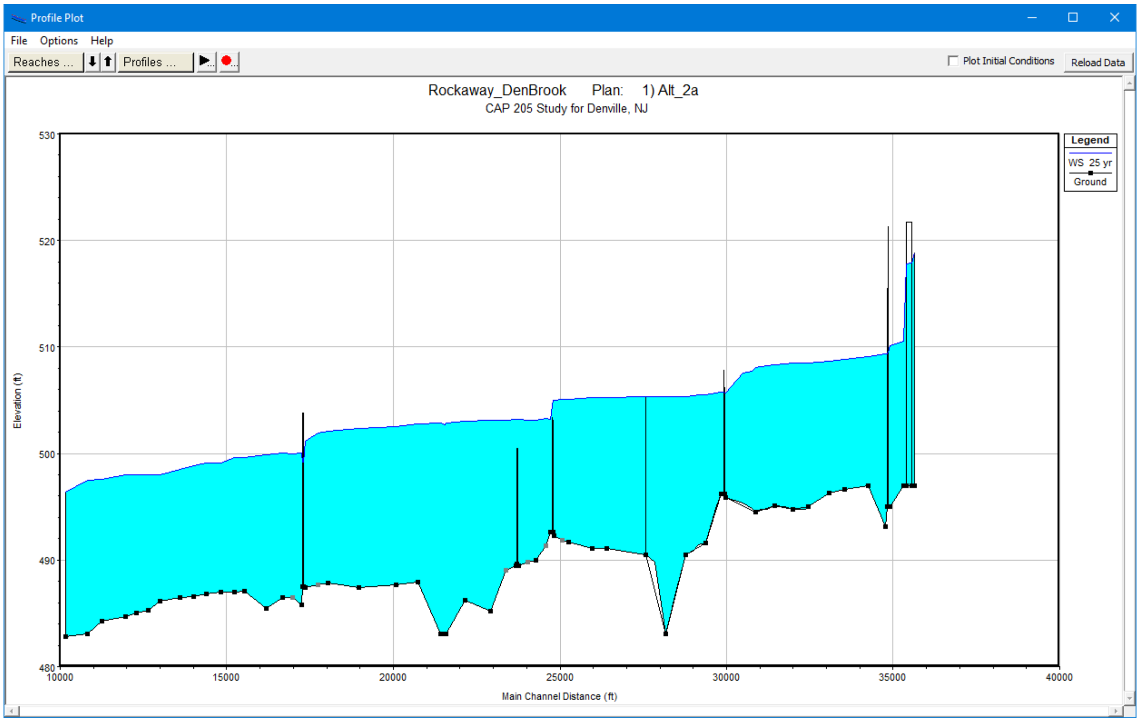
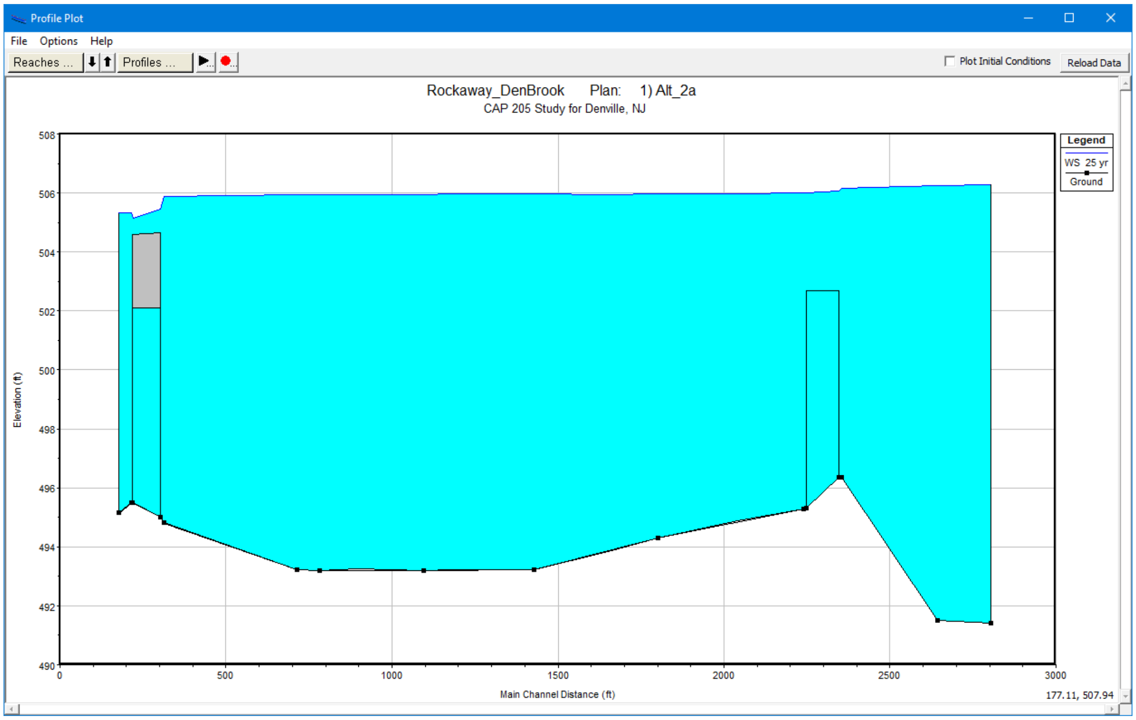
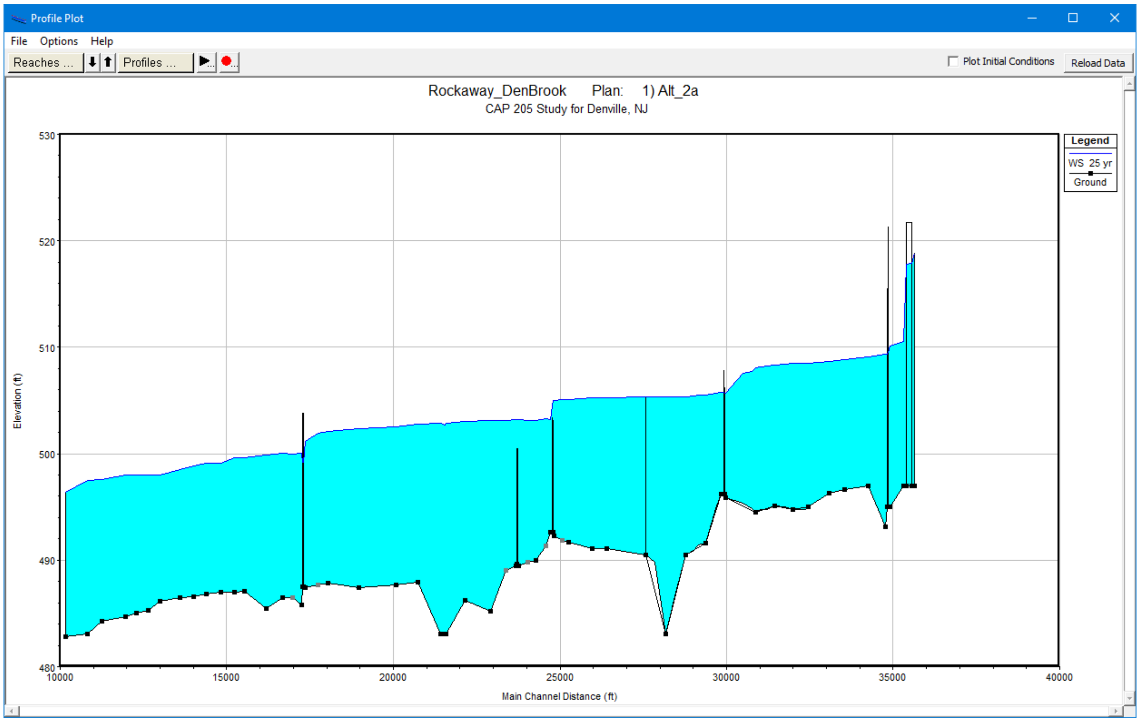


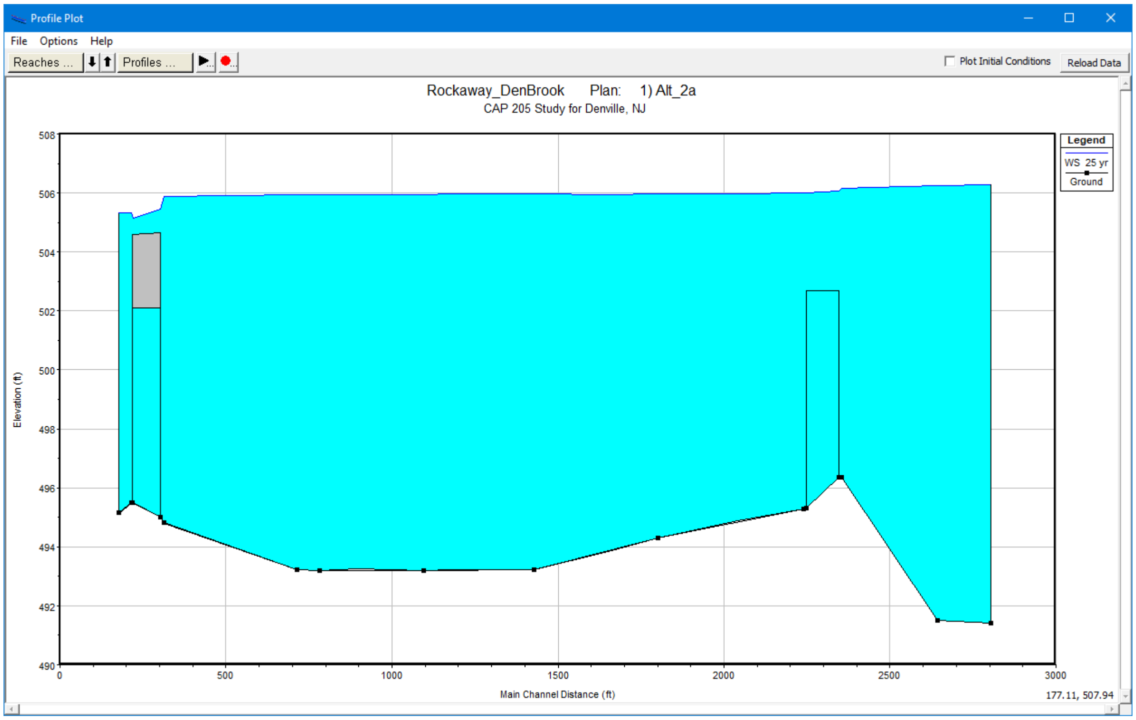
Alt-2b: Proposed Condition 25-year profile for Rockaway River



Alt-2b: Proposed Condition 25-year profile for Den Brook

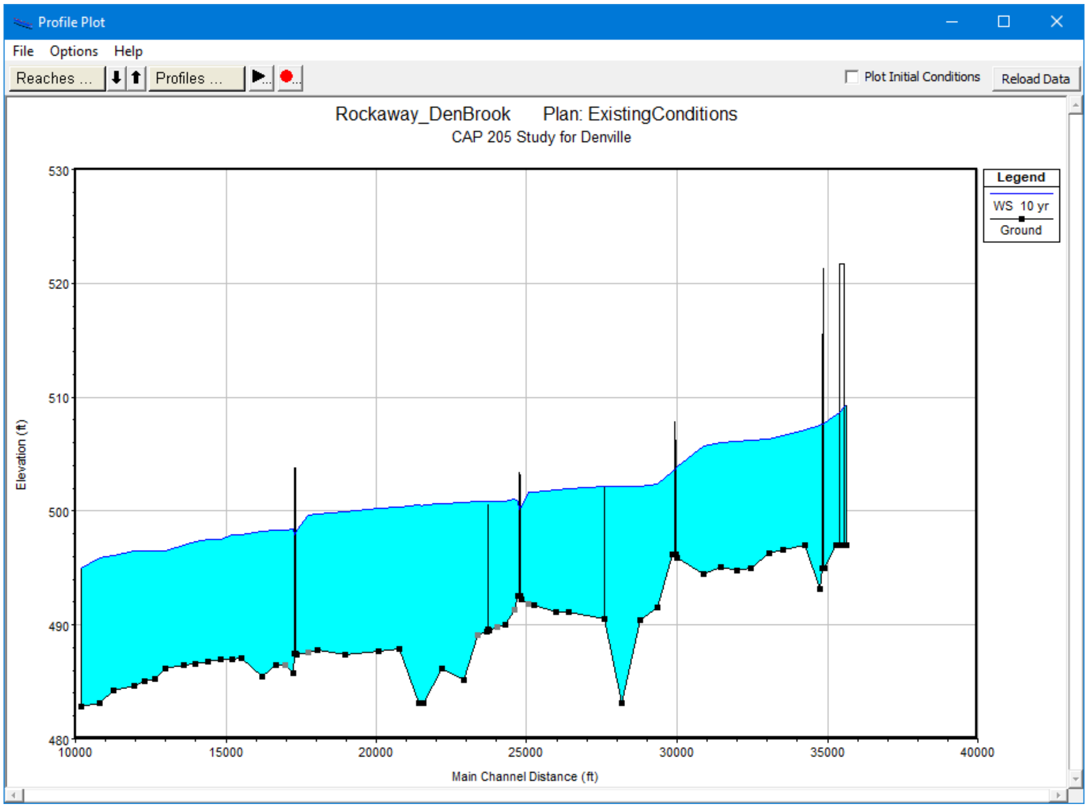


Alt-2b Sensitivity: Proposed Condition 25-year profile for Rockaway River

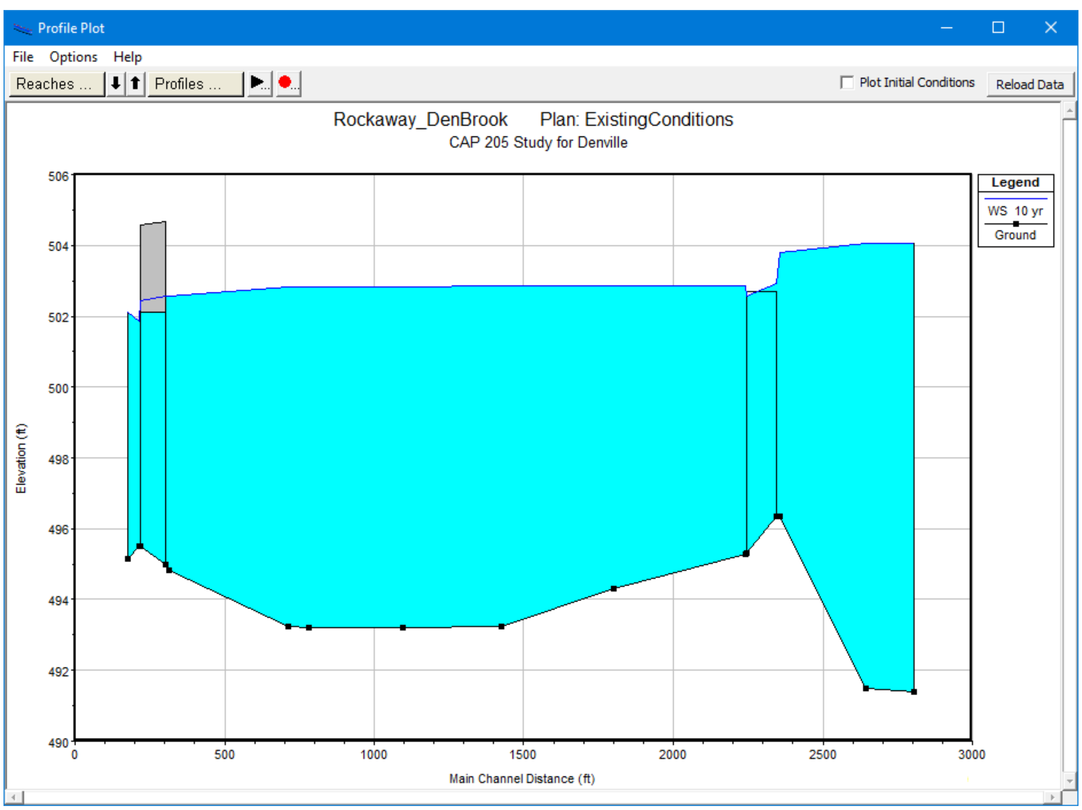


Alt-2b Sensitivity: Proposed Condition 25-year profile for Den Brook

Exhibit-1: Hydraulic Analysis
CAP Section 205 Feasibility Study for Denville, New Jersey



Alt-3: Proposed Condition 25-year profile for Rockaway River, Divert Flow with a 8'x20' box culvert



Alt-3: Proposed Condition 25-year profile for Den Brook, Divert Flow with a 8'x20' box culvert

EXHIBIT 2
HEC-RAS MODEL OUTPUT

Existing Condition Model

HEC-RAS Plan: Existing

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 2	35627	2 yr	1790.00	497.00	505.98	501.91	506.12	0.001124	3.04	670.43	271.76	0.22
Reach 2	35627	5 yr	3070.00	497.00	507.84	503.12	508.06	0.001317	3.92	925.84	307.33	0.24
Reach 2	35627	10 yr	4380.00	497.00	509.23	504.04	509.54	0.001524	4.69	1128.39	418.56	0.27
Reach 2	35627	25 yr	6530.00	497.00	511.31	505.25	511.75	0.001673	5.60	1444.38	610.31	0.29
Reach 2	35627	50 yr	8440.00	497.00	512.78	506.19	513.33	0.001816	6.33	1677.48	714.55	0.31
Reach 2	35627	100 yr	10660.00	497.00	514.51	507.18	515.17	0.001845	6.93	1953.04	728.81	0.32
Reach 2	35627	200 yr	13290.00	497.00	516.24	508.30	517.02	0.001926	7.62	2227.95	751.21	0.33
Reach 2	35627	500 yr	17510.00	497.00	518.74	509.84	519.72	0.002020	8.58	2625.46	801.39	0.35
Reach 2	35454 I-80 Bridge		Bridge									
Reach 2	35305	2 yr	1790.00	497.00	505.57	502.03	505.79	0.002140	3.92	527.22	157.59	0.29
Reach 2	35305	5 yr	3070.00	497.00	507.27	503.59	507.63	0.002513	5.01	723.86	175.89	0.33
Reach 2	35305	10 yr	4380.00	497.00	508.48	504.61	509.00	0.002967	6.03	870.18	195.78	0.36
Reach 2	35305	25 yr	6530.00	497.00	510.36	505.96	511.09	0.003251	7.21	1106.96	292.75	0.39
Reach 2	35305	50 yr	8440.00	497.00	511.62	506.93	512.55	0.003620	8.21	1271.54	472.47	0.42
Reach 2	35305	100 yr	10660.00	497.00	513.21	507.99	514.32	0.003670	9.00	1485.28	511.39	0.44
Reach 2	35305	200 yr	13290.00	497.00	514.73	509.13	516.07	0.003879	9.95	1694.65	529.75	0.46
Reach 2	35305	500 yr	17510.00	497.00	516.89	510.80	518.59	0.004150	11.27	2000.03	555.63	0.48
Reach 2	34907	2 yr	1790.00	495.00	505.16	499.72	505.27	0.000667	2.69	701.32	185.98	0.17
Reach 2	34907	5 yr	3070.00	495.00	506.69	500.96	506.91	0.001046	3.80	852.92	206.09	0.22
Reach 2	34907	10 yr	4380.00	495.00	507.72	501.99	508.07	0.001481	4.85	954.12	226.98	0.27
Reach 2	34907	25 yr	6530.00	495.00	509.42	503.29	509.98	0.001938	6.15	1122.91	295.49	0.31
Reach 2	34907	50 yr	8440.00	495.00	511.06	504.31	511.36	0.001127	5.12	2413.93	360.42	0.24
Reach 2	34907	100 yr	10660.00	495.00	512.75	505.37	513.05	0.001018	5.25	3106.77	425.97	0.24
Reach 2	34907	200 yr	13290.00	495.00	514.36	506.54	514.66	0.000940	5.40	3810.04	452.85	0.23
Reach 2	34907	500 yr	17510.00	495.00	516.66	508.25	516.96	0.000848	5.59	4975.29	536.41	0.23
Reach 2	34829 Savage Street Br		Bridge									
Reach 2	34768	2 yr	1790.00	493.17	505.10	497.41	505.17	0.000380	2.24	864.75	254.10	0.12
Reach 2	34768	5 yr	3070.00	493.17	506.58	498.67	506.75	0.000694	3.32	1010.84	397.58	0.17
Reach 2	34768	10 yr	4380.00	493.17	507.55	499.70	507.83	0.001069	4.35	1106.11	458.73	0.22
Reach 2	34768	25 yr	6530.00	493.17	508.98	501.12	509.47	0.001634	5.77	1246.86	497.95	0.27
Reach 2	34768	50 yr	8440.00	493.17	509.75	502.25	510.08	0.001314	5.36	3009.09	532.63	0.25
Reach 2	34768	100 yr	10660.00	493.17	510.57	503.54	510.96	0.001560	6.05	3464.50	588.49	0.27
Reach 2	34768	200 yr	13290.00	493.17	511.58	504.81	512.03	0.001754	6.69	4151.18	778.04	0.29
Reach 2	34768	500 yr	17510.00	493.17	512.84	506.63	513.35	0.001937	7.39	5191.73	876.71	0.31
Reach 2	34260	2 yr	1790.00	497.00	504.81	500.46	504.89	0.000876	2.47	1134.42	528.29	0.17
Reach 2	34260	5 yr	3070.00	497.00	506.22	501.76	506.30	0.000832	2.75	2221.71	967.73	0.17
Reach 2	34260	10 yr	4380.00	497.00	507.16	502.65	507.23	0.000774	2.87	3144.89	1012.72	0.17
Reach 2	34260	25 yr	6530.00	497.00	508.66	503.61	508.71	0.000578	2.75	4684.44	1074.52	0.15
Reach 2	34260	50 yr	8440.00	497.00	509.38	505.00	509.45	0.000623	2.99	5447.35	1115.24	0.16
Reach 2	34260	100 yr	10660.00	497.00	510.17	505.95	510.24	0.000652	3.20	6285.00	1166.51	0.16
Reach 2	34260	200 yr	13290.00	497.00	511.19	506.51	511.27	0.000628	3.32	7395.04	1260.70	0.16
Reach 2	34260	500 yr	17510.00	497.00	512.44	507.01	512.53	0.000648	3.59	8838.24	1338.39	0.17
Reach 2	33542	2 yr	1790.00	496.60	503.80	499.68	503.94	0.002130	3.18	754.51	540.92	0.22
Reach 2	33542	5 yr	3070.00	496.60	505.35	500.90	505.47	0.001725	3.30	1662.59	1992.91	0.21
Reach 2	33542	10 yr	4380.00	496.60	506.59	501.97	506.64	0.000864	2.57	3294.29	2314.83	0.15
Reach 2	33542	25 yr	6530.00	496.60	508.35	504.51	508.38	0.000375	1.90	5915.44	2547.08	0.10
Reach 2	33542	50 yr	8440.00	496.60	509.07	505.15	509.10	0.000384	2.01	7043.70	2665.47	0.10
Reach 2	33542	100 yr	10660.00	496.60	509.86	505.96	509.89	0.000380	2.09	8341.09	2766.17	0.10
Reach 2	33542	200 yr	13290.00	496.60	510.91	506.22	510.94	0.000333	2.06	10151.71	2834.22	0.10
Reach 2	33542	500 yr	17510.00	496.60	512.16	506.57	512.20	0.000331	2.18	12401.75	3139.23	0.10
Reach 2	33071	2 yr	1790.00	496.30	503.68	499.08	503.76	0.000135	1.01	1278.59	376.60	0.07
Reach 2	33071	5 yr	3070.00	496.30	505.21	500.61	505.34	0.000113	1.06	2038.06	623.09	0.06
Reach 2	33071	10 yr	4380.00	496.30	506.35	501.18	506.52	0.000110	1.14	2764.96	662.51	0.06
Reach 2	33071	25 yr	6530.00	496.30	508.06	501.80	508.28	0.000099	1.20	3953.59	875.60	0.06
Reach 2	33071	50 yr	8440.00	496.30	508.67	503.30	508.98	0.000124	1.39	4422.27	1034.81	0.07
Reach 2	33071	100 yr	10660.00	496.30	509.34	504.25	509.75	0.000149	1.58	4975.64	1213.25	0.08
Reach 2	33071	200 yr	13290.00	496.30	510.29	505.13	510.79	0.000159	1.72	5801.47	1328.64	0.08
Reach 2	33071	500 yr	17510.00	496.30	511.34	506.20	512.02	0.000190	1.97	6720.20	1464.88	0.09
Reach 2	32459	2 yr	1790.00	495.00	503.51		503.59	0.000922	2.44	1050.93	279.78	0.17
Reach 2	32459	5 yr	3070.00	495.00	505.06		505.17	0.001084	3.04	1576.26	378.19	0.19
Reach 2	32459	10 yr	4380.00	495.00	506.21		506.35	0.001207	3.49	2027.11	405.88	0.20
Reach 2	32459	25 yr	6530.00	495.00	507.95		508.12	0.001288	4.04	2826.53	537.81	0.21
Reach 2	32459	50 yr	8440.00	495.00	508.53		508.77	0.001733	4.85	3164.81	599.38	0.25
Reach 2	32459	100 yr	10660.00	495.00	509.19		509.48	0.002064	5.48	3571.00	643.16	0.27
Reach 2	32459	200 yr	13290.00	495.00	510.18		510.49	0.002109	5.83	4246.88	692.90	0.28
Reach 2	32459	500 yr	17510.00	495.00	511.28		511.64	0.002322	6.45	5091.08	831.56	0.30
Reach 2	31982	2 yr	1790.00	494.80	503.33		503.35	0.000275	1.63	1876.00	730.34	0.11
Reach 2	31982	5 yr	3070.00	494.80	504.92		504.94	0.000229	1.70	3358.28	1105.75	0.10
Reach 2	31982	10 yr	4380.00	494.80	506.09		506.12	0.000211	1.77	4816.85	1364.83	0.10
Reach 2	31982	25 yr	6530.00	494.80	507.88		507.90	0.000165	1.76	7709.07	1788.95	0.09
Reach 2	31982	50 yr	8440.00	494.80	508.46		508.49	0.000204	2.01	8791.23	1887.04	0.10
Reach 2	31982	100 yr	10660.00	494.80	509.13		509.16	0.000230	2.22	10057.99	1913.49	0.11
Reach 2	31982	200 yr	13290.00	494.80	510.14		510.17	0.000225	2.31	12017.64	2007.89	0.11
Reach 2	31982	500 yr	17510.00	494.80	511.24		511.28	0.000253	2.57	14294.30	2100.71	0.12
Reach 2	31440	2 yr	1790.00	495.10	503.15		503.19	0.000325	1.72	1713.76	804.06	0.11

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 2	31440	5 yr	3070.00	495.10	504.80		504.82	0.000216	1.61	3732.07	1723.56	0.10
Reach 2	31440	10 yr	4380.00	495.10	506.00		506.01	0.000156	1.49	6118.02	2241.01	0.08
Reach 2	31440	25 yr	6530.00	495.10	507.83		507.83	0.000086	1.24	10522.09	2554.78	0.06
Reach 2	31440	50 yr	8440.00	495.10	508.40		508.41	0.000099	1.37	11996.25	2581.58	0.07
Reach 2	31440	100 yr	10660.00	495.10	509.06		509.07	0.000106	1.47	13708.95	2591.52	0.07
Reach 2	31440	200 yr	13290.00	495.10	510.07		510.08	0.000101	1.51	16379.30	2726.58	0.07
Reach 2	31440	500 yr	17510.00	495.10	511.17		511.18	0.000106	1.63	19404.41	2785.42	0.07
Reach 2	30872	2 yr	1790.00	494.50	502.80		502.91	0.000754	2.65	762.45	266.67	0.18
Reach 2	30872	5 yr	3070.00	494.50	504.49		504.60	0.000717	2.99	1429.71	567.02	0.18
Reach 2	30872	10 yr	4380.00	494.50	505.75		505.85	0.000609	3.02	2207.56	635.79	0.17
Reach 2	30872	25 yr	6530.00	494.50	507.66		507.74	0.000423	2.83	3463.42	684.96	0.15
Reach 2	30872	50 yr	8440.00	494.50	508.19		508.29	0.000538	3.29	3829.39	697.03	0.17
Reach 2	30872	100 yr	10660.00	494.50	508.81		508.94	0.000636	3.69	4269.04	711.15	0.18
Reach 2	30872	200 yr	13290.00	494.50	509.81		509.96	0.000644	3.91	5013.82	777.25	0.18
Reach 2	30872	500 yr	17510.00	494.50	510.86		511.04	0.000758	4.45	5882.51	899.81	0.20
Reach 2	29983	2 yr	1790.00	495.90	501.39	499.08	501.65	0.003183	4.10	436.43	121.20	0.34
Reach 2	29983	5 yr	3070.00	495.90	502.84	500.04	503.28	0.003684	5.32	577.37	128.07	0.38
Reach 2	29983	10 yr	4380.00	495.90	503.90	500.88	504.55	0.004344	6.44	680.11	168.86	0.43
Reach 2	29983	25 yr	6530.00	495.90	505.70	502.09	506.61	0.004505	7.64	854.86	537.22	0.45
Reach 2	29983	50 yr	8440.00	495.90	506.56	503.07	507.17	0.003367	6.75	1816.51	808.46	0.38
Reach 2	29983	100 yr	10660.00	495.90	507.27	504.10	507.78	0.002971	6.47	2685.05	1040.29	0.36
Reach 2	29983	200 yr	13290.00	495.90	508.70	505.24	509.02	0.001833	5.56	4281.71	1156.98	0.29
Reach 2	29983	500 yr	17510.00	495.90	509.76	506.99	510.05	0.001684	5.66	5531.46	1195.49	0.28
Reach 2	29917 Diamond Rd Bridg		Bridge									
Reach 2	29840	2 yr	1790.00	496.20	500.96		501.18	0.003249	3.83	471.61	123.20	0.34
Reach 2	29840	5 yr	3070.00	496.20	502.39		502.73	0.003476	4.72	685.09	232.31	0.37
Reach 2	29840	10 yr	4380.00	496.20	503.52		503.84	0.002902	4.89	1103.93	514.65	0.35
Reach 2	29840	25 yr	6530.00	496.20	505.70		505.80	0.000793	3.12	3133.78	1213.17	0.19
Reach 2	29840	50 yr	8440.00	496.20	506.77		506.84	0.000532	2.77	4472.09	1262.87	0.16
Reach 2	29840	100 yr	10660.00	496.20	507.45		507.52	0.000511	2.84	5327.05	1269.64	0.16
Reach 2	29840	200 yr	13290.00	496.20	508.37		508.44	0.000438	2.79	6501.81	1279.09	0.15
Reach 2	29840	500 yr	17510.00	496.20	509.77		509.84	0.000360	2.74	8445.79	1443.77	0.14
Reach 2	29364	2 yr	1790.00	491.57	499.94		500.14	0.001553	3.52	527.59	171.52	0.25
Reach 2	29364	5 yr	3070.00	491.57	501.08		501.41	0.002237	4.73	790.28	270.36	0.31
Reach 2	29364	10 yr	4380.00	491.57	502.41		502.71	0.001909	4.88	1270.58	496.45	0.29
Reach 2	29364	25 yr	6530.00	491.57	505.46		505.52	0.000385	2.68	4048.00	1133.11	0.14
Reach 2	29364	50 yr	8440.00	491.57	506.59		506.64	0.000288	2.47	5367.35	1197.69	0.12
Reach 2	29364	100 yr	10660.00	491.57	507.26		507.32	0.000300	2.61	6188.42	1248.01	0.13
Reach 2	29364	200 yr	13290.00	491.57	508.21		508.27	0.000266	2.57	7395.55	1292.94	0.12
Reach 2	29364	500 yr	17510.00	491.57	509.64		509.70	0.000219	2.48	9330.44	1393.34	0.11
Reach 2	28772	2 yr	1790.00	490.47	498.86		499.06	0.002186	3.91	690.08	588.96	0.29
Reach 2	28772	5 yr	3070.00	490.47	500.58		500.64	0.000754	2.65	1948.19	823.71	0.18
Reach 2	28772	10 yr	4380.00	490.47	502.22		502.25	0.000347	2.07	3379.94	901.45	0.12
Reach 2	28772	25 yr	6530.00	490.47	505.37		505.39	0.000121	1.50	6300.23	985.16	0.08
Reach 2	28772	50 yr	8440.00	490.47	506.50		506.53	0.000136	1.69	7586.91	1223.21	0.08
Reach 2	28772	100 yr	10660.00	490.47	507.16		507.19	0.000160	1.90	8402.64	1255.51	0.09
Reach 2	28772	200 yr	13290.00	490.47	508.11		508.14	0.000167	2.02	9596.14	1262.20	0.09
Reach 2	28772	500 yr	17510.00	490.47	509.55		509.59	0.000168	2.16	11476.81	1379.04	0.10
Reach 2	28164	2 yr	1790.00	483.10	498.83		498.85	0.000093	1.27	2102.47	844.70	0.07
Reach 2	28164	5 yr	3070.00	483.10	500.51		500.53	0.000070	1.21	3583.98	943.41	0.06
Reach 2	28164	10 yr	4380.00	483.10	502.17		502.18	0.000048	1.09	5299.31	1153.30	0.05
Reach 2	28164	25 yr	6530.00	483.10	505.36		505.36	0.000022	0.83	9376.99	1326.34	0.03
Reach 2	28164	50 yr	8440.00	483.10	506.48		506.49	0.000023	0.90	10916.10	1399.84	0.04
Reach 2	28164	100 yr	10660.00	483.10	507.14		507.15	0.000029	1.03	11857.30	1457.55	0.04
Reach 2	28164	200 yr	13290.00	483.10	508.08		508.10	0.000033	1.12	13239.06	1475.52	0.04
Reach 2	28164	500 yr	17510.00	483.10	509.52		509.54	0.000036	1.24	15402.62	1547.55	0.05
Reach 1	27584	2 yr	2000.00	490.50	498.76		498.80	0.000110	1.96	2167.32	1199.61	0.15
Reach 1	27584	5 yr	3460.00	490.50	500.47		500.49	0.000067	1.82	4457.71	1486.58	0.12
Reach 1	27584	10 yr	5100.00	490.50	502.14		502.16	0.000041	1.63	7429.12	1980.73	0.10
Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.13	14819.71	2473.36	0.06
Reach 1	27584	50 yr	9940.00	490.50	506.48		506.49	0.000013	1.18	17624.95	2493.37	0.06
Reach 1	27584	100 yr	11880.00	490.50	507.13		507.14	0.000013	1.26	19263.31	2505.97	0.06
Reach 1	27584	200 yr	15110.00	490.50	508.08		508.09	0.000015	1.38	21636.49	2525.63	0.06
Reach 1	27584	500 yr	19960.00	490.50	509.51		509.53	0.000016	1.50	25298.02	2562.63	0.07
Reach 1	26406	2 yr	2000.00	491.10	498.43		498.58	0.000346	3.31	1037.47	506.16	0.25
Reach 1	26406	5 yr	3460.00	491.10	500.20		500.35	0.000280	3.61	2170.82	752.62	0.24
Reach 1	26406	10 yr	5100.00	491.10	501.95		502.06	0.000193	3.48	3549.11	816.07	0.21
Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Reach 1	26406	50 yr	9940.00	491.10	506.38		506.45	0.000091	3.14	7605.17	1032.48	0.15
Reach 1	26406	100 yr	11880.00	491.10	507.02		507.10	0.000101	3.42	8278.17	1069.47	0.16
Reach 1	26406	200 yr	15110.00	491.10	507.94		508.04	0.000118	3.85	9314.38	1154.40	0.18
Reach 1	26406	500 yr	19960.00	491.10	509.36		509.48	0.000126	4.23	11043.35	1306.44	0.19
Reach 1	25969	2 yr	2000.00	491.10	498.33		498.43	0.000280	2.94	1353.59	552.24	0.23
Reach 1	25969	5 yr	3460.00	491.10	500.12		500.22	0.000224	3.20	2358.64	576.91	0.21
Reach 1	25969	10 yr	5100.00	491.10	501.88		501.98	0.000178	3.32	3513.42	730.63	0.20
Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	25969	50 yr	9940.00	491.10	506.35		506.41	0.000079	2.91	7882.37	1224.33	0.14
Reach 1	25969	100 yr	11880.00	491.10	506.99		507.06	0.000084	3.11	8671.60	1233.18	0.15
Reach 1	25969	200 yr	15110.00	491.10	507.91		507.99	0.000092	3.39	9812.88	1242.76	0.16
Reach 1	25969	500 yr	19960.00	491.10	509.34		509.42	0.000093	3.62	11586.95	1251.48	0.16
Reach 1	25258	2 yr	2000.00	491.70	498.12		498.23	0.000299	2.93	1161.40	380.95	0.23
Reach 1	25258	5 yr	3460.00	491.70	499.93		500.06	0.000256	3.34	1859.12	393.07	0.23
Reach 1	25258	10 yr	5100.00	491.70	501.69		501.84	0.000224	3.66	2575.45	415.04	0.22
Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Reach 1	25258	50 yr	9940.00	491.70	506.19		506.33	0.000135	3.77	4824.94	584.85	0.18
Reach 1	25258	100 yr	11880.00	491.70	506.81		506.97	0.000151	4.12	5186.57	595.73	0.20
Reach 1	25258	200 yr	15110.00	491.70	507.68		507.89	0.000176	4.64	5710.99	610.47	0.22
Reach 1	25258	500 yr	19960.00	491.70	509.04		509.32	0.000190	5.11	6558.14	632.51	0.23
Reach 1	25058.0*	2 yr	2000.00	491.85	498.14		498.18	0.000083	1.73	1377.04	291.58	0.13
Reach 1	25058.0*	5 yr	3460.00	491.85	499.94		500.01	0.000096	2.23	1917.88	310.03	0.14
Reach 1	25058.0*	10 yr	5100.00	491.85	501.70		501.79	0.000100	2.62	2539.25	367.19	0.15
Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.90	555.68	0.14
Reach 1	25058.0*	50 yr	9940.00	491.85	506.17		506.31	0.000089	3.22	4718.50	575.46	0.15
Reach 1	25058.0*	100 yr	11880.00	491.85	506.77		506.95	0.000108	3.65	5068.97	603.48	0.17
Reach 1	25058.0*	200 yr	15110.00	491.85	507.62		507.86	0.000141	4.32	5583.65	614.11	0.20
Reach 1	25058.0*	500 yr	19960.00	491.85	508.94		509.27	0.000178	5.14	6406.15	631.32	0.22
Reach 1	24816	2 yr	2000.00	492.29	497.60	495.77	498.09	0.001190	5.63	355.54	121.86	0.46
Reach 1	24816	5 yr	3460.00	492.29	499.01	496.98	499.87	0.001443	7.42	466.25	141.87	0.54
Reach 1	24816	10 yr	5100.00	492.29	500.39	498.15	501.62	0.001572	8.89	573.48	161.63	0.58
Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Reach 1	24816	50 yr	9940.00	492.29	506.12	500.99	506.28	0.000171	3.57	3147.37	571.76	0.20
Reach 1	24816	100 yr	11880.00	492.29	506.73	502.01	506.92	0.000176	3.77	3503.12	585.76	0.20
Reach 1	24816	200 yr	15110.00	492.29	507.60	503.61	507.83	0.000184	4.06	4020.68	602.05	0.21
Reach 1	24816	500 yr	19960.00	492.29	508.95	504.13	509.22	0.000172	4.22	4840.04	606.13	0.21
Reach 1	24775 Pocono Road Brid		Bridge									
Reach 1	24725	2 yr	2000.00	492.60	497.50	496.29	498.03	0.000251	5.81	350.21	150.01	0.56
Reach 1	24725	5 yr	3460.00	492.60	499.17	497.59	499.67	0.000175	5.89	678.76	235.90	0.49
Reach 1	24725	10 yr	5100.00	492.60	500.87	498.77	501.26	0.000104	5.50	1182.99	358.74	0.40
Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Reach 1	24725	50 yr	9940.00	492.60	505.11	500.70	505.31	0.000032	4.34	3329.73	702.14	0.24
Reach 1	24725	100 yr	11880.00	492.60	505.99	501.20	506.18	0.000029	4.41	3953.93	730.75	0.23
Reach 1	24725	200 yr	15110.00	492.60	507.13	501.80	507.35	0.000029	4.66	4878.89	876.69	0.24
Reach 1	24725	500 yr	19960.00	492.60	508.73	502.94	508.94	0.000026	4.85	6368.00	1012.71	0.23
Reach 1	24579.6*	2 yr	2000.00	491.36	497.76	495.52	497.86	0.000287	2.76	950.70	368.16	0.23
Reach 1	24579.6*	5 yr	3460.00	491.36	499.43	496.55	499.52	0.000165	2.58	1639.55	435.82	0.18
Reach 1	24579.6*	10 yr	5100.00	491.36	501.05	497.18	501.15	0.000107	2.42	2392.08	488.67	0.15
Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000069	2.31	3542.90	527.94	0.13
Reach 1	24579.6*	50 yr	9940.00	491.36	505.16	498.50	505.28	0.000059	2.38	4610.69	630.83	0.12
Reach 1	24579.6*	100 yr	11880.00	491.36	506.02	498.85	506.16	0.000059	2.49	5156.43	661.79	0.12
Reach 1	24579.6*	200 yr	15110.00	491.36	507.16	499.33	507.33	0.000064	2.74	5900.68	707.46	0.13
Reach 1	24579.6*	500 yr	19960.00	491.36	508.72	499.94	508.94	0.000069	3.07	6972.40	787.14	0.14
Reach 1	24289	2 yr	2000.00	490.00	497.49	494.63	497.73	0.000570	4.26	656.52	279.32	0.32
Reach 1	24289	5 yr	3460.00	490.00	499.24	496.28	499.45	0.000312	3.80	1160.19	294.97	0.25
Reach 1	24289	10 yr	5100.00	490.00	500.87	497.83	501.10	0.000211	3.58	1649.79	305.02	0.21
Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Reach 1	24289	50 yr	9940.00	490.00	504.97	499.06	505.24	0.000137	3.72	2957.63	386.66	0.18
Reach 1	24289	100 yr	11880.00	490.00	505.79	499.48	506.11	0.000141	3.93	3257.22	395.63	0.19
Reach 1	24289	200 yr	15110.00	490.00	506.84	500.18	507.28	0.000157	4.35	3653.30	417.58	0.20
Reach 1	24289	500 yr	19960.00	490.00	508.28	501.17	508.87	0.000171	4.84	4223.05	445.20	0.21
Reach 1	24039.0*	2 yr	2000.00	489.77	497.36	494.43	497.59	0.000528	4.22	727.68	331.55	0.31
Reach 1	24039.0*	5 yr	3460.00	489.77	499.14	496.39	499.36	0.000400	4.42	1407.41	419.81	0.29
Reach 1	24039.0*	10 yr	5100.00	489.77	500.83	497.51	501.03	0.000325	4.57	2169.25	499.80	0.27
Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.49	503.31	0.000244	4.60	3409.72	713.26	0.24
Reach 1	24039.0*	50 yr	9940.00	489.77	505.00	499.20	505.17	0.000195	4.56	4564.02	849.32	0.22
Reach 1	24039.0*	100 yr	11880.00	489.77	505.85	499.64	506.03	0.000203	4.85	5132.22	934.80	0.23
Reach 1	24039.0*	200 yr	15110.00	489.77	506.95	500.45	507.16	0.000224	5.36	5893.57	1015.47	0.24
Reach 1	24039.0*	500 yr	19960.00	489.77	508.47	501.48	508.72	0.000243	5.94	6976.60	1159.26	0.26
Reach 1	23747	2 yr	2000.00	489.50	497.40	494.61	497.43	0.000093	1.69	1679.77	907.53	0.13
Reach 1	23747	5 yr	3460.00	489.50	499.21	495.24	499.22	0.000054	1.56	3842.18	1385.77	0.10
Reach 1	23747	10 yr	5100.00	489.50	500.90	495.83	500.91	0.000030	1.35	6412.67	1592.40	0.08
Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Reach 1	23747	50 yr	9940.00	489.50	505.07	497.06	505.08	0.000011	1.06	13588.10	1753.12	0.05
Reach 1	23747	100 yr	11880.00	489.50	505.92	497.44	505.93	0.000011	1.12	15087.32	1759.78	0.05
Reach 1	23747	200 yr	15110.00	489.50	507.04	497.86	507.05	0.000012	1.23	17060.43	1778.54	0.06
Reach 1	23747	500 yr	19960.00	489.50	508.58	498.29	508.59	0.000013	1.36	19813.38	1810.12	0.06
Reach 1	23720 Access Road Brid		Bridge									
Reach 1	23679	2 yr	2000.00	489.45	497.34		497.39	0.000173	2.27	1658.81	828.32	0.17
Reach 1	23679	5 yr	3460.00	489.45	499.17		499.21	0.000116	2.20	3922.87	1563.47	0.15
Reach 1	23679	10 yr	5100.00	489.45	500.88		500.90	0.000065	1.91	6728.15	1741.12	0.12
Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Reach 1	23679	50 yr	9940.00	489.45	505.06		505.08	0.000027	1.62	14201.95	1828.64	0.08

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	23679	100 yr	11880.00	489.45	505.92		505.93	0.000028	1.73	15772.24	1853.35	0.08
Reach 1	23679	200 yr	15110.00	489.45	507.03		507.05	0.000032	1.93	17893.41	1933.49	0.09
Reach 1	23679	500 yr	19960.00	489.45	508.56		508.59	0.000035	2.15	20901.09	1980.41	0.09
Reach 1	23379.0*	2 yr	2000.00	489.07	497.17	495.11	497.28	0.000455	3.28	1680.61	912.48	0.28
Reach 1	23379.0*	5 yr	3460.00	489.07	499.08	496.19	499.15	0.000216	2.90	3937.77	1383.30	0.21
Reach 1	23379.0*	10 yr	5100.00	489.07	500.82	496.85	500.87	0.000125	2.61	6517.65	1739.89	0.16
Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.52	503.19	0.000076	2.42	10816.11	2150.64	0.13
Reach 1	23379.0*	50 yr	9940.00	489.07	505.04	498.14	505.06	0.000051	2.21	14589.53	2216.88	0.11
Reach 1	23379.0*	100 yr	11880.00	489.07	505.89	498.64	505.92	0.000051	2.31	16321.03	2236.68	0.11
Reach 1	23379.0*	200 yr	15110.00	489.07	507.00	499.15	507.03	0.000054	2.52	18592.11	2262.62	0.12
Reach 1	23379.0*	500 yr	19960.00	489.07	508.54	499.76	508.57	0.000057	2.77	21737.85	2311.99	0.12
Reach 1	22916	2 yr	2000.00	485.17	497.13	490.38	497.18	0.000077	2.04	2198.59	892.83	0.13
Reach 1	22916	5 yr	3460.00	485.17	499.04	491.89	499.09	0.000067	2.20	4091.43	1136.41	0.12
Reach 1	22916	10 yr	5100.00	485.17	500.79	493.23	500.83	0.000053	2.17	6847.64	1666.12	0.11
Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Reach 1	22916	50 yr	9940.00	485.17	505.02	496.94	505.04	0.000029	1.96	14851.95	2442.48	0.09
Reach 1	22916	100 yr	11880.00	485.17	505.87	497.39	505.90	0.000030	2.07	16986.52	2560.95	0.09
Reach 1	22916	200 yr	15110.00	485.17	506.99	498.00	507.01	0.000032	2.26	19907.47	2663.37	0.09
Reach 1	22916	500 yr	19960.00	485.17	508.52	498.83	508.55	0.000034	2.45	24000.62	2715.70	0.10
Reach 1	22166	2 yr	2000.00	486.19	497.03	491.22	497.10	0.000141	2.39	2172.12	777.10	0.17
Reach 1	22166	5 yr	3460.00	486.19	498.94	493.02	499.02	0.000128	2.71	3850.44	959.26	0.17
Reach 1	22166	10 yr	5100.00	486.19	500.68	495.04	500.77	0.000118	2.94	5718.63	1122.88	0.16
Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Reach 1	22166	50 yr	9940.00	486.19	504.93	497.08	505.00	0.000082	3.10	11549.82	1779.99	0.14
Reach 1	22166	100 yr	11880.00	486.19	505.78	497.57	505.86	0.000086	3.30	13136.77	2044.17	0.15
Reach 1	22166	200 yr	15110.00	486.19	506.88	498.32	506.97	0.000095	3.64	15459.92	2186.12	0.16
Reach 1	22166	500 yr	19960.00	486.19	508.40	499.15	508.50	0.000101	3.98	18768.01	2233.70	0.17
Reach 1	21587	2 yr	2000.00	483.10	496.98	489.66	497.04	0.000071	2.10	1804.85	647.71	0.12
Reach 1	21587	5 yr	3460.00	483.10	498.85	491.22	498.95	0.000098	2.79	2915.42	1027.19	0.15
Reach 1	21587	10 yr	5100.00	483.10	500.57	492.34	500.70	0.000108	3.24	4252.51	1135.84	0.16
Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Reach 1	21587	50 yr	9940.00	483.10	504.78	495.63	504.94	0.000112	4.01	7665.54	1438.22	0.17
Reach 1	21587	100 yr	11880.00	483.10	505.59	496.51	505.78	0.000131	4.47	8363.36	1566.54	0.19
Reach 1	21587	200 yr	15110.00	483.10	506.62	497.50	506.88	0.000165	5.21	9284.81	1752.75	0.21
Reach 1	21587	500 yr	19960.00	483.10	508.04	498.41	508.39	0.000208	6.14	10652.58	1913.01	0.24
Reach 1	21543	2 yr	2000.00	483.10	496.95	489.65	497.04	0.000099	2.31	900.49	315.48	0.14
Reach 1	21543	5 yr	3460.00	483.10	498.78	491.23	498.94	0.000147	3.22	1352.88	703.50	0.18
Reach 1	21543	10 yr	5100.00	483.10	500.45	492.35	500.68	0.000181	3.95	1986.05	963.17	0.20
Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Reach 1	21543	50 yr	9940.00	483.10	504.56	495.06	504.91	0.000204	5.12	4291.89	1391.72	0.23
Reach 1	21543	100 yr	11880.00	483.10	505.32	496.10	505.75	0.000240	5.74	4856.37	1483.79	0.25
Reach 1	21543	200 yr	15110.00	483.10	506.27	497.56	506.84	0.000304	6.70	5615.93	1554.86	0.28
Reach 1	21543	500 yr	19960.00	483.10	507.60	499.75	508.34	0.000377	7.83	6722.17	1687.44	0.32
Reach 1	21426	2 yr	2000.00	483.10	496.96		497.02	0.000072	1.97	1901.95	461.54	0.12
Reach 1	21426	5 yr	3460.00	483.10	498.82		498.90	0.000094	2.58	3048.23	739.18	0.14
Reach 1	21426	10 yr	5100.00	483.10	500.52		500.63	0.000103	2.99	4385.58	814.70	0.15
Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Reach 1	21426	50 yr	9940.00	483.10	504.70		504.83	0.000102	3.65	8094.15	998.50	0.16
Reach 1	21426	100 yr	11880.00	483.10	505.49		505.65	0.000118	4.05	8910.36	1051.97	0.17
Reach 1	21426	200 yr	15110.00	483.10	506.50		506.70	0.000145	4.68	10018.58	1158.44	0.20
Reach 1	21426	500 yr	19960.00	483.10	507.91		508.16	0.000173	5.37	11709.00	1207.00	0.22
Reach 1	20749	2 yr	2000.00	487.90	496.80		496.93	0.000201	3.01	952.37	323.22	0.20
Reach 1	20749	5 yr	3460.00	487.90	498.64		498.80	0.000210	3.60	1881.24	661.34	0.22
Reach 1	20749	10 yr	5100.00	487.90	500.38		500.53	0.000173	3.70	3236.62	877.18	0.20
Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Reach 1	20749	50 yr	9940.00	487.90	504.66		504.76	0.000098	3.49	7521.94	1177.22	0.16
Reach 1	20749	100 yr	11880.00	487.90	505.46		505.56	0.000102	3.69	8486.32	1259.24	0.17
Reach 1	20749	200 yr	15110.00	487.90	506.47		506.59	0.000118	4.14	9826.45	1379.51	0.18
Reach 1	20749	500 yr	19960.00	487.90	507.90		508.03	0.000126	4.52	11926.97	1552.36	0.19
Reach 1	20087	2 yr	2000.00	487.66	496.70		496.80	0.000179	2.63	1453.32	387.60	0.19
Reach 1	20087	5 yr	3460.00	487.66	498.53		498.66	0.000195	3.27	2171.86	400.84	0.21
Reach 1	20087	10 yr	5100.00	487.66	500.24		500.41	0.000203	3.81	2871.62	429.27	0.22
Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Reach 1	20087	50 yr	9940.00	487.66	504.40		504.65	0.000201	4.81	5189.23	653.89	0.23
Reach 1	20087	100 yr	11880.00	487.66	505.14		505.45	0.000232	5.35	5677.88	668.35	0.25
Reach 1	20087	200 yr	15110.00	487.66	506.02		506.45	0.000299	6.33	6297.40	742.52	0.28
Reach 1	20087	500 yr	19960.00	487.66	507.30		507.86	0.000372	7.44	7363.29	937.63	0.32
Reach 1	18962	2 yr	2000.00	487.40	496.42		496.52	0.000343	3.13	1263.45	350.26	0.25
Reach 1	18962	5 yr	3460.00	487.40	498.26		498.39	0.000305	3.65	1930.78	380.53	0.25
Reach 1	18962	10 yr	5100.00	487.40	499.98		500.14	0.000288	4.13	2685.41	458.09	0.25
Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.80	572.27	0.24
Reach 1	18962	50 yr	9940.00	487.40	504.22		504.40	0.000210	4.63	5057.74	646.98	0.23
Reach 1	18962	100 yr	11880.00	487.40	504.94		505.15	0.000240	5.12	5527.59	659.89	0.25
Reach 1	18962	200 yr	15110.00	487.40	505.79		506.07	0.000301	5.98	6089.82	671.12	0.28
Reach 1	18962	500 yr	19960.00	487.40	507.00		507.39	0.000382	7.11	6942.99	799.81	0.32
Reach 1	18040	2 yr	2000.00	487.82	496.08		496.18	0.000390	2.84	1053.45	298.74	0.21

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	18040	5 yr	3460.00	487.82	497.96		498.08	0.000355	3.27	1667.63	355.61	0.21
Reach 1	18040	10 yr	5100.00	487.82	499.71		499.84	0.000319	3.55	2334.55	400.96	0.20
Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.02	572.95	0.20
Reach 1	18040	50 yr	9940.00	487.82	504.05		504.18	0.000226	3.85	4856.86	813.31	0.18
Reach 1	18040	100 yr	11880.00	487.82	504.72		504.90	0.000291	4.51	5440.50	928.64	0.21
Reach 1	18040	200 yr	15110.00	487.82	505.54		505.75	0.000334	5.01	6226.01	1001.76	0.23
Reach 1	18040	500 yr	19960.00	487.82	506.77		506.99	0.000356	5.44	7613.05	1206.43	0.24
Reach 1	17740.0*	2 yr	2000.00	487.64	496.03		496.11	0.000154	2.38	1333.76	328.04	0.17
Reach 1	17740.0*	5 yr	3460.00	487.64	497.89		498.01	0.000168	2.99	1993.09	371.38	0.19
Reach 1	17740.0*	10 yr	5100.00	487.64	499.62		499.77	0.000174	3.49	2656.41	406.82	0.20
Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.82	499.10	0.21
Reach 1	17740.0*	50 yr	9940.00	487.64	503.89		504.12	0.000163	4.34	4854.33	702.71	0.21
Reach 1	17740.0*	100 yr	11880.00	487.64	504.54		504.82	0.000193	4.87	5331.50	759.30	0.23
Reach 1	17740.0*	200 yr	15110.00	487.64	505.27		505.65	0.000255	5.78	5893.84	794.00	0.26
Reach 1	17740.0*	500 yr	19960.00	487.64	506.33		506.86	0.000335	6.93	6759.84	830.89	0.30
Reach 1	17348	2 yr	2000.00	487.40	495.55	491.96	495.88	0.002627	4.56	439.04	81.13	0.32
Reach 1	17348	5 yr	3460.00	487.40	497.05	493.48	497.68	0.003804	6.34	549.13	149.35	0.40
Reach 1	17348	10 yr	5100.00	487.40	498.34	494.81	499.33	0.004908	7.99	647.15	199.21	0.47
Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Reach 1	17348	50 yr	9940.00	487.40	503.40	497.89	503.89	0.001886	6.61	2569.36	453.24	0.31
Reach 1	17348	100 yr	11880.00	487.40	503.98	498.97	504.55	0.002170	7.29	2880.51	612.07	0.34
Reach 1	17348	200 yr	15110.00	487.40	504.56	501.12	505.30	0.002803	8.50	3246.87	669.31	0.39
Reach 1	17348	500 yr	19960.00	487.40	505.52	502.58	506.44	0.003379	9.73	3936.67	775.75	0.43
Reach 1	17322 Bush Road Bridge		Bridge									
Reach 1	17257	2 yr	2000.00	485.76	495.56	490.94	495.67	0.000239	2.83	1099.90	440.91	0.21
Reach 1	17257	5 yr	3460.00	485.76	497.10	493.27	497.26	0.000260	3.48	1766.18	465.21	0.23
Reach 1	17257	10 yr	5100.00	485.76	498.44	494.46	498.61	0.000269	3.78	2459.30	509.26	0.24
Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.19	544.20	0.25
Reach 1	17257	50 yr	9940.00	485.76	501.24	496.23	501.51	0.000297	4.88	3976.51	568.19	0.26
Reach 1	17257	100 yr	11880.00	485.76	502.12	496.78	502.42	0.000309	5.24	4482.00	588.29	0.27
Reach 1	17257	200 yr	15110.00	485.76	503.42	497.58	503.78	0.000324	5.77	5270.13	618.31	0.29
Reach 1	17257	500 yr	19960.00	485.76	505.12	498.49	505.56	0.000348	6.50	6398.50	710.56	0.30
Reach 1	16961.9*	2 yr	2000.00	486.47	495.34		495.54	0.000619	3.91	767.75	348.56	0.33
Reach 1	16961.9*	5 yr	3460.00	486.47	496.94		497.14	0.000484	4.20	1525.34	546.09	0.30
Reach 1	16961.9*	10 yr	5100.00	486.47	498.31		498.51	0.000407	4.43	2297.89	584.60	0.29
Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.34	636.34	0.28
Reach 1	16961.9*	50 yr	9940.00	486.47	501.16		501.40	0.000350	5.12	4086.28	659.76	0.28
Reach 1	16961.9*	100 yr	11880.00	486.47	502.05		502.29	0.000345	5.38	4674.09	673.78	0.29
Reach 1	16961.9*	200 yr	15110.00	486.47	503.36		503.64	0.000344	5.78	5581.67	706.06	0.29
Reach 1	16961.9*	500 yr	19960.00	486.47	505.07		505.40	0.000353	6.39	6839.89	771.60	0.30
Reach 1	16675	2 yr	2000.00	486.46	495.36		495.41	0.000162	1.90	1655.53	576.93	0.12
Reach 1	16675	5 yr	3460.00	486.46	496.97		497.02	0.000162	2.16	2601.14	598.39	0.13
Reach 1	16675	10 yr	5100.00	486.46	498.33		498.39	0.000167	2.41	3425.72	608.88	0.13
Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Reach 1	16675	50 yr	9940.00	486.46	501.19		501.28	0.000192	3.03	5215.91	654.98	0.15
Reach 1	16675	100 yr	11880.00	486.46	502.07		502.17	0.000204	3.25	5808.15	695.70	0.15
Reach 1	16675	200 yr	15110.00	486.46	503.39		503.51	0.000224	3.61	6792.44	809.35	0.16
Reach 1	16675	500 yr	19960.00	486.46	505.11		505.26	0.000246	4.06	8290.00	929.41	0.17
Reach 1	16198	2 yr	2000.00	485.50	495.25		495.33	0.000126	2.49	1217.38	477.00	0.16
Reach 1	16198	5 yr	3460.00	485.50	496.82		496.94	0.000146	3.07	2043.40	544.05	0.18
Reach 1	16198	10 yr	5100.00	485.50	498.17		498.31	0.000158	3.50	2793.25	572.16	0.19
Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Reach 1	16198	50 yr	9940.00	485.50	500.99		501.18	0.000184	4.44	4464.02	621.69	0.22
Reach 1	16198	100 yr	11880.00	485.50	501.86		502.07	0.000193	4.76	5012.10	640.49	0.23
Reach 1	16198	200 yr	15110.00	485.50	503.16		503.40	0.000207	5.22	5862.71	672.68	0.24
Reach 1	16198	500 yr	19960.00	485.50	504.84		505.13	0.000226	5.86	7077.63	841.25	0.25
Reach 1	15534	2 yr	2000.00	487.10	495.09		495.22	0.000208	3.04	1146.43	509.24	0.20
Reach 1	15534	5 yr	3460.00	487.10	496.62		496.81	0.000249	3.80	2044.90	661.89	0.23
Reach 1	15534	10 yr	5100.00	487.10	497.96		498.17	0.000261	4.29	3005.28	759.71	0.24
Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Reach 1	15534	50 yr	9940.00	487.10	500.78		501.02	0.000274	5.21	5208.56	821.31	0.26
Reach 1	15534	100 yr	11880.00	487.10	501.63		501.91	0.000285	5.55	5938.94	864.32	0.27
Reach 1	15534	200 yr	15110.00	487.10	502.91		503.23	0.000305	6.10	7071.11	919.96	0.28
Reach 1	15534	500 yr	19960.00	487.10	504.62		504.95	0.000306	6.58	8802.41	1088.92	0.29
Reach 1	15227	2 yr	2000.00	487.03	495.09	490.51	495.16	0.000130	2.37	1689.71	562.46	0.16
Reach 1	15227	5 yr	3460.00	487.03	496.62	491.54	496.72	0.000160	3.01	2593.67	633.44	0.19
Reach 1	15227	10 yr	5100.00	487.03	497.95	492.47	498.08	0.000177	3.51	3445.83	646.32	0.20
Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Reach 1	15227	50 yr	9940.00	487.03	500.73	494.91	500.94	0.000229	4.74	5307.08	707.36	0.24
Reach 1	15227	100 yr	11880.00	487.03	501.57	495.47	501.82	0.000249	5.17	5921.61	740.49	0.25
Reach 1	15227	200 yr	15110.00	487.03	502.84	496.17	503.13	0.000269	5.71	6867.00	774.42	0.27
Reach 1	15227	500 yr	19960.00	487.03	504.50	497.36	504.86	0.000300	6.49	8183.31	1049.95	0.29
Reach 1	14812	2 yr	2000.00	487.00	494.83	491.81	495.05	0.000493	3.81	695.49	247.32	0.31
Reach 1	14812	5 yr	3460.00	487.00	496.27	493.10	496.59	0.000570	4.76	1073.89	276.75	0.34
Reach 1	14812	10 yr	5100.00	487.00	497.52	494.47	497.92	0.000628	5.54	1463.38	387.11	0.36
Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	14812	50 yr	9940.00	487.00	500.32	496.55	500.76	0.000669	6.13	2841.31	558.19	0.45
Reach 1	14812	100 yr	11880.00	487.00	501.22	497.24	501.64	0.000660	6.05	3361.03	610.13	0.44
Reach 1	14812	200 yr	15110.00	487.00	502.60	499.12	502.96	0.000637	5.61	4287.70	786.00	0.44
Reach 1	14812	500 yr	19960.00	487.00	504.37	500.02	504.67	0.000603	5.21	5612.07	836.42	0.36
Reach 1	14396	2 yr	2000.00	486.80	494.72		494.84	0.000369	3.21	1560.21	615.85	0.26
Reach 1	14396	5 yr	3460.00	486.80	496.21		496.35	0.000358	3.78	2560.29	753.78	0.26
Reach 1	14396	10 yr	5100.00	486.80	497.49		497.66	0.000352	4.24	3684.02	929.41	0.27
Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Reach 1	14396	50 yr	9940.00	486.80	500.30		500.50	0.000321	4.99	6397.53	986.12	0.27
Reach 1	14396	100 yr	11880.00	486.80	501.18		501.39	0.000322	5.27	7265.77	996.15	0.28
Reach 1	14396	200 yr	15110.00	486.80	502.51		502.74	0.000323	5.68	8605.15	1025.51	0.28
Reach 1	14396	500 yr	19960.00	486.80	504.20		504.48	0.000342	6.36	10389.36	1072.94	0.30
Reach 1	13995	2 yr	2000.00	486.60	494.62	491.02	494.72	0.000237	2.86	1464.11	460.60	0.21
Reach 1	13995	5 yr	3460.00	486.60	496.07	492.40	496.22	0.000288	3.67	2186.32	526.51	0.24
Reach 1	13995	10 yr	5100.00	486.60	497.31	493.24	497.52	0.000328	4.36	2866.24	566.41	0.27
Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Reach 1	13995	50 yr	9940.00	486.60	499.99	495.00	500.34	0.000408	5.86	4460.02	619.54	0.31
Reach 1	13995	100 yr	11880.00	486.60	500.82	495.67	501.22	0.000438	6.37	4979.17	655.72	0.33
Reach 1	13995	200 yr	15110.00	486.60	502.08	496.47	502.56	0.000473	7.08	5792.38	694.52	0.34
Reach 1	13995	500 yr	19960.00	486.60	503.68	497.62	504.28	0.000526	8.06	6851.44	755.47	0.37
Reach 1	13603	2 yr	2000.00	486.50	494.48	490.92	494.61	0.000312	3.01	904.58	269.17	0.24
Reach 1	13603	5 yr	3460.00	486.50	495.86	492.27	496.08	0.000383	3.93	1286.55	281.95	0.28
Reach 1	13603	10 yr	5100.00	486.50	497.03	493.30	497.35	0.000460	4.83	1623.73	317.24	0.31
Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Reach 1	13603	50 yr	9940.00	486.50	499.47	495.20	500.11	0.000641	6.87	2559.34	434.21	0.38
Reach 1	13603	100 yr	11880.00	486.50	500.21	495.83	500.97	0.000696	7.52	2892.80	461.51	0.41
Reach 1	13603	200 yr	15110.00	486.50	501.35	496.76	502.28	0.000763	8.42	3432.95	505.26	0.43
Reach 1	13603	500 yr	19960.00	486.50	502.79	498.37	503.96	0.000854	9.61	4156.98	548.89	0.47
Reach 1	12986	2 yr	2000.00	486.15	494.10	490.88	494.35	0.000522	4.18	832.04	369.95	0.31
Reach 1	12986	5 yr	3460.00	486.15	495.38	492.40	495.76	0.000697	5.41	1375.27	467.41	0.36
Reach 1	12986	10 yr	5100.00	486.15	496.51	493.79	496.98	0.000766	6.27	1965.38	540.53	0.39
Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Reach 1	12986	50 yr	9940.00	486.15	498.99	496.25	499.65	0.000868	8.00	3346.10	589.15	0.44
Reach 1	12986	100 yr	11880.00	486.15	499.74	496.84	500.48	0.000912	8.59	3829.17	693.77	0.45
Reach 1	12986	200 yr	15110.00	486.15	500.89	497.67	501.74	0.000962	9.42	4701.67	824.20	0.47
Reach 1	12986	500 yr	19960.00	486.15	502.38	498.80	503.33	0.000990	10.31	5969.80	946.94	0.49
Reach 1	12640	2 yr	2000.00	485.30	493.98		494.15	0.000505	3.66	1118.09	492.38	0.30
Reach 1	12640	5 yr	3460.00	485.30	495.29		495.50	0.000534	4.30	1779.94	530.56	0.32
Reach 1	12640	10 yr	5100.00	485.30	496.45		496.70	0.000541	4.85	2523.31	785.78	0.33
Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.05	922.86	0.33
Reach 1	12640	50 yr	9940.00	485.30	499.02		499.32	0.000506	5.81	4829.76	986.07	0.34
Reach 1	12640	100 yr	11880.00	485.30	499.81		500.13	0.000503	6.12	5616.33	1007.08	0.34
Reach 1	12640	200 yr	15110.00	485.30	501.01		501.36	0.000493	6.53	6843.81	1034.57	0.34
Reach 1	12640	500 yr	19960.00	485.30	502.54		502.93	0.000499	7.15	8464.96	1083.13	0.35
Reach 1	12286	2 yr	2000.00	485.02	494.01		494.06	0.000082	1.99	2114.56	871.42	0.13
Reach 1	12286	5 yr	3460.00	485.02	495.31		495.38	0.000108	2.54	3282.89	942.72	0.15
Reach 1	12286	10 yr	5100.00	485.02	496.48		496.57	0.000126	2.97	4447.57	1116.25	0.17
Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.30	1211.12	0.18
Reach 1	12286	50 yr	9940.00	485.02	499.06		499.18	0.000149	3.78	7541.36	1236.24	0.19
Reach 1	12286	100 yr	11880.00	485.02	499.85		499.98	0.000158	4.05	8524.08	1251.88	0.20
Reach 1	12286	200 yr	15110.00	485.02	501.05		501.20	0.000168	4.43	10043.66	1276.26	0.21
Reach 1	12286	500 yr	19960.00	485.02	502.59		502.77	0.000183	4.94	12030.91	1309.37	0.22
Reach 1	11970	2 yr	2000.00	484.70	493.95		494.02	0.000192	2.46	1404.66	712.96	0.19
Reach 1	11970	5 yr	3460.00	484.70	495.28		495.34	0.000126	2.24	2543.91	923.39	0.16
Reach 1	11970	10 yr	5100.00	484.70	496.46		496.52	0.000097	2.21	3673.53	983.66	0.14
Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.93	1106.41	0.13
Reach 1	11970	50 yr	9940.00	484.70	499.06		499.13	0.000066	2.23	6442.67	1116.30	0.12
Reach 1	11970	100 yr	11880.00	484.70	499.86		499.93	0.000061	2.25	7332.01	1125.84	0.12
Reach 1	11970	200 yr	15110.00	484.70	501.06		501.15	0.000055	2.29	8702.20	1142.23	0.12
Reach 1	11970	500 yr	19960.00	484.70	502.61		502.72	0.000052	2.40	10481.98	1162.97	0.11
Reach 1	11265	2 yr	2000.00	484.26	493.59		493.82	0.000419	4.12	1327.01	793.31	0.29
Reach 1	11265	5 yr	3460.00	484.26	494.90		495.18	0.000481	5.00	2385.25	832.11	0.32
Reach 1	11265	10 yr	5100.00	484.26	496.06		496.38	0.000516	5.69	3385.75	897.09	0.34
Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.35	1017.98	0.36
Reach 1	11265	50 yr	9940.00	484.26	498.59		499.01	0.000574	7.09	5876.76	1028.74	0.37
Reach 1	11265	100 yr	11880.00	484.26	499.37		499.82	0.000591	7.52	6678.68	1039.46	0.38
Reach 1	11265	200 yr	15110.00	484.26	500.54		501.04	0.000616	8.16	7916.42	1066.81	0.39
Reach 1	11265	500 yr	19960.00	484.26	502.04		502.61	0.000653	9.01	9526.06	1088.04	0.41
Reach 1	10819	2 yr	2000.00	483.10	493.35		493.54	0.000587	4.21	1356.95	985.26	0.32
Reach 1	10819	5 yr	3460.00	483.10	494.73		494.86	0.000412	4.10	2777.64	1050.69	0.28
Reach 1	10819	10 yr	5100.00	483.10	495.93		496.05	0.000344	4.18	4098.38	1134.98	0.26
Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.58	1253.82	0.25
Reach 1	10819	50 yr	9940.00	483.10	498.53		498.64	0.000292	4.65	7299.22	1277.73	0.25
Reach 1	10819	100 yr	11880.00	483.10	499.32		499.44	0.000289	4.85	8311.47	1293.73	0.25
Reach 1	10819	200 yr	15110.00	483.10	500.50		500.64	0.000293	5.22	9876.67	1367.60	0.26
Reach 1	10819	500 yr	19960.00	483.10	502.03		502.17	0.000294	5.64	11984.10	1402.96	0.26

Existing Condition Model (Continued)

HEC-RAS Plan: Existing (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	10176	2 yr	2000.00	482.80	492.51	490.45	492.99	0.001401	5.77	623.22	387.44	0.49
Reach 1	10176	5 yr	3460.00	482.80	493.82	492.61	494.41	0.001401	6.79	1182.64	453.47	0.51
Reach 1	10176	10 yr	5100.00	482.80	494.94	493.52	495.64	0.001400	7.67	1754.65	574.70	0.52
Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.41	725.69	0.54
Reach 1	10176	50 yr	9940.00	482.80	497.35	495.45	498.26	0.001402	9.41	3417.05	802.12	0.55
Reach 1	10176	100 yr	11880.00	482.80	498.09	495.96	499.05	0.001400	9.91	4008.17	884.07	0.56
Reach 1	10176	200 yr	15110.00	482.80	499.20	497.11	500.24	0.001401	10.64	4968.38	1112.04	0.57
Reach 1	10176	500 yr	19960.00	482.80	500.63	498.18	501.77	0.001401	11.55	6309.05	1368.96	0.58

Alt-1a: Proposed Condition 100-year profile, with 10-stop log structures

HEC-RAS Plan: Alt_1a Profile: 100 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	100 yr	10660.00	497.00	515.40	507.18	515.97	0.001496	6.49	2093.74	737.88	0.29
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	100 yr	10660.00	497.00	514.42	507.84	515.31	0.002611	8.10	1664.22	526.86	0.37
Upper Rockway	Reach 2	34907	100 yr	10660.00	495.00	514.16	505.37	514.36	0.000642	4.43	3721.58	446.85	0.19
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	100 yr	10660.00	493.17	513.30	503.54	513.46	0.000612	4.22	5612.33	939.61	0.17
Upper Rockway	Reach 2	34260	100 yr	10660.00	497.00	513.19	506.12	513.21	0.000186	2.09	9723.32	1479.32	0.09
Upper Rockway	Reach 2	33542	100 yr	10660.00	496.60	513.14	506.11	513.15	0.000050	1.11	23544.12	3519.43	0.05
Upper Rockway	Reach 2	33071	100 yr	10660.00	496.30	512.54	506.01	513.05	0.000370	2.90	6188.92	1510.14	0.13
Upper Rockway	Reach 2	32459	100 yr	10660.00	495.00	512.42	504.39	512.65	0.000823	4.99	4230.25	512.42	0.22
Upper Rockway	Reach 2	31982	100 yr	10660.00	494.80	512.42	502.51	512.45	0.000140	2.02	8171.61	752.69	0.09
Upper Rockway	Reach 2	31731.8	100 yr	10660.00	495.00	512.29	502.86	512.39	0.000348	3.23	5273.21	564.83	0.14
Upper Rockway	Reach 2	31440	100 yr	10660.00	495.10	512.08	503.48	512.25	0.000553	3.94	3843.14	328.76	0.17
Upper Rockway	Reach 2	31156.0	100 yr	10660.00	494.91	511.90	503.40	512.08	0.000545	3.96	3420.56	403.63	0.17
Upper Rockway	Reach 2	31061.3	100 yr	10660.00	494.74	511.85	503.00	512.02	0.000532	3.95	4082.64	510.23	0.17
Upper Rockway	Reach 2	30872	100 yr	10660.00	494.50	511.59	503.49	511.87	0.000883	4.96	3337.30	388.45	0.22
Upper Rockway	Reach 2	30738	100 yr	10660.00	494.84	511.60	504.99	511.75	0.000410	3.28	3930.14	418.41	0.15
Upper Rockway	Reach 2	30485	100 yr	10660.00	495.32	511.21	504.66	511.57	0.001268	5.69	2903.15	305.26	0.26
Upper Rockway	Reach 2	29983	100 yr	10660.00	495.90	510.16	504.11	510.71	0.001973	6.65	2031.46	269.39	0.32
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	100 yr	10660.00	496.20	507.83	503.39	508.73	0.003628	7.76	1485.50	173.10	0.42
Upper Rockway	Reach 2	29674	100 yr	10660.00	494.88	507.69	502.14	508.12	0.001771	5.93	2419.16	325.26	0.30
Upper Rockway	Reach 2	29364	100 yr	10660.00	491.57	507.35	502.06	507.63	0.001206	5.25	3154.72	578.21	0.25
Upper Rockway	Reach 2	28772	100 yr	10660.00	490.47	507.30	500.67	507.34	0.000203	2.26	6913.60	843.07	0.10
Upper Rockway	Reach 2	28569.3	100 yr	10660.00	487.93	507.29	500.08	507.31	0.000080	1.44	7944.02	989.98	0.07
Upper Rockway	Reach 2	28358	100 yr	10660.00	485.56	507.28	498.63	507.30	0.000050	0.90	9869.10	1076.74	0.04
Upper Rockway	Reach 2	28164	100 yr	10660.00	483.10	507.27	495.37	507.29	0.000038	0.91	10823.54	1170.57	0.04
Upper Rockway	Reach 2	27860	100 yr	10660.00	489.77	507.26	499.16	507.27	0.000020	0.71	11560.48	1322.32	0.03
Upper Rockway	Reach 1	27584	100 yr	12260.00	490.50	507.26		507.27	0.000014	1.31	19580.71	2508.73	0.06
Upper Rockway	Reach 1	26406	100 yr	12260.00	491.10	507.14		507.23	0.000103	3.47	8412.96	1101.46	0.16
Upper Rockway	Reach 1	25969	100 yr	12260.00	491.10	507.12		507.18	0.000085	3.14	8825.17	1234.74	0.15
Upper Rockway	Reach 1	25258	100 yr	12260.00	491.70	506.93		507.10	0.000154	4.18	5257.57	597.73	0.20
Upper Rockway	Reach 1	25058.0*	100 yr	12260.00	491.85	506.89		507.07	0.000112	3.73	5139.07	605.81	0.17
Upper Rockway	Reach 1	24816	100 yr	12260.00	492.29	506.85	502.19	507.04	0.000176	3.81	3573.17	589.25	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	100 yr	12260.00	492.60	506.17	501.23	506.37	0.000029	4.41	4089.52	747.96	0.23
Upper Rockway	Reach 1	24579.6*	100 yr	12260.00	491.36	506.21	498.90	506.34	0.000059	2.51	5272.47	671.47	0.12
Upper Rockway	Reach 1	24289	100 yr	12260.00	490.00	505.96	499.56	506.30	0.000141	3.96	3321.46	397.82	0.19
Upper Rockway	Reach 1	24039.0*	100 yr	12260.00	489.77	506.03	499.74	506.21	0.000203	4.89	5255.05	949.92	0.23
Upper Rockway	Reach 1	23747	100 yr	12260.00	489.50	506.10	497.49	506.12	0.000011	1.12	15405.35	1761.52	0.05
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	100 yr	12260.00	489.45	506.10		506.11	0.000028	1.74	16107.60	1860.57	0.08
Upper Rockway	Reach 1	23379.0*	100 yr	12260.00	489.07	506.07	498.70	506.10	0.000050	2.32	16689.02	2240.73	0.11
Upper Rockway	Reach 1	22916	100 yr	12260.00	485.17	506.05	497.49	506.08	0.000030	2.09	17453.31	2592.44	0.09
Upper Rockway	Reach 1	22166	100 yr	12260.00	486.19	505.96	497.66	506.04	0.000086	3.33	13507.97	2092.76	0.15
Upper Rockway	Reach 1	21587	100 yr	12260.00	483.10	505.76	496.65	505.96	0.000134	4.55	8515.11	1606.25	0.19
Upper Rockway	Reach 1	21543	100 yr	12260.00	483.10	505.49	496.27	505.93	0.000244	5.83	4989.43	1498.71	0.25
Upper Rockway	Reach 1	21426	100 yr	12260.00	483.10	505.67		505.83	0.000119	4.10	9093.98	1063.02	0.18
Upper Rockway	Reach 1	20749	100 yr	12260.00	487.90	505.63		505.74	0.000106	3.79	8704.47	1300.02	0.17
Upper Rockway	Reach 1	20087	100 yr	12260.00	487.66	505.30		505.62	0.000236	5.44	5787.31	671.99	0.25
Upper Rockway	Reach 1	18962	100 yr	12260.00	487.40	505.10		505.32	0.000243	5.20	5634.48	662.05	0.25
Upper Rockway	Reach 1	18040	100 yr	12260.00	487.82	504.88		505.06	0.000289	4.53	5594.43	939.53	0.21
Upper Rockway	Reach 1	17740.0*	100 yr	12260.00	487.64	504.70		504.98	0.000197	4.95	5450.29	767.63	0.23
Upper Rockway	Reach 1	17348	100 yr	12260.00	487.40	504.14	499.17	504.71	0.002174	7.35	2978.84	627.55	0.34
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	100 yr	12260.00	485.76	502.28	496.86	502.59	0.000311	5.31	4578.65	591.90	0.27
Upper Rockway	Reach 1	16961.9*	100 yr	12260.00	486.47	502.21		502.46	0.000345	5.42	4785.59	676.83	0.29
Upper Rockway	Reach 1	16675	100 yr	12260.00	486.46	502.24		502.34	0.000206	3.29	5924.46	708.96	0.15
Upper Rockway	Reach 1	16198	100 yr	12260.00	485.50	502.02		502.23	0.000195	4.82	5116.68	643.89	0.23
Upper Rockway	Reach 1	15534	100 yr	12260.00	487.10	501.80		502.07	0.000286	5.61	6080.15	868.07	0.27
Upper Rockway	Reach 1	15227	100 yr	12260.00	487.03	501.73	495.56	501.98	0.000251	5.23	6041.10	748.60	0.25
Upper Rockway	Reach 1	14812	100 yr	12260.00	487.00	501.39	497.38	501.81	0.000659	6.01	3466.01	643.78	0.46
Upper Rockway	Reach 1	14396	100 yr	12260.00	486.80	501.35		501.56	0.000322	5.32	7432.24	997.88	0.28
Upper Rockway	Reach 1	13995	100 yr	12260.00	486.60	500.98	495.79	501.39	0.000443	6.46	5080.20	663.31	0.33
Upper Rockway	Reach 1	13603	100 yr	12260.00	486.50	500.36	495.94	501.13	0.000706	7.64	2957.79	471.15	0.41
Upper Rockway	Reach 1	12986	100 yr	12260.00	486.15	499.87	496.95	500.64	0.000926	8.73	3924.29	714.81	0.46
Upper Rockway	Reach 1	12640	100 yr	12260.00	485.30	499.96		500.28	0.000502	6.17	5764.95	1011.15	0.34
Upper Rockway	Reach 1	12286	100 yr	12260.00	485.02	499.99		500.13	0.000159	4.10	8708.91	1254.40	0.20
Upper Rockway	Reach 1	11970	100 yr	12260.00	484.70	500.00		500.08	0.000060	2.25	7498.90	1127.91	0.12
Upper Rockway	Reach 1	11265	100 yr	12260.00	484.26	499.51		499.97	0.000595	7.60	6828.69	1042.45	0.38
Upper Rockway	Reach 1	10819	100 yr	12260.00	483.10	499.46		499.58	0.000289	4.89	8501.11	1297.72	0.25
Upper Rockway	Reach 1	10176	100 yr	12260.00	482.80	498.23	495.96	499.20	0.001400	10.00	4121.07	899.04	0.56
Den Brook	Den Brook	2803	100 yr	1600.00	491.40	507.92	498.26	507.93	0.000009	0.81	2112.74	314.48	0.04
Den Brook	Den Brook	2644	100 yr	1600.00	491.50	507.91	498.36	507.93	0.000022	1.32	1441.20	218.31	0.06
Den Brook	Den Brook	2355	100 yr	1600.00	496.36	507.85	502.75	507.90	0.000113	2.28	916.14	206.34	0.13
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	100 yr	1600.00	495.27	507.75	502.70	507.79	0.000081	2.02	983.41	180.97	0.11
Den Brook	Den Brook	2040.19	100 yr	1600.00	494.89	507.68	499.94	507.76	0.000105	2.47	780.96	99.75	0.13
Den Brook	Den Brook	1800	100 yr	1600.00	494.30	507.70	499.66	507.72	0.000045	1.73	2050.78	293.67	0.09
Den Brook	Den Brook	1649.88	100 yr	1600.00	493.85	507.67	500.21	507.71	0.000069	1.92	1627.43	330.46	0.10
Den Brook	Den Brook	1427	100 yr	1600.00	493.24	507.69	498.20	507.69	0.000013	1.03	3513.23	432.20	0.05
Den Brook	Den Brook	1095	100 yr	1600.00	493.20	507.68	497.35	507.69	0.000011	0.91	4508.76	548.32	0.04
Den Brook	Den Brook	895.13	100 yr	1600.00	493.25	507.68	497.38	507.69	0.000010	0.83	5048.94	611.08	0.04
Den Brook	Den Brook	781	100 yr	1600.00	493.20	507.68	496.53	507.68	0.000006	0.63	5710.63	665.46	0.03
Den Brook	Den Brook	714	100 yr	1600.00	493.23	507.68	496.23	507.68	0.000002	0.40	11792.58	1347.29	0.02
Den Brook	Den Brook	313	100 yr	1600.00	494.80	507.64	499.42	507.67	0.000068	1.62	1241.06	442.45	0.08
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	100 yr	1600.00	495.50	507.26	500.03	507.28	0.000057	1.50	1377.33	319.44	0.08
Den Brook	Den Brook	177	100 yr	1600.00	495.10	507.26	499.59	507.28	0.000035	1.32	1460.15	245.29	0.07

Alt-1b: Proposed Condition 100-year profile, with 6-stop log structures

HEC-RAS Plan: Alt_1b Profile: 100 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	100 yr	10660.00	497.00	515.29	507.18	515.87	0.001532	6.54	2077.40	736.34	0.29
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	100 yr	10660.00	497.00	514.29	507.84	515.20	0.002695	8.18	1646.32	525.65	0.38
Upper Rockway	Reach 2	34907	100 yr	10660.00	495.00	514.02	505.37	514.23	0.000671	4.50	3657.23	442.37	0.20
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	100 yr	10660.00	493.17	513.06	503.54	513.23	0.000668	4.37	5383.37	914.73	0.18
Upper Rockway	Reach 2	34260	100 yr	10660.00	497.00	512.93	506.12	512.96	0.000204	2.16	9415.93	1429.71	0.10
Upper Rockway	Reach 2	33542	100 yr	10660.00	496.60	512.88	506.11	512.88	0.000056	1.17	22614.62	3498.35	0.05
Upper Rockway	Reach 2	33071	100 yr	10660.00	496.30	512.22	506.01	512.77	0.000407	3.00	5935.79	1410.42	0.13
Upper Rockway	Reach 2	32459	100 yr	10660.00	495.00	512.09	504.39	512.33	0.000912	5.18	4059.93	508.08	0.23
Upper Rockway	Reach 2	31982	100 yr	10660.00	494.80	512.09	502.51	512.12	0.000154	2.08	7897.46	750.48	0.09
Upper Rockway	Reach 2	31731.8	100 yr	10660.00	495.00	511.95	502.85	512.05	0.000390	3.37	5056.48	563.98	0.15
Upper Rockway	Reach 2	31440	100 yr	10660.00	495.10	511.72	503.48	511.89	0.000607	4.07	3723.31	327.52	0.18
Upper Rockway	Reach 2	31156.0	100 yr	10660.00	494.91	511.50	503.40	511.70	0.000623	4.17	3261.67	402.59	0.19
Upper Rockway	Reach 2	31061.3	100 yr	10660.00	494.74	511.45	503.00	511.63	0.000612	4.16	3877.06	510.23	0.19
Upper Rockway	Reach 2	30872	100 yr	10660.00	494.50	511.15	503.49	511.47	0.001004	5.19	3169.93	383.48	0.23
Upper Rockway	Reach 2	30738	100 yr	10660.00	494.84	511.16	505.01	511.33	0.000473	3.46	3749.11	415.72	0.16
Upper Rockway	Reach 2	30485	100 yr	10660.00	495.32	510.74	504.67	511.12	0.001429	5.91	2757.93	301.42	0.28
Upper Rockway	Reach 2	29983	100 yr	10660.00	495.90	509.39	504.07	510.08	0.002592	7.33	1816.27	254.31	0.36
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	100 yr	10660.00	496.20	507.74	503.39	508.66	0.003734	7.83	1470.59	172.31	0.43
Upper Rockway	Reach 2	29674	100 yr	10660.00	494.88	507.60	502.13	508.04	0.001835	6.00	2387.88	324.35	0.31
Upper Rockway	Reach 2	29364	100 yr	10660.00	491.57	507.23	502.06	507.52	0.001289	5.40	3083.12	571.34	0.26
Upper Rockway	Reach 2	28772	100 yr	10660.00	490.47	507.18	500.67	507.22	0.000212	2.30	6808.42	839.14	0.11
Upper Rockway	Reach 2	28569.3	100 yr	10660.00	487.93	507.16	500.08	507.19	0.000084	1.47	7819.70	984.64	0.07
Upper Rockway	Reach 2	28358	100 yr	10660.00	485.56	507.15	498.63	507.17	0.000052	0.91	9733.71	1063.56	0.04
Upper Rockway	Reach 2	28164	100 yr	10660.00	483.10	507.15	495.37	507.16	0.000039	0.92	10675.54	1170.57	0.04
Upper Rockway	Reach 2	27860	100 yr	10660.00	489.77	507.13	499.05	507.15	0.000021	0.73	11392.49	1320.98	0.03
Upper Rockway	Reach 1	27584	100 yr	11880.00	490.50	507.13		507.14	0.000013	1.29	19263.00	2505.97	0.06
Upper Rockway	Reach 1	26406	100 yr	11880.00	491.10	507.02		507.10	0.000101	3.42	8278.17	1069.47	0.16
Upper Rockway	Reach 1	25969	100 yr	11880.00	491.10	506.99		507.06	0.000084	3.11	8671.60	1233.18	0.15
Upper Rockway	Reach 1	25258	100 yr	11880.00	491.70	506.81		506.97	0.000151	4.12	5186.57	595.73	0.20
Upper Rockway	Reach 1	25058.0*	100 yr	11880.00	491.85	506.77		506.95	0.000108	3.65	5068.97	603.48	0.17
Upper Rockway	Reach 1	24816	100 yr	11880.00	492.29	506.73	502.01	506.92	0.000176	3.77	3503.12	585.76	0.20
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	100 yr	11880.00	492.60	505.99	501.20	506.18	0.000029	4.41	3953.93	730.75	0.23
Upper Rockway	Reach 1	24579.6*	100 yr	11880.00	491.36	506.02	498.85	506.16	0.000059	2.49	5156.43	661.79	0.12
Upper Rockway	Reach 1	24289	100 yr	11880.00	490.00	505.79	499.48	506.11	0.000141	3.93	3257.22	395.63	0.19
Upper Rockway	Reach 1	24039.0*	100 yr	11880.00	489.77	505.85	499.64	506.03	0.000203	4.85	5132.22	934.80	0.23
Upper Rockway	Reach 1	23747	100 yr	11880.00	489.50	505.92	497.42	505.93	0.000011	1.12	15087.32	1759.78	0.05
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	100 yr	11880.00	489.45	505.92		505.93	0.000028	1.73	15772.24	1853.35	0.08
Upper Rockway	Reach 1	23379.0*	100 yr	11880.00	489.07	505.89	498.64	505.92	0.000051	2.31	16321.03	2236.68	0.11
Upper Rockway	Reach 1	22916	100 yr	11880.00	485.17	505.87	497.39	505.90	0.000030	2.07	16986.52	2560.95	0.09
Upper Rockway	Reach 1	22166	100 yr	11880.00	486.19	505.78	497.57	505.86	0.000086	3.30	13136.77	2044.17	0.15
Upper Rockway	Reach 1	21587	100 yr	11880.00	483.10	505.59	496.51	505.78	0.000131	4.47	8363.36	1566.54	0.19
Upper Rockway	Reach 1	21543	100 yr	11880.00	483.10	505.32	496.10	505.75	0.000240	5.74	4856.37	1483.79	0.25
Upper Rockway	Reach 1	21426	100 yr	11880.00	483.10	505.49		505.65	0.000118	4.05	8910.36	1051.97	0.17
Upper Rockway	Reach 1	20749	100 yr	11880.00	487.90	505.46		505.56	0.000102	3.69	8486.32	1259.24	0.17
Upper Rockway	Reach 1	20087	100 yr	11880.00	487.66	505.14		505.45	0.000232	5.35	5677.88	668.35	0.25
Upper Rockway	Reach 1	18962	100 yr	11880.00	487.40	504.94		505.15	0.000240	5.12	5527.59	659.89	0.25
Upper Rockway	Reach 1	18040	100 yr	11880.00	487.82	504.72		504.90	0.000291	4.51	5440.50	928.64	0.21
Upper Rockway	Reach 1	17740.0*	100 yr	11880.00	487.64	504.54		504.82	0.000193	4.87	5331.50	759.30	0.23
Upper Rockway	Reach 1	17348	100 yr	11880.00	487.40	503.98	498.97	504.55	0.002170	7.29	2880.51	612.07	0.34
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	100 yr	11880.00	485.76	502.12	496.78	502.42	0.000309	5.24	4482.00	588.29	0.27
Upper Rockway	Reach 1	16961.9*	100 yr	11880.00	486.47	502.05		502.29	0.000345	5.38	4674.09	673.78	0.29
Upper Rockway	Reach 1	16675	100 yr	11880.00	486.46	502.07		502.17	0.000204	3.25	5808.15	695.70	0.15
Upper Rockway	Reach 1	16198	100 yr	11880.00	485.50	501.86		502.07	0.000193	4.76	5012.10	640.49	0.23
Upper Rockway	Reach 1	15534	100 yr	11880.00	487.10	501.63		501.91	0.000285	5.55	5938.94	864.32	0.27
Upper Rockway	Reach 1	15227	100 yr	11880.00	487.03	501.57	495.47	501.82	0.000249	5.17	5921.61	740.49	0.25
Upper Rockway	Reach 1	14812	100 yr	11880.00	487.00	501.22	497.24	501.64	0.000660	6.05	3361.03	610.13	0.44
Upper Rockway	Reach 1	14396	100 yr	11880.00	486.80	501.18		501.39	0.000322	5.27	7265.77	996.15	0.28
Upper Rockway	Reach 1	13995	100 yr	11880.00	486.60	500.82	495.67	501.22	0.000438	6.37	4979.17	655.72	0.33
Upper Rockway	Reach 1	13603	100 yr	11880.00	486.50	500.21	495.83	500.97	0.000696	7.52	2892.80	461.51	0.41
Upper Rockway	Reach 1	12986	100 yr	11880.00	486.15	499.74	496.84	500.48	0.000912	8.59	3829.17	693.77	0.45
Upper Rockway	Reach 1	12640	100 yr	11880.00	485.30	499.81		500.13	0.000503	6.12	5616.33	1007.08	0.34
Upper Rockway	Reach 1	12286	100 yr	11880.00	485.02	499.85		499.98	0.000158	4.05	8524.08	1251.88	0.20
Upper Rockway	Reach 1	11970	100 yr	11880.00	484.70	499.86		499.93	0.000061	2.25	7332.01	1125.84	0.12
Upper Rockway	Reach 1	11265	100 yr	11880.00	484.26	499.37		499.82	0.000591	7.52	6678.68	1039.46	0.38
Upper Rockway	Reach 1	10819	100 yr	11880.00	483.10	499.32		499.44	0.000289	4.85	8311.47	1293.73	0.25
Upper Rockway	Reach 1	10176	100 yr	11880.00	482.80	498.09	495.96	499.05	0.001400	9.91	4008.17	884.07	0.56
Den Brook	Den Brook	2803	100 yr	1220.00	491.40	507.56	497.63	507.57	0.000006	0.64	2034.11	299.68	0.03
Den Brook	Den Brook	2644	100 yr	1220.00	491.50	507.55	497.78	507.56	0.000014	1.05	1386.63	209.31	0.05
Den Brook	Den Brook	2355	100 yr	1220.00	496.36	507.51	502.70	507.55	0.000081	1.89	847.30	200.78	0.11
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	100 yr	1220.00	495.27	507.44	501.55	507.47	0.000056	1.65	928.10	179.22	0.09
Den Brook	Den Brook	2040.19	100 yr	1220.00	494.89	507.40	499.36	507.45	0.000067	1.94	753.37	98.20	0.10
Den Brook	Den Brook	1800	100 yr	1220.00	494.30	507.41	499.29	507.42	0.000029	1.37	1967.37	286.42	0.07
Den Brook	Den Brook	1649.88	100 yr	1220.00	493.85	507.39	499.48	507.42	0.000046	1.54	1535.61	329.38	0.08
Den Brook	Den Brook	1427	100 yr	1220.00	493.24	507.40	497.75	507.41	0.000009	0.82	3390.62	431.68	0.04
Den Brook	Den Brook	1095	100 yr	1220.00	493.20	507.40	497.04	507.40	0.000007	0.72	4353.78	547.91	0.03
Den Brook	Den Brook	895.13	100 yr	1220.00	493.25	507.40	497.04	507.40	0.000006	0.66	4876.38	610.29	0.03
Den Brook	Den Brook	781	100 yr	1220.00	493.20	507.40	496.29	507.40	0.000004	0.50	5522.69	664.95	0.02
Den Brook	Den Brook	714	100 yr	1220.00	493.23	507.40	495.93	507.40	0.000002	0.32	11411.95	1344.97	0.02
Den Brook	Den Brook	313	100 yr	1220.00	494.80	507.38	498.75	507.39	0.000035	1.15	1507.91	442.45	0.06
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	100 yr	1220.00	495.50	507.14	499.34	507.15	0.000036	1.19	1338.47	319.44	0.06
Den Brook	Den Brook	177	100 yr	1220.00	495.10	507.14	498.98	507.15	0.000022	1.03	1430.32	245.29	0.05

Alt-1c: Proposed Condition 50-year profile, with 10-stop log structures

HEC-RAS Plan: Alt_1c Profile: 100 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	100 yr	10660.00	497.00	515.29	507.18	515.87	0.001532	6.54	2077.32	736.34	0.29
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	100 yr	10660.00	497.00	514.29	507.84	515.20	0.002695	8.18	1646.23	525.65	0.38
Upper Rockway	Reach 2	34907	100 yr	10660.00	495.00	514.02	505.37	514.23	0.000671	4.50	3656.91	442.35	0.20
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	100 yr	10660.00	493.17	513.05	503.54	513.23	0.000668	4.37	5380.41	914.42	0.18
Upper Rockway	Reach 2	34260	100 yr	10660.00	497.00	512.92	506.12	512.95	0.000204	2.16	9411.80	1429.06	0.10
Upper Rockway	Reach 2	33542	100 yr	10660.00	496.60	512.87	506.11	512.88	0.000056	1.17	22602.45	3494.32	0.05
Upper Rockway	Reach 2	33071	100 yr	10660.00	496.30	512.22	503.81	512.77	0.000407	3.00	5932.58	1409.84	0.13
Upper Rockway	Reach 2	32459	100 yr	10660.00	495.00	512.08	504.39	512.33	0.000913	5.19	4057.72	508.02	0.23
Upper Rockway	Reach 2	31982	100 yr	10660.00	494.80	512.08	502.51	512.12	0.000154	2.08	7894.22	750.45	0.09
Upper Rockway	Reach 2	31731.8	100 yr	10660.00	495.00	511.94	502.85	512.05	0.000391	3.37	5053.97	563.97	0.15
Upper Rockway	Reach 2	31440	100 yr	10660.00	495.10	511.71	503.48	511.89	0.000608	4.07	3721.78	327.51	0.18
Upper Rockway	Reach 2	31156.0	100 yr	10660.00	494.91	511.50	503.39	511.70	0.000624	4.17	3259.62	402.58	0.19
Upper Rockway	Reach 2	31061.3	100 yr	10660.00	494.74	511.45	503.01	511.63	0.000613	4.17	3874.39	510.23	0.19
Upper Rockway	Reach 2	30872	100 yr	10660.00	494.50	511.15	503.49	511.46	0.001006	5.19	3167.76	383.42	0.23
Upper Rockway	Reach 2	30738	100 yr	10660.00	494.84	511.16	505.01	511.33	0.000474	3.46	3746.76	415.68	0.16
Upper Rockway	Reach 2	30485	100 yr	10660.00	495.32	510.73	504.67	511.11	0.001431	5.91	2756.00	301.37	0.28
Upper Rockway	Reach 2	29983	100 yr	10660.00	495.90	509.38	504.06	510.08	0.002602	7.34	1813.52	254.03	0.37
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	100 yr	10660.00	496.20	507.74	503.39	508.66	0.003734	7.83	1470.58	172.30	0.43
Upper Rockway	Reach 2	29674	100 yr	10660.00	494.88	507.60	502.16	508.04	0.001835	6.00	2387.87	324.35	0.31
Upper Rockway	Reach 2	29364	100 yr	10660.00	491.57	507.23	502.06	507.52	0.001289	5.40	3083.12	571.34	0.26
Upper Rockway	Reach 2	28772	100 yr	10660.00	490.47	507.18	500.67	507.22	0.000212	2.30	6808.42	839.14	0.11
Upper Rockway	Reach 2	28569.3	100 yr	10660.00	487.93	507.16	500.08	507.19	0.000084	1.47	7819.70	984.64	0.07
Upper Rockway	Reach 2	28358	100 yr	10660.00	485.56	507.15	498.63	507.17	0.000052	0.91	9733.71	1063.56	0.04
Upper Rockway	Reach 2	28164	100 yr	10660.00	483.10	507.15	495.37	507.16	0.000039	0.92	10675.54	1170.57	0.04
Upper Rockway	Reach 2	27860	100 yr	10660.00	489.77	507.13	499.04	507.15	0.000021	0.73	11392.49	1320.98	0.03
Upper Rockway	Reach 1	27584	100 yr	11880.00	490.50	507.13		507.14	0.000013	1.29	19263.00	2505.97	0.06
Upper Rockway	Reach 1	26406	100 yr	11880.00	491.10	507.02		507.10	0.000101	3.42	8278.17	1069.47	0.16
Upper Rockway	Reach 1	25969	100 yr	11880.00	491.10	506.99		507.06	0.000084	3.11	8671.60	1233.18	0.15
Upper Rockway	Reach 1	25258	100 yr	11880.00	491.70	506.81		506.97	0.000151	4.12	5186.57	595.73	0.20
Upper Rockway	Reach 1	25058.0*	100 yr	11880.00	491.85	506.77		506.95	0.000108	3.65	5068.97	603.48	0.17
Upper Rockway	Reach 1	24816	100 yr	11880.00	492.29	506.73	502.01	506.92	0.000176	3.77	3503.12	585.76	0.20
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	100 yr	11880.00	492.60	505.99	501.20	506.18	0.000029	4.41	3953.93	730.75	0.23
Upper Rockway	Reach 1	24579.6*	100 yr	11880.00	491.36	506.02	498.85	506.16	0.000059	2.49	5156.43	661.79	0.12
Upper Rockway	Reach 1	24289	100 yr	11880.00	490.00	505.79	499.48	506.11	0.000141	3.93	3257.22	395.63	0.19
Upper Rockway	Reach 1	24039.0*	100 yr	11880.00	489.77	505.85	499.64	506.03	0.000203	4.85	5132.22	934.80	0.23
Upper Rockway	Reach 1	23747	100 yr	11880.00	489.50	505.92	497.42	505.93	0.000011	1.12	15087.32	1759.78	0.05
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	100 yr	11880.00	489.45	505.92		505.93	0.000028	1.73	15772.24	1853.35	0.08
Upper Rockway	Reach 1	23379.0*	100 yr	11880.00	489.07	505.89	498.64	505.92	0.000051	2.31	16321.03	2236.68	0.11
Upper Rockway	Reach 1	22916	100 yr	11880.00	485.17	505.87	497.39	505.90	0.000030	2.07	16986.52	2560.95	0.09
Upper Rockway	Reach 1	22166	100 yr	11880.00	486.19	505.78	497.57	505.86	0.000086	3.30	13136.77	2044.17	0.15
Upper Rockway	Reach 1	21587	100 yr	11880.00	483.10	505.59	496.51	505.78	0.000131	4.47	8363.36	1566.54	0.19
Upper Rockway	Reach 1	21543	100 yr	11880.00	483.10	505.32	496.10	505.75	0.000240	5.74	4856.37	1483.79	0.25
Upper Rockway	Reach 1	21426	100 yr	11880.00	483.10	505.49		505.65	0.000118	4.05	8910.36	1051.97	0.17
Upper Rockway	Reach 1	20749	100 yr	11880.00	487.90	505.46		505.56	0.000102	3.69	8486.32	1259.24	0.17
Upper Rockway	Reach 1	20087	100 yr	11880.00	487.66	505.14		505.45	0.000232	5.35	5677.88	668.35	0.25
Upper Rockway	Reach 1	18962	100 yr	11880.00	487.40	504.94		505.15	0.000240	5.12	5527.59	659.89	0.25
Upper Rockway	Reach 1	18040	100 yr	11880.00	487.82	504.72		504.90	0.000291	4.51	5440.50	928.64	0.21
Upper Rockway	Reach 1	17740.0*	100 yr	11880.00	487.64	504.54		504.82	0.000193	4.87	5331.50	759.30	0.23
Upper Rockway	Reach 1	17348	100 yr	11880.00	487.40	503.98	498.97	504.55	0.002170	7.29	2880.51	612.07	0.34
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	100 yr	11880.00	485.76	502.12	496.78	502.42	0.000309	5.24	4482.00	588.29	0.27
Upper Rockway	Reach 1	16961.9*	100 yr	11880.00	486.47	502.05		502.29	0.000345	5.38	4674.09	673.78	0.29
Upper Rockway	Reach 1	16675	100 yr	11880.00	486.46	502.07		502.17	0.000204	3.25	5808.15	695.70	0.15
Upper Rockway	Reach 1	16198	100 yr	11880.00	485.50	501.86		502.07	0.000193	4.76	5012.10	640.49	0.23
Upper Rockway	Reach 1	15534	100 yr	11880.00	487.10	501.63		501.91	0.000285	5.55	5938.94	864.32	0.27
Upper Rockway	Reach 1	15227	100 yr	11880.00	487.03	501.57	495.47	501.82	0.000249	5.17	5921.61	740.49	0.25
Upper Rockway	Reach 1	14812	100 yr	11880.00	487.00	501.22	497.24	501.64	0.000660	6.05	3361.03	610.13	0.44
Upper Rockway	Reach 1	14396	100 yr	11880.00	486.80	501.18		501.39	0.000322	5.27	7265.77	996.15	0.28
Upper Rockway	Reach 1	13995	100 yr	11880.00	486.60	500.82	495.67	501.22	0.000438	6.37	4979.17	655.72	0.33
Upper Rockway	Reach 1	13603	100 yr	11880.00	486.50	500.21	495.83	500.97	0.000696	7.52	2892.80	461.51	0.41
Upper Rockway	Reach 1	12986	100 yr	11880.00	486.15	499.74	496.84	500.48	0.000912	8.59	3829.17	693.77	0.45
Upper Rockway	Reach 1	12640	100 yr	11880.00	485.30	499.81		500.13	0.000503	6.12	5616.33	1007.08	0.34
Upper Rockway	Reach 1	12286	100 yr	11880.00	485.02	499.85		499.98	0.000158	4.05	8524.08	1251.88	0.20
Upper Rockway	Reach 1	11970	100 yr	11880.00	484.70	499.86		499.93	0.000061	2.25	7332.01	1125.84	0.12
Upper Rockway	Reach 1	11265	100 yr	11880.00	484.26	499.37		499.82	0.000591	7.52	6678.68	1039.46	0.38
Upper Rockway	Reach 1	10819	100 yr	11880.00	483.10	499.32		499.44	0.000289	4.85	8311.47	1293.73	0.25
Upper Rockway	Reach 1	10176	100 yr	11880.00	482.80	498.09	495.96	499.05	0.001400	9.91	4008.17	884.07	0.56
Den Brook	Den Brook	2803	100 yr	1220.00	491.40	507.56	497.63	507.57	0.000006	0.64	2034.37	299.73	0.03
Den Brook	Den Brook	2644	100 yr	1220.00	491.50	507.55	497.78	507.57	0.000014	1.05	1386.81	209.34	0.05
Den Brook	Den Brook	2355	100 yr	1220.00	496.36	507.51	502.70	507.55	0.000081	1.89	843.59	199.20	0.11
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	100 yr	1220.00	495.27	507.44	501.55	507.47	0.000056	1.66	912.06	170.16	0.09
Den Brook	Den Brook	2040.19	100 yr	1220.00	494.89	507.40	499.36	507.45	0.000067	1.94	753.37	148.18	0.10
Den Brook	Den Brook	1800	100 yr	1220.00	494.30	507.41		507.42	0.000029	1.37	1967.37	286.42	0.07
Den Brook	Den Brook	1649.88	100 yr	1220.00	493.85	507.39	499.48	507.42	0.000046	1.54	1535.61	329.38	0.08
Den Brook	Den Brook	1427	100 yr	1220.00	493.24	507.40	497.75	507.41	0.000009	0.82	3390.62	431.68	0.04
Den Brook	Den Brook	1095	100 yr	1220.00	493.20	507.40	497.04	507.40	0.000007	0.72	4353.78	547.91	0.03
Den Brook	Den Brook	895.13	100 yr	1220.00	493.25	507.40	497.04	507.40	0.000006	0.66	4876.38	610.29	0.03
Den Brook	Den Brook	781	100 yr	1220.00	493.20	507.40	496.29	507.40	0.000004	0.50	5522.69	664.95	0.02
Den Brook	Den Brook	714	100 yr	1220.00	493.23	507.40	495.40	507.40	0.000002	0.32	11411.95	1344.97	0.02
Den Brook	Den Brook	313	100 yr	1220.00	494.80	507.38	498.74	507.39	0.000035	1.15	1507.91	442.45	0.06
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	100 yr	1220.00	495.50	507.14	499.34	507.15	0.000036	1.19	1338.47	319.44	0.06
Den Brook	Den Brook	177	100 yr	1220.00	495.10	507.14	498.98	507.15	0.000022	1.03	1430.32	245.29	0.05

Alt-1d: Proposed Condition 50-year profile, with 6-stop log structures

HEC-RAS Plan: Alt_1d Profile: 50 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	50 yr	8480.00	497.00	513.88	506.22	514.34	0.001368	5.79	1852.14	723.39	0.27
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	50 yr	8480.00	497.00	513.08	506.83	513.78	0.002329	7.17	1479.48	508.98	0.35
Upper Rockway	Reach 2	34907	50 yr	8480.00	495.00	512.79	504.32	512.97	0.000635	4.16	3123.61	426.44	0.19
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	50 yr	8480.00	493.17	511.72	502.25	511.89	0.000679	4.19	4260.51	786.56	0.18
Upper Rockway	Reach 2	34260	50 yr	8480.00	497.00	511.58	505.16	511.61	0.000220	2.12	7838.05	1280.06	0.10
Upper Rockway	Reach 2	33542	50 yr	8480.00	496.60	511.49	505.36	511.50	0.000096	1.44	11179.18	2923.41	0.07
Upper Rockway	Reach 2	33071	50 yr	8480.00	496.30	510.88	502.39	511.38	0.000398	2.79	4954.33	1282.36	0.13
Upper Rockway	Reach 2	32459	50 yr	8480.00	495.00	510.73	503.65	510.96	0.000880	4.80	3397.06	438.99	0.22
Upper Rockway	Reach 2	31982	50 yr	8480.00	494.80	510.73	502.25	510.75	0.000148	1.92	6885.16	740.07	0.09
Upper Rockway	Reach 2	31731.8	50 yr	8480.00	495.00	510.59	501.91	510.69	0.000393	3.19	4296.41	559.37	0.15
Upper Rockway	Reach 2	31440	50 yr	8480.00	495.10	510.39	502.60	510.54	0.000553	3.66	3292.08	323.83	0.17
Upper Rockway	Reach 2	31156.0	50 yr	8480.00	494.91	510.17	502.24	510.35	0.000645	3.99	2728.09	390.75	0.19
Upper Rockway	Reach 2	31061.3	50 yr	8480.00	494.74	510.11	501.91	510.28	0.000628	3.98	3214.60	483.61	0.18
Upper Rockway	Reach 2	30872	50 yr	8480.00	494.50	509.87	502.39	510.12	0.000914	4.67	2689.48	353.85	0.22
Upper Rockway	Reach 2	30738	50 yr	8480.00	494.84	509.86	504.55	510.00	0.000480	3.27	3211.89	407.86	0.16
Upper Rockway	Reach 2	30485	50 yr	8480.00	495.32	509.48	503.30	509.80	0.001323	5.34	2386.86	285.15	0.26
Upper Rockway	Reach 2	29983	50 yr	8480.00	495.90	508.22	503.12	508.82	0.002489	6.73	1532.58	233.57	0.35
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	50 yr	8480.00	496.20	507.04	502.52	507.72	0.003005	6.71	1352.66	165.50	0.38
Upper Rockway	Reach 2	29674	50 yr	8480.00	494.88	506.90	501.31	507.24	0.001521	5.25	2162.87	317.75	0.28
Upper Rockway	Reach 2	29364	50 yr	8480.00	491.57	506.55	500.89	506.81	0.001153	4.93	2714.08	520.48	0.24
Upper Rockway	Reach 2	28772	50 yr	8480.00	490.47	506.52	500.32	506.55	0.000174	2.02	6260.12	818.04	0.10
Upper Rockway	Reach 2	28569.3	50 yr	8480.00	487.93	506.50	499.76	506.52	0.000069	1.30	7178.86	960.93	0.06
Upper Rockway	Reach 2	28358	50 yr	8480.00	485.56	506.50	498.35	506.51	0.000041	0.79	9053.72	1020.02	0.04
Upper Rockway	Reach 2	28164	50 yr	8480.00	483.10	506.49	494.26	506.50	0.000031	0.80	9908.18	1159.94	0.03
Upper Rockway	Reach 2	27860	50 yr	8480.00	489.77	506.48	498.86	506.49	0.000018	0.64	10530.31	1316.15	0.03
Upper Rockway	Reach 1	27584	50 yr	9940.00	490.50	506.48		506.49	0.000013	1.21	17624.50	2493.37	0.06
Upper Rockway	Reach 1	26406	50 yr	9940.00	491.10	506.38		506.45	0.000091	3.14	7605.17	1032.48	0.15
Upper Rockway	Reach 1	25969	50 yr	9940.00	491.10	506.35		506.41	0.000079	2.91	7882.37	1224.33	0.14
Upper Rockway	Reach 1	25258	50 yr	9940.00	491.70	506.19		506.33	0.000135	3.77	4824.94	584.85	0.18
Upper Rockway	Reach 1	25058.0*	50 yr	9940.00	491.85	506.17		506.31	0.000089	3.22	4718.50	575.46	0.15
Upper Rockway	Reach 1	24816	50 yr	9940.00	492.29	506.12	500.99	506.28	0.000171	3.57	3147.37	571.76	0.20
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	50 yr	9940.00	492.60	505.11	500.70	505.31	0.000032	4.34	3329.73	702.14	0.24
Upper Rockway	Reach 1	24579.6*	50 yr	9940.00	491.36	505.16	498.50	505.28	0.000059	2.38	4610.69	630.83	0.12
Upper Rockway	Reach 1	24289	50 yr	9940.00	490.00	504.97	499.06	505.24	0.000137	3.72	2957.63	386.66	0.18
Upper Rockway	Reach 1	24039.0*	50 yr	9940.00	489.77	505.00	499.20	505.17	0.000195	4.56	4564.02	849.32	0.22
Upper Rockway	Reach 1	23747	50 yr	9940.00	489.50	505.07	497.06	505.08	0.000011	1.06	13588.10	1753.12	0.05
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	50 yr	9940.00	489.45	505.06		505.08	0.000027	1.62	14201.95	1828.64	0.08
Upper Rockway	Reach 1	23379.0*	50 yr	9940.00	489.07	505.04	498.14	505.06	0.000051	2.21	14589.53	2216.88	0.11
Upper Rockway	Reach 1	22916	50 yr	9940.00	485.17	505.02	496.94	505.04	0.000029	1.96	14851.95	2442.48	0.09
Upper Rockway	Reach 1	22166	50 yr	9940.00	486.19	504.93	497.08	505.00	0.000082	3.10	11549.82	1779.99	0.14
Upper Rockway	Reach 1	21587	50 yr	9940.00	483.10	504.78	495.63	504.94	0.000112	4.01	7665.54	1438.22	0.17
Upper Rockway	Reach 1	21543	50 yr	9940.00	483.10	504.56	495.06	504.91	0.000204	5.12	4291.89	1391.72	0.23
Upper Rockway	Reach 1	21426	50 yr	9940.00	483.10	504.70		504.83	0.000102	3.65	8094.15	998.50	0.16
Upper Rockway	Reach 1	20749	50 yr	9940.00	487.90	504.66		504.76	0.000098	3.49	7521.94	1177.22	0.16
Upper Rockway	Reach 1	20087	50 yr	9940.00	487.66	504.40		504.65	0.000201	4.81	5189.23	653.89	0.23
Upper Rockway	Reach 1	18962	50 yr	9940.00	487.40	504.22		504.40	0.000210	4.63	5057.74	646.98	0.23
Upper Rockway	Reach 1	18040	50 yr	9940.00	487.82	504.05		504.18	0.000226	3.85	4856.86	813.31	0.18
Upper Rockway	Reach 1	17740.0*	50 yr	9940.00	487.64	503.89		504.12	0.000163	4.34	4854.33	702.71	0.21
Upper Rockway	Reach 1	17348	50 yr	9940.00	487.40	503.40	497.89	503.89	0.001886	6.61	2569.36	453.24	0.31
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	50 yr	9940.00	485.76	501.24	496.23	501.51	0.000297	4.88	3976.51	568.19	0.26
Upper Rockway	Reach 1	16961.9*	50 yr	9940.00	486.47	501.16		501.40	0.000350	5.12	4086.28	659.76	0.28
Upper Rockway	Reach 1	16675	50 yr	9940.00	486.46	501.19		501.28	0.000192	3.03	5215.91	654.98	0.15
Upper Rockway	Reach 1	16198	50 yr	9940.00	485.50	500.99		501.18	0.000184	4.44	4464.02	621.69	0.22
Upper Rockway	Reach 1	15534	50 yr	9940.00	487.10	500.78		501.02	0.000274	5.21	5208.56	821.31	0.26
Upper Rockway	Reach 1	15227	50 yr	9940.00	487.03	500.73	494.91	500.94	0.000229	4.74	5307.08	707.36	0.24
Upper Rockway	Reach 1	14812	50 yr	9940.00	487.00	500.32	496.55	500.76	0.000669	6.13	2841.31	558.19	0.45
Upper Rockway	Reach 1	14396	50 yr	9940.00	486.80	500.30		500.50	0.000321	4.99	6397.53	986.12	0.27
Upper Rockway	Reach 1	13995	50 yr	9940.00	486.60	499.99	495.00	500.34	0.000408	5.86	4460.02	619.54	0.31
Upper Rockway	Reach 1	13603	50 yr	9940.00	486.50	499.47	495.20	500.11	0.000641	6.87	2559.34	434.21	0.38
Upper Rockway	Reach 1	12986	50 yr	9940.00	486.15	498.99	496.25	499.65	0.000868	8.00	3346.10	589.15	0.44
Upper Rockway	Reach 1	12640	50 yr	9940.00	485.30	499.02		499.32	0.000506	5.81	4829.76	986.07	0.34
Upper Rockway	Reach 1	12286	50 yr	9940.00	485.02	499.06		499.18	0.000149	3.78	7541.36	1236.24	0.19
Upper Rockway	Reach 1	11970	50 yr	9940.00	484.70	499.06		499.13	0.000066	2.23	6442.67	1116.30	0.12
Upper Rockway	Reach 1	11265	50 yr	9940.00	484.26	498.59		499.01	0.000574	7.09	5876.76	1028.74	0.37
Upper Rockway	Reach 1	10819	50 yr	9940.00	483.10	498.53		498.64	0.000292	4.65	7299.22	1277.73	0.25
Upper Rockway	Reach 1	10176	50 yr	9940.00	482.80	497.35	495.45	498.26	0.001402	9.41	3417.05	802.12	0.55
Den Brook	Den Brook	2803	50 yr	1460.00	491.40	507.34	498.12	507.35	0.000009	0.79	1985.69	281.11	0.04
Den Brook	Den Brook	2644	50 yr	1460.00	491.50	507.32	498.17	507.34	0.000022	1.29	1351.86	202.64	0.06
Den Brook	Den Brook	2355	50 yr	1460.00	496.36	507.25	502.71	507.31	0.000139	2.42	792.39	195.88	0.14
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	50 yr	1460.00	495.27	507.19	502.27	507.23	0.000093	2.10	868.97	169.17	0.12
Den Brook	Den Brook	2040.19	50 yr	1460.00	494.89	507.12	499.73	507.20	0.000106	2.40	726.57	146.15	0.13
Den Brook	Den Brook	1800	50 yr	1460.00	494.30	507.14		507.16	0.000045	1.68	1891.72	275.52	0.09
Den Brook	Den Brook	1649.88	50 yr	1460.00	493.85	507.11	499.97	507.15	0.000076	1.94	1442.85	327.99	0.11
Den Brook	Den Brook	1427	50 yr	1460.00	493.24	507.13	498.15	507.13	0.000014	1.02	3272.04	431.18	0.05
Den Brook	Den Brook	1095	50 yr	1460.00	493.20	507.12	497.25	507.13	0.000011	0.89	4202.63	547.50	0.04
Den Brook	Den Brook	895.13	50 yr	1460.00	493.25	507.12	497.28	507.13	0.000010	0.82	4707.90	609.52	0.04
Den Brook	Den Brook	781	50 yr	1460.00	493.20	507.12	496.40	507.13	0.000006	0.62	5339.03	664.44	0.03
Den Brook	Den Brook	714	50 yr	1460.00	493.23	507.12	496.09	507.12	0.000002	0.39	11040.85	1342.92	0.02
Den Brook	Den Brook	313	50 yr	1460.00	494.80	507.09	499.18	507.12	0.000064	1.53	1379.60	442.45	0.08
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	50 yr	1460.00	495.50	506.47	499.78	506.50	0.000086	1.75	1125.84	319.44	0.10
Den Brook	Den Brook	177	50 yr	1460.00	495.10	506.47	499.37	506.50	0.000046	1.42	1267.55	245.29	0.08

Alt-1e: Proposed Condition 25-year profile, with 8-stop log structures

HEC-RAS Plan: Alt_1e Profile: 25 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	25 yr	6530.00	497.00	511.99	505.25	512.37	0.001365	5.26	1551.67	676.49	0.27
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	25 yr	6530.00	497.00	511.27	505.82	511.86	0.002319	6.49	1238.14	415.83	0.34
Upper Rockway	Reach 2	34907	25 yr	6530.00	495.00	510.92	503.29	511.11	0.000707	4.02	2363.15	348.19	0.19
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	25 yr	6530.00	493.17	510.16	501.12	510.33	0.000676	3.92	3232.51	557.06	0.18
Upper Rockway	Reach 2	34260	25 yr	6530.00	497.00	509.99	503.77	510.03	0.000274	2.18	6095.18	1157.28	0.11
Upper Rockway	Reach 2	33542	25 yr	6530.00	496.60	509.88	504.65	509.89	0.000132	1.56	8375.77	2769.66	0.08
Upper Rockway	Reach 2	33071	25 yr	6530.00	496.30	509.29	501.77	509.75	0.000425	2.67	3805.80	1060.00	0.13
Upper Rockway	Reach 2	32459	25 yr	6530.00	495.00	509.11	502.66	509.31	0.000888	4.46	2784.25	367.87	0.22
Upper Rockway	Reach 2	31982	25 yr	6530.00	494.80	509.09	501.62	509.12	0.000148	1.78	5718.50	697.44	0.09
Upper Rockway	Reach 2	31731.8	25 yr	6530.00	495.00	508.94	501.10	509.04	0.000445	3.14	3384.82	551.04	0.15
Upper Rockway	Reach 2	31440	25 yr	6530.00	495.10	508.76	501.68	508.89	0.000546	3.35	2768.00	320.07	0.17
Upper Rockway	Reach 2	31156.0	25 yr	6530.00	494.91	508.49	501.20	508.69	0.000763	4.00	2097.24	369.22	0.20
Upper Rockway	Reach 2	31061.3	25 yr	6530.00	494.74	508.42	500.91	508.61	0.000741	3.97	2426.88	459.05	0.20
Upper Rockway	Reach 2	30872	25 yr	6530.00	494.50	508.20	501.18	508.44	0.000967	4.41	2117.01	333.54	0.22
Upper Rockway	Reach 2	30738	25 yr	6530.00	494.84	508.17	503.99	508.31	0.000585	3.29	2535.83	391.81	0.17
Upper Rockway	Reach 2	30485	25 yr	6530.00	495.32	507.78	502.47	508.07	0.001417	5.03	1914.87	269.30	0.27
Upper Rockway	Reach 2	29983	25 yr	6530.00	495.90	506.33	502.09	506.96	0.003140	6.69	1109.97	211.94	0.38
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	25 yr	6530.00	496.20	505.97	501.61	506.49	0.002668	5.85	1179.54	157.06	0.35
Upper Rockway	Reach 2	29674	25 yr	6530.00	494.88	505.79	500.41	506.08	0.001419	4.73	1818.84	304.88	0.26
Upper Rockway	Reach 2	29364	25 yr	6530.00	491.57	505.41	499.77	505.67	0.001201	4.73	2162.18	457.23	0.24
Upper Rockway	Reach 2	28772	25 yr	6530.00	490.47	505.39	499.93	505.41	0.000165	1.86	5358.94	784.97	0.09
Upper Rockway	Reach 2	28569.3	25 yr	6530.00	487.93	505.37	499.46	505.39	0.000067	1.21	6127.30	916.60	0.06
Upper Rockway	Reach 2	28358	25 yr	6530.00	485.56	505.37	495.90	505.38	0.000038	0.72	7907.18	1011.18	0.03
Upper Rockway	Reach 2	28164	25 yr	6530.00	483.10	505.36	493.20	505.37	0.000028	0.73	8617.53	1110.67	0.03
Upper Rockway	Reach 2	27860	25 yr	6530.00	489.77	505.35	498.65	505.36	0.000017	0.60	9049.52	1304.11	0.03
Upper Rockway	Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.17	14819.11	2473.35	0.06
Upper Rockway	Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Upper Rockway	Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14
Upper Rockway	Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Upper Rockway	Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.90	555.68	0.14
Upper Rockway	Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Upper Rockway	Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000069	2.31	3542.90	527.94	0.13
Upper Rockway	Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Upper Rockway	Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.49	503.31	0.000244	4.60	3409.72	713.26	0.24
Upper Rockway	Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Upper Rockway	Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.52	503.19	0.000076	2.42	10816.11	2150.64	0.13
Upper Rockway	Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Upper Rockway	Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Upper Rockway	Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Upper Rockway	Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Upper Rockway	Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Upper Rockway	Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Upper Rockway	Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Upper Rockway	Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.80	572.27	0.24
Upper Rockway	Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.02	572.95	0.20
Upper Rockway	Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.82	499.10	0.21
Upper Rockway	Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.19	544.20	0.25
Upper Rockway	Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.34	636.34	0.28
Upper Rockway	Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Upper Rockway	Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Upper Rockway	Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Upper Rockway	Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Upper Rockway	Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47
Upper Rockway	Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Upper Rockway	Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Upper Rockway	Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Upper Rockway	Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Upper Rockway	Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.05	922.86	0.33
Upper Rockway	Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.30	1211.12	0.18
Upper Rockway	Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.93	1106.41	0.13
Upper Rockway	Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.35	1017.98	0.36
Upper Rockway	Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.58	1253.82	0.25
Upper Rockway	Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.41	725.69	0.54
Den Brook	Den Brook	2803	25 yr	1140.00	491.40	506.22	496.69	506.23	0.000008	0.71	1746.68	274.31	0.04
Den Brook	Den Brook	2644	25 yr	1140.00	491.50	506.21	497.27	506.22	0.000020	1.16	1185.07	183.93	0.06
Den Brook	Den Brook	2355	25 yr	1140.00	496.36	506.11	502.70	506.19	0.000200	2.65	576.96	181.64	0.17
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	25 yr	1140.00	495.27	506.01	501.29	506.06	0.000118	2.17	674.44	162.37	0.13
Den Brook	Den Brook	2040.19	25 yr	1140.00	494.89	505.97	499.24	506.03	0.000100	2.16	618.56	138.32	0.12
Den Brook	Den Brook	1800	25 yr	1140.00	494.30	505.98		506.00	0.000039	1.46	1599.70	235.74	0.08
Den Brook	Den Brook	1649.88	25 yr	1140.00	493.85	505.94	499.30	505.99	0.000089	1.94	1063.66	322.27	0.11
Den Brook	Den Brook	1427	25 yr	1140.00	493.24	505.96	497.66	505.97	0.000013	0.94	2771.78	429.07	0.05
Den Brook	Den Brook	1095	25 yr	1140.00	493.20	505.96	496.97	505.97	0.000010	0.79	3567.69	539.08	0.04
Den Brook	Den Brook	895.13	25 yr	1140.00	493.25	505.96	496.97	505.96	0.000009	0.73	4013.38	535.62	0.04
Den Brook	Den Brook	781	25 yr	1140.00	493.20	505.96	496.24	505.96	0.000005	0.50	4607.56	546.77	0.03
Den Brook	Den Brook	714	25 yr	1140.00	493.23	505.96	495.47	505.96	0.000002	0.35	9535.73	1219.63	0.02
Den Brook	Den Brook	313	25 yr	1140.00	494.80	505.90	498.59	505.95	0.000125	1.98	852.63	432.16	0.11
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	25 yr	1140.00	495.50	505.33	499.19	505.38	0.000147	2.10	762.20	319.44	0.12
Den Brook	Den Brook	177	25 yr	1140.00	495.10	505.34	498.85	505.37	0.000058	1.49	990.09	245.29	0.09

Alt-1f: Proposed Condition 25-year profile, with 4-stop log structures

HEC-RAS Plan: Alt_1f Profile: 25 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	25 yr	6530.00	497.00	511.99	505.25	512.37	0.001365	5.26	1551.67	676.49	0.27
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	25 yr	6530.00	497.00	511.27	505.82	511.86	0.002319	6.49	1238.14	415.83	0.34
Upper Rockway	Reach 2	34907	25 yr	6530.00	495.00	510.92	503.29	511.11	0.000707	4.02	2363.15	348.19	0.19
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	25 yr	6530.00	493.17	510.16	501.12	510.33	0.000676	3.92	3232.51	557.06	0.18
Upper Rockway	Reach 2	34260	25 yr	6530.00	497.00	509.99	503.77	510.03	0.000274	2.18	6095.18	1157.28	0.11
Upper Rockway	Reach 2	33542	25 yr	6530.00	496.60	509.88	504.65	509.89	0.000132	1.56	8375.77	2769.66	0.08
Upper Rockway	Reach 2	33071	25 yr	6530.00	496.30	509.29	501.77	509.75	0.000425	2.67	3805.80	1060.00	0.13
Upper Rockway	Reach 2	32459	25 yr	6530.00	495.00	509.11	502.66	509.31	0.000888	4.46	2784.25	367.87	0.22
Upper Rockway	Reach 2	31982	25 yr	6530.00	494.80	509.09	501.62	509.12	0.000148	1.78	5718.50	697.44	0.09
Upper Rockway	Reach 2	31731.8	25 yr	6530.00	495.00	508.94	501.10	509.04	0.000445	3.14	3384.82	551.04	0.15
Upper Rockway	Reach 2	31440	25 yr	6530.00	495.10	508.76	501.68	508.89	0.000546	3.35	2768.00	320.07	0.17
Upper Rockway	Reach 2	31156.0	25 yr	6530.00	494.91	508.49	501.20	508.69	0.000763	4.00	2097.24	369.22	0.20
Upper Rockway	Reach 2	31061.3	25 yr	6530.00	494.74	508.42	500.91	508.61	0.000741	3.97	2426.88	459.05	0.20
Upper Rockway	Reach 2	30872	25 yr	6530.00	494.50	508.20	501.18	508.44	0.000967	4.41	2117.01	333.54	0.22
Upper Rockway	Reach 2	30738	25 yr	6530.00	494.84	508.17	503.99	508.31	0.000585	3.29	2535.83	391.81	0.17
Upper Rockway	Reach 2	30485	25 yr	6530.00	495.32	507.78	502.47	508.07	0.001417	5.03	1914.87	269.30	0.27
Upper Rockway	Reach 2	29983	25 yr	6530.00	495.90	506.33	502.09	506.96	0.003140	6.69	1109.97	211.94	0.38
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	25 yr	6530.00	496.20	505.97	501.61	506.49	0.002668	5.85	1179.54	157.06	0.35
Upper Rockway	Reach 2	29674	25 yr	6530.00	494.88	505.79	500.41	506.08	0.001419	4.73	1818.84	304.88	0.26
Upper Rockway	Reach 2	29364	25 yr	6530.00	491.57	505.41	499.77	505.67	0.001201	4.73	2162.18	457.23	0.24
Upper Rockway	Reach 2	28772	25 yr	6530.00	490.47	505.39	499.93	505.41	0.000165	1.86	5358.94	784.97	0.09
Upper Rockway	Reach 2	28569.3	25 yr	6530.00	487.93	505.37	499.46	505.39	0.000067	1.21	6127.30	916.60	0.06
Upper Rockway	Reach 2	28358	25 yr	6530.00	485.56	505.37	495.90	505.38	0.000038	0.72	7907.18	1011.18	0.03
Upper Rockway	Reach 2	28164	25 yr	6530.00	483.10	505.36	493.20	505.37	0.000028	0.73	8617.53	1110.67	0.03
Upper Rockway	Reach 2	27860	25 yr	6530.00	489.77	505.35	498.65	505.36	0.000017	0.60	9049.52	1304.11	0.03
Upper Rockway	Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.17	14819.11	2473.35	0.06
Upper Rockway	Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Upper Rockway	Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14
Upper Rockway	Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Upper Rockway	Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.90	555.68	0.14
Upper Rockway	Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Upper Rockway	Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000069	2.31	3542.90	527.94	0.13
Upper Rockway	Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Upper Rockway	Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.49	503.31	0.000244	4.60	3409.72	713.26	0.24
Upper Rockway	Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Upper Rockway	Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.52	503.19	0.000076	2.42	10816.11	2150.64	0.13
Upper Rockway	Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Upper Rockway	Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Upper Rockway	Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Upper Rockway	Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Upper Rockway	Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Upper Rockway	Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Upper Rockway	Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Upper Rockway	Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.80	572.27	0.24
Upper Rockway	Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.02	572.95	0.20
Upper Rockway	Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.82	499.10	0.21
Upper Rockway	Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.19	544.20	0.25
Upper Rockway	Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.34	636.34	0.28
Upper Rockway	Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Upper Rockway	Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Upper Rockway	Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Upper Rockway	Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Upper Rockway	Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47
Upper Rockway	Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Upper Rockway	Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Upper Rockway	Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Upper Rockway	Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Upper Rockway	Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.05	922.86	0.33
Upper Rockway	Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.30	1211.12	0.18
Upper Rockway	Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.93	1106.41	0.13
Upper Rockway	Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.35	1017.98	0.36
Upper Rockway	Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.58	1253.82	0.25
Upper Rockway	Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.41	725.69	0.54
Den Brook	Den Brook	2803	25 yr	1140.00	491.40	506.22	496.69	506.23	0.000008	0.71	1746.68	274.31	0.04
Den Brook	Den Brook	2644	25 yr	1140.00	491.50	506.21	497.27	506.22	0.000020	1.16	1185.07	183.93	0.06
Den Brook	Den Brook	2355	25 yr	1140.00	496.36	506.11	502.70	506.19	0.000200	2.65	576.96	181.64	0.17
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	25 yr	1140.00	495.27	506.01	501.29	506.06	0.000118	2.17	674.44	162.37	0.13
Den Brook	Den Brook	2040.19	25 yr	1140.00	494.89	505.97	499.24	506.03	0.000100	2.16	618.56	138.32	0.12
Den Brook	Den Brook	1800	25 yr	1140.00	494.30	505.98		506.00	0.000039	1.46	1599.70	235.74	0.08
Den Brook	Den Brook	1649.88	25 yr	1140.00	493.85	505.94	499.30	505.99	0.000089	1.94	1063.66	322.27	0.11
Den Brook	Den Brook	1427	25 yr	1140.00	493.24	505.96	497.66	505.97	0.000013	0.94	2771.78	429.07	0.05
Den Brook	Den Brook	1095	25 yr	1140.00	493.20	505.96	496.97	505.97	0.000010	0.79	3567.69	539.08	0.04
Den Brook	Den Brook	895.13	25 yr	1140.00	493.25	505.96	496.97	505.96	0.000009	0.73	4013.38	535.62	0.04
Den Brook	Den Brook	781	25 yr	1140.00	493.20	505.96	496.24	505.96	0.000005	0.50	4607.56	546.77	0.03
Den Brook	Den Brook	714	25 yr	1140.00	493.23	505.96	495.47	505.96	0.000002	0.35	9535.73	1219.63	0.02
Den Brook	Den Brook	313	25 yr	1140.00	494.80	505.90	498.59	505.95	0.000125	1.98	852.63	432.16	0.11
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	25 yr	1140.00	495.50	505.33	499.19	505.38	0.000147	2.10	762.20	319.44	0.12
Den Brook	Den Brook	177	25 yr	1140.00	495.10	505.34	498.85	505.37	0.000058	1.49	990.09	245.29	0.09

Alt-2a: Proposed Condition 25-year profile

HEC-RAS Plan: Alt_2a Profile: 25 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	25 yr	6530.00	497.00	518.81	505.25	518.95	0.000277	3.19	2636.63	802.31	0.13
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	25 yr	6530.00	497.00	510.57	505.82	511.25	0.002901	6.96	1146.70	317.14	0.37
Upper Rockway	Reach 2	34907	25 yr	6530.00	495.00	510.09	503.29	510.32	0.000944	4.45	2091.14	314.01	0.22
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	25 yr	6530.00	493.17	509.35	501.12	509.57	0.000917	4.40	2797.06	512.40	0.20
Upper Rockway	Reach 2	34260	25 yr	6530.00	497.00	509.08	503.77	509.13	0.000456	2.67	5126.14	1090.89	0.14
Upper Rockway	Reach 2	33542	25 yr	6530.00	496.60	508.87	504.65	508.89	0.000243	2.01	6718.13	2646.11	0.10
Upper Rockway	Reach 2	33071	25 yr	6530.00	496.30	508.63	501.80	508.82	0.000076	1.09	4390.37	1029.21	0.06
Upper Rockway	Reach 2	32459	25 yr	6530.00	495.00	508.52		508.71	0.000908	4.37	3159.51	599.22	0.22
Upper Rockway	Reach 2	32359.0	25 yr	6530.00	494.78	508.50	503.01	508.61	0.000638	3.54	2995.16	680.23	0.18
Upper Rockway	Reach 2	31982	25 yr	6530.00	494.80	508.47	501.62	508.49	0.000134	1.63	7839.04	1499.62	0.08
Upper Rockway	Reach 2	31731.8	25 yr	6530.00	494.99	508.40	501.10	508.44	0.000255	2.31	5940.51	1298.32	0.11
Upper Rockway	Reach 2	31440	25 yr	6530.00	495.10	508.34	501.68	508.37	0.000203	2.00	5538.05	1080.20	0.10
Upper Rockway	Reach 2	31229	25 yr	6530.00	494.75	508.23	503.90	508.31	0.000493	3.02	4103.65	1090.28	0.16
Upper Rockway	Reach 2	31046	25 yr	6530.00	494.74	508.16		508.22	0.000351	2.65	4389.86	877.99	0.13
Upper Rockway	Reach 2	30872	25 yr	6530.00	494.50	508.06		508.13	0.000343	2.61	3740.99	694.21	0.13
Upper Rockway	Reach 2	30760	25 yr	6530.00	494.84	507.74		507.82	0.000339	2.44	3091.11	585.84	0.13
Upper Rockway	Reach 2	30500	25 yr	6530.00	495.32	507.52	502.65	507.68	0.000877	3.89	2466.33	482.79	0.21
Upper Rockway	Reach 2	29983	25 yr	6530.00	495.90	505.70	502.09	506.61	0.004503	7.66	854.86	510.72	0.45
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	25 yr	6530.00	496.20	505.79	501.59	506.02	0.001537	4.38	1978.10	565.60	0.26
Upper Rockway	Reach 2	29674	25 yr	6530.00	494.88	505.69	500.42	505.81	0.000735	3.38	2744.08	603.34	0.19
Upper Rockway	Reach 2	29364	25 yr	6530.00	491.57	505.54	499.91	505.62	0.000450	2.92	3571.41	876.19	0.15
Upper Rockway	Reach 2	29151	25 yr	6530.00	491.44	505.47	501.06	505.53	0.000304	2.48	4185.16	820.69	0.13
Upper Rockway	Reach 2	29013.8	25 yr	6530.00	490.93	505.41	499.90	505.47	0.000388	2.90	4829.85	754.13	0.14
Upper Rockway	Reach 2	28772	25 yr	6530.00	490.47	505.38	499.94	505.41	0.000164	1.85	5393.18	793.03	0.09
Upper Rockway	Reach 2	28569.3	25 yr	6530.00	487.93	505.37	499.56	505.39	0.000068	1.21	6119.47	911.79	0.06
Upper Rockway	Reach 2	28358	25 yr	6530.00	485.56	505.36	495.90	505.38	0.000038	0.72	7899.43	1009.69	0.03
Upper Rockway	Reach 2	28164	25 yr	6530.00	483.10	505.36	493.31	505.37	0.000028	1.16	9288.72	1220.45	0.05
Upper Rockway	Reach 2	27860	25 yr	6530.00	489.77	505.35		505.36	0.000016	0.58	9317.49	1385.24	0.03
Upper Rockway	Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.17	14819.11	2473.35	0.06
Upper Rockway	Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Upper Rockway	Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14
Upper Rockway	Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Upper Rockway	Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.71	555.70	0.14
Upper Rockway	Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Upper Rockway	Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000070	2.31	3542.76	527.98	0.13
Upper Rockway	Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Upper Rockway	Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.50	503.31	0.000244	4.60	3409.63	713.47	0.24
Upper Rockway	Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Upper Rockway	Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.65	503.19	0.000076	2.42	10815.98	2150.68	0.13
Upper Rockway	Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Upper Rockway	Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Upper Rockway	Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Upper Rockway	Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Upper Rockway	Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Upper Rockway	Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Upper Rockway	Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Upper Rockway	Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.82	572.27	0.24
Upper Rockway	Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.04	572.96	0.20
Upper Rockway	Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.62	499.16	0.21
Upper Rockway	Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.18	544.20	0.25
Upper Rockway	Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.46	636.29	0.28
Upper Rockway	Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Upper Rockway	Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Upper Rockway	Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Upper Rockway	Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Upper Rockway	Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47
Upper Rockway	Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Upper Rockway	Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Upper Rockway	Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Upper Rockway	Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Upper Rockway	Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.02	922.85	0.33
Upper Rockway	Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.26	1211.12	0.18
Upper Rockway	Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.89	1106.41	0.13
Upper Rockway	Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.32	1017.98	0.36
Upper Rockway	Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.54	1253.82	0.25
Upper Rockway	Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.39	725.69	0.54
Den Brook	Den Brook	2803	25 yr	1140.00	491.40	506.27	496.69	506.28	0.000008	0.71	1757.43	274.62	0.04
Den Brook	Den Brook	2644	25 yr	1140.00	491.50	506.26	497.27	506.28	0.000020	1.15	1192.58	184.24	0.06
Den Brook	Den Brook	2355	25 yr	1140.00	496.36	506.17	502.70	506.24	0.000182	2.55	613.30	197.63	0.16
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	25 yr	1140.00	495.27	506.02	501.29	506.07	0.000114	2.14	717.37	238.48	0.13
Den Brook	Den Brook	2040.19	25 yr	1140.00	494.89	505.97	499.24	506.03	0.000100	2.16	618.65	138.33	0.12
Den Brook	Den Brook	1800	25 yr	1140.00	494.30	505.99	499.19	506.00	0.000038	1.44	1572.48	214.64	0.08
Den Brook	Den Brook	1649.88	25 yr	1140.00	493.85	505.93	499.30	505.99	0.000101	2.05	832.58	175.93	0.12
Den Brook	Den Brook	1427	25 yr	1140.00	493.24	505.96	497.65	505.97	0.000013	0.94	2504.32	304.39	0.05
Den Brook	Den Brook	1182.22	25 yr	1140.00	493.21	505.96	497.09	505.96	0.000012	0.87	3114.69	379.37	0.04
Den Brook	Den Brook	1095	25 yr	1140.00	493.20	505.96	496.98	505.96	0.000010	0.79	3505.33	418.01	0.04
Den Brook	Den Brook	895.13	25 yr	1140.00	493.25	505.96	496.97	505.96	0.000009	0.72	4001.70	477.97	0.04
Den Brook	Den Brook	781	25 yr	1140.00	493.20	505.96	496.24	505.96	0.000004	0.49	4598.09	520.84	0.02
Den Brook	Den Brook	714	25 yr	1140.00	493.23	505.96	495.47	505.96	0.000002	0.35	9503.13	1184.76	0.02
Den Brook	Den Brook	313	25 yr	1140.00	494.80	505.89	498.59	505.94	0.000129	2.01	770.72	318.22	0.11
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	25 yr	1140.00	495.50	505.33		505.38	0.000145	2.09	773.14	335.20	0.12
Den Brook	Den Brook	177	25 yr	1140.00	495.10	505.34		505.36	0.000057	1.48	1032.24	286.60	0.09

Alt-2b: Proposed Condition 25-year profile

HEC-RAS Plan: Alt_2b Profile: 25 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	25 yr	6530.00	497.00	518.81	505.25	518.95	0.000277	3.19	2636.63	802.31	0.13
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	25 yr	6530.00	497.00	510.57	505.82	511.25	0.002899	6.96	1146.88	317.27	0.37
Upper Rockway	Reach 2	34907	25 yr	6530.00	495.00	510.09	503.29	510.32	0.000943	4.45	2091.67	314.05	0.22
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	25 yr	6530.00	493.17	509.35	501.12	509.57	0.000916	4.40	2797.92	512.49	0.20
Upper Rockway	Reach 2	34260	25 yr	6530.00	497.00	509.08	503.77	509.13	0.000456	2.67	5128.19	1091.07	0.14
Upper Rockway	Reach 2	33542	25 yr	6530.00	496.60	508.87	504.65	508.89	0.000242	2.00	6721.74	2646.34	0.10
Upper Rockway	Reach 2	33071	25 yr	6530.00	496.30	508.64	501.80	508.82	0.000076	1.09	4392.31	1029.56	0.06
Upper Rockway	Reach 2	32459	25 yr	6530.00	495.00	508.52		508.71	0.000907	4.37	3161.08	599.27	0.22
Upper Rockway	Reach 2	32359.0	25 yr	6530.00	494.78	508.50	503.01	508.61	0.000637	3.53	2997.01	680.74	0.18
Upper Rockway	Reach 2	31982	25 yr	6530.00	494.80	508.47	501.62	508.49	0.000134	1.63	7843.16	1499.63	0.08
Upper Rockway	Reach 2	31731.8	25 yr	6530.00	494.99	508.40	501.10	508.44	0.000254	2.30	5944.23	1298.54	0.11
Upper Rockway	Reach 2	31440	25 yr	6530.00	495.10	508.34	501.68	508.37	0.000203	2.00	5541.25	1080.21	0.10
Upper Rockway	Reach 2	31229	25 yr	6530.00	494.75	508.24	503.90	508.31	0.000492	3.01	4107.14	1090.30	0.16
Upper Rockway	Reach 2	31046	25 yr	6530.00	494.74	508.16		508.22	0.000350	2.65	4392.78	878.12	0.13
Upper Rockway	Reach 2	30872	25 yr	6530.00	494.50	508.06		508.13	0.000343	2.61	3743.43	694.29	0.13
Upper Rockway	Reach 2	30760	25 yr	6530.00	494.84	507.74		507.82	0.000339	2.44	3093.56	585.96	0.13
Upper Rockway	Reach 2	30500	25 yr	6530.00	495.32	507.53	502.65	507.69	0.000875	3.89	2468.60	483.01	0.21
Upper Rockway	Reach 2	29983	25 yr	6530.00	495.90	505.71	502.10	506.62	0.004489	7.65	855.67	511.49	0.45
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	25 yr	6530.00	496.20	506.05	501.60	506.57	0.002607	5.82	1178.13	154.12	0.35
Upper Rockway	Reach 2	29674	25 yr	6530.00	494.88	505.81	500.46	506.19	0.001692	5.17	1498.13	209.31	0.29
Upper Rockway	Reach 2	29364	25 yr	6530.00	491.57	505.47	499.77	505.72	0.001166	4.67	2189.52	459.78	0.24
Upper Rockway	Reach 2	29151	25 yr	6530.00	491.44	505.47	501.06	505.53	0.000323	2.55	3761.36	632.00	0.14
Upper Rockway	Reach 2	29013.8	25 yr	6530.00	490.93	505.41	499.90	505.47	0.000388	2.90	4829.85	754.13	0.14
Upper Rockway	Reach 2	28772	25 yr	6530.00	490.47	505.38	499.94	505.41	0.000164	1.85	5393.18	793.03	0.09
Upper Rockway	Reach 2	28569.3	25 yr	6530.00	487.93	505.37	499.56	505.39	0.000068	1.21	6119.47	911.79	0.06
Upper Rockway	Reach 2	28358	25 yr	6530.00	485.56	505.36	495.90	505.38	0.000038	0.72	7899.43	1009.69	0.03
Upper Rockway	Reach 2	28164	25 yr	6530.00	483.10	505.36	493.31	505.37	0.000028	1.16	9288.72	1220.45	0.05
Upper Rockway	Reach 2	27860	25 yr	6530.00	489.77	505.35		505.36	0.000016	0.58	9317.49	1385.24	0.03
Upper Rockway	Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.17	14819.11	2473.35	0.06
Upper Rockway	Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Upper Rockway	Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14
Upper Rockway	Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Upper Rockway	Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.71	555.70	0.14
Upper Rockway	Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Upper Rockway	Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000070	2.31	3542.76	527.98	0.13
Upper Rockway	Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Upper Rockway	Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.50	503.31	0.000244	4.60	3409.63	713.47	0.24
Upper Rockway	Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Upper Rockway	Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.65	503.19	0.000076	2.42	10815.98	2150.68	0.13
Upper Rockway	Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Upper Rockway	Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Upper Rockway	Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Upper Rockway	Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Upper Rockway	Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Upper Rockway	Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Upper Rockway	Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Upper Rockway	Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.82	572.27	0.24
Upper Rockway	Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.04	572.96	0.20
Upper Rockway	Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.62	499.16	0.21
Upper Rockway	Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.18	544.20	0.25
Upper Rockway	Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.46	636.29	0.28
Upper Rockway	Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Upper Rockway	Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Upper Rockway	Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Upper Rockway	Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Upper Rockway	Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47
Upper Rockway	Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Upper Rockway	Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Upper Rockway	Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Upper Rockway	Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Upper Rockway	Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.02	922.85	0.33
Upper Rockway	Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.26	1211.12	0.18
Upper Rockway	Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.89	1106.41	0.13
Upper Rockway	Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.32	1017.98	0.36
Upper Rockway	Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.54	1253.82	0.25
Upper Rockway	Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.39	725.69	0.54
Den Brook	Den Brook	2803	25 yr	1140.00	491.40	506.29	496.69	506.30	0.000008	0.71	1762.27	274.76	0.04
Den Brook	Den Brook	2644	25 yr	1140.00	491.50	506.28	497.27	506.30	0.000020	1.15	1195.96	184.38	0.06
Den Brook	Den Brook	2355	25 yr	1140.00	496.36	506.19	502.70	506.26	0.000187	2.58	592.42	183.78	0.16
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	25 yr	1140.00	495.27	506.01	501.29	506.06	0.000117	2.17	681.19	171.64	0.13
Den Brook	Den Brook	2040.19	25 yr	1140.00	494.89	505.97	499.24	506.03	0.000100	2.16	618.57	138.32	0.12
Den Brook	Den Brook	1800	25 yr	1140.00	494.30	505.98	499.19	506.00	0.000039	1.46	1599.75	235.78	0.08
Den Brook	Den Brook	1649.88	25 yr	1140.00	493.85	505.94	499.30	505.99	0.000096	2.01	888.85	200.94	0.12
Den Brook	Den Brook	1427	25 yr	1140.00	493.24	505.96	497.65	505.97	0.000013	0.94	2550.23	325.39	0.05
Den Brook	Den Brook	1182.22	25 yr	1140.00	493.21	505.96	497.09	505.96	0.000012	0.87	3141.48	399.37	0.04
Den Brook	Den Brook	1095	25 yr	1140.00	493.20	505.96	496.98	505.96	0.000010	0.79	3510.78	435.26	0.04
Den Brook	Den Brook	895.13	25 yr	1140.00	493.25	505.96	496.97	505.96	0.000009	0.73	4002.62	491.01	0.04
Den Brook	Den Brook	781	25 yr	1140.00	493.20	505.96	496.24	505.96	0.000005	0.50	4599.34	535.47	0.03
Den Brook	Den Brook	714	25 yr	1140.00	493.23	505.96	495.47	505.96	0.000002	0.35	9506.57	1198.87	0.02
Den Brook	Den Brook	313	25 yr	1140.00	494.80	505.89	498.59	505.94	0.000129	2.01	770.72	318.22	0.11
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	214	25 yr	1140.00	495.50	505.33		505.38	0.000145	2.09	773.14	335.20	0.12
Den Brook	Den Brook	177	25 yr	1140.00	495.10	505.34		505.36	0.000057	1.48	1032.24	286.60	0.09

Alt-2b Sensitivity: Proposed Condition 25-year profile

HEC-RAS Plan: Alt_2b_s Profile: 25 yr

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	25 yr	6530.00	497.00	518.81	505.25	518.95	0.000277	3.19	2636.63	802.31	0.13
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	25 yr	6530.00	497.00	510.54	505.82	511.22	0.002937	6.99	1141.88	313.56	0.38
Upper Rockway	Reach 2	34907	25 yr	6530.00	495.00	510.04	503.29	510.28	0.000959	4.48	2076.74	312.82	0.22
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	25 yr	6530.00	493.17	509.30	501.12	509.53	0.000932	4.43	2774.23	510.17	0.21
Upper Rockway	Reach 2	34260	25 yr	6530.00	497.00	509.03	503.77	509.08	0.000471	2.70	5071.49	1087.78	0.14
Upper Rockway	Reach 2	33542	25 yr	6530.00	496.60	508.81	504.65	508.83	0.000248	2.02	6626.24	2634.15	0.10
Upper Rockway	Reach 2	33071	25 yr	6530.00	496.30	508.57	501.80	508.76	0.000078	1.10	4341.33	1010.28	0.06
Upper Rockway	Reach 2	32459	25 yr	6530.00	495.00	508.46		508.64	0.000936	4.43	3119.50	598.00	0.22
Upper Rockway	Reach 2	32359.0	25 yr	6530.00	494.78	508.43	503.01	508.55	0.000665	3.60	2948.73	662.11	0.18
Upper Rockway	Reach 2	31982	25 yr	6530.00	494.80	508.40	501.62	508.42	0.000139	1.66	7734.21	1499.22	0.08
Upper Rockway	Reach 2	31731.8	25 yr	6530.00	494.99	508.32	501.10	508.37	0.000265	2.35	5846.01	1292.91	0.12
Upper Rockway	Reach 2	31440	25 yr	6530.00	495.10	508.26	501.68	508.29	0.000212	2.03	5456.57	1080.05	0.10
Upper Rockway	Reach 2	31229	25 yr	6530.00	494.75	508.15	503.90	508.23	0.000523	3.09	4014.75	1089.95	0.16
Upper Rockway	Reach 2	31046	25 yr	6530.00	494.74	508.07		508.14	0.000366	2.70	4315.70	870.38	0.14
Upper Rockway	Reach 2	30872	25 yr	6530.00	494.50	507.97		508.04	0.000359	2.65	3679.37	692.16	0.13
Upper Rockway	Reach 2	30760	25 yr	6530.00	494.84	507.63		507.72	0.000361	2.50	3028.86	582.61	0.13
Upper Rockway	Reach 2	30500	25 yr	6530.00	495.32	507.41		507.57	0.000933	3.98	2418.87	524.85	0.21
Upper Rockway	Reach 2	30417.5	25 yr	6530.00	495.47	507.11	502.52	507.43	0.001386	5.15	2071.45	366.28	0.29
Upper Rockway	Reach 2	30330.6*	25 yr	6530.00	495.56	507.02	502.41	507.31	0.001230	5.02	2047.24	503.69	0.28
Upper Rockway	Reach 2	30156.8*	25 yr	6530.00	495.73	506.69	502.20	507.07	0.001326	5.58	1800.32	426.82	0.32
Upper Rockway	Reach 2	30069.9*	25 yr	6530.00	495.81	506.55	501.95	506.95	0.001294	5.73	1679.20	385.98	0.33
Upper Rockway	Reach 2	29983	25 yr	6530.00	495.90	505.71	502.10	506.62	0.004489	7.65	855.67	318.19	0.45
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	25 yr	6530.00	496.20	506.05	501.60	506.58	0.002641	5.85	1161.18	151.10	0.35
Upper Rockway	Reach 2	29674	25 yr	6530.00	494.88	505.81	500.46	506.19	0.001692	5.17	1498.13	209.31	0.29
Upper Rockway	Reach 2	29364	25 yr	6530.00	491.57	505.47	499.77	505.72	0.001166	4.67	2189.52	459.78	0.24
Upper Rockway	Reach 2	29151	25 yr	6530.00	491.44	505.47	501.06	505.53	0.000323	2.55	3761.36	632.00	0.14
Upper Rockway	Reach 2	29013.8	25 yr	6530.00	490.93	505.41	499.90	505.47	0.000388	2.90	4829.85	754.13	0.14
Upper Rockway	Reach 2	28772	25 yr	6530.00	490.47	505.38	499.94	505.41	0.000164	1.85	5393.18	793.03	0.09
Upper Rockway	Reach 2	28569.3	25 yr	6530.00	487.93	505.37	499.56	505.39	0.000068	1.21	6119.47	911.79	0.06
Upper Rockway	Reach 2	28358	25 yr	6530.00	485.56	505.36	495.90	505.38	0.000038	0.72	7899.43	1009.69	0.03
Upper Rockway	Reach 2	28164	25 yr	6530.00	483.10	505.36	493.31	505.37	0.000028	1.16	9288.72	1220.45	0.05
Upper Rockway	Reach 2	27860	25 yr	6530.00	489.77	505.35		505.36	0.000016	0.58	9317.49	1385.24	0.03
Upper Rockway	Reach 1	27584	25 yr	7670.00	490.50	505.35		505.36	0.000013	1.17	14819.11	2473.35	0.06
Upper Rockway	Reach 1	26406	25 yr	7670.00	491.10	505.26		505.32	0.000087	2.89	6468.85	982.90	0.15
Upper Rockway	Reach 1	25969	25 yr	7670.00	491.10	505.22		505.28	0.000079	2.76	6559.68	1146.79	0.14
Upper Rockway	Reach 1	25258	25 yr	7670.00	491.70	505.09		505.21	0.000126	3.44	4191.08	565.26	0.18
Upper Rockway	Reach 1	25058.0*	25 yr	7670.00	491.85	505.08		505.18	0.000073	2.75	4098.71	555.70	0.14
Upper Rockway	Reach 1	24816	25 yr	7670.00	492.29	504.99	499.73	505.15	0.000194	3.52	2522.38	535.71	0.21
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	25 yr	7670.00	492.60	503.22	499.76	503.48	0.000050	4.79	2207.41	488.87	0.29
Upper Rockway	Reach 1	24579.6*	25 yr	7670.00	491.36	503.32	497.87	503.43	0.000070	2.31	3542.76	527.98	0.13
Upper Rockway	Reach 1	24289	25 yr	7670.00	490.00	503.12	498.53	503.39	0.000148	3.48	2346.81	318.93	0.18
Upper Rockway	Reach 1	24039.0*	25 yr	7670.00	489.77	503.13	498.50	503.31	0.000244	4.60	3409.63	713.47	0.24
Upper Rockway	Reach 1	23747	25 yr	7670.00	489.50	503.21	496.60	503.21	0.000016	1.16	10332.34	1734.99	0.06
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	25 yr	7670.00	489.45	503.19		503.21	0.000038	1.71	10824.67	1788.36	0.09
Upper Rockway	Reach 1	23379.0*	25 yr	7670.00	489.07	503.16	497.65	503.19	0.000076	2.42	10815.98	2150.68	0.13
Upper Rockway	Reach 1	22916	25 yr	7670.00	485.17	503.13	495.87	503.16	0.000037	2.05	10898.55	1783.93	0.10
Upper Rockway	Reach 1	22166	25 yr	7670.00	486.19	503.04	496.41	503.11	0.000097	3.08	8482.98	1368.66	0.15
Upper Rockway	Reach 1	21587	25 yr	7670.00	483.10	502.90	493.91	503.05	0.000113	3.71	6110.34	1255.57	0.17
Upper Rockway	Reach 1	21543	25 yr	7670.00	483.10	502.71	493.85	503.02	0.000203	4.71	3119.30	1192.39	0.22
Upper Rockway	Reach 1	21426	25 yr	7670.00	483.10	502.83		502.95	0.000105	3.41	6352.67	888.60	0.16
Upper Rockway	Reach 1	20749	25 yr	7670.00	487.90	502.77		502.87	0.000117	3.49	5449.24	999.42	0.17
Upper Rockway	Reach 1	20087	25 yr	7670.00	487.66	502.53		502.76	0.000213	4.50	4006.05	582.92	0.23
Upper Rockway	Reach 1	18962	25 yr	7670.00	487.40	502.32		502.49	0.000242	4.45	3902.82	572.27	0.24
Upper Rockway	Reach 1	18040	25 yr	7670.00	487.82	502.09		502.23	0.000281	3.87	3521.04	572.96	0.20
Upper Rockway	Reach 1	17740.0*	25 yr	7670.00	487.64	501.96		502.16	0.000177	4.08	3696.62	499.16	0.21
Upper Rockway	Reach 1	17348	25 yr	7670.00	487.40	501.15	496.53	501.84	0.002931	7.32	1622.88	381.17	0.38
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	25 yr	7670.00	485.76	500.09	495.49	500.32	0.000280	4.39	3338.18	544.20	0.25
Upper Rockway	Reach 1	16961.9*	25 yr	7670.00	486.47	500.00		500.22	0.000359	4.78	3332.46	636.29	0.28
Upper Rockway	Reach 1	16675	25 yr	7670.00	486.46	500.03		500.10	0.000178	2.74	4472.18	626.11	0.14
Upper Rockway	Reach 1	16198	25 yr	7670.00	485.50	499.85		500.01	0.000170	4.02	3771.51	592.88	0.21
Upper Rockway	Reach 1	15534	25 yr	7670.00	487.10	499.64		499.87	0.000260	4.77	4303.16	786.70	0.25
Upper Rockway	Reach 1	15227	25 yr	7670.00	487.03	499.61	494.09	499.78	0.000201	4.17	4539.46	672.54	0.22
Upper Rockway	Reach 1	14812	25 yr	7670.00	487.00	499.12	495.67	499.61	0.000686	6.22	2196.50	523.46	0.47
Upper Rockway	Reach 1	14396	25 yr	7670.00	486.80	499.15		499.33	0.000323	4.63	5264.63	972.52	0.27
Upper Rockway	Reach 1	13995	25 yr	7670.00	486.60	498.90	494.28	499.18	0.000369	5.20	3791.39	598.34	0.29
Upper Rockway	Reach 1	13603	25 yr	7670.00	486.50	498.49	494.41	498.98	0.000557	5.98	2159.81	392.07	0.35
Upper Rockway	Reach 1	12986	25 yr	7670.00	486.15	498.00	495.32	498.57	0.000801	7.19	2783.19	560.48	0.41
Upper Rockway	Reach 1	12640	25 yr	7670.00	485.30	497.99		498.26	0.000505	5.37	3838.02	922.85	0.33
Upper Rockway	Reach 1	12286	25 yr	7670.00	485.02	498.02		498.13	0.000137	3.42	6275.26	1211.12	0.18
Upper Rockway	Reach 1	11970	25 yr	7670.00	484.70	498.02		498.08	0.000078	2.24	5285.89	1106.41	0.13
Upper Rockway	Reach 1	11265	25 yr	7670.00	484.26	497.57		497.95	0.000554	6.54	4826.32	1017.98	0.36
Upper Rockway	Reach 1	10819	25 yr	7670.00	483.10	497.49		497.60	0.000296	4.37	5979.54	1253.82	0.25
Upper Rockway	Reach 1	10176	25 yr	7670.00	482.80	496.38	494.62	497.21	0.001400	8.73	2686.39	725.69	0.54
Den Brook	Den Brook	2803	25 yr	1140.00	491.40	506.32	496.69	506.33	0.000009	0.57	1768.02	274.93	0.03
Den Brook	Den Brook	2644	25 yr	1140.00	491.50	506.31	497.35	506.32	0.000024	0.95	1200.06	184.55	0.05
Den Brook	Den Brook	2355	25 yr	1140.00	496.36	506.23	502.70	506.29	0.000245	2.22	599.59	184.34	0.14
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	25 yr	1140.00	495.27	506.04	501.29	506.09	0.000154	1.87	686.45	171.86	0.11
Den Brook	Den Brook	2040.19	25 yr	1140.00	494.89	505.98	499.24	506.04	0.000162	2.06	619.87	138.42	0.12
Den Brook	Den Brook	1800	25 yr	1140.00	494.30	505.99	499.12	506.00	0.000047	1.21	1601.11	235.89	0.07
Den Brook	Den Brook	1649.88	25 yr	1140.00	493.85	505.94	499.30	505.99	0.000096	2.01	888.85	200.94	0.12
Den Brook	Den Brook	1427	25 yr	1140.00	493.24	505.96	497.65	505.97	0.000013	0.94	2550.23	325.39	0.05
Den Brook	Den Brook	1182.22	25 yr	1140.00	493.21	505.96	497.09	505.96	0.000012	0.87	3141.48	399.37	0.04
Den Brook	Den Brook	1095	25 yr	1140.00	493.20	505.96	496.98	505.96	0.000010	0.79	3510.78	435.26	0.04
Den Brook	Den Brook	895.13	25 yr	1140.00	493.25	505.96	496.97	505.96	0.000009	0.73	4002.62	491.01	0.04
Den Brook	Den Brook	781	25 yr	1140.00	493.20	505.96	496.24	505.96	0.000005	0.50	4599.34	535.47	0.03
Den Brook	Den Brook	714	25 yr	1140.00	493.23	505.96	495.47	505.96	0.000002	0.35	9506.57	1198.87	0.02
Den Brook	Den Brook	313	25 yr	1140.00	494.80	505.89	498.59	505.94	0.000129	2.01	770.72	318.22	0.11
Den Brook	Den Brook	241		Bridge									

Alt-2b Sensitivity: Proposed Condition 25-year profile (continued)

HEC-RAS Plan: Alt_2b_s Profile: 25 yr (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Den Brook	Den Brook	214	25 yr	1140.00	495.50	505.33		505.38	0.000145	2.09	773.14	335.20	0.12
Den Brook	Den Brook	177	25 yr	1140.00	495.10	505.34		505.36	0.000057	1.48	1032.24	286.60	0.09

Alt-3: Proposed Condition 25-year profile

HEC-RAS Plan: Alt_3 Profile: 10 yr

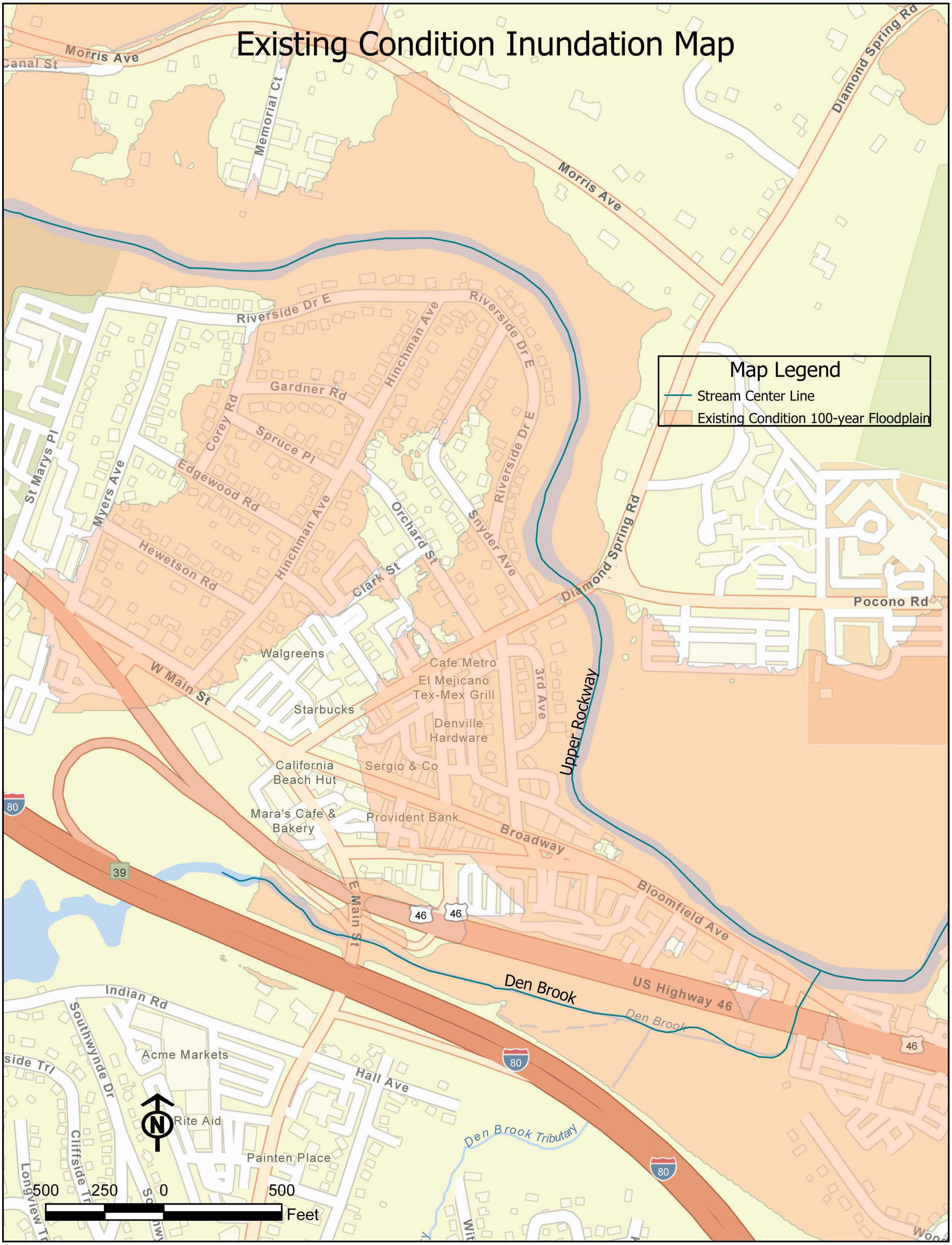
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Upper Rockway	Reach 2	35627	10 yr	4380.00	497.00	509.23	504.04	509.54	0.001524	4.69	1128.39	418.56	0.27
Upper Rockway	Reach 2	35454 I-80 Bridge		Bridge									
Upper Rockway	Reach 2	35305	10 yr	4380.00	497.00	508.48	504.61	509.00	0.002967	6.03	870.18	195.78	0.36
Upper Rockway	Reach 2	34907	10 yr	4380.00	495.00	507.72	501.99	508.07	0.001481	4.85	954.12	226.98	0.27
Upper Rockway	Reach 2	34829 Savage Street Br		Bridge									
Upper Rockway	Reach 2	34768	10 yr	4380.00	493.17	507.55	499.70	507.83	0.001069	4.35	1106.11	458.73	0.22
Upper Rockway	Reach 2	34260	10 yr	4380.00	497.00	507.16	502.65	507.23	0.000774	2.87	3144.89	1012.72	0.17
Upper Rockway	Reach 2	33542	10 yr	4380.00	496.60	506.59	501.97	506.64	0.000864	2.57	3294.29	2314.83	0.15
Upper Rockway	Reach 2	33071	10 yr	4380.00	496.30	506.35	501.18	506.52	0.000110	1.14	2764.96	662.51	0.06
Upper Rockway	Reach 2	32459	10 yr	4380.00	495.00	506.21		506.35	0.001207	3.49	2027.11	405.88	0.20
Upper Rockway	Reach 2	31982	10 yr	4380.00	494.80	506.09		506.12	0.000211	1.77	4816.85	1364.83	0.10
Upper Rockway	Reach 2	31440	10 yr	4380.00	495.10	506.00		506.01	0.000156	1.49	6118.02	2241.01	0.08
Upper Rockway	Reach 2	30872	10 yr	4380.00	494.50	505.75		505.85	0.000609	3.02	2207.56	635.79	0.17
Upper Rockway	Reach 2	29983	10 yr	4380.00	495.90	503.90	500.88	504.55	0.004344	6.44	680.11	168.86	0.43
Upper Rockway	Reach 2	29917 Diamond Rd Bridg		Bridge									
Upper Rockway	Reach 2	29840	10 yr	4380.00	496.20	503.52		503.84	0.002902	4.89	1103.93	514.65	0.35
Upper Rockway	Reach 2	29364	10 yr	4380.00	491.57	502.41		502.71	0.001909	4.88	1270.58	496.45	0.29
Upper Rockway	Reach 2	28772	10 yr	4380.00	490.47	502.22		502.25	0.000347	2.07	3379.94	901.45	0.12
Upper Rockway	Reach 2	28164	10 yr	4380.00	483.10	502.17		502.18	0.000048	1.09	5299.31	1153.30	0.05
Upper Rockway	Reach 1	27584	10 yr	5100.00	490.50	502.14		502.16	0.000041	1.63	7429.12	1980.73	0.10
Upper Rockway	Reach 1	26406	10 yr	5100.00	491.10	501.95		502.06	0.000193	3.48	3549.11	816.07	0.21
Upper Rockway	Reach 1	25969	10 yr	5100.00	491.10	501.88		501.98	0.000178	3.32	3513.42	730.63	0.20
Upper Rockway	Reach 1	25258	10 yr	5100.00	491.70	501.69		501.84	0.000224	3.66	2575.45	415.04	0.22
Upper Rockway	Reach 1	25058.0*	10 yr	5100.00	491.85	501.70		501.79	0.000100	2.62	2539.25	367.19	0.15
Upper Rockway	Reach 1	24816	10 yr	5100.00	492.29	500.39	498.15	501.62	0.001572	8.89	573.48	161.63	0.58
Upper Rockway	Reach 1	24775 Pocono Road Brid		Bridge									
Upper Rockway	Reach 1	24725	10 yr	5100.00	492.60	500.87	498.77	501.26	0.000104	5.50	1182.99	358.74	0.40
Upper Rockway	Reach 1	24579.6*	10 yr	5100.00	491.36	501.05	497.18	501.15	0.000107	2.42	2392.08	488.67	0.15
Upper Rockway	Reach 1	24289	10 yr	5100.00	490.00	500.87	497.83	501.10	0.000211	3.58	1649.79	305.02	0.21
Upper Rockway	Reach 1	24039.0*	10 yr	5100.00	489.77	500.83	497.51	501.03	0.000325	4.57	2169.25	499.80	0.27
Upper Rockway	Reach 1	23747	10 yr	5100.00	489.50	500.90	495.85	500.91	0.000030	1.35	6412.67	1592.40	0.08
Upper Rockway	Reach 1	23720 Access Road Brid		Bridge									
Upper Rockway	Reach 1	23679	10 yr	5100.00	489.45	500.88		500.90	0.000065	1.91	6728.15	1741.12	0.12
Upper Rockway	Reach 1	23379.0*	10 yr	5100.00	489.07	500.82	496.85	500.87	0.000125	2.61	6517.65	1739.89	0.16
Upper Rockway	Reach 1	22916	10 yr	5100.00	485.17	500.79	493.23	500.83	0.000053	2.17	6847.64	1666.12	0.11
Upper Rockway	Reach 1	22166	10 yr	5100.00	486.19	500.68	495.04	500.77	0.000118	2.94	5718.63	1122.88	0.16
Upper Rockway	Reach 1	21587	10 yr	5100.00	483.10	500.57	492.34	500.70	0.000108	3.24	4252.51	1135.84	0.16
Upper Rockway	Reach 1	21543	10 yr	5100.00	483.10	500.45	492.35	500.68	0.000181	3.95	1986.05	963.17	0.20
Upper Rockway	Reach 1	21426	10 yr	5100.00	483.10	500.52		500.63	0.000103	2.99	4385.58	814.70	0.15
Upper Rockway	Reach 1	20749	10 yr	5100.00	487.90	500.38		500.53	0.000173	3.70	3236.62	877.18	0.20
Upper Rockway	Reach 1	20087	10 yr	5100.00	487.66	500.24		500.41	0.000203	3.81	2871.62	429.27	0.22
Upper Rockway	Reach 1	18962	10 yr	5100.00	487.40	499.98		500.14	0.000288	4.13	2685.41	458.09	0.25
Upper Rockway	Reach 1	18040	10 yr	5100.00	487.82	499.71		499.84	0.000319	3.55	2334.55	400.96	0.20
Upper Rockway	Reach 1	17740.0*	10 yr	5100.00	487.64	499.62		499.77	0.000174	3.49	2656.41	406.82	0.20
Upper Rockway	Reach 1	17348	10 yr	5100.00	487.40	498.34	494.81	499.33	0.004908	7.99	647.15	199.21	0.47
Upper Rockway	Reach 1	17322 Bush Road Bridge		Bridge									
Upper Rockway	Reach 1	17257	10 yr	5100.00	485.76	498.44	494.46	498.61	0.000269	3.78	2459.30	509.26	0.24
Upper Rockway	Reach 1	16961.9*	10 yr	5100.00	486.47	498.31		498.51	0.000407	4.43	2297.89	584.60	0.29
Upper Rockway	Reach 1	16675	10 yr	5100.00	486.46	498.33		498.39	0.000167	2.41	3425.72	608.88	0.13
Upper Rockway	Reach 1	16198	10 yr	5100.00	485.50	498.17		498.31	0.000158	3.50	2793.25	572.16	0.19
Upper Rockway	Reach 1	15534	10 yr	5100.00	487.10	497.96		498.17	0.000261	4.29	3005.28	759.71	0.24
Upper Rockway	Reach 1	15227	10 yr	5100.00	487.03	497.95	492.47	498.08	0.000177	3.51	3445.83	646.32	0.20
Upper Rockway	Reach 1	14812	10 yr	5100.00	487.00	497.52	494.47	497.92	0.000628	5.54	1463.38	387.11	0.36
Upper Rockway	Reach 1	14396	10 yr	5100.00	486.80	497.49		497.66	0.000352	4.24	3684.02	929.41	0.27
Upper Rockway	Reach 1	13995	10 yr	5100.00	486.60	497.31	493.24	497.52	0.000328	4.36	2866.24	566.41	0.27
Upper Rockway	Reach 1	13603	10 yr	5100.00	486.50	497.03	493.30	497.35	0.000460	4.83	1623.73	317.24	0.31
Upper Rockway	Reach 1	12986	10 yr	5100.00	486.15	496.51	493.79	496.98	0.000766	6.27	1965.38	540.53	0.39
Upper Rockway	Reach 1	12640	10 yr	5100.00	485.30	496.45		496.70	0.000541	4.85	2523.31	785.78	0.33
Upper Rockway	Reach 1	12286	10 yr	5100.00	485.02	496.48		496.57	0.000126	2.97	4447.57	1116.25	0.17
Upper Rockway	Reach 1	11970	10 yr	5100.00	484.70	496.46		496.52	0.000097	2.21	3673.53	983.66	0.14
Upper Rockway	Reach 1	11265	10 yr	5100.00	484.26	496.06		496.38	0.000516	5.69	3385.75	897.09	0.34
Upper Rockway	Reach 1	10819	10 yr	5100.00	483.10	495.93		496.05	0.000344	4.18	4098.38	1134.98	0.26
Upper Rockway	Reach 1	10176	10 yr	5100.00	482.80	494.94	493.52	495.64	0.001400	7.67	1754.65	574.70	0.52
Den Brook	Den Brook	2803	10 yr	720.00	491.40	504.06	495.60	504.07	0.000008	0.63	1299.27	260.15	0.03
Den Brook	Den Brook	2644	10 yr	720.00	491.50	504.05	495.97	504.07	0.000019	1.00	880.88	161.36	0.05
Den Brook	Den Brook	2355	10 yr	720.00	496.36	503.79	501.77	503.99	0.000623	4.15	240.72	105.90	0.29
Den Brook	Den Brook	2302		Bridge									
Den Brook	Den Brook	2240	10 yr	720.00	495.27	502.84	499.87	503.05	0.000616	3.70	218.28	98.90	0.27
Den Brook	Den Brook	1800	10 yr	720.00	494.30	502.84		502.86	0.000074	1.59	916.29	204.97	0.10
Den Brook	Den Brook	1427	10 yr	720.00	493.24	502.84		502.85	0.000014	0.77	2101.29	412.57	0.05
Den Brook	Den Brook	1095	10 yr	720.00	493.20	502.84		502.84	0.000013	0.75	2321.48	361.84	0.05
Den Brook	Den Brook	781	10 yr	720.00	493.20	502.84		502.84	0.000006	0.47	3018.55	533.01	0.03
Den Brook	Den Brook	714	10 yr	720.00	493.23	502.84		502.84	0.000003	0.35	5894.15	1253.01	0.02
Den Brook	Den Brook	314	10 yr	720.00	494.81	502.57	498.30	502.77	0.000612	3.63	198.50	38.61	0.26
Den Brook	Den Brook	241		Bridge									
Den Brook	Den Brook	216	10 yr	720.00	495.50	501.84	500.89	502.49	0.003572	6.56	111.93	50.45	0.57
Den Brook	Den Brook	178	10 yr	720.00	495.16	502.10		502.20	0.000331	2.61	306.23	116.73	0.19

EXHIBIT - 3
INNUNDATION MAPPING FOR EXISTING AND PROJECT CONDITION

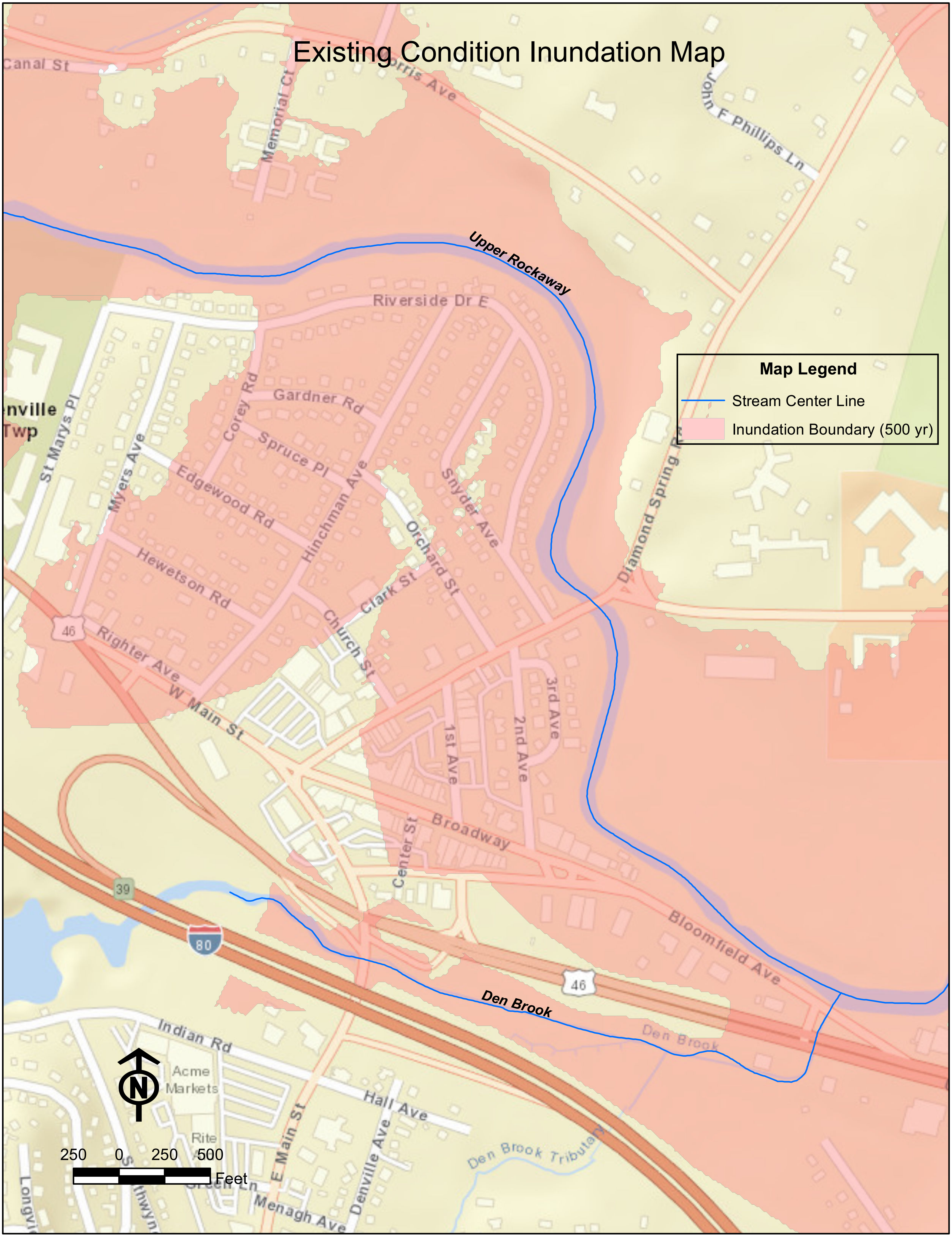
Existing Condition Inundation Map

Existing Condition Inundation Map

Existing Condition Inundation Map



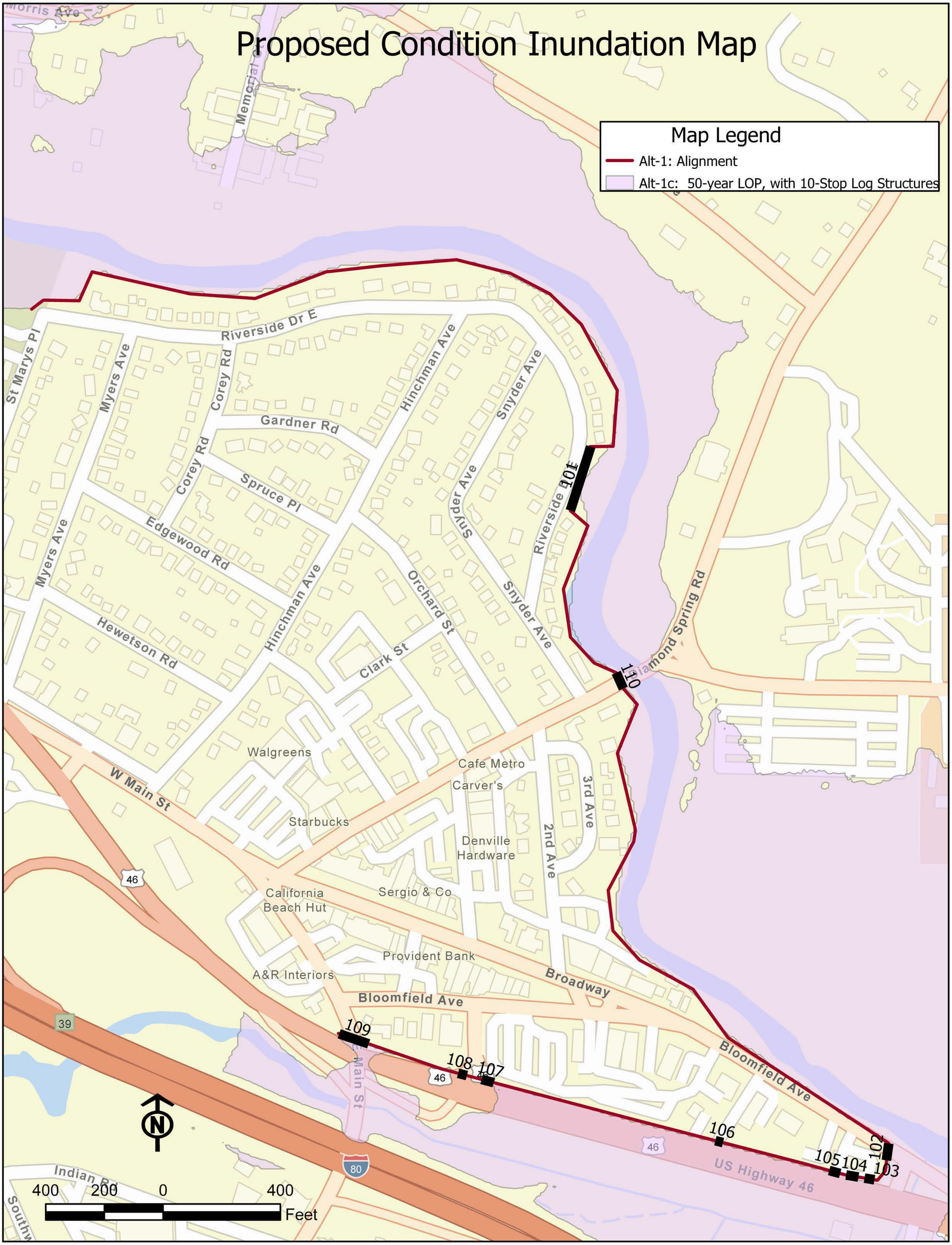
Existing Condition Inundation Map



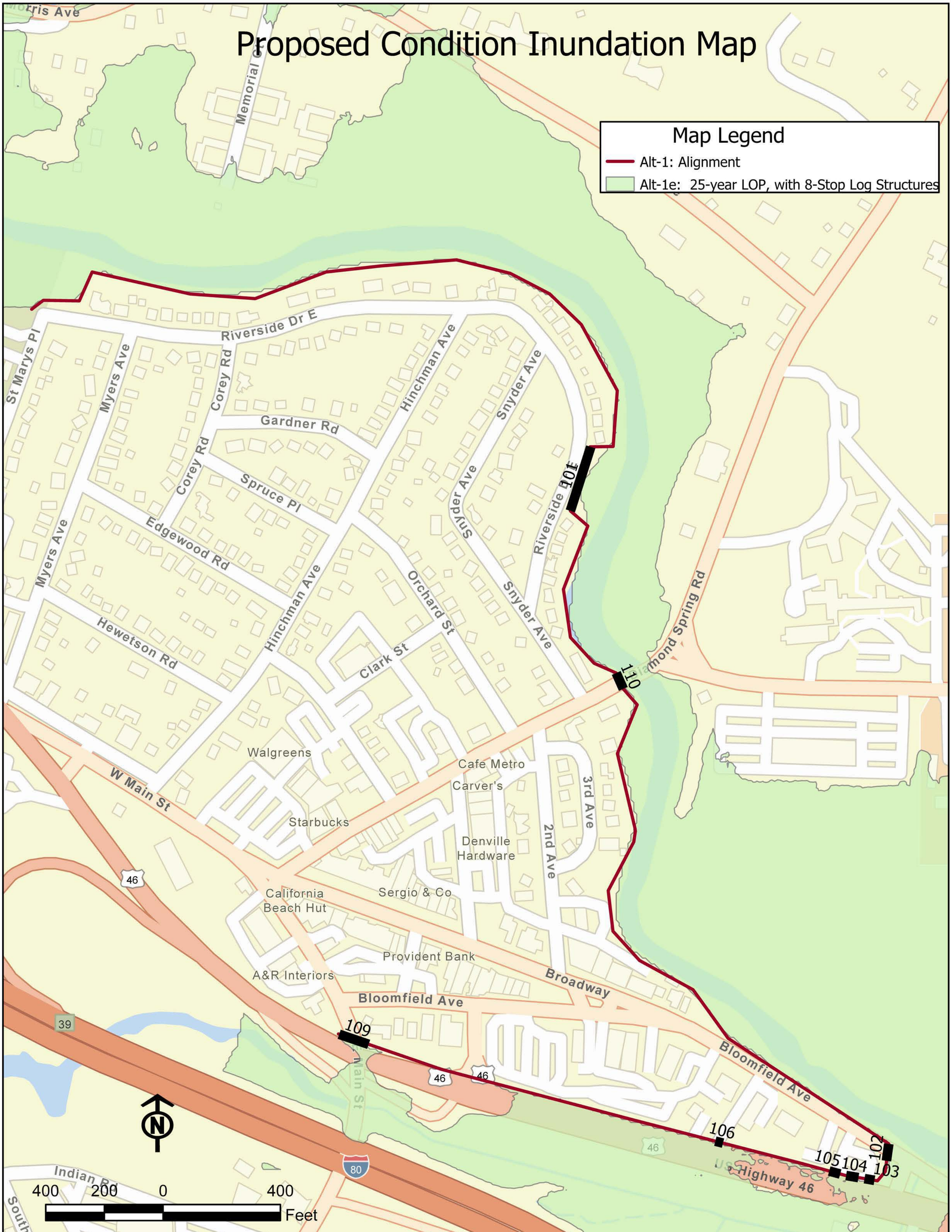
Proposed Condition Inundation Map

Proposed Condition Inundation Map

Proposed Condition Inundation Map



Proposed Condition Inundation Map

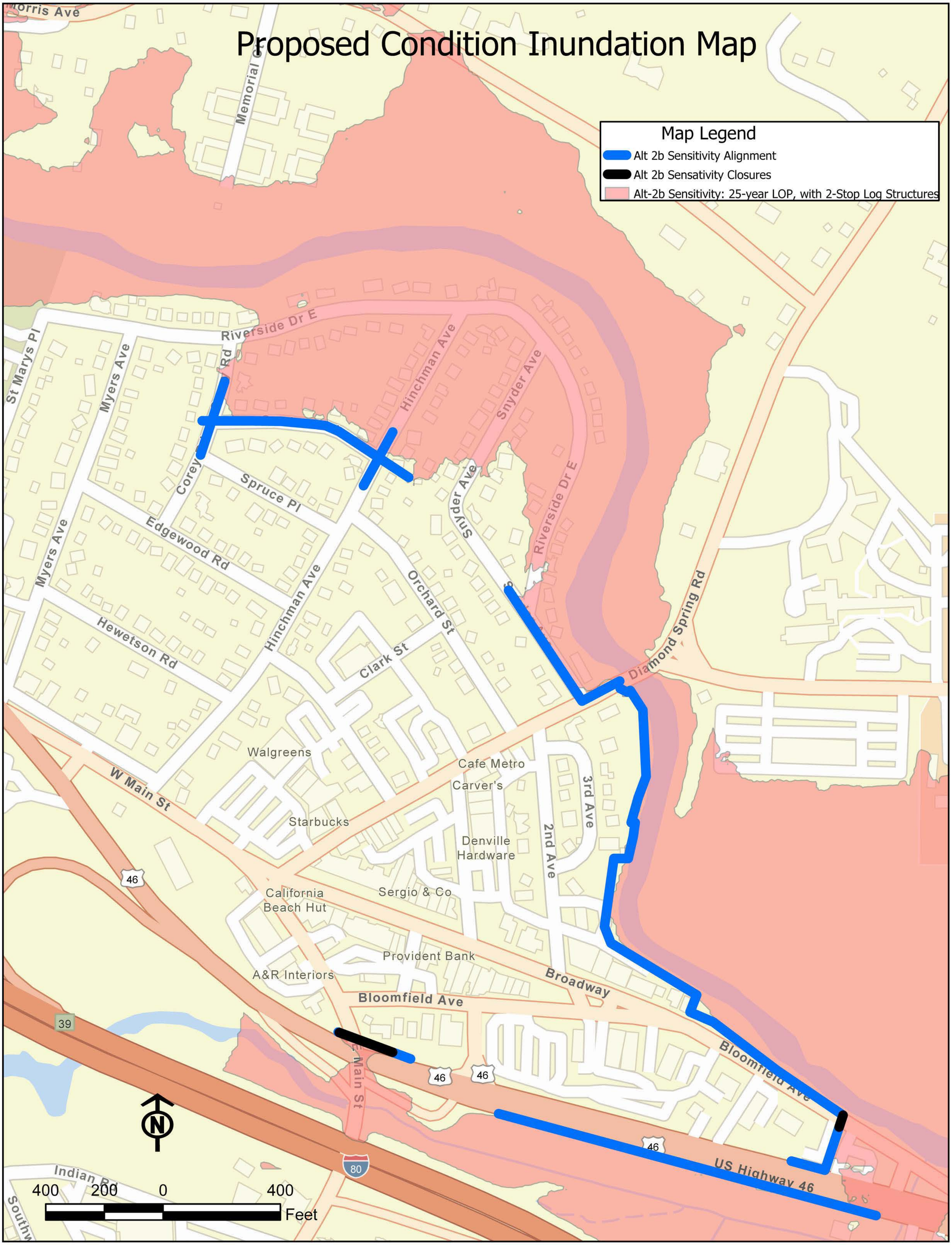


Proposed Condition Inundation Map
Map Legend
Alt-1: Alignment
Alt-1e: 25-year LOP, with 8-Stop Log Structures
Riverside Dr E
St Marys Pl
Myers Ave
Corey Rd
Gardner Rd
Hinchman Ave
Snyder Ave
Spruce Pl
Edgewood Rd
Hewetson Rd
Orchard St
Clark St
Riverside Dr
Diamond Spring Rd
W Main St
Walgreens
Cafe Metro
Carver's
Starbucks
Denville Hardware
3rd Ave
2nd Ave
California Beach Hut
Sergio & Co
Provident Bank
A&R Interiors
Broadway
Bloomfield Ave
Highway 46
Main St
Indian Rd
101
102
103
104
105
106
109
110
46
39
80
N
400 200 0 400
Feet

Proposed Condition Inundation Map

Proposed Condition Inundation Map

Proposed Condition Inundation Map



Proposed Condition Inundation Map
Map Legend
Alt 2b Sensitivity Alignment
Alt 2b Sensativity Closures
Alt-2b Sensitivity: 25-year LOP, with 2-Stop Log Structures
Morris Ave
Memorial
Riverside Dr E
St Marys Pl
Myers Ave
Corey Rd
Hinchman Ave
Snyder Ave
Spruce Pl
Edgewood Rd
Hewetson Rd
Orchard St
Clark St
Diamond Spring Rd
Walgreens
Cafe Metro
Carver's
3rd Ave
2nd Ave
Starbucks
Denville Hardware
W Main St
California Beach Hut
Sergio & Co
Provident Bank
A&R Interiors
Broadway
Bloomfield Ave
E Main St
US Highway 46
46
39
80
Indian Rd
400 200 0 400
Feet
N

Proposed Condition Inundation Map

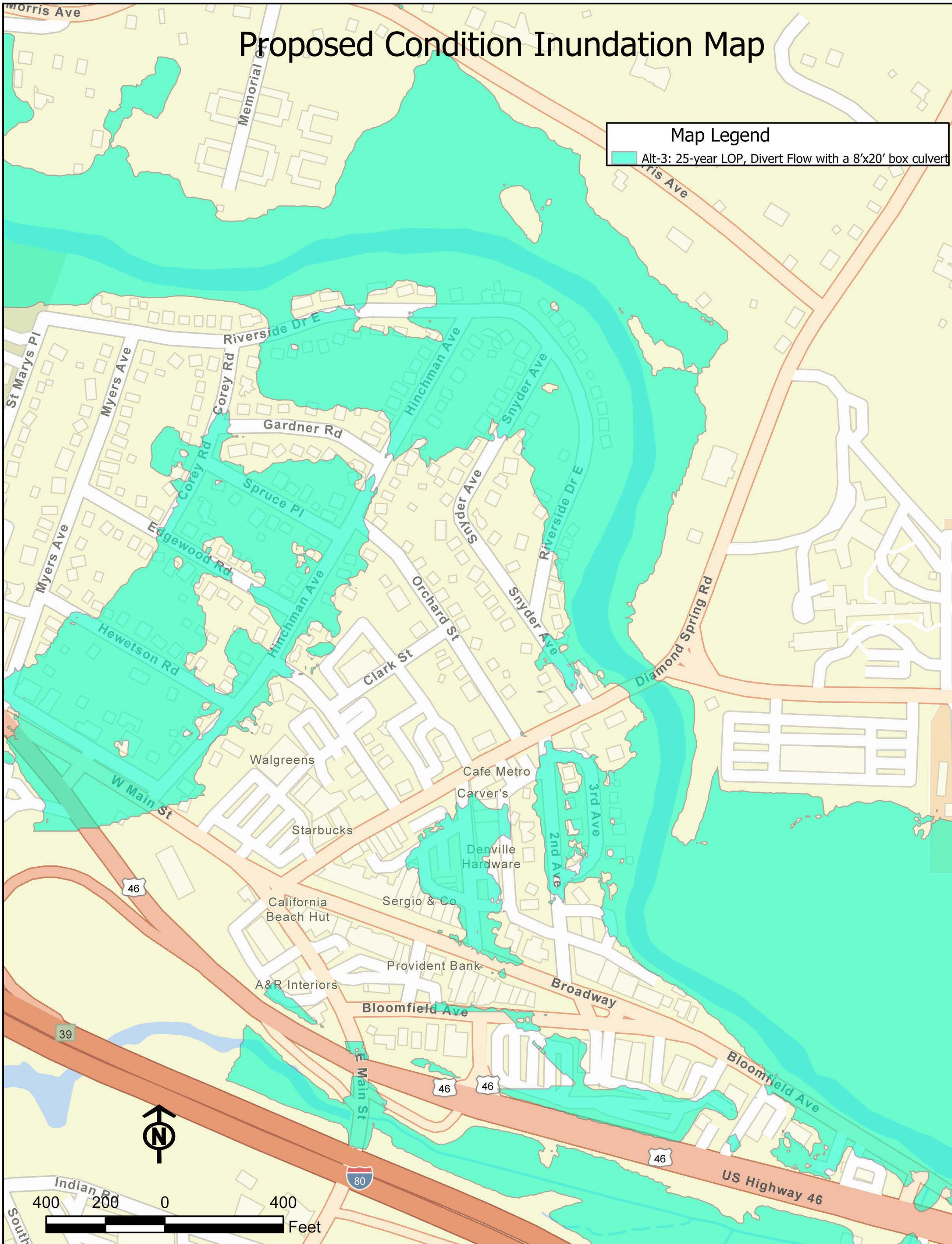
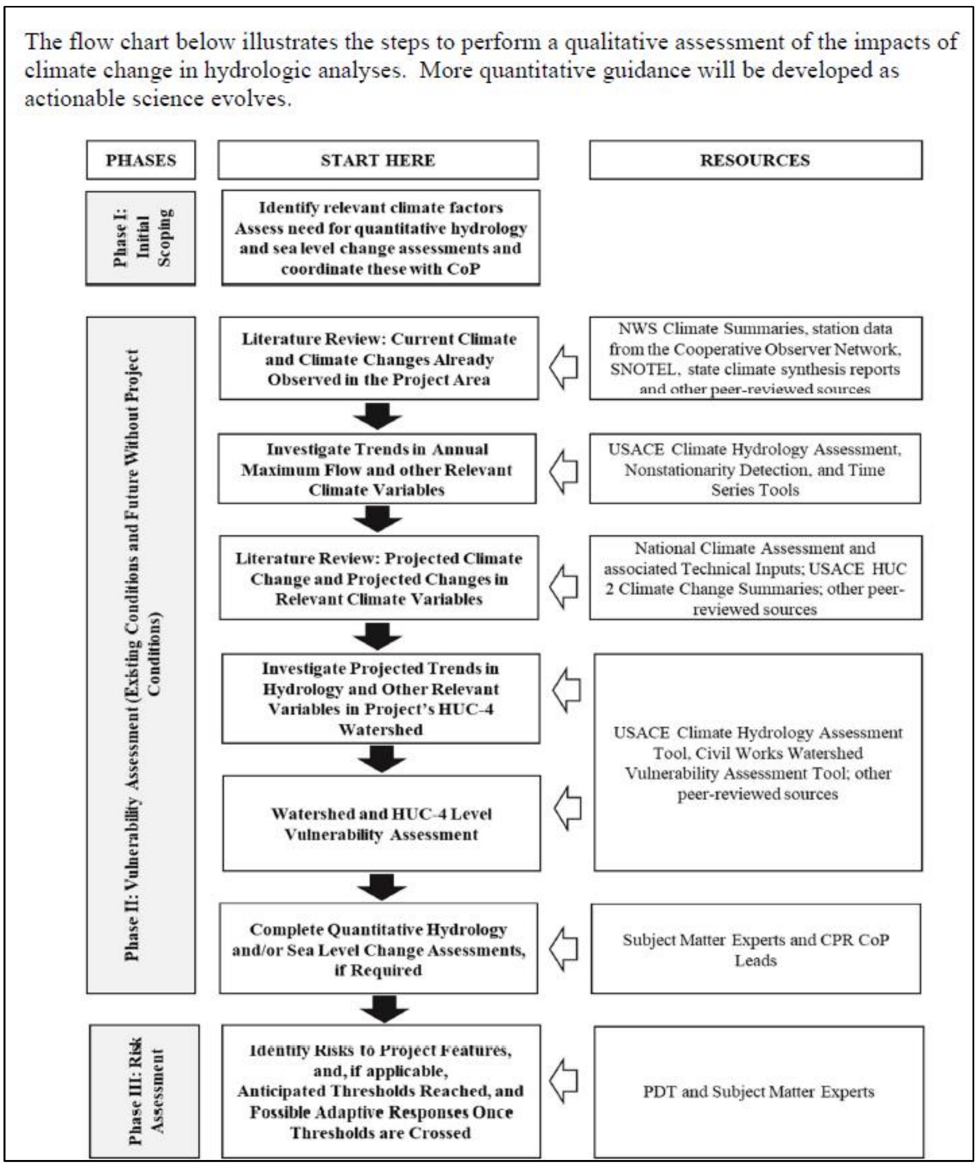


EXHIBIT – 4
CLIMATE CHANGE ASSESSMENTS
DENVILLE, NJ CAP 205 STUDY

Introduction

Engineering and Construction Bulletin (ECB) 2018-14 (rev2) requires USACE studies to provide a qualitative description of climate change impacts to inland hydrology and/or sea level change assessments as necessary. ECB 2018-14 stipulates that for project areas at elevations less than or equal to 50 feet NAVD88, a determination should be made as to whether sea level rise will affect the river stage by increasing (or decreasing) water surface elevation downstream of the project area. The entire project area is away from New Jersey coast and above 50 feet NAVD88. The lowest ground elevation is 480.2 ft NAVD88. Therefore, sea level rise assessment is not necessary for this FRM study.

The objective of ECB 2018-14 is to enhance USACE climate preparedness and resilience by incorporating relevant information about observed and expected inland hydrology climate change impacts in project analyses for new, and existing USACE projects.



Above is from ECB 2018-14 (rev2)

ECB 2018-14 requires at a minimum, a qualitative assessment of potential climate change threats and impacts that may be relevant to the recommended plan for the Denville, New Jersey Flood Risk Management (FRM) Study. Accordingly, the qualitative assessment will focus on the Tentatively Selected Plan - non-structural plan including 84 structures being elevated and 11 structure being flood proofed in the Township of Denville.

Scope of Qualitative Analysis

A qualitative analysis will provide the necessary information to support the assessment of climate change risk and uncertainties for the Denville, New Jersey Flood Risk Management (FRM) Study. The relevant climate variables identified for this study are precipitation, temperature, and streamflow.

Literature Review

The Fourth National Climate Assessment (NCA4) and the USACE's Civil Works Technical Report CWTS-2015-09, as well as state-specific resources published by the National Oceanic and Atmospheric Administration (NOAA are the basis for this literature review. The NCA4 considers climate change research at both a national and regional scale (USGCRP 2018). Civil Works Technical Report CWTS-2015-09 was published by USACE in 2015 as part of a series of regional summary reports covering peer-reviewed climate literature. The 2015 USACE Technical Reports cover 2-digit, United States Geological Survey (USGS), hydrologic unit code (HUC) watersheds in the United States (U.S). The project area is located in 2-digit HUC 02, the Mid-Atlantic Region (USACE 2015) and in the NCA4 Northeast region.

These references summarize trends in historic and observed temperature, precipitation, and streamflow records, as well as provide an indication of future hydrometeorology based on the outputs from Global Climate Models (GCMs). In this assessment, background on observed and projected temperature and precipitation is provided as context for the impact they have on observed and projected streamflow. Temperature, precipitation, and streamflow measurements have been taken since the late 1800s and provide insight into how the climate has changed over the past century. GCMs are used in combination with different representative concentration pathways (RCPs) reflecting projected radiative forcings up to year 2100. Radiative forcings encompass the change in net radiative flux due to external drivers of climate change, such as changes in carbon dioxide or land use/land cover. GCMs are used to approximate future temperature and precipitation. Projected temperature and precipitation time series can be transformed to regional and local scales (a process called downscaling). Downscaled time series can then be applied as inputs to macro-scale hydrologic models (Graham, Andreasson, and Carlsson, 2007).

Uncertainty is inherent to climate change modeling due to the coarse spatial scale of the GCMs and the many inputs and assumptions required to create climate changed projections (USGCRP 2017). When applied, precipitation-runoff models introduce an additional layer of uncertainty. However, these methods represent the best available science to predict future hydrologic variables (e.g. precipitation, temperature, streamflow). It is best practice to use multiple GCMs when studying climate change impacts to understand how various model assumptions impact results (Gleckler et al. 2008).

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can be transformed to regional and local scales (a process called downscaling). Downscaled time series can then be applied as inputs to macro-scale hydrologic models (Graham, Andreasson, and Carlsson, 2007).
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Precipitation

According to Fourth National Climate Assessment, historical precipitation differences across regions are apparent as increases have occurred in several regions and predominantly in the Northeast. A national average increase of 4% in annual precipitation since 1901 mostly a result of large increases in the fall season. Annual precipitation has increased by 5% to more than 15% in parts of the Northeast from the first half of the last century (1901–1960) compared to present day (1986–2015).

According to NOAA State Climate Summary for New Jersey, precipitation has been highly variable, with wetter than average conditions over the last decade. Winter and spring precipitation and extreme precipitation events are projected to increase in the future. Figure-1 shows observed precipitation variabilities in the past for the State of New Jersey. The dark horizontal lines represent the long-term average. Annual and summer precipitation has been above average during the most recent decade (2000– 2014), with record amounts of summer precipitation occurring between 2010 and 2014.

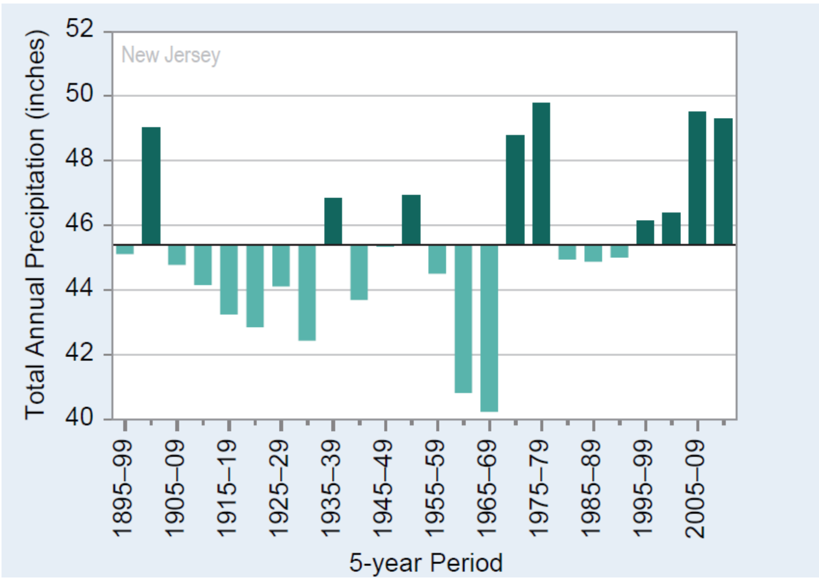

Figure 1 Observed Precipitation for the State of New Jersey

Regional changes in flood dynamics are likely to occur as a result of perturbations to precipitation and temperature conditions. Flood severity is a result of many interrelated factors including topography, soil moisture, precipitation amount, precipitation intensity, land cover, and others.

Temperature

According to Fourth National Climate Assessment, average temperatures have risen in many regions of the United States. On average, temperatures in the United States have increased between 1.2 and 1.8° Fahrenheit (F) since the early 20th Century (Figure 2). Annual average temperatures increased across the Northeast, with annual average ranges from less than 1°F in West Virginia to about 3°F or more in New England since 1901 (Runkle et al 2017a, Runkle et al 2017b). As shown in Figure 5, the temperatures in

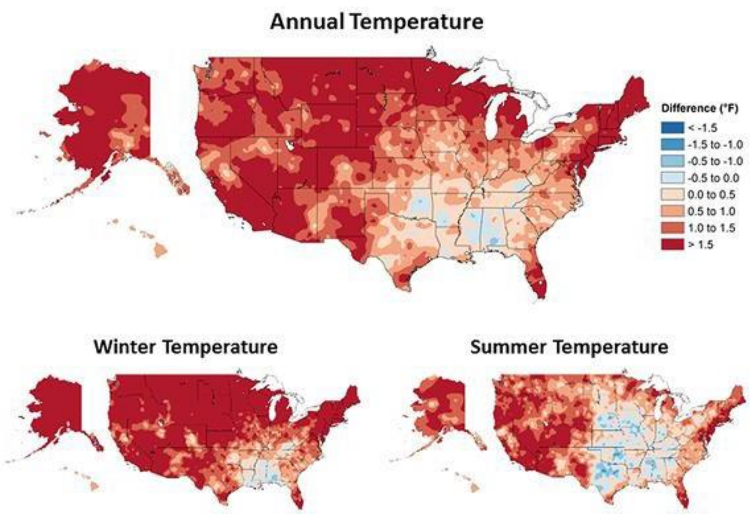

Figure 2 Observed Changes in Annual, Winter and Summer Temperature

much of the Northeast increased on average 1.5°F or more in winter. The average annual increase in the Northeast was 1.43°F.

According to NOAA State Climate Summary, average annual temperatures have increased by 3°F in New Jersey over the past century. Under a high emissions pathway, historically unprecedented warming is projected by the end of the 21st century. Heat Wave are projected to be more intense while cold waves are projected to be less intense.

The CHAT is also used to assess projected changes to annual maximum (by water year) 1-day total temparature for HUC 02030103 - Hackensack-Passaic. **Error! Reference source not found.** shows the range of precipitation output for the historic period (1951-2006) and future period (2006-2099) for the HUC 02030103 - Hackensack-Passaic watershed for the RCP 4.5 and 8.5 scenarios.

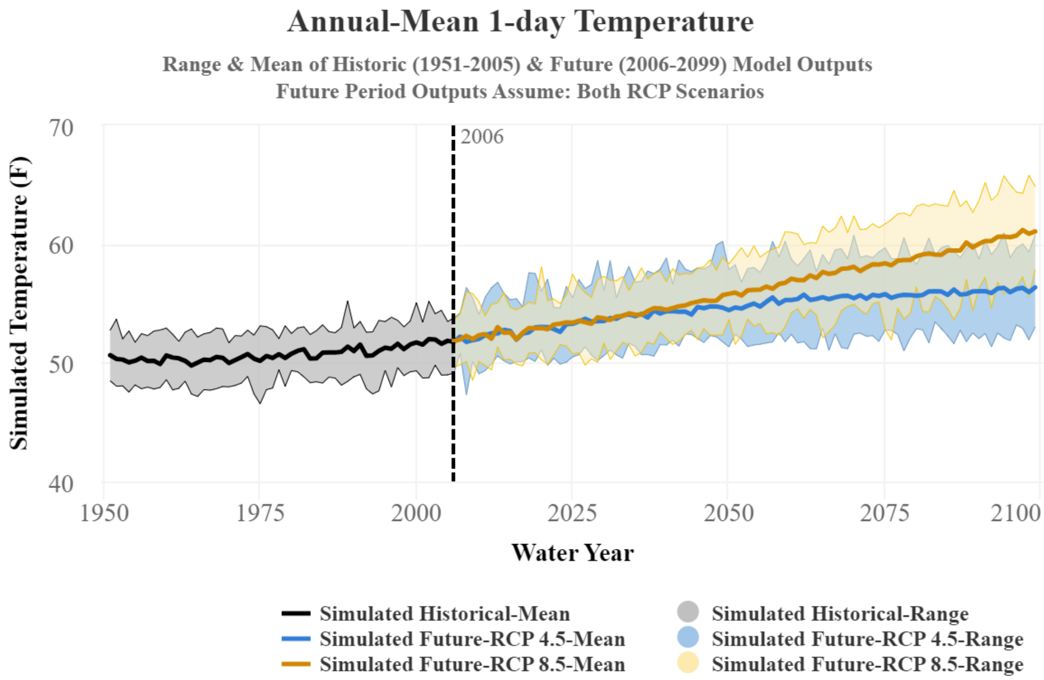

Figure 3 CHAT Analysis of Annual-Mean 1-day Temperature Trend for HUC 02030103 - Hackensack-Passaic watershed

Streamflow

The USACE Climate Hydrology Assessment Tool (CHAT) was used to Climate-modeled projected annual maximum monthly flow range. The CHAT was also used to investigate future changes in the range and mean of annual maximum monthly stream flows in hydrologic unit code 203, Lower Hudson- Long Island. The following map shows stream segment investigated with the CHAT tool:

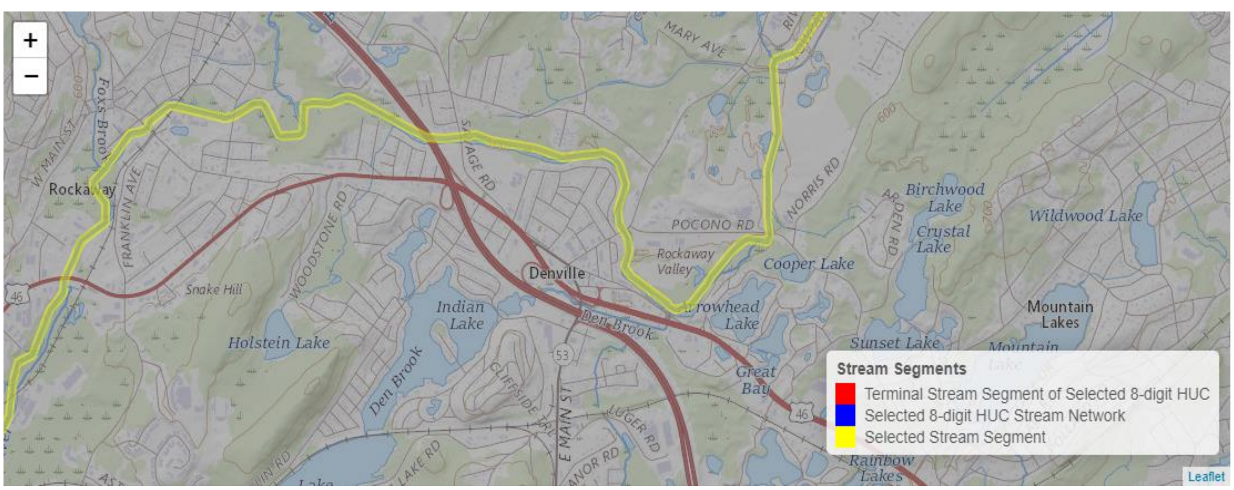

Figure 4 Stream Segment Selected for the CHAT Analysis

The mean and range of RCP 4.5 and RCP 8.5 Hydrology Model for Rockaway River flow is shown in Figure 5. The above figure displays the mean of the annual (water year based) time series derived from 32 CMIP5 based Global Climate Models (GCMs). The figures also display the inter-model spread. In the figures the bold line represents the inter-model mean and the shaded area represents the inter-model range (the inter-model minimum to the inter-model maximum). Different color schemes are

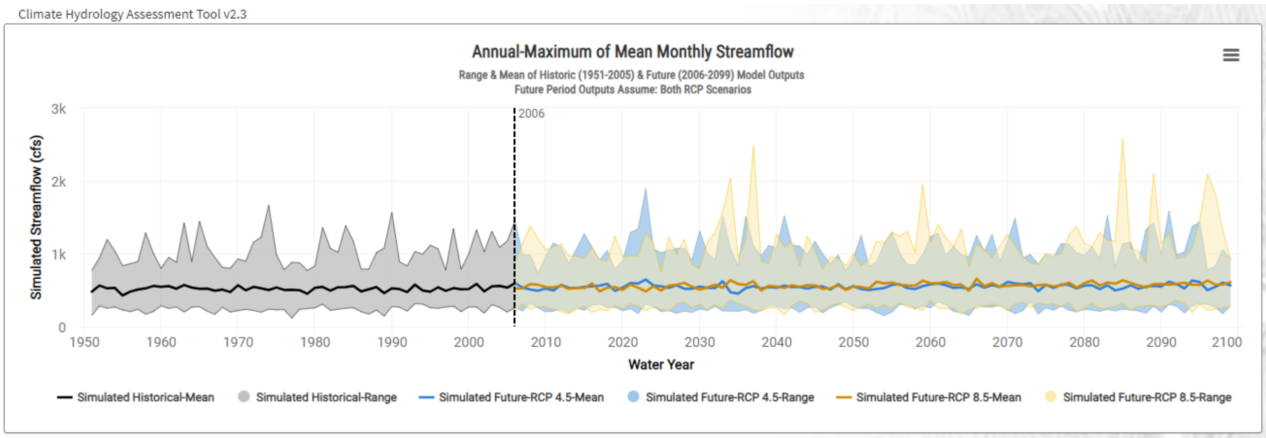

Figure 5 Annual Maximum of Mean Monthly Streamflow using CHAT tool for Stream segment ID: 02001233

applied to differentiate between the different time-periods and RCPs being modeled. For both the historic period and the future period, hydroclimatic outputs are generated using simulated GCM outputs, thus CHAT output should not be directly compared to observations. Runoff is displayed in CHAT for the selected stream segment of Rockaway River. Output displayed represents the cumulative runoff from all upstream segments, as well as local runoff contributions which reach the selected segment.

In addition to the overall watershed assessments using CHAT tool, we also analyzed gage data for USGS 01380450 Rockaway River at Main Street at Boonton NJ using Time Series Toolbox (TST) tool. The gage is located at bridge on West Main Street in Boonton, 0.8 mile upstream of Interstate 287 bridge and 1.5 mile upstream from Boonton reservoir. Period record for the gage is from 1937 through 2020.

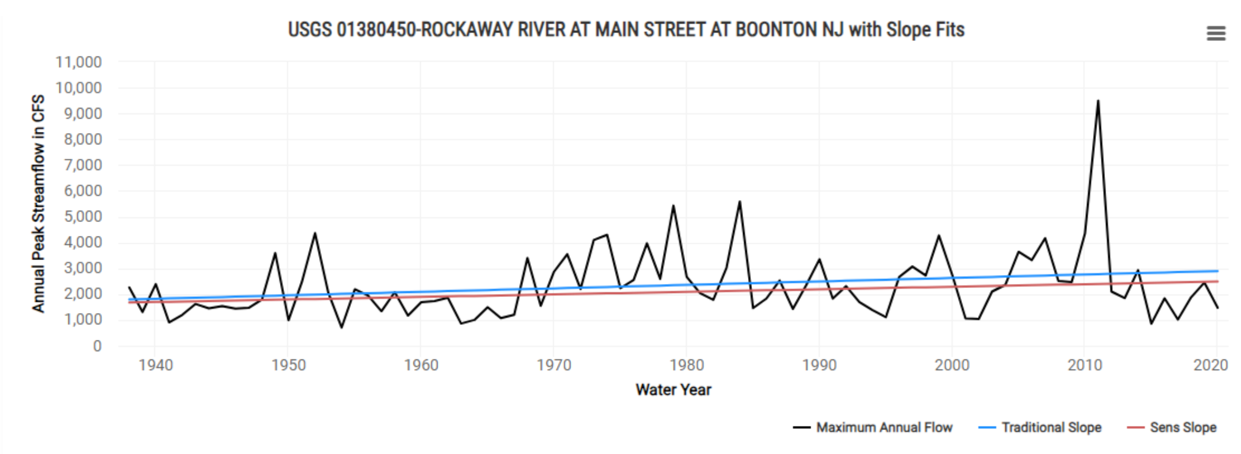

Figure 6 Streamflow trend for USGS 01380450 Rockaway River at Main Street at Boonton NJ

Results of the TST analysis of USGS gage record is shown in figure 6. A statistically significant increasing flow trend was detected by the t-test, Mann-Kendall test, and by Spearman Rank – Order test. Trend hypothesis test results are shown in the following table:

Trend Line Coefficients

Method	Directionality	Slope	Intercept
Traditional Slope	Positive	13	-24204
Sen's Slope	Positive	10	-17469

Trend Hypothesis Test

Test	P-Value
t-Test	0.026921
Mann-Kendall	0.021407
Spearman Rank-Order	0.01838

- **A statistically significant trend (at the alpha = .05 level) was detected by the t-Test.**
- **A statistically significant trend (at the alpha = .05 level) was detected by the Mann-Kendall Test.**
- **A statistically significant trend (at the alpha = .05 level) was detected by the Spearman Rank-Order Test.**

Table 1 Streamflow trend for USGS 01380450 Rockaway River at Main Street at Boonton NJ

Both CHAT tool trend lines show an increasing trend, however, this trend cannot be used to justify an increased streamflow for project design. Therefore, FWOP project condition stream flow will remain unchanged for design considerations.

The CHAT is also used to assess projected changes to annual maximum (by water year) 1-day total precipitation (rolling 1-day sum of daily accumulated precipitation) for HUC 02030103 - Hackensack-Passaic. **Error! Reference source not found.** shows the range of precipitation output for the historic period (1951-2006) and future period (2006-2099) for the HUC 02030103 - Hackensack-Passaic watershed for the RCP 4.5 and 8.5 scenarios.

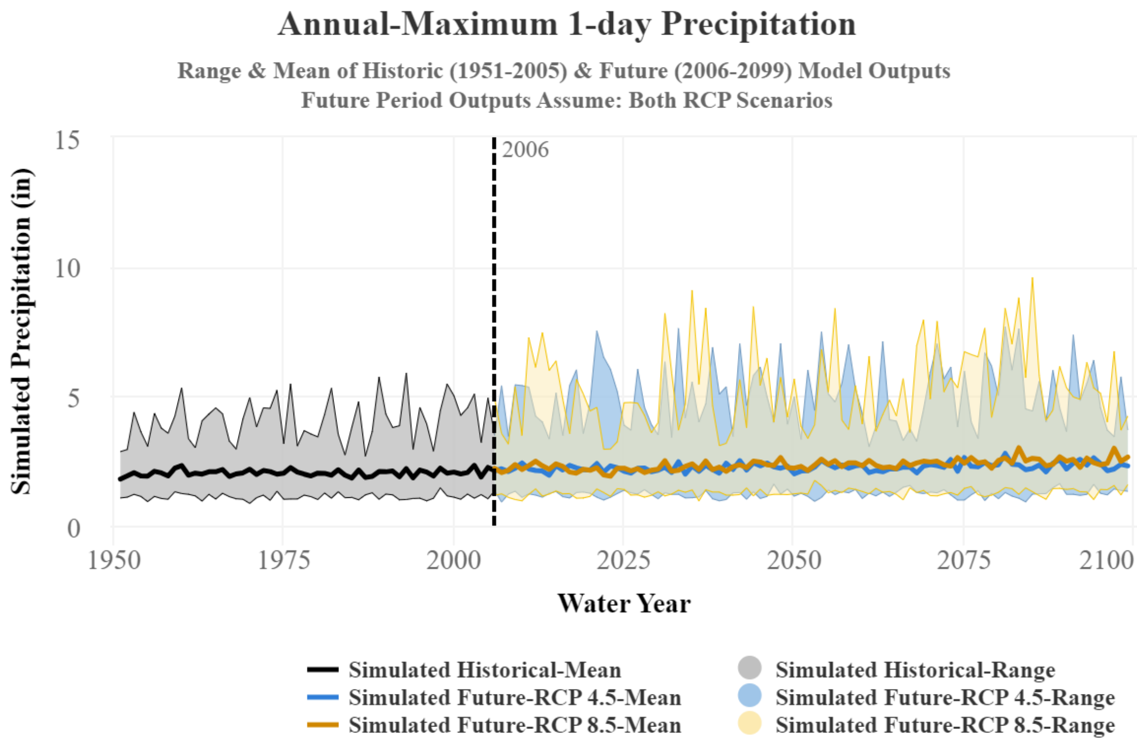

Figure 7 Precipitation trend for HUC 02030103 - Hackensack-Passaic

Non-stationarity Detection Tool

The USACE Non-stationarity Detection (NSD) Tool (USACE, 2016b) enables the user to apply a series of statistical tests to assess the stationarity of annual instantaneous peak streamflow data series at any United States Geological Survey (USGS) streamflow gage site with more than 30 years of annual instantaneous peak streamflow records through Water Year 2014. The tool helps practitioners in identifying continuous periods of statistically homogenous (stationary) annual instantaneous peak streamflow datasets that can be adopted for further hydrologic analysis. The tool also allows users to conduct monotonic trend analyses on the identified subsets of stationary flow records.

The NSD Tool for the Rockway River at the USGS gage site detected several non-stationarities starting around the mid 1960’s as shown in Figure 6. Non-stationarities indicate that past conditions may not represent future conditions. The non-stationarities that occurred for the gage were investigated but it was not determined why they have occurred. There is no dams/reservoirs within Morris County where Denville is located or factors within the region that may have caused these non-stationarities.

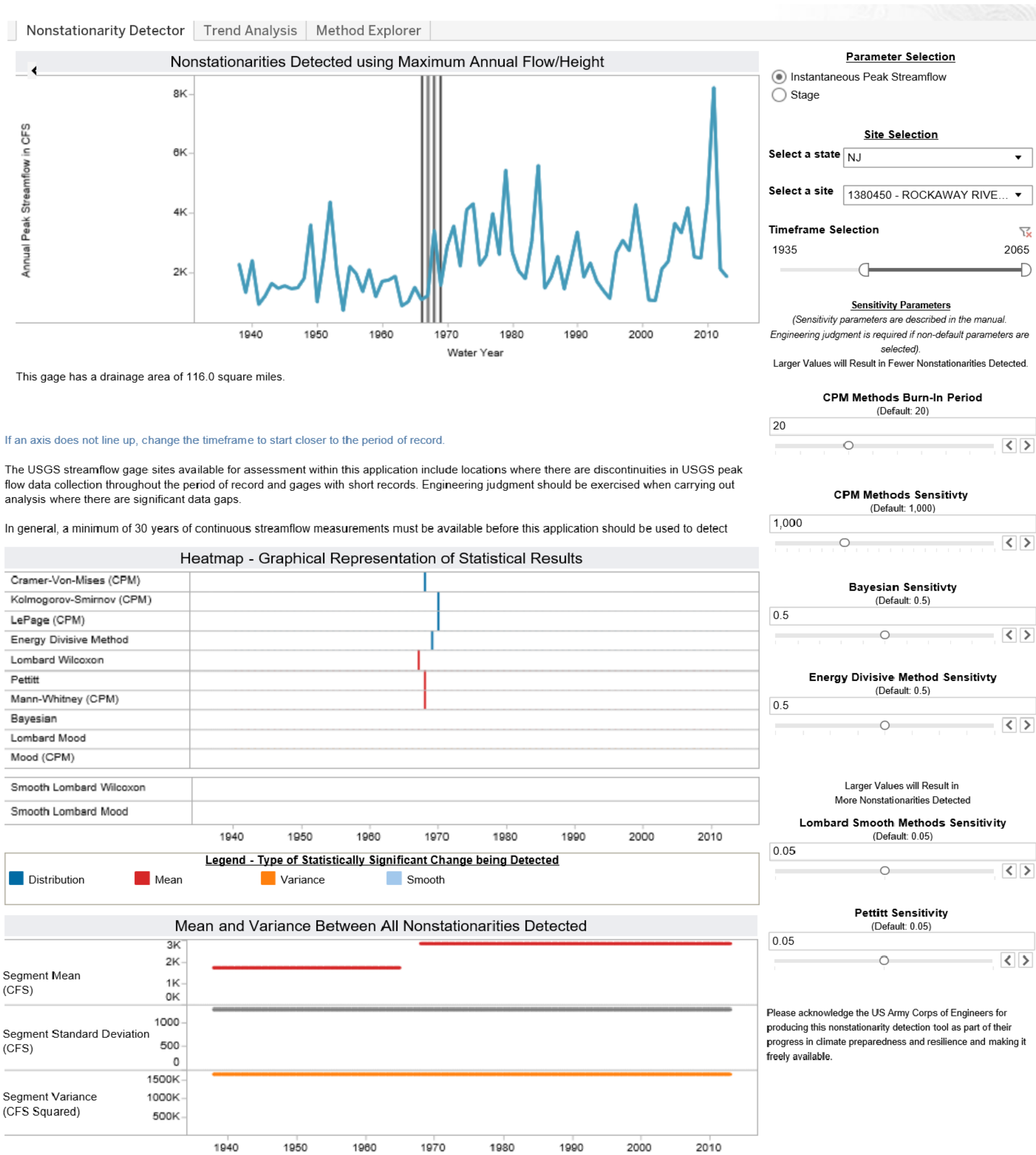

Figure 8 Non-Stationarity Detection (NSD) Tool Analysis for USGS 01380450 Rockaway River at Main Street at Boonton NJ

USACE Vulnerability Assessment

The USACE Watershed Climate Change Vulnerability Assessment (VA) Tool facilitates a screening-level, comparative assessment of the vulnerability for a selected USACE business line and 4-digit HUC watershed to the impacts of climate change, relative to the other 4-digit HUC watersheds within the continental United States (CONUS). It uses the Coupled Model Intercomparison Project (CMIP5) GCM-BCSD (Bias Corrected, Spatially Disaggregated) -VIC dataset (2014) to define projected hydrologic and meteorologic inputs, combined with other data types, to define a series of indicator variables to define a vulnerability score (USACE 2020b).

Vulnerabilities are represented by a weighted-order, weighted-average (WOWA) score generated for two subsets of simulations (wet—top 50% of cumulative runoff projections; and dry—bottom 50% cumulative runoff projections). Data are available for three epochs. The epochs include the historic period ("Base" epoch) and two 30-year, future epochs (centered on 2050 and 2085). The Base epoch is not based on projections and so it is not split into different scenarios. For this application, the tool was applied using its default, National Standards Settings. In the context of the VA Tool, there is some uncertainty in all of the inputs to the vulnerability assessments. Some of this uncertainty is reflected by the differences in results for each of the subset-epoch combinations.

As shown in Figure , the Lower Hudson-Long Island (HUC 0203) watershed is considered relatively vulnerable to climate change impacts for the flood risk reduction business line for two out of four epoch-subset combinations. HUC 0203 is not relatively vulnerable for the wet-2050 and wet-2085 subsets. A watershed is considered relatively vulnerable to climate change impacts if it has a vulnerability score that falls within the top 20% of WOWA scores for a given business line in the CONUS (includes all 4-digit HUCs for flood risk management).

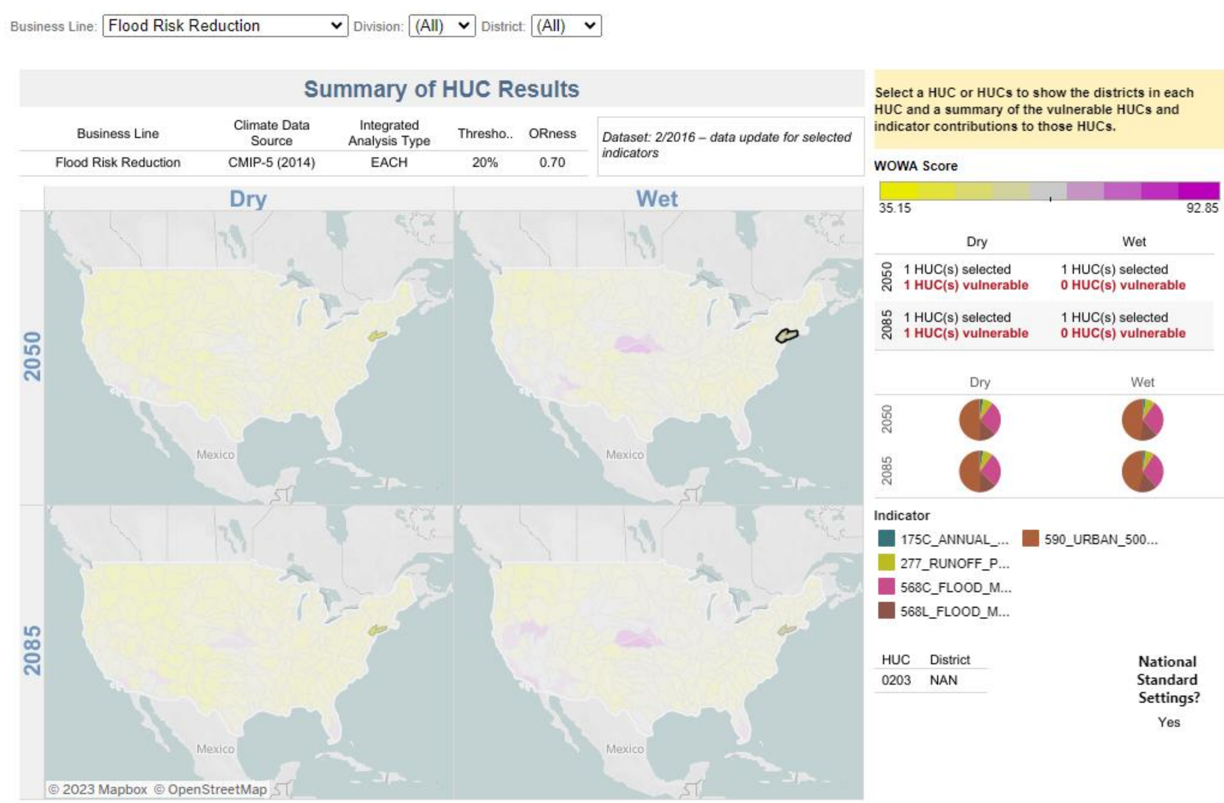

Figure 9 VA Tool 4-Digit HUC Summary: Lower Hudson-Long Island (HUC 0203)

Indicators used to compute the Flood Risk Reduction WOWA score include: the acres of urban area within the 500-year floodplain, the coefficient of variation in cumulative annual flow, runoff elasticity (ratio of streamflow runoff change to precipitation change), and two indicators of flood magnification (indicator of how much high flows are projected to change over time), one of which includes contributions from upstream watersheds and the other focused only on the change in flood magnitude within the selected 4-digit HUC.

As can be seen in Figure and

Table *2 VA Tool Output- HUC 0203 Lower Hudson-Long Island Watershed - Flood Risk Reduction Business Line*
, for the wet and dry scenarios, the dominant indicator contributing 46% or more to the Lower Hudson-Long Island' vulnerability score is urban area within the 500-year floodplain. The WOWA score changes by less than 5% between the 2050 and 2085 epochs for both the WET and DRY subsets. The percentage by which the indicator variable contributes to the VA score does not significantly change overtime.

Table 2 VA Tool Output- HUC 0203 Lower Hudson-Long Island Watershed - Flood Risk Reduction Business Line

Subset	Epoch	VA Score (WOWA Score)	% Change in VA Score (2050 to 2085)	Dominant Factor	% Change In Indicator (2050 to 2085)	
					Contribution	Value
Dry	2050	52.48	1.7%	590_URBAN_500YRFLOODPLAIN_AREA	49.06%	25.75
Dry	2085	53.37		590_URBAN_500YRFLOODPLAIN_AREA	49.19%	26.25
Wet	2050	54.42	4.6%	590_URBAN_500YRFLOODPLAIN_AREA	47.32%	25.75
Wet	2085	56.91		590_URBAN_500YRFLOODPLAIN_AREA	46.12%	26.25

Conclusions

The increase in observed temperature is the strongest evidence that climate change is evident in the basin. The literature review indicates that precipitation increased over the observed period of record and is projected to increase in the future as a result of climate change. More extreme events have occurred in recent years and the climate hydrology assessment tool predicts increases in projected annual maximum monthly flows during the next century.

The interaction between streamflow, precipitation, and temperature illustrates that there is some uncertainty with predicting future flood flows. While precipitation increased during the observed record and may continue to increase in the future, increases in temperature and evapotranspiration may potentially outweigh watershed runoff which could reduce flood risk.

Methods of quantitatively accounting for climate change impacts or long-term persistent climate trends in an engineering analysis are not currently outlined in USACE guidance; however, NJDEP and Township of Denville may wish to take on this responsibility based on the information provided. Current evidence does not support any specific increase of peak flows due to climate change.

Below is Residual risk table.

Table 3 Residual Risk Due to Climate Change

Feature or Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Dry Flood Proofing	Increased sea level	Increased water levels and wave heights seaward of the flood proof Structures	Increased SLR may increase frequency and magnitude of water level and wave loading on flood proofed structures. Risk reduction level decreases while residual risk increases.	Likely
Wet Flood Proofing	Increased sea level	Increased water levels and wave heights seaward of flood proofed structures	Increased SLR may increase frequency and magnitude of water level and wave loading on flood proofed structures. Risk reduction level decreases while residual risk increases.	Likely
Raise or Elevate Structure	Increased sea level	Increased water levels and wave heights seaward of elevated structures	No harm, elevated structure may protect property from being damaged.	Likely