MOSSY OAKS WATERSHED IMPROVEMENTS

BASIN #1 DRAINAGE STUDY

FINAL

Prepared for:

City of Beaufort and Town of Port Royal, South Carolina

August 2018

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1.0 EXECUTIVE SUMMARY

1.1 Executive Summary

The Mossy Oaks district is a 582-acre drainage basin that lies within the city limits of the City of Beaufort and the Town of Port Royal, South Carolina. The watershed is divided into two basins that both flow to Battery Creek. This report focuses on the northern basin (referred to as Basin #1) and improvements that can be made to improve drainage and reduce flooding throughout the watershed. Much of the lower part of the basin is low-lying and is susceptible to tidal influences from nearby marsh areas. Improvements to undersized and substandard drainage infrastructure will help to mitigate flooding; however, not all flooding conditions can be overcome.

Due to the combination of rainfall and tidal presence, there are four drainage scenarios that have been identified:

- Lower intensity rainfall/"normal" astronomical tides (Mean Low Water through Mean High Water)
- Lower intensity rainfall/higher & extreme tides (spring tides, king tides, and tropical storm tides)
- High intensity rainfall/normal tides, and
- High intensity rainfall/higher & extreme tides.

Currently, the basin only performs adequately for the first scenario, a lower-intensity rainfall during normal tides.

By replacing an over-capacity pipe under the Spanish Moss Trail, adding mechanical flap gates to the outfall side of proposed new larger pipes, and providing other drainage upgrades in the lower watershed, proposed improvements could allow mitigation for 3 of the 4 scenarios, as shown in Figure 1.0 below.

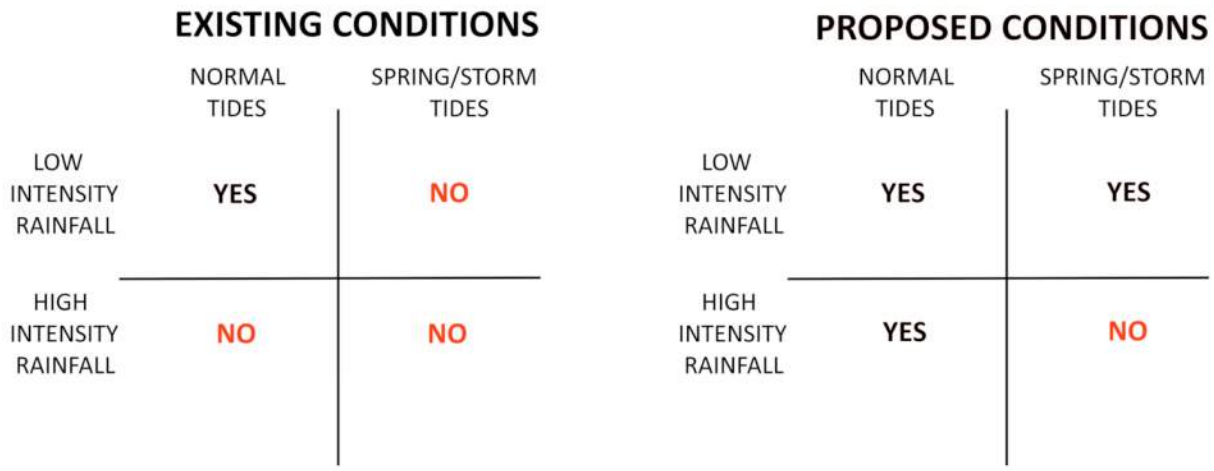


Figure 1.0 – Summary of effects of proposed improvements

1.2 Recommendations

Per the study and analysis presented in this report, the following improvements are recommended and listed in order of priority:

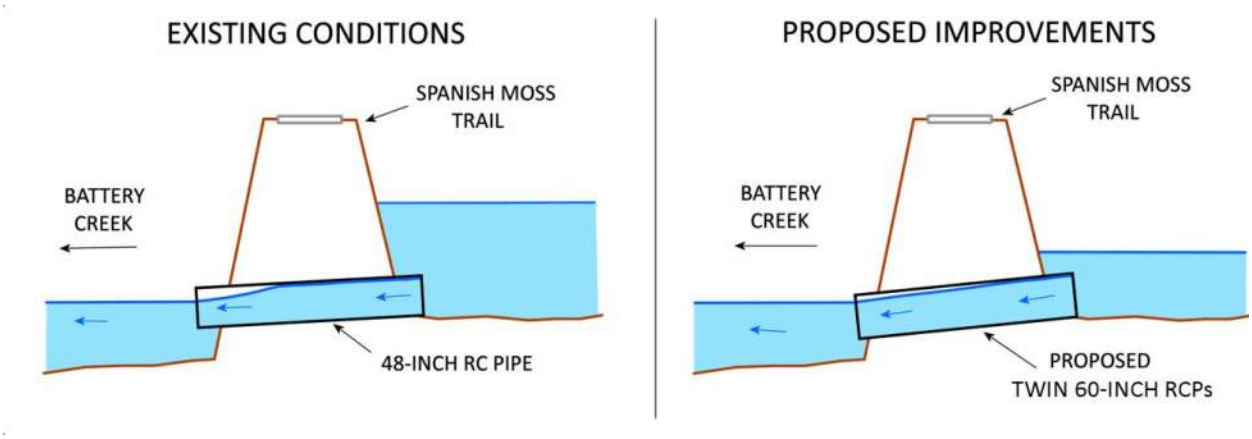
- Replace the 48-inch crossline pipe under the Spanish Moss Trail with twin 60-inch pipes.
- Provide tidal flap gates on the downstream end of the Spanish Moss Trail pipes.
- Replace the pipes under Battery Creek Road downstream of Duck Pond with twin 54-inch pipes.
- Raise the elevation of Battery Creek Road to accommodate the larger pipes, to prevent roadway overtopping, and to reduce the intrusion of floodwaters into upstream areas.
- Relocate the sidewalk from the Duck Pond dam to the shoulder of Battery Creek Road.
- Replace the pipe under Jane Way with twin 54-inch pipes.
- Replace the pipe under First Boulevard at the Jane Way canal crossing with twin 54-inch pipes.
- Clean and regrade the Jane Way canal upstream of First Boulevard and along the Beaufort Middle School property.
- Replace the crossline pipes at Center Drive East with twin 54-inch pipes.
- Improve the roadside ditch along the south side of First Boulevard between Jane Way and Battery Creek Road.
- Replace crossline pipes along the West Royal Oaks area ditch from the marsh up to Battery Creek Road.
- Consider raising approximately 1,000 linear feet of the Spanish Moss Trail by a maximum of 1.7 feet (this alterative may require further investigation by a geotechnical engineer to determine the stability of the trail embankment).
- Develop a mitigation plan for over 17 properties subject to recurrent flooding. These homes are located along West Royal Oaks Road, Battery Creek Road, Jane Way, and First Boulevard.

It is recommended that raising the elevation of the Spanish Moss Trail be considered as a means of protecting upstream areas by preventing trail overtopping up to a 25-year tidal event (approximately elevation 10.3 feet NAVD 1988 at the Battery Creek outfall). As a frame of reference, the storm tide created by Hurricane Matthew in the Mossy Oaks area was found to be an approximate 10-year event, while Tropical Storm Irma produced a storm tide between a 10- and 25-year event.

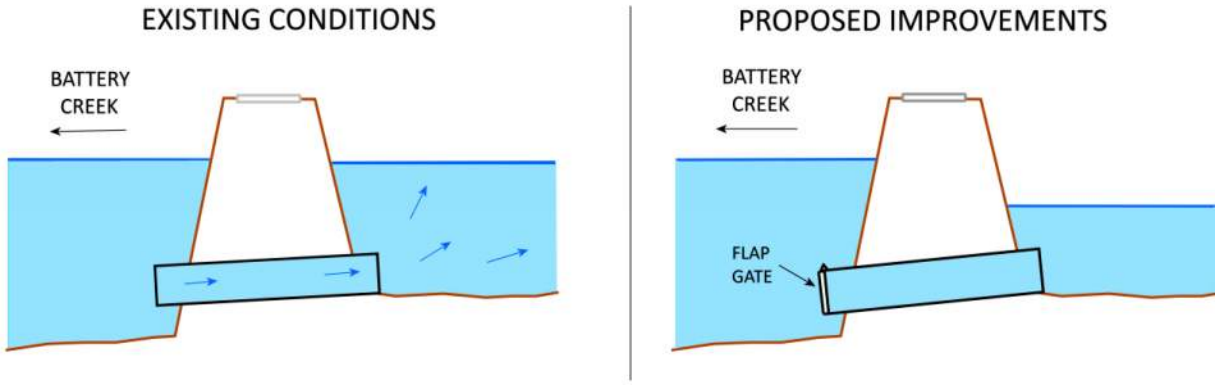
The recommended Basin #1 pipe and ditch improvements will prove beneficial up to a combination of a 25-year rainfall combined with a 25-year storm tide. The only scenario that cannot be overcome is a high-intensity rainfall event occurring in conjunction with a higher or extreme storm tide because floodwaters simply have no place to flow during high tidal surges. The tidal gate, however, will help to store water and to greatly reduce the area of flooding. This is discussed in Scenario #2 in Section 1.3.

1.3 Example Scenarios

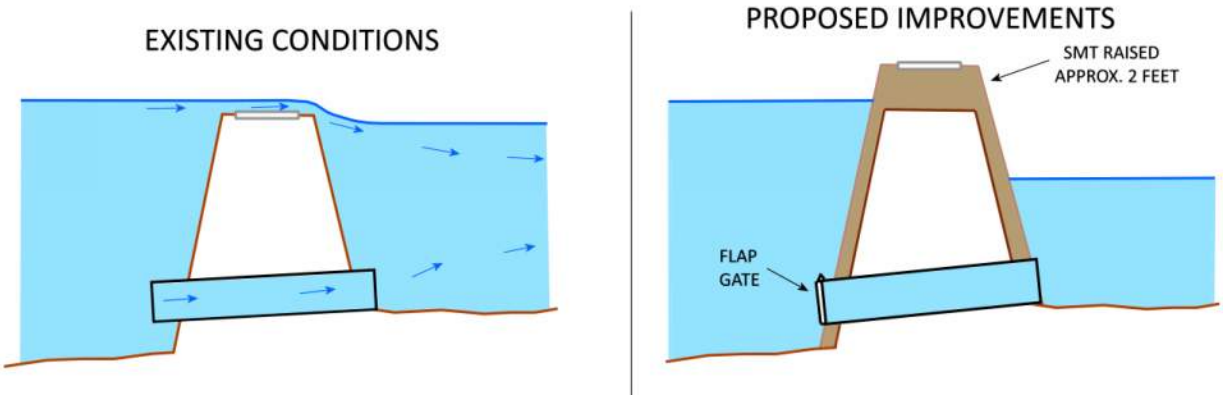
The following diagrams present three scenarios that demonstrate how proposed upgrades at the Spanish Moss Trail, the highest priority improvement, would improve overall flooding conditions within Basin #1:



Scenario #1 – Normal (daily) range of tides: Existing conditions (left): the Spanish Moss Trail 48-inch crossline pipe, which is undersized, creates a backup of stormwater and potential flooding conditions on the upstream side. By comparison, the proposed new larger pipes (right) would allow high-intensity rainfall events to pass through with lower water surface elevations on the upstream side, and reduced flooding throughout the watershed.



Scenario #2 – Spring tide, king tide, or tropical storm tide less than a 25-year event: Existing conditions: as the storm tide rises quickly on the downstream side, salt water backs up through the crossline pipe and floods the upstream area. As floodwaters arrive from upstream, they are trapped in the marsh, and the result is backup of flow and widespread flooding in Basin #1. The proposed flap gate on the new crossline pipes would keep tidal water from flowing to the upstream side of the trail. This would provide a lower water surface on the upstream side that would allow for more storage of stormwater arriving from the watershed, and reduced flooding. However, flooding could still be significant at higher-intensity rainfall events because floodwaters would be trapped by the high tide.



Scenario #3 – Tropical storm tide up to a 25-year event: Existing conditions: a storm tide of this magnitude would rise quickly and overtop the Spanish Moss Trail from the downstream (Battery Creek) side. The result would be widespread and catastrophic flooding throughout the lower portion of Mossy Oaks. By raising the elevation of the Spanish Moss Trail a maximum of 1.7 feet along a 1000-foot section of trail, the trail embankment would act as a dam to keep storm surge water from overtopping the embankment up to a 25-year tidal event. In addition, the tidal flap gate would keep storm surge water from flowing through the proposed crossline pipes to upstream areas. The result would be lower water surface elevations upstream of the Spanish Moss Trail, which would allow for more storage of stormwater from the watershed, and reduced flooding. Like Scenario #2, however, flooding could still be significant at higher-intensity rainfall events.

The following sections of this report present a detailed description of the approach, methodologies, assumptions, and findings of this watershed study. More details on the recommended improvements are presented in Section 5.0.

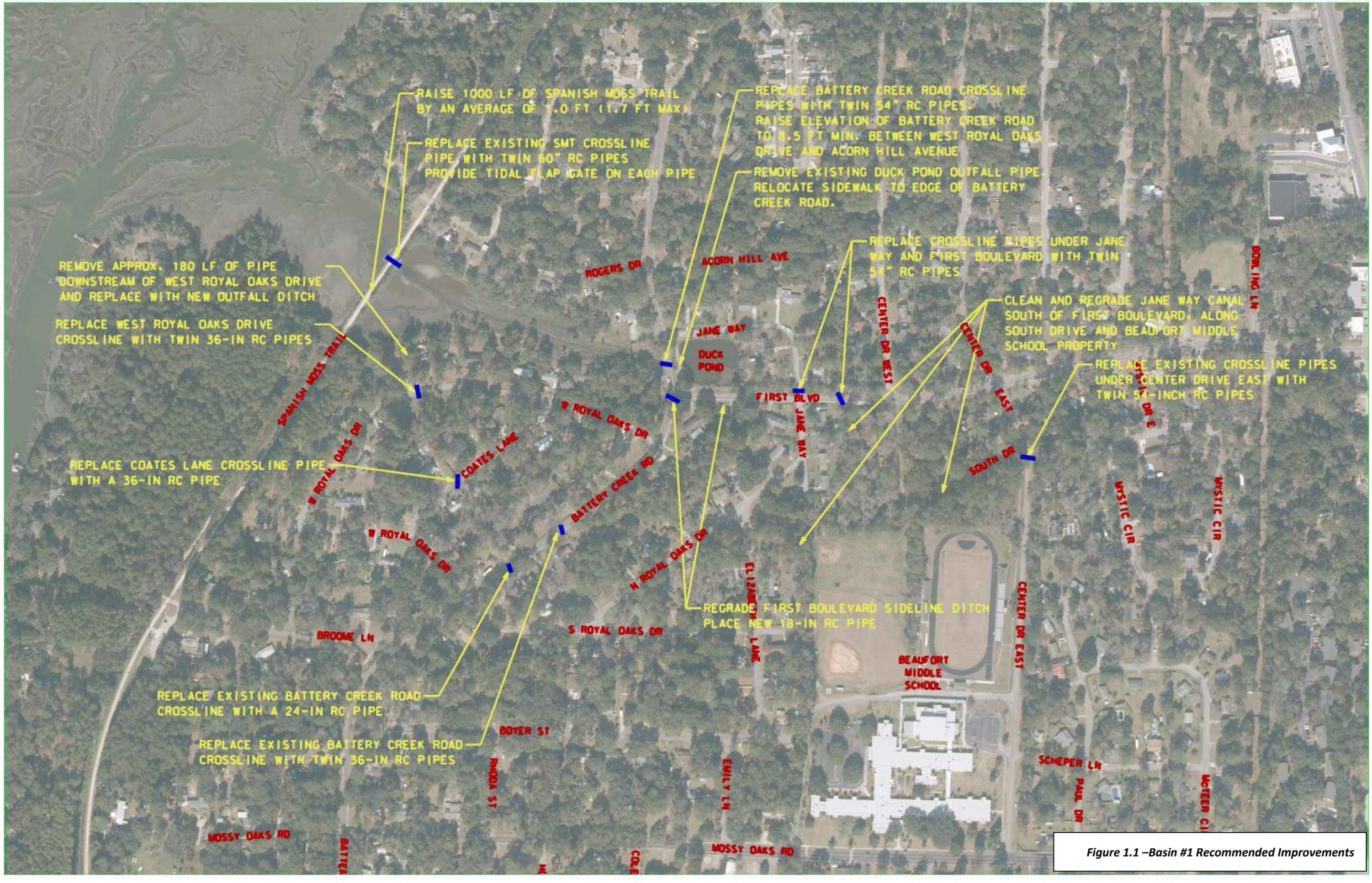


Figure 1.1 –Basin #1 Recommended Improvements

2.0 INTRODUCTION

2.1 Project Description

The Mossy Oaks district lies within the city limits of the City of Beaufort and the Town of Port Royal, South Carolina. It is generally bounded by SC Route 281 (Ribaut Road) to the east and Battery Creek to the west (see map, Figure 2.0).

Covering 582 acres, Mossy Oaks is heavily developed with high- and low-density residential dwellings, two schools, and scattered commercial properties. Many of the properties within the area are low-lying, and much of the drainage infrastructure is aging, substandard, or unmaintained, leading to considerable backup of floodwaters onto private properties throughout the area during heavy rainfall and/or tropical storm surge events.

The Mossy Oaks area consists of two separate watersheds, both of which drain to the west through tidally-influenced ditches and marsh areas toward Battery Creek. Main drainage ditches from both watersheds flow via crossline pipes under the Spanish Moss Trail, a 12-foot wide paved multi-use "Rails-to-Trail" pathway. Basin #1, in the northern portion of Mossy Oaks, covers 213 acres, while Basin #2 to the south covers 369 acres.

Flooding issues have been prevalent over an approximate 20-year period throughout both watersheds, and many properties have experienced damage from flooding several times over that period. Recently, flooding from Hurricane Matthew (October, 2016) and Tropical Storm Irma (September, 2017), as well as other localized heavy rainfall events, have led to widespread flooding and property damage throughout Mossy Oaks. A task force of state and local government officials, engineers, and local residents has been formed with the ultimate goal of developing corrective solutions to the chronic flooding issues experienced by Mossy Oaks residents and property owners.

To that end, Infrastructure Consulting & Engineering has been contracted by the City of Beaufort and the Town of Port Royal to provide independent hydrologic and hydraulic analyses of both Mossy Oaks watersheds.

This report will focus on Basin #1, and it will detail the methodologies used to analyze the watershed, document existing drainage and flooding conditions, and discuss the impact of proposed improvements to the watershed.

A Basin #2 analysis report has been submitted under separate cover.

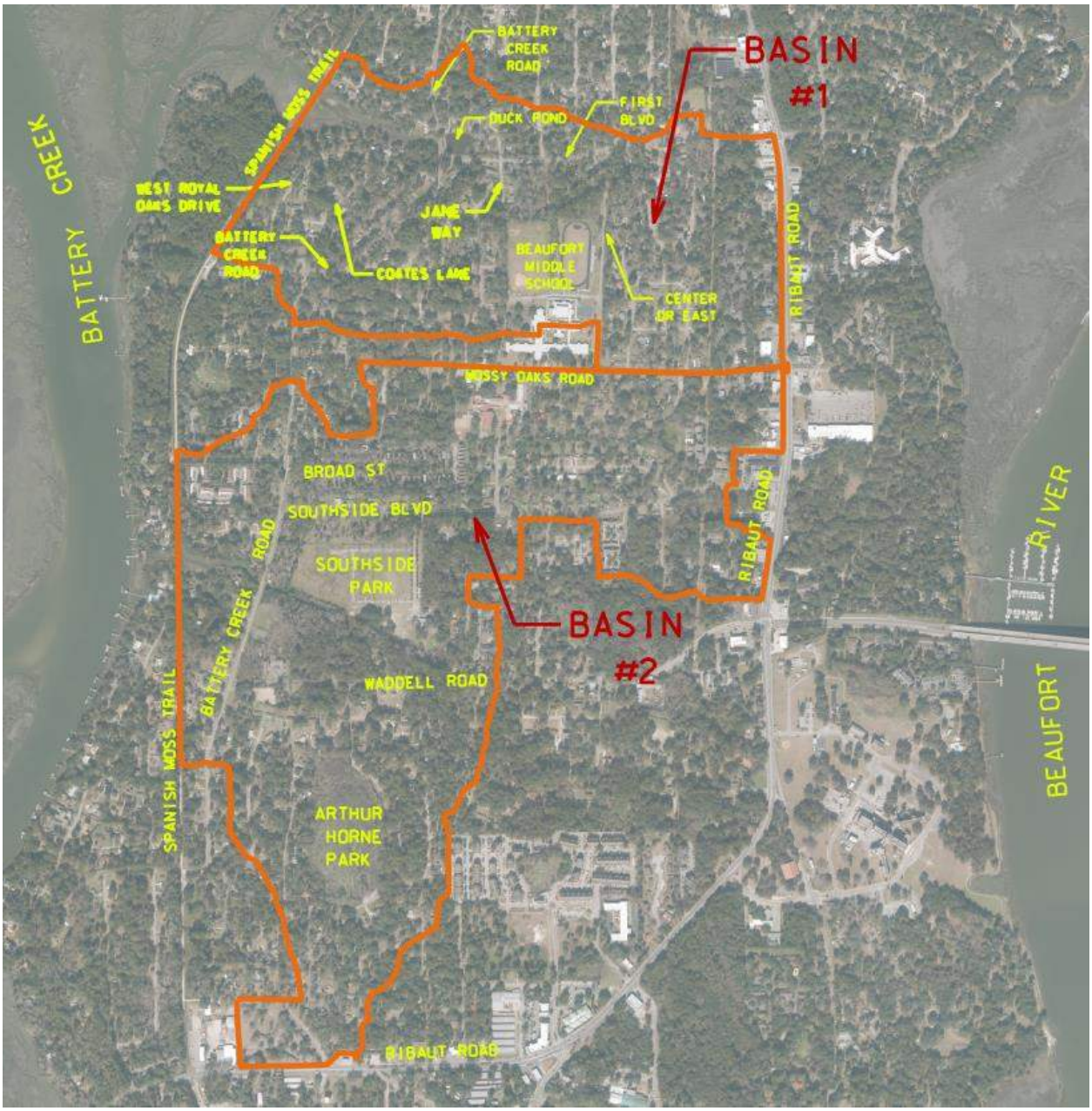


Figure 2.0 – Watershed Map of Mossy Oaks District

2.2 Basin #1 Watershed Characteristics

As shown on Figure 2.0, the 213-acre Basin #1 watershed extends from Ribaut Road westward to Battery Creek. It is bounded to the south by Mossy Oaks Road, and it extends to the north just beyond First Boulevard. The amount and type of development in the watershed creates a high potential for runoff during high-intensity rainfall events.

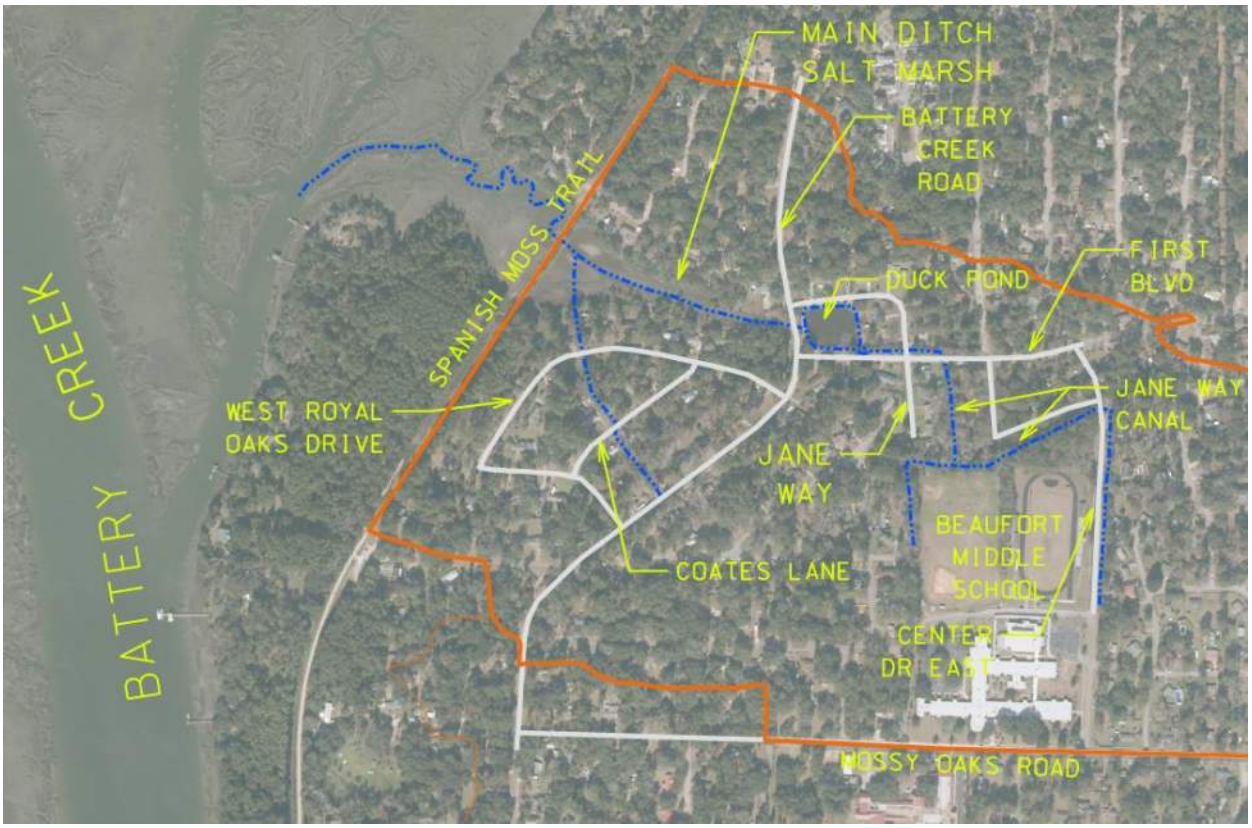


Figure 2.1 – Lower Basin #1 Location Map

Runoff from most of this watershed collects into a series of ditches which form a large canal, known locally as the Jane Way canal, along the northern boundary of Beaufort Middle School. This canal flows through three roadway pipe crossings (First Boulevard, Jane Way, and Battery Creek Road) before entering an area of salt marsh 700 feet above the Spanish Moss Trail. After crossing under the trail via a 48-inch pipe, it flows into a tributary of Battery Creek.

A separate, smaller portion of the overall watershed drains by way of a ditch and pipe crossings through the West Royal Oaks neighborhood. The West Royal Oaks ditch flows directly into the Battery Creek marsh just upstream of the Spanish Moss Trail.

Due to low-lying elevations, most of the lower portion of the Basin #1 is influenced by astronomical (daily) high tides. At high tide/spring tides, major rainfall events have the potential for causing flooding along West Royal Oaks Drive. Significant property impacts begin when flood elevations reach approximately elevation 7.0 feet (NAVD 1988), the lowest finished floor elevation of homes in the neighborhood. Several outbuildings and sheds have finished floor elevations as low as 5.5 feet.

Other areas prone to recurrent flooding lie mostly along the main Basin #1 ditch/canal, including properties along Battery Creek Road, Jane Way, First Boulevard, South Drive, and Center Drive East.

2.3 Flooding History

Most of the Mossy Oaks flooding complaints to the City of Beaufort have come after periods of heavy rainfall, but smaller storms occurring during high tides have also produced significant flooding. Several residents in attendance at a City of Beaufort Council meeting on September 28th, 2017 spoke of these types of flooding experiences that have occurred in recent years.

Two major storm events have recently impacted large areas of the Basin #1 watershed. Hurricane Matthew moved on a path parallel to and just offshore of the South Carolina coast on October 8th, 2016, and its storm surge produced tide elevations in excess of 7.5 feet (NAVD 1988) in areas along Battery Creek. In addition, the Beaufort area received over 14 inches of rainfall in 24 hours between October 7th and 8th. The combination of a high tidal surge combined with extreme rainfall amounts led to major flooding and property damage throughout Basin #1.

Less than one year later, many of those same properties were flooded again as Tropical Storm Irma moved along the west coast of Florida and into southern Georgia on September 11th, 2017. Although the storm paralleled Florida's gulf coast, it created a significant storm surge along the Atlantic coast, including tide elevations of greater than 8 feet along Battery Creek. While the storm produced lower rainfall amounts in the Mossy Oaks area compared to Hurricane Matthew, the bulk of the recorded 5.7 inches fell in a few hours prior to the peak storm tide's arrival on September 11th. Basin #1 flooding occurred as peak stormwater discharges and peak storm tide arrived at the same time.

2.4 Factors Contributing to Flooding

The first and most obvious factor contributing to flooding, particularly in the lower portions of Basin #1, is the low-lying elevation of many of the properties. Over 40 homes lie within or partially within the 8-foot elevation created by the Tropical Storm Irma storm tide. As stated earlier, many of these properties are subject to shallow flooding during higher astronomical tides. This has been exacerbated by the fact that, over the period of time that Mossy Oaks has become developed, there has been a measurable increase in Mean Seal Level. As shown in Figure 2.2, sea levels have increased along the South Carolina coast by a total of approximately 1 foot over the past century.

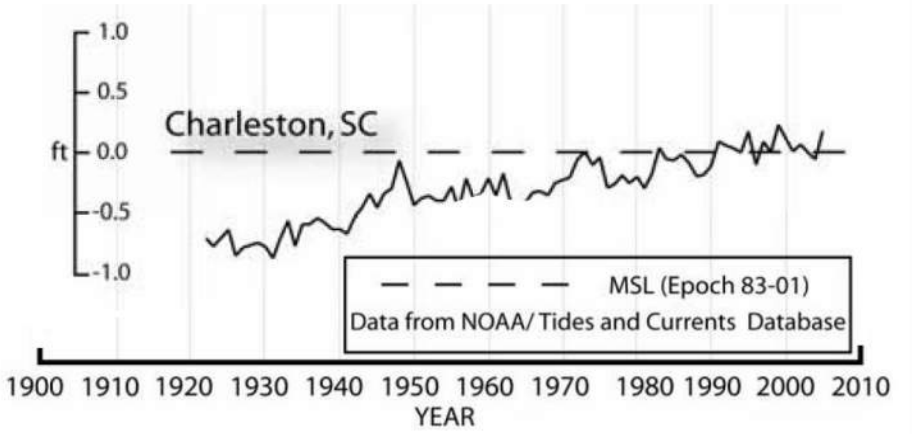


Figure 2.2 – Sea levels along the US Atlantic and Gulf coasts over the past century (from FHWA Hydraulic Engineering Circular No. 25, "Highways in the Coastal Environment")

Secondly, in addition to the large amount of development in this watershed, there are very few stormwater management measures (such as retention ponds) in place to control flooding.

Thirdly, much of the drainage infrastructure within the watershed is aging, ineffective, poorly constructed, or unmaintained. Some of these areas that stand out within Basin #1 are the following:

- The 48-inch reinforced concrete pipe under the Spanish Moss Trail is severely undersized. The pipe creates considerable backup of floodwaters on the upstream (inland) side of the pipe during rainfall events.
- Other upstream pipes along the main drainage ditch/Jane Way canal are also severely undersized and/or blocked. These pipes are located where the ditch passes under Battery Creek Road, Jane Way, First Boulevard, and Center Drive East.
- Many sections of the main drainage ditch/Jane Way canal are overgrown and contain debris, brush, and trash, leading to poor drainage capacity, particularly in areas along South Drive, Jane Way, and the Beaufort Middle School property.
- Other areas (such as West Royal Oaks Road) have a high potential for flooding due to poorly-functioning pipes and/or ditches.

Much discussion in the community related to causes of flooding within the watershed centers on the Duck Pond at the intersection of Battery Creek Road and First Boulevard and its supposed need for dredging/deepening to increase stormwater storage. In fact, due to its small surface area, the pond has little impact on flood discharges the magnitude of those that the Basin #1 watershed produces, and deepening the pond would have minor effects, if any at all. While some cleaning of pond sediment deposition would be beneficial, its overall effects on stormwater discharges would be minimal.

2.5 Project Approach

To achieve the purpose of the project, the approach to the overall analysis involved several steps in order to fully understand the complex interaction of tidal storm surges and rainfall events within Basin #1, and to develop the most practical and cost-effective plan to improve existing problem areas, as shown below:

<u>Existing conditions analysis:</u>

- Development, calibration, and analysis of storm tide boundary conditions at Battery Creek for a range of tropical storm surge events using two-dimensional hydrodynamic modeling.
- Development and analysis of Basin #1 existing flooding conditions using computerized flood routing and one-dimensional hydraulic models for 10- through 100-year rainfall events, paired with calculated storm tides as downstream boundary conditions.
- Identification of major existing drainage problem areas within Basin #1.

<u>Proposed conditions analysis:</u>

- Analysis of and recommendations for proposed improvements to Basin #1 using computerized flood routing and one-dimensional hydraulic models for 10- through 100-year rainfall events, paired with and downstream boundary storm tides.
- Comparison of existing conditions to proposed conditions results and evaluation of proposed impacts to the overall watershed.

The Basin #1 study approach will be discussed in greater detail in the next two sections of this report.

3.0 EXISTING CONDITIONS ANALYSIS

3.1 Tidal Storm Surge Modeling

In order to completely understand the effects on the Basin #1 watershed created by tropical storms, it was necessary to develop a model to compute storm tide elevations along Battery Creek at the Basin #1 outfall for various tropical storm magnitudes and associated storm surges. This was accomplished using the two-dimensional computer program Surface Water Modeling System (SMS).

With this program, a two-dimensional mesh was constructed from the Beaufort River inlet (Fort Fremont tidal gage) upstream through Beaufort River and Battery Creek, with the intent of predicting the propagation effects of a storm surge arriving at the inlet and moving upstream through the river system.

As shown in Figure 3.0, the SMS model included portions of Beaufort River to the east, and Battery Creek to the west, of the City of Beaufort. This was necessary in order to determine the degree to which storm surge flows separate and travel through each branch of the river system.

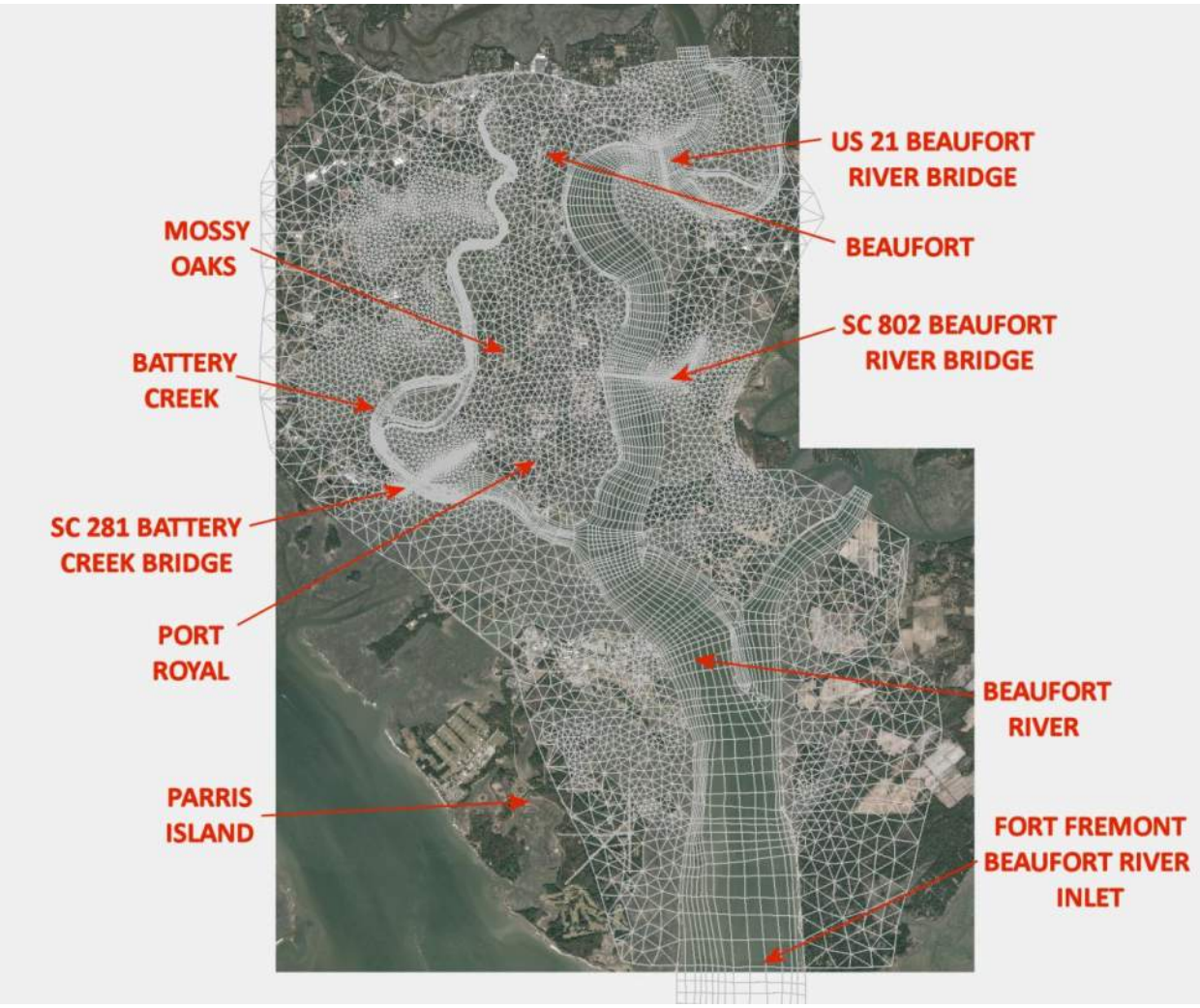


Figure 3.0 – SMS model two-dimensional mesh

3.1.1 Tidal Storm Surge Data Sources

The two-dimensional model was constructed using the following data sources:

- Bathymetric data of Beaufort River and Battery Creek provided by "Bathymetry Data Viewer" (*https://maps.ngdc.noaa.gov/viewers/bathymetry/*), a website maintained by the National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information.
- Ground terrain data from LiDAR provided by the South Carolina Department of Natural Resources (SCDNR).
- Aerial photography provided by SCDNR.
- Tide gage records, datums, and predictions from the "NOAA Tides and Currents" website (*https://tidesandcurrents.noaa.gov*) and the "WWW Tide and Current Predictor" website (*http://tbone.biol.sc.edu/tide/).*
- Observed tidal gage measurements provided by WEC, Inc. for the period March 12th – 26th, 2018. Temporary tidal gages were placed at three locations (shown in Figure 3.1) within the Battery Creek tidal marsh: 1) just downstream of the Spanish Moss Trail, 2) just upstream of the Spanish Moss Trail, and 3) just downstream of Battery Creek Road. Tidal gage plots are shown in Appendix "C".

Figure 3.1 – Temporary tidal gage locations

- Field measurements provided by the United States Geological Survey (USGS) on their website "Flood Event Viewer" (*https://water.usgs.gov/floods/FEV/*). This data included Hurricane Matthew and Tropical Storm Irma storm tide hydrographs and high water marks.

3.1.2 Tidal Datums at NOAA Stations

The tidal datum records for the gaging stations used in this analysis were as follows (all elevations are referenced to NAVD 1988 datum):

Fort Fremont (Beaufort River inlet) – NOAA tidal station 8668686:

Mean Higher High Water = 3.16
Mean High Water = 2.70
Mean Tide Level = -0.35
Mean Low Water = -3.40
Mean Lower Low Water = -3.62
(Note: tidal datum records were not available for the Fort Fremont gage, but were assumed to be approximately equal to elevations obtained for the nearby NOAA Port Royal Plantation – Hilton Head station 8669167).

Battery Creek – NOAA tidal station 8668092:

Mean Higher High Water = 3.78
Mean High Water = 3.38
Mean Tide Level = -0.44
Mean Low Water = -4.26
Mean Lower Low Water = -4.46

3.1.3 Model Calibration – Daily (Astronomical) Tides

The first step after construction of the SMS model was to insure correct geometry and stream/ground roughness coefficients were being utilized. This was done by calibrating the model, from the downstream boundary conditions at the Beaufort River inlet (Fort Fremont - NOAA tidal station 8668686) upstream to Battery Creek at the Basin #1 outfall, for the same time period in which temporary tidal gages were in place in the Battery Creek marsh. Predicted astronomical tides were used as the downstream boundary condition, as no real-time tide gage records are available at the Fort Fremont tidal station. The resulting tides calculated by the SMS model at the Basin #1 outfall were compared to the observed tide records provided by WEC, Inc. and the predicted tides for the Battery Creek tidal station (NOAA 8668092).

As shown in Figure 3.2, the calculated tides compared very well to predicted tides for the Battery Creek Station from March 17th to March 20th, 2018. The shape of the calculated tidal curve also closely matched the observed records; however, the observed high tides were nearly 1 foot higher than calculated high tides during a portion of this period. These differences could be attributed to any combination of the following: 1) errors in predicted tides at either or both tidal stations used in the model, 2) actual conditions such as wind, current, or offshore weather effects that were not captured in the tidal predictions but that could have affected actual gage measurements, and 3) uncertainty of +/- 0.1 feet in gage measurements accounted for in the provided data.

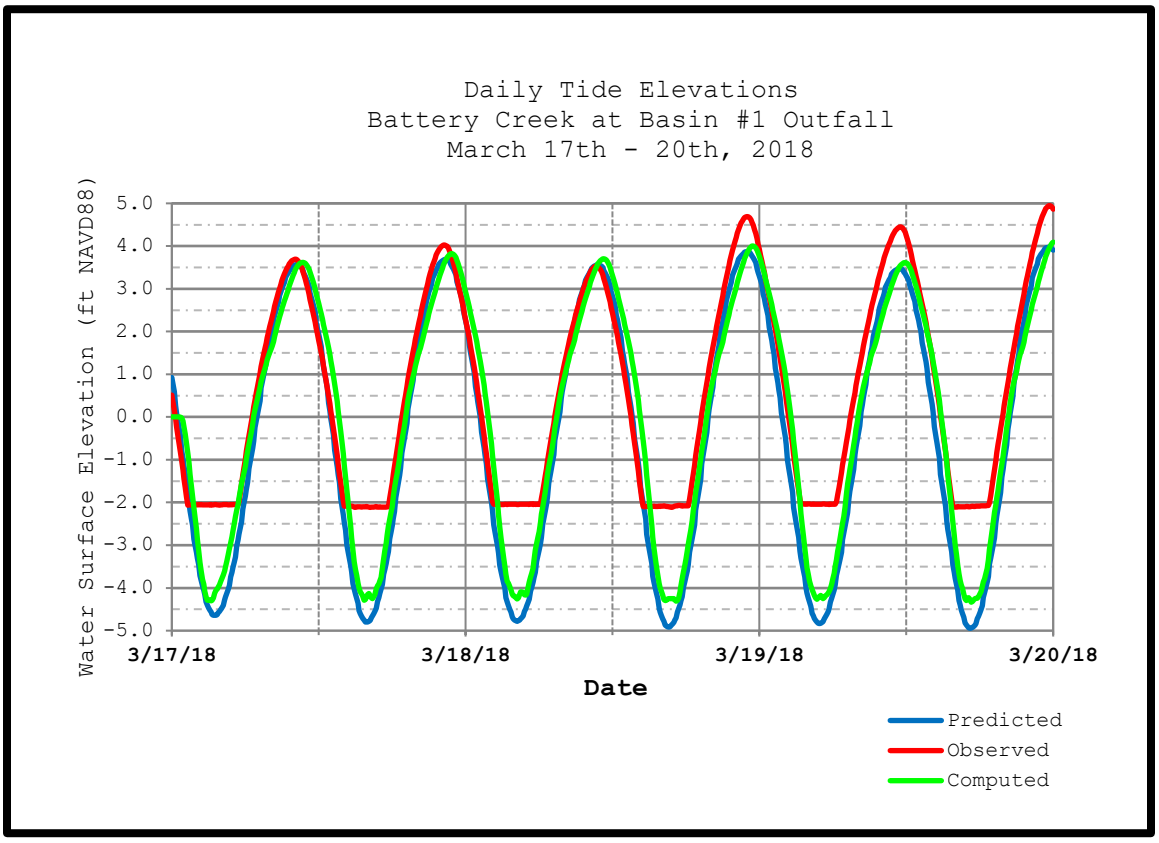


Figure 3.2– SMS model calibration results for Basin #1 astronomical tides
(Note: the lowest elevation provided in temporary gage measurements by WEC, Inc. was -2.0 ft NAVD 1988)

3.1.4 Model Calibration – Tropical Storm Tides

The SMS model was then calibrated for tropical storm events using data gathered from the USGS Flood Event Viewer for Hurricane Matthew and Tropical Storm Irma. Based on observed data provided from real time temporary gages that were in place during these storms, as well as permanent tidal gages located in Charleston Harbor, South Carolina and Fort Pulaski, Georgia, approximate storm tide hydrographs were developed for the Fort Fremont station. These plots are shown in Figure 3.3.

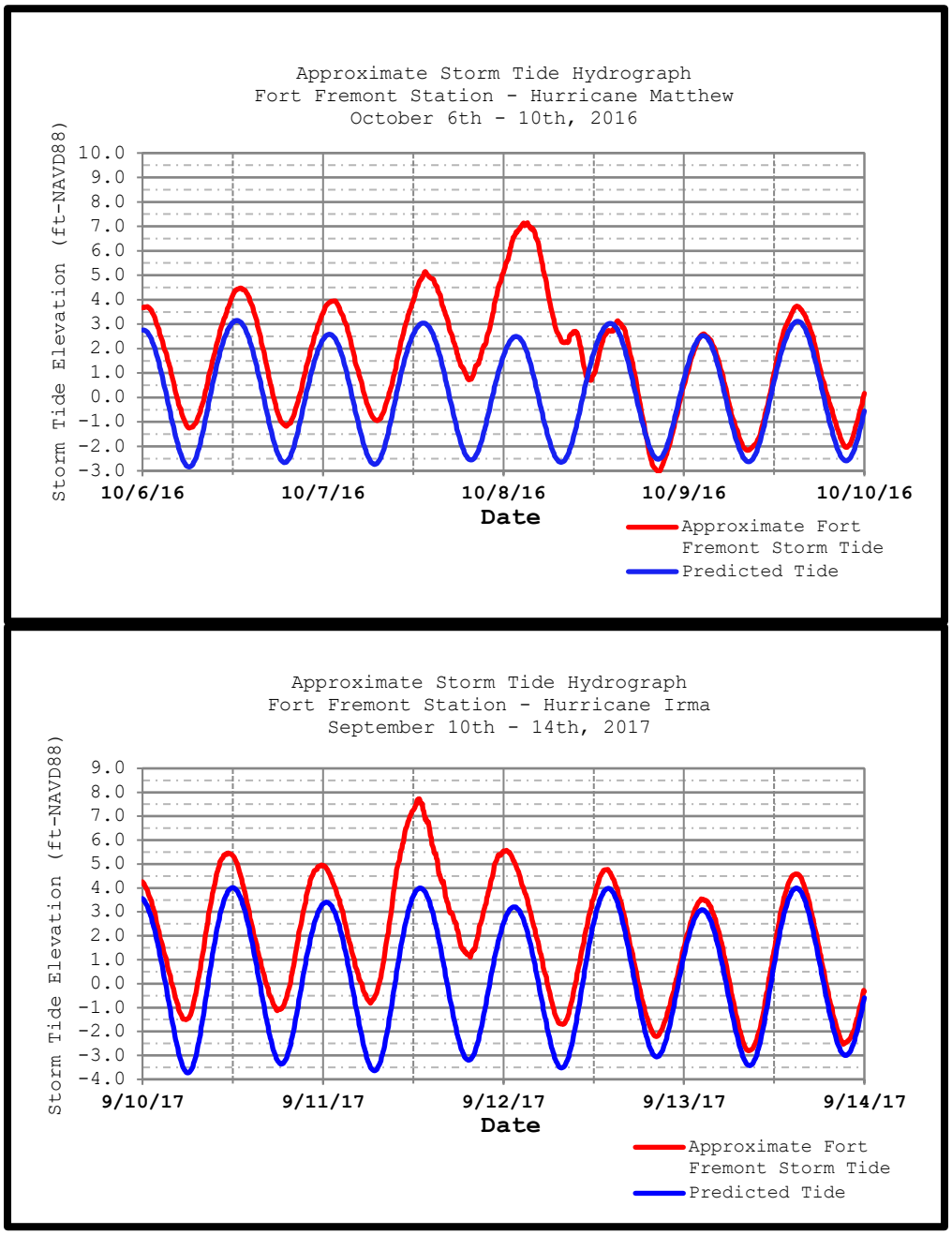


Figure 3.3 – Computed (approximate) storm tide hydrographs for Fort Fremont tidal station at Beaufort River Inlet

After running the SMS model for each storm using the approximate hydrographs, the computed storm tide elevations were compared at two locations in the model where USGS measurements were available on the "Flood Event Viewer" website: SC 281 Bridge over Battery Creek and US 21 Bridge over Beaufort River (in downtown Beaufort).

The results of this calibration analysis were within a reasonable degree of accuracy. They are presented in Table 3.0.

Table 3.0 Results of the Hurricane Matthew and Tropical Storm Irma SMS Calibrations

Location	HURRICANE MATTHEW – 10/8/2016 Peak Storm Tide Elevations Feet (NAVD 1988)		TROPICAL STORM IRMA – 9/11/2017 Peak Storm Tide Elevations Feet (NAVD 1988)	
	Calculated (SMS model)	Observed (per USGS Flood Event Viewer)	Calculated (SMS model)	Observed (per USGS Flood Event Viewer)
SC 281 Bridge over Battery Creek	7.59	7.60	8.08	8.22
US 21 Bridge over Beaufort River	7.59	7.49	8.12	8.17

The model also computed peak storm tide elevations and storm tide hydrographs at the Basin #1/Battery Creek outfall for both of the storm surge simulations. The peak tide elevation results were as follows:

Hurricane Matthew = 7.4 ft NAVD 1988
Tropical Storm Irma = 8.3 ft NAVD 1988

3.1.5 Storm Tide Analysis

Once the calibration analyses were completed, the next step was to develop and analyze synthetic hydrographs of 10- through 500-year storm tide events in the SMS model. The first step in this process was a thorough review of available guidance on determining tropical storm tide elevations at the Beaufort River inlet (Fort Fremont station) that was conducted using the following manuals:

- *Storm Tide Frequencies on the South Carolina Coast* (NOAA Technical Report NWS-16; Myers; June, 1975).
- *Tidal Hydraulic Modeling for Bridges Users Manual* (Pooled Fund Study SPR-3(22); Zevenbergen, et al.; December, 1997)
- *Coast of South Carolina Storm Surge Study* (US Army Corps of Engineers ERDC/CHL TR-01-11; Scheffner and Carson; June, 2001)
- *Highways in the Coastal Environment* (FHWA Hydraulic Engineering Circular No. 25, Second Edition; Douglass and Krolak; June, 2008)

Based on this review, peak tropical storm tide elevations at the Fort Fremont gage were determined to be the following:

Storm Magnitude	Storm Tide Elevation (ft. NAVD 1988)
10-year	6.9
25-year	9.8
50-year	12.3
100-year	14.8
500-year	20.5

Using these peak elevations, synthetic storm tide hydrographs (10- through 500-year) were developed and input as the downstream boundary conditions in the SMS model. A typical synthetic hydrograph (for the 25-year storm tide) is shown in Figure 3.4. SMS model simulations were then run for each of the storm tide frequencies, and these simulations produced 10- through 500-year calculated storm tide hydrographs along Battery Creek at the Basin #1 outfall.

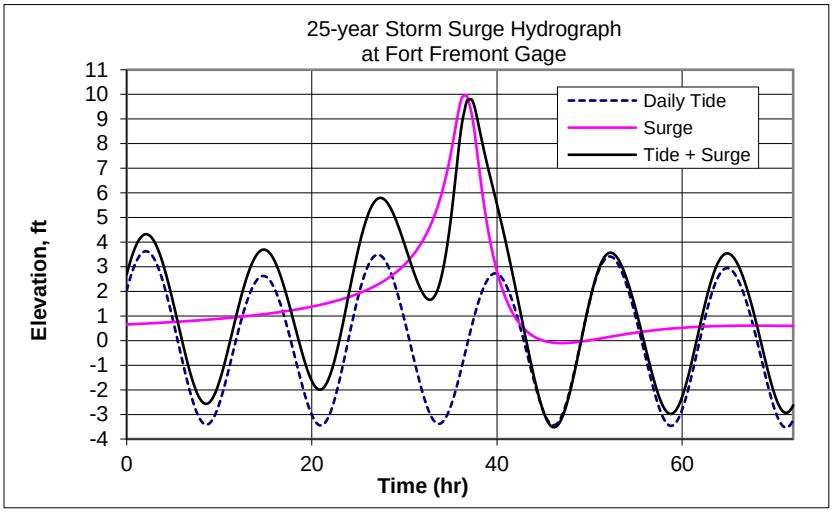


Figure 3.4 – 25-year synthetic storm tide hydrograph for Fort Fremont tidal station at Beaufort River Inlet

3.1.6 Results of Storm Tide Analysis

The SMS model of Beaufort River and Battery Creek generated the following peak storm tide elevations at the Basin #1 outfall at Battery Creek:

Storm Magnitude	Peak Storm Tide Elevation (ft. NAVD 1988)
10-year	7.6
25-year	10.3
50-year	12.7
100-year	15.1
500-year	20.6

Based on these computed results, Hurricane Matthew (peak storm tide elevation = 7.4 feet) was determined to be an approximate 10-year storm, while Tropical Storm Irma (8.3 feet) was determined to be between a 10- and 25-year storm.

3.2 Existing Basin #1 Watershed Analysis

In order to analyze existing drainage conditions with the Basin #1 watershed, two computer programs were utilized. The hydrodynamic model CivilStorm was used to determine flood discharges produced by various rainfall events, while the unsteady flow capabilities of the program HEC-RAS were used to analyze the hydraulic performance of pipes and ditches along the main ditch and Jane Way canal.

A separate analysis of crossline pipes in the West Royal Oaks neighborhood was performed using the computer program HY-8.

3.2.1 Hydrologic Modeling/CivilStorm

A CivilStorm model of the 213-acre Basin #1 watershed was constructed by first dividing the overall watershed into 13 separate subareas, as shown in Figure 3.5. The model computed the routing of a flood hydrograph beginning with the largest subarea, SA-1-1, at the canal and moving downstream to the 48-inch RCP under the Spanish Moss Trail. Along the way, additional smaller subareas were added into the routing at points where they flow into the canal.

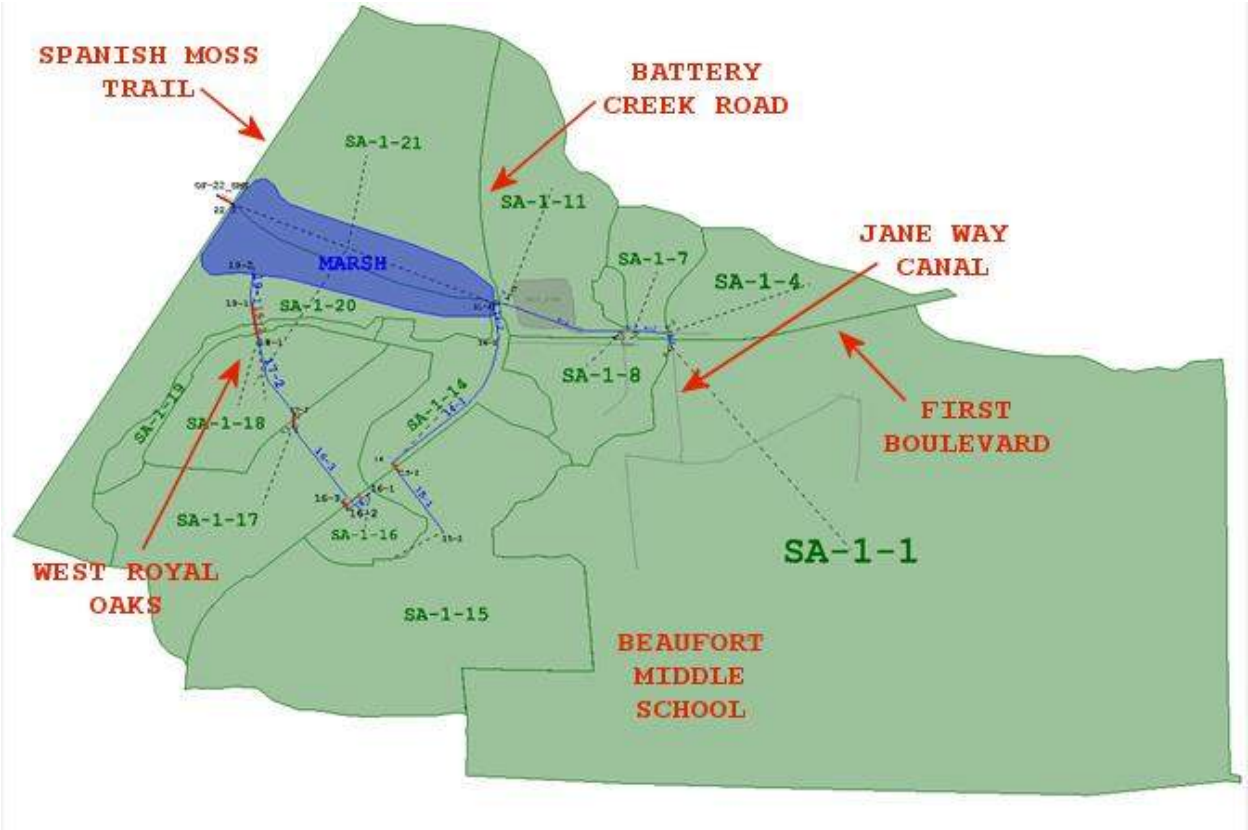


Figure 3.5 – CivilStorm model layout for existing conditions

The subareas were analyzed using Natural Resources Conservation Service (NRCS) TR-55 methodology. A flow hydrograph was developed for each subarea based on NRCS Type III rainfall distribution and the following 24-hour rainfall amounts, based on data gathered from the NOAA "Precipitation Frequency Data Server" website:

Rainfall Return Event	24-hour Rainfall (in.)
10-year	6.4
25-year	7.8
50-year	8.9
100-year	10.2

Each subarea was assigned a weighted Curve Number based on its land cover and soil characteristics. This dimensionless, empirical parameter is an indicator of the potential for runoff from a drainage area with a certain soil type and land usage.

Times of concentration were also computed for each subarea using the NRCS computer program Win-TR55.

3.2.2 Existing Conditions CivilStorm Flood Discharge Results

Based on 10- through 100-year analyses of existing conditions within the Basin #1 watershed, peak stormwater flow discharges (cfs) at key locations are presented in Table 3.1 below.

Table 3.1 Existing Conditions CivilStorm Results– Discharges (cfs)

Return Period	Jane Way Canal/First Blvd 30" RCP	Jane Way 48" RCP	Duck Pond/Battery Creek Road Double 24" RCP	Just Downstream of Battery Creek Road	Royal Oaks Ditch/ Battery Creek Road 24" RCP	Royal Oaks Ditch/ Coates Lane 24" RCP	Royal Oaks Ditch/ West Royal Oaks Drive 24/30" RCP	Battery Creek Marsh, Just Upstream of Spanish Moss Trail
10-year	166	170	178	214	3	22	35	257
25-year	225	231	243	289	5	33	52	356
50-year	272	280	296	353	6	41	66	440
100-year	329	339	359	431	8	52	83	541

3.2.3 Hydraulic Modeling/HEC-RAS

An unsteady flow model was constructed using HEC-RAS version 5.0. Geometric cross-sectional, pipe, roadway, and ditch data was input into the model based on field survey data provided by Andrews Engineering & Surveying, Inc., and SCDNR LiDAR data. The model extends from Battery Creek upstream to the Jane Way canal pipe crossing at Center Drive East, and ground cross-sections were spaced along the ditch approximately every 50 to 75 feet.

This model was calibrated for daily tide cycles using the temporary gage records provided by WEC, Inc. Good calibration results confirmed the accuracy of the HEC-RAS geometry and Manning's roughness coefficients.

The Royal Oaks drainage structures were not included in the HEC-RAS model; separate analyses of cross-line pipes in the Royal Oaks neighborhood will be discussed in Section 3.2.5 of this report.

Since the Duck Pond at the intersection of Battery Creek Road and First Boulevard has little effect on the hydrologic and hydraulic characteristics of the watershed, the pond and its outlet pipe were omitted from the model. All that was included in the analysis in this area was geometry representing the pipe crossing under Battery Creek Road.

The results generated by the CivilStorm analysis were input as flow hydrographs at appropriate locations in the HEC-RAS model. Model calculations were performed for the 10- through 100-year rainfall events. In addition, a range of downstream tidal tailwaters were applied, from Mean Low Water through the 25-year storm tide elevation.

It should be noted that one set of analyses was made at an extreme Spring Tide elevation, also referred to as King Tide. Using the website "WWW Tide and Current Predictor" website (*http://tbone.biol.sc.edu/tide/), a* review of predicted extreme astronomical tide elevations over a 30-year period from 1990 to 2020 revealed that annually, the highest Spring Tide elevations range between 5.3 and 6.0 feet NAVD 1988. A king tide peaking at elevation 5.8 feet NAVD 1988 was chosen for this analysis.

A simulation analysis was also made of conditions generated by Tropical Storm Irma on September 11th, 2017. On that day, records show that approximately 5.7 inches of rain fell over a period of several hours ending at 2 PM, while based on the storm tide analysis of Tropical Storm Irma discussed in Section 3.1.4, the peak storm tide of approximately 8.3 feet arrived at the Basin #1/Battery Creek outfall at approximately 1:30 PM.

Because tropical storm-related tide elevations equal to or greater than a 25-year magnitude (approximately 10.3 feet NAVD 1988) would cause overtopping of the Spanish Moss Trail (the low point of which is 9.8 feet NAVD 1988 adjacent to the West Royal Oaks area), these types of events combined with heavy rainfall would cause catastrophic flooding throughout most of Basin #1, potentially generating flood elevations between 9.0 – 11.0 feet NAVD 1988 (for a 25-year storm tide) in the lower parts of the watershed.

A complete table of existing conditions HEC-RAS results is presented in the next section.

3.2.4 Existing Conditions HEC-RAS Analysis Results

Water surface elevations (NAVD 1988 datum) generated by the HEC-RAS existing conditions analysis at six key locations (shown in Figure 3.6) along the Basin #1 main ditch/Jane Way canal are presented in Table 3.2 below.

For a frame of reference, substantial flooding and damage of habitable structures begins around elevation 7.0 feet (NAVD 1988) in lower parts of the watershed.

Inundation maps presented in Appendix "A" for select rainfall and tidal events give an idea as to the extent of flooding produced during these conditions.

Figure 3.6 –HEC-RAS results locations

Table 3.2 Existing Conditions HEC-RAS Results
Water Surface Elevations (feet NAVD 1988)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail 48" RCP	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Double 24" RCP	4) Jane Way 48" RCP	5) Jane Way Canal/First Blvd 30" RCP	6) Center Drive East Double 36" RCP
10-year/ MLW	4.4	4.5	5.3	5.5	8.5	9.4
25-year/ MLW	5.0	5.1	6.7	7.1	8.9	9.4
50-year/ MLW	5.4	5.5	7.7	7.8	9.0	9.5
100-year/ MLW	6.3	6.3	8.0	8.0	9.0	9.6
10-year/ MTL rising	4.4	4.4	5.3	5.5	8.5	9.4
25-year/ MTL rising	5.0	5.0	6.7	7.1	8.9	9.4
50-year/ MTL rising	5.4	5.5	7.7	7.8	9.0	9.5
100-year/ MTL rising	6.3	6.3	8.0	8.0	9.0	9.6

Table 3.2 (continued)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail 48" RCP	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Double 24" RCP	4) Jane Way 48" RCP	5) Jane Way Canal/First Blvd 30" RCP	6) Center Drive East Double 36" RCP
10-year/ MTL falling	4.6	4.6	5.5	5.6	8.6	9.4
25-year/ MTL falling	5.1	5.2	6.8	7.2	8.9	9.4
50-year/ MTL falling	5.5	5.6	7.7	7.8	9.0	9.5
100-year/ MTL falling	6.4	6.4	8.0	8.0	9.0	9.6
10-year/ MHW	4.5	4.6	5.5	5.6	8.5	9.4
25-year/ MHW	5.1	5.1	6.8	7.1	8.9	9.4
50-year/ MHW	5.5	5.5	7.7	7.8	9.0	9.5
100-year/ MHW	6.3	6.3	8.0	8.0	9.0	9.6
10-year/ King Tide	6.2	6.2	6.6	6.7	8.7	10.2
25-year/ King Tide	6.5	6.5	7.3	7.6	9.0	10.2
50-year/ King Tide	6.7	6.7	7.8	7.9	9.0	10.2
100-year/ King Tide	7.1	7.2	8.1	8.1	9.0	10.3
10-year/ 10-year Storm Tide	6.9	6.9	7.1	7.1	8.7	10.2
25-year/ 10-year Storm Tide	7.1	7.1	7.7	7.7	9.0	10.2
50-year/ 10-year Storm Tide	7.3	7.3	7.9	8.0	9.0	10.2
100-year/ 10-year Storm Tide	7.8	7.8	8.1	8.2	9.0	10.3

Table 3.2 (continued)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail 48" RCP	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Double 24" RCP	4) Jane Way 48" RCP	5) Jane Way Canal/First Blvd 30" RCP	6) Center Drive East Double 36" RCP
10-year/ 25-year Storm Tide*	9.0	9.0	9.0	9.5	9.5	10.5
25-year/ 25-year Storm Tide*	9.1	9.1	9.1	9.6	9.6	10.6
50-year/ 25-year Storm Tide*	9.3	9.3	9.3	9.8	9.8	10.8
100-year/ 25-year Storm Tide*	9.5	9.5	9.5	10.0	10.0	11.0
Tropical Storm Irma	7.4	7.4	7.4	7.5	8.7	10.2

*Tidal elevations during a 25-year tropical event exceed the low point in the Spanish Moss Trail, leading to overtopping of the trail and tidal inundation of areas upstream. Elevations shown are approximate.

3.2.5 Crossline Pipe Analyses/HY-8

The existing West Royal Oaks crossline pipes at Battery Creek Road (two separate crossings), Coates Lane, and West Royal Oaks Drive were analyzed using the culvert analysis program HY-8. The pipe locations are shown in Figure 3.7.

Figure 3.7 –HY-8 crossline pipe study locations

The HY-8 results revealed the following:

- 1) Battery Creek Road (250 feet northeast of intersection with West Royal Oaks Drive): existing 24-inch RC crossline pipe size is adequate, but the pipe is laid on an adverse slope, which hinders its hydraulic performance.
- 2) Battery Creek Road (450 feet northeast of intersection with West Royal Oaks Drive): existing 24-inch RC crossline pipe is undersized.
- 3) Coates Lane: existing 24-in RC crossline pipe is undersized.
- 4) West Royal Oaks Drive: existing 24-inch RC crossline pipe and connecting 30-inch RCP outfall pipe are both undersized. The elevations of these pipes severely hinder their hydraulic performance since they are affected by daily tides from the nearby marsh.

The ditches connecting these pipes were not analyzed; however, their conditions were noted and recommendations will be made concerning the ditches later in this report.

3.2.6 Existing Conditions Analysis Discussion

The results of the existing conditions hydrologic and hydraulic study point to many major issues that have contributed to flooding throughout the lower half of the Basin #1 watershed, including the Jane Way canal/First Boulevard area, Battery Creek Road/Duck Pond, and West Royal Oaks. First and foremost, the watershed produces significant flood discharges due to a high amount of development and lack of stormwater management facilities in place.

Due to ground topography and lack of available space at key locations in the watershed, identification of a suitable location to provide effective stormwater detention which would aid in minimizing discharges was not possible.

Most of the major drainage structures are undersized, poorly constructed, or unmaintained. Most notable is the 48-inch RCP Spanish Moss Trail crossline pipe. As discussed in Section 1.3 and shown in Table 3.2, there are high floodwater elevations created upstream of this pipe which are propagated upstream through the main drainage system. Floodwaters such as those produced during Hurricane Matthew and Tropical Storm Irma can take several hours to completely recede due to the lack of capacity of this pipe and others throughout the watershed.

All of these factors lead to Basin #1 flooding during medium- to high-intensity rainfall events, and the presence of high tides on Battery Creek increases the extent of flooding.

The results of the existing conditions analysis confirms the inability of the existing drainage network in handling all but the smallest rainfall events, as shown in Figure 1.0.

4.0 PROPOSED CONDITIONS ANALYSIS

4.1 Criteria

Similar to the approach used for existing conditions, proposed conditions analyses were made for the Basin #1 watershed for 10- through 100-year rainfall events and paired with downstream tidal conditions ranging from Mean Low Water through a 25-year storm tide.

For proposed new drainage, recommendations will be made based on requirements established by South Carolina Department of Transportation hydraulic design criteria. For secondary and local roads, such as those found throughout Mossy Oaks, all crossline pipes were designed to handle 25-year storm discharges. Ditches such as the Jane Way canal were also analyzed for a 25-year event.

For downstream boundary conditions, a 25-year storm tide was chosen as the design event. A storm surge of this magnitude could be contained on the downstream side of the Spanish Moss Trail by raising the trail approximately 1.7 feet at its low point and providing flap gates on the trail crossline pipes. Raising the trail higher to accommodate 50-year or higher storm tides would be impractical due to exponentially higher construction costs and permitting constraints.

4.2 Proposed Conditions CivilStorm, HEC-RAS, and HY-8 Models

Although the drainage systems were sized to handle a 25-year storm, the proposed analysis also included 10-, 50-, and 100-year storms (similar to the existing conditions analysis) to understand the overall effects on the watershed by major rainfall events.

The proposed conditions analysis was developed by modifying existing conditions models to reflect improved drainage structures and to address problem areas identified in the previous section of this report.

4.2.1 CivilStorm Model Modifications

The proposed CivilStorm analysis reflects the following modifications as compared to the existing conditions:

- Flow in the roadside ditch along the south side of First Boulevard was reversed to allow stormwater discharges to flow through a new Battery Creek Road crossline pipe, then along Battery Creek Road via a roadside ditch and directly into the marsh (see Figure 4.0). This could be accomplished by regrading the ditch, and would keep drainage from the south side of Jane Way from flowing toward the Duck Pond area.
- Along with the reversal of ditch flow, the existing crossline pipe under First Boulevard (west side of Jane Way intersection) would be abandoned, so it was removed from the CivilStorm model.

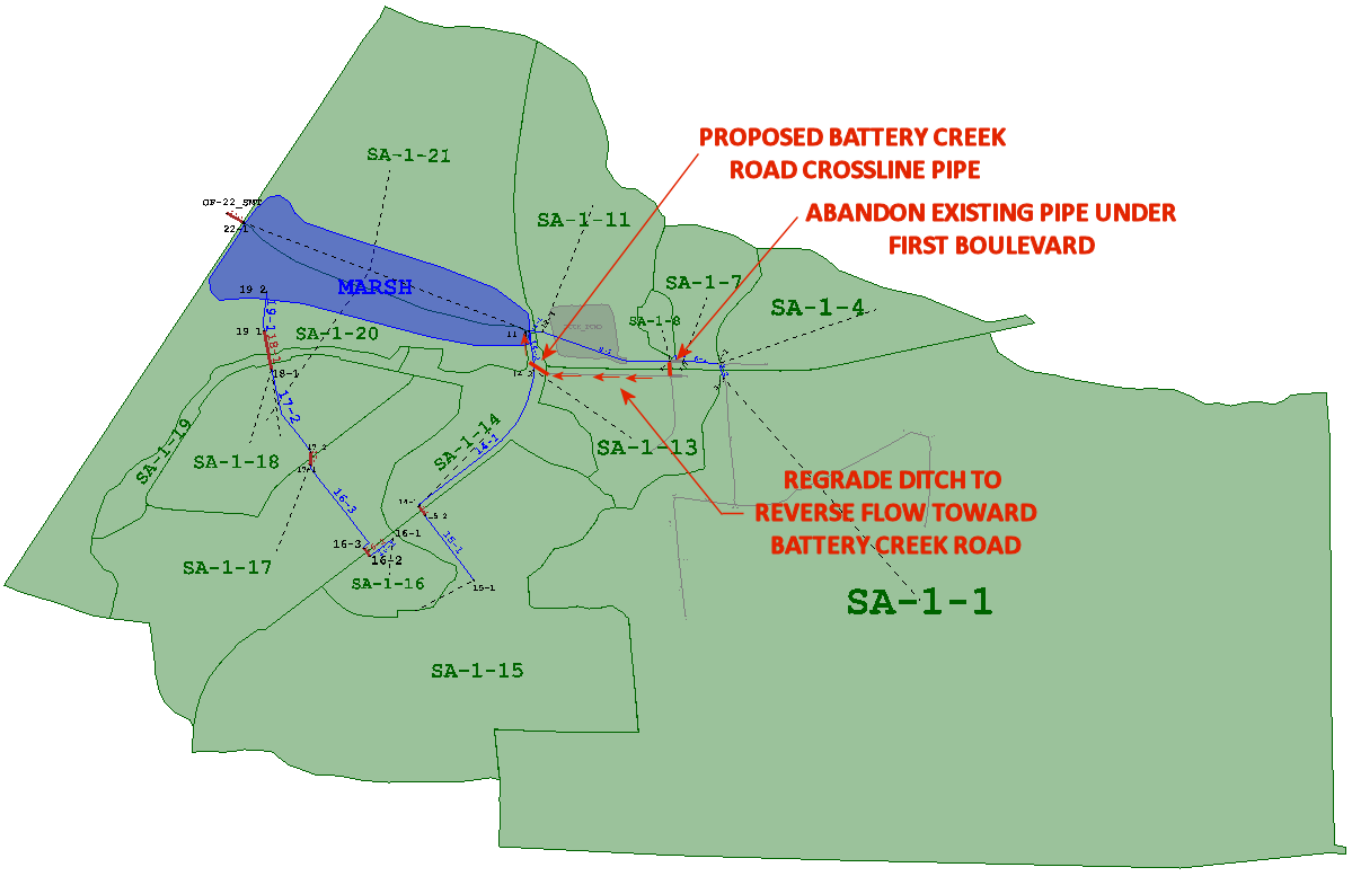


Figure 4.0 – CivilStorm model layout revisions for proposed conditions

4.2.2 HEC-RAS Model Modifications (Main Ditch through Jane Way Canal)

The proposed HEC-RAS analysis reflects the following modifications as compared to the existing conditions:

- The 48-inch RC pipe under the Spanish Moss Trail was increased to twin 60-inch RC pipes.
- The trail profile was raised to a minimum elevation of 11.5 NAVD 1988 to keep the 25-year storm tide from overtopping the trail and inundating lower Basin #1.
- The pipe replacements included tidal flap gates on the downstream ends to model the effects of minimizing tidal backwater in areas upstream of the trail. A separate analysis was made without flap gates to judge their effectiveness.
- The existing double 24-inch crossline pipe under Battery Creek Road (just downstream of the Duck Pond) was increased to twin 54-inch RC pipes. The pipe invert elevations were set at the existing water surface elevation of the Duck Pond in order to keep the pond conditions similar to existing.

- The elevation of Battery Creek Road was increased to a minimum of 8.5 feet NAVD 1988 in order to accommodate the larger pipes and to prevent the roadway from overtopping up to a 100-year rainfall/25-year storm tide event.
- The existing 48-inch RC pipe crossing of the main ditch under Jane Way was increased to twin 54-inch RC pipes.
- The existing 30-inch RC pipe crossing of the main ditch under First Boulevard was increased to twin 54-inch RC pipes.
- The Jane Way canal upstream of First Boulevard and extending along South Drive included lower Manning's roughness coefficients to determine the effects of ditch cleaning.
- The existing double 36-inch crossline pipe under Center Drive East was increased to twin 54-inch RC pipes.

4.3 Proposed Conditions Analysis Results

4.3.1 Proposed Conditions CivilStorm Flood Discharge Results

Based on the revised CivilStorm analysis, peak stormwater flow discharges changed only slightly from the existing conditions model due to the reversal of flow in the First Boulevard ditch. This change reduced discharges slightly just upstream of Battery Creek Road. Resulting discharges (cfs) at key locations are presented in Table 4.0 below.

Table 4.0 Proposed Conditions CivilStorm Results – Discharges (cfs)

Return Period	Jane Way Canal/First Blvd Twin 54" RCPs	Jane Way Twin 54" RCPs	Duck Pond/Battery Creek Road Twin 54" RCPs	Just Downstream of Battery Creek Road	Royal Oaks Ditch/ Battery Creek Road 24" RCP	Royal Oaks Ditch/ Coates Lane 36" RCP	Royal Oaks Ditch/ West Royal Oaks Drive Twin 36" RCPs	Spanish Moss Trail Twin 60" RCPs
10-year	166	170	172	214	3	22	35	257
25-year	225	231	235	289	5	33	52	356
50-year	272	280	286	353	6	41	66	440
100-year	329	339	347	431	8	52	83	541

4.3.2 Proposed Conditions HEC-RAS Analysis Results

The following tables list the results of the HEC-RAS analysis using proposed new pipe and ditch improvements, along with a comparison of the resulting water surface profiles both with and without tidal flap gates at the end of the Spanish Moss Trail crossline pipes.

The flap gates would be a type that allows normal tidal flow (low tide to high tide) into and out of the pipes so that the upstream marsh receives its normal daily flow of saltwater. However, they would be set to close when the downstream tidal tailwater reaches a certain elevation during spring tides or tropical storm tides. For this reason, the flap gates would have no impact on upstream water surface profiles during any Battery Creek tidal event up to Mean High Water.

The flap gate type, however, would allow for manual closure, and if the gate were to be closed at the lowest tidal elevation possible in advance of an oncoming storm tide event, there could be a significant benefit to areas upstream. While the hydraulic modeling software used to perform this investigation does not adequately model this scenario, it is believed that water surface profiles upstream of the Spanish Moss Trail culvert could benefit as much as 1 to 2 feet in elevation if a timely closure of the flap gate is made in advance of a rising storm tide.

Table 4.1 presents the results of the HEC-RAS analysis with a flap gates attached to the Spanish Moss Trail pipes. Table 4.2 presents a comparison of results with and without the flap gates in place, from Spring Tide through 25-year storm surge analyses. Figure 3.4 shows the locations where these results are reported.

Inundation maps presented in Appendix "A" for select rainfall and tidal events give an idea as to the effectiveness of proposed improvements by comparing the extents of existing conditions vs. proposed conditions flooding.

As discussed earlier, substantial flooding and damage of habitable structures begins around elevation 7.0 feet (NAVD 1988) in lower parts of the watershed.

Table 4.1 Proposed Conditions HEC-RAS Results (Including Flap Gate on Spanish Moss Trail Culvert)
Water Surface Elevations (feet NAVD 1988)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail Twin 60" RCPs	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Twin 54" RCPs	4) Jane Way Twin 54" RCPs	5) Jane Way Canal/First Blvd Twin 54" RCPs	6) Center Drive East Twin 54" RCPs
10-year/ MLW	3.4	5.0	5.6	6.3	6.9	8.0
25-year/ MLW	3.8	5.2	5.9	6.6	7.4	8.9
50-year/ MLW	4.2	5.3	6.1	6.9	7.7	9.5
100-year/ MLW	4.7	5.5	6.3	7.1	8.1	10.1
10-year/ MTL rising	3.4	5.0	5.6	6.3	6.9	8.0
25-year/ MTL rising	3.8	5.2	5.9	6.6	7.4	8.9
50-year/ MTL rising	4.2	5.3	6.1	6.9	7.7	9.5
100-year/ MTL rising	4.7	5.5	6.3	7.1	8.1	10.1

Table 4.1 (continued)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail Twin 60" RCPs	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Twin 54" RCPs	4) Jane Way Twin 54" RCPs	5) Jane Way Canal/First Blvd Twin 54" RCPs	6) Center Drive East Twin 54" RCPs
10-year/ MTL falling	3.4	5.0	5.7	6.3	6.9	8.0
25-year/ MTL falling	3.8	5.2	5.9	6.6	7.4	8.9
50-year/ MTL falling	4.2	5.3	6.1	6.9	7.8	9.5
100-year/ MTL falling	4.7	5.5	6.3	7.1	8.1	10.1
10-year/ MHW	3.9	5.0	5.7	6.3	6.9	8.0
25-year/ MHW	4.2	5.2	6.0	6.6	7.4	8.9
50-year/ MHW	4.5	5.4	6.1	6.9	7.8	9.5
100-year/ MHW	4.9	5.6	6.3	7.2	8.1	10.1
10-year/ King Tide	5.8	5.9	6.2	6.6	7.0	8.0
25-year/ King Tide	6.1	6.1	6.6	7.0	7.5	8.9
50-year/ King Tide	6.3	6.3	6.8	7.3	8.0	9.5
100-year/ King Tide	6.5	6.6	7.1	7.6	8.4	10.1
10-year/ 10-year Storm Tide	6.3	6.4	6.6	6.7	7.0	8.0
25-year/ 10-year Storm Tide	6.7	6.7	7.0	7.3	7.6	9.0
50-year/ 10-year Storm Tide	7.0	7.0	7.3	7.6	8.1	9.5
100-year/ 10-year Storm Tide	7.2	7.2	7.6	7.8	8.4	10.1

Table 4.1 (continued)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail Twin 60" RCPs	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Twin 54" RCPs	4) Jane Way Twin 54" RCPs	5) Jane Way Canal/First Blvd Twin 54" RCPs	6) Center Drive East Twin 54" RCPs
10-year/ 25-year Storm Tide*	7.0	7.0	7.0	7.0	7.1	8.0
25-year/ 25-year Storm Tide*	7.4	7.4	7.5	7.5	7.7	8.9
50-year/ 25-year Storm Tide*	7.7	7.6	7.8	7.8	8.1	9.2
100-year/ 25-year Storm Tide*	7.9	7.9	8.2	8.2	8.5	10.1

*These elevations are based on raising the low point in the Spanish Moss Trail to approximately 11.5 NAVD 1988 to prevent overtopping of the trail during 25-year storm tides. If the trail is not raised and it overtops, these elevations will be closer to 9.0 – 11.0 feet, similar to the existing conditions results (Table 3.2).

Table 4.2 Proposed Conditions HEC-RAS Results with No Flap Gates on Spanish Moss Trail Culvert (Results from Flap Gates Analysis Shown in Parentheses for Comparison) Water Surface Elevations (NAVD 1988)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail Twin 60" RCPs	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Twin 54" RCPs	4) Jane Way Twin 54" RCPs	5) Jane Way Canal/First Blvd Twin 54" RCPs	6) Center Drive East Twin 54" RCPs
10-year/ King Tide	6.2 (5.8)	6.2 (5.9)	6.6 (6.2)	6.9 (6.6)	7.3 (7.0)	8.1 (8.0)
25-year/ King Tide	6.3 (6.1)	6.4 (6.1)	6.8 (6.6)	7.2 (7.0)	7.7 (7.5)	9.0 (8.9)
50-year/ King Tide	6.5 (6.3)	6.6 (6.3)	6.9 (6.8)	7.5 (7.3)	8.1 (8.0)	9.5 (9.5)
100-year/ King Tide	6.7 (6.5)	6.7 (6.6)	7.2 (7.1)	7.6 (7.6)	8.4 (8.4)	10.1 (10.1)

Table 4.2 (continued)

Rainfall Return Period/ Tidal Event	1) Spanish Moss Trail Twin 60" RCPs	2) Just Downstream of Battery Creek Road	3) Duck Pond/Battery Creek Road Twin 54" RCPs	4) Jane Way Twin 54" RCPs	5) Jane Way Canal/First Blvd Twin 54" RCPs	6) Center Drive East Twin 54" RCPs
10-year/ 10-year Storm Tide	7.3 (6.3)	7.4 (6.4)	7.5 (6.6)	7.6 (6.7)	7.9 (7.0)	8.5 (8.0)
25-year/ 10-year Storm Tide	7.5 (6.7)	7.5 (6.7)	7.7 (7.0)	7.8 (7.3)	8.2 (7.6)	9.2 (9.0)
50-year/ 10-year Storm Tide	7.5 (7.0)	7.6 (7.0)	7.9 (7.3)	7.9 (7.6)	8.5 (8.1)	9.7 (9.5)
100-year/ 10-year Storm Tide	7.7 (7.2)	7.7 (7.2)	8.1 (7.6)	8.2 (7.8)	8.7 (8.4)	10.1 (10.1)
10-year/ 25-year Storm Tide*	8.9 (7.0)	8.9 (7.0)	8.9 (7.0)	8.9 (7.0)	8.9 (7.1)	9.1 (8.0)
25-year/ 25-year Storm Tide*	9.1 (7.4)	9.1 (7.4)	9.1 (7.5)	9.1 (7.5)	9.1 (7.7)	9.6 (8.9)
50-year/ 25-year Storm Tide*	9.1 (7.7)	9.1 (7.6)	9.2 (7.8)	9.2 (7.8)	9.2 (8.1)	10.0 (9.2)
100-year/ 25-year Storm Tide*	9.3 (7.9)	9.3 (7.9)	9.3 (8.2)	9.3 (8.2)	9.3 (8.5)	10.2 (10.1)

4.3.3 HY-8 Model Results (West Royal Oaks Crossline Pipes)

Based on the findings of the existing conditions HY-8 analysis, the West Royal Oaks crossline pipes were re-analyzed with larger pipes where necessary. Following is a summary of the proposed HY-8 results (refer to Figure 3.5 for pipe locations):

- 1) Battery Creek Road (250 feet northeast of intersection with West Royal Oaks Drive): existing 24-inch pipe was replaced with a proposed 24-inch RC pipe with a positive slope to improve on the conditions of the existing pipe laid on an adverse slope.
- 2) Battery Creek Road (450 feet northeast of intersection with West Royal Oaks Drive): existing 24-inch pipe was replaced with proposed twin 36-inch RC pipes.

- 3) Coates Lane: existing 24-in pipe was replaced with a 36-inch RC pipe.
- 4) West Royal Oaks Drive: existing 24-inch crossline pipe was replaced with proposed twin 36-inch crossline pipes. The existing 36-inch outfall pipe was removed so that it would be replaced by an outfall ditch.

4.4 Proposed Conditions Analysis Discussion

The proposed drainage structures would provide a cleaner, more efficient drainage "system" than the existing ones. They would work in series, providing a smooth transition from one structure downstream to the next and allowing stormwater to flow more freely toward Battery Creek.

It should be stated again that the efficiency of the proposed improvements will be limited during higher-intensity rainfall events combined with high tidal elevations on Battery Creek because stormwater flooding will be trapped by the high tides. However, the results showed that a tidal flap gate would have some measurable benefit during these extreme events.

Regardless of the degree of improvements that are undertaken, there will still be properties located in tidally-affected areas left vulnerable to flood damage due to their low-lying ground/structure elevations. These are mostly centered around the areas between Jane Way and Center Drive East, First Boulevard (near Jane Way), and the West Royal Oaks neighborhood.

A very large number of rainfall vs. tidal scenarios were investigated in the preparation of this study, and the issues associated with tidal events bring another level of complexity to the Basin #1 flooding problem. For example, the proposed improvements will be inadequate if a 50-year storm surge strikes the Beaufort area and completely inundates much of Basin #1. The results presented in this report suggest that while the goal of providing improvements to the overall Basin #1 drainage system is attainable, it was clear that not all combined rainfall/tidal flooding events could be addressed without eliminating the risk of widespread flooding.

Sea level rise will likely be another continuing issue that Basin #1 will likely face in the future. Scientific estimates of sea level rise vary greatly, and there is very little solid guidance for engineers to design or plan for exact future increases (either in amount or time period over which the increases may occur).

The water surface elevations presented in Table 4.1 would increase proportionately with any future increases in sea level. For example, a one-foot sea level increase would result in approximately one foot of increase in all of the elevations reported for the various storm events. However, exact future sea level increases were not accounted for in the analysis or recommendations presented in this study.

Based upon the overall findings of this study, the most efficient, cost-effective, and practical solutions to Basin #1 flooding issues were developed and are presented in the next section of this report.

5.0 CONCLUSION/FINDINGS

5.1 Recommendations

Based on all of the observations and findings discussed in this report, the following improvements are recommended:

- Replace the 48-inch RC pipe under the Spanish Moss Trail with twin 60-inch RC pipes. As stated in section 3.2.6, the existing pipe is the largest impediment to flow in the entire watershed.
- Provide flap gates on each of the pipes to prevent storm tides downstream of the Spanish Moss Trail from inundating the upstream marsh and removing potential storage for stormwater from Basin #1. These gates would be the type that allow backflow during normal tidal cycles to keep the upstream salt marsh healthy.
- Provide regular maintenance to the flap gates, and have a plan in place to close the gates ahead of predicted extreme tides and possible heavy rainfall.
- Replace the crossline pipes under Battery Creek Road (at the Duck Pond), Jane Way, and First Boulevard with twin 54-inch RC pipes. Geometric constraints at the Jane Way and First Boulevard locations will make installations of these culverts challenging, and minor ditch widening may be necessary immediately upstream and downstream of the crossings.
- Improve Battery Creek Road from West Royal Oaks Drive northward to Acorn Hill Avenue. Raise the elevation of the roadway to a minimum of 8.5 feet NAVD 1988 to accommodate the construction of the pipes. Relocate the sidewalk from the Duck Pond dam to the shoulder of Battery Creek Road. Remove the existing pond outflow pipe.
- Clean the Jane Way canal from First Boulevard upstream to the confluence of two large canals at the north side of the Beaufort Middle School property. Clean the ditch along the north and west sides of the school property, and along South Drive to a point upstream of the crossline pipes under Center Drive East. These ditches should be cleared free of debris and trash, to form a smooth bottom and to eliminate as much standing water as possible.
- A program of regular maintenance should be instituted by the City to keep this area of ditch as cleared of debris, vegetative growth, and blockage as possible.
- Replace the existing double 36-inch crossline pipes under Center Drive East with twin 54-inch RC pipes.
- As discussed in Section 4.2.1, regrade the roadside ditch on the south side of First Boulevard to reverse flow toward Battery Creek Road. Provide a new 18-inch crossline pipe under Battery Creek Road to accept flow from this ditch, and abandon the existing crossline pipe under First Boulevard (located just west of Jane Way).
- Replace the existing 24-inch crossline pipe under Battery Creek Road (250 feet northeast of the intersection with West Royal Oaks Drive) with a proposed 24-inch RC pipe laid on positive slope.

- Replace the existing 36-inch crossline pipe under Battery Creek Road (450 feet northeast of intersection with West Royal Oaks Drive) with twin 36-inch RC pipes.
- Replace the existing 24-inch crossline pipe under Coates Lane with a 36-inch RC pipe.
- Replace the crossline pipe under West Royals Oaks Drive with twin 36-inch RC pipes. Remove the outfall pipe just downstream of the crossline and replace the existing pipe with a proposed new outfall ditch to the marsh. This crossline pipe will likely continue to exhibit hydraulic performance issues which are unavoidable due to its elevation and close proximity to the salt marsh.
- Provide spot improvements and cleaning of constricted areas in the West Royal Oaks ditch between Battery Creek Road and West Royal Oaks Drive to provide a free flow of stormwater through this area.
- Consider raising the elevation on the Spanish Moss Trail in an area adjacent to West Royal Oaks Drive from its current low point of 9.8 feet (NAVD 1988) to elevation 11.5 feet to fully protect the area from storm tide inundation up to and including a 25-year tidal event. This would amount to raising approximately 1000 feet of trail approximately 1.0 foot on average (1.7 feet maximum). Before this task is undertaken, it is recommended that a geotechnical engineer provide technical expertise as to the stability of the trail embankment fill in this area as subjected to extreme tides.
- Develop a mitigation plan for over 17 properties subject to recurrent flooding. These homes are located along West Royal Oaks Road, Battery Creek Road, Jane Way, and First Boulevard.

5.2 Summary of Improvements

Extensive study was undertaken to research, model, and understand the complexity of the flooding issues within Mossy Oaks Basin #1. A large number of scenarios were investigated using multiple hydraulic models to provide accurate solutions and to match real life situations experienced during recent storm events.

There are many factors leading to existing flooding, but the most obvious reasons point back to inadequate drainage infrastructure that has been poorly maintained for many years. The proposed new pipes recommended in this report, along with ditch maintenance in key locations, would provide immediate and positive impacts to the capacity of the Basin #1 drainage system.

And while these recommendations would not solve all flooding issues encountered during extreme rainfall combined with tidal storm events, if implemented they will result in a measurable improvement over existing conditions.

In summary, the impact of these recommendations would be the following:

- Construction of five new RC pipe crossings along the Basin #1 main ditch and Jane Way canal, along with ditch cleaning upstream of First Boulevard, would result in lower floodwater elevations (compared to existing conditions) from the Jane Way canal area downstream to Battery Creek for 10- through 100-year rainfall events that occur concurrently with normal astronomical tides (Mean Low Water through Mean High Water).

- Inclusion of flap gates on the downstream end of the proposed new Spanish Moss Trail pipes would lower flooding potential in the watershed for high-intensity rainfall events that occur concurrently with higher storm tides, from spring tides up through 10-year tropical storm tides (similar in magnitude to Hurricane Matthew and Tropical Storm Irma storm tides experienced in the Beaufort area). The flap gates would allow for manual operation, and timely closure of the gates during approaching storm tides could reduce flooding elevations in Basin #1 by a significantly lower amount.

- Raising the elevation of the Spanish Moss Trail to a minimum of 11.5 feet NAVD 1988 around the low point (in the vicinity of the West Royal Oaks neighborhood) would protect upstream areas from storm tide inundation up to a 25-year tropical storm tide event by preventing the trail from overtopping. Further geotechnical exploration on the stability of the trail embankment would need to be undertaken prior to pursuing this task.

- The replacement of crossline pipes in the West Royal Oaks neighborhood would reduce localized flooding. In addition, the other improvements mentioned above would reduce backwater into the neighborhood from the adjacent salt marsh, thereby allowing drainage to flow more freely to the marsh.

APPENDIX A

INUNDATION MAPS FOR 25-YEAR RAINFALL EVENTS AT VARIOUS TIDE CONDTIONS

BASIN #1
APPROXIMATE INUNDATION AREA
25-YEAR RAINFALL/
MEAN HIGH WATER

EXISTING CONDITIONS

PROPOSED CONDITIONS

ROGERS DR
ACORN HILL AVE
BOWLING LN
SPANISH MOSS TRAIL
JANE WAY
DUCK POND
CENTER DR WEST
CENTER DR EAST
FIRST BLVD
MYSTIC DR E
W ROYAL OAKS DR
COATES LANE
BATTERY CREEK RD
JANE WAY
SOUTH DR
MYSTIC CIR
MYSTIC CIR
W ROYAL OAKS DR
N ROYAL OAKS DR
ELIZABETH LANE
CENTER DR EAST
BROOME LN
S ROYAL OAKS DR
BEAUFORT MIDDLE SCHOOL
SCHEPER LN
PAUL DR
McTEER CIR
BOYER ST
RHODA ST
EMILY LN
MOSSY OAKS RD
KS RD
BATT
CO

BASIN #1
APPROXIMATE INUNDATION AREA
25-YEAR RAINFALL/KING TIDE

EXISTING CONDITIONS

PROPOSED CONDITIONS

ROGERS DR
ACORN HILL AVE
BOWLING LN
SPANISH MOSS TRAIL
JANE WAY
DUCK POND
CENTER DR WEST
CENTER DR EAST
FIRST BLVD
MYSTIC DR E
W ROYAL OAKS DR
COATES LANE
BATTERY CREEK RD
JANE WAY
SOUTH DR
MYSTIC CIR
MYSTIC CIR
W ROYAL OAKS DR
W ROYAL OAKS DR
S ROYAL OAKS DR
ELIZABETH LANE
CENTER DR EAST
BROOME LN
BEAUFORT MIDDLE SCHOOL
BOYER ST
RHODA ST
EMILY LN
SCHEPER LN
PAUL DR
CENTER DR EAST
McTEER CIR
MOSSY OAKS RD

BASIN #1
APPROXIMATE INUNDATION AREA
25-YEAR RAINFALL/
10-YEAR STORM TIDE

EXISTING CONDITIONS

PROPOSED CONDITIONS

ROGERS DR
ACORN HILL AVE
BOWLING LN
SPANISH MOSS TRAIL
JANE WAY
DUCK POND
CENTER DR WEST
CENTER DR EAST
FIRST BLVD
MYSTIC DR E
W ROYAL OAKS DR
COATES LANE
BATTERY CREEK RD
JANE WAY
SOUTH DR
MYSTIC CIR
MYSTIC CIR
W ROYAL OAKS DR
N ROYAL OAKS DR
ELIZABETH LANE
CENTER DR EAST
BROOME LN
S ROYAL OAKS DR
BEAUFORT MIDDLE SCHOOL
BOYER ST
RHODA ST
EMILY LN
SCHEPER LN
PAUL DR
CENTER DR EAST
MCTEER CIR
MOSSY OAKS RD

BASIN #1
APPROXIMATE INUNDATION AREA
25-YEAR RAINFALL/
25-YEAR STORM TIDE

EXISTING CONDITIONS

PROPOSED CONDITIONS

ROGERS DR
ACORN HILL AVE
BOWLING LN
SPANISH MOSS TRAIL
JANE WAY
DUCK POND
CENTER DR WEST
CENTER DR EAST
FIRST BLVD
MYSTIC DR E
W ROYAL OAKS DR
COATES LANE
W ROYAL OAKS DR
BATTERY CREEK RD
JANE WAY
SOUTH DR
MYSTIC CIR
MYSTIC CIR
W ROYAL OAKS DR
S ROYAL OAKS DR
ELIZABETH LANE
CENTER DR EAST
BEAUFORT MIDDLE SCHOOL
BROOME LN
BOYER ST
RHODA ST
EMILY LN
SCHEPER LN
PAUL DR
McTEER CIR
MOSSY OAKS RD

APPENDIX B

RAINFALL TABLES FOR MOSSY OAKS

NOAA Atlas 14, Volume 2, Version 3
Location name: Beaufort, South Carolina, USA*
Latitude: 32.4066°, Longitude: -80.6986°
Elevation: 8.46 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.499 (0.455-0.544)	0.586 (0.535-0.640)	0.678 (0.618-0.740)	0.760 (0.691-0.830)	0.854 (0.772-0.935)	0.929 (0.833-1.02)	1.00 (0.891-1.11)	1.07 (0.942-1.20)	1.16 (1.00-1.31)	1.23 (1.05-1.41)
10-min	0.797 (0.727-0.869)	0.937 (0.856-1.02)	1.09 (0.990-1.19)	1.22 (1.11-1.33)	1.36 (1.23-1.49)	1.48 (1.33-1.63)	1.59 (1.42-1.76)	1.70 (1.49-1.89)	1.83 (1.58-2.07)	1.94 (1.66-2.21)
15-min	0.996 (0.909-1.09)	1.18 (1.08-1.29)	1.37 (1.25-1.50)	1.54 (1.40-1.68)	1.73 (1.56-1.89)	1.87 (1.68-2.06)	2.01 (1.79-2.23)	2.15 (1.88-2.39)	2.31 (1.99-2.60)	2.44 (2.08-2.78)
30-min	1.37 (1.25-1.49)	1.63 (1.49-1.78)	1.95 (1.78-2.13)	2.23 (2.03-2.43)	2.56 (2.31-2.80)	2.82 (2.53-3.10)	3.08 (2.74-3.41)	3.34 (2.93-3.72)	3.67 (3.17-4.14)	3.95 (3.37-4.50)
60-min	1.70 (1.55-1.86)	2.04 (1.87-2.23)	2.50 (2.28-2.73)	2.90 (2.64-3.17)	3.40 (3.07-3.72)	3.83 (3.43-4.20)	4.25 (3.78-4.70)	4.68 (4.11-5.22)	5.26 (4.55-5.93)	5.76 (4.92-6.57)
2-hr	2.03 (1.86-2.21)	2.46 (2.25-2.68)	3.05 (2.79-3.32)	3.56 (3.24-3.86)	4.17 (3.79-4.54)	4.67 (4.21-5.10)	5.16 (4.62-5.67)	5.65 (5.01-6.24)	6.28 (5.48-7.00)	6.81 (5.88-7.67)
3-hr	2.17 (1.99-2.37)	2.63 (2.41-2.88)	3.27 (2.99-3.57)	3.84 (3.49-4.19)	4.56 (4.12-4.98)	5.16 (4.63-5.67)	5.77 (5.12-6.37)	6.40 (5.61-7.11)	7.23 (6.23-8.13)	7.96 (6.76-9.05)
6-hr	2.54 (2.32-2.79)	3.06 (2.80-3.37)	3.81 (3.47-4.20)	4.50 (4.08-4.95)	5.42 (4.86-5.97)	6.22 (5.51-6.89)	7.04 (6.16-7.86)	7.92 (6.83-8.92)	9.13 (7.70-10.4)	10.2 (8.43-11.8)
12-hr	2.94 (2.66-3.28)	3.55 (3.22-3.97)	4.47 (4.04-4.99)	5.33 (4.78-5.94)	6.47 (5.73-7.23)	7.47 (6.53-8.39)	8.53 (7.34-9.65)	9.67 (8.16-11.0)	11.3 (9.25-13.0)	12.7 (10.2-14.9)
24-hr	3.44 (3.18-3.74)	4.19 (3.86-4.56)	5.41 (4.98-5.88)	6.40 (5.88-6.94)	7.80 (7.13-8.45)	8.94 (8.13-9.69)	10.2 (9.18-11.0)	11.4 (10.3-12.4)	13.2 (11.8-14.4)	14.7 (13.0-16.0)
2-day	4.04 (3.75-4.35)	4.89 (4.55-5.28)	6.26 (5.80-6.74)	7.37 (6.82-7.94)	8.93 (8.22-9.63)	10.2 (9.35-11.0)	11.6 (10.5-12.5)	13.0 (11.8-14.1)	15.0 (13.5-16.3)	16.7 (14.8-18.1)
3-day	4.34 (4.05-4.67)	5.26 (4.89-5.65)	6.67 (6.20-7.18)	7.82 (7.24-8.40)	9.43 (8.69-10.1)	10.7 (9.85-11.5)	12.1 (11.0-13.0)	13.6 (12.3-14.6)	15.6 (14.0-16.9)	17.2 (15.4-18.7)
4-day	4.65 (4.34-4.99)	5.62 (5.24-6.03)	7.09 (6.59-7.61)	8.27 (7.67-8.87)	9.92 (9.16-10.6)	11.3 (10.3-12.1)	12.7 (11.6-13.6)	14.1 (12.8-15.2)	16.2 (14.6-17.4)	17.8 (15.9-19.2)
7-day	5.41 (5.07-5.79)	6.51 (6.10-6.97)	8.13 (7.60-8.69)	9.40 (8.77-10.0)	11.2 (10.4-11.9)	12.6 (11.6-13.4)	14.0 (12.9-15.0)	15.5 (14.2-16.6)	17.6 (16.0-18.9)	19.2 (17.4-20.7)
10-day	6.21 (5.83-6.62)	7.45 (6.99-7.95)	9.14 (8.55-9.74)	10.4 (9.76-11.1)	12.2 (11.4-13.0)	13.6 (12.6-14.5)	15.0 (13.9-16.0)	16.4 (15.2-17.5)	18.4 (16.8-19.7)	19.9 (18.2-21.3)
20-day	8.32 (7.84-8.85)	9.92 (9.34-10.6)	12.0 (11.3-12.7)	13.6 (12.7-14.4)	15.7 (14.7-16.7)	17.4 (16.2-18.5)	19.0 (17.7-20.3)	20.7 (19.2-22.1)	23.1 (21.2-24.6)	24.9 (22.8-26.6)
30-day	10.3 (9.70-10.9)	12.2 (11.5-12.9)	14.4 (13.6-15.3)	16.1 (15.2-17.1)	18.3 (17.3-19.4)	20.1 (18.8-21.3)	21.8 (20.4-23.1)	23.5 (21.9-24.9)	25.8 (23.9-27.4)	27.5 (25.4-29.3)
45-day	12.9 (12.2-13.6)	15.2 (14.5-16.0)	17.8 (16.9-18.7)	19.7 (18.7-20.7)	22.2 (21.0-23.3)	24.1 (22.7-25.3)	25.9 (24.4-27.3)	27.7 (26.0-29.3)	30.1 (28.2-31.9)	32.0 (29.8-33.9)
60-day	15.3 (14.5-16.1)	18.0 (17.1-18.9)	20.9 (19.8-21.9)	23.0 (21.8-24.1)	25.7 (24.3-27.0)	27.8 (26.2-29.2)	29.7 (28.0-31.3)	31.7 (29.8-33.4)	34.2 (32.0-36.1)	36.1 (33.6-38.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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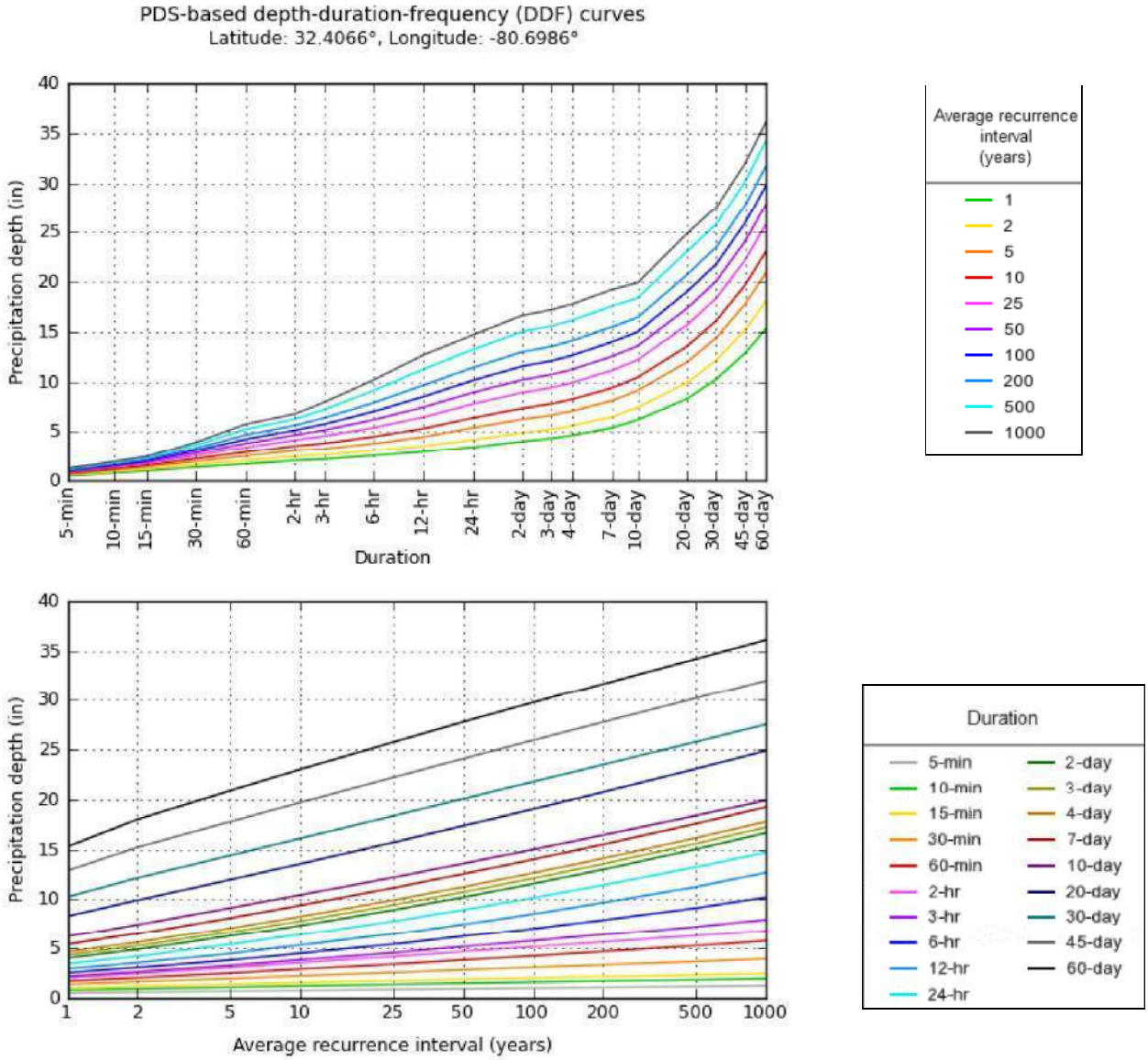
PF graphical



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Tue May 8 11:36:05 2018

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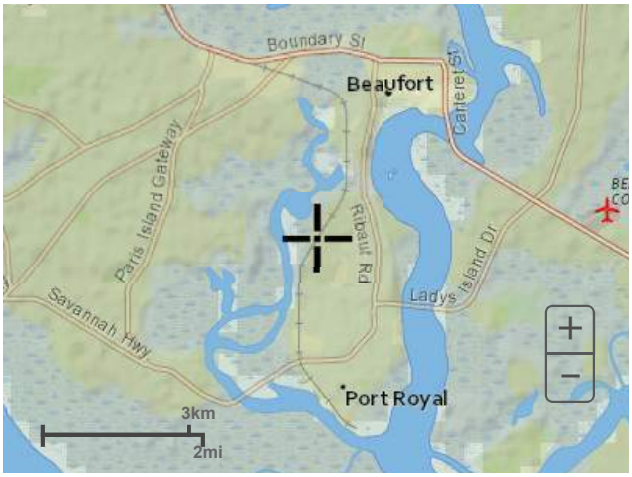
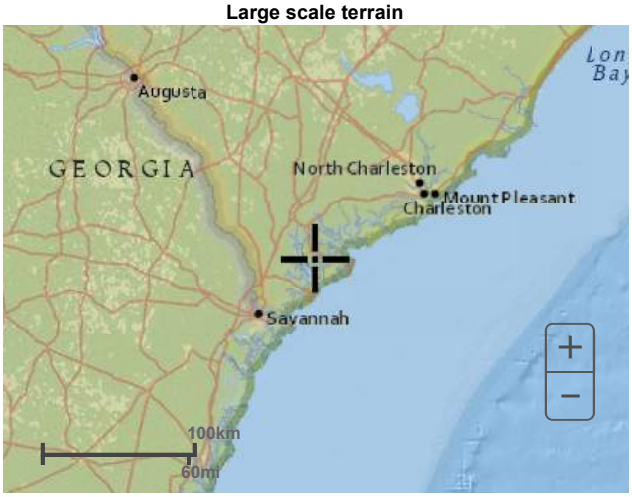
Maps & aerials

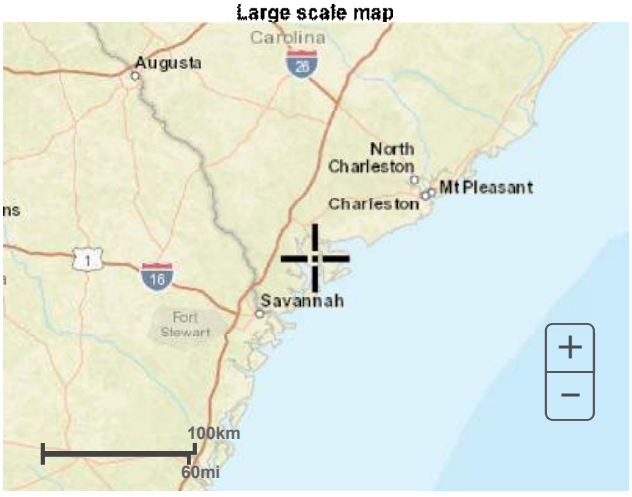
Small scale terrain



Large scale terrain



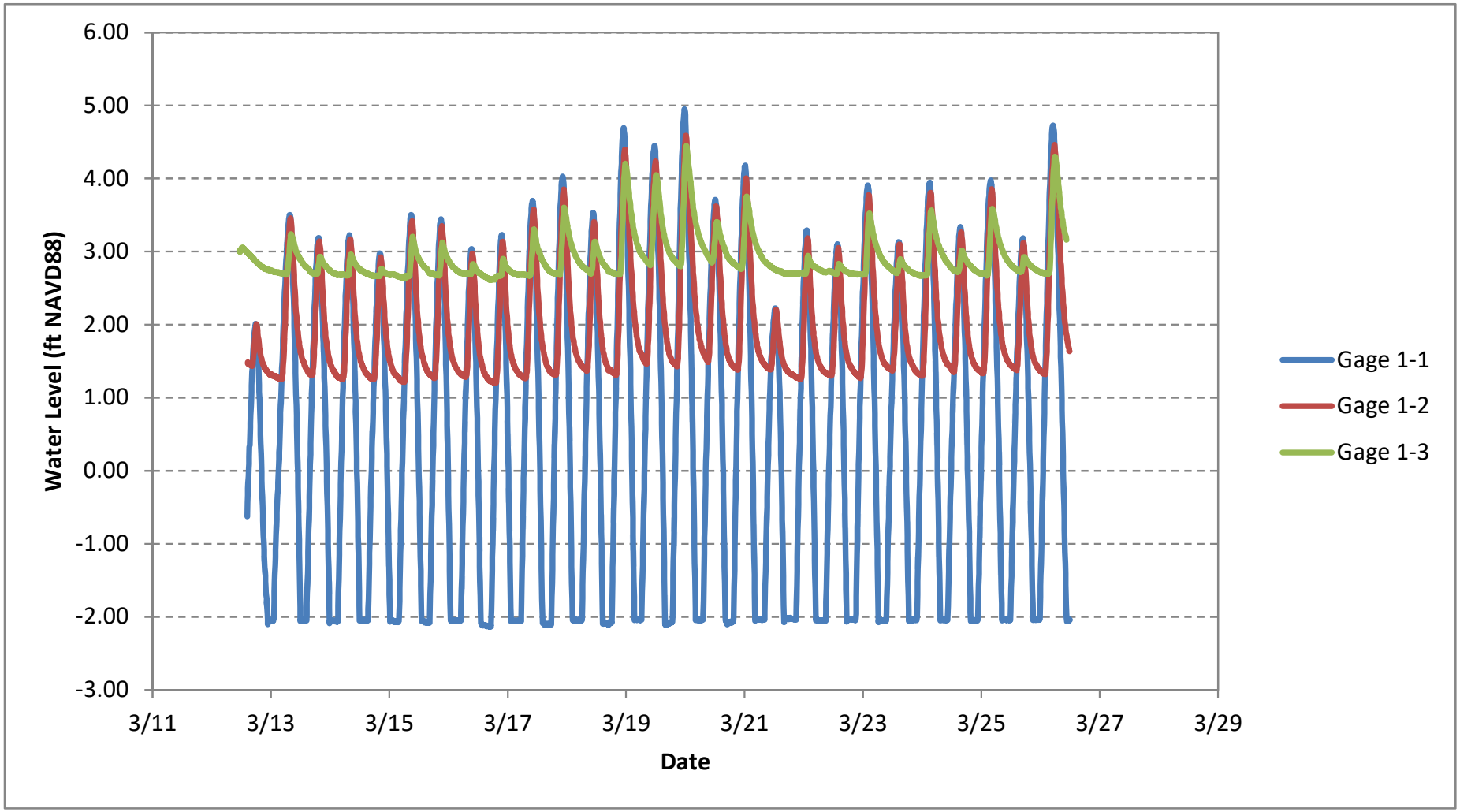
Large scale map



APPENDIX C

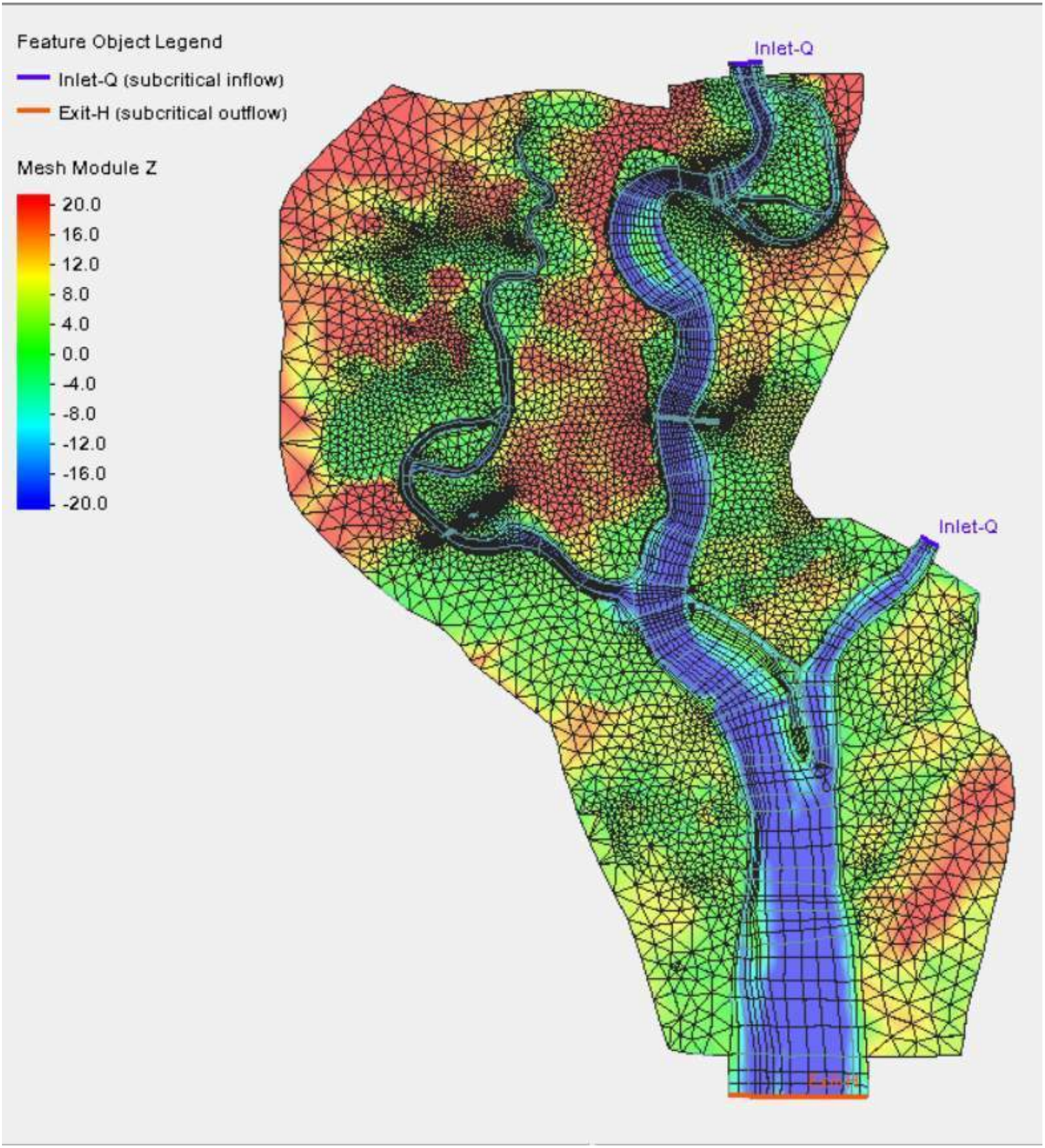
WEC, INC. TEMPORARY TIDAL GAGE RECORDS

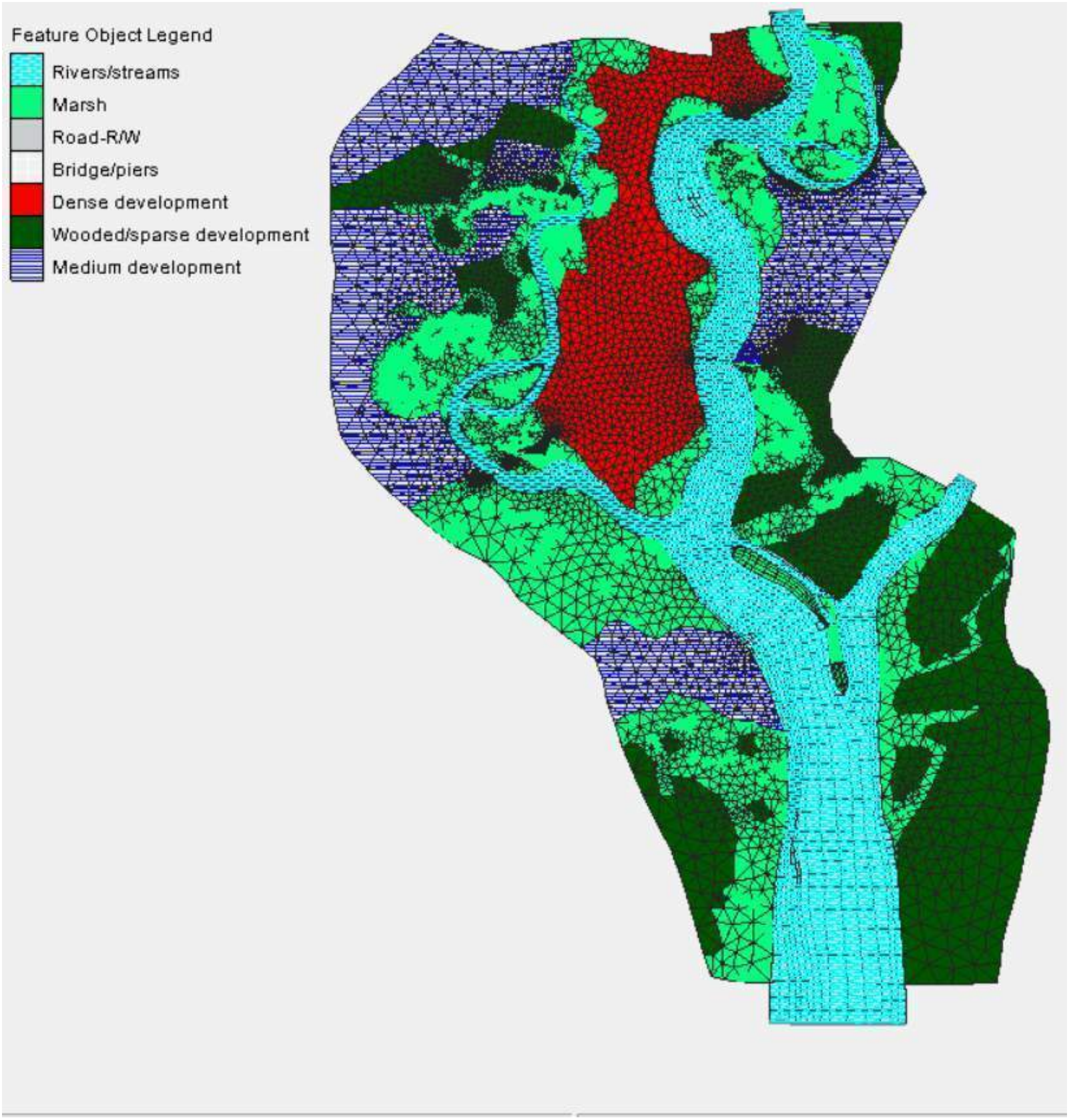

Tide gage 1
Tide gage 2
Tide gage 3


6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
Water Level (ft NAVD88)
3/11
3/13
3/15
3/17
3/19
3/21
3/23
3/25
3/27
3/29
Date
Gage 1-1
Gage 1-2
Gage 1-3

APPENDIX D

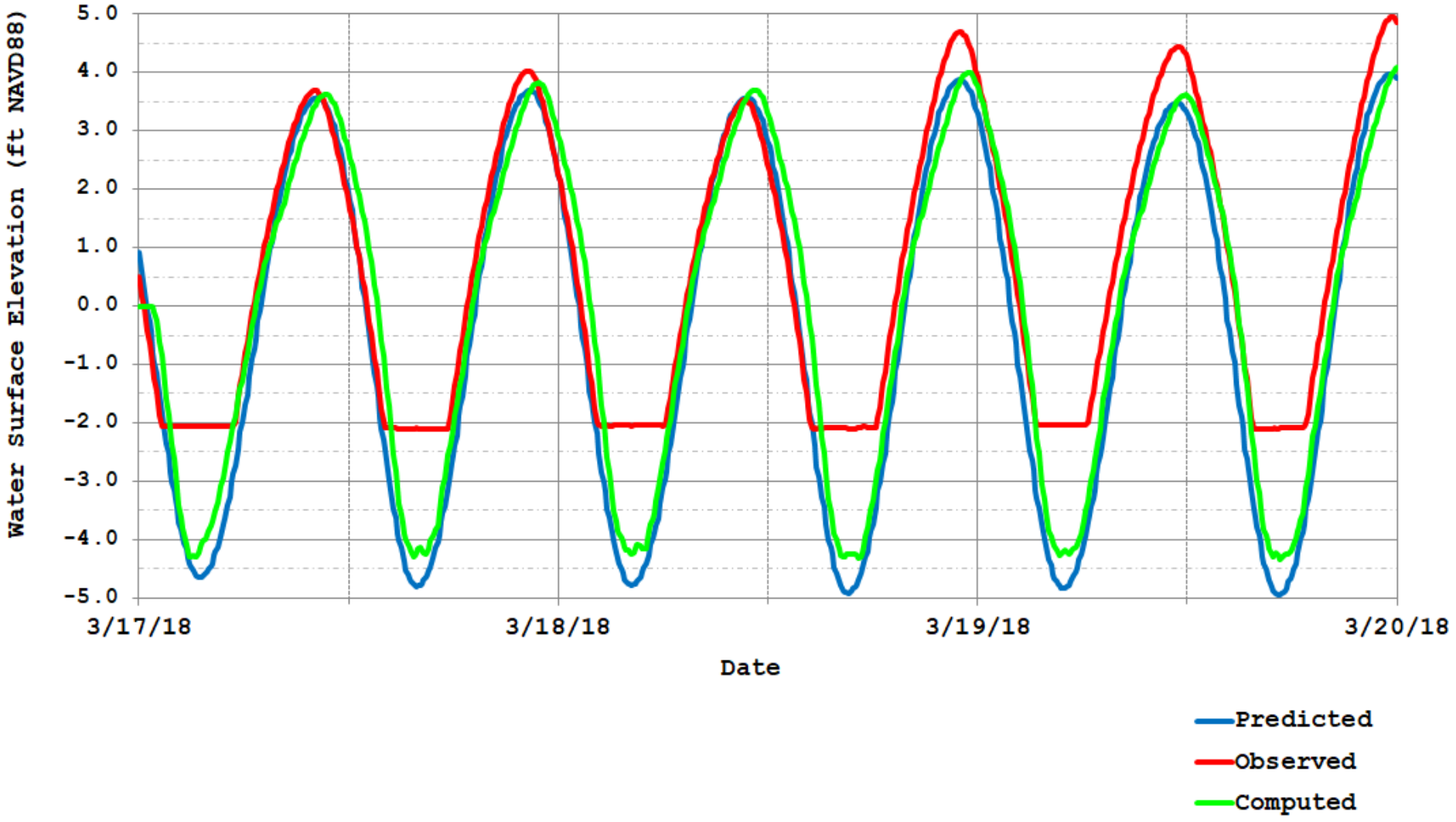
SURFACE WATER MODELING SYSTEM (SMS) RESULTS


Feature Object Legend
Inlet-Q (subcritical inflow)
Exit-H (subcritical outflow)
Mesh Module Z
20.0
16.0
12.0
8.0
4.0
0.0
-4.0
-8.0
-12.0
-16.0
-20.0
Inlet-Q
Inlet-Q

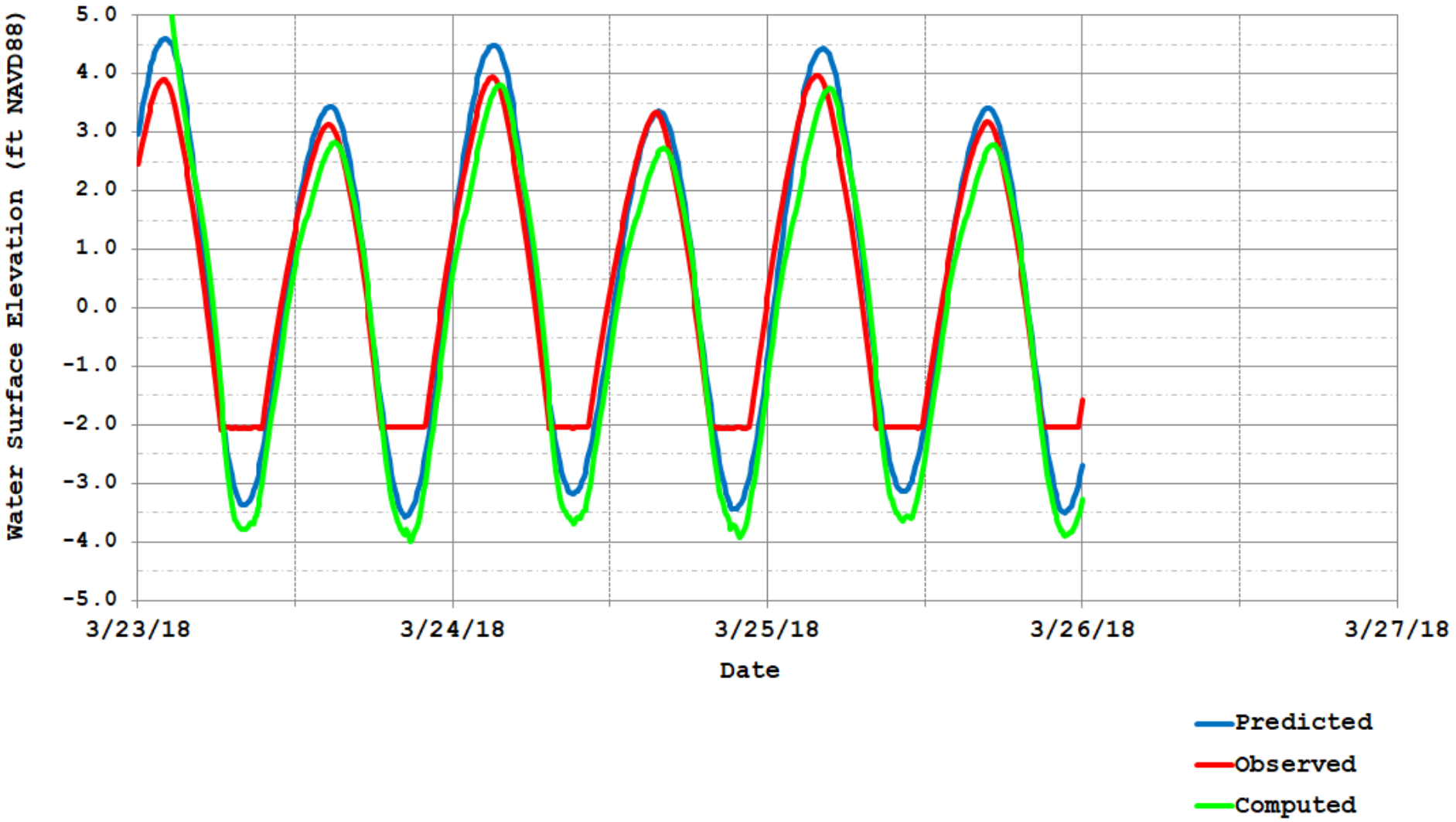

Feature Object Legend
Rivers/streams
Marsh
Road-R/W
Bridge/piers
Dense development
Wooded/sparse development
Medium development

SMS Calibration Results Computed Astronomical Tides vs. WEC Gage Records

Daily Tide Elevations
Battery Creek at Basin #1 Outfall
March 17th - 20th, 2018

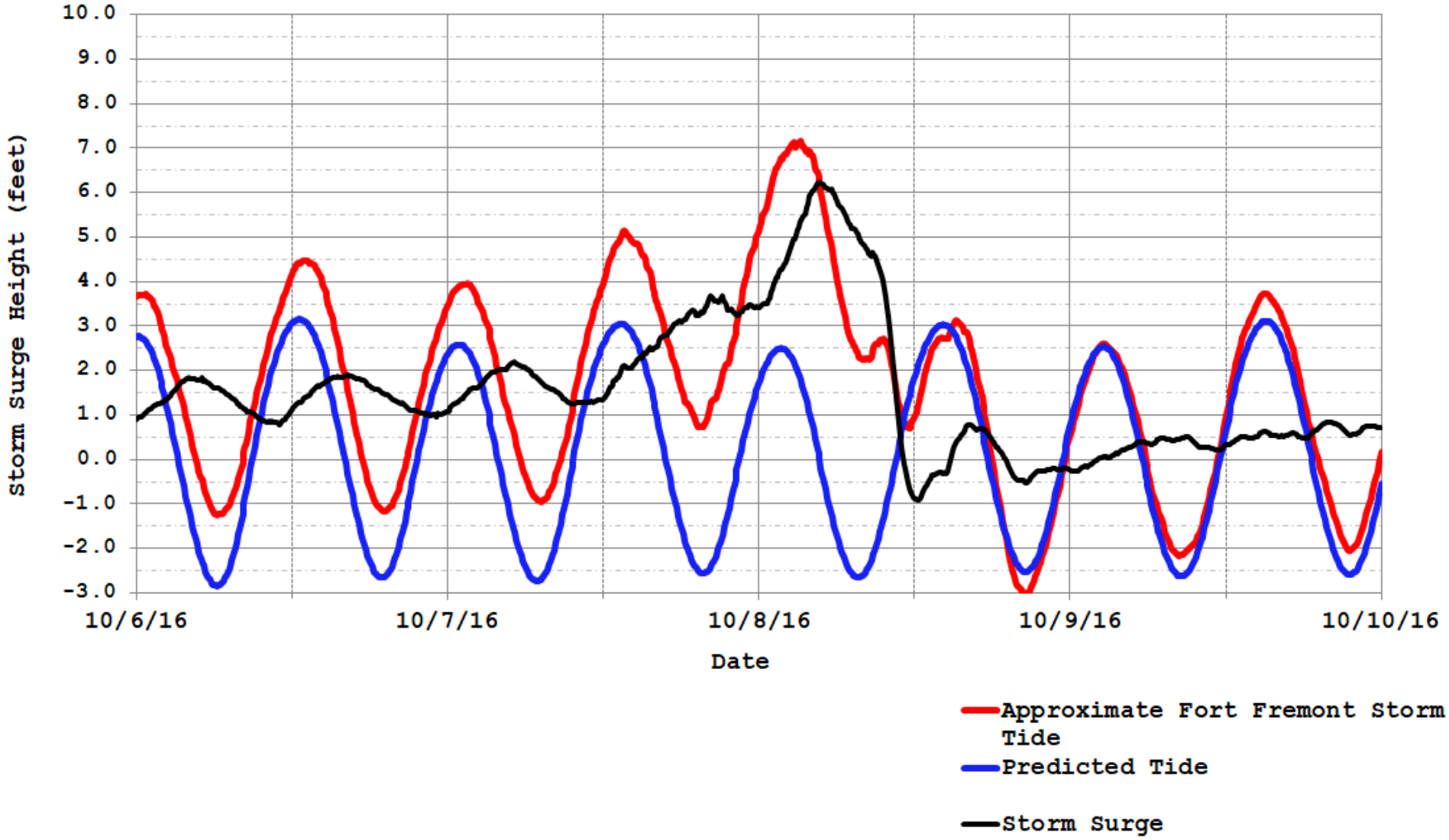


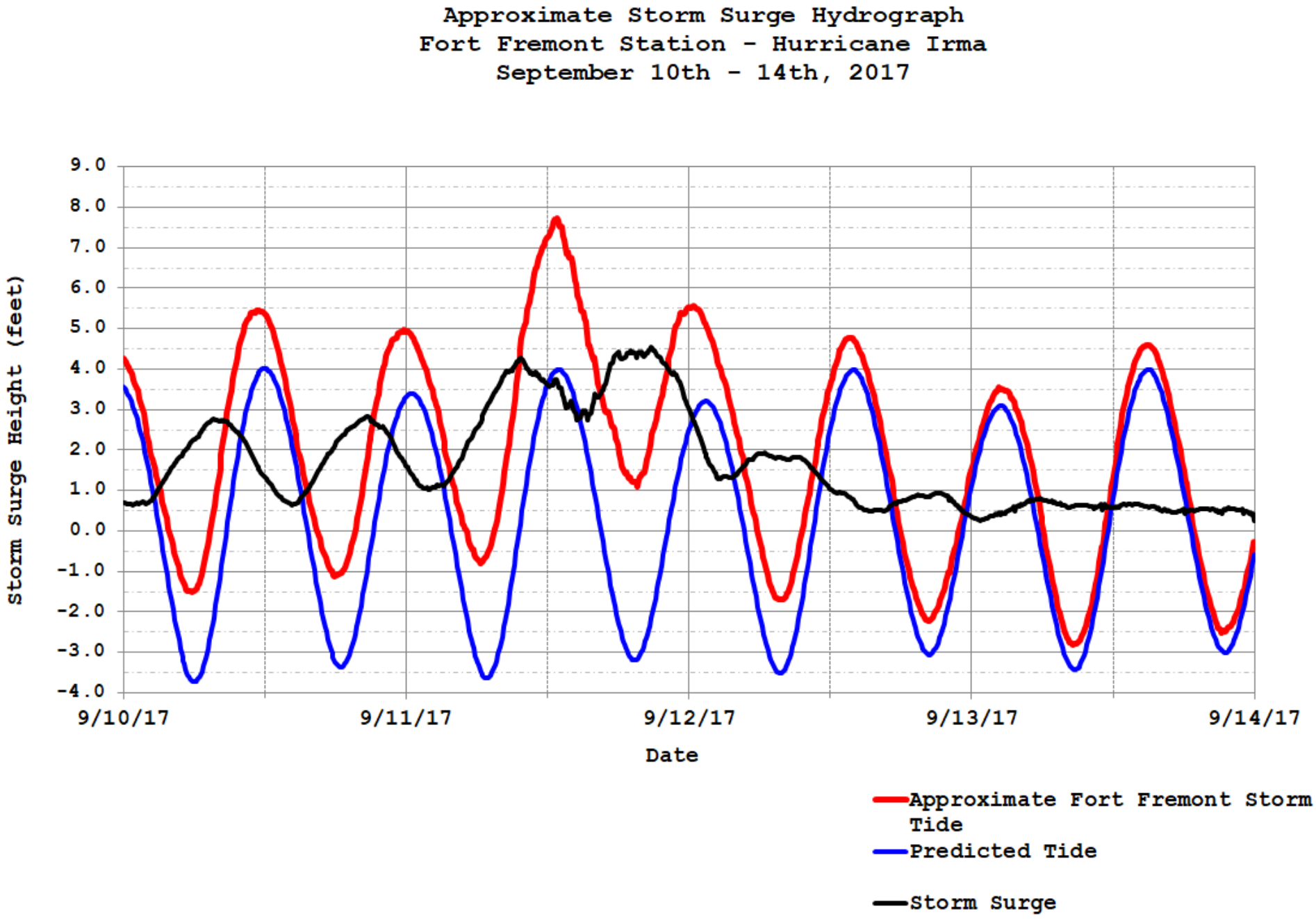
Daily Tide Elevations
Battery Creek at Basin #1 Outfall
March 23th - 26th, 2018



Storm Surge Analyses:
Hurricane Matthew (10/6 - 10/10/16)
Tropical Storm Irma (9/10 - 9/14/17)

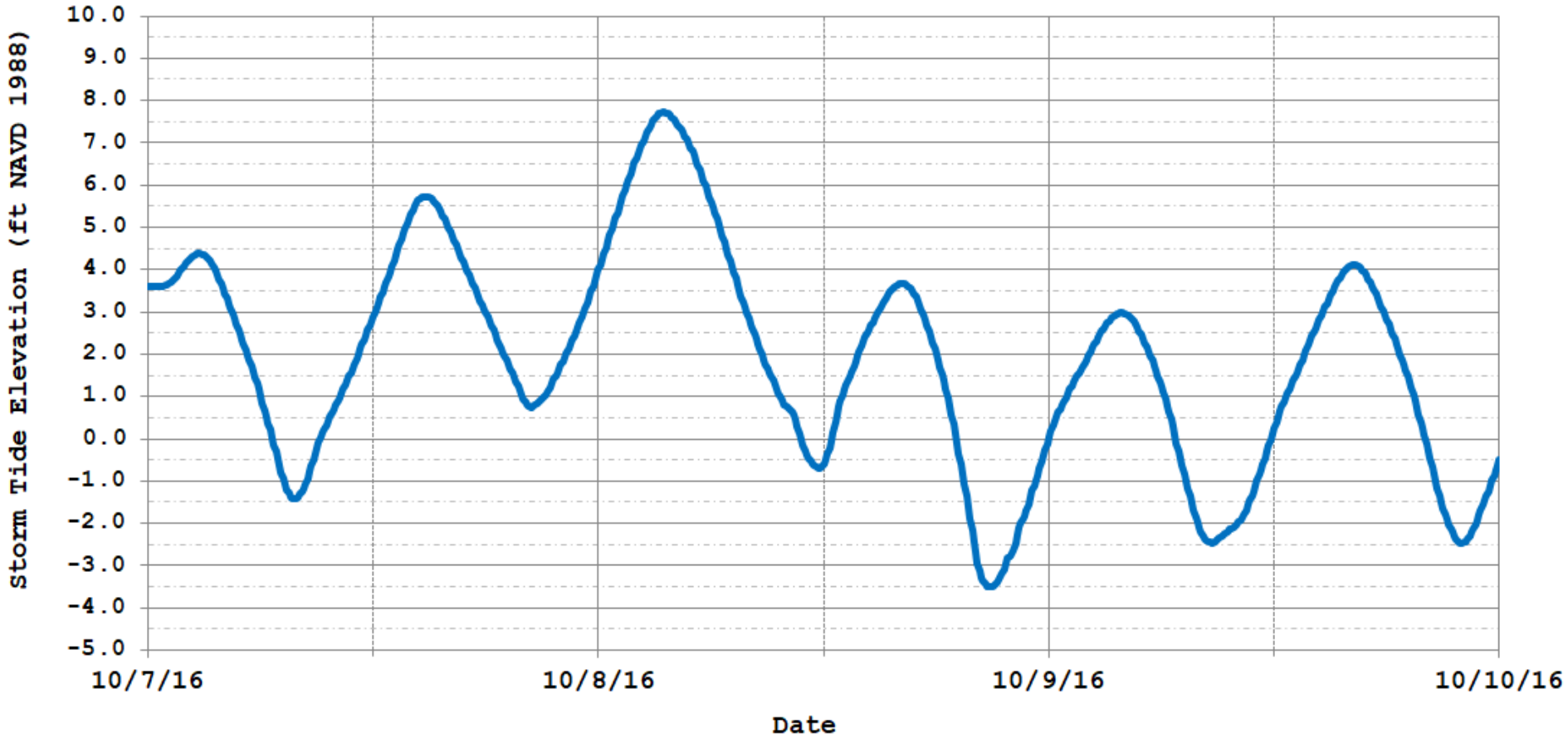
Approximate Storm Surge Hydrograph
Fort Fremont Station - Hurricane Matthew
October 6th - 10th, 2016



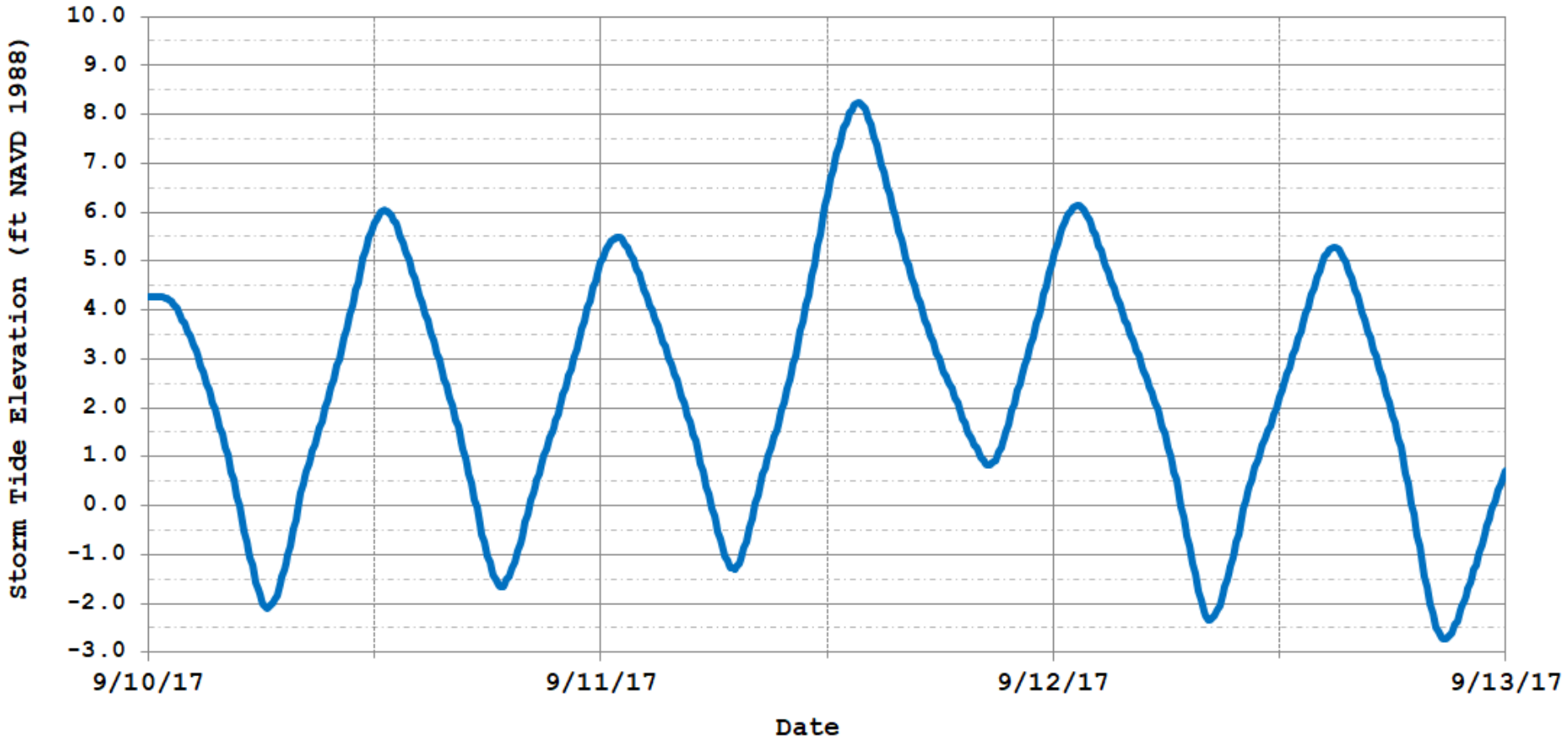

Approximate Storm Surge Hydrograph
Fort Fremont Station - Hurricane Irma
September 10th - 14th, 2017
Storm Surge Height (feet)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
9/10/17
9/11/17
9/12/17
9/13/17
9/14/17
Date
Approximate Fort Fremont Storm Tide
Predicted Tide
Storm Surge

Synthetic Design Storm Tide Hydrographs on Battery Creek at Mossy Oaks Basin #1

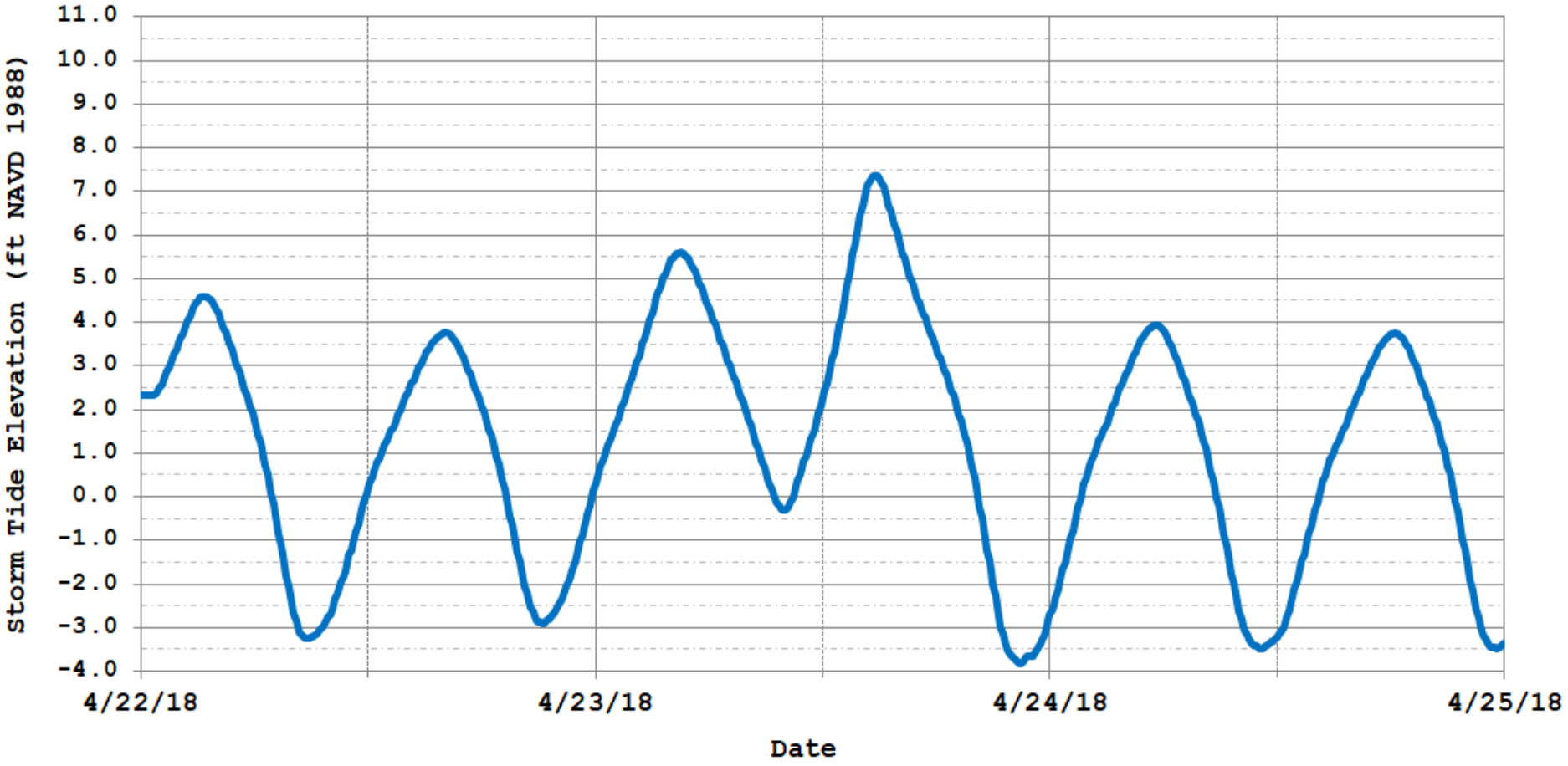
Approximate Storm Surge Hydrograph
Basin #1 OFD - Hurricane Matthew
October 7th - 10th, 2016



Approximate Storm Surge Hydrograph
Basin #1 OFD - Hurricane Irma
September 10th - 13th, 2017

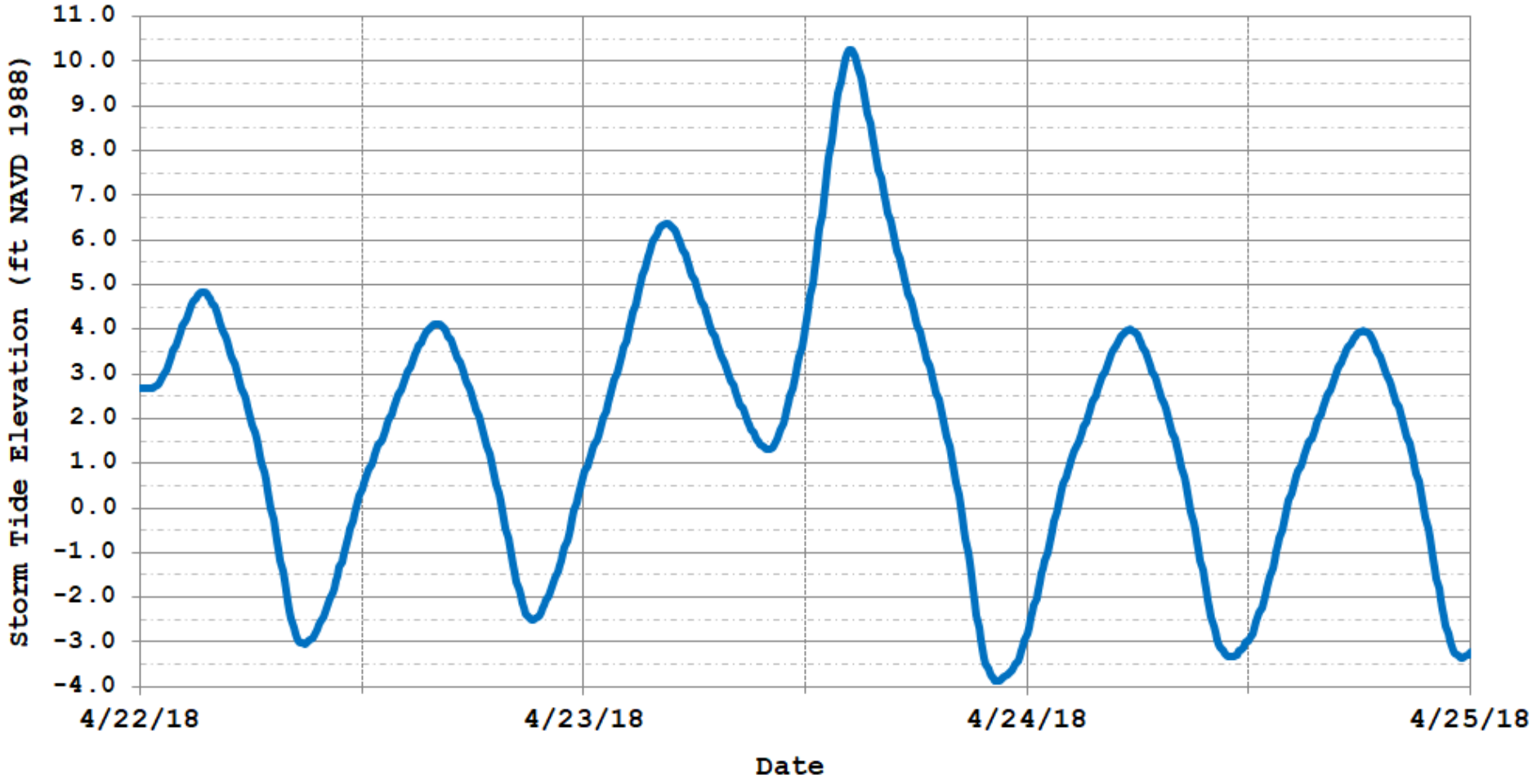


10-year Design Storm Tide Hydrograph
Battery Creek - Basin #1 OFD



Note: recent tidal data was selected for the tidal storm surge simulation; dates and times are insignificant.

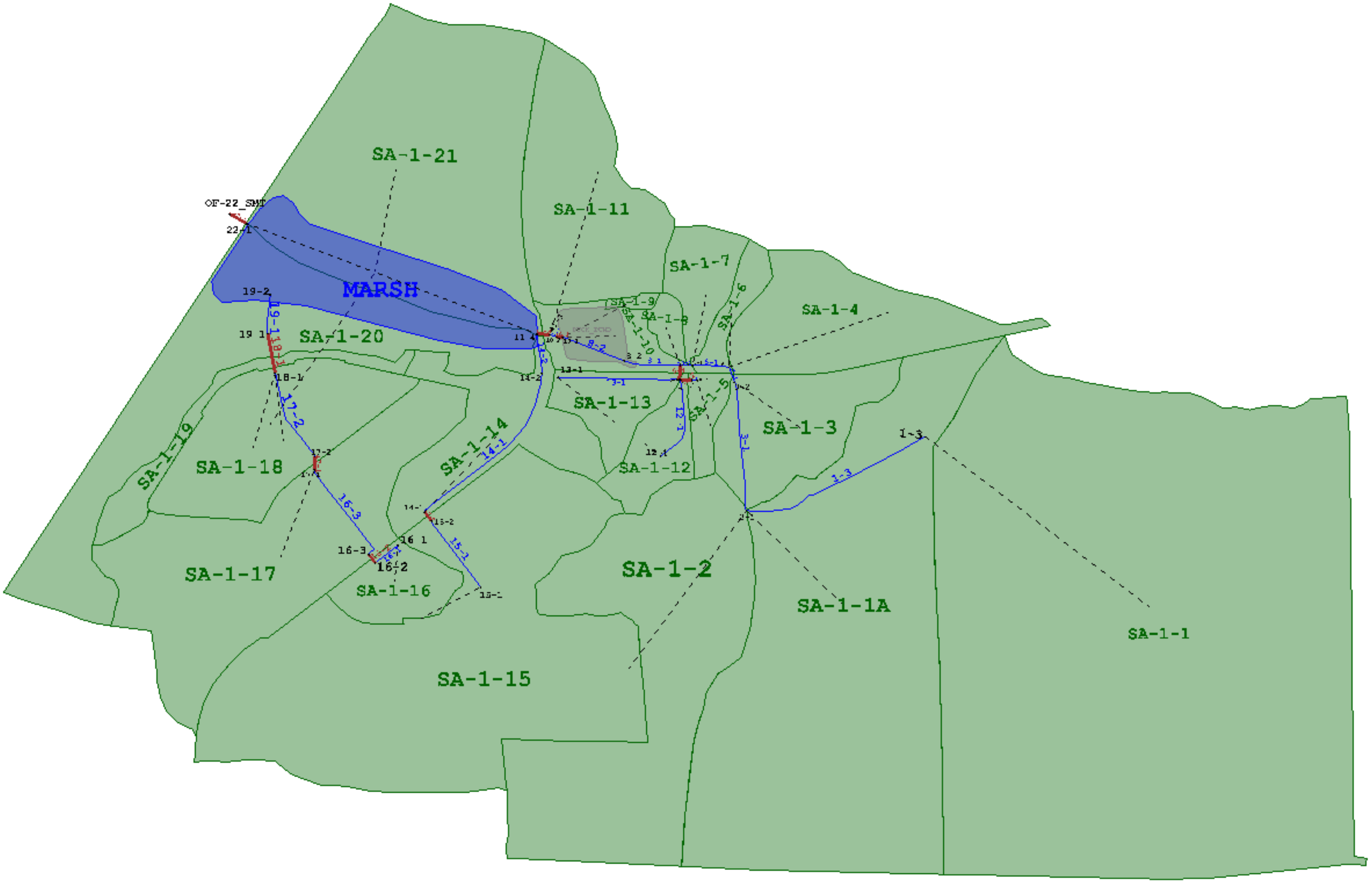
25-year Design Storm Tide Hydrograph
Battery Creek - Basin #1 OFD



Note: recent tidal data was selected for the tidal storm surge simulation; dates and times are insignificant.

APPENDIX E

CIVILSTORM RESULTS


SA-1-21
SA-1-11
SA-1-7
SA-1-6
SA-1-4
SA-1-9
SA-1-8
SA-1-10
SA-1-20
MARSH
SA-1-13
SA-1-5
SA-1-3
SA-1-19
SA-1-18
SA-1-14
SA-1-12
SA-1-17
SA-1-16
SA-1-2
SA-1-1A
SA-1-15
SA-1-1
OF-22_SMT
22-1
19-2
19-1
18-1
17-2
16-3
16-2
16-1
15-1
14-2
14-1
13-1
12-1
11-2
8-2
5-1
3-1
1-3

Multiple Element Report

SA-1-1

<General>

ID	366	Notes	
Label	SA-1-1	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	111.768	acres	Area (User Defined)	111.8	acres
Use Scaled Area?	FALSE				

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	3-2

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph	
Area Defined By	Single Area	Tc Input Type	User Defined Tc	
Loss Method	SCS CN	Time of Concentration	67.2	min
SCS CN	73.8	Time of Concentration (Composite)	67.2	min
SCS CN (Composite)	73.8	SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	166.4	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	225.3	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	272.4	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	328.6	cfs	Time (Maximum Flow)	762	min

Results

Area (Unified)	111.8	acres	Volume (Total Runoff)	20,733,568.50	gal

Calculation Messages

Time (min)	Message

SA-1-4

<General>

ID	37	Notes	
Label	SA-1-4	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	6.427 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	6-1

Inflow (Wet)
Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph	
Area Defined By	Single Area	Tc Input Type	User Defined Tc	
Loss Method	SCS CN	Time of Concentration	21	min
SCS CN	57	Time of Concentration (Composite)	21	min
SCS CN (Composite)	57	SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended
Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0 in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	8.7	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	13.3	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	17.2	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	22.0	cfs	Time (Maximum Flow)	762	min
Area (Unified)	6.427	acres	Volume (Total Runoff)	808,240.20	gal

Calculation Messages

Time (min)	Message

SA-1-7

<General>

ID	374	Notes	
Label	SA-1-7	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	3.185 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	7-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph	
Area Defined By	Single Area	Tc Input Type	User Defined Tc	
Loss Method	SCS CN	Time of Concentration	15.4	min
SCS CN	58.9	Time of Concentration (Composite)	15.4	min
SCS CN (Composite)	58.9	SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0 in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0 cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE			

Results (Maximum Values)

10-year Q (Max)	5.3 cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	8.0 cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	10.3 cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	13.1 cfs	Time (Maximum Flow)	762	min
Area (Unified)	3.185 acres	Volume (Total Runoff)	423,517.10	gal

Calculation Messages

Time (min)	Message

SA-1-8

<General>

ID	375	Notes	
Label	SA-1-8	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	5.591 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	8-1

Inflow (Wet)
Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph	
Area Defined By	Single Area	Tc Input Type	User Defined Tc	
Loss Method	SCS CN	Time of Concentration	26.1	min
SCS CN	68.7	Time of Concentration (Composite)	26.1	min
SCS CN (Composite)	68.7	SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0 in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	11.6	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	16.1	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	19.8	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	24.2	cfs	Time (Maximum Flow)	762	min
Area (Unified)	5.591	acres	Volume (Total Runoff)	941,924.60	gal

Calculation Messages

Time (min)	Message

Multiple Element
Report

SA-1-11

<General>

ID	377	Notes	
Label	SA-1-11	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	10.499 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	11-3

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph

Area Defined By	Single Area	Tc Input Type	User Defined Tc
Loss Method	SCS CN	Time of Concentration	21.4 min
SCS CN	65.3	Time of Concentration (Composite)	21.4 min
SCS CN (Composite)	65.3	SCS Unit Hydrograph Method	Default Curvilinear

Results (Extended Catchment)

Precipitation (Cumulative)	0 in	Precipitation (Incremental)	0 in

Results (Flow)

Flow (Total Out)	0 cfs	Flow (Local from Inflow Collection)	0 cfs
Local Inflow?	FALSE		

Results (Maximum Values)

10-year Q (Max)	20.5 cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	29.1 cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	36.1 cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	44.5 cfs	Time (Maximum Flow)	762	min

Area (Unified)	10.499 acres	Volume (Total Runoff)	1,640,021.60 gal

Calculation Messages

Time (min)	Message

SA-1-14

<General>

ID	46	Notes	
Label	SA-1-14	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	5.243 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	14-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration	44.1	min
SCS CN	80		Time of Concentration (Composite)	44.1	min
SCS CN (Composite)	80		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	11.7	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	15.2	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	18.0	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	21.3	cfs	Time (Maximum Flow)	762	min

Area (Unified)	5.243	acres	Volume (Total Runoff)	1,090,592.40	gal

Calculation Messages

Time (min)	Message

SA-1-15

<General>

ID	49	Notes	
Label	SA-1-15	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	25.791 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	15-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration		22.5 min
SCS CN	62		Time of Concentration (Composite)		22.5 min
SCS CN (Composite)	62		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	43.8	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	64.0	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	80.6	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	101.0	cfs	Time (Maximum Flow)	762	min

Area (Unified)	25.791	acres	Volume (Total Runoff)	3,719,127.20	gal

Calculation Messages

Time (min)	Message

SA-1-16

<General>

ID	149	Notes	
Label	SA-1-16	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	2.189 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	16-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration	21.6	min
SCS CN	59		Time of Concentration (Composite)	21.6	min
SCS CN (Composite)	59		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	3.3	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	4.9	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	6.3	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	7.9	cfs	Time (Maximum Flow)	762	min

Area (Unified)	2.189	acres	Volume (Total Runoff)	291,538.30	gal

Calculation Messages

Time (min)	Message

SA-1-17

<General>

ID	54	Notes	
Label	SA-1-17	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	13.774 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	17-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration		31.9 min
SCS CN	61		Time of Concentration (Composite)		31.9 min
SCS CN (Composite)	61		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	19.2	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	28.4	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	36.0	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	45.3	cfs	Time (Maximum Flow)	762	min

Area (Unified)	13.774	acres	Volume (Total Runoff)	1,932,225.60	gal

Calculation Messages

Time (min)	Message

SA-1-18

<General>

ID	53	Notes	
Label	SA-1-18	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	7.186 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	18-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration		22.1 min
SCS CN	62		Time of Concentration (Composite)		22.1 min
SCS CN (Composite)	62		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0 in	Precipitation (Incremental)	0 in

Results (Flow)

Flow (Total Out)	0 cfs	Flow (Local from Inflow Collection)	0 cfs
Local Inflow?	FALSE		

Results (Maximum Values)

10-year Q (Max)	12.2 cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	17.9 cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	22.5 cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	28.2 cfs	Time (Maximum Flow)	762	min

Area (Unified)	7.186 acres	Volume (Total Runoff)	1,036,785.00	gal

Calculation Messages

Time (min)	Message

SA-1-19

<General>

ID	52	Notes	
Label	SA-1-19	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	1.907 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	18-1

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration		23.4 min
SCS CN	57		Time of Concentration (Composite)		23.4 min
SCS CN (Composite)	57		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	2.5	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	3.8	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	5.0	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	6.4	cfs	Time (Maximum Flow)	762	min

Area (Unified)	1.907	acres	Volume (Total Runoff)	239,675.80	gal

Calculation Messages

Time (min)	Message

SA-1-20

<General>

ID	55	Notes	
Label	SA-1-20	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	13.063 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	MARSH

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration		28.5 min
SCS CN	66		Time of Concentration (Composite)		28.5 min
SCS CN (Composite)	66		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	23.2	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	33.0	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	41.1	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	50.8	cfs	Time (Maximum Flow)	762	min

Area (Unified)	13.063	acres	Volume (Total Runoff)	2,071,939.30	gal

Calculation Messages

Time (min)	Message

SA-1-21

<General>

ID	51	Notes	
Label	SA-1-21	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	19.267 acres	Use Scaled Area?	TRUE

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	MARSH

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc

Loss Method	SCS CN		Time of Concentration	24.1	min
SCS CN	64		Time of Concentration (Composite)	24.1	min
SCS CN (Composite)	64		SCS Unit Hydrograph Method	Default Curvilinear	

Results (Extended Catchment)

Precipitation (Cumulative)	0	in	Precipitation (Incremental)	0	in

Results (Flow)

Flow (Total Out)	0	cfs	Flow (Local from Inflow Collection)	0	cfs
Local Inflow?	FALSE				

Results (Maximum Values)

10-year Q (Max)	34.4	cfs	Time (Maximum Flow)	762	min
25-year Q (Max)	49.6	cfs	Time (Maximum Flow)	762	min
50-year Q (Max)	62.0	cfs	Time (Maximum Flow)	762	min
100-year Q (Max)	77.2	cfs	Time (Maximum Flow)	762	min

Area (Unified)	19.267	acres	Volume (Total Runoff)	2,916,923.80	gal

Calculation Messages

Time (min)	Message

Center Drive East

<General>

ID	34	Notes	
Label	SA-1-1	Hyperlinks	<Collection: 0 items>

GIS-IDs
GIS-ID

<Geometry>

Scaled Area	60.979 acres	Area (User Defined)	62.9 acres
Use Scaled Area?	FALSE		

Active Topology

Is Active?	TRUE

Catchment

Outflow Element	1-3

Inflow (Wet) Collection

Rainfall

Use Local Rainfall?	FALSE

Runoff

Runoff Method	Unit Hydrograph	Unit Hydrograph Method	SCS Unit Hydrograph
Area Defined By	Single Area	Tc Input Type	User Defined Tc
Loss Method	SCS CN	Time of Concentration	0.524 hours
SCS CN	75	Time of Concentration (Composite)	0.524 hours

SCS CN (Composite)	75	SCS Unit Hydrograph Method	Default Curvilinear

Results (Extended Catchment)

Precipitation (Cumulative)	0 in	Precipitation (Incremental)	0 in

Results (Flow)

Flow (Total Out)	0 cfs	Flow (Local from Inflow Collection)	0 cfs
Local Inflow?	FALSE		

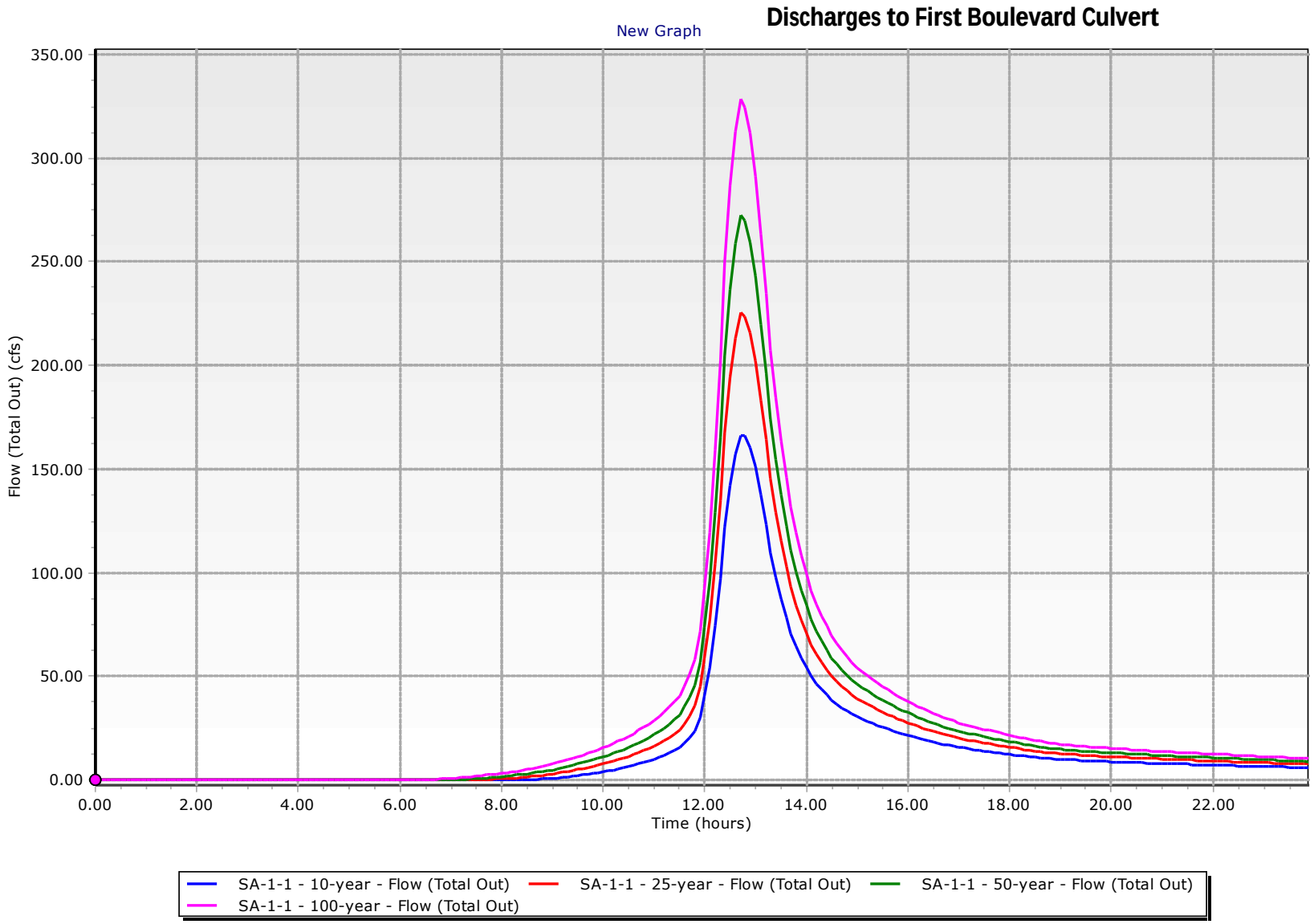
Results (Maximum Values)

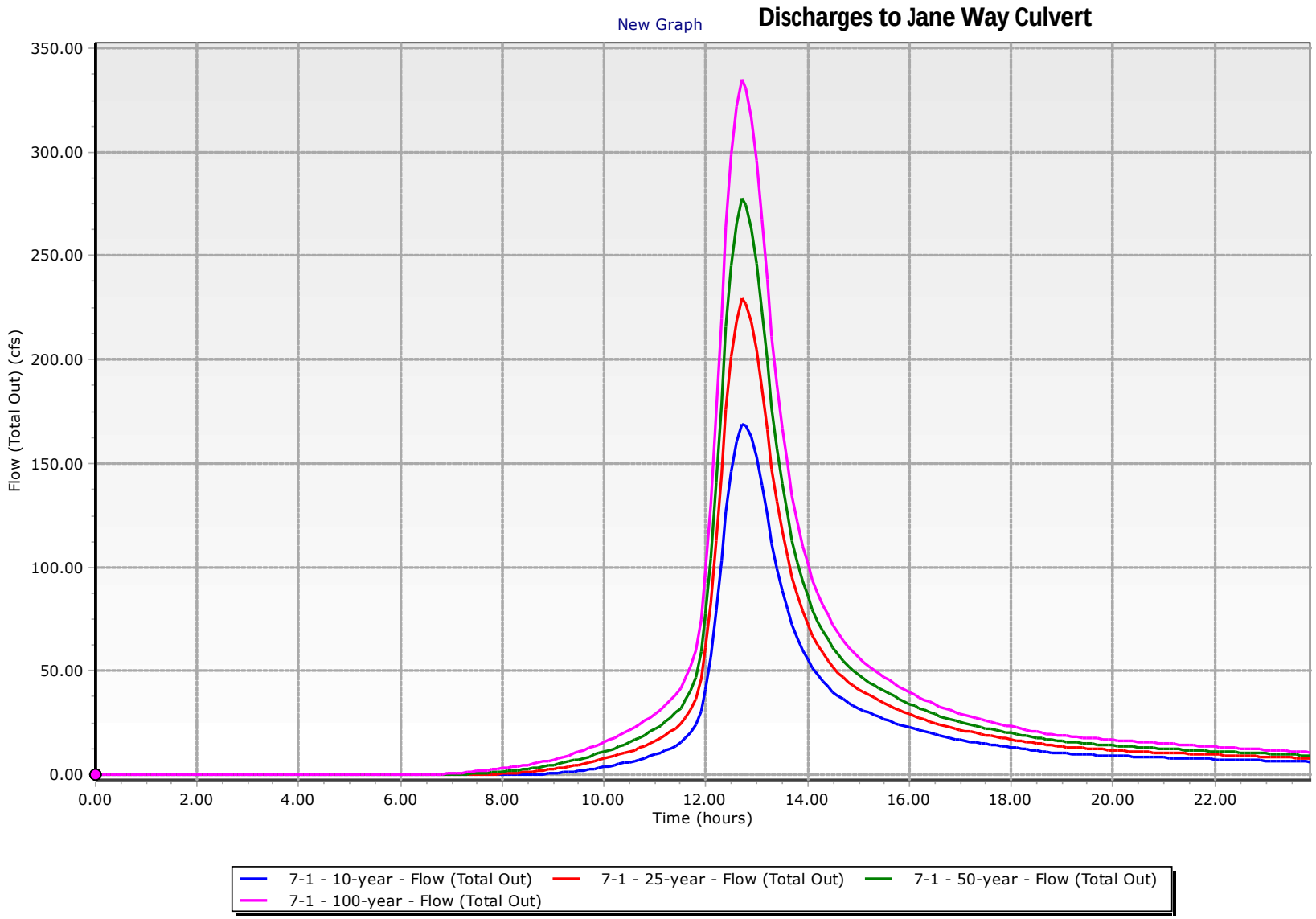
Flow (Maximum)-10-year	144.8	cfs	Time (Maximum Flow)	762	min
Flow (Maximum)-25-year	193.4	cfs	Time (Maximum Flow)	762	min
Flow (Maximum)-50-year	232.0	cfs	Time (Maximum Flow)	762	min
Flow (Maximum)-100-year	277.9	cfs	Time (Maximum Flow)	762	min

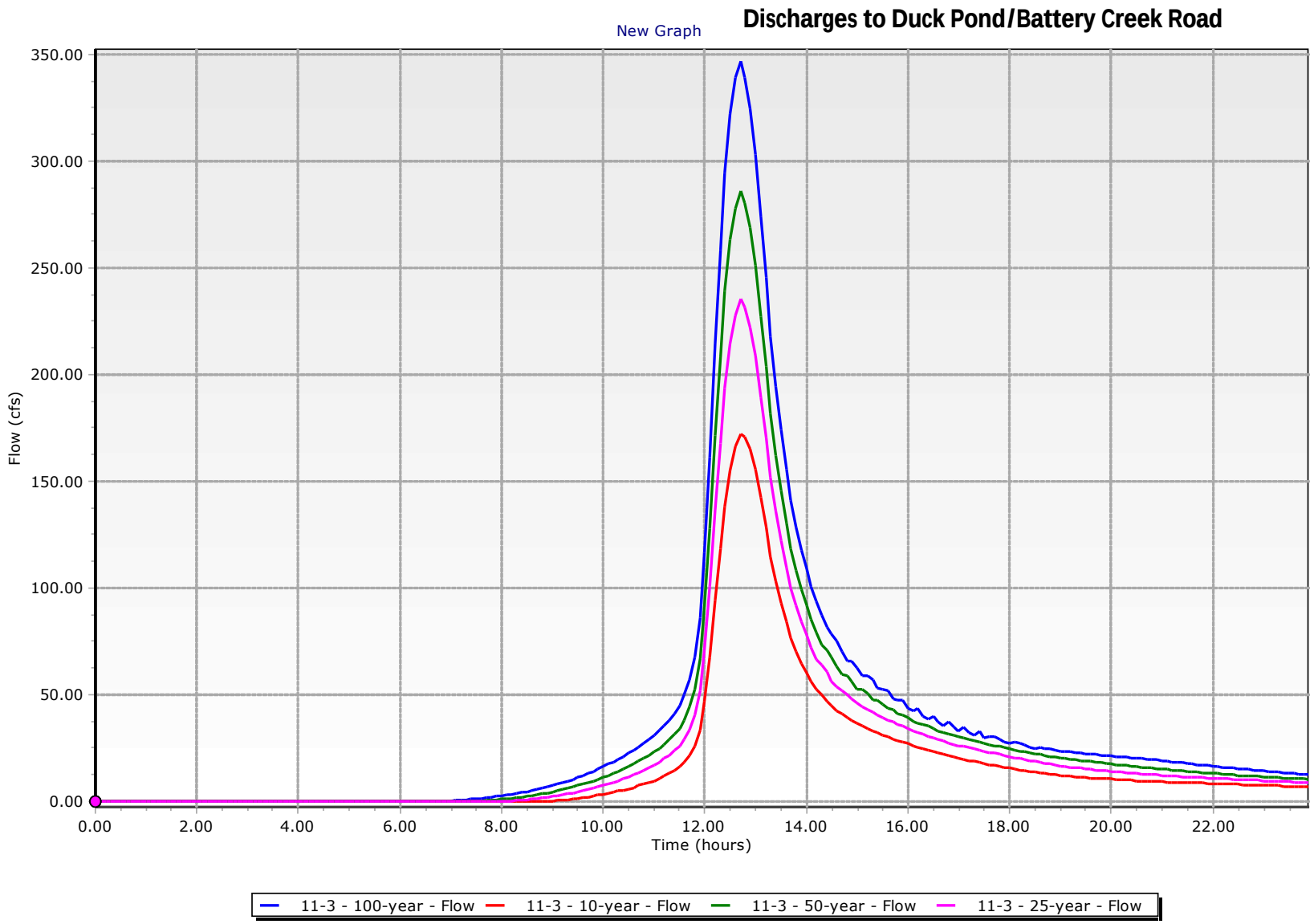
Area (Unified)	62.9 acres	Volume (Total Runoff)	12,006,472.90 gal

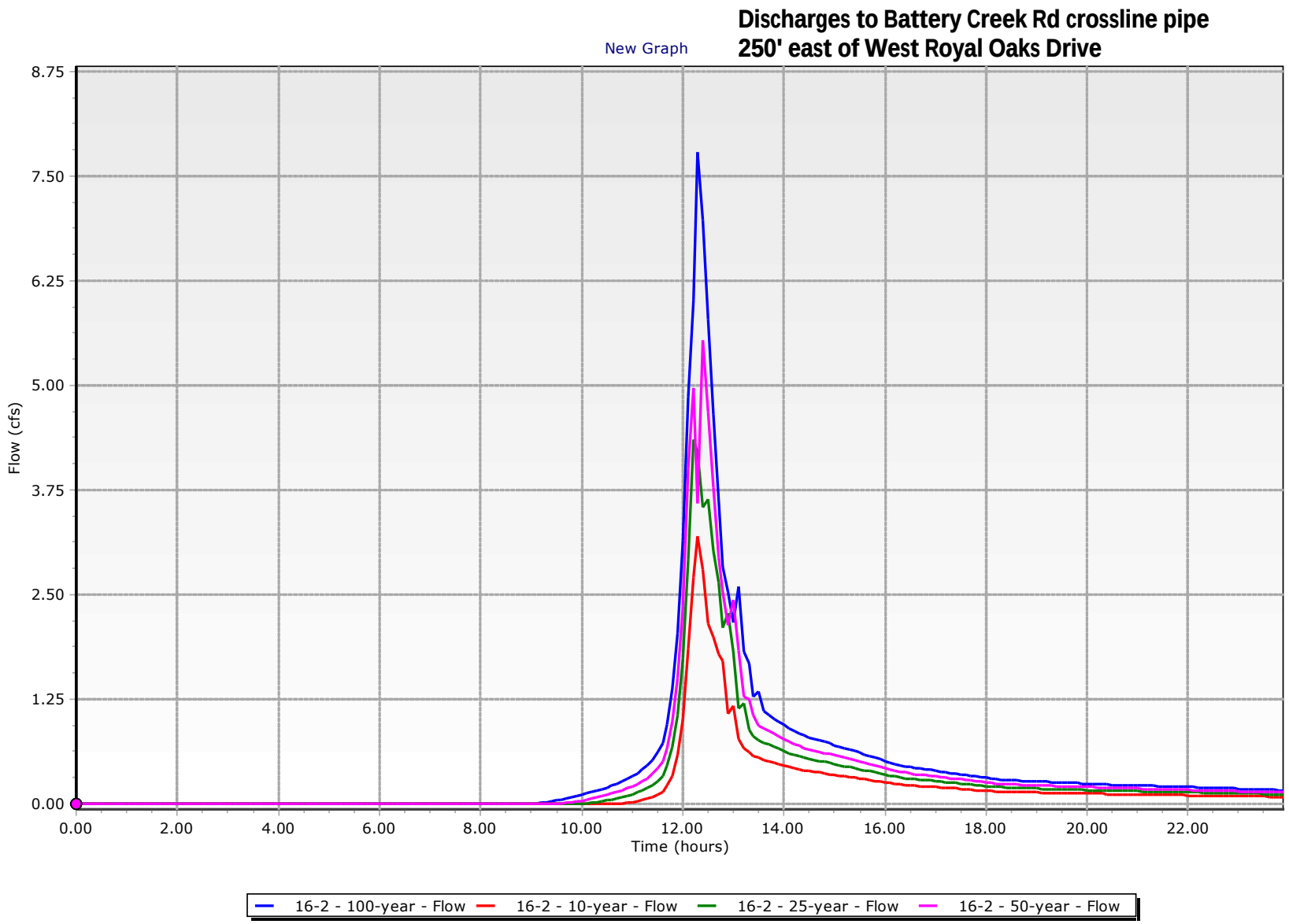
Calculation Messages

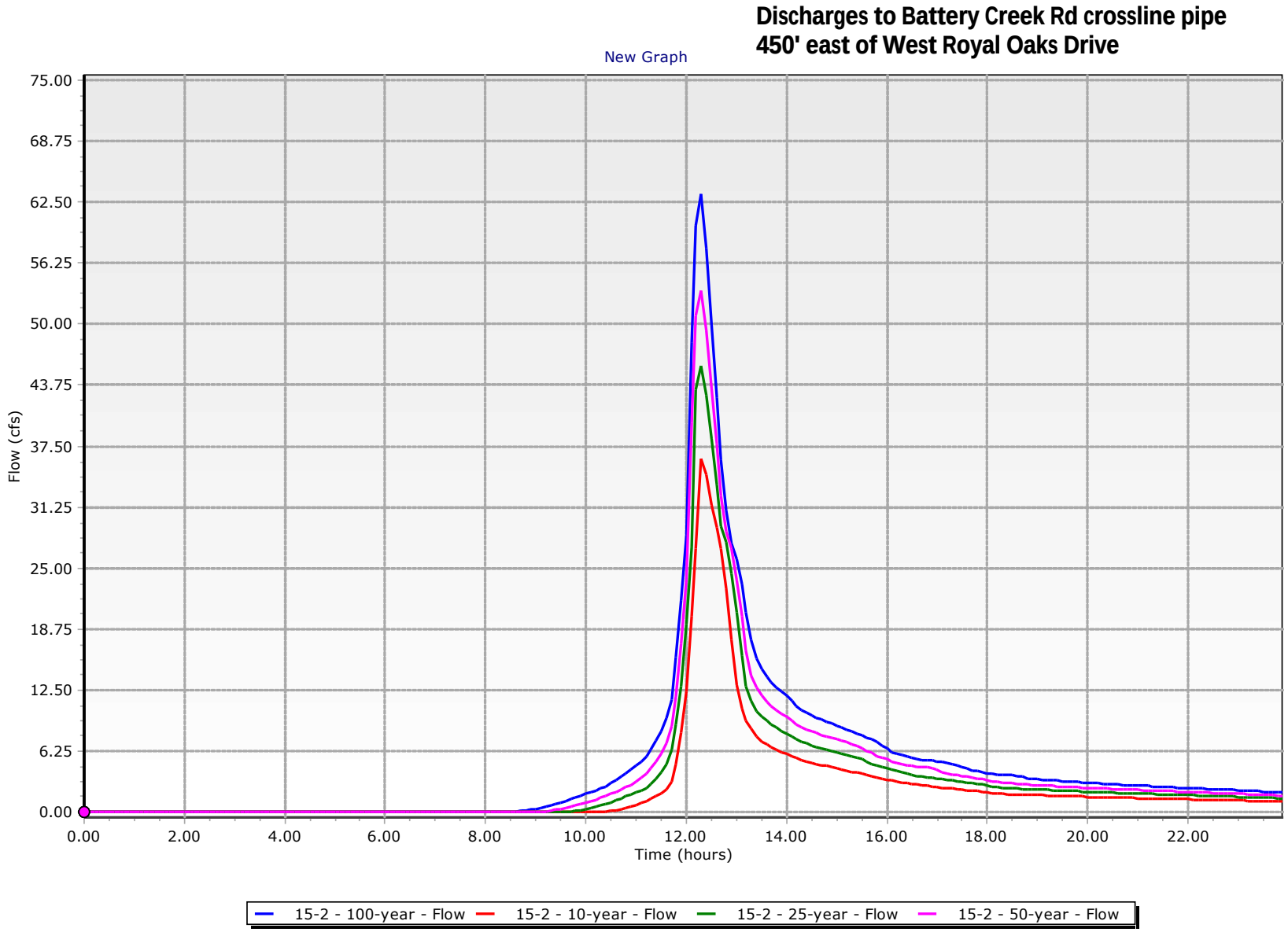
Time (hours)	Message

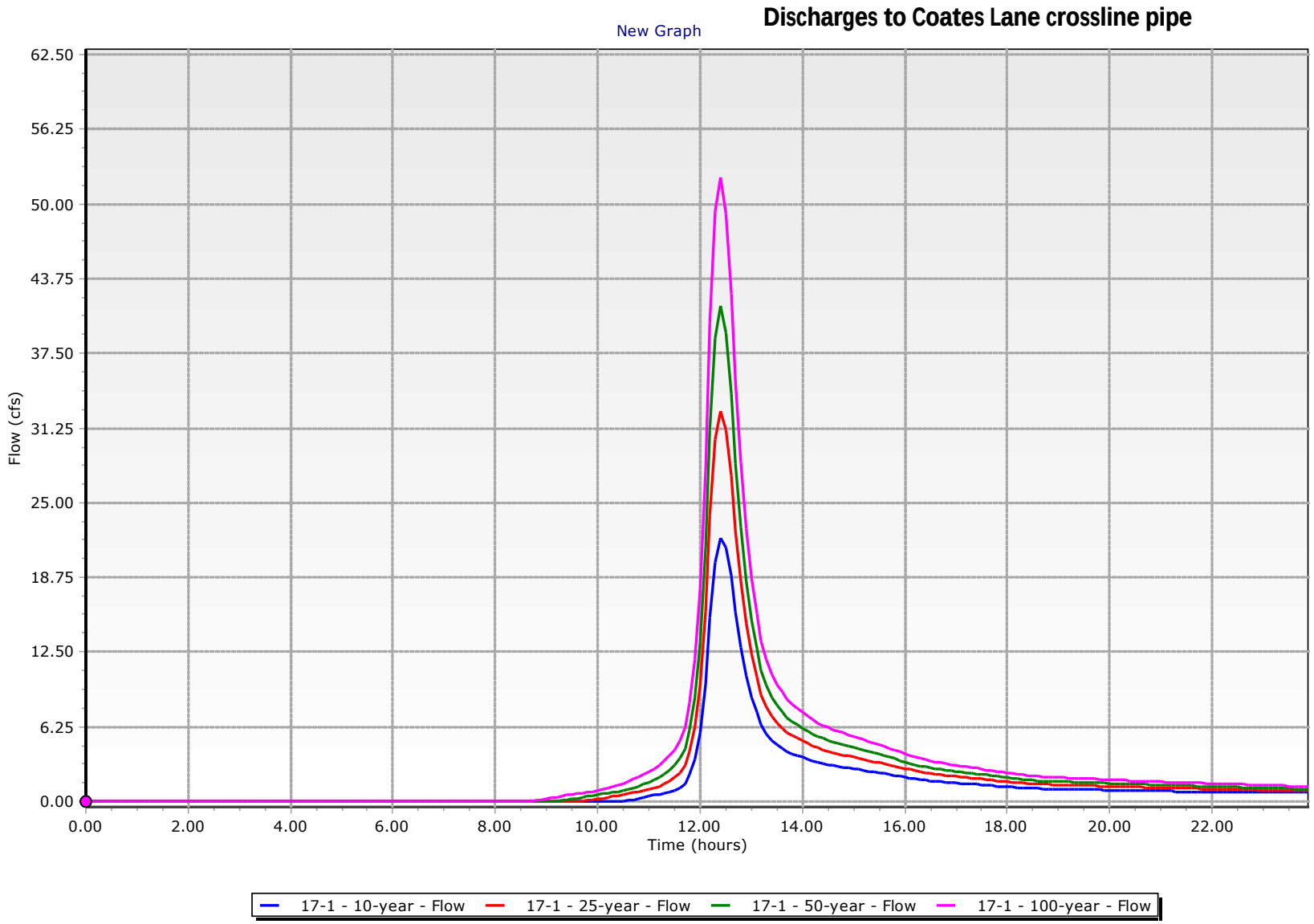

Discharges to First Boulevard Culvert
New Graph
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Flow (Total Out) (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
SA-1-1 - 10-year - Flow (Total Out)
SA-1-1 - 25-year - Flow (Total Out)
SA-1-1 - 50-year - Flow (Total Out)
SA-1-1 - 100-year - Flow (Total Out)


New Graph
Discharges to Jane Way Culvert
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Flow (Total Out) (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
7-1 - 10-year - Flow (Total Out)
7-1 - 25-year - Flow (Total Out)
7-1 - 50-year - Flow (Total Out)
7-1 - 100-year - Flow (Total Out)

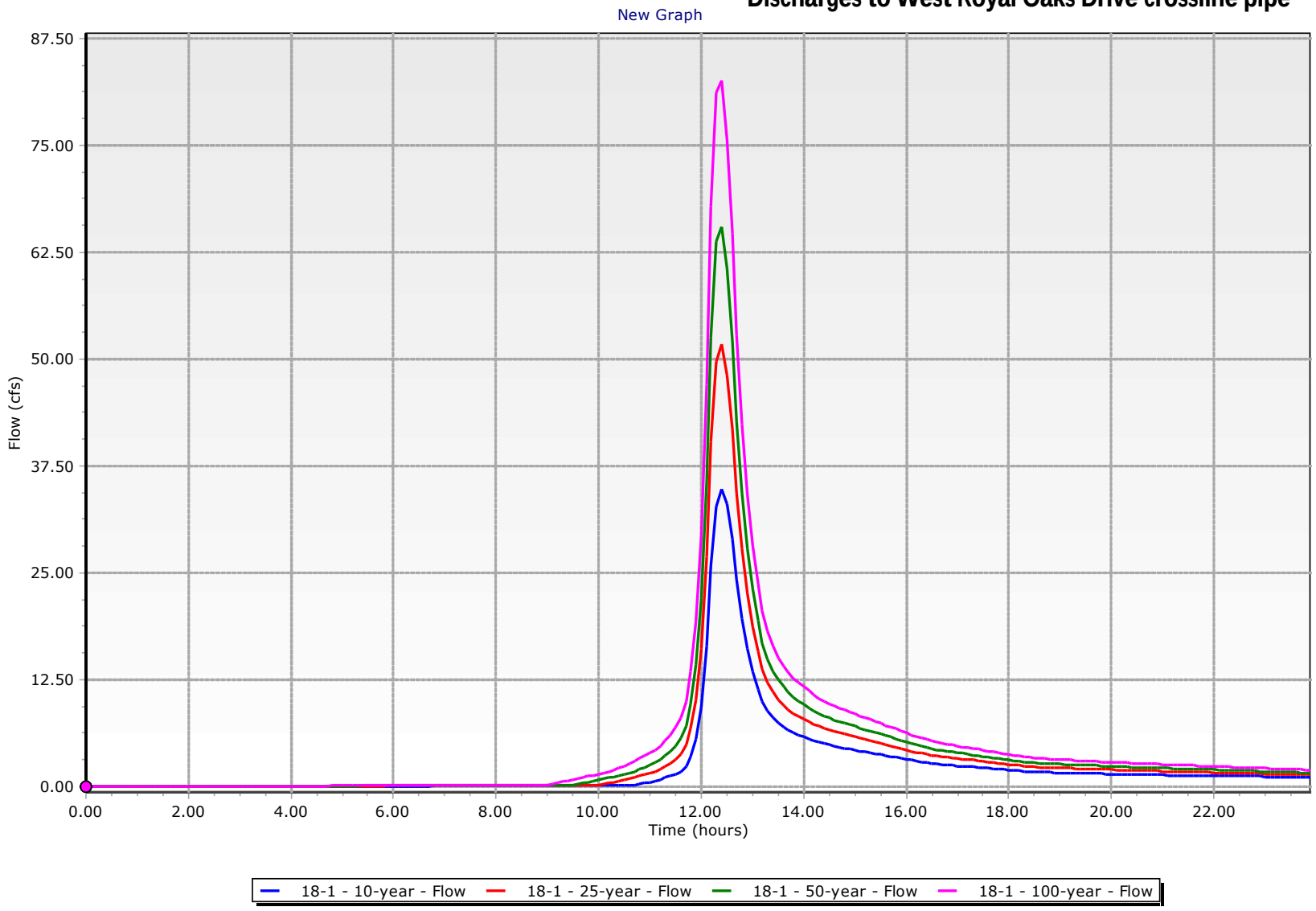

New Graph
Discharges to Duck Pond/Battery Creek Road
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Flow (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
11-3 - 100-year - Flow
11-3 - 10-year - Flow
11-3 - 50-year - Flow
11-3 - 25-year - Flow


Discharges to Battery Creek Rd crossline pipe
250' east of West Royal Oaks Drive
New Graph
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
Flow (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
16-2 - 100-year - Flow
16-2 - 10-year - Flow
16-2 - 25-year - Flow
16-2 - 50-year - Flow

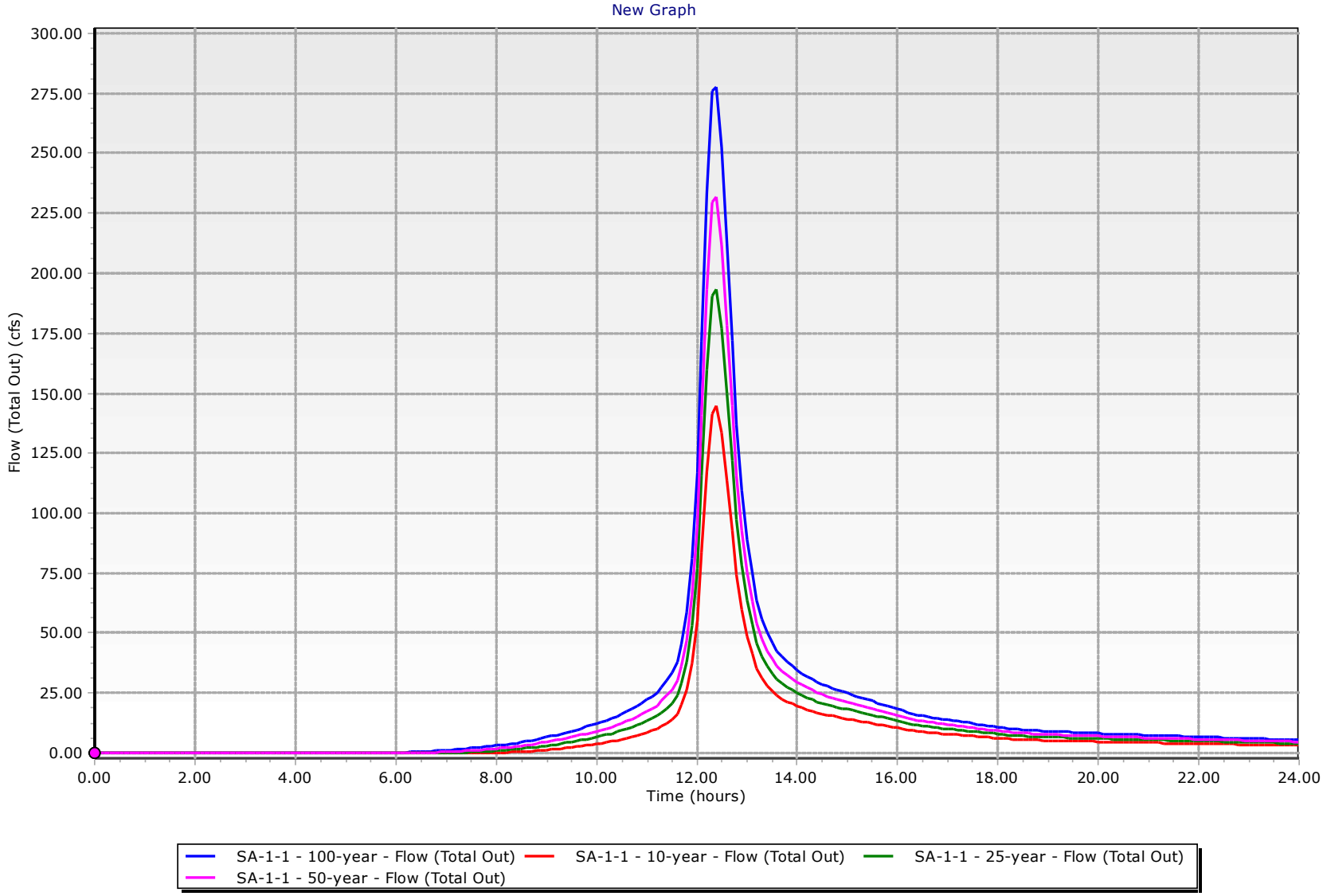

Discharges to Battery Creek Rd crossline pipe
450' east of West Royal Oaks Drive
New Graph
75.00
68.75
62.50
56.25
50.00
43.75
37.50
31.25
25.00
18.75
12.50
6.25
0.00
Flow (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
15-2 - 100-year - Flow
15-2 - 10-year - Flow
15-2 - 25-year - Flow
15-2 - 50-year - Flow


Discharges to Coates Lane crossline pipe
New Graph
62.50
56.25
50.00
43.75
37.50
31.25
25.00
18.75
12.50
6.25
0.00
Flow (cfs)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
Time (hours)
17-1 - 10-year - Flow
17-1 - 25-year - Flow
17-1 - 50-year - Flow
17-1 - 100-year - Flow

Discharges to West Royal Oaks Drive crossline pipe



Discharges to Center Drive East crossline pipes



APPENDIX F

HEC-RAS UNSTEADY FLOW MODEL RESULTS

(EXISTING AND PROPOSED CONDITIONS)


HEC-RAS CROSS-SECTION
LOCATIONS
0.000
0.150
0.300
0.400
0.500
0.750
1.000
1.075
1.150
1.520
2.470
2.570
2.620
2.675
2.725
2.775
2.825
2.875
2.925
2.975
3.025
3.075
3.125
3.175
3.225
3.275
3.325
3.375
3.425
3.475
4.600
4.700
4.800
ROGERS DR
ACORN HILL AVE
JANE WAY
DUCK
POND
FIRST BLVD
CENTER DR WEST
CENTER DR EAST
SOUTH DR
MYSTIC DR E
MYSTIC CIR
BOWLING LN
SPANISH MOSS TRAIL
W ROYAL OAKS DR
COATES LANE
BATTERY CREEK RD
N ROYAL OAKS DR
S ROYAL OAKS DR
BROOME LN
ELIZABETH LANE
BOYER ST
BEAUFORT
MIDDLE
SCHOOL

Existing Conditions - Mean Low Water

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-44.5	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
25-year	0.000	-44.4	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
50-year	0.000	-44.3	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-44.1	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	-28.5	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-28.4	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	-28.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
100-year	0.150	-28.0	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
10-year	0.300	-28.4	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
25-year	0.300	-28.3	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
50-year	0.300	-28.1	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
100-year	0.300	-27.9	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
10-year	0.400	-26.7	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	-26.6	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
50-year	0.400	-26.5	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
100-year	0.400	79.7	-2.8	3.4		3.4	0.0000	0.1	1934.4	613.0
10-year	0.500	-22.4	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	-22.2	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
50-year	0.500	66.4	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
100-year	0.500	76.8	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
10-year	0.650	-15.8	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
25-year	0.650	-15.7	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
50-year	0.650	63.2	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
100-year	0.650	73.7	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
10-year	0.750	-14.1	-2.6	3.4		3.4	0.0000	0.0	1122.3	389.6
25-year	0.750	-13.9	-2.6	3.4		3.4	0.0000	0.0	1122.3	389.6
50-year	0.750	63.2	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
100-year	0.750	73.7	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
10-year	1.000	-14.0	-2.5	3.4		3.4	0.0000	0.0	1314.7	428.5
25-year	1.000	-13.8	-2.5	3.4		3.4	0.0000	0.0	1314.6	428.5
50-year	1.000	61.8	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
100-year	1.000	72.2	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
10-year	1.075	-13.8	-2.5	3.4		3.4	0.0000	0.0	1140.1	474.1
25-year	1.075	-13.7	-2.5	3.4		3.4	0.0000	0.0	1140.1	474.1
50-year	1.075	61.9	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1
100-year	1.075	72.3	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1

10-year	1.150	-13.6	-2.5	3.4	3.4	0.0000	0.0	966.1	467.8
25-year	1.150	-13.5	-2.5	3.4	3.4	0.0000	0.0	966.1	467.8
50-year	1.150	62.0	-2.5	3.4	3.4	0.0000	0.1	966.1	467.8
100-year	1.150	72.4	-2.5	3.4	3.4	0.0000	0.1	966.2	467.8
10-year	1.200	-13.5	-2.5	3.4	3.4	0.0000	0.0	1049.2	468.5
25-year	1.200	-13.4	-2.5	3.4	3.4	0.0000	0.0	1049.2	468.5
50-year	1.200	62.1	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
100-year	1.200	72.5	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
10-year	1.300	-13.2	-2.5	3.4	3.4	0.0000	0.0	840.8	465.8
25-year	1.300	-13.1	-2.5	3.4	3.4	0.0000	0.0	840.8	465.8
50-year	1.300	62.2	-2.5	3.4	3.4	0.0000	0.1	840.8	465.8
100-year	1.300	72.6	-2.5	3.4	3.4	0.0000	0.1	840.8	465.8
10-year	1.450	25.2	-2.5	3.4	3.4	0.0000	0.3	88.6	460.0
25-year	1.450	46.1	-2.5	3.4	3.4	0.0000	0.5	88.6	460.0
50-year	1.450	62.3	-2.5	3.4	3.4	0.0000	0.7	88.6	460.0
100-year	1.450	72.7	-2.5	3.4	3.4	0.0000	0.8	88.6	460.0
	1.485	Culvert							
10-year	1.520	65.1	-1.0	4.4	4.4	0.0000	0.8	79.5	477.1
25-year	1.520	84.0	-1.0	5.0	5.0	0.0000	1.0	88.8	527.2
50-year	1.520	97.0	-1.0	5.4	5.5	0.0000	1.0	95.2	535.6
100-year	1.520	119.1	-1.0	6.3	6.3	0.0000	1.1	108.2	568.6
10-year	1.570	59.2	0.7	4.4	4.4	0.0000	0.2	308.8	465.8
25-year	1.570	74.5	0.7	5.0	5.0	0.0000	0.2	365.3	512.2
50-year	1.570	84.8	0.7	5.5	5.5	0.0000	0.2	403.8	533.8
100-year	1.570	112.1	0.7	6.3	6.3	0.0000	0.2	481.8	588.1
10-year	1.620	54.6	0.7	4.4	4.4	0.0000	0.1	563.4	438.7
25-year	1.620	67.0	0.7	5.0	5.0	0.0000	0.1	676.5	470.9
50-year	1.620	75.2	0.7	5.5	5.5	0.0000	0.1	753.5	488.2
100-year	1.620	107.2	0.7	6.3	6.3	0.0000	0.1	909.5	540.0
10-year	1.670	54.6	0.7	4.4	4.4	0.0000	0.1	699.6	363.9
25-year	1.670	67.0	0.7	5.0	5.0	0.0000	0.1	848.6	446.6
50-year	1.670	75.2	0.7	5.5	5.5	0.0000	0.1	951.6	456.3
100-year	1.670	107.2	0.7	6.3	6.3	0.0000	0.1	1163.7	486.0
10-year	1.720	39.2	0.7	4.4	4.4	0.0000	0.1	613.1	285.6
25-year	1.720	46.7	0.7	5.0	5.0	0.0000	0.1	784.4	316.8
50-year	1.720	53.0	0.7	5.5	5.5	0.0000	0.1	904.9	419.0
100-year	1.720	98.1	0.7	6.3	6.3	0.0000	0.1	1160.2	475.1
10-year	1.770	39.2	0.8	4.4	4.4	0.0000	0.1	480.6	245.4
25-year	1.770	46.7	0.8	5.0	5.0	0.0000	0.1	640.1	275.2
50-year	1.770	53.0	0.8	5.5	5.5	0.0000	0.1	765.3	336.0

100-year	1.770	98.1	0.8	6.3	6.3	0.0000	0.1	1045.8	539.3
10-year	1.820	39.2	0.8	4.4	4.4	0.0000	0.1	326.2	183.8
25-year	1.820	46.7	0.8	5.0	5.0	0.0000	0.1	469.5	263.8
50-year	1.820	53.0	0.8	5.5	5.5	0.0000	0.1	595.1	327.7
100-year	1.820	98.1	0.8	6.3	6.3	0.0000	0.2	962.5	531.9
10-year	1.870	39.2	0.9	4.4	4.4	0.0000	0.2	327.2	179.1
25-year	1.870	46.7	0.9	5.0	5.0	0.0000	0.1	463.5	266.8
50-year	1.870	53.0	0.9	5.5	5.5	0.0000	0.1	568.6	308.0
100-year	1.870	98.1	0.9	6.3	6.3	0.0000	0.2	835.8	518.3
10-year	1.920	39.2	0.9	4.4	4.4	0.0000	0.2	245.2	140.2
25-year	1.920	46.7	0.9	5.0	5.0	0.0000	0.2	344.5	204.3
50-year	1.920	53.0	0.9	5.5	5.5	0.0000	0.2	438.6	276.0
100-year	1.920	98.1	0.9	6.3	6.3	0.0000	0.2	661.8	485.6
10-year	1.970	39.2	1.0	4.4	4.4	0.0000	0.3	214.4	154.3
25-year	1.970	46.7	1.0	5.0	5.0	0.0000	0.2	330.1	227.3
50-year	1.970	53.0	1.0	5.5	5.5	0.0000	0.2	428.4	242.8
100-year	1.970	98.1	1.0	6.3	6.3	0.0000	0.3	639.4	395.0
10-year	2.020	39.2	1.1	4.4	4.4	0.0000	0.3	179.3	122.7
25-year	2.020	46.8	1.1	5.0	5.0	0.0000	0.3	269.5	184.8
50-year	2.020	53.0	1.1	5.5	5.5	0.0000	0.2	356.8	233.5
100-year	2.020	98.1	1.1	6.3	6.3	0.0000	0.3	574.7	362.0
10-year	2.070	39.2	1.1	4.4	4.4	0.0000	0.3	151.4	105.8
25-year	2.070	46.8	1.1	5.0	5.0	0.0000	0.3	236.6	204.3
50-year	2.070	53.0	1.1	5.5	5.5	0.0000	0.2	333.9	252.1
100-year	2.070	98.1	1.1	6.3	6.3	0.0000	0.3	556.7	315.7
10-year	2.120	39.2	1.1	4.4	4.4	0.0000	0.3	175.2	123.0
25-year	2.120	46.8	1.1	5.0	5.0	0.0000	0.3	258.5	151.4
50-year	2.120	53.0	1.1	5.5	5.5	0.0000	0.2	328.8	206.0
100-year	2.120	98.1	1.1	6.3	6.3	0.0000	0.3	534.8	292.7
10-year	2.170	39.2	1.1	4.4	4.4	0.0000	0.3	185.6	124.0
25-year	2.170	46.8	1.1	5.0	5.0	0.0000	0.3	269.7	154.2
50-year	2.170	53.0	1.1	5.5	5.5	0.0000	0.2	335.3	166.2
100-year	2.170	98.2	1.1	6.3	6.3	0.0000	0.3	524.8	330.9
10-year	2.220	39.2	1.2	4.4	4.4	0.0000	0.4	138.7	116.4
25-year	2.220	46.8	1.2	5.0	5.0	0.0000	0.3	225.8	181.1
50-year	2.220	53.0	1.2	5.5	5.5	0.0000	0.3	313.1	232.2
100-year	2.220	98.2	1.2	6.3	6.3	0.0000	0.3	529.7	338.0
10-year	2.270	39.2	1.2	4.4	4.4	0.0000	0.4	141.7	133.5
25-year	2.270	46.8	1.2	5.0	5.0	0.0000	0.3	245.3	211.8
50-year	2.270	53.0	1.2	5.5	5.5	0.0000	0.3	339.0	229.3
100-year	2.270	98.3	1.2	6.3	6.3	0.0000	0.3	559.5	315.9

10-year	2.320	39.2	1.4	4.4	4.4	0.0000	0.4	119.4	78.2
25-year	2.320	46.9	1.4	5.0	5.0	0.0000	0.4	185.7	150.9
50-year	2.320	53.0	1.4	5.5	5.5	0.0000	0.3	260.4	210.2
100-year	2.320	98.3	1.4	6.3	6.3	0.0000	0.4	489.4	369.0
10-year	2.370	39.2	1.7	4.4	4.4	0.0000	0.6	92.7	76.9
25-year	2.370	46.9	1.7	5.0	5.0	0.0000	0.5	167.8	181.4
50-year	2.370	53.0	1.7	5.5	5.5	0.0000	0.4	253.6	221.9
100-year	2.370	98.3	1.7	6.3	6.3	0.0000	0.5	469.2	330.7
10-year	2.420	39.2	1.8	4.4	4.4	0.0001	0.7	60.0	47.1
25-year	2.420	46.3	1.8	5.0	5.0	0.0000	0.6	117.9	135.1
50-year	2.420	53.0	1.8	5.5	5.5	0.0000	0.5	198.6	233.2
100-year	2.420	98.3	1.8	6.3	6.3	0.0000	0.5	421.1	344.7
10-year	2.470	39.2	1.8	4.4	4.4	0.0002	0.9	52.5	37.9
25-year	2.470	46.3	1.8	5.0	5.0	0.0001	0.7	98.6	103.3
50-year	2.470	53.0	1.8	5.5	5.5	0.0000	0.6	165.6	207.4
100-year	2.470	98.5	1.8	6.3	6.3	0.0000	0.6	360.3	331.7
10-year	2.520	39.3	1.8	4.4	4.4	0.0003	1.0	42.9	28.1
25-year	2.520	46.4	1.8	5.0	5.1	0.0001	0.8	70.1	80.0
50-year	2.520	53.0	1.8	5.5	5.5	0.0001	0.7	117.3	149.7
100-year	2.520	97.1	1.8	6.3	6.3	0.0000	0.6	309.1	288.5
10-year	2.570	28.2	2.0	4.4	4.5	0.0001	0.8	40.9	23.7
25-year	2.570	29.6	2.0	5.1	5.1	0.0001	0.6	56.7	35.2
50-year	2.570	30.1	2.0	5.5	5.5	0.0000	0.5	81.0	101.1
100-year	2.570	86.8	2.0	6.3	6.3	0.0001	0.7	270.6	284.8
10-year	2.620	28.2	1.4	4.5	4.5	0.0001	0.4	79.1	69.0
25-year	2.620	29.6	1.4	5.1	5.1	0.0000	0.2	125.5	87.6
50-year	2.620	30.2	1.4	5.5	5.5	0.0000	0.2	169.6	127.4
100-year	2.620	87.2	1.4	6.3	6.3	0.0000	0.3	322.8	236.8
	2.650	Culvert							
10-year	2.675	30.2	1.6	5.3	5.3	0.0000	0.3	118.3	58.9
25-year	2.675	44.5	1.6	6.7	6.7	0.0000	0.2	402.0	350.0
50-year	2.675	57.3	1.6	7.7	7.7	0.0000	0.2	856.2	719.8
100-year	2.675	143.1	1.6	8.0	8.0	0.0000	0.3	1113.1	872.5
10-year	2.725	27.6	1.0	5.3	5.3	0.0000	0.1	561.2	180.8
25-year	2.725	42.6	1.0	6.7	6.7	0.0000	0.1	871.5	289.4
50-year	2.725	54.2	1.0	7.7	7.7	0.0000	0.1	1239.9	512.9
100-year	2.725	138.1	1.0	8.0	8.0	0.0000	0.1	1416.8	580.9
10-year	2.775	27.6	1.6	5.3	5.3	0.0000	0.0	672.8	210.7
25-year	2.775	42.6	1.6	6.7	6.7	0.0000	0.0	1053.3	355.8
50-year	2.775	54.2	1.6	7.7	7.7	0.0000	0.1	1430.9	441.4

100-year	2.775	138.1	1.6	8.0	8.0	0.0000	0.1	1581.8	498.2
10-year	2.825	27.7	1.5	5.3	5.3	0.0000	0.1	571.1	209.6
25-year	2.825	42.6	1.5	6.7	6.7	0.0000	0.1	858.8	374.4
50-year	2.825	54.2	1.5	7.7	7.7	0.0000	0.1	1199.7	462.4
100-year	2.825	138.0	1.5	8.0	8.0	0.0000	0.1	1507.8	480.1
10-year	2.875	27.7	1.1	5.3	5.3	0.0000	0.1	560.0	228.9
25-year	2.875	42.6	1.1	6.7	6.7	0.0000	0.1	858.5	346.3
50-year	2.875	54.2	1.1	7.7	7.7	0.0000	0.1	1195.8	424.3
100-year	2.875	138.2	1.1	8.0	8.0	0.0000	0.1	1489.3	526.1
10-year	2.925	27.7	1.9	5.3	5.3	0.0000	0.1	424.5	231.4
25-year	2.925	42.6	1.9	6.7	6.7	0.0000	0.1	712.6	377.5
50-year	2.925	54.2	1.9	7.7	7.7	0.0000	0.1	1103.1	519.9
100-year	2.925	138.0	1.9	8.0	8.0	0.0000	0.1	1440.3	553.3
10-year	2.975	27.7	1.9	5.3	5.4	0.0000	0.6	48.2	35.6
25-year	2.975	42.6	1.9	6.7	6.7	0.0000	0.6	75.5	303.4
50-year	2.975	54.2	1.9	7.7	7.7	0.0000	0.3	466.4	481.8
100-year	2.975	138.0	1.9	8.0	8.0	0.0000	0.6	572.2	660.8
10-year	3.025	27.7	1.9	5.3	5.4	0.0000	0.6	47.8	32.1
25-year	3.025	42.6	1.9	6.7	6.7	0.0000	0.6	74.7	280.5
50-year	3.025	54.2	1.9	7.7	7.7	0.0000	0.3	427.0	462.0
100-year	3.025	138.0	1.9	8.0	8.0	0.0000	0.7	526.5	589.7
10-year	3.075	26.1	1.9	5.4	5.4	0.0000	0.5	49.6	33.6
25-year	3.075	41.5	1.9	6.7	6.8	0.0000	0.5	76.9	190.9
50-year	3.075	52.5	1.9	7.7	7.7	0.0000	0.3	405.4	541.4
100-year	3.075	135.4	1.9	8.0	8.0	0.0000	0.7	529.3	638.5
10-year	3.125	26.2	1.9	5.4	5.4	0.0000	0.6	46.3	26.4
25-year	3.125	41.5	1.9	6.7	6.8	0.0000	0.6	72.4	247.7
50-year	3.125	52.5	1.9	7.7	7.7	0.0000	0.3	655.0	625.3
100-year	3.125	135.9	1.9	8.0	8.0	0.0000	0.5	865.2	661.9
	3.150	Culvert							
10-year	3.175	26.2	2.0	5.5	5.5	0.0000	0.6	44.7	15.6
25-year	3.175	42.7	2.0	7.1	7.1	0.0000	0.6	88.8	510.6
50-year	3.175	90.5	2.0	7.8	7.8	0.0001	0.8	236.4	910.3
100-year	3.175	140.0	2.0	8.0	8.0	0.0000	0.6	855.5	1047.8
10-year	3.225	25.5	2.1	5.5	5.5	0.0001	0.6	42.0	14.6
25-year	3.225	42.1	2.1	7.1	7.1	0.0000	0.6	67.3	319.0
50-year	3.225	100.9	2.1	7.8	7.8	0.0001	1.3	84.6	602.1
100-year	3.225	139.8	2.1	8.0	8.1	0.0002	1.7	103.7	1051.6
10-year	3.275	24.3	2.2	5.5	5.5	0.0000	0.5	46.1	17.6
25-year	3.275	41.0	2.2	7.1	7.1	0.0000	0.5	77.7	772.3

50-year	3.275	98.6	2.2	7.8	7.8	0.0001	1.1	103.4	879.4
100-year	3.275	163.1	2.2	8.1	8.1	0.0002	1.6	130.3	1041.1
10-year	3.325	24.3	2.2	5.5	5.5	0.0000	0.5	45.6	17.7
25-year	3.325	41.0	2.2	7.1	7.1	0.0000	0.5	77.3	907.2
50-year	3.325	98.3	2.2	7.8	7.8	0.0001	1.1	92.0	1029.3
100-year	3.325	162.7	2.2	8.1	8.1	0.0002	1.7	98.2	1052.9
	3.350	Culvert							
10-year	3.385	25.1	2.3	8.5	8.5	0.0000	0.0	1400.8	1102.0
25-year	3.385	43.9	2.3	8.9	8.9	0.0000	0.1	1751.3	1150.0
50-year	3.385	102.4	2.3	9.0	9.0	0.0000	0.1	1802.9	1157.0
100-year	3.385	204.5	2.3	9.0	9.0	0.0000	0.2	2194.6	1160.2
10-year	3.435	25.1	2.5	8.5	8.5	0.0000	0.0	1765.8	1102.5
25-year	3.435	43.9	2.5	8.9	8.9	0.0000	0.1	2194.4	1129.4
50-year	3.435	102.4	2.5	9.0	9.0	0.0000	0.1	2257.8	1133.3
100-year	3.435	204.4	2.5	9.0	9.0	0.0000	0.2	2290.6	1135.2
10-year	3.485	25.1	2.7	8.5	8.5	0.0000	0.0	1448.2	980.2
25-year	3.485	44.0	2.7	8.9	8.9	0.0000	0.1	1830.1	1009.0
50-year	3.485	102.6	2.7	9.0	9.0	0.0000	0.1	1886.8	1013.2
100-year	3.485	204.4	2.7	9.0	9.0	0.0000	0.2	1916.3	1015.1
10-year	3.560	25.1	2.9	8.5	8.5	0.0000	0.0	1367.0	928.2
25-year	3.560	43.9	2.9	8.9	8.9	0.0000	0.1	1729.0	957.0
50-year	3.560	102.7	2.9	9.0	9.0	0.0000	0.1	1782.8	961.2
100-year	3.560	204.4	2.9	9.0	9.0	0.0000	0.3	1811.2	963.2
10-year	3.635	25.2	3.1	8.5	8.5	0.0000	0.1	1282.6	873.2
25-year	3.635	44.0	3.1	8.9	8.9	0.0000	0.1	1624.6	907.8
50-year	3.635	102.6	3.1	9.0	9.0	0.0000	0.1	1675.8	912.9
100-year	3.635	204.8	3.1	9.0	9.0	0.0000	0.3	1703.1	915.3
10-year	3.710	25.2	3.3	8.5	8.5	0.0000	0.1	1196.5	813.2
25-year	3.710	44.0	3.3	8.9	8.9	0.0000	0.1	1515.5	847.8
50-year	3.710	102.4	3.3	9.0	9.0	0.0000	0.1	1563.4	852.9
100-year	3.710	205.3	3.3	9.0	9.0	0.0000	0.3	1589.3	855.5
10-year	3.785	25.3	3.5	8.5	8.5	0.0000	0.1	1120.1	734.7
25-year	3.785	43.9	3.5	8.9	8.9	0.0000	0.1	1411.8	784.6
50-year	3.785	102.7	3.5	9.0	9.0	0.0000	0.2	1456.4	791.9
100-year	3.785	205.8	3.5	9.0	9.0	0.0000	0.3	1480.9	795.7
10-year	3.850	25.4	3.7	8.5	8.5	0.0000	0.1	621.5	666.3
25-year	3.850	44.0	3.7	8.9	8.9	0.0000	0.1	885.2	706.6
50-year	3.850	103.2	3.7	9.0	9.0	0.0000	0.2	925.4	712.6
100-year	3.850	206.1	3.7	9.0	9.0	0.0000	0.3	948.7	795.3
10-year	3.925	25.4	3.7	8.5	8.5	0.0000	0.1	445.3	604.6

25-year	3.925	44.3	3.7	8.9	8.9	0.0000	0.1	704.3	744.0
50-year	3.925	103.9	3.7	9.0	9.0	0.0000	0.3	747.7	764.9
100-year	3.925	207.2	3.7	9.0	9.0	0.0001	0.6	774.3	774.9
10-year	4.000	25.5	3.7	8.5	8.5	0.0000	0.1	374.6	578.4
25-year	4.000	44.4	3.7	8.9	8.9	0.0000	0.2	621.9	709.0
50-year	4.000	105.6	3.7	9.0	9.0	0.0000	0.3	664.4	729.1
100-year	4.000	209.5	3.7	9.0	9.0	0.0001	0.6	693.7	738.6
10-year	4.075	25.6	3.6	8.5	8.5	0.0000	0.2	127.8	81.0
25-year	4.075	45.2	3.6	8.9	8.9	0.0000	0.3	163.0	104.7
50-year	4.075	108.7	3.6	9.0	9.0	0.0002	0.8	169.6	109.2
100-year	4.075	216.5	3.6	9.0	9.1	0.0008	1.5	196.5	714.0
10-year	4.150	25.6	3.6	8.5	8.5	0.0000	0.2	110.4	49.5
25-year	4.150	47.6	3.6	8.9	8.9	0.0001	0.4	151.3	158.7
50-year	4.150	130.8	3.6	9.0	9.0	0.0004	1.0	165.9	779.4
100-year	4.150	225.9	3.6	9.1	9.1	0.0010	1.6	239.3	784.7
10-year	4.225	25.6	3.6	8.5	8.5	0.0000	0.2	105.9	33.8
25-year	4.225	51.9	3.6	8.9	8.9	0.0001	0.4	119.6	36.8
50-year	4.225	146.0	3.6	9.0	9.1	0.0006	1.2	149.6	720.2
100-year	4.225	241.1	3.6	9.2	9.2	0.0012	1.7	253.4	749.4
10-year	4.300	25.7	3.7	8.5	8.5	0.0000	0.3	95.3	30.4
25-year	4.300	56.2	3.7	8.9	8.9	0.0001	0.5	107.8	33.1
50-year	4.300	152.7	3.7	9.1	9.1	0.0008	1.3	152.0	519.6
100-year	4.300	248.5	3.7	9.3	9.3	0.0014	1.8	255.0	620.1
10-year	4.375	25.9	3.8	8.5	8.6	0.0000	0.3	89.6	27.9
25-year	4.375	64.9	3.8	9.0	9.0	0.0002	0.6	101.3	30.4
50-year	4.375	158.7	3.8	9.1	9.2	0.0008	1.4	187.5	620.5
100-year	4.375	262.8	3.8	9.4	9.4	0.0012	1.7	330.6	660.4
10-year	4.450	26.3	3.8	8.6	8.6	0.0001	0.4	73.8	25.4
25-year	4.450	204.6	3.8	9.0	9.1	0.0027	2.4	85.8	28.0
50-year	4.450	239.7	3.8	9.3	9.3	0.0019	2.0	255.8	697.0
100-year	4.450	286.8	3.8	9.5	9.5	0.0013	1.7	406.3	721.7
10-year	4.525	159.5	3.9	8.7	8.8	0.0023	2.2	73.3	23.8
25-year	4.525	208.3	3.9	9.2	9.2	0.0020	2.1	208.1	758.1
50-year	4.525	253.4	3.9	9.4	9.4	0.0014	1.7	363.3	773.5
100-year	4.525	293.1	3.9	9.6	9.6	0.0010	1.5	499.8	786.8
10-year	4.600	160.9	4.0	8.9	8.9	0.0020	2.1	77.3	22.1
25-year	4.600	211.5	4.0	9.3	9.3	0.0013	1.7	299.2	764.4
50-year	4.600	258.2	4.0	9.5	9.5	0.0010	1.5	429.5	777.0
100-year	4.600	295.8	4.0	9.6	9.6	0.0008	1.4	547.8	788.3
	4.650	Culvert							

10-year	4.700	164.0	3.5	9.4	9.4	0.0003	0.9	414.8	951.7
25-year	4.700	196.5	3.5	9.4	9.4	0.0004	1.0	449.1	952.8
50-year	4.700	259.2	3.5	9.5	9.5	0.0005	1.1	527.5	955.1
100-year	4.700	298.8	3.5	9.6	9.6	0.0004	0.9	669.2	959.3
10-year	4.800	164.2	3.6	9.4	9.4	0.0004	1.0	386.0	911.7
25-year	4.800	224.9	3.6	9.5	9.5	0.0006	1.2	434.6	913.5
50-year	4.800	263.7	3.6	9.5	9.6	0.0006	1.2	510.7	916.2
100-year	4.800	303.6	3.6	9.7	9.7	0.0004	1.1	634.2	927.1

Proposed Conditions - Mean Low Water

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-35.5	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
25-year	0.000	-35.4	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
50-year	0.000	-35.3	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-35.1	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	-20.2	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-20.1	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	-20.0	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
100-year	0.150	-19.7	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
10-year	0.300	-20.0	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
25-year	0.300	-19.9	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
50-year	0.300	-19.8	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
100-year	0.300	-19.5	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
10-year	0.400	-18.3	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	-18.2	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
50-year	0.400	-18.1	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
100-year	0.400	-17.8	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
10-year	0.500	-5.4	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	-16.8	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
50-year	0.500	-16.8	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
100-year	0.500	8.3	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
10-year	0.650	-3.0	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
25-year	0.650	-14.5	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
50-year	0.650	5.4	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
100-year	0.650	10.8	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
10-year	0.750	-1.8	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
25-year	0.750	4.0	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
50-year	0.750	7.9	-2.6	3.4		3.4	0.0000	0.0	1122.2	389.6
100-year	0.750	13.3	-2.6	3.4		3.4	0.0000	0.0	1122.2	389.6
10-year	1.000	2.1	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
25-year	1.000	6.6	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
50-year	1.000	10.6	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
100-year	1.000	16.0	-2.5	3.4		3.4	0.0000	0.0	1314.5	428.5
10-year	1.075	3.3	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
25-year	1.075	7.9	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
50-year	1.075	12.0	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
100-year	1.075	17.4	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1

10-year	1.150	4.4	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
25-year	1.150	9.0	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
50-year	1.150	13.0	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
100-year	1.150	18.5	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
10-year	1.200	4.4	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
25-year	1.200	9.1	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
50-year	1.200	13.1	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
100-year	1.200	18.5	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
10-year	1.300	4.6	-2.5	3.4	3.4	0.0000	0.0	840.6	465.8
25-year	1.300	9.7	-2.5	3.4	3.4	0.0000	0.0	840.6	465.8
50-year	1.300	13.8	-2.5	3.4	3.4	0.0000	0.0	840.7	465.8
100-year	1.300	19.2	-2.5	3.4	3.4	0.0000	0.0	840.7	465.8
10-year	1.450	5.2	-2.5	3.4	3.4	0.0000	0.0	198.2	459.9
25-year	1.450	10.1	-2.5	3.4	3.4	0.0000	0.1	198.2	459.9
50-year	1.450	14.2	-2.5	3.4	3.4	0.0000	0.1	198.2	459.9
100-year	1.450	19.6	-2.5	3.4	3.4	0.0000	0.1	198.2	459.9
	1.485	Culvert							
10-year	1.520	14.5	-1.0	3.4	3.4	0.0000	0.2	96.8	438.7
25-year	1.520	250.5	-1.0	3.8	3.9	0.0002	2.4	105.4	447.3
50-year	1.520	286.8	-1.0	4.2	4.3	0.0002	2.5	115.5	456.7
100-year	1.520	327.0	-1.0	4.7	4.8	0.0002	2.6	126.6	513.1
10-year	1.570	13.2	0.7	3.4	3.4	0.0000	0.1	219.9	414.0
25-year	1.570	236.9	0.7	3.9	3.9	0.0001	0.9	262.8	455.8
50-year	1.570	266.2	0.7	4.3	4.3	0.0000	0.9	301.7	464.4
100-year	1.570	298.8	0.7	4.8	4.8	0.0000	0.9	344.3	493.7
10-year	1.620	12.2	0.7	3.4	3.4	0.0000	0.0	385.6	349.6
25-year	1.620	225.8	0.7	3.9	3.9	0.0000	0.5	473.8	404.8
50-year	1.620	249.3	0.7	4.3	4.3	0.0000	0.5	551.5	436.8
100-year	1.620	275.5	0.7	4.8	4.8	0.0000	0.4	636.7	464.9
10-year	1.670	12.2	0.7	3.4	3.4	0.0000	0.0	468.6	271.9
25-year	1.670	225.8	0.7	3.9	3.9	0.0000	0.4	583.2	341.9
50-year	1.670	249.3	0.7	4.3	4.3	0.0000	0.4	684.4	361.8
100-year	1.670	275.7	0.7	4.8	4.8	0.0000	0.4	796.2	443.1
10-year	1.720	10.7	0.7	3.4	3.4	0.0000	0.0	363.7	224.8
25-year	1.720	200.8	0.7	3.9	3.9	0.0000	0.5	481.2	261.1
50-year	1.720	216.5	0.7	4.3	4.3	0.0000	0.4	596.0	284.2
100-year	1.720	234.1	0.7	4.8	4.8	0.0000	0.4	723.7	295.8
10-year	1.770	10.6	0.8	3.4	3.4	0.0000	0.0	261.0	196.2
25-year	1.770	200.8	0.8	3.9	3.9	0.0000	0.7	364.4	223.4
50-year	1.770	216.5	0.8	4.3	4.3	0.0000	0.6	465.0	244.3
100-year	1.770	234.2	0.8	4.8	4.8	0.0000	0.5	582.7	253.4

10-year	1.820	6.9	0.8	3.4	3.4	0.0000	0.1	177.8	134.8
25-year	1.820	200.8	0.8	3.9	3.9	0.0002	1.0	246.4	143.1
50-year	1.820	216.5	0.8	4.3	4.3	0.0001	0.8	314.6	180.0
100-year	1.820	234.2	0.8	4.8	4.8	0.0001	0.7	414.3	241.4
10-year	1.870	7.1	0.9	3.4	3.4	0.0000	0.1	173.8	135.3
25-year	1.870	200.9	0.9	3.9	3.9	0.0001	1.0	246.3	155.7
50-year	1.870	216.6	0.9	4.3	4.4	0.0001	0.9	316.7	174.2
100-year	1.870	234.3	0.9	4.8	4.8	0.0000	0.8	413.2	250.3
10-year	1.920	7.2	0.9	3.4	3.4	0.0000	0.1	128.3	97.2
25-year	1.920	200.9	0.9	3.9	3.9	0.0002	1.3	182.6	119.8
50-year	1.920	216.6	0.9	4.3	4.4	0.0001	1.1	237.1	137.7
100-year	1.920	234.3	0.9	4.8	4.8	0.0001	1.0	305.1	171.6
10-year	1.970	7.3	1.0	3.4	3.4	0.0000	0.1	91.4	97.1
25-year	1.970	200.9	1.0	3.9	4.0	0.0005	2.1	147.7	125.3
50-year	1.970	216.6	1.0	4.3	4.4	0.0003	1.7	205.8	151.3
100-year	1.970	234.3	1.0	4.8	4.8	0.0001	1.4	285.6	190.7
10-year	2.020	7.6	1.1	3.4	3.4	0.0000	0.1	80.2	71.8
25-year	2.020	200.9	1.1	3.9	4.0	0.0005	2.0	127.5	104.5
50-year	2.020	216.6	1.1	4.4	4.4	0.0003	1.7	173.8	120.9
100-year	2.020	234.3	1.1	4.8	4.8	0.0002	1.4	234.9	157.6
10-year	2.070	169.4	1.1	3.5	3.6	0.0026	2.9	65.2	79.8
25-year	2.070	200.9	1.1	4.0	4.0	0.0010	2.2	108.1	92.9
50-year	2.070	216.7	1.1	4.4	4.4	0.0005	1.8	148.1	104.8
100-year	2.070	234.3	1.1	4.8	4.9	0.0003	1.5	200.3	149.9
10-year	2.120	169.9	1.1	3.6	3.7	0.0009	2.2	86.6	87.1
25-year	2.120	200.9	1.1	4.0	4.1	0.0005	1.9	129.8	111.0
50-year	2.120	216.7	1.1	4.4	4.4	0.0003	1.6	174.6	122.4
100-year	2.120	234.3	1.1	4.8	4.9	0.0002	1.4	232.1	141.3
10-year	2.170	170.4	1.1	3.6	3.7	0.0009	2.3	97.6	103.8
25-year	2.170	200.9	1.1	4.0	4.1	0.0005	2.0	141.7	118.4
50-year	2.170	216.7	1.1	4.4	4.5	0.0003	1.7	187.1	124.2
100-year	2.170	234.3	1.1	4.9	4.9	0.0002	1.4	243.1	143.7
10-year	2.220	170.5	1.2	3.7	3.8	0.0019	2.9	67.8	79.1
25-year	2.220	200.9	1.2	4.1	4.1	0.0011	2.5	102.2	98.0
50-year	2.220	216.7	1.2	4.4	4.5	0.0006	2.1	141.0	117.4
100-year	2.220	234.3	1.2	4.9	4.9	0.0003	1.7	197.7	153.0
10-year	2.270	171.1	1.2	3.8	3.9	0.0012	2.5	73.6	75.1
25-year	2.270	201.0	1.2	4.1	4.2	0.0008	2.4	106.0	108.7
50-year	2.270	216.7	1.2	4.5	4.5	0.0005	2.0	147.9	135.0
100-year	2.270	234.3	1.2	4.9	4.9	0.0003	1.7	213.5	188.9
10-year	2.320	172.3	1.4	3.8	3.9	0.0010	2.5	78.6	56.0
25-year	2.320	201.1	1.4	4.2	4.2	0.0008	2.4	100.3	72.0

50-year	2.320	216.7	1.4	4.5	4.5	0.0005	2.2	124.4	82.4
100-year	2.320	234.3	1.4	4.9	4.9	0.0003	1.9	165.3	125.6
10-year	2.370	172.5	1.7	3.8	4.1	0.0028	3.9	55.5	55.0
25-year	2.370	201.1	1.7	4.2	4.3	0.0019	3.6	75.7	66.5
50-year	2.370	216.7	1.7	4.5	4.6	0.0012	3.1	98.5	80.2
100-year	2.370	234.5	1.7	4.9	5.0	0.0007	2.6	146.4	143.0
10-year	2.420	173.1	1.8	4.0	4.2	0.0038	3.9	44.0	30.6
25-year	2.420	201.4	1.8	4.2	4.5	0.0031	3.9	52.9	38.2
50-year	2.420	216.7	1.8	4.5	4.7	0.0021	3.5	65.3	61.2
100-year	2.420	234.5	1.8	4.9	5.0	0.0012	3.0	102.6	119.7
10-year	2.470	173.5	1.8	4.2	4.5	0.0055	4.6	44.1	33.9
25-year	2.470	202.1	1.8	4.4	4.7	0.0049	4.6	52.0	36.4
50-year	2.470	217.0	1.8	4.6	4.9	0.0037	4.3	64.5	73.8
100-year	2.470	235.7	1.8	5.0	5.1	0.0024	3.7	92.4	98.2
10-year	2.520	173.6	1.8	4.4	4.7	0.0051	4.2	43.5	28.5
25-year	2.520	203.1	1.8	4.6	4.9	0.0052	4.5	48.4	36.3
50-year	2.520	222.3	1.8	4.8	5.1	0.0046	4.5	55.3	45.8
100-year	2.520	238.2	1.8	5.1	5.3	0.0034	4.1	73.2	84.5
10-year	2.570	141.7	2.0	4.8	5.0	0.0021	3.1	50.1	25.9
25-year	2.570	146.7	2.0	5.1	5.2	0.0016	2.9	56.8	35.3
50-year	2.570	156.0	2.0	5.2	5.3	0.0014	2.9	62.8	50.2
100-year	2.570	169.5	2.0	5.4	5.5	0.0013	2.8	74.4	87.1
10-year	2.620	147.5	1.4	5.0	5.0	0.0007	1.2	119.1	83.9
25-year	2.620	155.4	1.4	5.2	5.2	0.0005	1.2	137.2	94.8
50-year	2.620	161.6	1.4	5.3	5.4	0.0004	1.1	152.8	113.3
100-year	2.620	175.6	1.4	5.5	5.5	0.0004	1.1	174.2	130.9
	2.650	Culvert							
10-year	2.675	155.0	1.6	5.6	5.7	0.0002	1.1	145.3	125.5
25-year	2.675	175.9	1.6	5.9	6.0	0.0001	1.1	188.6	170.0
50-year	2.675	189.1	1.6	6.1	6.1	0.0001	1.1	220.2	213.8
100-year	2.675	201.1	1.6	6.3	6.3	0.0001	1.1	258.8	244.9
10-year	2.725	150.9	1.0	5.7	5.7	0.0000	0.3	622.1	192.4
25-year	2.725	170.8	1.0	6.0	6.0	0.0000	0.3	679.6	213.8
50-year	2.725	184.1	1.0	6.1	6.1	0.0000	0.3	715.4	222.8
100-year	2.725	195.6	1.0	6.3	6.3	0.0000	0.3	753.3	238.0
10-year	2.775	150.9	1.6	5.7	5.7	0.0000	0.2	744.2	224.7
25-year	2.775	170.8	1.6	6.0	6.0	0.0000	0.2	811.2	246.8
50-year	2.775	184.1	1.6	6.1	6.1	0.0000	0.2	854.6	272.6
100-year	2.775	195.6	1.6	6.3	6.3	0.0000	0.2	901.3	302.4
10-year	2.825	150.9	1.5	5.7	5.7	0.0000	0.2	636.9	228.0
25-year	2.825	170.8	1.5	6.0	6.0	0.0000	0.3	695.4	253.5

50-year	2.825	184.1	1.5	6.1	6.1	0.0000	0.3	729.4	279.2
100-year	2.825	195.6	1.5	6.3	6.3	0.0000	0.3	763.9	303.4
10-year	2.875	150.9	1.1	5.7	5.7	0.0000	0.2	629.7	242.7
25-year	2.875	170.8	1.1	6.0	6.0	0.0000	0.3	690.4	266.3
50-year	2.875	184.1	1.1	6.1	6.1	0.0000	0.3	725.5	293.1
100-year	2.875	195.6	1.1	6.3	6.3	0.0000	0.3	760.9	312.0
10-year	2.925	150.9	1.9	5.7	5.7	0.0000	0.3	491.8	253.1
25-year	2.925	170.8	1.9	6.0	6.0	0.0000	0.3	550.6	267.5
50-year	2.925	184.1	1.9	6.1	6.1	0.0000	0.3	584.5	292.3
100-year	2.925	195.6	1.9	6.3	6.3	0.0000	0.3	618.7	307.6
10-year	2.975	150.9	1.9	5.7	5.8	0.0009	2.8	54.5	63.9
25-year	2.975	170.8	1.9	6.0	6.1	0.0009	2.9	59.9	92.7
50-year	2.975	184.2	1.9	6.1	6.3	0.0009	2.9	63.1	149.4
100-year	2.975	195.6	1.9	6.3	6.4	0.0009	2.9	66.4	184.6
10-year	3.025	150.9	1.9	5.7	5.9	0.0009	2.8	54.8	45.8
25-year	3.025	170.8	1.9	6.0	6.1	0.0009	2.8	60.2	55.4
50-year	3.025	184.2	1.9	6.2	6.3	0.0009	2.9	63.4	73.7
100-year	3.025	195.6	1.9	6.3	6.5	0.0009	2.9	66.6	106.1
10-year	3.075	148.3	1.9	5.8	5.9	0.0007	2.6	58.0	47.9
25-year	3.075	167.5	1.9	6.1	6.2	0.0007	2.6	63.5	62.5
50-year	3.075	181.4	1.9	6.3	6.4	0.0007	2.7	66.7	83.4
100-year	3.075	192.4	1.9	6.4	6.5	0.0007	2.8	70.0	95.2
10-year	3.125	148.3	1.9	5.8	6.0	0.0008	2.7	54.9	53.5
25-year	3.125	167.5	1.9	6.1	6.2	0.0008	2.8	60.2	119.5
50-year	3.125	181.4	1.9	6.3	6.4	0.0008	2.9	63.3	176.2
100-year	3.125	192.4	1.9	6.4	6.6	0.0008	2.9	66.5	194.1
	3.150	Culvert							
10-year	3.175	148.5	2.0	6.3	6.4	0.0007	2.6	57.3	16.9
25-year	3.175	167.6	2.0	6.6	6.7	0.0007	2.6	63.7	17.5
50-year	3.175	181.7	2.0	6.9	7.0	0.0007	2.7	68.1	17.9
100-year	3.175	192.4	2.0	7.1	7.2	0.0006	2.6	95.8	534.1
10-year	3.225	147.4	2.1	6.3	6.4	0.0008	2.7	54.3	15.7
25-year	3.225	166.4	2.1	6.7	6.8	0.0008	2.8	60.1	16.2
50-year	3.225	180.4	2.1	6.9	7.0	0.0008	2.8	64.2	16.5
100-year	3.225	191.0	2.1	7.2	7.3	0.0007	2.8	69.0	358.4
10-year	3.275	145.4	2.2	6.4	6.5	0.0006	2.3	62.6	19.6
25-year	3.275	163.9	2.2	6.7	6.8	0.0005	2.3	69.9	20.4
50-year	3.275	177.7	2.2	7.0	7.1	0.0005	2.4	75.3	761.6
100-year	3.275	188.0	2.2	7.3	7.4	0.0005	2.3	81.6	789.1
10-year	3.325	145.4	2.2	6.4	6.5	0.0006	2.3	62.7	19.8
25-year	3.325	163.9	2.2	6.8	6.9	0.0006	2.3	70.1	20.7

50-year	3.325	177.1	2.2	7.0	7.1	0.0005	2.3	76.0	841.4
100-year	3.325	187.8	2.2	7.3	7.4	0.0004	2.2	117.9	992.7
	3.350	Culvert							
10-year	3.385	145.4	2.3	6.9	6.9	0.0002	1.5	96.2	86.2
25-year	3.385	163.9	2.3	7.4	7.4	0.0001	1.2	393.5	937.3
50-year	3.385	179.0	2.3	7.7	7.8	0.0000	0.8	704.9	982.9
100-year	3.385	189.9	2.3	8.1	8.1	0.0000	0.6	1029.0	1050.0
10-year	3.435	145.4	2.4	6.9	6.9	0.0002	1.4	159.4	136.9
25-year	3.435	164.0	2.4	7.4	7.4	0.0001	1.0	540.7	1002.4
50-year	3.435	179.1	2.4	7.8	7.8	0.0000	0.7	920.9	1039.6
100-year	3.435	189.9	2.4	8.1	8.1	0.0000	0.5	1317.9	1073.5
10-year	3.485	145.3	2.4	6.9	7.0	0.0002	1.5	97.8	34.3
25-year	3.485	163.9	2.4	7.4	7.4	0.0001	1.1	404.6	825.7
50-year	3.485	179.5	2.4	7.8	7.8	0.0000	0.8	717.6	861.0
100-year	3.485	190.0	2.4	8.1	8.1	0.0000	0.6	1053.6	949.2
10-year	3.560	145.2	2.5	6.9	7.0	0.0003	1.6	95.1	64.1
25-year	3.560	164.1	2.5	7.4	7.4	0.0001	1.2	393.5	778.2
50-year	3.560	180.7	2.5	7.8	7.8	0.0001	0.9	683.7	804.3
100-year	3.560	190.0	2.5	8.1	8.1	0.0000	0.6	997.1	897.3
10-year	3.635	145.1	2.5	7.0	7.0	0.0003	1.7	90.9	93.1
25-year	3.635	164.2	2.5	7.4	7.4	0.0001	1.2	378.2	732.5
50-year	3.635	182.1	2.5	7.8	7.8	0.0001	0.9	648.0	757.8
100-year	3.635	190.2	2.5	8.1	8.1	0.0000	0.7	940.7	836.3
10-year	3.710	145.7	2.6	7.0	7.0	0.0003	1.8	98.7	142.1
25-year	3.710	164.9	2.6	7.4	7.4	0.0001	1.3	366.9	672.1
50-year	3.710	183.7	2.6	7.8	7.8	0.0001	1.0	611.7	700.7
100-year	3.710	190.4	2.6	8.1	8.1	0.0000	0.7	881.8	776.5
10-year	3.785	147.2	2.7	7.0	7.0	0.0003	1.8	165.0	498.7
25-year	3.785	166.4	2.7	7.4	7.4	0.0001	1.3	393.2	574.0
50-year	3.785	185.3	2.7	7.8	7.8	0.0001	1.0	603.9	628.3
100-year	3.785	190.6	2.7	8.1	8.1	0.0000	0.7	844.6	681.9
10-year	3.850	148.7	2.7	7.0	7.1	0.0004	2.0	96.2	123.4
25-year	3.850	166.4	2.7	7.4	7.5	0.0003	1.8	158.7	185.4
50-year	3.850	186.2	2.7	7.8	7.8	0.0002	1.6	232.6	238.7
100-year	3.850	190.9	2.7	8.1	8.2	0.0001	1.4	373.8	623.7
10-year	3.925	150.7	2.8	7.0	7.1	0.0003	1.9	81.4	25.2
25-year	3.925	168.8	2.8	7.4	7.5	0.0003	1.8	107.2	111.5
50-year	3.925	187.6	2.8	7.8	7.8	0.0002	1.8	150.8	146.1
100-year	3.925	191.2	2.8	8.1	8.2	0.0002	1.6	244.6	457.5
10-year	4.000	151.7	2.9	7.1	7.1	0.0003	1.8	85.9	27.3
25-year	4.000	174.7	2.9	7.5	7.5	0.0003	1.8	96.6	28.9

50-year	4.000	189.4	2.9	7.8	7.8	0.0003	1.8	107.1	49.2
100-year	4.000	192.8	2.9	8.1	8.2	0.0002	1.6	187.6	444.2
10-year	4.075	156.1	2.9	7.1	7.2	0.0003	1.8	86.8	28.5
25-year	4.075	205.5	2.9	7.5	7.5	0.0004	2.1	98.0	30.2
50-year	4.075	193.6	2.9	7.8	7.9	0.0003	1.8	108.0	31.5
100-year	4.075	194.6	2.9	8.2	8.2	0.0002	1.6	119.3	32.9
10-year	4.150	157.4	3.0	7.1	7.2	0.0005	2.1	76.9	25.3
25-year	4.150	206.3	3.0	7.5	7.6	0.0006	2.4	87.2	28.3
50-year	4.150	212.1	3.0	7.8	7.9	0.0005	2.2	96.7	30.7
100-year	4.150	198.5	3.0	8.2	8.2	0.0003	1.8	107.7	33.1
10-year	4.225	158.3	3.1	7.1	7.2	0.0005	2.1	74.5	24.2
25-year	4.225	207.0	3.1	7.5	7.6	0.0006	2.5	84.3	26.4
50-year	4.225	212.9	3.1	7.8	7.9	0.0005	2.3	92.9	28.6
100-year	4.225	203.1	3.1	8.2	8.2	0.0004	2.0	103.0	31.1
10-year	4.300	158.7	3.1	7.2	7.3	0.0006	2.3	68.9	22.7
25-year	4.300	209.7	3.1	7.6	7.7	0.0007	2.7	78.2	24.5
50-year	4.300	214.2	3.1	7.9	8.0	0.0006	2.5	86.0	26.2
100-year	4.300	209.9	3.1	8.2	8.3	0.0005	2.2	94.9	28.1
10-year	4.375	160.4	3.2	7.2	7.3	0.0006	2.4	66.6	21.3
25-year	4.375	210.2	3.2	7.6	7.7	0.0008	2.8	75.6	23.0
50-year	4.375	215.7	3.2	7.9	8.0	0.0007	2.6	82.6	24.3
100-year	4.375	217.0	3.2	8.2	8.3	0.0005	2.4	90.6	25.9
10-year	4.450	160.5	3.3	7.2	7.4	0.0015	3.3	48.8	19.7
25-year	4.450	210.5	3.3	7.6	7.8	0.0017	3.7	57.1	21.2
50-year	4.450	216.0	3.3	7.9	8.1	0.0014	3.4	63.5	22.4
100-year	4.450	217.9	3.3	8.2	8.4	0.0010	3.1	70.8	23.7
10-year	4.525	161.2	3.3	7.3	7.5	0.0013	3.2	51.1	18.5
25-year	4.525	210.8	3.3	7.8	8.0	0.0015	3.6	59.1	19.9
50-year	4.525	224.5	3.3	8.0	8.2	0.0013	3.5	64.6	20.9
100-year	4.525	236.5	3.3	8.3	8.5	0.0012	3.3	70.9	21.9
10-year	4.600	161.4	3.4	7.4	7.6	0.0009	2.8	57.7	17.5
25-year	4.600	214.9	3.4	7.9	8.1	0.0011	3.3	65.7	18.7
50-year	4.600	235.4	3.4	8.1	8.3	0.0011	3.3	70.6	19.4
100-year	4.600	278.9	3.4	8.4	8.6	0.0013	3.7	76.4	20.3
	4.650	Culvert							
10-year	4.700	165.2	3.5	8.0	8.1	0.0006	2.3	72.6	26.3
25-year	4.700	218.5	3.5	8.9	9.0	0.0005	2.2	99.6	33.0
50-year	4.700	244.4	3.5	9.5	9.5	0.0004	2.1	118.2	954.3
100-year	4.700	290.4	3.5	10.1	10.1	0.0001	0.8	1100.5	974.5
10-year	4.800	165.2	3.6	8.1	8.2	0.0008	2.6	64.4	23.2
25-year	4.800	218.1	3.6	9.0	9.1	0.0006	2.5	93.2	60.8

50-year	4.800	244.4	3.6	9.5		9.5	0.0002	1.6	488.3	915.4
100-year	4.800	290.5	3.6	10.1		10.1	0.0001	1.0	1031.0	992.9

Existing Conditions - Mean Tide Level (Rising)

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-44.7	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
25-year	0.000	-44.7	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
50-year	0.000	-44.7	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-44.7	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	-28.7	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-28.7	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	91.8	-2.7	3.4		3.4	0.0000	0.1	2183.7	701.5
100-year	0.150	120.4	-2.7	3.4		3.4	0.0000	0.1	2183.7	701.5
10-year	0.300	-28.6	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
25-year	0.300	-28.6	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
50-year	0.300	-28.6	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
100-year	0.300	119.0	-2.7	3.4		3.4	0.0000	0.1	2171.7	638.2
10-year	0.400	-26.9	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	74.4	-2.8	3.4		3.4	0.0000	0.1	1934.4	613.0
50-year	0.400	88.9	-2.8	3.4		3.4	0.0000	0.1	1934.4	613.0
100-year	0.400	117.6	-2.8	3.4		3.4	0.0000	0.1	1934.4	613.0
10-year	0.500	-22.5	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	71.4	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
50-year	0.500	86.0	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
100-year	0.500	114.7	-2.8	3.4		3.4	0.0000	0.2	1312.3	376.3
10-year	0.650	-15.9	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
25-year	0.650	68.2	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
50-year	0.650	82.9	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
100-year	0.650	111.7	-2.7	3.4		3.4	0.0000	0.1	1324.0	396.9
10-year	0.750	-14.2	-2.6	3.4		3.4	0.0000	0.0	1122.3	389.6
25-year	0.750	68.3	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
50-year	0.750	81.3	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
100-year	0.750	110.1	-2.6	3.4		3.4	0.0000	0.2	1122.3	389.6
10-year	1.000	-14.1	-2.5	3.4		3.4	0.0000	0.0	1314.7	428.5
25-year	1.000	66.8	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
50-year	1.000	81.4	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
100-year	1.000	110.2	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
10-year	1.075	-14.0	-2.5	3.4		3.4	0.0000	0.0	1140.1	474.1
25-year	1.075	66.9	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1
50-year	1.075	81.5	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1
100-year	1.075	110.3	-2.5	3.4		3.4	0.0000	0.1	1140.2	474.1
10-year	1.150	-13.8	-2.5	3.4		3.4	0.0000	0.0	966.1	467.8

25-year	1.150	67.0	-2.5	3.4	3.4	0.0000	0.1	966.1	467.8
50-year	1.150	81.6	-2.5	3.4	3.4	0.0000	0.1	966.2	467.8
100-year	1.150	110.3	-2.5	3.4	3.4	0.0000	0.2	966.2	467.8
10-year	1.200	-13.6	-2.5	3.4	3.4	0.0000	0.0	1049.2	468.5
25-year	1.200	67.1	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
50-year	1.200	81.7	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
100-year	1.200	110.4	-2.5	3.4	3.4	0.0000	0.2	1049.3	468.6
10-year	1.300	-13.3	-2.5	3.4	3.4	0.0000	0.0	840.8	465.8
25-year	1.300	67.2	-2.5	3.4	3.4	0.0000	0.1	840.8	465.8
50-year	1.300	81.7	-2.5	3.4	3.4	0.0000	0.2	840.8	465.8
100-year	1.300	110.4	-2.5	3.4	3.4	0.0000	0.2	840.9	465.8
10-year	1.450	46.7	-2.5	3.4	3.4	0.0000	0.5	88.6	460.0
25-year	1.450	67.3	-2.5	3.4	3.4	0.0000	0.8	88.6	460.0
50-year	1.450	81.8	-2.5	3.4	3.4	0.0000	0.9	88.6	460.1
100-year	1.450	110.5	-2.5	3.4	3.4	0.0000	1.3	88.7	460.1
	1.485	Culvert							
10-year	1.520	64.5	-1.0	4.4	4.4	0.0000	0.8	79.1	475.6
25-year	1.520	83.2	-1.0	5.0	5.0	0.0000	0.9	88.4	525.9
50-year	1.520	96.2	-1.0	5.4	5.4	0.0000	1.0	94.8	535.5
100-year	1.520	118.6	-1.0	6.3	6.3	0.0000	1.1	107.8	567.8
10-year	1.570	58.6	0.7	4.4	4.4	0.0000	0.2	306.8	465.5
25-year	1.570	73.8	0.7	5.0	5.0	0.0000	0.2	363.1	510.7
50-year	1.570	84.2	0.7	5.4	5.4	0.0000	0.2	401.4	533.3
100-year	1.570	111.6	0.7	6.3	6.3	0.0000	0.2	479.7	580.1
10-year	1.620	54.1	0.7	4.4	4.4	0.0000	0.1	559.5	438.1
25-year	1.620	66.4	0.7	5.0	5.0	0.0000	0.1	672.0	468.9
50-year	1.620	74.7	0.7	5.4	5.4	0.0000	0.1	748.8	486.0
100-year	1.620	106.7	0.7	6.3	6.3	0.0000	0.1	905.3	537.3
10-year	1.670	54.1	0.7	4.4	4.4	0.0000	0.1	694.5	363.2
25-year	1.670	66.4	0.7	5.0	5.0	0.0000	0.1	842.7	446.1
50-year	1.670	74.7	0.7	5.4	5.4	0.0000	0.1	945.3	455.7
100-year	1.670	106.7	0.7	6.3	6.3	0.0000	0.1	1157.9	484.8
10-year	1.720	39.1	0.7	4.4	4.4	0.0000	0.1	607.3	285.1
25-year	1.720	46.3	0.7	5.0	5.0	0.0000	0.1	777.5	313.6
50-year	1.720	52.7	0.7	5.4	5.4	0.0000	0.1	897.4	416.8
100-year	1.720	97.6	0.7	6.3	6.3	0.0000	0.1	1153.1	471.2
10-year	1.770	39.1	0.8	4.4	4.4	0.0000	0.1	475.3	245.0
25-year	1.770	46.3	0.8	5.0	5.0	0.0000	0.1	633.3	273.8
50-year	1.770	52.7	0.8	5.4	5.4	0.0000	0.1	757.2	330.7
100-year	1.770	97.6	0.8	6.3	6.3	0.0000	0.1	1037.9	524.3
10-year	1.820	39.1	0.8	4.4	4.4	0.0000	0.1	322.2	182.5
25-year	1.820	46.3	0.8	5.0	5.0	0.0000	0.1	462.9	260.9

50-year	1.820	52.7	0.8	5.4	5.4	0.0000	0.1	586.5	324.7
100-year	1.820	97.6	0.8	6.3	6.3	0.0000	0.2	950.1	527.6
10-year	1.870	39.1	0.9	4.4	4.4	0.0000	0.2	323.4	177.3
25-year	1.870	46.3	0.9	5.0	5.0	0.0000	0.1	457.7	264.2
50-year	1.870	52.7	0.9	5.4	5.4	0.0000	0.1	561.8	305.1
100-year	1.870	97.6	0.9	6.3	6.3	0.0000	0.2	827.4	513.0
10-year	1.920	39.1	0.9	4.4	4.4	0.0000	0.2	242.2	139.3
25-year	1.920	46.3	0.9	5.0	5.0	0.0000	0.2	339.7	201.2
50-year	1.920	52.7	0.9	5.4	5.4	0.0000	0.2	432.3	272.5
100-year	1.920	97.6	0.9	6.3	6.3	0.0000	0.2	655.3	463.1
10-year	1.970	39.1	1.0	4.4	4.4	0.0000	0.3	211.0	153.1
25-year	1.970	46.3	1.0	5.0	5.0	0.0000	0.2	324.6	226.2
50-year	1.970	52.7	1.0	5.4	5.4	0.0000	0.2	422.2	242.2
100-year	1.970	97.6	1.0	6.3	6.3	0.0000	0.3	633.4	390.5
10-year	2.020	39.1	1.1	4.4	4.4	0.0000	0.3	176.7	121.9
25-year	2.020	46.3	1.1	5.0	5.0	0.0000	0.3	265.1	182.6
50-year	2.020	52.7	1.1	5.4	5.4	0.0000	0.2	350.9	232.8
100-year	2.020	97.6	1.1	6.3	6.3	0.0000	0.3	568.1	348.4
10-year	2.070	39.1	1.1	4.4	4.4	0.0000	0.3	149.2	105.1
25-year	2.070	46.1	1.1	5.0	5.0	0.0000	0.3	231.7	200.5
50-year	2.070	52.8	1.1	5.4	5.4	0.0000	0.2	327.5	251.3
100-year	2.070	97.6	1.1	6.3	6.3	0.0000	0.3	549.8	301.2
10-year	2.120	39.1	1.1	4.4	4.4	0.0000	0.3	172.5	121.8
25-year	2.120	46.2	1.1	5.0	5.0	0.0000	0.3	254.9	149.7
50-year	2.120	52.7	1.1	5.4	5.4	0.0000	0.2	323.7	199.9
100-year	2.120	97.6	1.1	6.3	6.3	0.0000	0.3	528.5	286.8
10-year	2.170	39.1	1.1	4.4	4.4	0.0000	0.3	183.0	123.7
25-year	2.170	46.2	1.1	5.0	5.0	0.0000	0.3	265.9	153.8
50-year	2.170	52.7	1.1	5.4	5.4	0.0000	0.2	331.1	165.3
100-year	2.170	97.6	1.1	6.3	6.3	0.0000	0.3	518.4	327.0
10-year	2.220	39.1	1.2	4.4	4.4	0.0000	0.4	136.2	115.2
25-year	2.220	46.2	1.2	5.0	5.0	0.0000	0.3	221.5	177.9
50-year	2.220	52.7	1.2	5.4	5.4	0.0000	0.3	307.2	230.9
100-year	2.220	97.0	1.2	6.3	6.3	0.0000	0.3	523.4	335.1
10-year	2.270	39.2	1.2	4.4	4.4	0.0000	0.4	138.8	132.8
25-year	2.270	46.2	1.2	5.0	5.0	0.0000	0.3	240.1	210.8
50-year	2.270	52.7	1.2	5.4	5.4	0.0000	0.3	333.1	228.3
100-year	2.270	97.0	1.2	6.3	6.3	0.0000	0.3	552.5	307.3
10-year	2.320	39.1	1.4	4.4	4.4	0.0000	0.4	117.7	77.0
25-year	2.320	46.2	1.4	5.0	5.0	0.0000	0.4	182.1	148.4
50-year	2.320	52.7	1.4	5.4	5.4	0.0000	0.3	255.1	208.7
100-year	2.320	97.1	1.4	6.3	6.3	0.0000	0.4	481.5	364.2

10-year	2.370	39.1	1.7	4.4	4.4	0.0000	0.6	91.1	75.9
25-year	2.370	46.2	1.7	5.0	5.0	0.0000	0.5	163.5	176.8
50-year	2.370	52.7	1.7	5.4	5.4	0.0000	0.4	248.0	219.3
100-year	2.370	97.1	1.7	6.3	6.3	0.0000	0.5	462.3	328.9
10-year	2.420	39.2	1.8	4.4	4.4	0.0001	0.7	59.1	45.8
25-year	2.420	46.2	1.8	5.0	5.0	0.0000	0.6	114.9	129.5
50-year	2.420	52.8	1.8	5.4	5.4	0.0000	0.5	192.7	230.1
100-year	2.420	97.1	1.8	6.3	6.3	0.0000	0.5	413.9	338.6
10-year	2.470	39.2	1.8	4.4	4.4	0.0002	0.9	51.7	36.3
25-year	2.470	46.2	1.8	5.0	5.0	0.0001	0.7	96.2	102.3
50-year	2.470	52.8	1.8	5.4	5.4	0.0001	0.6	160.4	204.5
100-year	2.470	97.1	1.8	6.3	6.3	0.0000	0.6	354.1	314.2
10-year	2.520	39.2	1.8	4.4	4.4	0.0003	1.0	42.3	27.7
25-year	2.520	46.2	1.8	5.0	5.0	0.0001	0.8	68.3	77.5
50-year	2.520	52.9	1.8	5.4	5.4	0.0001	0.7	113.7	146.8
100-year	2.520	97.1	1.8	6.3	6.3	0.0001	0.6	302.9	283.6
10-year	2.570	28.3	2.0	4.4	4.4	0.0002	0.8	40.4	23.6
25-year	2.570	29.7	2.0	5.0	5.0	0.0001	0.6	55.9	33.9
50-year	2.570	30.3	2.0	5.4	5.5	0.0000	0.5	78.5	98.1
100-year	2.570	85.0	2.0	6.3	6.3	0.0001	0.7	264.5	281.3
10-year	2.620	28.3	1.4	4.4	4.4	0.0001	0.4	77.7	68.5
25-year	2.620	29.7	1.4	5.0	5.0	0.0000	0.2	123.4	86.2
50-year	2.620	30.3	1.4	5.5	5.5	0.0000	0.2	166.3	124.9
100-year	2.620	85.1	1.4	6.3	6.3	0.0000	0.3	317.4	232.1
	2.650	Culvert							
10-year	2.675	30.2	1.6	5.3	5.3	0.0000	0.3	117.3	58.4
25-year	2.675	44.5	1.6	6.7	6.7	0.0000	0.2	398.2	348.3
50-year	2.675	56.8	1.6	7.7	7.7	0.0000	0.2	851.4	714.6
100-year	2.675	143.5	1.6	8.0	8.0	0.0000	0.3	1107.9	861.9
10-year	2.725	27.7	1.0	5.3	5.3	0.0000	0.1	558.1	180.5
25-year	2.725	42.6	1.0	6.7	6.7	0.0000	0.1	868.4	287.6
50-year	2.725	53.7	1.0	7.7	7.7	0.0000	0.1	1236.5	511.6
100-year	2.725	138.7	1.0	8.0	8.0	0.0000	0.1	1413.3	580.2
10-year	2.775	27.7	1.6	5.3	5.3	0.0000	0.0	669.2	210.1
25-year	2.775	42.6	1.6	6.7	6.7	0.0000	0.0	1049.5	355.1
50-year	2.775	53.7	1.6	7.7	7.7	0.0000	0.1	1428.0	440.8
100-year	2.775	138.7	1.6	8.0	8.0	0.0000	0.1	1578.8	496.4
10-year	2.825	27.7	1.5	5.3	5.3	0.0000	0.1	567.7	209.0
25-year	2.825	42.6	1.5	6.7	6.7	0.0000	0.1	856.5	373.2
50-year	2.825	53.7	1.5	7.7	7.7	0.0000	0.1	1197.4	461.8
100-year	2.825	138.7	1.5	8.0	8.0	0.0000	0.1	1313.1	479.8
10-year	2.875	27.7	1.1	5.3	5.3	0.0000	0.1	556.4	228.4

25-year	2.875	42.6	1.1	6.7	6.7	0.0000	0.1	856.2	345.5
50-year	2.875	53.7	1.1	7.7	7.7	0.0000	0.1	1193.6	423.9
100-year	2.875	138.7	1.1	8.0	8.0	0.0000	0.1	1316.4	525.2
10-year	2.925	27.7	1.9	5.3	5.3	0.0000	0.1	421.0	230.2
25-year	2.925	42.6	1.9	6.7	6.7	0.0000	0.1	710.4	375.6
50-year	2.925	53.7	1.9	7.7	7.7	0.0000	0.1	1100.5	519.5
100-year	2.925	138.7	1.9	8.0	8.0	0.0000	0.1	1235.1	552.7
10-year	2.975	27.7	1.9	5.3	5.3	0.0000	0.6	47.8	35.0
25-year	2.975	42.6	1.9	6.7	6.7	0.0000	0.6	75.3	299.8
50-year	2.975	53.7	1.9	7.7	7.7	0.0000	0.3	464.5	480.0
100-year	2.975	138.5	1.9	8.0	8.0	0.0000	0.6	570.0	658.9
10-year	3.025	27.7	1.9	5.3	5.3	0.0000	0.6	47.5	31.5
25-year	3.025	42.6	1.9	6.7	6.7	0.0000	0.6	74.4	278.9
50-year	3.025	53.7	1.9	7.7	7.7	0.0000	0.3	425.0	460.0
100-year	3.025	138.8	1.9	8.0	8.0	0.0000	0.7	524.6	587.3
10-year	3.075	26.2	1.9	5.3	5.3	0.0000	0.5	49.3	33.1
25-year	3.075	41.5	1.9	6.7	6.7	0.0000	0.5	76.7	188.7
50-year	3.075	52.0	1.9	7.7	7.7	0.0000	0.3	402.9	538.5
100-year	3.075	135.9	1.9	8.0	8.0	0.0000	0.7	526.9	637.2
10-year	3.125	26.2	1.9	5.3	5.3	0.0000	0.6	46.0	26.3
25-year	3.125	41.5	1.9	6.7	6.7	0.0000	0.6	72.2	243.6
50-year	3.125	52.0	1.9	7.7	7.7	0.0000	0.3	650.9	624.4
100-year	3.125	136.5	1.9	8.0	8.0	0.0000	0.5	861.2	661.5
	3.150	Culvert							
10-year	3.175	26.2	2.0	5.5	5.5	0.0000	0.6	44.4	15.6
25-year	3.175	42.7	2.0	7.1	7.1	0.0000	0.6	86.8	503.5
50-year	3.175	89.7	2.0	7.8	7.8	0.0001	0.8	235.7	908.8
100-year	3.175	140.1	2.0	8.0	8.0	0.0000	0.6	849.9	1047.3
10-year	3.225	25.5	2.1	5.5	5.5	0.0001	0.6	41.7	14.6
25-year	3.225	42.1	2.1	7.1	7.1	0.0000	0.6	67.1	314.6
50-year	3.225	100.1	2.1	7.8	7.8	0.0001	1.3	84.4	601.0
100-year	3.225	140.2	2.1	8.0	8.1	0.0002	1.7	102.8	1051.0
10-year	3.275	24.3	2.2	5.5	5.5	0.0000	0.5	45.8	17.6
25-year	3.275	41.0	2.2	7.1	7.1	0.0000	0.5	77.4	771.2
50-year	3.275	97.8	2.2	7.8	7.8	0.0001	1.1	103.2	878.8
100-year	3.275	159.1	2.2	8.1	8.1	0.0002	1.6	130.0	1040.9
10-year	3.325	24.3	2.2	5.5	5.5	0.0000	0.5	45.3	17.7
25-year	3.325	41.0	2.2	7.1	7.1	0.0000	0.5	77.0	897.8
50-year	3.325	98.0	2.2	7.8	7.8	0.0001	1.1	91.9	1029.0
100-year	3.325	158.6	2.2	8.1	8.1	0.0002	1.6	98.1	1052.7
	3.350	Culvert							

10-year	3.385	25.1	2.3	8.5	8.5	0.0000	0.0	1400.2	1101.9
25-year	3.385	44.0	2.3	8.9	8.9	0.0000	0.1	1750.5	1149.9
50-year	3.385	101.8	2.3	9.0	9.0	0.0000	0.1	1802.7	1156.9
100-year	3.385	203.1	2.3	9.0	9.0	0.0000	0.2	2194.3	1160.2
10-year	3.435	25.1	2.5	8.5	8.5	0.0000	0.0	1765.1	1102.5
25-year	3.435	44.0	2.5	8.9	8.9	0.0000	0.1	2193.4	1129.3
50-year	3.435	101.9	2.5	9.0	9.0	0.0000	0.1	2257.5	1133.3
100-year	3.435	203.6	2.5	9.0	9.0	0.0000	0.2	2290.4	1135.2
10-year	3.485	25.1	2.7	8.5	8.5	0.0000	0.0	1447.5	980.1
25-year	3.485	44.0	2.7	8.9	8.9	0.0000	0.1	1829.3	1008.9
50-year	3.485	101.8	2.7	9.0	9.0	0.0000	0.1	1886.6	1013.2
100-year	3.485	203.8	2.7	9.0	9.0	0.0000	0.2	1916.1	1015.1
10-year	3.560	25.1	2.9	8.5	8.5	0.0000	0.0	1366.4	928.1
25-year	3.560	44.0	2.9	8.9	8.9	0.0000	0.1	1728.2	956.9
50-year	3.560	101.8	2.9	9.0	9.0	0.0000	0.1	1782.6	961.2
100-year	3.560	204.0	2.9	9.0	9.0	0.0000	0.3	1810.9	963.2
10-year	3.635	25.2	3.1	8.5	8.5	0.0000	0.1	1282.0	873.2
25-year	3.635	43.9	3.1	8.9	8.9	0.0000	0.1	1623.8	907.7
50-year	3.635	101.7	3.1	9.0	9.0	0.0000	0.1	1675.5	912.8
100-year	3.635	204.2	3.1	9.0	9.0	0.0000	0.3	1702.8	915.3
10-year	3.710	25.3	3.3	8.5	8.5	0.0000	0.1	1196.0	813.2
25-year	3.710	43.9	3.3	8.9	8.9	0.0000	0.1	1514.8	847.7
50-year	3.710	102.0	3.3	9.0	9.0	0.0000	0.1	1563.2	852.8
100-year	3.710	204.5	3.3	9.0	9.0	0.0000	0.3	1589.1	855.5
10-year	3.785	25.3	3.5	8.5	8.5	0.0000	0.1	1119.6	734.6
25-year	3.785	44.2	3.5	8.9	8.9	0.0000	0.1	1411.2	784.5
50-year	3.785	102.2	3.5	9.0	9.0	0.0000	0.2	1456.2	791.9
100-year	3.785	205.2	3.5	9.0	9.0	0.0000	0.3	1480.6	795.7
10-year	3.850	25.4	3.7	8.5	8.5	0.0000	0.1	621.1	666.2
25-year	3.850	44.2	3.7	8.9	8.9	0.0000	0.1	884.6	706.5
50-year	3.850	102.4	3.7	9.0	9.0	0.0000	0.2	925.2	712.5
100-year	3.850	205.5	3.7	9.0	9.0	0.0000	0.3	948.5	795.3
10-year	3.925	25.5	3.7	8.5	8.5	0.0000	0.1	444.9	604.3
25-year	3.925	44.3	3.7	8.9	8.9	0.0000	0.1	703.7	743.7
50-year	3.925	103.3	3.7	9.0	9.0	0.0000	0.3	747.5	764.8
100-year	3.925	207.0	3.7	9.0	9.0	0.0001	0.6	774.0	774.9
10-year	4.000	25.5	3.7	8.5	8.5	0.0000	0.1	374.3	578.2
25-year	4.000	44.4	3.7	8.9	8.9	0.0000	0.2	621.3	708.7
50-year	4.000	104.9	3.7	9.0	9.0	0.0000	0.3	664.2	729.0
100-year	4.000	209.4	3.7	9.0	9.0	0.0001	0.6	693.4	738.6
10-year	4.075	25.6	3.6	8.5	8.5	0.0000	0.2	127.7	81.0
25-year	4.075	45.2	3.6	8.9	8.9	0.0000	0.3	162.9	104.6
50-year	4.075	108.1	3.6	9.0	9.0	0.0002	0.8	169.6	109.2

100-year	4.075	215.5	3.6	9.0	9.1	0.0008	1.5	196.2	713.9
10-year	4.150	25.6	3.6	8.5	8.5	0.0000	0.2	110.4	49.2
25-year	4.150	49.3	3.6	8.9	8.9	0.0001	0.4	151.2	158.5
50-year	4.150	130.7	3.6	9.0	9.0	0.0004	1.0	165.4	779.3
100-year	4.150	225.2	3.6	9.1	9.1	0.0010	1.6	238.8	784.7
10-year	4.225	25.7	3.6	8.5	8.5	0.0000	0.2	105.9	33.8
25-year	4.225	51.1	3.6	8.9	8.9	0.0001	0.4	119.6	36.7
50-year	4.225	145.4	3.6	9.0	9.1	0.0006	1.2	149.0	720.1
100-year	4.225	240.7	3.6	9.2	9.2	0.0012	1.7	252.7	749.2
10-year	4.300	25.7	3.7	8.5	8.5	0.0000	0.3	95.3	30.4
25-year	4.300	56.1	3.7	8.9	8.9	0.0001	0.5	107.8	33.1
50-year	4.300	152.5	3.7	9.1	9.1	0.0008	1.3	151.5	519.1
100-year	4.300	248.1	3.7	9.3	9.3	0.0014	1.8	254.4	619.6
10-year	4.375	26.0	3.8	8.5	8.6	0.0000	0.3	89.6	27.9
25-year	4.375	64.2	3.8	9.0	9.0	0.0002	0.6	101.3	30.4
50-year	4.375	158.9	3.8	9.1	9.2	0.0008	1.4	186.9	620.3
100-year	4.375	262.5	3.8	9.4	9.4	0.0012	1.7	330.1	660.2
10-year	4.450	26.3	3.8	8.6	8.6	0.0001	0.4	73.8	25.4
25-year	4.450	204.8	3.8	9.0	9.1	0.0027	2.4	85.8	28.0
50-year	4.450	239.7	3.8	9.3	9.3	0.0019	2.0	255.4	697.0
100-year	4.450	287.1	3.8	9.5	9.5	0.0013	1.7	405.9	721.7
10-year	4.525	159.4	3.9	8.7	8.8	0.0023	2.2	73.3	23.8
25-year	4.525	208.3	3.9	9.2	9.2	0.0020	2.1	207.9	758.1
50-year	4.525	253.4	3.9	9.4	9.4	0.0014	1.7	363.1	773.5
100-year	4.525	293.0	3.9	9.6	9.6	0.0010	1.5	499.5	786.7
10-year	4.600	160.9	4.0	8.9	8.9	0.0020	2.1	77.3	22.1
25-year	4.600	211.5	4.0	9.3	9.3	0.0013	1.7	299.1	764.4
50-year	4.600	258.4	4.0	9.5	9.5	0.0010	1.5	429.4	777.0
100-year	4.600	295.8	4.0	9.6	9.6	0.0008	1.4	547.5	788.3
	4.650	Culvert							
10-year	4.700	164.0	3.5	9.4	9.4	0.0003	0.9	414.8	951.7
25-year	4.700	196.5	3.5	9.4	9.4	0.0004	1.0	449.1	952.8
50-year	4.700	259.2	3.5	9.5	9.5	0.0005	1.1	527.4	955.1
100-year	4.700	298.8	3.5	9.6	9.6	0.0004	0.9	668.9	959.3
10-year	4.800	164.2	3.6	9.4	9.4	0.0004	1.0	386.0	911.7
25-year	4.800	225.0	3.6	9.5	9.5	0.0006	1.2	434.6	913.5
50-year	4.800	263.9	3.6	9.5	9.6	0.0006	1.2	510.6	916.2
100-year	4.800	303.6	3.6	9.7	9.7	0.0004	1.1	633.9	927.1

Proposed Conditions - Mean Tide Level (Rising)

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-35.6	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
25-year	0.000	-35.6	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
50-year	0.000	-35.6	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-35.6	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	-20.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-20.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	-20.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
100-year	0.150	-20.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
10-year	0.300	-20.1	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
25-year	0.300	-20.1	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
50-year	0.300	-20.1	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
100-year	0.300	-20.1	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
10-year	0.400	-18.3	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	-18.3	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
50-year	0.400	-18.3	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
100-year	0.400	-18.3	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
10-year	0.500	-17.0	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	-17.0	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
50-year	0.500	-17.0	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
100-year	0.500	-17.0	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
10-year	0.650	-14.7	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
25-year	0.650	-14.7	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
50-year	0.650	-14.7	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
100-year	0.650	-14.7	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
10-year	0.750	18.7	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
25-year	0.750	30.3	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
50-year	0.750	-13.4	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
100-year	0.750	-13.4	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
10-year	1.000	22.7	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
25-year	1.000	34.2	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
50-year	1.000	42.9	-2.5	3.4		3.4	0.0000	0.1	1314.4	428.5
100-year	1.000	53.4	-2.5	3.4		3.4	0.0000	0.1	1314.4	428.5
10-year	1.075	22.8	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
25-year	1.075	34.3	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
50-year	1.075	44.1	-2.5	3.4		3.4	0.0000	0.1	1139.9	474.1
100-year	1.075	54.6	-2.5	3.4		3.4	0.0000	0.1	1139.9	474.1
10-year	1.150	23.8	-2.5	3.4		3.4	0.0000	0.0	965.9	467.7

25-year	1.150	35.4	-2.5	3.4	3.4	0.0000	0.1	965.9	467.7
50-year	1.150	44.1	-2.5	3.4	3.4	0.0000	0.1	965.9	467.7
100-year	1.150	54.8	-2.5	3.4	3.4	0.0000	0.1	965.9	467.7
10-year	1.200	23.9	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
25-year	1.200	35.5	-2.5	3.4	3.4	0.0000	0.1	1049.0	468.5
50-year	1.200	44.3	-2.5	3.4	3.4	0.0000	0.1	1049.0	468.5
100-year	1.200	54.9	-2.5	3.4	3.4	0.0000	0.1	1049.0	468.5
10-year	1.300	24.6	-2.5	3.4	3.4	0.0000	0.0	840.6	465.8
25-year	1.300	36.2	-2.5	3.4	3.4	0.0000	0.1	840.7	465.8
50-year	1.300	45.0	-2.5	3.4	3.4	0.0000	0.1	840.6	465.8
100-year	1.300	55.6	-2.5	3.4	3.4	0.0000	0.1	840.7	465.8
10-year	1.450	25.0	-2.5	3.4	3.4	0.0000	0.1	198.2	459.9
25-year	1.450	36.6	-2.5	3.4	3.4	0.0000	0.2	198.2	459.9
50-year	1.450	45.4	-2.5	3.4	3.4	0.0000	0.2	198.2	459.9
100-year	1.450	56.0	-2.5	3.4	3.4	0.0000	0.3	198.2	459.9
	1.485	Culvert							
10-year	1.520	27.0	-1.0	3.4	3.4	0.0000	0.3	97.1	439.1
25-year	1.520	250.5	-1.0	3.8	3.9	0.0002	2.4	105.4	447.3
50-year	1.520	286.8	-1.0	4.2	4.3	0.0002	2.5	115.5	456.7
100-year	1.520	327.0	-1.0	4.7	4.8	0.0002	2.6	126.6	513.1
10-year	1.570	27.3	0.7	3.4	3.4	0.0000	0.1	221.4	415.2
25-year	1.570	236.9	0.7	3.9	3.9	0.0001	0.9	262.8	455.8
50-year	1.570	266.2	0.7	4.3	4.3	0.0000	0.9	301.7	464.4
100-year	1.570	298.8	0.7	4.8	4.8	0.0000	0.9	344.3	493.6
10-year	1.620	25.8	0.7	3.4	3.4	0.0000	0.1	388.6	351.5
25-year	1.620	225.8	0.7	3.9	3.9	0.0000	0.5	473.8	404.8
50-year	1.620	249.3	0.7	4.3	4.3	0.0000	0.5	551.5	436.8
100-year	1.620	275.5	0.7	4.8	4.8	0.0000	0.4	636.6	464.9
10-year	1.670	25.5	0.7	3.4	3.4	0.0000	0.1	472.4	274.2
25-year	1.670	225.8	0.7	3.9	3.9	0.0000	0.4	583.2	341.9
50-year	1.670	249.3	0.7	4.3	4.3	0.0000	0.4	684.4	361.8
100-year	1.670	275.7	0.7	4.8	4.8	0.0000	0.4	796.2	443.1
10-year	1.720	23.0	0.7	3.4	3.4	0.0000	0.1	367.4	225.6
25-year	1.720	200.8	0.7	3.9	3.9	0.0000	0.5	481.2	261.1
50-year	1.720	216.5	0.7	4.3	4.3	0.0000	0.4	596.0	284.2
100-year	1.720	234.1	0.7	4.8	4.8	0.0000	0.4	723.7	295.8
10-year	1.770	23.0	0.8	3.4	3.4	0.0000	0.1	264.3	197.1
25-year	1.770	200.8	0.8	3.9	3.9	0.0000	0.7	364.4	223.4
50-year	1.770	216.5	0.8	4.3	4.3	0.0000	0.6	464.9	244.3
100-year	1.770	234.2	0.8	4.8	4.8	0.0000	0.5	582.7	253.4
10-year	1.820	23.1	0.8	3.4	3.4	0.0000	0.2	180.1	135.0
25-year	1.820	200.8	0.8	3.9	3.9	0.0002	1.0	246.4	143.1

50-year	1.820	216.5	0.8	4.3	4.3	0.0001	0.8	314.6	180.0
100-year	1.820	234.2	0.8	4.8	4.8	0.0001	0.7	414.3	241.3
10-year	1.870	23.2	0.9	3.4	3.4	0.0000	0.2	176.0	136.0
25-year	1.870	200.9	0.9	3.9	3.9	0.0001	1.0	246.3	155.7
50-year	1.870	216.6	0.9	4.3	4.4	0.0001	0.9	316.7	174.2
100-year	1.870	234.3	0.9	4.8	4.8	0.0000	0.8	413.2	250.3
10-year	1.920	23.4	0.9	3.4	3.4	0.0000	0.2	130.0	98.0
25-year	1.920	200.9	0.9	3.9	3.9	0.0002	1.3	182.6	119.8
50-year	1.920	216.6	0.9	4.3	4.4	0.0001	1.1	237.1	137.7
100-year	1.920	234.3	0.9	4.8	4.8	0.0001	1.0	305.0	171.5
10-year	1.970	23.5	1.0	3.4	3.4	0.0000	0.4	93.0	98.1
25-year	1.970	200.9	1.0	3.9	4.0	0.0005	2.1	147.7	125.3
50-year	1.970	216.6	1.0	4.3	4.4	0.0003	1.7	205.8	151.3
100-year	1.970	234.3	1.0	4.8	4.8	0.0001	1.4	285.6	190.7
10-year	2.020	23.6	1.1	3.4	3.4	0.0000	0.3	81.5	73.0
25-year	2.020	200.9	1.1	3.9	4.0	0.0005	2.0	127.5	104.5
50-year	2.020	216.6	1.1	4.4	4.4	0.0003	1.7	173.7	120.9
100-year	2.020	234.3	1.1	4.8	4.8	0.0002	1.4	234.9	157.6
10-year	2.070	169.4	1.1	3.5	3.6	0.0026	2.9	65.1	79.8
25-year	2.070	200.9	1.1	4.0	4.0	0.0010	2.2	108.1	92.9
50-year	2.070	216.7	1.1	4.4	4.4	0.0005	1.8	148.1	104.8
100-year	2.070	234.3	1.1	4.8	4.9	0.0003	1.5	200.3	149.9
10-year	2.120	169.9	1.1	3.6	3.7	0.0009	2.2	86.6	87.1
25-year	2.120	200.9	1.1	4.0	4.1	0.0005	1.9	129.8	110.9
50-year	2.120	216.7	1.1	4.4	4.4	0.0003	1.6	174.6	122.4
100-year	2.120	234.3	1.1	4.8	4.9	0.0002	1.4	232.0	141.3
10-year	2.170	170.4	1.1	3.6	3.7	0.0009	2.3	97.6	103.8
25-year	2.170	200.9	1.1	4.0	4.1	0.0005	2.0	141.7	118.4
50-year	2.170	216.7	1.1	4.4	4.5	0.0003	1.7	187.1	124.2
100-year	2.170	234.3	1.1	4.9	4.9	0.0002	1.4	243.1	143.7
10-year	2.220	170.5	1.2	3.7	3.8	0.0019	2.9	67.8	79.1
25-year	2.220	200.9	1.2	4.1	4.1	0.0011	2.5	102.1	98.0
50-year	2.220	216.7	1.2	4.4	4.5	0.0006	2.1	141.0	117.3
100-year	2.220	234.3	1.2	4.9	4.9	0.0003	1.7	197.7	153.0
10-year	2.270	171.1	1.2	3.8	3.9	0.0012	2.5	73.6	75.1
25-year	2.270	201.0	1.2	4.1	4.2	0.0008	2.4	106.0	108.7
50-year	2.270	216.7	1.2	4.5	4.5	0.0005	2.0	147.9	135.0
100-year	2.270	234.3	1.2	4.9	4.9	0.0003	1.7	213.4	188.9
10-year	2.320	172.3	1.4	3.8	3.9	0.0010	2.5	78.6	56.0
25-year	2.320	201.1	1.4	4.2	4.2	0.0008	2.4	100.3	71.9
50-year	2.320	216.7	1.4	4.5	4.5	0.0005	2.2	124.4	82.4
100-year	2.320	234.3	1.4	4.9	4.9	0.0003	1.9	165.3	125.6

10-year	2.370	172.5	1.7	3.8	4.1	0.0028	3.9	55.5	55.0
25-year	2.370	201.1	1.7	4.2	4.3	0.0019	3.6	75.7	66.5
50-year	2.370	216.7	1.7	4.5	4.6	0.0012	3.1	98.5	80.2
100-year	2.370	234.5	1.7	4.9	5.0	0.0007	2.6	146.4	143.0
10-year	2.420	173.1	1.8	4.0	4.2	0.0038	3.9	44.0	30.6
25-year	2.420	201.4	1.8	4.2	4.5	0.0031	3.9	52.9	38.2
50-year	2.420	216.7	1.8	4.5	4.7	0.0021	3.5	65.3	61.2
100-year	2.420	234.5	1.8	4.9	5.0	0.0012	3.0	102.6	119.7
10-year	2.470	173.5	1.8	4.2	4.5	0.0055	4.6	44.1	33.9
25-year	2.470	202.1	1.8	4.4	4.7	0.0049	4.6	52.0	36.4
50-year	2.470	217.0	1.8	4.6	4.9	0.0037	4.3	64.5	73.8
100-year	2.470	235.7	1.8	5.0	5.1	0.0024	3.7	92.4	98.2
10-year	2.520	173.6	1.8	4.4	4.7	0.0051	4.2	43.5	28.5
25-year	2.520	203.1	1.8	4.6	4.9	0.0052	4.5	48.4	36.3
50-year	2.520	222.3	1.8	4.8	5.1	0.0046	4.5	55.3	45.7
100-year	2.520	238.2	1.8	5.1	5.3	0.0034	4.1	73.2	84.5
10-year	2.570	141.7	2.0	4.8	5.0	0.0021	3.1	50.1	25.9
25-year	2.570	146.7	2.0	5.1	5.2	0.0016	2.9	56.8	35.3
50-year	2.570	155.9	2.0	5.2	5.3	0.0014	2.9	62.8	50.2
100-year	2.570	169.4	2.0	5.4	5.5	0.0013	2.8	74.4	87.1
10-year	2.620	147.5	1.4	5.0	5.0	0.0007	1.2	119.1	83.9
25-year	2.620	155.4	1.4	5.2	5.2	0.0005	1.2	137.2	94.8
50-year	2.620	161.6	1.4	5.3	5.4	0.0004	1.1	152.8	113.3
100-year	2.620	175.6	1.4	5.5	5.5	0.0004	1.1	174.2	130.9
	2.650	Culvert							
10-year	2.675	155.0	1.6	5.6	5.7	0.0002	1.1	145.3	125.5
25-year	2.675	175.9	1.6	5.9	6.0	0.0001	1.1	188.6	170.0
50-year	2.675	189.1	1.6	6.1	6.1	0.0001	1.1	220.2	213.8
100-year	2.675	201.1	1.6	6.3	6.3	0.0001	1.1	258.8	244.9
10-year	2.725	150.9	1.0	5.7	5.7	0.0000	0.3	622.1	192.4
25-year	2.725	170.8	1.0	6.0	6.0	0.0000	0.3	679.6	213.8
50-year	2.725	184.1	1.0	6.1	6.1	0.0000	0.3	715.4	222.8
100-year	2.725	195.6	1.0	6.3	6.3	0.0000	0.3	753.3	238.0
10-year	2.775	150.9	1.6	5.7	5.7	0.0000	0.2	744.2	224.7
25-year	2.775	170.8	1.6	6.0	6.0	0.0000	0.2	811.2	246.8
50-year	2.775	184.1	1.6	6.1	6.1	0.0000	0.2	854.6	272.6
100-year	2.775	195.6	1.6	6.3	6.3	0.0000	0.2	901.3	302.4
10-year	2.825	150.9	1.5	5.7	5.7	0.0000	0.2	636.9	228.0
25-year	2.825	170.8	1.5	6.0	6.0	0.0000	0.3	695.4	253.5
50-year	2.825	184.1	1.5	6.1	6.1	0.0000	0.3	729.4	279.2
100-year	2.825	195.6	1.5	6.3	6.3	0.0000	0.3	763.9	303.4
10-year	2.875	150.9	1.1	5.7	5.7	0.0000	0.2	629.7	242.7

25-year	2.875	170.8	1.1	6.0	6.0	0.0000	0.3	690.4	266.3
50-year	2.875	184.1	1.1	6.1	6.1	0.0000	0.3	725.5	293.1
100-year	2.875	195.6	1.1	6.3	6.3	0.0000	0.3	760.9	312.0
10-year	2.925	150.9	1.9	5.7	5.7	0.0000	0.3	491.8	253.1
25-year	2.925	170.8	1.9	6.0	6.0	0.0000	0.3	550.6	267.5
50-year	2.925	184.1	1.9	6.1	6.1	0.0000	0.3	584.5	292.3
100-year	2.925	195.6	1.9	6.3	6.3	0.0000	0.3	618.7	307.6
10-year	2.975	150.9	1.9	5.7	5.8	0.0009	2.8	54.5	63.9
25-year	2.975	170.8	1.9	6.0	6.1	0.0009	2.9	59.9	92.7
50-year	2.975	184.2	1.9	6.1	6.3	0.0009	2.9	63.1	149.4
100-year	2.975	195.6	1.9	6.3	6.4	0.0009	2.9	66.4	184.6
10-year	3.025	150.9	1.9	5.7	5.9	0.0009	2.8	54.8	45.8
25-year	3.025	170.8	1.9	6.0	6.1	0.0009	2.8	60.2	55.4
50-year	3.025	184.2	1.9	6.2	6.3	0.0009	2.9	63.4	73.7
100-year	3.025	195.6	1.9	6.3	6.5	0.0009	2.9	66.6	106.1
10-year	3.075	148.3	1.9	5.8	5.9	0.0007	2.6	58.0	47.9
25-year	3.075	167.5	1.9	6.1	6.2	0.0007	2.6	63.5	62.5
50-year	3.075	181.4	1.9	6.3	6.4	0.0007	2.7	66.7	83.4
100-year	3.075	192.4	1.9	6.4	6.5	0.0007	2.8	70.0	95.2
10-year	3.125	148.3	1.9	5.8	6.0	0.0008	2.7	54.9	53.5
25-year	3.125	167.5	1.9	6.1	6.2	0.0008	2.8	60.2	119.5
50-year	3.125	181.4	1.9	6.3	6.4	0.0008	2.9	63.3	176.2
100-year	3.125	192.4	1.9	6.4	6.6	0.0008	2.9	66.5	194.1
	3.150	Culvert							
10-year	3.175	148.5	2.0	6.3	6.4	0.0007	2.6	57.3	16.9
25-year	3.175	167.6	2.0	6.6	6.7	0.0007	2.6	63.7	17.5
50-year	3.175	181.7	2.0	6.9	7.0	0.0007	2.7	68.1	17.9
100-year	3.175	192.4	2.0	7.1	7.2	0.0006	2.6	95.8	534.0
10-year	3.225	147.4	2.1	6.3	6.4	0.0008	2.7	54.3	15.7
25-year	3.225	166.4	2.1	6.7	6.8	0.0008	2.8	60.1	16.2
50-year	3.225	180.4	2.1	6.9	7.0	0.0008	2.8	64.2	16.5
100-year	3.225	191.0	2.1	7.2	7.3	0.0007	2.8	69.0	358.4
10-year	3.275	145.4	2.2	6.4	6.5	0.0006	2.3	62.6	19.6
25-year	3.275	163.9	2.2	6.7	6.8	0.0005	2.3	69.9	20.4
50-year	3.275	177.7	2.2	7.0	7.1	0.0005	2.4	75.3	761.6
100-year	3.275	188.0	2.2	7.3	7.4	0.0005	2.3	81.6	789.1
10-year	3.325	145.4	2.2	6.4	6.5	0.0006	2.3	62.7	19.8
25-year	3.325	163.9	2.2	6.8	6.9	0.0006	2.3	70.1	20.7
50-year	3.325	177.1	2.2	7.0	7.1	0.0005	2.3	76.0	841.3
100-year	3.325	187.7	2.2	7.3	7.4	0.0004	2.2	117.9	992.7
	3.350	Culvert							

10-year	3.385	145.4	2.3	6.9	6.9	0.0002	1.5	96.2	86.2
25-year	3.385	163.9	2.3	7.4	7.4	0.0001	1.2	393.5	937.3
50-year	3.385	179.0	2.3	7.7	7.8	0.0000	0.8	704.9	982.9
100-year	3.385	189.9	2.3	8.1	8.1	0.0000	0.6	1029.0	1050.0
10-year	3.435	145.4	2.4	6.9	6.9	0.0002	1.4	159.4	136.9
25-year	3.435	164.0	2.4	7.4	7.4	0.0001	1.0	540.7	1002.4
50-year	3.435	179.1	2.4	7.8	7.8	0.0000	0.7	920.9	1039.6
100-year	3.435	190.0	2.4	8.1	8.1	0.0000	0.5	1317.8	1073.5
10-year	3.485	145.3	2.4	6.9	7.0	0.0002	1.5	97.8	34.3
25-year	3.485	163.9	2.4	7.4	7.4	0.0001	1.1	404.6	825.7
50-year	3.485	179.5	2.4	7.8	7.8	0.0000	0.8	717.5	861.0
100-year	3.485	189.9	2.4	8.1	8.1	0.0000	0.6	1053.5	949.2
10-year	3.560	145.2	2.5	6.9	7.0	0.0003	1.6	95.1	64.1
25-year	3.560	164.1	2.5	7.4	7.4	0.0001	1.2	393.5	778.2
50-year	3.560	180.7	2.5	7.8	7.8	0.0001	0.9	683.7	804.3
100-year	3.560	190.0	2.5	8.1	8.1	0.0000	0.6	997.0	897.3
10-year	3.635	145.1	2.5	7.0	7.0	0.0003	1.7	90.9	93.1
25-year	3.635	164.2	2.5	7.4	7.4	0.0001	1.2	378.3	732.5
50-year	3.635	182.1	2.5	7.8	7.8	0.0001	0.9	647.9	757.8
100-year	3.635	190.2	2.5	8.1	8.1	0.0000	0.7	940.6	836.3
10-year	3.710	145.7	2.6	7.0	7.0	0.0003	1.8	98.7	142.1
25-year	3.710	164.9	2.6	7.4	7.4	0.0001	1.3	366.9	672.1
50-year	3.710	183.7	2.6	7.8	7.8	0.0001	1.0	611.7	700.7
100-year	3.710	190.4	2.6	8.1	8.1	0.0000	0.7	881.7	776.5
10-year	3.785	147.2	2.7	7.0	7.0	0.0003	1.8	165.0	498.6
25-year	3.785	166.4	2.7	7.4	7.4	0.0001	1.3	393.2	574.0
50-year	3.785	185.3	2.7	7.8	7.8	0.0001	1.0	603.9	628.3
100-year	3.785	190.6	2.7	8.1	8.1	0.0000	0.7	844.6	681.9
10-year	3.850	148.7	2.7	7.0	7.1	0.0004	2.0	96.2	123.4
25-year	3.850	166.4	2.7	7.4	7.5	0.0003	1.8	158.7	185.4
50-year	3.850	186.2	2.7	7.8	7.8	0.0002	1.6	232.6	238.7
100-year	3.850	190.9	2.7	8.1	8.2	0.0001	1.4	373.8	623.7
10-year	3.925	150.7	2.8	7.0	7.1	0.0003	1.9	81.4	25.2
25-year	3.925	168.8	2.8	7.4	7.5	0.0003	1.8	107.2	111.5
50-year	3.925	187.6	2.8	7.8	7.8	0.0002	1.8	150.8	146.1
100-year	3.925	191.2	2.8	8.1	8.2	0.0002	1.6	244.6	457.5
10-year	4.000	151.7	2.9	7.1	7.1	0.0003	1.8	85.9	27.3
25-year	4.000	174.4	2.9	7.5	7.5	0.0003	1.8	96.6	28.9
50-year	4.000	189.4	2.9	7.8	7.8	0.0003	1.8	107.1	49.2
100-year	4.000	192.8	2.9	8.1	8.2	0.0002	1.6	187.6	444.1
10-year	4.075	156.1	2.9	7.1	7.2	0.0003	1.8	86.8	28.5
25-year	4.075	205.5	2.9	7.5	7.5	0.0004	2.1	98.0	30.2
50-year	4.075	193.6	2.9	7.8	7.9	0.0003	1.8	108.0	31.5

100-year	4.075	194.6	2.9	8.2	8.2	0.0002	1.6	119.3	32.9
10-year	4.150	157.4	3.0	7.1	7.2	0.0005	2.1	76.9	25.3
25-year	4.150	206.3	3.0	7.5	7.6	0.0006	2.4	87.2	28.3
50-year	4.150	212.1	3.0	7.8	7.9	0.0005	2.2	96.7	30.7
100-year	4.150	198.5	3.0	8.2	8.2	0.0003	1.8	107.7	33.1
10-year	4.225	158.3	3.1	7.1	7.2	0.0005	2.1	74.5	24.2
25-year	4.225	207.0	3.1	7.5	7.6	0.0006	2.5	84.3	26.4
50-year	4.225	212.9	3.1	7.8	7.9	0.0005	2.3	92.9	28.6
100-year	4.225	203.1	3.1	8.2	8.2	0.0004	2.0	103.0	31.1
10-year	4.300	158.7	3.1	7.2	7.3	0.0006	2.3	68.9	22.7
25-year	4.300	209.7	3.1	7.6	7.7	0.0007	2.7	78.2	24.5
50-year	4.300	214.2	3.1	7.9	8.0	0.0006	2.5	86.0	26.2
100-year	4.300	209.9	3.1	8.2	8.3	0.0005	2.2	94.9	28.1
10-year	4.375	160.4	3.2	7.2	7.3	0.0006	2.4	66.6	21.3
25-year	4.375	210.2	3.2	7.6	7.7	0.0008	2.8	75.6	23.0
50-year	4.375	215.7	3.2	7.9	8.0	0.0007	2.6	82.6	24.3
100-year	4.375	217.0	3.2	8.2	8.3	0.0005	2.4	90.5	25.9
10-year	4.450	160.5	3.3	7.2	7.4	0.0015	3.3	48.8	19.7
25-year	4.450	210.5	3.3	7.6	7.8	0.0017	3.7	57.1	21.2
50-year	4.450	216.0	3.3	7.9	8.1	0.0014	3.4	63.5	22.4
100-year	4.450	217.9	3.3	8.2	8.4	0.0010	3.1	70.8	23.7
10-year	4.525	161.2	3.3	7.3	7.5	0.0013	3.2	51.1	18.5
25-year	4.525	210.8	3.3	7.8	8.0	0.0015	3.6	59.1	19.9
50-year	4.525	224.5	3.3	8.0	8.2	0.0013	3.5	64.6	20.9
100-year	4.525	236.5	3.3	8.3	8.5	0.0012	3.3	70.9	21.9
10-year	4.600	161.4	3.4	7.4	7.6	0.0009	2.8	57.7	17.5
25-year	4.600	214.9	3.4	7.9	8.1	0.0011	3.3	65.7	18.7
50-year	4.600	235.5	3.4	8.1	8.3	0.0011	3.3	70.6	19.4
100-year	4.600	278.9	3.4	8.4	8.6	0.0013	3.7	76.4	20.3
	4.650	Culvert							
10-year	4.700	165.2	3.5	8.0	8.1	0.0006	2.3	72.6	26.3
25-year	4.700	218.5	3.5	8.9	9.0	0.0005	2.2	99.6	33.0
50-year	4.700	244.4	3.5	9.5	9.5	0.0004	2.1	118.2	954.3
100-year	4.700	290.4	3.5	10.1	10.1	0.0001	0.8	1100.5	974.5
10-year	4.800	165.2	3.6	8.1	8.2	0.0008	2.6	64.4	23.2
25-year	4.800	218.1	3.6	9.0	9.1	0.0006	2.5	93.2	60.8
50-year	4.800	244.4	3.6	9.5	9.5	0.0002	1.6	488.3	915.4
100-year	4.800	290.5	3.6	10.1	10.1	0.0001	1.0	1031.0	992.9

Existing Conditions - Mean Tide Level (Falling)

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-43.3	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
25-year	0.000	-36.4	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
50-year	0.000	-29.3	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
100-year	0.000	-23.2	-2.6	3.4	-2.3	3.4	0.0000	0.0	1359.2	450.7
10-year	0.150	-27.2	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-19.6	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	-14.6	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
100-year	0.150	-8.3	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
10-year	0.300	-27.0	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
25-year	0.300	-19.5	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
50-year	0.300	-12.8	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
100-year	0.300	-6.4	-2.7	3.4		3.4	0.0000	0.0	2171.7	638.2
10-year	0.400	-25.4	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	-17.8	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
50-year	0.400	-11.2	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
100-year	0.400	-4.8	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
10-year	0.500	-21.0	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	-14.9	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
50-year	0.500	50.8	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
100-year	0.500	61.4	-2.8	3.4		3.4	0.0000	0.1	1312.3	376.3
10-year	0.650	-14.5	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
25-year	0.650	-8.6	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
50-year	0.650	47.6	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
100-year	0.650	58.2	-2.7	3.4		3.4	0.0000	0.1	1323.9	396.9
10-year	0.750	-12.8	-2.6	3.4		3.4	0.0000	0.0	1122.3	389.6
25-year	0.750	-6.9	-2.6	3.4		3.4	0.0000	0.0	1122.3	389.6
50-year	0.750	46.0	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
100-year	0.750	58.3	-2.6	3.4		3.4	0.0000	0.1	1122.3	389.6
10-year	1.000	-12.7	-2.5	3.4		3.4	0.0000	0.0	1314.6	428.5
25-year	1.000	-5.2	-2.5	3.4		3.4	0.0000	0.0	1314.7	428.5
50-year	1.000	46.2	-2.5	3.4		3.4	0.0000	0.1	1314.6	428.5
100-year	1.000	56.8	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
10-year	1.075	-12.6	-2.5	3.4		3.4	0.0000	0.0	1140.1	474.1
25-year	1.075	-5.1	-2.5	3.4		3.4	0.0000	0.0	1140.1	474.1
50-year	1.075	46.3	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1
100-year	1.075	57.0	-2.5	3.4		3.4	0.0000	0.1	1140.1	474.1
10-year	1.150	-12.4	-2.5	3.4		3.4	0.0000	0.0	966.1	467.8

25-year	1.150	-5.0	-2.5	3.4	3.4	0.0000	0.0	966.1	467.8
50-year	1.150	46.3	-2.5	3.4	3.4	0.0000	0.1	966.1	467.8
100-year	1.150	57.1	-2.5	3.4	3.4	0.0000	0.1	966.1	467.8
10-year	1.200	-12.3	-2.5	3.4	3.4	0.0000	0.0	1049.2	468.5
25-year	1.200	-4.9	-2.5	3.4	3.4	0.0000	0.0	1049.2	468.5
50-year	1.200	46.4	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
100-year	1.200	57.1	-2.5	3.4	3.4	0.0000	0.1	1049.2	468.5
10-year	1.300	-12.0	-2.5	3.4	3.4	0.0000	0.0	840.8	465.8
25-year	1.300	-4.7	-2.5	3.4	3.4	0.0000	0.0	840.8	465.8
50-year	1.300	46.5	-2.5	3.4	3.4	0.0000	0.1	840.8	465.8
100-year	1.300	57.2	-2.5	3.4	3.4	0.0000	0.1	840.8	465.8
10-year	1.450	20.7	-2.5	3.4	3.4	0.0000	0.2	88.6	460.0
25-year	1.450	29.1	-2.5	3.4	3.4	0.0000	0.3	88.6	460.0
50-year	1.450	46.6	-2.5	3.4	3.4	0.0000	0.5	88.6	460.0
100-year	1.450	57.3	-2.5	3.4	3.4	0.0000	0.7	88.6	460.0
	1.485	Culvert							
10-year	1.520	69.9	-1.0	4.6	4.6	0.0000	0.9	81.9	501.5
25-year	1.520	88.0	-1.0	5.1	5.2	0.0000	1.0	90.8	532.1
50-year	1.520	100.1	-1.0	5.5	5.6	0.0000	1.0	96.7	536.1
100-year	1.520	120.5	-1.0	6.4	6.4	0.0000	1.1	109.1	570.1
10-year	1.570	63.4	0.7	4.6	4.6	0.0000	0.2	323.4	468.6
25-year	1.570	77.7	0.7	5.2	5.2	0.0000	0.2	377.2	522.8
50-year	1.570	87.3	0.7	5.6	5.6	0.0000	0.2	412.7	535.8
100-year	1.570	113.5	0.7	6.4	6.4	0.0000	0.2	487.4	600.5
10-year	1.620	58.2	0.7	4.6	4.6	0.0000	0.1	592.6	443.4
25-year	1.620	69.4	0.7	5.2	5.2	0.0000	0.1	700.2	478.2
50-year	1.620	77.2	0.7	5.6	5.6	0.0000	0.1	771.3	496.8
100-year	1.620	108.5	0.7	6.4	6.4	0.0000	0.1	920.8	545.1
10-year	1.670	58.2	0.7	4.6	4.6	0.0000	0.1	737.9	412.3
25-year	1.670	69.4	0.7	5.2	5.2	0.0000	0.1	880.3	449.6
50-year	1.670	77.2	0.7	5.6	5.6	0.0000	0.1	975.6	458.4
100-year	1.670	108.5	0.7	6.4	6.4	0.0000	0.1	1179.2	489.3
10-year	1.720	40.4	0.7	4.6	4.6	0.0000	0.1	656.5	287.5
25-year	1.720	48.6	0.7	5.2	5.2	0.0000	0.1	821.4	347.7
50-year	1.720	54.1	0.7	5.6	5.6	0.0000	0.1	933.3	426.0
100-year	1.720	99.4	0.7	6.4	6.4	0.0000	0.1	1179.3	492.1
10-year	1.770	40.4	0.8	4.6	4.6	0.0000	0.1	520.7	248.6
25-year	1.770	48.7	0.8	5.2	5.2	0.0000	0.1	677.1	291.3
50-year	1.770	54.1	0.8	5.6	5.6	0.0000	0.1	796.1	349.8
100-year	1.770	99.4	0.8	6.4	6.4	0.0000	0.1	1066.8	544.8
10-year	1.820	40.4	0.8	4.6	4.6	0.0000	0.1	358.6	208.5
25-year	1.820	48.7	0.8	5.2	5.2	0.0000	0.1	505.4	280.9

50-year	1.820	54.1	0.8	5.6	5.6	0.0000	0.1	628.2	339.6
100-year	1.820	99.4	0.8	6.4	6.4	0.0000	0.2	996.2	543.4
10-year	1.870	40.4	0.9	4.6	4.6	0.0000	0.2	357.8	212.8
25-year	1.870	48.7	0.9	5.2	5.2	0.0000	0.1	495.2	278.8
50-year	1.870	54.2	0.9	5.6	5.6	0.0000	0.1	594.7	335.3
100-year	1.870	99.4	0.9	6.4	6.4	0.0000	0.2	858.7	532.8
10-year	1.920	40.4	0.9	4.6	4.6	0.0000	0.2	267.8	147.0
25-year	1.920	48.7	0.9	5.2	5.2	0.0000	0.2	371.0	222.8
50-year	1.920	54.2	0.9	5.6	5.6	0.0000	0.2	462.9	287.2
100-year	1.920	99.4	0.9	6.4	6.4	0.0000	0.2	679.3	510.8
10-year	1.970	40.4	1.0	4.6	4.6	0.0000	0.3	240.5	168.2
25-year	1.970	48.7	1.0	5.2	5.2	0.0000	0.2	359.8	232.7
50-year	1.970	54.2	1.0	5.6	5.6	0.0000	0.2	451.8	245.3
100-year	1.970	99.4	1.0	6.4	6.4	0.0000	0.3	655.4	406.7
10-year	2.020	40.4	1.1	4.6	4.6	0.0000	0.3	199.5	134.8
25-year	2.020	48.7	1.1	5.2	5.2	0.0000	0.2	293.7	203.2
50-year	2.020	54.2	1.1	5.6	5.6	0.0000	0.2	378.8	236.1
100-year	2.020	99.4	1.1	6.4	6.4	0.0000	0.3	592.3	370.2
10-year	2.070	40.4	1.1	4.6	4.6	0.0000	0.3	168.7	112.3
25-year	2.070	48.7	1.1	5.2	5.2	0.0000	0.3	264.5	229.1
50-year	2.070	54.2	1.1	5.6	5.6	0.0000	0.2	358.2	255.6
100-year	2.070	99.4	1.1	6.4	6.4	0.0000	0.3	575.8	329.9
10-year	2.120	40.4	1.1	4.6	4.6	0.0000	0.3	195.4	129.7
25-year	2.120	48.7	1.1	5.2	5.2	0.0000	0.2	278.3	161.5
50-year	2.120	54.2	1.1	5.6	5.6	0.0000	0.2	349.4	222.7
100-year	2.120	99.4	1.1	6.4	6.4	0.0000	0.3	551.8	303.7
10-year	2.170	40.4	1.1	4.6	4.6	0.0000	0.3	205.9	127.0
25-year	2.170	48.6	1.1	5.2	5.2	0.0000	0.3	289.6	156.6
50-year	2.170	54.2	1.1	5.6	5.6	0.0000	0.2	351.1	173.3
100-year	2.170	99.4	1.1	6.4	6.4	0.0000	0.3	541.9	340.5
10-year	2.220	40.4	1.2	4.6	4.6	0.0000	0.4	158.1	125.2
25-year	2.220	48.6	1.2	5.2	5.2	0.0000	0.3	250.4	202.9
50-year	2.220	54.2	1.2	5.6	5.6	0.0000	0.3	335.5	237.4
100-year	2.220	99.4	1.2	6.4	6.4	0.0000	0.3	546.6	345.7
10-year	2.270	40.4	1.2	4.6	4.6	0.0000	0.4	163.8	142.4
25-year	2.270	48.6	1.2	5.2	5.2	0.0000	0.3	273.6	216.5
50-year	2.270	54.2	1.2	5.6	5.6	0.0000	0.3	361.5	233.0
100-year	2.270	99.4	1.2	6.4	6.4	0.0000	0.3	579.0	338.9
10-year	2.320	40.4	1.4	4.6	4.6	0.0000	0.4	132.9	88.9
25-year	2.320	48.7	1.4	5.2	5.2	0.0000	0.4	206.2	171.9
50-year	2.320	54.2	1.4	5.6	5.6	0.0000	0.3	281.3	227.8
100-year	2.320	99.4	1.4	6.4	6.4	0.0000	0.4	510.9	381.8

10-year	2.370	40.4	1.7	4.6	4.6	0.0000	0.6	106.1	91.7
25-year	2.370	48.7	1.7	5.2	5.2	0.0000	0.5	192.7	202.0
50-year	2.370	54.2	1.7	5.6	5.6	0.0000	0.4	275.1	231.7
100-year	2.370	99.4	1.7	6.4	6.4	0.0000	0.5	488.1	335.4
10-year	2.420	40.4	1.8	4.6	4.6	0.0001	0.6	68.6	75.2
25-year	2.420	48.7	1.8	5.2	5.2	0.0000	0.5	138.1	183.8
50-year	2.420	54.2	1.8	5.6	5.6	0.0000	0.5	221.3	241.4
100-year	2.420	99.4	1.8	6.4	6.4	0.0000	0.5	441.1	361.1
10-year	2.470	40.4	1.8	4.6	4.6	0.0001	0.8	60.0	60.0
25-year	2.470	49.0	1.8	5.2	5.2	0.0001	0.7	113.8	145.7
50-year	2.470	54.2	1.8	5.6	5.6	0.0000	0.6	185.7	218.0
100-year	2.470	99.5	1.8	6.4	6.4	0.0000	0.6	378.8	378.7
10-year	2.520	40.4	1.8	4.6	4.6	0.0002	0.9	47.4	32.3
25-year	2.520	49.1	1.8	5.2	5.2	0.0001	0.8	81.1	107.5
50-year	2.520	54.2	1.8	5.6	5.6	0.0001	0.7	133.6	191.9
100-year	2.520	99.6	1.8	6.4	6.4	0.0000	0.6	326.4	301.6
10-year	2.570	27.9	2.0	4.6	4.6	0.0001	0.7	44.6	24.6
25-year	2.570	29.2	2.0	5.2	5.2	0.0001	0.5	61.4	41.8
50-year	2.570	29.8	2.0	5.6	5.6	0.0000	0.5	92.4	156.9
100-year	2.570	87.8	2.0	6.4	6.4	0.0001	0.7	287.2	294.2
10-year	2.620	27.9	1.4	4.6	4.6	0.0001	0.3	89.9	72.7
25-year	2.620	29.2	1.4	5.2	5.2	0.0000	0.2	137.3	94.9
50-year	2.620	29.8	1.4	5.6	5.6	0.0000	0.2	182.3	137.2
100-year	2.620	88.3	1.4	6.4	6.4	0.0000	0.3	337.7	249.5
	2.650	Culvert							
10-year	2.675	30.1	1.6	5.5	5.5	0.0000	0.2	127.1	80.4
25-year	2.675	44.7	1.6	6.8	6.8	0.0000	0.2	423.1	359.5
50-year	2.675	59.6	1.6	7.7	7.7	0.0000	0.2	874.1	738.0
100-year	2.675	141.8	1.6	8.0	8.0	0.0000	0.3	1126.7	884.3
10-year	2.725	27.4	1.0	5.5	5.5	0.0000	0.1	585.6	183.7
25-year	2.725	42.8	1.0	6.8	6.8	0.0000	0.1	889.2	304.3
50-year	2.725	56.4	1.0	7.7	7.7	0.0000	0.1	1252.5	516.2
100-year	2.725	136.9	1.0	8.0	8.0	0.0000	0.1	1425.7	582.6
10-year	2.775	27.4	1.6	5.5	5.5	0.0000	0.0	701.4	216.4
25-year	2.775	42.8	1.6	6.8	6.8	0.0000	0.0	1074.6	360.0
50-year	2.775	56.4	1.6	7.7	7.7	0.0000	0.1	1441.8	445.4
100-year	2.775	136.9	1.6	8.0	8.0	0.0000	0.1	1589.5	503.1
10-year	2.825	27.4	1.5	5.5	5.5	0.0000	0.1	597.6	219.0
25-year	2.825	42.8	1.5	6.8	6.8	0.0000	0.1	871.2	380.4
50-year	2.825	56.4	1.5	7.7	7.7	0.0000	0.1	1208.4	464.1
100-year	2.825	136.9	1.5	8.0	8.0	0.0000	0.1	1515.2	481.0
10-year	2.875	27.4	1.1	5.5	5.5	0.0000	0.1	588.2	233.0

25-year	2.875	42.8	1.1	6.8	6.8	0.0000	0.1	871.3	352.7
50-year	2.875	56.4	1.1	7.7	7.7	0.0000	0.1	1203.9	426.8
100-year	2.875	137.1	1.1	8.0	8.0	0.0000	0.1	1497.4	528.3
10-year	2.925	27.4	1.9	5.5	5.5	0.0000	0.1	451.8	240.8
25-year	2.925	42.8	1.9	6.8	6.8	0.0000	0.1	724.9	384.1
50-year	2.925	56.4	1.9	7.7	7.7	0.0000	0.1	1113.1	521.4
100-year	2.925	136.9	1.9	8.0	8.0	0.0000	0.1	1448.8	555.3
10-year	2.975	27.4	1.9	5.5	5.5	0.0000	0.5	50.6	49.0
25-year	2.975	42.8	1.9	6.8	6.8	0.0000	0.6	76.7	318.1
50-year	2.975	56.4	1.9	7.7	7.7	0.0000	0.3	473.5	490.7
100-year	2.975	137.1	1.9	8.0	8.0	0.0000	0.6	578.0	669.8
10-year	3.025	27.4	1.9	5.5	5.5	0.0000	0.6	50.1	37.1
25-year	3.025	42.8	1.9	6.8	6.8	0.0000	0.6	75.9	288.1
50-year	3.025	56.4	1.9	7.7	7.7	0.0000	0.3	434.6	471.2
100-year	3.025	137.1	1.9	8.0	8.0	0.0000	0.7	531.5	595.8
10-year	3.075	25.8	1.9	5.5	5.5	0.0000	0.5	52.0	37.6
25-year	3.075	41.7	1.9	6.8	6.8	0.0000	0.5	78.1	201.3
50-year	3.075	54.7	1.9	7.7	7.7	0.0000	0.4	414.6	553.5
100-year	3.075	134.3	1.9	8.0	8.0	0.0000	0.7	535.3	641.8
10-year	3.125	25.8	1.9	5.5	5.5	0.0000	0.5	48.6	27.5
25-year	3.125	41.7	1.9	6.8	6.8	0.0000	0.6	73.6	274.4
50-year	3.125	54.7	1.9	7.7	7.7	0.0000	0.3	670.5	630.0
100-year	3.125	134.7	1.9	8.0	8.0	0.0000	0.5	875.3	663.0
	3.150	Culvert							
10-year	3.175	25.9	2.0	5.6	5.6	0.0000	0.6	46.7	15.9
25-year	3.175	42.9	2.0	7.2	7.2	0.0000	0.6	100.4	549.4
50-year	3.175	93.4	2.0	7.8	7.8	0.0001	0.9	239.1	916.4
100-year	3.175	137.4	2.0	8.0	8.1	0.0000	0.6	869.8	1049.1
10-year	3.225	25.2	2.1	5.6	5.6	0.0000	0.6	43.9	14.7
25-year	3.225	42.3	2.1	7.2	7.2	0.0000	0.6	68.4	343.5
50-year	3.225	92.3	2.1	7.8	7.8	0.0001	1.2	85.0	606.4
100-year	3.225	137.1	2.1	8.1	8.1	0.0002	1.6	106.2	1053.4
10-year	3.275	23.9	2.2	5.6	5.6	0.0000	0.5	48.4	17.9
25-year	3.275	41.2	2.2	7.2	7.2	0.0000	0.5	79.0	778.2
50-year	3.275	100.7	2.2	7.8	7.8	0.0001	1.1	104.1	881.4
100-year	3.275	170.2	2.2	8.1	8.1	0.0002	1.7	130.9	1041.6
10-year	3.325	23.9	2.2	5.6	5.6	0.0000	0.5	47.8	18.0
25-year	3.325	41.2	2.2	7.2	7.2	0.0000	0.5	78.6	958.6
50-year	3.325	101.2	2.2	7.8	7.8	0.0001	1.1	92.2	1030.1
100-year	3.325	170.8	2.2	8.1	8.1	0.0002	1.7	98.3	1053.4
	3.350	Culvert							

10-year	3.385	25.0	2.3	8.6	8.6	0.0000	0.0	1411.5	1103.5
25-year	3.385	43.9	2.3	8.9	8.9	0.0000	0.1	1755.8	1150.6
50-year	3.385	104.8	2.3	9.0	9.0	0.0000	0.1	1803.8	1157.1
100-year	3.385	206.3	2.3	9.0	9.0	0.0000	0.2	2195.2	1160.3
10-year	3.435	25.0	2.5	8.6	8.6	0.0000	0.0	1778.9	1103.3
25-year	3.435	43.9	2.5	8.9	8.9	0.0000	0.1	2199.9	1129.7
50-year	3.435	104.7	2.5	9.0	9.0	0.0000	0.1	2258.9	1133.4
100-year	3.435	206.3	2.5	9.0	9.0	0.0000	0.2	2291.3	1135.2
10-year	3.485	25.0	2.7	8.6	8.6	0.0000	0.0	1459.8	981.1
25-year	3.485	43.9	2.7	8.9	8.9	0.0000	0.1	1835.1	1009.4
50-year	3.485	104.8	2.7	9.0	9.0	0.0000	0.1	1887.8	1013.3
100-year	3.485	206.3	2.7	9.0	9.0	0.0000	0.2	1916.9	1015.1
10-year	3.560	25.0	2.9	8.6	8.6	0.0000	0.0	1378.0	929.1
25-year	3.560	43.8	2.9	8.9	8.9	0.0000	0.1	1733.6	957.4
50-year	3.560	104.9	2.9	9.0	9.0	0.0000	0.1	1783.7	961.3
100-year	3.560	206.3	2.9	9.0	9.0	0.0000	0.3	1811.7	963.2
10-year	3.635	25.0	3.1	8.6	8.6	0.0000	0.0	1293.0	874.3
25-year	3.635	43.9	3.1	8.9	8.9	0.0000	0.1	1629.0	908.2
50-year	3.635	105.0	3.1	9.0	9.0	0.0000	0.1	1676.6	912.9
100-year	3.635	206.7	3.1	9.0	9.0	0.0000	0.3	1703.6	915.3
10-year	3.710	25.1	3.3	8.6	8.6	0.0000	0.1	1206.2	814.3
25-year	3.710	43.8	3.3	8.9	8.9	0.0000	0.1	1519.6	848.2
50-year	3.710	105.3	3.3	9.0	9.0	0.0000	0.2	1564.2	853.0
100-year	3.710	206.7	3.3	9.0	9.0	0.0000	0.3	1589.8	855.5
10-year	3.785	25.0	3.5	8.6	8.6	0.0000	0.1	1128.8	736.2
25-year	3.785	43.8	3.5	8.9	8.9	0.0000	0.1	1415.7	785.2
50-year	3.785	105.5	3.5	9.0	9.0	0.0000	0.2	1457.1	792.1
100-year	3.785	206.9	3.5	9.0	9.0	0.0000	0.3	1481.4	795.8
10-year	3.850	25.0	3.7	8.6	8.6	0.0000	0.1	629.5	667.5
25-year	3.850	43.9	3.7	8.9	8.9	0.0000	0.1	888.6	707.1
50-year	3.850	105.9	3.7	9.0	9.0	0.0000	0.2	926.1	712.7
100-year	3.850	207.6	3.7	9.0	9.0	0.0000	0.3	949.2	795.4
10-year	3.925	25.1	3.7	8.6	8.6	0.0000	0.1	452.6	608.9
25-year	3.925	44.0	3.7	8.9	8.9	0.0000	0.1	708.0	745.8
50-year	3.925	106.5	3.7	9.0	9.0	0.0000	0.3	748.5	765.3
100-year	3.925	208.9	3.7	9.0	9.0	0.0001	0.6	774.8	775.0
10-year	4.000	25.1	3.7	8.6	8.6	0.0000	0.1	381.5	582.4
25-year	4.000	44.3	3.7	8.9	8.9	0.0000	0.2	625.4	710.6
50-year	4.000	108.2	3.7	9.0	9.0	0.0000	0.3	665.2	729.5
100-year	4.000	211.2	3.7	9.0	9.0	0.0001	0.6	694.2	738.7
10-year	4.075	25.2	3.6	8.6	8.6	0.0000	0.2	128.7	81.6
25-year	4.075	44.8	3.6	8.9	8.9	0.0000	0.3	163.5	105.0
50-year	4.075	112.3	3.6	9.0	9.0	0.0002	0.8	169.8	109.3

100-year	4.075	218.3	3.6	9.0		9.1	0.0008	1.6	197.2	714.0
10-year	4.150	25.3	3.6	8.6		8.6	0.0000	0.2	111.0	53.8
25-year	4.150	47.1	3.6	8.9		8.9	0.0001	0.4	152.1	159.5
50-year	4.150	136.2	3.6	9.0		9.0	0.0005	1.1	168.0	779.5
100-year	4.150	227.3	3.6	9.1		9.1	0.0011	1.6	240.6	784.8
10-year	4.225	25.5	3.6	8.6		8.6	0.0000	0.2	106.3	33.9
25-year	4.225	51.1	3.6	8.9		8.9	0.0001	0.4	119.8	36.8
50-year	4.225	147.5	3.6	9.0		9.1	0.0006	1.2	151.5	720.8
100-year	4.225	241.9	3.6	9.2		9.2	0.0012	1.7	254.7	749.8
10-year	4.300	25.7	3.7	8.6		8.6	0.0000	0.3	95.7	30.5
25-year	4.300	61.3	3.7	8.9		9.0	0.0001	0.6	108.0	33.1
50-year	4.300	154.6	3.7	9.1		9.1	0.0008	1.3	153.5	521.2
100-year	4.300	249.2	3.7	9.3		9.3	0.0014	1.8	256.1	621.1
10-year	4.375	25.9	3.8	8.6		8.6	0.0000	0.3	89.9	28.0
25-year	4.375	68.3	3.8	9.0		9.0	0.0002	0.7	101.5	30.5
50-year	4.375	159.7	3.8	9.1		9.2	0.0008	1.4	189.7	621.1
100-year	4.375	263.1	3.8	9.4		9.4	0.0012	1.7	331.7	660.7
10-year	4.450	26.3	3.8	8.6		8.6	0.0001	0.4	74.1	25.5
25-year	4.450	204.3	3.8	9.0	6.3	9.1	0.0027	2.4	86.5	668.1
50-year	4.450	239.0	3.8	9.3		9.3	0.0019	2.0	257.0	697.2
100-year	4.450	286.0	3.8	9.5		9.5	0.0013	1.7	407.0	721.9
10-year	4.525	159.4	3.9	8.7		8.8	0.0023	2.2	73.4	23.8
25-year	4.525	208.3	3.9	9.2		9.2	0.0020	2.1	209.6	758.3
50-year	4.525	253.2	3.9	9.4		9.4	0.0014	1.7	363.7	773.5
100-year	4.525	293.1	3.9	9.6		9.6	0.0010	1.5	500.3	786.8
10-year	4.600	160.8	4.0	8.9		8.9	0.0020	2.1	77.4	22.1
25-year	4.600	211.4	4.0	9.3		9.3	0.0013	1.7	300.3	764.5
50-year	4.600	258.4	4.0	9.5		9.5	0.0010	1.5	429.7	777.0
100-year	4.600	296.1	4.0	9.6		9.6	0.0008	1.4	548.3	788.3
	4.650	Culvert								
10-year	4.700	164.0	3.5	9.4		9.4	0.0003	0.9	414.9	951.7
25-year	4.700	196.5	3.5	9.4		9.4	0.0004	1.0	449.2	952.8
50-year	4.700	259.2	3.5	9.5		9.5	0.0005	1.1	527.8	955.1
100-year	4.700	298.0	3.5	9.6		9.6	0.0004	0.9	669.7	959.3
10-year	4.800	164.2	3.6	9.4		9.4	0.0004	1.0	386.0	911.7
25-year	4.800	224.9	3.6	9.5		9.5	0.0006	1.2	434.5	913.5
50-year	4.800	263.7	3.6	9.5		9.6	0.0006	1.2	510.9	916.2
100-year	4.800	303.3	3.6	9.7		9.7	0.0004	1.1	634.5	927.2

Proposed Conditions - Mean Tide Level (Falling)

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-33.3	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
25-year	0.000	-27.2	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
50-year	0.000	-21.5	-2.6	3.4	-2.3	3.4	0.0000	0.0	1359.2	450.7
100-year	0.000	-13.4	-2.6	3.4	-2.3	3.4	0.0000	0.0	1359.2	450.7
10-year	0.150	-17.9	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
25-year	0.150	-8.4	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
50-year	0.150	-6.1	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
100-year	0.150	1.9	-2.7	3.4		3.4	0.0000	0.0	2183.7	701.5
10-year	0.300	-17.7	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
25-year	0.300	-8.2	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
50-year	0.300	-5.8	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
100-year	0.300	3.9	-2.7	3.4		3.4	0.0000	0.0	2171.8	638.2
10-year	0.400	-16.0	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
25-year	0.400	-10.1	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
50-year	0.400	-4.1	-2.8	3.4		3.4	0.0000	0.0	1934.4	613.0
100-year	0.400	4.0	-2.8	3.4		3.4	0.0000	0.0	1934.5	613.0
10-year	0.500	-14.7	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
25-year	0.500	-8.7	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
50-year	0.500	-2.7	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
100-year	0.500	5.5	-2.8	3.4		3.4	0.0000	0.0	1312.3	376.3
10-year	0.650	-12.3	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
25-year	0.650	-6.3	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
50-year	0.650	-0.3	-2.7	3.4		3.4	0.0000	0.0	1323.8	396.9
100-year	0.650	7.9	-2.7	3.4		3.4	0.0000	0.0	1323.9	396.9
10-year	0.750	-11.1	-2.6	3.4		3.4	0.0000	0.0	1122.1	389.6
25-year	0.750	-3.8	-2.6	3.4		3.4	0.0000	0.0	1122.2	389.6
50-year	0.750	1.0	-2.6	3.4		3.4	0.0000	0.0	1122.2	389.6
100-year	0.750	10.5	-2.6	3.4		3.4	0.0000	0.0	1122.2	389.6
10-year	1.000	-7.3	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
25-year	1.000	-1.1	-2.5	3.4		3.4	0.0000	0.0	1314.4	428.5
50-year	1.000	4.9	-2.5	3.4		3.4	0.0000	0.0	1314.5	428.5
100-year	1.000	13.3	-2.5	3.4		3.4	0.0000	0.0	1314.5	428.5
10-year	1.075	0.0	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
25-year	1.075	0.2	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
50-year	1.075	6.3	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
100-year	1.075	14.7	-2.5	3.4		3.4	0.0000	0.0	1139.9	474.1
10-year	1.150	1.0	-2.5	3.4		3.4	0.0000	0.0	965.9	467.7

25-year	1.150	1.2	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
50-year	1.150	7.3	-2.5	3.4	3.4	0.0000	0.0	965.9	467.7
100-year	1.150	15.8	-2.5	3.4	3.4	0.0000	0.0	966.0	467.8
10-year	1.200	1.1	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
25-year	1.200	1.3	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
50-year	1.200	7.4	-2.5	3.4	3.4	0.0000	0.0	1049.0	468.5
100-year	1.200	15.9	-2.5	3.4	3.4	0.0000	0.0	1049.1	468.5
10-year	1.300	1.8	-2.5	3.4	3.4	0.0000	0.0	840.6	465.8
25-year	1.300	1.5	-2.5	3.4	3.4	0.0000	0.0	840.7	465.8
50-year	1.300	7.6	-2.5	3.4	3.4	0.0000	0.0	840.7	465.8
100-year	1.300	16.7	-2.5	3.4	3.4	0.0000	0.0	840.7	465.8
10-year	1.450	2.2	-2.5	3.4	3.4	0.0000	0.0	198.2	459.9
25-year	1.450	2.3	-2.5	3.4	3.4	0.0000	0.0	198.2	459.9
50-year	1.450	8.5	-2.5	3.4	3.4	0.0000	0.0	198.2	459.9
100-year	1.450	17.1	-2.5	3.4	3.4	0.0000	0.1	198.2	459.9
	1.485	Culvert							
10-year	1.520	11.6	-1.0	3.4	3.4	0.0000	0.1	96.7	438.6
25-year	1.520	254.2	-1.0	3.8	3.9	0.0002	2.4	106.5	448.2
50-year	1.520	291.0	-1.0	4.2	4.3	0.0002	2.5	116.7	465.1
100-year	1.520	330.8	-1.0	4.7	4.8	0.0002	2.6	127.7	515.5
10-year	1.570	10.4	0.7	3.4	3.4	0.0000	0.1	219.7	413.8
25-year	1.570	239.8	0.7	3.9	3.9	0.0001	0.9	266.7	456.6
50-year	1.570	269.2	0.7	4.4	4.4	0.0000	0.9	306.2	465.3
100-year	1.570	301.6	0.7	4.8	4.9	0.0000	0.9	348.3	497.6
10-year	1.620	9.7	0.7	3.4	3.4	0.0000	0.0	385.2	349.3
25-year	1.620	228.0	0.7	4.0	4.0	0.0000	0.5	481.6	408.9
50-year	1.620	251.1	0.7	4.4	4.4	0.0000	0.5	560.4	438.2
100-year	1.620	277.7	0.7	4.9	4.9	0.0000	0.4	644.7	465.8
10-year	1.670	9.6	0.7	3.4	3.4	0.0000	0.0	468.0	271.6
25-year	1.670	228.0	0.7	4.0	4.0	0.0000	0.4	593.4	345.5
50-year	1.670	251.2	0.7	4.4	4.4	0.0000	0.4	696.1	363.4
100-year	1.670	277.7	0.7	4.9	4.9	0.0000	0.4	806.9	443.7
10-year	1.720	8.4	0.7	3.4	3.4	0.0000	0.0	363.1	224.7
25-year	1.720	201.7	0.7	4.0	4.0	0.0000	0.5	492.7	266.5
50-year	1.720	217.4	0.7	4.4	4.4	0.0000	0.4	609.2	285.3
100-year	1.720	235.0	0.7	4.9	4.9	0.0000	0.4	736.1	298.2
10-year	1.770	8.3	0.8	3.4	3.4	0.0000	0.0	260.5	196.1
25-year	1.770	201.7	0.8	4.0	4.0	0.0000	0.6	374.1	224.7
50-year	1.770	217.4	0.8	4.4	4.4	0.0000	0.6	477.1	245.1
100-year	1.770	235.0	0.8	4.9	4.9	0.0000	0.5	594.0	254.3
10-year	1.820	8.3	0.8	3.4	3.4	0.0000	0.1	177.5	134.7
25-year	1.820	201.8	0.8	4.0	4.0	0.0002	0.9	252.6	144.8

50-year	1.820	217.4	0.8	4.4	4.4	0.0001	0.8	323.6	183.0
100-year	1.820	235.1	0.8	4.9	4.9	0.0001	0.7	425.2	245.9
10-year	1.870	4.5	0.9	3.4	3.4	0.0000	0.0	173.4	135.2
25-year	1.870	201.8	0.9	4.0	4.0	0.0001	1.0	253.0	157.4
50-year	1.870	217.4	0.9	4.4	4.4	0.0001	0.9	325.2	178.2
100-year	1.870	235.2	0.9	4.9	4.9	0.0000	0.7	423.4	253.3
10-year	1.920	4.6	0.9	3.4	3.4	0.0000	0.0	128.0	97.1
25-year	1.920	201.8	0.9	4.0	4.0	0.0002	1.2	187.8	121.5
50-year	1.920	217.4	0.9	4.4	4.4	0.0001	1.1	243.7	139.7
100-year	1.920	235.2	0.9	4.9	4.9	0.0001	0.9	312.6	179.9
10-year	1.970	4.7	1.0	3.4	3.4	0.0000	0.1	91.1	97.0
25-year	1.970	201.8	1.0	4.0	4.0	0.0005	2.1	153.1	126.5
50-year	1.970	217.4	1.0	4.4	4.4	0.0003	1.6	213.3	153.9
100-year	1.970	235.2	1.0	4.9	4.9	0.0001	1.3	294.1	194.7
10-year	2.020	170.1	1.1	3.4	3.5	0.0011	2.3	80.8	72.4
25-year	2.020	201.8	1.1	4.0	4.0	0.0005	1.9	131.8	106.1
50-year	2.020	217.4	1.1	4.4	4.4	0.0003	1.6	179.4	122.8
100-year	2.020	235.2	1.1	4.9	4.9	0.0002	1.4	241.6	161.1
10-year	2.070	170.3	1.1	3.5	3.6	0.0024	2.8	66.8	80.4
25-year	2.070	201.8	1.1	4.0	4.1	0.0009	2.2	111.8	94.0
50-year	2.070	217.4	1.1	4.4	4.5	0.0005	1.8	152.9	106.3
100-year	2.070	235.2	1.1	4.9	4.9	0.0003	1.5	207.1	169.2
10-year	2.120	171.0	1.1	3.6	3.7	0.0009	2.2	87.7	88.9
25-year	2.120	201.8	1.1	4.1	4.1	0.0005	1.9	133.9	111.9
50-year	2.120	217.4	1.1	4.4	4.5	0.0003	1.6	180.0	124.6
100-year	2.120	235.2	1.1	4.9	4.9	0.0002	1.3	238.0	142.7
10-year	2.170	171.1	1.1	3.7	3.7	0.0009	2.3	98.8	104.2
25-year	2.170	201.8	1.1	4.1	4.1	0.0005	2.0	145.9	118.9
50-year	2.170	217.3	1.1	4.5	4.5	0.0003	1.6	192.4	124.9
100-year	2.170	235.2	1.1	4.9	4.9	0.0002	1.4	249.2	149.1
10-year	2.220	171.1	1.2	3.7	3.8	0.0019	2.8	68.7	80.0
25-year	2.220	201.8	1.2	4.1	4.2	0.0010	2.4	105.5	99.4
50-year	2.220	217.3	1.2	4.5	4.5	0.0005	2.0	146.0	119.3
100-year	2.220	235.3	1.2	4.9	4.9	0.0003	1.7	204.1	156.6
10-year	2.270	171.6	1.2	3.8	3.9	0.0012	2.5	74.3	75.5
25-year	2.270	201.8	1.2	4.1	4.2	0.0008	2.3	109.0	111.1
50-year	2.270	217.3	1.2	4.5	4.5	0.0005	2.0	153.4	136.4
100-year	2.270	235.3	1.2	4.9	4.9	0.0003	1.6	221.3	195.5
10-year	2.320	172.6	1.4	3.8	3.9	0.0010	2.5	79.1	56.2
25-year	2.320	201.9	1.4	4.2	4.3	0.0008	2.4	102.2	72.5
50-year	2.320	217.3	1.4	4.5	4.6	0.0005	2.2	127.6	84.9
100-year	2.320	235.3	1.4	4.9	5.0	0.0003	1.9	170.4	135.8

10-year	2.370	172.7	1.7	3.8	4.1	0.0027	3.9	56.0	55.4
25-year	2.370	201.9	1.7	4.2	4.4	0.0018	3.6	77.5	67.3
50-year	2.370	217.3	1.7	4.5	4.6	0.0011	3.1	101.6	85.7
100-year	2.370	235.3	1.7	4.9	5.0	0.0006	2.5	152.2	151.4
10-year	2.420	173.4	1.8	4.0	4.2	0.0037	3.9	44.1	30.7
25-year	2.420	202.1	1.8	4.3	4.5	0.0030	3.8	53.7	40.0
50-year	2.420	217.3	1.8	4.6	4.7	0.0020	3.5	67.5	70.9
100-year	2.420	235.3	1.8	4.9	5.1	0.0011	2.9	107.1	122.9
10-year	2.470	173.8	1.8	4.2	4.5	0.0055	4.6	44.2	33.9
25-year	2.470	202.6	1.8	4.4	4.7	0.0048	4.6	52.6	38.0
50-year	2.470	219.8	1.8	4.7	4.9	0.0036	4.2	66.8	75.8
100-year	2.470	236.3	1.8	5.0	5.2	0.0023	3.7	95.9	102.2
10-year	2.520	174.0	1.8	4.4	4.7	0.0051	4.2	43.6	28.6
25-year	2.520	203.3	1.8	4.6	4.9	0.0051	4.5	48.7	36.8
50-year	2.520	222.8	1.8	4.8	5.1	0.0046	4.5	56.4	53.7
100-year	2.520	238.9	1.8	5.1	5.3	0.0033	4.1	75.1	90.5
10-year	2.570	141.9	2.0	4.8	5.0	0.0021	3.1	50.2	26.0
25-year	2.570	146.6	2.0	5.1	5.2	0.0016	2.9	56.9	35.5
50-year	2.570	156.9	2.0	5.2	5.3	0.0015	2.9	63.0	50.7
100-year	2.570	173.9	2.0	5.4	5.5	0.0014	2.9	75.2	93.8
10-year	2.620	147.5	1.4	5.0	5.0	0.0007	1.2	119.3	84.0
25-year	2.620	155.5	1.4	5.2	5.2	0.0005	1.1	137.4	95.0
50-year	2.620	162.4	1.4	5.3	5.4	0.0004	1.1	153.2	113.6
100-year	2.620	175.9	1.4	5.5	5.5	0.0004	1.1	175.7	132.1
	2.650	Culvert							
10-year	2.675	155.1	1.6	5.7	5.7	0.0002	1.1	145.6	125.7
25-year	2.675	175.9	1.6	5.9	6.0	0.0001	1.1	188.8	170.1
50-year	2.675	189.2	1.6	6.1	6.1	0.0001	1.1	220.6	217.2
100-year	2.675	201.1	1.6	6.3	6.3	0.0001	1.1	259.3	245.3
10-year	2.725	151.0	1.0	5.7	5.7	0.0000	0.3	622.5	192.5
25-year	2.725	170.8	1.0	6.0	6.0	0.0000	0.3	679.9	213.9
50-year	2.725	184.2	1.0	6.1	6.1	0.0000	0.3	715.7	222.8
100-year	2.725	195.6	1.0	6.3	6.3	0.0000	0.3	753.8	238.1
10-year	2.775	151.0	1.6	5.7	5.7	0.0000	0.2	744.7	224.8
25-year	2.775	170.8	1.6	6.0	6.0	0.0000	0.2	811.5	246.9
50-year	2.775	184.2	1.6	6.1	6.1	0.0000	0.2	855.0	272.8
100-year	2.775	195.6	1.6	6.3	6.3	0.0000	0.2	901.9	302.8
10-year	2.825	151.0	1.5	5.7	5.7	0.0000	0.2	637.3	228.1
25-year	2.825	170.8	1.5	6.0	6.0	0.0000	0.3	695.7	253.6
50-year	2.825	184.2	1.5	6.1	6.1	0.0000	0.3	729.8	279.5
100-year	2.825	195.6	1.5	6.3	6.3	0.0000	0.3	764.3	303.7
10-year	2.875	151.0	1.1	5.7	5.7	0.0000	0.2	630.1	242.8

25-year	2.875	170.8	1.1	6.0	6.0	0.0000	0.3	690.7	266.6
50-year	2.875	184.2	1.1	6.1	6.1	0.0000	0.3	725.8	293.3
100-year	2.875	195.6	1.1	6.3	6.3	0.0000	0.3	761.4	312.2
10-year	2.925	151.0	1.9	5.7	5.7	0.0000	0.3	492.3	253.2
25-year	2.925	170.8	1.9	6.0	6.0	0.0000	0.3	550.9	267.6
50-year	2.925	184.2	1.9	6.1	6.1	0.0000	0.3	584.8	292.3
100-year	2.925	195.6	1.9	6.3	6.3	0.0000	0.3	619.1	307.9
10-year	2.975	151.0	1.9	5.7	5.8	0.0009	2.8	54.5	64.0
25-year	2.975	170.8	1.9	6.0	6.1	0.0009	2.9	59.9	92.9
50-year	2.975	184.2	1.9	6.1	6.3	0.0009	2.9	63.2	149.8
100-year	2.975	195.6	1.9	6.3	6.4	0.0009	2.9	66.5	185.9
10-year	3.025	151.0	1.9	5.7	5.9	0.0009	2.8	54.9	45.9
25-year	3.025	170.8	1.9	6.0	6.1	0.0009	2.8	60.2	55.5
50-year	3.025	184.2	1.9	6.2	6.3	0.0009	2.9	63.4	73.8
100-year	3.025	195.6	1.9	6.4	6.5	0.0009	2.9	66.7	106.7
10-year	3.075	148.4	1.9	5.8	5.9	0.0007	2.6	58.0	48.0
25-year	3.075	167.5	1.9	6.1	6.2	0.0007	2.6	63.5	62.6
50-year	3.075	181.4	1.9	6.3	6.4	0.0007	2.7	66.8	83.5
100-year	3.075	192.4	1.9	6.4	6.5	0.0007	2.8	70.1	95.6
10-year	3.125	148.4	1.9	5.8	6.0	0.0008	2.7	54.9	53.7
25-year	3.125	167.6	1.9	6.1	6.2	0.0008	2.8	60.2	119.7
50-year	3.125	181.6	1.9	6.3	6.4	0.0009	2.9	63.4	176.5
100-year	3.125	192.4	1.9	6.4	6.6	0.0008	2.9	66.5	194.4
	3.150	Culvert							
10-year	3.175	148.5	2.0	6.3	6.4	0.0007	2.6	57.4	16.9
25-year	3.175	167.6	2.0	6.6	6.7	0.0007	2.6	63.7	17.5
50-year	3.175	181.7	2.0	6.9	7.0	0.0007	2.7	68.1	17.9
100-year	3.175	192.4	2.0	7.1	7.2	0.0006	2.6	96.2	535.4
10-year	3.225	147.5	2.1	6.3	6.4	0.0008	2.7	54.3	15.7
25-year	3.225	166.4	2.1	6.7	6.8	0.0008	2.8	60.1	16.2
50-year	3.225	180.4	2.1	6.9	7.0	0.0008	2.8	64.3	16.5
100-year	3.225	191.0	2.1	7.2	7.3	0.0007	2.8	69.0	359.3
10-year	3.275	145.4	2.2	6.4	6.5	0.0006	2.3	62.6	19.6
25-year	3.275	163.9	2.2	6.8	6.8	0.0005	2.3	70.0	20.4
50-year	3.275	177.7	2.2	7.0	7.1	0.0005	2.4	75.3	761.8
100-year	3.275	187.9	2.2	7.3	7.4	0.0005	2.3	81.6	789.3
10-year	3.325	145.4	2.2	6.4	6.5	0.0006	2.3	62.8	19.8
25-year	3.325	163.9	2.2	6.8	6.9	0.0006	2.3	70.2	20.7
50-year	3.325	177.1	2.2	7.0	7.1	0.0005	2.3	76.1	842.9
100-year	3.325	187.7	2.2	7.3	7.4	0.0004	2.2	118.3	992.9
	3.350	Culvert							

10-year	3.385	145.4	2.3	6.9	6.9	0.0002	1.5	96.3	86.3
25-year	3.385	164.0	2.3	7.4	7.4	0.0001	1.2	394.5	937.4
50-year	3.385	179.0	2.3	7.8	7.8	0.0000	0.8	706.3	983.1
100-year	3.385	189.8	2.3	8.1	8.1	0.0000	0.6	1030.5	1050.3
10-year	3.435	145.4	2.4	6.9	6.9	0.0002	1.4	159.6	137.0
25-year	3.435	164.0	2.4	7.4	7.4	0.0001	1.0	541.9	1002.5
50-year	3.435	179.3	2.4	7.8	7.8	0.0000	0.7	922.6	1039.8
100-year	3.435	189.9	2.4	8.1	8.1	0.0000	0.5	1319.7	1073.6
10-year	3.485	145.4	2.4	6.9	7.0	0.0002	1.5	97.9	34.3
25-year	3.485	164.0	2.4	7.4	7.4	0.0001	1.1	405.5	825.8
50-year	3.485	179.4	2.4	7.8	7.8	0.0000	0.8	719.0	861.1
100-year	3.485	189.9	2.4	8.1	8.1	0.0000	0.6	1055.2	949.3
10-year	3.560	145.2	2.5	6.9	7.0	0.0003	1.6	95.2	64.4
25-year	3.560	164.1	2.5	7.4	7.4	0.0001	1.2	394.3	778.3
50-year	3.560	180.4	2.5	7.8	7.8	0.0001	0.9	685.0	804.4
100-year	3.560	190.0	2.5	8.1	8.1	0.0000	0.6	998.6	897.4
10-year	3.635	145.1	2.5	7.0	7.0	0.0003	1.7	91.1	93.7
25-year	3.635	164.2	2.5	7.4	7.4	0.0001	1.2	379.1	732.5
50-year	3.635	181.8	2.5	7.8	7.8	0.0001	0.9	649.2	757.9
100-year	3.635	190.1	2.5	8.1	8.1	0.0000	0.7	942.1	836.5
10-year	3.710	145.7	2.6	7.0	7.0	0.0003	1.8	98.9	142.7
25-year	3.710	164.9	2.6	7.4	7.4	0.0001	1.3	367.6	672.2
50-year	3.710	183.3	2.6	7.8	7.8	0.0001	1.0	612.8	700.8
100-year	3.710	190.4	2.6	8.1	8.1	0.0000	0.7	883.1	776.6
10-year	3.785	147.4	2.7	7.0	7.0	0.0003	1.8	165.6	500.3
25-year	3.785	166.4	2.7	7.4	7.4	0.0001	1.3	393.8	574.1
50-year	3.785	184.9	2.7	7.8	7.8	0.0001	1.0	604.9	628.5
100-year	3.785	190.6	2.7	8.1	8.1	0.0000	0.7	845.8	682.1
10-year	3.850	148.7	2.7	7.0	7.1	0.0004	2.0	96.4	123.6
25-year	3.850	166.4	2.7	7.4	7.5	0.0003	1.8	158.9	185.5
50-year	3.850	185.7	2.7	7.8	7.8	0.0002	1.6	233.0	238.9
100-year	3.850	190.9	2.7	8.1	8.2	0.0001	1.4	374.9	623.8
10-year	3.925	150.7	2.8	7.0	7.1	0.0003	1.9	81.4	25.2
25-year	3.925	168.8	2.8	7.4	7.5	0.0003	1.8	107.3	111.6
50-year	3.925	187.7	2.8	7.8	7.8	0.0002	1.8	151.1	146.3
100-year	3.925	191.2	2.8	8.1	8.2	0.0002	1.6	245.4	458.1
10-year	4.000	151.7	2.9	7.1	7.1	0.0003	1.8	86.0	27.3
25-year	4.000	174.4	2.9	7.5	7.5	0.0003	1.8	96.6	28.9
50-year	4.000	188.9	2.9	7.8	7.8	0.0003	1.8	107.2	49.6
100-year	4.000	192.5	2.9	8.1	8.2	0.0002	1.6	188.3	444.7
10-year	4.075	156.3	2.9	7.1	7.2	0.0003	1.8	86.8	28.5
25-year	4.075	205.5	2.9	7.5	7.6	0.0004	2.1	98.0	30.3
50-year	4.075	193.6	2.9	7.8	7.9	0.0003	1.8	108.0	31.5

100-year	4.075	194.6	2.9	8.2	8.2	0.0002	1.6	119.4	32.9
10-year	4.150	158.0	3.0	7.1	7.2	0.0005	2.1	77.0	25.3
25-year	4.150	206.3	3.0	7.5	7.6	0.0006	2.4	87.2	28.3
50-year	4.150	212.1	3.0	7.8	7.9	0.0005	2.2	96.7	30.7
100-year	4.150	198.5	3.0	8.2	8.2	0.0003	1.8	107.8	33.1
10-year	4.225	158.7	3.1	7.1	7.2	0.0005	2.1	74.5	24.2
25-year	4.225	207.0	3.1	7.5	7.6	0.0006	2.5	84.4	26.4
50-year	4.225	212.9	3.1	7.9	7.9	0.0005	2.3	93.0	28.6
100-year	4.225	203.0	3.1	8.2	8.2	0.0004	2.0	103.0	31.1
10-year	4.300	159.0	3.1	7.2	7.3	0.0006	2.3	68.9	22.7
25-year	4.300	209.7	3.1	7.6	7.7	0.0007	2.7	78.2	24.5
50-year	4.300	214.2	3.1	7.9	8.0	0.0006	2.5	86.0	26.2
100-year	4.300	209.9	3.1	8.2	8.3	0.0005	2.2	94.9	28.2
10-year	4.375	160.4	3.2	7.2	7.3	0.0006	2.4	66.6	21.3
25-year	4.375	210.2	3.2	7.6	7.7	0.0008	2.8	75.6	23.0
50-year	4.375	215.7	3.2	7.9	8.0	0.0007	2.6	82.6	24.3
100-year	4.375	217.0	3.2	8.2	8.3	0.0005	2.4	90.6	25.9
10-year	4.450	160.5	3.3	7.2	7.4	0.0015	3.3	48.8	19.7
25-year	4.450	210.4	3.3	7.6	7.8	0.0017	3.7	57.1	21.2
50-year	4.450	215.9	3.3	7.9	8.1	0.0013	3.4	63.5	22.4
100-year	4.450	217.6	3.3	8.2	8.4	0.0010	3.1	70.8	23.7
10-year	4.525	161.4	3.3	7.3	7.5	0.0013	3.2	51.1	18.5
25-year	4.525	210.8	3.3	7.8	8.0	0.0015	3.6	59.2	19.9
50-year	4.525	224.5	3.3	8.0	8.2	0.0013	3.5	64.6	20.9
100-year	4.525	235.7	3.3	8.3	8.5	0.0011	3.3	70.9	21.9
10-year	4.600	161.6	3.4	7.4	7.6	0.0009	2.8	57.7	17.5
25-year	4.600	214.9	3.4	7.9	8.1	0.0011	3.3	65.7	18.7
50-year	4.600	235.4	3.4	8.1	8.3	0.0011	3.3	70.6	19.4
100-year	4.600	278.9	3.4	8.4	8.6	0.0013	3.7	76.5	20.3
	4.650	Culvert							
10-year	4.700	165.2	3.5	8.0	8.1	0.0006	2.3	72.7	26.3
25-year	4.700	218.4	3.5	8.9	9.0	0.0005	2.2	99.6	33.0
50-year	4.700	244.4	3.5	9.5	9.5	0.0004	2.1	118.3	954.3
100-year	4.700	290.3	3.5	10.1	10.1	0.0001	0.8	1100.9	974.6
10-year	4.800	165.2	3.6	8.1	8.2	0.0008	2.6	64.4	23.2
25-year	4.800	218.1	3.6	9.0	9.1	0.0006	2.5	93.2	60.8
50-year	4.800	244.4	3.6	9.5	9.5	0.0002	1.6	488.8	915.4
100-year	4.800	290.5	3.6	10.1	10.1	0.0001	1.0	1031.4	992.9

Existing Conditions - Mean High Water

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-33.4	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
25-year	0.000	-33.4	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
50-year	0.000	-41.5	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-41.5	-2.6	3.4	-2.1	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	-12.8	-2.7	3.4		3.4	0.0000	0.0	2183.9	701.5
25-year	0.150	-12.8	-2.7	3.4		3.4	0.0000	0.0	2183.9	701.5
50-year	0.150	-21.4	-2.7	3.4		3.4	0.0000	0.0	2183.8	701.5
100-year	0.150	-21.4	-2.7	3.4		3.4	0.0000	0.0	2183.8	701.5
10-year	0.300	-12.7	-2.7	3.4		3.4	0.0000	0.0	2172.0	638.2
25-year	0.300	-12.7	-2.7	3.4		3.4	0.0000	0.0	2172.0	638.2
50-year	0.300	-21.4	-2.7	3.4		3.4	0.0000	0.0	2172.0	638.2
100-year	0.300	-21.4	-2.7	3.4		3.4	0.0000	0.0	2172.0	638.2
10-year	0.400	-12.4	-2.8	3.4		3.4	0.0000	0.0	1934.7	613.0
25-year	0.400	-12.4	-2.8	3.4		3.4	0.0000	0.0	1934.7	613.0
50-year	0.400	-19.4	-2.8	3.4		3.4	0.0000	0.0	1934.7	613.0
100-year	0.400	-19.4	-2.8	3.4		3.4	0.0000	0.0	1934.7	613.0
10-year	0.500	-9.1	-2.8	3.4		3.4	0.0000	0.0	1312.5	376.4
25-year	0.500	-9.1	-2.8	3.4		3.4	0.0000	0.0	1312.5	376.4
50-year	0.500	-17.8	-2.8	3.4		3.4	0.0000	0.0	1312.5	376.4
100-year	0.500	-17.8	-2.8	3.4		3.4	0.0000	0.0	1312.5	376.4
10-year	0.650	-7.5	-2.7	3.4		3.4	0.0000	0.0	1324.1	396.9
25-year	0.650	-7.5	-2.7	3.4		3.4	0.0000	0.0	1324.1	396.9
50-year	0.650	-16.2	-2.7	3.4		3.4	0.0000	0.0	1324.1	396.9
100-year	0.650	-16.2	-2.7	3.4		3.4	0.0000	0.0	1324.1	396.9
10-year	0.750	-5.8	-2.6	3.4		3.4	0.0000	0.0	1122.5	389.6
25-year	0.750	-5.8	-2.6	3.4		3.4	0.0000	0.0	1122.5	389.6
50-year	0.750	-14.6	-2.6	3.4		3.4	0.0000	0.0	1122.4	389.6
100-year	0.750	-14.6	-2.6	3.4		3.4	0.0000	0.0	1122.4	389.6
10-year	1.000	-2.6	-2.5	3.4		3.4	0.0000	0.0	1314.8	428.5
25-year	1.000	-2.6	-2.5	3.4		3.4	0.0000	0.0	1314.8	428.5
50-year	1.000	-10.0	-2.5	3.4		3.4	0.0000	0.0	1314.7	428.5
100-year	1.000	108.3	-2.5	3.4		3.4	0.0000	0.1	1314.7	428.5
10-year	1.075	-1.1	-2.5	3.4		3.4	0.0000	0.0	1140.2	474.1
25-year	1.075	-1.1	-2.5	3.4		3.4	0.0000	0.0	1140.2	474.1
50-year	1.075	-9.9	-2.5	3.4		3.4	0.0000	0.0	1140.2	474.1
100-year	1.075	108.4	-2.5	3.4		3.4	0.0000	0.1	1140.2	474.1
10-year	1.150	0.1	-2.5	3.4		3.4	0.0000	0.0	966.2	467.8

25-year	1.150	0.1	-2.5	3.4	3.4	0.0000	0.0	966.2	467.8
50-year	1.150	-8.7	-2.5	3.4	3.4	0.0000	0.0	966.2	467.8
100-year	1.150	108.4	-2.5	3.4	3.4	0.0000	0.2	966.2	467.8
10-year	1.200	0.1	-2.5	3.4	3.4	0.0000	0.0	1049.3	468.6
25-year	1.200	0.1	-2.5	3.4	3.4	0.0000	0.0	1049.3	468.6
50-year	1.200	96.6	-2.5	3.4	3.4	0.0000	0.1	1049.3	468.6
100-year	1.200	108.5	-2.5	3.4	3.4	0.0000	0.2	1049.3	468.6
10-year	1.300	0.4	-2.5	3.4	3.4	0.0000	0.0	840.9	465.8
25-year	1.300	0.4	-2.5	3.4	3.4	0.0000	0.0	840.9	465.8
50-year	1.300	96.7	-2.5	3.4	3.4	0.0000	0.2	840.9	465.8
100-year	1.300	108.5	-2.5	3.4	3.4	0.0000	0.2	840.9	465.8
10-year	1.450	68.3	-2.5	3.4	3.4	0.0000	0.8	88.6	460.0
25-year	1.450	85.3	-2.5	3.4	3.4	0.0000	1.0	88.6	460.1
50-year	1.450	96.8	-2.5	3.4	3.4	0.0000	1.1	88.7	460.1
100-year	1.450	108.6	-2.5	3.4	3.4	0.0000	1.2	88.7	460.1
	1.485	Culvert							
10-year	1.520	69.7	-1.0	4.5	4.6	0.0000	0.9	81.8	500.6
25-year	1.520	86.3	-1.0	5.1	5.1	0.0000	1.0	90.0	530.1
50-year	1.520	97.7	-1.0	5.5	5.5	0.0000	1.0	95.5	535.7
100-year	1.520	118.9	-1.0	6.3	6.3	0.0000	1.1	107.9	568.1
10-year	1.570	63.1	0.7	4.6	4.6	0.0000	0.2	322.8	468.5
25-year	1.570	76.3	0.7	5.1	5.1	0.0000	0.2	372.2	520.5
50-year	1.570	85.4	0.7	5.5	5.5	0.0000	0.2	405.9	534.3
100-year	1.570	111.8	0.7	6.3	6.3	0.0000	0.2	480.6	585.3
10-year	1.620	57.9	0.7	4.6	4.6	0.0000	0.1	591.4	443.2
25-year	1.620	68.3	0.7	5.1	5.1	0.0000	0.1	690.3	476.8
50-year	1.620	75.6	0.7	5.5	5.5	0.0000	0.1	757.6	490.1
100-year	1.620	106.9	0.7	6.3	6.3	0.0000	0.1	907.0	538.9
10-year	1.670	57.9	0.7	4.6	4.6	0.0000	0.1	736.3	411.7
25-year	1.670	68.3	0.7	5.1	5.1	0.0000	0.1	867.0	448.3
50-year	1.670	75.6	0.7	5.5	5.5	0.0000	0.1	957.1	456.8
100-year	1.670	106.9	0.7	6.3	6.3	0.0000	0.1	1160.3	485.2
10-year	1.720	40.1	0.7	4.6	4.6	0.0000	0.1	654.7	287.4
25-year	1.720	47.7	0.7	5.1	5.1	0.0000	0.1	805.9	335.2
50-year	1.720	53.2	0.7	5.5	5.5	0.0000	0.1	911.4	420.9
100-year	1.720	97.8	0.7	6.3	6.3	0.0000	0.1	1156.0	472.7
10-year	1.770	40.1	0.8	4.6	4.6	0.0000	0.1	519.0	248.4
25-year	1.770	47.7	0.8	5.1	5.1	0.0000	0.1	661.4	282.5
50-year	1.770	53.2	0.8	5.5	5.5	0.0000	0.1	772.3	340.5
100-year	1.770	97.8	0.8	6.3	6.3	0.0000	0.1	1041.1	538.1
10-year	1.820	40.0	0.8	4.6	4.6	0.0000	0.1	357.2	207.7
25-year	1.820	47.7	0.8	5.1	5.1	0.0000	0.1	490.1	273.9

50-year	1.820	53.2	0.8	5.5	5.5	0.0000	0.1	602.6	330.2
100-year	1.820	97.8	0.8	6.3	6.3	0.0000	0.2	955.2	529.3
10-year	1.870	40.0	0.9	4.6	4.6	0.0000	0.1	356.4	212.2
25-year	1.870	47.7	0.9	5.1	5.1	0.0000	0.1	481.8	274.5
50-year	1.870	53.2	0.9	5.5	5.5	0.0000	0.1	574.5	310.5
100-year	1.870	97.8	0.9	6.3	6.3	0.0000	0.2	830.8	515.1
10-year	1.920	40.0	0.9	4.6	4.6	0.0000	0.2	266.9	146.7
25-year	1.920	47.7	0.9	5.1	5.1	0.0000	0.2	359.6	214.1
50-year	1.920	53.2	0.9	5.5	5.5	0.0000	0.2	444.1	278.9
100-year	1.920	97.8	0.9	6.3	6.3	0.0000	0.2	658.0	480.0
10-year	1.970	40.0	1.0	4.6	4.6	0.0000	0.3	239.4	167.6
25-year	1.970	47.7	1.0	5.1	5.1	0.0000	0.2	347.3	230.4
50-year	1.970	53.2	1.0	5.5	5.5	0.0000	0.2	433.8	243.4
100-year	1.970	97.8	1.0	6.3	6.3	0.0000	0.3	635.9	392.3
10-year	2.020	40.0	1.1	4.6	4.6	0.0000	0.3	198.6	134.4
25-year	2.020	47.7	1.1	5.1	5.1	0.0000	0.3	283.3	194.3
50-year	2.020	53.2	1.1	5.5	5.5	0.0000	0.2	361.8	234.1
100-year	2.020	97.8	1.1	6.3	6.3	0.0000	0.3	570.8	360.2
10-year	2.070	40.0	1.1	4.6	4.6	0.0000	0.3	168.0	111.9
25-year	2.070	47.7	1.1	5.1	5.1	0.0000	0.3	252.4	223.9
50-year	2.070	53.2	1.1	5.5	5.5	0.0000	0.2	339.5	252.9
100-year	2.070	97.8	1.1	6.3	6.3	0.0000	0.3	552.6	312.6
10-year	2.120	40.0	1.1	4.6	4.6	0.0000	0.3	194.6	129.4
25-year	2.120	47.7	1.1	5.1	5.1	0.0000	0.2	269.9	156.7
50-year	2.120	53.2	1.1	5.5	5.5	0.0000	0.2	333.4	211.3
100-year	2.120	97.8	1.1	6.3	6.3	0.0000	0.3	531.1	290.2
10-year	2.170	40.0	1.1	4.6	4.6	0.0000	0.3	205.0	126.9
25-year	2.170	47.7	1.1	5.1	5.1	0.0000	0.3	281.3	155.6
50-year	2.170	53.2	1.1	5.5	5.5	0.0000	0.2	338.9	167.1
100-year	2.170	97.8	1.1	6.3	6.3	0.0000	0.3	521.0	328.8
10-year	2.220	40.0	1.2	4.6	4.6	0.0000	0.4	157.3	124.7
25-year	2.220	47.7	1.2	5.1	5.1	0.0000	0.3	239.7	198.1
50-year	2.220	53.2	1.2	5.5	5.5	0.0000	0.3	318.2	233.3
100-year	2.220	97.8	1.2	6.3	6.3	0.0000	0.3	526.0	336.3
10-year	2.270	40.0	1.2	4.6	4.6	0.0000	0.3	162.9	141.8
25-year	2.270	47.7	1.2	5.1	5.1	0.0000	0.3	261.7	214.8
50-year	2.270	53.2	1.2	5.5	5.5	0.0000	0.3	344.1	230.2
100-year	2.270	97.8	1.2	6.3	6.3	0.0000	0.3	555.3	310.8
10-year	2.320	40.0	1.4	4.6	4.6	0.0000	0.4	132.3	88.5
25-year	2.320	47.7	1.4	5.1	5.1	0.0000	0.4	197.2	165.7
50-year	2.320	53.2	1.4	5.5	5.5	0.0000	0.3	265.0	211.4
100-year	2.320	97.1	1.4	6.3	6.3	0.0000	0.4	484.7	366.2

10-year	2.370	40.0	1.7	4.6	4.6	0.0000	0.6	105.5	90.9
25-year	2.370	47.7	1.7	5.1	5.1	0.0000	0.5	182.0	197.3
50-year	2.370	53.2	1.7	5.5	5.5	0.0000	0.4	258.5	224.1
100-year	2.370	97.1	1.7	6.3	6.3	0.0000	0.5	465.1	329.7
10-year	2.420	40.0	1.8	4.6	4.6	0.0001	0.6	68.1	73.4
25-year	2.420	47.7	1.8	5.1	5.1	0.0000	0.5	128.6	174.4
50-year	2.420	53.2	1.8	5.5	5.5	0.0000	0.5	203.7	235.8
100-year	2.420	97.1	1.8	6.3	6.3	0.0000	0.5	416.8	341.1
10-year	2.470	40.0	1.8	4.6	4.6	0.0001	0.8	59.6	58.9
25-year	2.470	47.7	1.8	5.1	5.1	0.0001	0.7	106.6	127.0
50-year	2.470	53.2	1.8	5.5	5.5	0.0000	0.6	170.2	209.8
100-year	2.470	97.1	1.8	6.3	6.3	0.0000	0.6	356.6	321.3
10-year	2.520	40.1	1.8	4.6	4.6	0.0002	0.9	47.2	32.1
25-year	2.520	47.8	1.8	5.1	5.1	0.0001	0.8	76.0	93.1
50-year	2.520	53.3	1.8	5.5	5.5	0.0001	0.7	120.5	152.1
100-year	2.520	97.1	1.8	6.3	6.3	0.0001	0.6	305.4	285.6
10-year	2.570	27.5	2.0	4.6	4.6	0.0001	0.7	44.4	24.5
25-year	2.570	29.1	2.0	5.1	5.1	0.0001	0.6	59.3	39.6
50-year	2.570	29.9	2.0	5.5	5.5	0.0000	0.5	83.1	103.6
100-year	2.570	85.1	2.0	6.3	6.3	0.0001	0.7	267.0	282.7
10-year	2.620	27.6	1.4	4.6	4.6	0.0001	0.3	89.4	72.5
25-year	2.620	29.1	1.4	5.1	5.1	0.0000	0.2	132.2	91.8
50-year	2.620	29.9	1.4	5.5	5.5	0.0000	0.2	172.4	129.6
100-year	2.620	85.1	1.4	6.3	6.3	0.0000	0.3	319.5	234.0
	2.650	Culvert							
10-year	2.675	30.4	1.6	5.5	5.5	0.0000	0.2	126.3	77.5
25-year	2.675	44.7	1.6	6.8	6.8	0.0000	0.2	414.5	355.7
50-year	2.675	57.3	1.6	7.7	7.7	0.0000	0.2	857.1	720.9
100-year	2.675	143.0	1.6	8.0	8.0	0.0000	0.3	1109.7	862.7
10-year	2.725	27.7	1.0	5.5	5.5	0.0000	0.1	583.6	183.4
25-year	2.725	42.8	1.0	6.8	6.8	0.0000	0.1	881.9	298.3
50-year	2.725	54.3	1.0	7.7	7.7	0.0000	0.1	1240.6	513.0
100-year	2.725	138.1	1.0	8.0	8.0	0.0000	0.1	1414.5	580.4
10-year	2.775	27.8	1.6	5.5	5.5	0.0000	0.0	699.0	215.9
25-year	2.775	42.8	1.6	6.8	6.8	0.0000	0.0	1066.0	358.0
50-year	2.775	54.3	1.6	7.7	7.7	0.0000	0.1	1431.5	441.5
100-year	2.775	138.1	1.6	8.0	8.0	0.0000	0.1	1579.8	497.0
10-year	2.825	27.8	1.5	5.5	5.5	0.0000	0.1	595.5	218.2
25-year	2.825	42.8	1.5	6.8	6.8	0.0000	0.1	866.2	377.4
50-year	2.825	54.3	1.5	7.7	7.7	0.0000	0.1	1200.2	462.5
100-year	2.825	138.1	1.5	8.0	8.0	0.0000	0.1	1313.9	479.9
10-year	2.875	27.8	1.1	5.5	5.5	0.0000	0.1	586.0	232.7

25-year	2.875	42.8	1.1	6.8	6.8	0.0000	0.1	866.1	349.9
50-year	2.875	54.3	1.1	7.7	7.7	0.0000	0.1	1196.2	424.4
100-year	2.875	138.1	1.1	8.0	8.0	0.0000	0.1	1317.3	525.6
10-year	2.925	27.8	1.9	5.5	5.5	0.0000	0.1	449.6	240.1
25-year	2.925	42.8	1.9	6.8	6.8	0.0000	0.1	720.0	381.6
50-year	2.925	54.3	1.9	7.7	7.7	0.0000	0.1	1103.7	520.0
100-year	2.925	138.1	1.9	8.0	8.0	0.0000	0.1	1236.0	552.9
10-year	2.975	27.8	1.9	5.5	5.5	0.0000	0.6	50.4	47.9
25-year	2.975	42.8	1.9	6.8	6.8	0.0000	0.6	76.2	312.6
50-year	2.975	54.3	1.9	7.7	7.7	0.0000	0.3	466.8	482.1
100-year	2.975	138.1	1.9	8.0	8.0	0.0000	0.6	570.8	659.5
10-year	3.025	27.8	1.9	5.5	5.5	0.0000	0.6	49.9	36.7
25-year	3.025	42.8	1.9	6.8	6.8	0.0000	0.6	75.4	283.2
50-year	3.025	54.3	1.9	7.7	7.7	0.0000	0.3	427.5	462.4
100-year	3.025	138.1	1.9	8.0	8.0	0.0000	0.7	525.3	588.1
10-year	3.075	26.2	1.9	5.5	5.5	0.0000	0.5	51.8	37.3
25-year	3.075	41.8	1.9	6.8	6.8	0.0000	0.5	77.6	197.2
50-year	3.075	52.5	1.9	7.7	7.7	0.0000	0.3	405.9	541.9
100-year	3.075	135.5	1.9	8.0	8.0	0.0000	0.7	527.7	637.6
10-year	3.125	26.2	1.9	5.5	5.5	0.0000	0.5	48.4	27.1
25-year	3.125	41.8	1.9	6.8	6.8	0.0000	0.6	73.1	263.8
50-year	3.125	52.6	1.9	7.7	7.7	0.0000	0.3	655.8	625.5
100-year	3.125	136.1	1.9	8.0	8.0	0.0000	0.5	862.6	661.6
	3.150	Culvert							
10-year	3.175	26.3	2.0	5.6	5.6	0.0000	0.6	46.6	15.8
25-year	3.175	43.0	2.0	7.1	7.2	0.0000	0.6	96.2	535.3
50-year	3.175	89.8	2.0	7.8	7.8	0.0001	0.8	236.4	910.4
100-year	3.175	139.9	2.0	8.0	8.0	0.0000	0.6	851.8	1047.5
10-year	3.225	25.3	2.1	5.6	5.6	0.0000	0.6	43.8	14.7
25-year	3.225	42.0	2.1	7.1	7.2	0.0000	0.6	68.0	334.7
50-year	3.225	100.9	2.1	7.8	7.8	0.0001	1.3	84.5	601.9
100-year	3.225	139.7	2.1	8.0	8.1	0.0002	1.7	103.1	1051.2
10-year	3.275	24.0	2.2	5.6	5.6	0.0000	0.5	48.2	17.9
25-year	3.275	40.9	2.2	7.2	7.2	0.0000	0.5	78.6	776.1
50-year	3.275	98.6	2.2	7.8	7.8	0.0001	1.1	103.4	879.3
100-year	3.275	160.0	2.2	8.1	8.1	0.0002	1.6	130.1	1040.9
10-year	3.325	24.0	2.2	5.6	5.6	0.0000	0.5	47.7	18.0
25-year	3.325	40.9	2.2	7.2	7.2	0.0000	0.5	78.1	940.0
50-year	3.325	98.3	2.2	7.8	7.8	0.0001	1.1	92.0	1029.2
100-year	3.325	159.7	2.2	8.1	8.1	0.0002	1.6	98.1	1052.8
	3.350	Culvert							

10-year	3.385	25.0	2.3	8.5	8.5	0.0000	0.0	1408.6	1103.1
25-year	3.385	43.9	2.3	8.9	8.9	0.0000	0.1	1753.6	1150.3
50-year	3.385	102.3	2.3	9.0	9.0	0.0000	0.1	1802.9	1157.0
100-year	3.385	203.4	2.3	9.0	9.0	0.0000	0.2	2194.4	1160.2
10-year	3.435	25.0	2.5	8.5	8.5	0.0000	0.0	1775.4	1103.1
25-year	3.435	43.9	2.5	8.9	8.9	0.0000	0.1	2197.2	1129.6
50-year	3.435	102.5	2.5	9.0	9.0	0.0000	0.1	2257.7	1133.3
100-year	3.435	203.4	2.5	9.0	9.0	0.0000	0.2	2290.4	1135.2
10-year	3.485	25.0	2.7	8.5	8.5	0.0000	0.0	1456.7	980.8
25-year	3.485	43.9	2.7	8.9	8.9	0.0000	0.1	1832.7	1009.2
50-year	3.485	102.4	2.7	9.0	9.0	0.0000	0.1	1886.8	1013.2
100-year	3.485	203.6	2.7	9.0	9.0	0.0000	0.2	1916.1	1015.1
10-year	3.560	25.0	2.9	8.5	8.5	0.0000	0.0	1375.1	928.8
25-year	3.560	43.9	2.9	8.9	8.9	0.0000	0.1	1731.4	957.2
50-year	3.560	102.6	2.9	9.0	9.0	0.0000	0.1	1782.8	961.2
100-year	3.560	204.1	2.9	9.0	9.0	0.0000	0.3	1811.0	963.2
10-year	3.635	25.0	3.1	8.5	8.5	0.0000	0.0	1290.2	874.0
25-year	3.635	43.8	3.1	8.9	8.9	0.0000	0.1	1626.9	908.0
50-year	3.635	102.5	3.1	9.0	9.0	0.0000	0.1	1675.7	912.8
100-year	3.635	204.5	3.1	9.0	9.0	0.0000	0.3	1702.9	915.3
10-year	3.710	25.1	3.3	8.5	8.5	0.0000	0.1	1203.6	814.0
25-year	3.710	43.8	3.3	8.9	8.9	0.0000	0.1	1517.6	848.0
50-year	3.710	102.5	3.3	9.0	9.0	0.0000	0.1	1563.4	852.9
100-year	3.710	204.8	3.3	9.0	9.0	0.0000	0.3	1589.1	855.5
10-year	3.785	25.1	3.5	8.5	8.5	0.0000	0.1	1126.5	735.8
25-year	3.785	43.8	3.5	8.9	8.9	0.0000	0.1	1413.8	784.9
50-year	3.785	102.5	3.5	9.0	9.0	0.0000	0.2	1456.3	791.9
100-year	3.785	205.3	3.5	9.0	9.0	0.0000	0.3	1480.7	795.7
10-year	3.850	25.1	3.7	8.5	8.5	0.0000	0.1	627.3	667.2
25-year	3.850	43.8	3.7	8.9	8.9	0.0000	0.1	887.0	706.9
50-year	3.850	103.1	3.7	9.0	9.0	0.0000	0.2	925.4	712.6
100-year	3.850	205.6	3.7	9.0	9.0	0.0000	0.3	948.5	795.3
10-year	3.925	25.1	3.7	8.5	8.5	0.0000	0.1	450.6	607.8
25-year	3.925	43.8	3.7	8.9	8.9	0.0000	0.1	706.2	744.9
50-year	3.925	103.9	3.7	9.0	9.0	0.0000	0.3	747.7	764.9
100-year	3.925	207.0	3.7	9.0	9.0	0.0001	0.6	774.1	774.9
10-year	4.000	25.2	3.7	8.6	8.6	0.0000	0.1	379.7	581.3
25-year	4.000	43.9	3.7	8.9	8.9	0.0000	0.2	623.7	709.8
50-year	4.000	105.4	3.7	9.0	9.0	0.0000	0.3	664.4	729.1
100-year	4.000	209.4	3.7	9.0	9.0	0.0001	0.6	693.4	738.6
10-year	4.075	25.2	3.6	8.6	8.6	0.0000	0.2	128.5	81.4
25-year	4.075	44.5	3.6	8.9	8.9	0.0000	0.3	163.2	104.9
50-year	4.075	108.7	3.6	9.0	9.0	0.0002	0.8	169.6	109.2

100-year	4.075	215.8	3.6	9.0	9.1	0.0008	1.5	196.3	713.9
10-year	4.150	25.3	3.6	8.6	8.6	0.0000	0.2	110.9	52.6
25-year	4.150	46.9	3.6	8.9	8.9	0.0001	0.4	151.7	159.1
50-year	4.150	130.7	3.6	9.0	9.0	0.0004	1.0	165.8	779.4
100-year	4.150	225.5	3.6	9.1	9.1	0.0010	1.6	238.8	784.7
10-year	4.225	25.4	3.6	8.6	8.6	0.0000	0.2	106.2	33.9
25-year	4.225	51.2	3.6	8.9	8.9	0.0001	0.4	119.7	36.8
50-year	4.225	145.8	3.6	9.0	9.1	0.0006	1.2	149.4	720.2
100-year	4.225	240.7	3.6	9.2	9.2	0.0012	1.7	252.8	749.3
10-year	4.300	25.6	3.7	8.6	8.6	0.0000	0.3	95.6	30.5
25-year	4.300	58.4	3.7	8.9	8.9	0.0001	0.5	107.9	33.1
50-year	4.300	152.4	3.7	9.1	9.1	0.0008	1.3	151.8	519.4
100-year	4.300	248.1	3.7	9.3	9.3	0.0014	1.8	254.4	619.6
10-year	4.375	25.8	3.8	8.6	8.6	0.0000	0.3	89.8	27.9
25-year	4.375	66.2	3.8	9.0	9.0	0.0002	0.7	101.4	30.4
50-year	4.375	158.7	3.8	9.1	9.2	0.0008	1.4	187.2	620.4
100-year	4.375	262.5	3.8	9.4	9.4	0.0012	1.7	330.1	660.2
10-year	4.450	26.2	3.8	8.6	8.6	0.0001	0.4	74.0	25.4
25-year	4.450	204.6	3.8	9.0	9.1	0.0027	2.4	85.8	28.0
50-year	4.450	239.7	3.8	9.3	9.3	0.0019	2.0	255.5	697.0
100-year	4.450	287.1	3.8	9.5	9.5	0.0013	1.7	405.9	721.7
10-year	4.525	159.5	3.9	8.7	8.8	0.0023	2.2	73.4	23.8
25-year	4.525	208.3	3.9	9.2	9.2	0.0020	2.1	208.6	758.1
50-year	4.525	253.4	3.9	9.4	9.4	0.0014	1.7	363.1	773.5
100-year	4.525	293.0	3.9	9.6	9.6	0.0010	1.5	499.5	786.7
10-year	4.600	160.8	4.0	8.9	8.9	0.0020	2.1	77.3	22.1
25-year	4.600	211.5	4.0	9.3	9.3	0.0013	1.7	299.5	764.4
50-year	4.600	258.4	4.0	9.5	9.5	0.0010	1.5	429.4	777.0
100-year	4.600	295.8	4.0	9.6	9.6	0.0008	1.4	547.5	788.3
	4.650	Culvert							
10-year	4.700	164.0	3.5	9.4	9.4	0.0003	0.9	414.9	951.7
25-year	4.700	196.5	3.5	9.4	9.4	0.0004	1.0	449.2	952.8
50-year	4.700	259.2	3.5	9.5	9.5	0.0005	1.1	527.4	955.1
100-year	4.700	299.1	3.5	9.6	9.6	0.0004	0.9	668.8	959.3
10-year	4.800	164.2	3.6	9.4	9.4	0.0004	1.0	386.0	911.7
25-year	4.800	225.0	3.6	9.5	9.5	0.0006	1.2	434.6	913.5
50-year	4.800	263.9	3.6	9.5	9.6	0.0006	1.2	510.6	916.2
100-year	4.800	303.6	3.6	9.7	9.7	0.0004	1.1	633.9	927.1

Proposed Conditions - Mean High Water

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-14.1	-2.6	3.4	-2.3	3.4	0.0000	0.0	1359.2	450.7
25-year	0.000	-28.6	-2.6	3.4	-2.2	3.4	0.0000	0.0	1359.2	450.7
50-year	0.000	-36.2	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
100-year	0.000	-36.2	-2.6	3.4	-2.2	3.4	0.0000	-0.1	1359.2	450.7
10-year	0.150	189.0	-2.7	3.4		3.4	0.0000	0.2	2184.0	701.5
25-year	0.150	242.1	-2.7	3.4		3.4	0.0000	0.2	2184.2	701.5
50-year	0.150	277.4	-2.7	3.4		3.4	0.0000	0.2	2184.3	701.5
100-year	0.150	315.5	-2.7	3.4		3.4	0.0000	0.3	2184.5	701.5
10-year	0.300	189.1	-2.7	3.4		3.4	0.0000	0.2	2172.0	638.2
25-year	0.300	242.2	-2.7	3.4		3.4	0.0000	0.2	2172.2	638.2
50-year	0.300	277.5	-2.7	3.4		3.4	0.0000	0.2	2172.4	638.2
100-year	0.300	315.7	-2.7	3.4		3.4	0.0000	0.3	2172.6	638.2
10-year	0.400	190.6	-2.8	3.4		3.4	0.0000	0.2	1934.7	613.0
25-year	0.400	243.7	-2.8	3.4		3.4	0.0000	0.2	1934.9	613.0
50-year	0.400	279.0	-2.8	3.4		3.4	0.0000	0.3	1935.1	613.1
100-year	0.400	317.0	-2.8	3.4		3.4	0.0000	0.3	1935.3	613.1
10-year	0.500	193.3	-2.8	3.4		3.4	0.0000	0.3	1312.5	376.4
25-year	0.500	246.2	-2.8	3.4		3.4	0.0000	0.4	1312.6	376.4
50-year	0.500	281.4	-2.8	3.4		3.4	0.0000	0.4	1312.7	376.4
100-year	0.500	319.3	-2.8	3.4		3.4	0.0000	0.5	1312.8	376.4
10-year	0.650	199.1	-2.7	3.4		3.4	0.0000	0.2	1324.1	396.9
25-year	0.650	251.6	-2.7	3.4		3.4	0.0000	0.3	1324.3	396.9
50-year	0.650	286.6	-2.7	3.4		3.4	0.0000	0.4	1324.4	396.9
100-year	0.650	323.0	-2.7	3.4		3.4	0.0000	0.4	1324.5	396.9
10-year	0.750	200.6	-2.6	3.4		3.4	0.0000	0.3	1122.5	389.6
25-year	0.750	253.0	-2.6	3.4		3.4	0.0000	0.4	1122.6	389.6
50-year	0.750	287.9	-2.6	3.4		3.4	0.0000	0.4	1122.7	389.6
100-year	0.750	325.6	-2.6	3.4		3.4	0.0000	0.5	1122.9	389.6
10-year	1.000	202.1	-2.5	3.4		3.4	0.0000	0.3	1315.0	428.5
25-year	1.000	254.4	-2.5	3.4		3.4	0.0000	0.3	1315.2	428.5
50-year	1.000	289.3	-2.5	3.4		3.4	0.0000	0.4	1315.4	428.5
100-year	1.000	327.0	-2.5	3.4		3.4	0.0000	0.4	1315.7	428.6
10-year	1.075	202.3	-2.5	3.4		3.4	0.0000	0.3	1140.4	474.1
25-year	1.075	254.6	-2.5	3.4		3.4	0.0000	0.3	1140.6	474.2
50-year	1.075	289.4	-2.5	3.4		3.4	0.0000	0.4	1140.8	474.2
100-year	1.075	327.1	-2.5	3.4		3.4	0.0000	0.4	1141.0	474.2
10-year	1.150	202.4	-2.5	3.4		3.4	0.0000	0.3	966.4	467.9

25-year	1.150	254.8	-2.5	3.4	3.4	0.0000	0.4	966.6	467.9
50-year	1.150	289.6	-2.5	3.4	3.4	0.0000	0.4	966.7	468.0
100-year	1.150	327.3	-2.5	3.4	3.4	0.0000	0.5	966.9	468.0
10-year	1.200	202.6	-2.5	3.4	3.4	0.0000	0.3	1049.5	468.6
25-year	1.200	254.9	-2.5	3.4	3.4	0.0000	0.4	1049.7	468.7
50-year	1.200	289.8	-2.5	3.4	3.4	0.0000	0.4	1049.9	468.7
100-year	1.200	327.4	-2.5	3.4	3.4	0.0000	0.5	1050.1	468.8
10-year	1.300	203.3	-2.5	3.4	3.4	0.0000	0.4	841.1	465.8
25-year	1.300	255.5	-2.5	3.4	3.4	0.0000	0.5	841.2	465.8
50-year	1.300	290.3	-2.5	3.4	3.4	0.0000	0.5	841.3	465.9
100-year	1.300	327.9	-2.5	3.4	3.4	0.0000	0.6	841.5	465.9
10-year	1.450	203.3	-2.5	3.4	3.4	0.0000	1.0	198.3	460.0
25-year	1.450	255.6	-2.5	3.4	3.4	0.0000	1.3	198.3	460.0
50-year	1.450	290.4	-2.5	3.4	3.4	0.0001	1.5	198.4	460.0
100-year	1.450	328.0	-2.5	3.4	3.5	0.0001	1.7	198.4	460.1
	1.485	Culvert							
10-year	1.520	206.0	-1.0	3.9	4.0	0.0001	1.9	109.3	450.7
25-year	1.520	256.2	-1.0	4.2	4.3	0.0002	2.2	116.7	465.1
50-year	1.520	295.9	-1.0	4.5	4.6	0.0002	2.4	123.4	497.8
100-year	1.520	336.1	-1.0	4.9	5.0	0.0002	2.6	131.8	521.8
10-year	1.570	197.8	0.7	4.0	4.0	0.0000	0.7	273.4	458.1
25-year	1.570	241.6	0.7	4.3	4.4	0.0000	0.8	303.5	464.8
50-year	1.570	272.5	0.7	4.6	4.7	0.0000	0.8	330.3	472.0
100-year	1.570	305.3	0.7	5.0	5.0	0.0000	0.8	363.4	511.0
10-year	1.620	191.1	0.7	4.0	4.0	0.0000	0.4	494.1	415.4
25-year	1.620	229.0	0.7	4.4	4.4	0.0000	0.4	554.7	437.3
50-year	1.620	253.0	0.7	4.7	4.7	0.0000	0.4	608.5	445.9
100-year	1.620	280.0	0.7	5.0	5.0	0.0000	0.4	674.8	470.2
10-year	1.670	191.1	0.7	4.0	4.0	0.0000	0.3	609.4	350.8
25-year	1.670	229.0	0.7	4.4	4.4	0.0000	0.3	688.6	362.4
50-year	1.670	253.0	0.7	4.7	4.7	0.0000	0.4	759.0	420.4
100-year	1.670	280.0	0.7	5.0	5.0	0.0000	0.3	846.7	446.4
10-year	1.720	170.8	0.7	4.0	4.0	0.0000	0.4	510.8	273.7
25-year	1.720	201.5	0.7	4.4	4.4	0.0000	0.4	600.6	284.6
50-year	1.720	217.6	0.7	4.7	4.7	0.0000	0.4	680.9	292.5
100-year	1.720	235.3	0.7	5.0	5.0	0.0000	0.4	782.4	316.2
10-year	1.770	170.9	0.8	4.0	4.0	0.0000	0.5	389.5	226.6
25-year	1.770	201.5	0.8	4.4	4.4	0.0000	0.5	469.2	244.6
50-year	1.770	217.6	0.8	4.7	4.7	0.0000	0.5	543.2	250.3
100-year	1.770	235.1	0.8	5.0	5.0	0.0000	0.5	638.1	274.8
10-year	1.820	170.9	0.8	4.0	4.0	0.0001	0.8	262.5	148.0
25-year	1.820	201.5	0.8	4.4	4.4	0.0001	0.8	317.8	181.1

50-year	1.820	217.6	0.8	4.7	4.7	0.0001	0.7	378.0	219.8
100-year	1.820	235.3	0.8	5.0	5.0	0.0000	0.7	467.6	263.0
10-year	1.870	170.9	0.9	4.0	4.0	0.0001	0.8	263.5	160.1
25-year	1.870	201.5	0.9	4.4	4.4	0.0001	0.8	319.6	175.6
50-year	1.870	217.6	0.9	4.7	4.7	0.0000	0.8	377.6	240.2
100-year	1.870	235.3	0.9	5.0	5.0	0.0000	0.7	462.2	266.2
10-year	1.920	170.9	0.9	4.0	4.0	0.0001	1.0	195.8	124.2
25-year	1.920	201.5	0.9	4.4	4.4	0.0001	1.0	239.3	138.4
50-year	1.920	217.6	0.9	4.7	4.7	0.0001	1.0	281.1	150.8
100-year	1.920	235.3	0.9	5.0	5.0	0.0001	0.9	343.4	203.6
10-year	1.970	170.9	1.0	4.0	4.1	0.0003	1.7	161.2	130.1
25-year	1.970	201.5	1.0	4.4	4.4	0.0002	1.5	208.3	152.1
50-year	1.970	217.6	1.0	4.7	4.7	0.0002	1.4	257.0	176.7
100-year	1.970	235.3	1.0	5.0	5.0	0.0001	1.2	329.5	227.1
10-year	2.020	170.9	1.1	4.0	4.1	0.0003	1.6	137.9	108.4
25-year	2.020	201.6	1.1	4.4	4.4	0.0003	1.5	175.5	121.5
50-year	2.020	217.6	1.1	4.7	4.7	0.0002	1.4	212.7	141.1
100-year	2.020	235.3	1.1	5.0	5.1	0.0001	1.3	269.3	184.7
10-year	2.070	170.9	1.1	4.1	4.1	0.0006	1.8	116.4	95.2
25-year	2.070	201.6	1.1	4.4	4.4	0.0004	1.7	149.3	105.2
50-year	2.070	217.7	1.1	4.7	4.7	0.0003	1.5	180.8	117.7
100-year	2.070	235.3	1.1	5.0	5.1	0.0002	1.4	237.6	205.1
10-year	2.120	170.9	1.1	4.1	4.1	0.0003	1.5	137.5	112.7
25-year	2.120	201.6	1.1	4.4	4.4	0.0003	1.5	175.5	123.1
50-year	2.120	217.7	1.1	4.7	4.7	0.0002	1.4	211.3	134.9
100-year	2.120	235.3	1.1	5.0	5.1	0.0001	1.2	260.8	152.5
10-year	2.170	170.9	1.1	4.1	4.1	0.0003	1.6	148.7	119.3
25-year	2.170	201.6	1.1	4.4	4.5	0.0003	1.5	187.7	124.3
50-year	2.170	217.7	1.1	4.7	4.7	0.0002	1.4	222.9	130.0
100-year	2.170	235.3	1.1	5.1	5.1	0.0001	1.3	273.1	154.6
10-year	2.220	170.9	1.2	4.1	4.2	0.0007	2.0	107.2	100.2
25-year	2.220	201.6	1.2	4.4	4.5	0.0005	1.9	141.5	117.5
50-year	2.220	217.7	1.2	4.7	4.7	0.0004	1.7	176.0	140.1
100-year	2.220	235.3	1.2	5.1	5.1	0.0002	1.5	230.4	184.5
10-year	2.270	171.0	1.2	4.1	4.2	0.0006	2.0	109.2	111.2
25-year	2.270	201.6	1.2	4.5	4.5	0.0004	1.9	147.9	135.0
50-year	2.270	217.7	1.2	4.7	4.8	0.0003	1.7	187.2	162.6
100-year	2.270	235.3	1.2	5.1	5.1	0.0002	1.5	253.1	213.2
10-year	2.320	171.0	1.4	4.2	4.2	0.0006	2.1	101.6	72.3
25-year	2.320	201.6	1.4	4.5	4.5	0.0005	2.1	124.2	82.2
50-year	2.320	217.7	1.4	4.7	4.8	0.0004	1.9	148.5	104.0
100-year	2.320	235.3	1.4	5.1	5.1	0.0003	1.8	191.8	155.3

10-year	2.370	171.1	1.7	4.2	4.3	0.0013	3.0	76.6	66.9
25-year	2.370	201.6	1.7	4.5	4.6	0.0010	2.9	98.1	80.0
50-year	2.370	217.8	1.7	4.7	4.8	0.0007	2.7	126.2	128.8
100-year	2.370	235.4	1.7	5.1	5.1	0.0005	2.3	177.3	191.1
10-year	2.420	171.5	1.8	4.2	4.4	0.0023	3.3	52.5	37.5
25-year	2.420	201.6	1.8	4.5	4.7	0.0018	3.3	64.8	58.7
50-year	2.420	217.7	1.8	4.8	4.9	0.0014	3.1	86.2	112.7
100-year	2.420	235.4	1.8	5.1	5.2	0.0009	2.7	125.9	148.6
10-year	2.470	172.5	1.8	4.3	4.6	0.0039	4.1	50.0	35.8
25-year	2.470	201.8	1.8	4.6	4.8	0.0034	4.0	62.6	72.3
50-year	2.470	218.6	1.8	4.8	5.0	0.0026	3.8	80.5	86.2
100-year	2.470	236.1	1.8	5.1	5.3	0.0018	3.3	110.9	138.6
10-year	2.520	173.4	1.8	4.5	4.8	0.0044	4.0	45.6	30.2
25-year	2.520	202.0	1.8	4.8	5.0	0.0041	4.2	53.5	43.4
50-year	2.520	220.7	1.8	5.0	5.2	0.0037	4.1	64.1	71.4
100-year	2.520	237.3	1.8	5.2	5.4	0.0027	3.8	84.5	116.2
10-year	2.570	143.1	2.0	4.9	5.0	0.0020	3.1	51.1	26.5
25-year	2.570	151.4	2.0	5.1	5.2	0.0017	3.0	57.2	36.0
50-year	2.570	161.4	2.0	5.2	5.4	0.0015	2.9	64.2	55.2
100-year	2.570	172.2	2.0	5.5	5.6	0.0013	2.8	79.3	99.0
10-year	2.620	147.2	1.4	5.0	5.0	0.0006	1.2	121.8	85.1
25-year	2.620	157.0	1.4	5.2	5.2	0.0005	1.2	138.6	95.7
50-year	2.620	167.7	1.4	5.4	5.4	0.0004	1.1	156.4	116.6
100-year	2.620	173.1	1.4	5.6	5.6	0.0003	1.0	180.6	135.8
	2.650	Culvert							
10-year	2.675	154.9	1.6	5.7	5.7	0.0002	1.1	147.8	127.9
25-year	2.675	175.6	1.6	6.0	6.0	0.0001	1.1	191.0	171.8
50-year	2.675	189.0	1.6	6.1	6.1	0.0001	1.1	224.2	219.8
100-year	2.675	200.2	1.6	6.3	6.3	0.0001	1.1	263.7	248.4
10-year	2.725	150.7	1.0	5.7	5.7	0.0000	0.2	625.8	193.3
25-year	2.725	170.5	1.0	6.0	6.0	0.0000	0.3	682.6	215.1
50-year	2.725	183.9	1.0	6.1	6.1	0.0000	0.3	719.3	223.7
100-year	2.725	194.5	1.0	6.3	6.3	0.0000	0.3	757.9	240.2
10-year	2.775	150.7	1.6	5.7	5.7	0.0000	0.2	748.6	225.6
25-year	2.775	170.5	1.6	6.0	6.0	0.0000	0.2	814.7	251.7
50-year	2.775	183.9	1.6	6.1	6.1	0.0000	0.2	859.4	273.9
100-year	2.775	194.5	1.6	6.3	6.3	0.0000	0.2	907.1	305.9
10-year	2.825	150.7	1.5	5.7	5.7	0.0000	0.2	640.8	228.7
25-year	2.825	170.5	1.5	6.0	6.0	0.0000	0.2	698.3	255.2
50-year	2.825	183.9	1.5	6.1	6.1	0.0000	0.3	733.1	283.3
100-year	2.825	194.5	1.5	6.3	6.3	0.0000	0.3	767.9	307.6
10-year	2.875	150.7	1.1	5.7	5.7	0.0000	0.2	633.8	243.9

25-year	2.875	170.5	1.1	6.0	6.0	0.0000	0.3	693.4	269.3
50-year	2.875	184.0	1.1	6.1	6.1	0.0000	0.3	729.3	295.2
100-year	2.875	194.5	1.1	6.3	6.3	0.0000	0.3	765.1	314.0
10-year	2.925	150.7	1.9	5.7	5.7	0.0000	0.3	495.8	253.8
25-year	2.925	170.5	1.9	6.0	6.0	0.0000	0.3	553.5	268.8
50-year	2.925	184.0	1.9	6.1	6.1	0.0000	0.3	588.2	292.7
100-year	2.925	194.5	1.9	6.3	6.3	0.0000	0.3	622.7	310.3
10-year	2.975	150.8	1.9	5.7	5.8	0.0009	2.8	54.8	64.6
25-year	2.975	170.5	1.9	6.0	6.1	0.0009	2.8	60.2	95.3
50-year	2.975	184.0	1.9	6.2	6.3	0.0009	2.9	63.5	153.4
100-year	2.975	194.6	1.9	6.3	6.5	0.0009	2.9	66.8	190.1
10-year	3.025	150.8	1.9	5.8	5.9	0.0009	2.7	55.2	46.5
25-year	3.025	170.5	1.9	6.0	6.2	0.0009	2.8	60.4	55.9
50-year	3.025	184.0	1.9	6.2	6.3	0.0009	2.9	63.7	75.0
100-year	3.025	194.9	1.9	6.4	6.5	0.0009	2.9	67.0	111.4
10-year	3.075	148.2	1.9	5.8	5.9	0.0007	2.5	58.3	48.7
25-year	3.075	167.2	1.9	6.1	6.2	0.0007	2.6	63.7	63.2
50-year	3.075	181.2	1.9	6.3	6.4	0.0007	2.7	67.0	84.6
100-year	3.075	191.6	1.9	6.4	6.5	0.0007	2.7	70.4	98.0
10-year	3.125	148.2	1.9	5.9	6.0	0.0008	2.7	55.2	55.5
25-year	3.125	167.2	1.9	6.1	6.3	0.0008	2.8	60.4	121.7
50-year	3.125	181.2	1.9	6.3	6.4	0.0008	2.9	63.6	178.4
100-year	3.125	191.7	1.9	6.5	6.6	0.0008	2.9	66.8	196.0
	3.150	Culvert							
10-year	3.175	148.3	2.0	6.3	6.4	0.0007	2.6	57.5	16.9
25-year	3.175	167.3	2.0	6.6	6.7	0.0007	2.6	63.8	17.5
50-year	3.175	181.2	2.0	6.9	7.0	0.0007	2.7	68.3	17.9
100-year	3.175	191.9	2.0	7.2	7.3	0.0006	2.6	98.4	542.8
10-year	3.225	147.2	2.1	6.3	6.4	0.0008	2.7	54.5	15.7
25-year	3.225	166.1	2.1	6.7	6.8	0.0008	2.8	60.2	16.2
50-year	3.225	179.9	2.1	6.9	7.1	0.0008	2.8	64.4	16.5
100-year	3.225	190.5	2.1	7.2	7.3	0.0007	2.8	69.2	363.9
10-year	3.275	145.1	2.2	6.4	6.5	0.0006	2.3	62.8	19.6
25-year	3.275	163.6	2.2	6.8	6.8	0.0005	2.3	70.1	20.5
50-year	3.275	177.2	2.2	7.0	7.1	0.0005	2.4	75.5	762.8
100-year	3.275	187.5	2.2	7.3	7.4	0.0004	2.3	81.9	790.3
10-year	3.325	145.1	2.2	6.4	6.5	0.0006	2.3	62.9	19.8
25-year	3.325	163.6	2.2	6.8	6.9	0.0006	2.3	70.3	20.7
50-year	3.325	176.6	2.2	7.0	7.1	0.0005	2.3	76.6	851.2
100-year	3.325	187.2	2.2	7.3	7.4	0.0004	2.2	120.2	993.8
	3.350	Culvert							

10-year	3.385	145.1	2.3	6.9	6.9	0.0002	1.5	96.4	86.7
25-year	3.385	163.6	2.3	7.4	7.4	0.0001	1.2	396.9	937.8
50-year	3.385	178.4	2.3	7.8	7.8	0.0000	0.8	710.7	983.7
100-year	3.385	189.2	2.3	8.1	8.1	0.0000	0.6	1035.9	1051.0
10-year	3.435	145.1	2.4	6.9	6.9	0.0002	1.4	160.4	137.5
25-year	3.435	163.7	2.4	7.4	7.4	0.0001	1.0	544.8	1002.8
50-year	3.435	178.5	2.4	7.8	7.8	0.0000	0.7	927.9	1040.3
100-year	3.435	189.3	2.4	8.1	8.1	0.0000	0.5	1326.2	1074.1
10-year	3.485	145.1	2.4	6.9	7.0	0.0002	1.5	98.0	34.3
25-year	3.485	163.7	2.4	7.4	7.4	0.0001	1.1	407.9	826.1
50-year	3.485	178.9	2.4	7.8	7.8	0.0000	0.8	723.4	861.6
100-year	3.485	189.3	2.4	8.1	8.1	0.0000	0.6	1060.9	949.7
10-year	3.560	145.0	2.5	6.9	7.0	0.0003	1.6	95.5	65.2
25-year	3.560	163.7	2.5	7.4	7.4	0.0001	1.2	396.5	778.5
50-year	3.560	180.0	2.5	7.8	7.8	0.0001	0.8	689.1	804.8
100-year	3.560	189.3	2.5	8.1	8.1	0.0000	0.6	1003.9	897.9
10-year	3.635	144.9	2.5	7.0	7.0	0.0003	1.7	91.5	95.5
25-year	3.635	163.9	2.5	7.4	7.4	0.0001	1.2	381.0	732.7
50-year	3.635	181.4	2.5	7.8	7.8	0.0001	0.9	652.9	758.3
100-year	3.635	189.5	2.5	8.1	8.1	0.0000	0.7	947.1	837.0
10-year	3.710	145.4	2.6	7.0	7.0	0.0003	1.8	99.5	144.3
25-year	3.710	164.5	2.6	7.4	7.4	0.0001	1.3	369.3	672.4
50-year	3.710	183.0	2.6	7.8	7.8	0.0001	0.9	616.3	701.2
100-year	3.710	189.7	2.6	8.1	8.1	0.0000	0.7	887.7	777.2
10-year	3.785	147.2	2.7	7.0	7.0	0.0003	1.8	167.6	505.0
25-year	3.785	166.1	2.7	7.4	7.4	0.0001	1.3	395.2	574.5
50-year	3.785	184.6	2.7	7.8	7.8	0.0001	1.0	607.9	629.3
100-year	3.785	190.1	2.7	8.1	8.1	0.0000	0.7	849.8	682.9
10-year	3.850	148.7	2.7	7.0	7.1	0.0004	2.0	96.8	124.2
25-year	3.850	166.1	2.7	7.4	7.5	0.0003	1.8	159.4	185.9
50-year	3.850	185.6	2.7	7.8	7.8	0.0002	1.6	234.1	239.6
100-year	3.850	190.1	2.7	8.1	8.2	0.0001	1.4	378.5	624.5
10-year	3.925	150.7	2.8	7.1	7.1	0.0003	1.9	81.5	25.2
25-year	3.925	168.5	2.8	7.4	7.5	0.0003	1.8	107.5	111.8
50-year	3.925	187.0	2.8	7.8	7.8	0.0002	1.8	151.8	146.8
100-year	3.925	190.8	2.8	8.1	8.2	0.0002	1.6	248.1	460.3
10-year	4.000	151.5	2.9	7.1	7.1	0.0003	1.8	86.1	27.3
25-year	4.000	174.1	2.9	7.5	7.5	0.0003	1.8	96.7	28.9
50-year	4.000	188.7	2.9	7.8	7.8	0.0003	1.8	107.4	50.7
100-year	4.000	192.0	2.9	8.2	8.2	0.0002	1.6	190.8	446.6
10-year	4.075	155.4	2.9	7.1	7.2	0.0003	1.8	86.9	28.5
25-year	4.075	205.3	2.9	7.5	7.6	0.0004	2.1	98.1	30.3
50-year	4.075	191.8	2.9	7.8	7.9	0.0003	1.8	108.2	31.5

100-year	4.075	193.8	2.9	8.2	8.2	0.0002	1.6	119.5	32.9
10-year	4.150	158.2	3.0	7.1	7.2	0.0005	2.1	77.0	25.4
25-year	4.150	206.1	3.0	7.5	7.6	0.0006	2.4	87.3	28.3
50-year	4.150	212.0	3.0	7.8	7.9	0.0005	2.2	96.8	30.7
100-year	4.150	197.1	3.0	8.2	8.2	0.0003	1.8	107.9	33.1
10-year	4.225	159.3	3.1	7.2	7.2	0.0005	2.1	74.6	24.3
25-year	4.225	206.8	3.1	7.5	7.6	0.0006	2.5	84.4	26.4
50-year	4.225	212.7	3.1	7.9	7.9	0.0005	2.3	93.1	28.6
100-year	4.225	202.0	3.1	8.2	8.3	0.0004	2.0	103.2	31.2
10-year	4.300	159.4	3.1	7.2	7.3	0.0006	2.3	69.0	22.7
25-year	4.300	209.6	3.1	7.6	7.7	0.0007	2.7	78.3	24.5
50-year	4.300	213.7	3.1	7.9	8.0	0.0006	2.5	86.1	26.2
100-year	4.300	208.0	3.1	8.2	8.3	0.0004	2.2	95.1	28.2
10-year	4.375	159.8	3.2	7.2	7.3	0.0006	2.4	66.7	21.3
25-year	4.375	210.0	3.2	7.6	7.7	0.0008	2.8	75.6	23.0
50-year	4.375	215.5	3.2	7.9	8.0	0.0007	2.6	82.7	24.3
100-year	4.375	216.0	3.2	8.2	8.3	0.0005	2.4	90.7	26.0
10-year	4.450	159.8	3.3	7.2	7.4	0.0015	3.3	48.8	19.7
25-year	4.450	210.3	3.3	7.6	7.8	0.0017	3.7	57.1	21.2
50-year	4.450	215.8	3.3	7.9	8.1	0.0013	3.4	63.6	22.4
100-year	4.450	216.5	3.3	8.2	8.4	0.0010	3.1	71.0	23.7
10-year	4.525	161.8	3.3	7.3	7.5	0.0013	3.2	51.1	18.5
25-year	4.525	210.7	3.3	7.8	8.0	0.0015	3.6	59.2	19.9
50-year	4.525	223.8	3.3	8.0	8.2	0.0013	3.5	64.6	20.9
100-year	4.525	236.8	3.3	8.3	8.5	0.0011	3.3	71.0	21.9
10-year	4.600	162.0	3.4	7.5	7.6	0.0009	2.8	57.8	17.5
25-year	4.600	214.8	3.4	7.9	8.1	0.0011	3.3	65.7	18.7
50-year	4.600	234.8	3.4	8.1	8.3	0.0011	3.3	70.6	19.4
100-year	4.600	278.8	3.4	8.4	8.6	0.0013	3.6	76.5	20.3
	4.650	Culvert							
10-year	4.700	165.3	3.5	8.0	8.1	0.0006	2.3	72.8	26.3
25-year	4.700	218.4	3.5	8.9	9.0	0.0005	2.2	99.6	33.0
50-year	4.700	244.3	3.5	9.5	9.5	0.0004	2.1	118.3	954.3
100-year	4.700	290.3	3.5	10.1	10.1	0.0001	0.8	1101.4	974.6
10-year	4.800	165.3	3.6	8.1	8.2	0.0008	2.6	64.5	23.2
25-year	4.800	217.9	3.6	9.0	9.1	0.0006	2.5	93.2	60.8
50-year	4.800	244.4	3.6	9.5	9.5	0.0002	1.6	489.0	915.4
100-year	4.800	290.5	3.6	10.1	10.1	0.0001	1.0	1031.9	993.0

Existing Conditions - Spring/King Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-68.2	-2.6	5.8	-2.0	5.8	0.0000	-0.1	2533.2	579.0
25-year	0.000	-1.2	-2.6	5.8	-2.5	5.8	0.0000	0.0	2533.2	579.0
50-year	0.000	9.6	-2.6	5.8	-2.4	5.8	0.0000	0.0	2533.2	579.0
100-year	0.000	18.6	-2.6	5.8	-2.3	5.8	0.0000	0.0	2533.2	579.0
10-year	0.150	-39.8	-2.7	5.8		5.8	0.0000	0.0	3920.7	785.1
25-year	0.150	16.7	-2.7	5.8		5.8	0.0000	0.0	3920.5	785.0
50-year	0.150	32.5	-2.7	5.8		5.8	0.0000	0.0	3920.7	785.1
100-year	0.150	41.5	-2.7	5.8		5.8	0.0000	0.0	3920.7	785.1
10-year	0.300	-39.5	-2.7	5.8		5.8	0.0000	0.0	3748.0	736.0
25-year	0.300	20.1	-2.7	5.8		5.8	0.0000	0.0	3747.6	736.0
50-year	0.300	33.0	-2.7	5.8		5.8	0.0000	0.0	3747.9	736.0
100-year	0.300	46.0	-2.7	5.8		5.8	0.0000	0.0	3748.0	736.0
10-year	0.400	-35.7	-2.8	5.8		5.8	0.0000	0.0	3450.4	642.4
25-year	0.400	20.4	-2.8	5.8		5.8	0.0000	0.0	3449.9	642.4
50-year	0.400	36.4	-2.8	5.8		5.8	0.0000	0.0	3450.2	642.4
100-year	0.400	46.3	-2.8	5.8		5.8	0.0000	0.0	3450.3	642.4
10-year	0.500	-35.5	-2.8	5.8		5.8	0.0000	0.0	2306.0	483.0
25-year	0.500	22.5	-2.8	5.8		5.8	0.0000	0.0	2305.6	482.9
50-year	0.500	36.7	-2.8	5.8		5.8	0.0000	0.0	2305.9	482.9
100-year	0.500	49.1	-2.8	5.8		5.8	0.0000	0.0	2305.9	482.9
10-year	0.650	-32.8	-2.7	5.8		5.8	0.0000	0.0	2335.1	504.3
25-year	0.650	22.6	-2.7	5.8		5.8	0.0000	0.0	2334.6	504.2
50-year	0.650	38.7	-2.7	5.8		5.8	0.0000	0.0	2334.9	504.3
100-year	0.650	49.3	-2.7	5.8		5.8	0.0000	0.0	2335.0	504.3
10-year	0.750	-32.7	-2.6	5.8		5.8	0.0000	0.0	2124.5	510.9
25-year	0.750	24.1	-2.6	5.8		5.8	0.0000	0.0	2123.9	510.9
50-year	0.750	38.9	-2.6	5.8		5.8	0.0000	0.0	2124.2	510.9
100-year	0.750	51.3	-2.6	5.8		5.8	0.0000	0.0	2124.3	510.9
10-year	1.000	-30.5	-2.5	5.8		5.8	0.0000	0.0	2184.3	503.8
25-year	1.000	25.2	-2.5	5.8		5.8	0.0000	0.0	2183.8	503.7
50-year	1.000	40.3	-2.5	5.8		5.8	0.0000	0.0	2184.0	503.7
100-year	1.000	52.9	-2.5	5.8		5.8	0.0000	0.0	2184.2	503.7
10-year	1.075	-28.9	-2.5	5.8		5.8	0.0000	0.0	1943.4	583.6
25-year	1.075	25.4	-2.5	5.8		5.8	0.0000	0.0	1942.8	583.5
50-year	1.075	40.5	-2.5	5.8		5.8	0.0000	0.0	1943.1	583.5
100-year	1.075	53.0	-2.5	5.8		5.8	0.0000	0.0	1943.2	583.5
10-year	1.150	2.7	-2.5	5.8		5.8	0.0000	0.0	1668.8	579.3

25-year	1.150	26.0	-2.5	5.8	5.8	0.0000	0.0	1668.2	579.1
50-year	1.150	40.6	-2.5	5.8	5.8	0.0000	0.0	1668.5	579.2
100-year	1.150	53.2	-2.5	5.8	5.8	0.0000	0.1	1668.6	579.3
10-year	1.200	2.8	-2.5	5.8	5.8	0.0000	0.0	1684.8	563.9
25-year	1.200	26.0	-2.5	5.8	5.8	0.0000	0.0	1684.3	563.8
50-year	1.200	41.2	-2.5	5.8	5.8	0.0000	0.0	1684.5	563.9
100-year	1.200	53.9	-2.5	5.8	5.8	0.0000	0.1	1684.6	563.9
10-year	1.300	2.9	-2.5	5.8	5.8	0.0000	0.0	1368.8	592.5
25-year	1.300	26.5	-2.5	5.8	5.8	0.0000	0.0	1368.3	592.5
50-year	1.300	41.3	-2.5	5.8	5.8	0.0000	0.0	1368.5	592.5
100-year	1.300	54.0	-2.5	5.8	5.8	0.0000	0.1	1368.6	592.5
10-year	1.450	4.2	-2.5	5.8	5.8	0.0000	0.0	124.6	560.1
25-year	1.450	27.0	-2.5	5.8	5.8	0.0000	0.2	124.6	560.0
50-year	1.450	41.3	-2.5	5.8	5.8	0.0000	0.3	124.6	560.1
100-year	1.450	54.1	-2.5	5.8	5.8	0.0000	0.4	124.6	560.1
	1.485	Culvert							
10-year	1.520	68.4	-1.0	6.2	6.2	0.0000	0.6	106.1	564.0
25-year	1.520	81.4	-1.0	6.5	6.5	0.0000	0.7	110.4	572.2
50-year	1.520	89.9	-1.0	6.7	6.7	0.0000	0.8	113.7	585.0
100-year	1.520	135.6	-1.0	7.1	7.2	0.0000	1.1	120.8	598.4
10-year	1.570	60.5	0.7	6.2	6.2	0.0000	0.1	468.0	575.8
25-year	1.570	70.6	0.7	6.5	6.5	0.0000	0.1	494.3	613.6
50-year	1.570	76.9	0.7	6.7	6.7	0.0000	0.2	514.0	626.2
100-year	1.570	128.2	0.7	7.2	7.2	0.0000	0.2	557.5	643.7
10-year	1.620	53.9	0.7	6.2	6.2	0.0000	0.1	881.8	509.4
25-year	1.620	61.9	0.7	6.5	6.5	0.0000	0.1	934.4	561.0
50-year	1.620	66.5	0.7	6.7	6.7	0.0000	0.1	973.8	582.3
100-year	1.620	123.0	0.7	7.2	7.2	0.0000	0.1	1061.0	601.9
10-year	1.670	53.9	0.7	6.2	6.2	0.0000	0.1	1125.7	482.0
25-year	1.670	61.9	0.7	6.5	6.5	0.0000	0.1	1198.1	493.6
50-year	1.670	66.6	0.7	6.7	6.7	0.0000	0.1	1252.7	512.0
100-year	1.670	123.0	0.7	7.2	7.2	0.0000	0.1	1373.8	527.1
10-year	1.720	33.7	0.7	6.2	6.2	0.0000	0.0	1113.8	459.9
25-year	1.720	40.6	0.7	6.5	6.5	0.0000	0.0	1202.6	502.7
50-year	1.720	43.1	0.7	6.7	6.7	0.0000	0.0	1270.2	555.0
100-year	1.720	113.3	0.7	7.2	7.2	0.0000	0.1	1421.2	656.1
10-year	1.770	33.7	0.8	6.2	6.2	0.0000	0.1	994.3	510.1
25-year	1.770	40.6	0.8	6.5	6.5	0.0000	0.1	1092.5	548.2
50-year	1.770	43.0	0.8	6.7	6.7	0.0000	0.1	1167.0	556.5
100-year	1.770	113.3	0.8	7.2	7.2	0.0000	0.1	1334.5	625.4
10-year	1.820	33.7	0.8	6.2	6.2	0.0000	0.1	882.8	499.4
25-year	1.820	40.6	0.8	6.5	6.5	0.0000	0.1	1038.1	560.1

50-year	1.820	43.1	0.8	6.7	6.7	0.0000	0.1	1162.9	575.5
100-year	1.820	113.3	0.8	7.2	7.2	0.0000	0.1	1452.0	619.7
10-year	1.870	33.7	0.9	6.2	6.2	0.0000	0.1	781.7	501.1
25-year	1.870	40.6	0.9	6.5	6.5	0.0000	0.1	887.4	544.5
50-year	1.870	43.0	0.9	6.7	6.7	0.0000	0.1	973.8	573.8
100-year	1.870	113.3	0.9	7.2	7.2	0.0000	0.2	1176.7	618.1
10-year	1.920	33.6	0.9	6.2	6.2	0.0000	0.1	620.4	417.5
25-year	1.920	40.6	0.9	6.5	6.5	0.0000	0.1	700.9	540.9
50-year	1.920	43.1	0.9	6.7	6.7	0.0000	0.1	764.5	570.2
100-year	1.920	113.3	0.9	7.2	7.2	0.0000	0.2	914.9	650.5
10-year	1.970	33.6	1.0	6.2	6.2	0.0000	0.1	600.9	355.4
25-year	1.970	40.6	1.0	6.5	6.5	0.0000	0.1	674.9	418.0
50-year	1.970	43.1	1.0	6.7	6.7	0.0000	0.1	732.6	455.6
100-year	1.970	113.3	1.0	7.2	7.2	0.0000	0.3	865.8	510.4
10-year	2.020	33.5	1.1	6.2	6.2	0.0000	0.1	531.8	309.9
25-year	2.020	40.6	1.1	6.5	6.5	0.0000	0.1	613.8	380.9
50-year	2.020	43.1	1.1	6.7	6.7	0.0000	0.1	677.9	493.3
100-year	2.020	113.3	1.1	7.2	7.2	0.0000	0.3	834.3	597.1
10-year	2.070	33.4	1.1	6.2	6.2	0.0000	0.1	514.4	278.3
25-year	2.070	40.6	1.1	6.5	6.5	0.0000	0.1	600.6	369.5
50-year	2.070	43.1	1.1	6.7	6.7	0.0000	0.1	691.0	507.3
100-year	2.070	113.3	1.1	7.2	7.2	0.0000	0.2	940.7	623.7
10-year	2.120	33.4	1.1	6.2	6.2	0.0000	0.1	494.5	272.3
25-year	2.120	40.6	1.1	6.5	6.5	0.0000	0.1	573.1	316.7
50-year	2.120	43.2	1.1	6.7	6.7	0.0000	0.1	638.9	363.0
100-year	2.120	113.3	1.1	7.2	7.2	0.0000	0.3	816.5	566.1
10-year	2.170	33.3	1.1	6.2	6.2	0.0000	0.1	483.3	301.2
25-year	2.170	40.6	1.1	6.5	6.5	0.0000	0.1	562.6	368.5
50-year	2.170	43.2	1.1	6.7	6.7	0.0000	0.1	623.9	430.1
100-year	2.170	113.3	1.1	7.2	7.2	0.0000	0.3	765.6	602.6
10-year	2.220	33.3	1.2	6.2	6.2	0.0000	0.1	488.4	319.9
25-year	2.220	40.6	1.2	6.5	6.5	0.0000	0.1	566.9	356.9
50-year	2.220	43.2	1.2	6.7	6.7	0.0000	0.1	627.3	416.9
100-year	2.220	113.3	1.2	7.2	7.2	0.0000	0.3	785.2	735.2
10-year	2.270	33.2	1.2	6.2	6.2	0.0000	0.1	514.8	290.9
25-year	2.270	40.6	1.2	6.5	6.5	0.0000	0.1	603.5	354.3
50-year	2.270	43.2	1.2	6.7	6.7	0.0000	0.1	678.0	466.9
100-year	2.270	113.3	1.2	7.2	7.2	0.0000	0.2	864.2	717.5
10-year	2.320	33.3	1.4	6.2	6.2	0.0000	0.1	440.9	309.3
25-year	2.320	40.7	1.4	6.5	6.5	0.0000	0.2	537.2	391.5
50-year	2.320	43.2	1.4	6.7	6.7	0.0000	0.1	617.6	430.9
100-year	2.320	113.3	1.4	7.2	7.2	0.0000	0.3	808.3	683.0

10-year	2.370	33.3	1.7	6.2	6.2	0.0000	0.2	423.5	308.3
25-year	2.370	40.7	1.7	6.5	6.5	0.0000	0.2	510.9	350.1
50-year	2.370	43.2	1.7	6.7	6.7	0.0000	0.2	582.3	403.0
100-year	2.370	113.4	1.7	7.2	7.2	0.0000	0.4	755.2	597.9
10-year	2.420	33.3	1.8	6.2	6.2	0.0000	0.2	375.6	294.0
25-year	2.420	40.7	1.8	6.5	6.5	0.0000	0.2	465.6	382.2
50-year	2.420	43.2	1.8	6.7	6.7	0.0000	0.2	540.9	447.0
100-year	2.420	113.4	1.8	7.2	7.2	0.0000	0.4	727.0	583.6
10-year	2.470	33.3	1.8	6.2	6.2	0.0000	0.2	321.3	254.6
25-year	2.470	40.7	1.8	6.5	6.5	0.0000	0.2	403.9	418.7
50-year	2.470	43.1	1.8	6.7	6.7	0.0000	0.2	482.8	439.9
100-year	2.470	113.5	1.8	7.2	7.2	0.0000	0.4	665.5	489.4
10-year	2.520	33.3	1.8	6.2	6.2	0.0000	0.3	268.4	265.7
25-year	2.520	40.7	1.8	6.5	6.5	0.0000	0.2	347.4	316.6
50-year	2.520	43.1	1.8	6.7	6.7	0.0000	0.2	415.6	344.2
100-year	2.520	113.6	1.8	7.2	7.2	0.0000	0.4	594.0	462.4
10-year	2.570	16.8	2.0	6.2	6.2	0.0000	0.2	229.0	269.4
25-year	2.570	18.3	2.0	6.5	6.5	0.0000	0.1	306.6	315.0
50-year	2.570	18.3	2.0	6.7	6.7	0.0000	0.1	380.9	415.6
100-year	2.570	101.0	2.0	7.2	7.2	0.0000	0.4	573.9	486.8
10-year	2.620	16.8	1.4	6.2	6.2	0.0000	0.1	286.4	213.3
25-year	2.620	18.3	1.4	6.5	6.5	0.0000	0.1	356.1	287.8
50-year	2.620	18.3	1.4	6.7	6.7	0.0000	0.1	428.9	374.6
100-year	2.620	101.1	1.4	7.2	7.2	0.0000	0.3	663.6	540.3
	2.650	Culvert							
10-year	2.675	24.3	1.6	6.6	6.6	0.0000	0.1	348.2	325.9
25-year	2.675	45.2	1.6	7.3	7.3	0.0000	0.1	628.0	481.6
50-year	2.675	67.9	1.6	7.8	7.8	0.0000	0.2	979.4	801.6
100-year	2.675	146.1	1.6	8.1	8.1	0.0000	0.3	1183.0	932.2
10-year	2.725	21.6	1.0	6.6	6.6	0.0000	0.0	827.5	266.0
25-year	2.725	43.6	1.0	7.3	7.3	0.0000	0.1	1060.9	414.2
50-year	2.725	64.6	1.0	7.8	7.8	0.0000	0.1	1325.0	553.9
100-year	2.725	141.0	1.0	8.1	8.1	0.0000	0.1	1462.0	588.7
10-year	2.775	21.6	1.6	6.6	6.6	0.0000	0.0	997.5	343.8
25-year	2.775	43.6	1.6	7.3	7.3	0.0000	0.0	1264.4	415.7
50-year	2.775	64.6	1.6	7.8	7.8	0.0000	0.1	1504.3	468.0
100-year	2.775	141.0	1.6	8.1	8.1	0.0000	0.1	1621.4	533.8
10-year	2.825	21.6	1.5	6.6	6.6	0.0000	0.0	825.5	357.5
25-year	2.825	43.6	1.5	7.3	7.3	0.0000	0.0	974.8	416.8
50-year	2.825	64.6	1.5	7.8	7.8	0.0000	0.1	1257.0	470.5
100-year	2.825	141.0	1.5	8.1	8.1	0.0000	0.1	1545.2	484.6
10-year	2.875	21.6	1.1	6.6	6.6	0.0000	0.0	824.3	334.8

25-year	2.875	43.6	1.1	7.3	7.3	0.0000	0.0	977.9	406.7
50-year	2.875	64.6	1.1	7.8	7.8	0.0000	0.1	1252.8	488.4
100-year	2.875	141.0	1.1	8.1	8.1	0.0000	0.1	1530.7	547.1
10-year	2.925	21.6	1.9	6.6	6.6	0.0000	0.0	679.6	360.0
25-year	2.925	43.6	1.9	7.3	7.3	0.0000	0.1	827.5	464.7
50-year	2.925	64.6	1.9	7.8	7.8	0.0000	0.1	1169.1	534.9
100-year	2.925	141.1	1.9	8.1	8.1	0.0000	0.1	1483.6	564.8
10-year	2.975	21.6	1.9	6.6	6.6	0.0000	0.3	72.1	258.5
25-year	2.975	43.6	1.9	7.3	7.3	0.0000	0.3	356.3	398.0
50-year	2.975	64.6	1.9	7.8	7.8	0.0000	0.3	515.5	581.2
100-year	2.975	141.0	1.9	8.1	8.1	0.0000	0.6	602.3	703.6
10-year	3.025	21.6	1.9	6.6	6.6	0.0000	0.3	71.3	234.9
25-year	3.025	43.6	1.9	7.3	7.3	0.0000	0.3	311.2	375.3
50-year	3.025	64.6	1.9	7.8	7.8	0.0000	0.3	476.3	512.4
100-year	3.025	141.1	1.9	8.1	8.1	0.0000	0.7	551.9	620.5
10-year	3.075	20.1	1.9	6.6	6.6	0.0000	0.3	73.5	142.6
25-year	3.075	42.7	1.9	7.3	7.3	0.0000	0.5	88.4	393.9
50-year	3.075	62.7	1.9	7.8	7.8	0.0000	0.4	466.4	587.7
100-year	3.075	138.2	1.9	8.1	8.1	0.0000	0.7	559.7	658.8
10-year	3.125	20.1	1.9	6.6	6.6	0.0000	0.3	69.2	208.6
25-year	3.125	42.7	1.9	7.3	7.3	0.0000	0.4	282.8	527.3
50-year	3.125	62.7	1.9	7.8	7.8	0.0000	0.3	757.9	647.5
100-year	3.125	138.3	1.9	8.1	8.1	0.0000	0.5	917.3	685.7
	3.150	Culvert							
10-year	3.175	20.2	2.0	6.7	6.7	0.0000	0.3	64.3	17.6
25-year	3.175	43.3	2.0	7.6	7.6	0.0000	0.5	187.5	797.2
50-year	3.175	62.9	2.0	7.9	7.9	0.0000	0.5	261.6	965.4
100-year	3.175	139.2	2.0	8.1	8.1	0.0000	0.6	929.7	1054.5
10-year	3.225	19.5	2.1	6.7	6.7	0.0000	0.3	60.1	16.2
25-year	3.225	42.8	2.1	7.6	7.6	0.0000	0.6	77.0	518.9
50-year	3.225	62.1	2.1	7.9	7.9	0.0000	0.8	88.7	639.9
100-year	3.225	137.8	2.1	8.1	8.1	0.0002	1.6	118.8	1061.8
10-year	3.275	18.2	2.2	6.7	6.7	0.0000	0.3	68.4	20.3
25-year	3.275	41.9	2.2	7.6	7.6	0.0000	0.5	91.3	838.9
50-year	3.275	60.5	2.2	7.9	7.9	0.0000	0.6	109.1	896.0
100-year	3.275	134.9	2.2	8.1	8.1	0.0001	1.3	139.7	1048.5
10-year	3.325	18.2	2.2	6.7	6.7	0.0000	0.3	68.0	20.4
25-year	3.325	41.9	2.2	7.6	7.6	0.0000	0.5	87.2	1011.8
50-year	3.325	60.5	2.2	7.9	7.9	0.0000	0.7	93.7	1035.6
100-year	3.325	136.0	2.2	8.1	8.1	0.0001	1.4	99.1	1057.3
	3.350	Culvert							

10-year	3.385	24.8	2.3	8.7	8.7	0.0000	0.0	1536.1	1120.6
25-year	3.385	43.9	2.3	9.0	9.0	0.0000	0.1	1783.4	1154.3
50-year	3.385	63.4	2.3	9.0	9.0	0.0000	0.1	1806.5	1157.5
100-year	3.385	185.2	2.3	9.0	9.0	0.0000	0.2	2194.7	1160.2
10-year	3.435	24.8	2.5	8.7	8.7	0.0000	0.0	1931.1	1113.0
25-year	3.435	43.9	2.5	9.0	9.0	0.0000	0.1	2233.7	1131.8
50-year	3.435	63.4	2.5	9.0	9.0	0.0000	0.1	2262.1	1133.6
100-year	3.435	185.1	2.5	9.0	9.0	0.0000	0.2	2290.6	1135.2
10-year	3.485	24.8	2.7	8.7	8.7	0.0000	0.0	1595.2	991.4
25-year	3.485	43.9	2.7	9.0	9.0	0.0000	0.1	1865.3	1011.6
50-year	3.485	63.6	2.7	9.0	9.0	0.0000	0.1	1890.6	1013.5
100-year	3.485	184.9	2.7	9.0	9.0	0.0000	0.2	1916.3	1015.1
10-year	3.560	24.9	2.9	8.7	8.7	0.0000	0.0	1506.3	939.4
25-year	3.560	43.9	2.9	9.0	9.0	0.0000	0.1	1762.3	959.6
50-year	3.560	63.7	2.9	9.0	9.0	0.0000	0.1	1786.4	961.5
100-year	3.560	184.8	2.9	9.0	9.0	0.0000	0.2	1811.0	963.2
10-year	3.635	24.9	3.1	8.7	8.7	0.0000	0.0	1413.8	886.7
25-year	3.635	43.9	3.1	9.0	9.0	0.0000	0.1	1656.2	910.9
50-year	3.635	63.7	3.1	9.0	9.0	0.0000	0.1	1679.1	913.2
100-year	3.635	184.3	3.1	9.0	9.0	0.0000	0.2	1702.8	915.3
10-year	3.710	24.9	3.3	8.7	8.7	0.0000	0.0	1318.8	826.7
25-year	3.710	43.8	3.3	9.0	9.0	0.0000	0.1	1545.0	850.9
50-year	3.710	63.6	3.3	9.0	9.0	0.0000	0.1	1566.4	853.2
100-year	3.710	184.1	3.3	9.0	9.0	0.0000	0.3	1588.9	855.5
10-year	3.785	24.9	3.5	8.7	8.7	0.0000	0.0	1231.1	754.1
25-year	3.785	43.9	3.5	9.0	9.0	0.0000	0.1	1439.2	789.1
50-year	3.785	63.7	3.5	9.0	9.0	0.0000	0.1	1459.1	792.4
100-year	3.785	183.8	3.5	9.0	9.0	0.0000	0.3	1480.4	795.6
10-year	3.850	24.9	3.7	8.7	8.7	0.0000	0.1	722.1	681.9
25-year	3.850	43.9	3.7	9.0	9.0	0.0000	0.1	909.8	710.3
50-year	3.850	63.8	3.7	9.0	9.0	0.0000	0.1	927.7	712.9
100-year	3.850	199.1	3.7	9.0	9.0	0.0000	0.3	948.1	795.3
10-year	3.925	24.9	3.7	8.7	8.7	0.0000	0.1	539.5	658.7
25-year	3.925	43.8	3.7	9.0	9.0	0.0000	0.1	730.4	756.6
50-year	3.925	103.9	3.7	9.0	9.0	0.0000	0.3	750.1	766.0
100-year	3.925	200.8	3.7	9.0	9.0	0.0001	0.6	773.5	774.8
10-year	4.000	24.9	3.7	8.7	8.7	0.0000	0.1	464.6	629.0
25-year	4.000	43.9	3.7	9.0	9.0	0.0000	0.1	646.7	720.8
50-year	4.000	105.4	3.7	9.0	9.0	0.0000	0.3	666.6	730.1
100-year	4.000	204.2	3.7	9.0	9.0	0.0001	0.6	692.6	738.4
10-year	4.075	24.9	3.6	8.7	8.7	0.0000	0.2	140.3	87.9
25-year	4.075	44.0	3.6	9.0	9.0	0.0000	0.3	166.6	107.2
50-year	4.075	107.1	3.6	9.0	9.0	0.0002	0.8	170.0	109.4

100-year	4.075	208.1	3.6	9.0	9.1	0.0007	1.5	194.7	713.7
10-year	4.150	25.1	3.6	8.7	8.7	0.0000	0.2	121.4	95.4
25-year	4.150	44.2	3.6	9.0	9.0	0.0001	0.3	156.9	164.4
50-year	4.150	113.3	3.6	9.0	9.0	0.0003	0.9	166.5	779.4
100-year	4.150	218.3	3.6	9.1	9.1	0.0010	1.5	234.4	784.4
10-year	4.225	25.5	3.6	8.7	8.7	0.0000	0.2	111.0	34.9
25-year	4.225	44.4	3.6	9.0	9.0	0.0001	0.4	120.8	37.0
50-year	4.225	118.1	3.6	9.0	9.0	0.0004	1.0	141.8	718.0
100-year	4.225	232.2	3.6	9.2	9.2	0.0011	1.6	244.5	747.0
10-year	4.300	25.7	3.7	8.7	8.7	0.0000	0.3	99.9	31.4
25-year	4.300	45.7	3.7	9.0	9.0	0.0001	0.4	108.8	33.3
50-year	4.300	133.4	3.7	9.1	9.1	0.0006	1.2	139.7	506.5
100-year	4.300	233.1	3.7	9.3	9.3	0.0013	1.7	243.7	609.8
10-year	4.375	27.0	3.8	8.7	8.7	0.0000	0.3	93.8	28.8
25-year	4.375	47.1	3.8	9.0	9.0	0.0001	0.5	102.1	30.6
50-year	4.375	133.6	3.8	9.1	9.1	0.0006	1.2	164.5	613.8
100-year	4.375	286.8	3.8	9.4	9.4	0.0015	1.9	324.4	658.5
10-year	4.450	27.1	3.8	8.7	8.7	0.0001	0.4	77.6	26.2
25-year	4.450	48.5	3.8	9.0	9.0	0.0002	0.6	85.3	27.9
50-year	4.450	247.2	3.8	9.2	9.3	0.0021	2.1	246.4	695.5
100-year	4.450	295.1	3.8	9.5	9.5	0.0013	1.7	408.9	722.2
10-year	4.525	29.1	3.9	8.7	8.7	0.0001	0.4	73.3	23.8
25-year	4.525	206.5	3.9	9.1	9.2	0.0022	2.2	186.7	756.0
50-year	4.525	256.9	3.9	9.4	9.4	0.0014	1.8	362.8	773.4
100-year	4.525	299.5	3.9	9.6	9.6	0.0010	1.5	504.4	787.2
10-year	4.600	163.5	4.0	8.8	8.9	0.0021	2.1	76.5	22.0
25-year	4.600	212.5	4.0	9.3	9.3	0.0014	1.8	283.2	762.8
50-year	4.600	261.0	4.0	9.5	9.5	0.0010	1.6	430.3	777.1
100-year	4.600	307.3	4.0	9.6	9.6	0.0008	1.4	554.6	788.9
	4.650	Culvert							
10-year	4.700	166.0	3.5	10.2	10.2	0.0000	0.2	1219.1	981.3
25-year	4.700	207.3	3.5	10.2	10.2	0.0000	0.3	1247.0	982.9
50-year	4.700	221.9	3.5	10.2	10.2	0.0000	0.3	1258.7	983.5
100-year	4.700	229.9	3.5	10.3	10.3	0.0000	0.3	1266.4	984.0
10-year	4.800	165.9	3.6	10.2	10.2	0.0000	0.3	1149.6	1005.0
25-year	4.800	212.7	3.6	10.2	10.2	0.0000	0.4	1180.0	1007.6
50-year	4.800	231.8	3.6	10.3	10.3	0.0000	0.4	1193.3	1008.8
100-year	4.800	245.6	3.6	10.3	10.3	0.0000	0.4	1202.5	1009.6

Proposed Conditions - Spring/King Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-36.8	-2.6	5.8	-2.2	5.8	0.0000	0.0	2533.2	579.0
25-year	0.000	-39.5	-2.6	5.8	-2.1	5.8	0.0000	0.0	2533.2	579.0
50-year	0.000	-39.5	-2.6	5.8	-2.1	5.8	0.0000	0.0	2533.2	579.0
100-year	0.000	114.4	-2.6	5.8	-1.8	5.8	0.0000	0.1	2533.2	579.0
10-year	0.150	-9.8	-2.7	5.8		5.8	0.0000	0.0	3920.7	785.1
25-year	0.150	-16.6	-2.7	5.8		5.8	0.0000	0.0	3920.5	785.1
50-year	0.150	-16.6	-2.7	5.8		5.8	0.0000	0.0	3920.5	785.1
100-year	0.150	151.8	-2.7	5.8		5.8	0.0000	0.1	3920.2	785.0
10-year	0.300	-9.5	-2.7	5.8		5.8	0.0000	0.0	3748.0	736.0
25-year	0.300	-9.3	-2.7	5.8		5.8	0.0000	0.0	3747.7	736.0
50-year	0.300	-9.3	-2.7	5.8		5.8	0.0000	0.0	3747.7	736.0
100-year	0.300	151.9	-2.7	5.8		5.8	0.0000	0.1	3747.2	736.0
10-year	0.400	-8.9	-2.8	5.8		5.8	0.0000	0.0	3450.3	642.4
25-year	0.400	-9.1	-2.8	5.8		5.8	0.0000	0.0	3450.1	642.4
50-year	0.400	-9.1	-2.8	5.8		5.8	0.0000	0.0	3450.1	642.4
100-year	0.400	151.9	-2.8	5.8		5.8	0.0000	0.1	3449.5	642.4
10-year	0.500	-5.9	-2.8	5.8		5.8	0.0000	0.0	2306.0	482.9
25-year	0.500	-8.6	-2.8	5.8		5.8	0.0000	0.0	2305.8	482.9
50-year	0.500	-8.6	-2.8	5.8		5.8	0.0000	0.0	2305.8	482.9
100-year	0.500	146.5	-2.8	5.8		5.8	0.0000	0.1	2305.3	482.8
10-year	0.650	-3.6	-2.7	5.8		5.8	0.0000	0.0	2335.0	504.3
25-year	0.650	-4.1	-2.7	5.8		5.8	0.0000	0.0	2334.8	504.3
50-year	0.650	74.7	-2.7	5.8		5.8	0.0000	0.1	2334.8	504.3
100-year	0.650	146.7	-2.7	5.8		5.8	0.0000	0.1	2334.4	504.2
10-year	0.750	-3.5	-2.6	5.8		5.8	0.0000	0.0	2124.4	510.9
25-year	0.750	-4.0	-2.6	5.8		5.8	0.0000	0.0	2124.2	510.9
50-year	0.750	75.4	-2.6	5.8		5.8	0.0000	0.1	2124.5	510.9
100-year	0.750	146.9	-2.6	5.8		5.8	0.0000	0.1	2123.7	510.9
10-year	1.000	-1.7	-2.5	5.8		5.8	0.0000	0.0	2184.2	503.7
25-year	1.000	-3.5	-2.5	5.8		5.8	0.0000	0.0	2184.0	503.7
50-year	1.000	76.5	-2.5	5.8		5.8	0.0000	0.1	2184.9	503.8
100-year	1.000	94.5	-2.5	5.8		5.8	0.0000	0.1	2183.8	503.7
10-year	1.075	-1.4	-2.5	5.8		5.8	0.0000	0.0	1943.2	583.5
25-year	1.075	-2.8	-2.5	5.8		5.8	0.0000	0.0	1943.1	583.5
50-year	1.075	76.9	-2.5	5.8		5.8	0.0000	0.1	1944.2	583.7
100-year	1.075	96.0	-2.5	5.8		5.8	0.0000	0.1	1943.1	583.5
10-year	1.150	-0.5	-2.5	5.8		5.8	0.0000	0.0	1668.6	579.3

25-year	1.150	-0.5	-2.5	5.8		5.8	0.0000	0.0	1668.5	579.2
50-year	1.150	68.5	-2.5	5.8		5.8	0.0000	0.1	1669.7	579.6
100-year	1.150	97.1	-2.5	5.8		5.8	0.0000	0.1	1668.6	579.3
10-year	1.200	-0.4	-2.5	5.8		5.8	0.0000	0.0	1684.6	563.9
25-year	1.200	-0.4	-2.5	5.8		5.8	0.0000	0.0	1684.6	563.9
50-year	1.200	69.1	-2.5	5.8		5.8	0.0000	0.1	1685.8	563.9
100-year	1.200	97.7	-2.5	5.8		5.8	0.0000	0.1	1684.7	563.9
10-year	1.300	-0.2	-2.5	5.8		5.8	0.0000	0.0	1368.5	592.5
25-year	1.300	-0.2	-2.5	5.8		5.8	0.0000	0.0	1368.5	592.5
50-year	1.300	62.0	-2.5	5.8		5.8	0.0000	0.1	1369.7	592.6
100-year	1.300	98.5	-2.5	5.8		5.8	0.0000	0.1	1368.8	592.5
10-year	1.450	0.0	-2.5	5.8		5.8	0.0000	0.0	285.1	560.1
25-year	1.450	0.0	-2.5	5.8		5.8	0.0000	0.0	285.1	560.1
50-year	1.450	55.1	-2.5	5.8		5.8	0.0000	0.2	285.4	560.4
100-year	1.450	98.8	-2.5	5.8		5.8	0.0000	0.4	285.2	560.2
	1.485	Inl Struct								
10-year	1.520	157.3	-1.0	5.8	0.5	5.8	0.0000	1.0	153.1	550.8
25-year	1.520	203.2	-1.0	6.1	0.7	6.1	0.0000	1.3	160.1	561.2
50-year	1.520	227.9	-1.0	6.3	0.8	6.3	0.0000	1.4	165.3	567.4
100-year	1.520	260.2	-1.0	6.5	0.9	6.6	0.0000	1.5	171.4	576.3
10-year	1.570	149.9	0.7	5.8		5.8	0.0000	0.4	433.2	553.0
25-year	1.570	193.7	0.7	6.1		6.1	0.0000	0.4	460.2	572.2
50-year	1.570	211.9	0.7	6.3		6.3	0.0000	0.4	480.2	584.5
100-year	1.570	233.8	0.7	6.6		6.6	0.0000	0.5	503.9	617.6
10-year	1.620	160.1	0.7	5.8		5.8	0.0000	0.2	812.6	501.6
25-year	1.620	183.4	0.7	6.1		6.1	0.0000	0.2	866.7	507.8
50-year	1.620	197.8	0.7	6.3		6.3	0.0000	0.2	906.7	538.7
100-year	1.620	211.4	0.7	6.6		6.6	0.0000	0.2	954.2	577.7
10-year	1.670	149.9	0.7	5.8		5.8	0.0000	0.2	1031.5	470.8
25-year	1.670	183.5	0.7	6.1		6.1	0.0000	0.2	1105.2	479.5
50-year	1.670	197.8	0.7	6.3		6.3	0.0000	0.2	1159.9	485.1
100-year	1.670	211.5	0.7	6.6		6.6	0.0000	0.2	1225.6	508.6
10-year	1.720	130.2	0.7	5.8		5.8	0.0000	0.2	1000.2	434.0
25-year	1.720	160.5	0.7	6.1		6.1	0.0000	0.2	1088.8	456.3
50-year	1.720	167.3	0.7	6.3		6.3	0.0000	0.2	1155.6	472.5
100-year	1.720	171.4	0.7	6.6		6.6	0.0000	0.2	1236.7	535.3
10-year	1.770	131.4	0.8	5.8		5.8	0.0000	0.2	868.6	397.9
25-year	1.770	160.5	0.8	6.1		6.1	0.0000	0.2	966.6	494.0
50-year	1.770	167.3	0.8	6.3		6.3	0.0000	0.2	1040.6	538.0
100-year	1.770	171.4	0.8	6.6		6.6	0.0000	0.2	1130.0	551.4
10-year	1.820	132.4	0.8	5.8		5.8	0.0000	0.3	711.3	385.6
25-year	1.820	160.6	0.8	6.1		6.1	0.0000	0.3	842.1	477.9

50-year	1.820	167.3	0.8	6.3	6.3	0.0000	0.3	954.5	529.1
100-year	1.820	171.4	0.8	6.6	6.6	0.0000	0.3	1100.9	570.8
10-year	1.870	133.4	0.9	5.8	5.8	0.0000	0.3	659.0	392.1
25-year	1.870	160.6	0.9	6.1	6.1	0.0000	0.3	753.4	489.0
50-year	1.870	167.4	0.9	6.3	6.3	0.0000	0.3	830.4	514.9
100-year	1.870	171.4	0.9	6.6	6.6	0.0000	0.3	930.6	559.7
10-year	1.920	134.3	0.9	5.8	5.8	0.0000	0.4	521.1	322.6
25-year	1.920	160.6	0.9	6.1	6.1	0.0000	0.4	598.6	397.9
50-year	1.920	167.4	0.9	6.3	6.3	0.0000	0.4	657.7	479.6
100-year	1.920	171.4	0.9	6.6	6.6	0.0000	0.4	732.8	556.8
10-year	1.970	135.0	1.0	5.8	5.8	0.0000	0.5	507.2	275.2
25-year	1.970	160.6	1.0	6.1	6.1	0.0000	0.5	580.5	340.7
50-year	1.970	167.8	1.0	6.3	6.3	0.0000	0.5	635.7	392.2
100-year	1.970	171.4	1.0	6.6	6.6	0.0000	0.5	704.1	435.2
10-year	2.020	135.7	1.1	5.8	5.8	0.0000	0.5	433.2	258.9
25-year	2.020	160.6	1.1	6.1	6.1	0.0000	0.5	509.2	300.0
50-year	2.020	167.8	1.1	6.3	6.3	0.0000	0.5	570.7	360.2
100-year	2.020	171.4	1.1	6.6	6.6	0.0000	0.5	646.0	442.1
10-year	2.070	136.4	1.1	5.8	5.8	0.0000	0.5	416.4	264.2
25-year	2.070	160.4	1.1	6.1	6.1	0.0000	0.5	493.1	275.2
50-year	2.070	167.8	1.1	6.3	6.3	0.0000	0.5	552.6	312.6
100-year	2.070	171.4	1.1	6.6	6.6	0.0000	0.5	644.2	460.2
10-year	2.120	137.0	1.1	5.8	5.8	0.0000	0.5	401.3	238.0
25-year	2.120	160.4	1.1	6.1	6.1	0.0000	0.5	473.8	270.2
50-year	2.120	167.8	1.1	6.3	6.3	0.0000	0.5	531.2	290.4
100-year	2.120	171.4	1.1	6.6	6.6	0.0000	0.5	606.3	348.6
10-year	2.170	137.7	1.1	5.8	5.8	0.0000	0.5	394.3	217.7
25-year	2.170	160.4	1.1	6.1	6.1	0.0000	0.5	463.2	279.2
50-year	2.170	168.0	1.1	6.3	6.3	0.0000	0.5	521.4	329.0
100-year	2.170	171.5	1.1	6.6	6.6	0.0000	0.5	594.1	391.1
10-year	2.220	138.9	1.2	5.8	5.8	0.0000	0.6	390.8	251.0
25-year	2.220	160.3	1.2	6.1	6.1	0.0000	0.6	467.5	302.4
50-year	2.220	168.0	1.2	6.3	6.3	0.0000	0.5	526.5	336.5
100-year	2.220	171.5	1.2	6.6	6.6	0.0000	0.5	597.9	379.4
10-year	2.270	139.4	1.2	5.8	5.8	0.0000	0.6	417.2	246.3
25-year	2.270	160.3	1.2	6.1	6.1	0.0000	0.6	493.3	281.3
50-year	2.270	168.1	1.2	6.3	6.3	0.0000	0.5	556.1	311.8
100-year	2.270	171.5	1.2	6.6	6.6	0.0000	0.5	642.2	401.4
10-year	2.320	139.9	1.4	5.8	5.8	0.0000	0.7	337.2	262.0
25-year	2.320	160.1	1.4	6.1	6.1	0.0000	0.7	418.4	301.4
50-year	2.320	168.1	1.4	6.3	6.3	0.0000	0.7	485.6	366.7
100-year	2.320	171.6	1.4	6.6	6.6	0.0000	0.6	578.8	407.4

10-year	2.370	140.4	1.7	5.8	5.8	0.0001	0.9	329.4	249.0
25-year	2.370	160.1	1.7	6.1	6.1	0.0000	0.8	402.4	286.6
50-year	2.370	168.3	1.7	6.3	6.3	0.0000	0.8	466.2	329.9
100-year	2.370	171.6	1.7	6.6	6.6	0.0000	0.7	547.9	380.2
10-year	2.420	140.7	1.8	5.8	5.8	0.0001	1.0	278.8	256.3
25-year	2.420	159.9	1.8	6.1	6.1	0.0001	0.9	355.3	283.1
50-year	2.420	168.3	1.8	6.3	6.3	0.0001	0.9	418.2	342.2
100-year	2.420	171.7	1.8	6.6	6.6	0.0000	0.8	505.1	425.5
10-year	2.470	141.1	1.8	5.8	5.8	0.0002	1.2	238.2	231.3
25-year	2.470	160.0	1.8	6.1	6.1	0.0001	1.1	305.0	250.7
50-year	2.470	168.4	1.8	6.3	6.3	0.0001	1.0	358.6	326.8
100-year	2.470	171.7	1.8	6.6	6.6	0.0001	0.9	446.6	433.3
10-year	2.520	141.6	1.8	5.8	5.8	0.0003	1.4	183.6	231.6
25-year	2.520	160.1	1.8	6.1	6.1	0.0002	1.3	252.3	262.5
50-year	2.520	168.4	1.8	6.3	6.3	0.0001	1.1	308.1	287.7
100-year	2.520	171.8	1.8	6.6	6.6	0.0001	0.9	384.9	332.7
10-year	2.570	127.7	2.0	5.8	5.9	0.0004	1.6	146.3	233.2
25-year	2.570	132.8	2.0	6.1	6.1	0.0002	1.3	215.6	266.1
50-year	2.570	135.1	2.0	6.3	6.3	0.0001	1.1	271.5	285.3
100-year	2.570	127.1	2.0	6.6	6.6	0.0001	0.8	348.0	392.6
10-year	2.620	128.0	1.4	5.9	5.9	0.0001	0.6	224.7	170.1
25-year	2.620	133.6	1.4	6.1	6.1	0.0001	0.6	277.8	207.5
50-year	2.620	135.6	1.4	6.3	6.4	0.0001	0.5	324.7	238.5
100-year	2.620	127.2	1.4	6.6	6.6	0.0000	0.4	398.1	341.0
	2.650	Culvert							
10-year	2.675	133.9	1.6	6.2	6.2	0.0001	0.7	243.9	233.8
25-year	2.675	149.8	1.6	6.6	6.6	0.0000	0.7	340.4	321.3
50-year	2.675	158.2	1.6	6.8	6.8	0.0000	0.7	419.7	358.0
100-year	2.675	174.0	1.6	7.0	7.1	0.0000	0.6	516.2	405.0
10-year	2.725	130.4	0.0	6.2	6.2	0.0000	0.1	968.2	228.4
25-year	2.725	145.1	0.0	6.6	6.6	0.0000	0.1	1054.1	264.2
50-year	2.725	152.7	0.0	6.8	6.8	0.0000	0.1	1119.1	303.7
100-year	2.725	168.1	0.0	7.0	7.0	0.0000	0.2	1200.3	335.6
10-year	2.775	130.4	0.0	6.2	6.2	0.0000	0.1	1137.5	280.5
25-year	2.775	145.2	0.0	6.6	6.6	0.0000	0.1	1248.1	341.7
50-year	2.775	152.8	0.0	6.8	6.8	0.0000	0.1	1329.6	359.5
100-year	2.775	168.1	0.0	7.0	7.1	0.0000	0.1	1423.9	381.2
10-year	2.825	130.5	0.0	6.2	6.2	0.0000	0.1	1123.1	294.0
25-year	2.825	145.2	0.0	6.6	6.6	0.0000	0.1	1195.8	355.5
50-year	2.825	152.8	0.0	6.8	6.8	0.0000	0.1	1244.2	379.2
100-year	2.825	168.1	0.0	7.0	7.1	0.0000	0.1	1297.3	397.1
10-year	2.875	130.5	0.0	6.2	6.2	0.0000	0.1	1175.4	304.0

25-year	2.875	145.2	0.0	6.6	6.6	0.0000	0.1	1250.1	333.6
50-year	2.875	152.8	0.0	6.8	6.8	0.0000	0.1	1300.0	352.2
100-year	2.875	168.2	0.0	7.0	7.1	0.0000	0.1	1354.6	385.3
10-year	2.925	130.5	1.0	6.2	6.2	0.0000	0.2	851.5	294.3
25-year	2.925	145.2	1.0	6.6	6.6	0.0000	0.2	923.5	359.1
50-year	2.925	152.8	1.0	6.8	6.8	0.0000	0.2	971.5	383.6
100-year	2.925	168.2	1.0	7.0	7.1	0.0000	0.2	1024.0	430.1
10-year	2.975	130.5	1.9	6.2	6.3	0.0004	2.0	64.9	164.5
25-year	2.975	145.3	1.9	6.6	6.6	0.0004	2.0	72.0	257.2
50-year	2.975	153.0	1.9	6.8	6.9	0.0004	2.0	76.7	318.0
100-year	2.975	168.2	1.9	7.0	7.1	0.0002	1.4	286.9	380.3
10-year	3.025	130.5	1.9	6.3	6.3	0.0004	2.0	64.6	83.5
25-year	3.025	145.4	1.9	6.6	6.7	0.0004	2.0	71.6	239.1
50-year	3.025	153.5	1.9	6.8	6.9	0.0004	2.0	76.2	291.8
100-year	3.025	168.5	1.9	7.1	7.1	0.0004	2.1	81.2	327.8
10-year	3.075	128.3	1.9	6.3	6.3	0.0004	1.9	67.3	85.5
25-year	3.075	142.5	1.9	6.6	6.7	0.0003	1.9	74.4	153.7
50-year	3.075	150.5	1.9	6.8	6.9	0.0003	1.9	79.0	208.4
100-year	3.075	165.7	1.9	7.1	7.1	0.0003	2.0	83.7	300.4
10-year	3.125	128.3	1.9	6.3	6.4	0.0004	2.0	63.6	178.1
25-year	3.125	142.6	1.9	6.6	6.7	0.0004	2.0	70.3	218.2
50-year	3.125	151.6	1.9	6.9	6.9	0.0004	2.0	75.2	300.6
100-year	3.125	168.9	1.9	7.1	7.2	0.0002	1.6	238.8	465.0
	3.150	Culvert							
10-year	3.175	128.7	2.0	6.6	6.6	0.0004	2.1	62.7	17.4
25-year	3.175	143.6	2.0	7.0	7.1	0.0004	2.0	71.4	449.1
50-year	3.175	155.4	2.0	7.3	7.4	0.0003	1.9	133.5	652.9
100-year	3.175	175.3	2.0	7.6	7.6	0.0003	1.8	194.6	812.5
10-year	3.225	127.9	2.1	6.6	6.7	0.0005	2.2	58.9	16.1
25-year	3.225	142.6	2.1	7.0	7.1	0.0004	2.2	66.2	292.5
50-year	3.225	154.3	2.1	7.4	7.4	0.0004	2.2	71.8	428.2
100-year	3.225	174.2	2.1	7.6	7.7	0.0004	2.3	79.2	545.5
10-year	3.275	126.2	2.2	6.6	6.7	0.0003	1.9	67.8	20.2
25-year	3.275	140.4	2.2	7.1	7.1	0.0003	1.8	77.2	770.0
50-year	3.275	151.8	2.2	7.4	7.5	0.0003	1.8	85.1	810.9
100-year	3.275	171.6	2.2	7.7	7.7	0.0003	1.9	97.2	859.2
10-year	3.325	126.3	2.2	6.7	6.7	0.0004	1.9	67.8	20.4
25-year	3.325	140.4	2.2	7.1	7.2	0.0003	1.8	81.6	903.7
50-year	3.325	151.7	2.2	7.4	7.5	0.0002	1.7	138.6	1001.9
100-year	3.325	171.7	2.2	7.7	7.8	0.0002	1.6	189.6	1023.9
	3.350	Culvert							

10-year	3.385	126.8	2.3	7.0	7.0	0.0001	1.3	99.8	892.8
25-year	3.385	140.7	2.3	7.5	7.6	0.0000	0.8	537.7	958.6
50-year	3.385	153.7	2.3	8.0	8.0	0.0000	0.6	886.6	1008.9
100-year	3.385	171.7	2.3	8.4	8.4	0.0000	0.5	1248.8	1080.9
10-year	3.435	126.8	2.4	7.0	7.0	0.0001	1.1	185.7	966.3
25-year	3.435	140.7	2.4	7.6	7.6	0.0000	0.7	714.6	1019.6
50-year	3.435	153.9	2.4	8.0	8.0	0.0000	0.5	1144.3	1060.9
100-year	3.435	171.8	2.4	8.4	8.4	0.0000	0.4	1584.2	1090.7
10-year	3.485	126.8	2.4	7.0	7.0	0.0002	1.3	114.7	791.7
25-year	3.485	140.7	2.4	7.6	7.6	0.0001	0.8	547.0	842.0
50-year	3.485	154.0	2.4	8.0	8.0	0.0000	0.5	902.4	881.1
100-year	3.485	171.9	2.4	8.4	8.4	0.0000	0.4	1289.2	967.6
10-year	3.560	126.8	2.5	7.0	7.1	0.0002	1.4	120.8	753.0
25-year	3.560	140.7	2.5	7.6	7.6	0.0001	0.8	524.4	790.1
50-year	3.560	154.2	2.5	8.0	8.0	0.0000	0.6	854.4	819.2
100-year	3.560	171.9	2.5	8.4	8.4	0.0000	0.5	1219.2	915.7
10-year	3.635	126.8	2.5	7.0	7.1	0.0002	1.4	123.8	707.7
25-year	3.635	140.8	2.5	7.6	7.6	0.0001	0.9	498.1	743.8
50-year	3.635	154.2	2.5	8.0	8.0	0.0000	0.6	807.1	772.4
100-year	3.635	172.0	2.5	8.4	8.4	0.0000	0.5	1147.5	858.3
10-year	3.710	127.2	2.6	7.1	7.1	0.0002	1.5	136.5	644.1
25-year	3.710	141.1	2.6	7.6	7.6	0.0001	0.9	473.8	684.7
50-year	3.710	156.0	2.6	8.0	8.0	0.0000	0.7	757.4	717.1
100-year	3.710	172.1	2.6	8.4	8.4	0.0000	0.5	1073.2	798.4
10-year	3.785	128.5	2.7	7.1	7.1	0.0002	1.5	204.3	520.5
25-year	3.785	141.5	2.7	7.6	7.6	0.0001	0.9	482.0	597.5
50-year	3.785	150.0	2.7	8.0	8.0	0.0000	0.7	734.4	659.7
100-year	3.785	172.8	2.7	8.4	8.4	0.0000	0.5	1013.3	713.3
10-year	3.850	129.2	2.7	7.1	7.1	0.0003	1.7	104.7	133.6
25-year	3.850	141.5	2.7	7.6	7.6	0.0002	1.4	188.4	208.4
50-year	3.850	150.2	2.7	8.0	8.0	0.0001	1.1	284.2	269.8
100-year	3.850	172.9	2.7	8.4	8.4	0.0001	0.9	527.8	649.1
10-year	3.925	132.8	2.8	7.1	7.1	0.0003	1.6	82.8	25.5
25-year	3.925	142.0	2.8	7.6	7.6	0.0002	1.5	124.1	126.1
50-year	3.925	150.3	2.8	8.0	8.0	0.0001	1.3	182.2	166.6
100-year	3.925	173.0	2.8	8.4	8.4	0.0001	1.2	365.8	545.3
10-year	4.000	136.3	2.9	7.1	7.2	0.0002	1.6	87.2	27.5
25-year	4.000	147.2	2.9	7.6	7.6	0.0002	1.5	100.4	29.3
50-year	4.000	150.3	2.9	8.0	8.0	0.0001	1.3	125.3	112.0
100-year	4.000	174.0	2.9	8.4	8.4	0.0001	1.2	302.4	524.7
10-year	4.075	141.3	2.9	7.1	7.2	0.0003	1.6	88.0	28.7
25-year	4.075	150.8	2.9	7.6	7.6	0.0002	1.5	101.7	30.8
50-year	4.075	174.1	2.9	8.0	8.0	0.0002	1.5	113.9	32.2

100-year	4.075	175.1	2.9	8.4	8.4	0.0002	1.4	128.8	66.5
10-year	4.150	143.5	3.0	7.2	7.2	0.0004	1.8	77.9	25.6
25-year	4.150	153.2	3.0	7.6	7.7	0.0003	1.7	90.4	29.1
50-year	4.150	177.1	3.0	8.0	8.0	0.0003	1.7	102.2	31.9
100-year	4.150	176.0	3.0	8.4	8.4	0.0002	1.5	115.3	34.6
10-year	4.225	150.1	3.1	7.2	7.2	0.0004	2.0	75.3	24.4
25-year	4.225	160.1	3.1	7.6	7.7	0.0003	1.8	86.8	26.9
50-year	4.225	177.9	3.1	8.0	8.1	0.0003	1.8	97.8	29.8
100-year	4.225	178.9	3.1	8.4	8.4	0.0002	1.6	109.9	32.7
10-year	4.300	150.9	3.1	7.2	7.3	0.0005	2.2	69.5	22.8
25-year	4.300	202.4	3.1	7.6	7.7	0.0006	2.5	80.1	24.9
50-year	4.300	178.7	3.1	8.0	8.1	0.0004	2.0	90.1	27.1
100-year	4.300	181.7	3.1	8.4	8.5	0.0003	1.8	100.9	29.5
10-year	4.375	151.4	3.2	7.2	7.3	0.0006	2.3	67.1	21.4
25-year	4.375	205.1	3.2	7.7	7.8	0.0007	2.7	77.2	23.3
50-year	4.375	179.3	3.2	8.1	8.1	0.0004	2.1	86.0	25.0
100-year	4.375	187.5	3.2	8.4	8.5	0.0004	2.0	95.9	27.2
10-year	4.450	151.5	3.3	7.2	7.4	0.0013	3.1	49.2	19.8
25-year	4.450	205.7	3.3	7.7	7.9	0.0015	3.5	58.5	21.5
50-year	4.450	179.3	3.3	8.1	8.2	0.0008	2.7	66.6	22.9
100-year	4.450	187.5	3.3	8.4	8.5	0.0006	2.5	75.6	24.7
10-year	4.525	160.6	3.3	7.4	7.5	0.0012	3.1	51.4	18.6
25-year	4.525	206.2	3.3	7.8	8.0	0.0013	3.4	60.2	20.1
50-year	4.525	226.4	3.3	8.1	8.3	0.0012	3.4	66.8	21.2
100-year	4.525	210.8	3.3	8.5	8.6	0.0008	2.8	74.6	22.6
10-year	4.600	164.3	3.4	7.5	7.6	0.0009	2.8	58.0	17.6
25-year	4.600	208.7	3.4	7.9	8.1	0.0010	3.1	66.4	18.8
50-year	4.600	250.6	3.4	8.2	8.4	0.0012	3.5	72.6	19.7
100-year	4.600	264.0	3.4	8.6	8.7	0.0011	3.4	78.8	20.7
	4.650	Culvert							
10-year	4.700	165.5	3.5	8.0	8.1	0.0006	2.3	73.1	26.4
25-year	4.700	217.3	3.5	8.9	9.0	0.0005	2.2	100.2	33.2
50-year	4.700	267.3	3.5	9.2	9.3	0.0005	2.2	260.5	947.1
100-year	4.700	292.9	3.5	10.1	10.1	0.0000	0.8	1135.0	976.5
10-year	4.800	165.5	3.6	8.1	8.2	0.0008	2.6	64.8	23.3
25-year	4.800	216.9	3.6	9.0	9.1	0.0006	2.4	94.4	61.2
50-year	4.800	266.9	3.6	9.3	9.3	0.0006	2.5	246.8	906.6
100-year	4.800	293.7	3.6	10.1	10.1	0.0001	0.9	1065.9	997.6

Existing Conditions - 10-year Storm Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-100.0	-2.6	7.4	-1.8	7.4	0.0000	-0.1	3745.2	1020.0
25-year	0.000	-88.6	-2.6	7.4	-1.9	7.4	0.0000	-0.1	3745.2	1020.0
50-year	0.000	-79.0	-2.6	7.4	-1.9	7.4	0.0000	0.0	3745.2	1020.0
100-year	0.000	-67.1	-2.6	7.4	-2.0	7.4	0.0000	0.0	3745.2	1020.0
10-year	0.150	-92.7	-2.7	7.4		7.4	0.0000	0.0	5338.1	1027.8
25-year	0.150	-81.3	-2.7	7.4		7.4	0.0000	0.0	5338.1	1027.8
50-year	0.150	-71.7	-2.7	7.4		7.4	0.0000	0.0	5338.2	1027.8
100-year	0.150	-59.6	-2.7	7.4		7.4	0.0000	0.0	5338.2	1027.8
10-year	0.300	-86.6	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
25-year	0.300	-75.2	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
50-year	0.300	-65.6	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
100-year	0.300	-53.4	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
10-year	0.400	-82.3	-2.8	7.4		7.4	0.0000	0.0	4604.8	899.4
25-year	0.400	-70.9	-2.8	7.4		7.4	0.0000	0.0	4604.8	899.4
50-year	0.400	-61.3	-2.8	7.4		7.4	0.0000	0.0	4604.8	899.4
100-year	0.400	-49.0	-2.8	7.4		7.4	0.0000	0.0	4604.9	899.4
10-year	0.500	-82.1	-2.8	7.4		7.4	0.0000	-0.1	3162.2	624.4
25-year	0.500	-70.7	-2.8	7.4		7.4	0.0000	0.0	3162.2	624.4
50-year	0.500	-61.1	-2.8	7.4		7.4	0.0000	0.0	3162.2	624.4
100-year	0.500	-48.8	-2.8	7.4		7.4	0.0000	0.0	3162.2	624.4
10-year	0.650	-84.2	-2.7	7.4		7.4	0.0000	-0.1	3116.8	612.0
25-year	0.650	-72.8	-2.7	7.4		7.4	0.0000	0.0	3116.8	612.0
50-year	0.650	-63.2	-2.7	7.4		7.4	0.0000	0.0	3116.8	612.0
100-year	0.650	-51.0	-2.7	7.4		7.4	0.0000	0.0	3116.8	612.0
10-year	0.750	-84.1	-2.6	7.4		7.4	0.0000	-0.1	2847.9	610.0
25-year	0.750	-72.7	-2.6	7.4		7.4	0.0000	0.0	2848.0	610.0
50-year	0.750	-63.1	-2.6	7.4		7.4	0.0000	0.0	2848.0	610.0
100-year	0.750	-50.9	-2.6	7.4		7.4	0.0000	0.0	2848.0	610.0
10-year	1.000	-87.7	-2.5	7.4		7.4	0.0000	-0.1	2781.2	616.4
25-year	1.000	-76.3	-2.5	7.4		7.4	0.0000	0.0	2781.3	616.4
50-year	1.000	-66.9	-2.5	7.4		7.4	0.0000	0.0	2781.3	616.4
100-year	1.000	-54.8	-2.5	7.4		7.4	0.0000	0.0	2781.3	616.4
10-year	1.075	-87.5	-2.5	7.4		7.4	0.0000	-0.1	2496.3	664.7
25-year	1.075	-76.0	-2.5	7.4		7.4	0.0000	0.0	2496.3	664.7
50-year	1.075	-66.6	-2.5	7.4		7.4	0.0000	0.0	2496.3	664.7
100-year	1.075	-54.5	-2.5	7.4		7.4	0.0000	0.0	2496.3	664.7
10-year	1.150	-87.3	-2.5	7.4		7.4	0.0000	-0.1	2144.8	650.0

25-year	1.150	-75.9	-2.5	7.4	7.4	0.0000	-0.1	2144.8	650.0
50-year	1.150	-66.5	-2.5	7.4	7.4	0.0000	-0.1	2144.8	650.0
100-year	1.150	-54.4	-2.5	7.4	7.4	0.0000	0.0	2144.8	650.0
10-year	1.200	-87.3	-2.5	7.4	7.4	0.0000	-0.1	2109.5	648.8
25-year	1.200	-75.8	-2.5	7.4	7.4	0.0000	-0.1	2109.5	648.8
50-year	1.200	-66.5	-2.5	7.4	7.4	0.0000	-0.1	2109.5	648.8
100-year	1.200	-54.3	-2.5	7.4	7.4	0.0000	0.0	2109.5	648.8
10-year	1.300	-87.7	-2.5	7.4	7.4	0.0000	-0.1	1713.8	637.3
25-year	1.300	-75.8	-2.5	7.4	7.4	0.0000	-0.1	1713.8	637.3
50-year	1.300	-67.0	-2.5	7.4	7.4	0.0000	-0.1	1713.8	637.3
100-year	1.300	-54.9	-2.5	7.4	7.4	0.0000	-0.1	1713.9	637.3
10-year	1.450	-87.4	-2.5	7.4	7.4	0.0000	-0.6	148.1	646.0
25-year	1.450	-75.8	-2.5	7.4	7.4	0.0000	-0.5	148.1	646.0
50-year	1.450	-66.7	-2.5	7.4	7.4	0.0000	-0.5	148.1	646.0
100-year	1.450	-54.5	-2.5	7.4	7.4	0.0000	-0.4	148.1	646.1
	1.485	Culvert							
10-year	1.520	41.8	-1.0	6.9	6.9	0.0000	0.4	116.4	586.8
25-year	1.520	58.2	-1.0	7.1	7.1	0.0000	0.5	120.1	596.4
50-year	1.520	66.4	-1.0	7.3	7.3	0.0000	0.5	122.7	602.2
100-year	1.520	140.7	-1.0	7.8	7.8	0.0000	1.1	130.3	648.7
10-year	1.570	43.3	0.7	6.9	6.9	0.0000	0.1	529.9	636.2
25-year	1.570	48.9	0.7	7.1	7.1	0.0000	0.1	551.6	641.7
50-year	1.570	54.8	0.7	7.3	7.3	0.0000	0.1	567.5	648.6
100-year	1.570	133.7	0.7	7.8	7.8	0.0000	0.2	614.5	688.4
10-year	1.620	38.0	0.7	6.9	6.9	0.0000	0.0	1005.5	586.5
25-year	1.620	41.2	0.7	7.1	7.1	0.0000	0.0	1049.0	598.7
50-year	1.620	45.4	0.7	7.3	7.3	0.0000	0.0	1080.7	609.9
100-year	1.620	128.4	0.7	7.8	7.8	0.0000	0.1	1175.0	650.7
10-year	1.670	38.0	0.7	6.9	6.9	0.0000	0.0	1296.8	517.8
25-year	1.670	41.2	0.7	7.1	7.1	0.0000	0.0	1357.2	525.3
50-year	1.670	45.4	0.7	7.3	7.3	0.0000	0.0	1401.2	542.8
100-year	1.670	128.4	0.7	7.8	7.8	0.0000	0.1	1532.1	609.8
10-year	1.720	19.8	0.7	6.9	6.9	0.0000	0.0	1324.8	592.1
25-year	1.720	20.8	0.7	7.1	7.1	0.0000	0.0	1400.3	642.2
50-year	1.720	23.8	0.7	7.3	7.3	0.0000	0.0	1455.8	659.1
100-year	1.720	118.5	0.7	7.8	7.8	0.0000	0.1	1622.8	683.1
10-year	1.770	19.8	0.8	6.9	6.9	0.0000	0.0	1227.4	573.2
25-year	1.770	20.8	0.8	7.1	7.1	0.0000	0.0	1311.2	608.8
50-year	1.770	23.8	0.8	7.3	7.3	0.0000	0.0	1373.6	663.3
100-year	1.770	118.5	0.8	7.8	7.8	0.0000	0.1	1566.0	705.7
10-year	1.820	19.8	0.8	6.9	6.9	0.0000	0.0	1265.4	591.3
25-year	1.820	20.8	0.8	7.1	7.1	0.0000	0.0	1410.9	614.8

50-year	1.820	23.9	0.8	7.3	7.3	0.0000	0.0	1520.4	629.4
100-year	1.820	118.5	0.8	7.8	7.8	0.0000	0.1	1865.0	696.9
10-year	1.870	19.8	0.9	6.9	6.9	0.0000	0.0	1046.3	588.8
25-year	1.870	20.8	0.9	7.1	7.1	0.0000	0.0	1148.2	613.2
50-year	1.870	23.9	0.9	7.3	7.3	0.0000	0.0	1224.0	638.8
100-year	1.870	118.5	0.9	7.8	7.8	0.0000	0.1	1455.5	758.1
10-year	1.920	19.9	0.9	6.9	6.9	0.0000	0.0	817.3	590.7
25-year	1.920	20.8	0.9	7.1	7.1	0.0000	0.0	893.2	639.7
50-year	1.920	24.0	0.9	7.3	7.3	0.0000	0.0	951.0	667.6
100-year	1.920	118.5	0.9	7.8	7.8	0.0000	0.2	1125.7	722.7
10-year	1.970	19.9	1.0	6.9	6.9	0.0000	0.1	780.0	474.2
25-year	1.970	20.8	1.0	7.1	7.1	0.0000	0.1	846.9	497.3
50-year	1.970	24.2	1.0	7.3	7.3	0.0000	0.1	897.9	544.5
100-year	1.970	118.5	1.0	7.8	7.8	0.0000	0.2	1080.7	667.1
10-year	2.020	19.8	1.1	6.9	6.9	0.0000	0.1	733.3	542.0
25-year	2.020	20.8	1.1	7.1	7.1	0.0000	0.1	811.9	580.8
50-year	2.020	24.4	1.1	7.3	7.3	0.0000	0.1	871.7	624.1
100-year	2.020	118.5	1.1	7.8	7.8	0.0000	0.2	1059.4	712.0
10-year	2.070	19.2	1.1	6.9	6.9	0.0000	0.1	775.4	565.7
25-year	2.070	20.7	1.1	7.1	7.1	0.0000	0.1	904.0	618.7
50-year	2.070	24.6	1.1	7.3	7.3	0.0000	0.1	1001.0	632.8
100-year	2.070	118.5	1.1	7.8	7.8	0.0000	0.2	1308.1	715.2
10-year	2.120	18.2	1.1	6.9	6.9	0.0000	0.0	696.3	432.5
25-year	2.120	20.6	1.1	7.1	7.1	0.0000	0.1	789.0	539.7
50-year	2.120	24.9	1.1	7.3	7.3	0.0000	0.1	862.9	610.3
100-year	2.120	118.5	1.1	7.8	7.8	0.0000	0.2	1094.9	777.1
10-year	2.170	17.5	1.1	6.9	6.9	0.0000	0.0	674.3	476.6
25-year	2.170	20.5	1.1	7.1	7.1	0.0000	0.1	745.3	574.7
50-year	2.170	25.0	1.1	7.3	7.3	0.0000	0.1	799.4	629.5
100-year	2.170	118.5	1.1	7.8	7.8	0.0000	0.2	971.5	849.6
10-year	2.220	17.2	1.2	6.9	6.9	0.0000	0.0	680.7	493.8
25-year	2.220	20.7	1.2	7.1	7.1	0.0000	0.1	761.8	685.7
50-year	2.220	25.3	1.2	7.3	7.3	0.0000	0.1	823.2	778.7
100-year	2.220	118.5	1.2	7.8	7.8	0.0000	0.2	1011.3	927.7
10-year	2.270	17.2	1.2	6.9	6.9	0.0000	0.0	741.9	561.9
25-year	2.270	20.9	1.2	7.1	7.1	0.0000	0.1	836.8	682.2
50-year	2.270	25.3	1.2	7.3	7.3	0.0000	0.1	910.9	794.7
100-year	2.270	118.5	1.2	7.8	7.8	0.0000	0.2	1147.0	929.1
10-year	2.320	16.9	1.4	6.9	6.9	0.0000	0.1	685.4	530.5
25-year	2.320	21.2	1.4	7.1	7.1	0.0000	0.1	781.1	611.4
50-year	2.320	25.4	1.4	7.3	7.3	0.0000	0.1	852.4	750.6
100-year	2.320	118.5	1.4	7.8	7.8	0.0000	0.2	1064.7	1016.6

10-year	2.370	16.9	1.7	6.9	6.9	0.0000	0.1	644.0	470.9
25-year	2.370	21.3	1.7	7.1	7.1	0.0000	0.1	730.6	566.1
50-year	2.370	25.6	1.7	7.3	7.3	0.0000	0.1	794.7	648.6
100-year	2.370	118.5	1.7	7.8	7.8	0.0000	0.3	988.9	867.0
10-year	2.420	17.0	1.8	6.9	6.9	0.0000	0.1	605.3	475.0
25-year	2.420	21.5	1.8	7.1	7.1	0.0000	0.1	699.4	568.9
50-year	2.420	25.6	1.8	7.3	7.3	0.0000	0.1	771.5	611.4
100-year	2.420	118.5	1.8	7.8	7.8	0.0000	0.3	1002.4	791.9
10-year	2.470	17.0	1.8	6.9	6.9	0.0000	0.1	547.6	452.0
25-year	2.470	21.6	1.8	7.1	7.1	0.0000	0.1	638.8	478.6
50-year	2.470	25.6	1.8	7.3	7.3	0.0000	0.1	708.5	519.8
100-year	2.470	118.4	1.8	7.8	7.8	0.0000	0.3	918.9	596.4
10-year	2.520	17.0	1.8	6.9	6.9	0.0000	0.1	474.7	371.2
25-year	2.520	21.6	1.8	7.1	7.1	0.0000	0.1	566.3	445.8
50-year	2.520	25.6	1.8	7.3	7.3	0.0000	0.1	638.4	480.2
100-year	2.520	118.4	1.8	7.8	7.8	0.0000	0.3	865.2	662.1
10-year	2.570	4.0	2.0	6.9	6.9	0.0000	0.0	447.7	444.1
25-year	2.570	4.9	2.0	7.1	7.1	0.0000	0.0	544.7	477.6
50-year	2.570	4.6	2.0	7.3	7.3	0.0000	0.0	619.7	501.8
100-year	2.570	105.7	2.0	7.8	7.8	0.0000	0.3	870.1	771.2
10-year	2.620	4.0	1.4	6.9	6.9	0.0000	0.0	503.3	475.7
25-year	2.620	4.9	1.4	7.1	7.1	0.0000	0.0	625.9	531.1
50-year	2.620	4.6	1.4	7.3	7.3	0.0000	0.0	722.0	563.1
100-year	2.620	105.7	1.4	7.8	7.8	0.0000	0.2	1088.9	760.1
	2.650	Culvert							
10-year	2.675	22.0	1.6	7.1	7.1	0.0000	0.1	519.2	407.1
25-year	2.675	47.2	1.6	7.7	7.7	0.0000	0.1	844.3	706.6
50-year	2.675	79.6	1.6	7.9	7.9	0.0000	0.2	1049.6	835.1
100-year	2.675	160.8	1.6	8.1	8.1	0.0000	0.3	1229.0	997.2
10-year	2.725	19.8	1.0	7.1	7.1	0.0000	0.0	970.1	336.4
25-year	2.725	45.4	1.0	7.7	7.7	0.0000	0.0	1231.3	509.4
50-year	2.725	76.0	1.0	7.9	7.9	0.0000	0.1	1373.5	572.7
100-year	2.725	155.5	1.0	8.1	8.1	0.0000	0.1	1490.3	598.7
10-year	2.775	19.8	1.6	7.1	7.1	0.0000	0.0	1168.4	381.5
25-year	2.775	45.4	1.6	7.7	7.7	0.0000	0.0	1423.5	440.1
50-year	2.775	76.0	1.6	7.9	7.9	0.0000	0.1	1545.1	482.0
100-year	2.775	155.5	1.6	8.1	8.1	0.0000	0.1	1647.4	556.9
10-year	2.825	19.8	1.5	7.1	7.1	0.0000	0.0	923.9	397.3
25-year	2.825	45.4	1.5	7.7	7.7	0.0000	0.0	1193.9	460.9
50-year	2.825	76.0	1.5	7.9	7.9	0.0000	0.1	1288.0	475.2
100-year	2.825	155.5	1.5	8.1	8.1	0.0000	0.1	1568.4	488.4
10-year	2.875	19.8	1.1	7.1	7.1	0.0000	0.0	925.6	385.4

25-year	2.875	45.4	1.1	7.7	7.7	0.0000	0.0	1190.3	423.6
50-year	2.875	76.0	1.1	7.9	7.9	0.0000	0.1	1287.3	514.1
100-year	2.875	155.6	1.1	8.1	8.1	0.0000	0.1	1557.0	558.0
10-year	2.925	19.8	1.9	7.1	7.1	0.0000	0.0	777.2	430.9
25-year	2.925	45.4	1.9	7.7	7.7	0.0000	0.1	1096.4	518.9
50-year	2.925	76.0	1.9	7.9	7.9	0.0000	0.1	1205.4	545.4
100-year	2.925	155.6	1.9	8.1	8.1	0.0000	0.1	1510.7	574.2
10-year	2.975	19.8	1.9	7.1	7.1	0.0000	0.2	288.3	380.6
25-year	2.975	45.4	1.9	7.7	7.7	0.0000	0.2	461.6	477.1
50-year	2.975	76.0	1.9	7.9	7.9	0.0000	0.3	544.8	630.4
100-year	2.975	155.6	1.9	8.1	8.1	0.0000	0.5	893.8	715.6
10-year	3.025	19.8	1.9	7.1	7.1	0.0000	0.2	81.2	327.8
25-year	3.025	45.4	1.9	7.7	7.7	0.0000	0.3	422.0	455.3
50-year	3.025	76.0	1.9	7.9	7.9	0.0000	0.4	502.7	558.9
100-year	3.025	155.6	1.9	8.1	8.1	0.0000	0.7	567.7	640.6
10-year	3.075	18.5	1.9	7.1	7.1	0.0000	0.2	83.3	294.2
25-year	3.075	44.3	1.9	7.7	7.7	0.0000	0.3	399.1	533.6
50-year	3.075	74.0	1.9	7.9	7.9	0.0000	0.4	499.6	619.9
100-year	3.075	152.7	1.9	8.1	8.1	0.0000	0.7	578.6	670.7
10-year	3.125	18.5	1.9	7.1	7.1	0.0000	0.2	221.5	419.3
25-year	3.125	44.3	1.9	7.7	7.7	0.0000	0.2	644.4	623.0
50-year	3.125	74.0	1.9	7.9	7.9	0.0000	0.3	814.0	656.3
100-year	3.125	153.0	1.9	8.1	8.1	0.0000	0.5	950.2	688.7
	3.150	Culvert							
10-year	3.175	19.1	2.0	7.1	7.1	0.0000	0.3	94.8	530.9
25-year	3.175	44.3	2.0	7.7	7.7	0.0000	0.4	226.6	888.5
50-year	3.175	74.5	2.0	8.0	8.0	0.0000	0.6	284.5	1014.1
100-year	3.175	153.9	2.0	8.2	8.2	0.0000	0.6	977.8	1058.8
10-year	3.225	18.5	2.1	7.1	7.1	0.0000	0.3	67.8	330.8
25-year	3.225	43.9	2.1	7.7	7.7	0.0000	0.6	82.7	583.8
50-year	3.225	73.7	2.1	8.0	8.0	0.0001	0.9	93.1	675.4
100-year	3.225	152.6	2.1	8.2	8.2	0.0002	1.7	129.3	1068.8
10-year	3.275	17.5	2.2	7.1	7.1	0.0000	0.2	78.3	774.8
25-year	3.275	42.9	2.2	7.7	7.7	0.0000	0.5	99.8	867.9
50-year	3.275	72.1	2.2	8.0	8.0	0.0000	0.7	115.9	913.8
100-year	3.275	149.6	2.2	8.2	8.2	0.0001	1.4	148.4	1055.9
10-year	3.325	17.5	2.2	7.1	7.1	0.0000	0.2	77.8	928.4
25-year	3.325	42.9	2.2	7.7	7.7	0.0000	0.5	90.7	1024.4
50-year	3.325	72.2	2.2	8.0	8.0	0.0000	0.8	95.7	1042.7
100-year	3.325	151.7	2.2	8.2	8.2	0.0002	1.5	100.1	1061.9
	3.350	Culvert							

10-year	3.385	23.3	2.3	8.7	8.7	0.0000	0.0	1578.1	1126.4
25-year	3.385	43.9	2.3	9.0	9.0	0.0000	0.1	1795.3	1155.9
50-year	3.385	75.4	2.3	9.0	9.0	0.0000	0.1	1813.1	1158.3
100-year	3.385	175.6	2.3	9.0	9.0	0.0000	0.2	2198.6	1160.4
10-year	3.435	23.3	2.5	8.7	8.7	0.0000	0.0	1982.3	1116.2
25-year	3.435	43.9	2.5	9.0	9.0	0.0000	0.0	2248.3	1132.7
50-year	3.435	75.4	2.5	9.0	9.0	0.0000	0.1	2270.2	1134.1
100-year	3.435	175.6	2.5	9.0	9.0	0.0000	0.2	2294.5	1135.3
10-year	3.485	23.3	2.7	8.7	8.7	0.0000	0.0	1640.9	994.8
25-year	3.485	43.9	2.7	9.0	9.0	0.0000	0.1	1878.3	1012.6
50-year	3.485	75.7	2.7	9.0	9.0	0.0000	0.1	1897.9	1014.0
100-year	3.485	175.9	2.7	9.0	9.0	0.0000	0.2	1919.7	1015.2
10-year	3.560	23.3	2.9	8.7	8.7	0.0000	0.0	1549.5	942.8
25-year	3.560	43.9	2.9	9.0	9.0	0.0000	0.1	1774.7	960.6
50-year	3.560	75.8	2.9	9.0	9.0	0.0000	0.1	1793.3	962.0
100-year	3.560	176.2	2.9	9.0	9.0	0.0000	0.2	1814.2	963.3
10-year	3.635	23.3	3.1	8.7	8.7	0.0000	0.0	1454.7	890.8
25-year	3.635	43.9	3.1	9.0	9.0	0.0000	0.1	1668.0	912.1
50-year	3.635	75.7	3.1	9.0	9.0	0.0000	0.1	1685.6	913.8
100-year	3.635	176.8	3.1	9.0	9.0	0.0000	0.2	1705.8	915.4
10-year	3.710	23.3	3.3	8.7	8.7	0.0000	0.0	1356.9	830.8
25-year	3.710	43.9	3.3	9.0	9.0	0.0000	0.1	1556.0	852.1
50-year	3.710	75.9	3.3	9.0	9.0	0.0000	0.1	1572.6	853.8
100-year	3.710	203.0	3.3	9.0	9.0	0.0000	0.3	1591.8	855.7
10-year	3.785	23.3	3.5	8.7	8.7	0.0000	0.0	1265.9	760.0
25-year	3.785	43.9	3.5	9.0	9.0	0.0000	0.1	1449.4	790.8
50-year	3.785	76.1	3.5	9.0	9.0	0.0000	0.1	1464.8	793.3
100-year	3.785	203.2	3.5	9.0	9.0	0.0000	0.3	1483.3	796.0
10-year	3.850	23.3	3.7	8.7	8.7	0.0000	0.1	753.5	686.8
25-year	3.850	43.9	3.7	9.0	9.0	0.0000	0.1	919.0	711.6
50-year	3.850	76.1	3.7	9.0	9.0	0.0000	0.1	932.9	713.7
100-year	3.850	203.2	3.7	9.0	9.0	0.0000	0.3	951.1	795.5
10-year	3.925	23.4	3.7	8.7	8.7	0.0000	0.1	570.1	675.4
25-year	3.925	43.9	3.7	9.0	9.0	0.0000	0.1	740.2	761.3
50-year	3.925	77.4	3.7	9.0	9.0	0.0000	0.2	755.4	768.5
100-year	3.925	203.1	3.7	9.0	9.0	0.0001	0.6	776.5	775.4
10-year	4.000	23.4	3.7	8.7	8.7	0.0000	0.1	493.8	644.6
25-year	4.000	44.0	3.7	9.0	9.0	0.0000	0.1	656.1	725.2
50-year	4.000	80.6	3.7	9.0	9.0	0.0000	0.3	671.1	732.2
100-year	4.000	203.0	3.7	9.0	9.0	0.0001	0.6	695.5	739.0
10-year	4.075	23.4	3.6	8.7	8.7	0.0000	0.2	144.4	90.9
25-year	4.075	44.0	3.6	9.0	9.0	0.0000	0.3	168.0	108.1
50-year	4.075	115.7	3.6	9.0	9.0	0.0002	0.8	170.5	109.8

100-year	4.075	209.2	3.6	9.0	9.1	0.0007	1.5	197.4	714.1
10-year	4.150	23.5	3.6	8.7	8.7	0.0000	0.2	126.2	110.2
25-year	4.150	44.1	3.6	9.0	9.0	0.0000	0.3	159.0	166.5
50-year	4.150	120.2	3.6	9.0	9.0	0.0004	0.9	171.9	779.8
100-year	4.150	222.2	3.6	9.1	9.1	0.0010	1.6	238.6	784.7
10-year	4.225	23.6	3.6	8.7	8.7	0.0000	0.2	112.6	35.3
25-year	4.225	45.4	3.6	9.0	9.0	0.0001	0.4	121.3	37.1
50-year	4.225	125.1	3.6	9.0	9.1	0.0004	1.0	148.6	719.9
100-year	4.225	230.0	3.6	9.2	9.2	0.0011	1.6	248.1	748.0
10-year	4.300	23.9	3.7	8.7	8.7	0.0000	0.2	101.3	31.7
25-year	4.300	48.3	3.7	9.0	9.0	0.0001	0.4	109.3	33.4
50-year	4.300	129.9	3.7	9.1	9.1	0.0006	1.1	144.5	511.7
100-year	4.300	231.3	3.7	9.3	9.3	0.0012	1.7	245.3	611.3
10-year	4.375	24.1	3.8	8.7	8.7	0.0000	0.3	95.1	29.1
25-year	4.375	48.3	3.8	9.0	9.0	0.0001	0.5	102.5	30.7
50-year	4.375	130.1	3.8	9.1	9.1	0.0006	1.2	168.7	615.0
100-year	4.375	284.9	3.8	9.4	9.4	0.0015	1.9	325.1	658.7
10-year	4.450	24.6	3.8	8.7	8.7	0.0000	0.3	78.8	26.5
25-year	4.450	48.3	3.8	9.0	9.0	0.0002	0.6	85.7	28.0
50-year	4.450	246.7	3.8	9.2	9.3	0.0021	2.1	247.1	695.6
100-year	4.450	295.2	3.8	9.5	9.5	0.0013	1.7	409.3	722.2
10-year	4.525	25.5	3.9	8.7	8.7	0.0001	0.3	74.4	24.0
25-year	4.525	206.2	3.9	9.1	9.2	0.0022	2.2	187.8	756.1
50-year	4.525	256.9	3.9	9.4	9.4	0.0014	1.8	363.1	773.5
100-year	4.525	300.0	3.9	9.6	9.6	0.0010	1.5	504.7	787.2
10-year	4.600	163.5	4.0	8.8	8.9	0.0021	2.1	76.6	22.0
25-year	4.600	212.1	4.0	9.3	9.3	0.0014	1.8	283.5	762.9
50-year	4.600	261.0	4.0	9.5	9.5	0.0010	1.6	430.5	777.1
100-year	4.600	307.3	4.0	9.6	9.6	0.0008	1.4	554.8	789.0
	4.650	Culvert							
10-year	4.700	166.2	3.5	10.2	10.2	0.0000	0.2	1219.3	981.3
25-year	4.700	207.4	3.5	10.2	10.2	0.0000	0.3	1246.7	982.8
50-year	4.700	221.9	3.5	10.2	10.2	0.0000	0.3	1258.7	983.5
100-year	4.700	229.8	3.5	10.3	10.3	0.0000	0.3	1266.4	984.0
10-year	4.800	165.9	3.6	10.2	10.2	0.0000	0.3	1149.8	1005.0
25-year	4.800	212.4	3.6	10.2	10.2	0.0000	0.4	1179.7	1007.6
50-year	4.800	231.8	3.6	10.3	10.3	0.0000	0.4	1193.4	1008.8
100-year	4.800	245.6	3.6	10.3	10.3	0.0000	0.4	1202.5	1009.6

Proposed Conditions - 10-year Storm Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-12.2	-2.6	7.4	-2.3	7.4	0.0000	0.0	3745.2	1020.0
25-year	0.000	-28.3	-2.6	7.4	-2.2	7.4	0.0000	0.0	3745.2	1020.0
50-year	0.000	-27.9	-2.6	7.4	-2.2	7.4	0.0000	0.0	3745.2	1020.0
100-year	0.000	-12.2	-2.6	7.4	-2.3	7.4	0.0000	0.0	3745.2	1020.0
10-year	0.150	-5.0	-2.7	7.4		7.4	0.0000	0.0	5338.1	1027.8
25-year	0.150	-24.0	-2.7	7.4		7.4	0.0000	0.0	5337.5	1027.8
50-year	0.150	-23.6	-2.7	7.4		7.4	0.0000	0.0	5337.6	1027.8
100-year	0.150	-5.0	-2.7	7.4		7.4	0.0000	0.0	5338.1	1027.8
10-year	0.300	1.1	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
25-year	0.300	-19.9	-2.7	7.4		7.4	0.0000	0.0	5092.4	939.7
50-year	0.300	-19.5	-2.7	7.4		7.4	0.0000	0.0	5092.7	939.7
100-year	0.300	1.1	-2.7	7.4		7.4	0.0000	0.0	5093.5	939.7
10-year	0.400	5.2	-2.8	7.4		7.4	0.0000	0.0	4604.8	899.4
25-year	0.400	-16.5	-2.8	7.4		7.4	0.0000	0.0	4603.5	899.1
50-year	0.400	-7.7	-2.8	7.4		7.4	0.0000	0.0	4603.9	899.2
100-year	0.400	5.2	-2.8	7.4		7.4	0.0000	0.0	4604.8	899.4
10-year	0.500	5.3	-2.8	7.4		7.4	0.0000	0.0	3162.1	624.4
25-year	0.500	-14.1	-2.8	7.4		7.4	0.0000	0.0	3161.1	624.4
50-year	0.500	-7.4	-2.8	7.4		7.4	0.0000	0.0	3161.5	624.4
100-year	0.500	5.3	-2.8	7.4		7.4	0.0000	0.0	3162.1	624.4
10-year	0.650	3.3	-2.7	7.4		7.4	0.0000	0.0	3116.8	612.0
25-year	0.650	-12.8	-2.7	7.4		7.4	0.0000	0.0	3115.8	611.9
50-year	0.650	-7.0	-2.7	7.4		7.4	0.0000	0.0	3116.2	612.0
100-year	0.650	3.3	-2.7	7.4		7.4	0.0000	0.0	3116.8	612.0
10-year	0.750	1.4	-2.6	7.4		7.4	0.0000	0.0	2847.9	610.0
25-year	0.750	-4.1	-2.6	7.4		7.4	0.0000	0.0	2846.9	609.8
50-year	0.750	-6.4	-2.6	7.4		7.4	0.0000	0.0	2847.4	609.9
100-year	0.750	1.4	-2.6	7.4		7.4	0.0000	0.0	2847.9	610.0
10-year	1.000	-0.2	-2.5	7.4		7.4	0.0000	0.0	2781.2	616.4
25-year	1.000	-3.5	-2.5	7.4		7.4	0.0000	0.0	2780.3	616.2
50-year	1.000	-5.0	-2.5	7.4		7.4	0.0000	0.0	2780.7	616.3
100-year	1.000	-0.2	-2.5	7.4		7.4	0.0000	0.0	2781.2	616.4
10-year	1.075	0.0	-2.5	7.4		7.4	0.0000	0.0	2496.3	664.7
25-year	1.075	-2.8	-2.5	7.4		7.4	0.0000	0.0	2495.4	664.6
50-year	1.075	-3.8	-2.5	7.4		7.4	0.0000	0.0	2495.7	664.7
100-year	1.075	0.0	-2.5	7.4		7.4	0.0000	0.0	2496.3	664.7

10-year	1.150	0.1	-2.5	7.4		7.4	0.0000	0.0	2144.8	650.0
25-year	1.150	-2.1	-2.5	7.4		7.4	0.0000	0.0	2144.0	649.8
50-year	1.150	-2.7	-2.5	7.4		7.4	0.0000	0.0	2144.3	649.9
100-year	1.150	0.1	-2.5	7.4		7.4	0.0000	0.0	2144.8	650.0
10-year	1.200	-0.6	-2.5	7.4		7.4	0.0000	0.0	2109.5	648.8
25-year	1.200	-1.5	-2.5	7.4		7.4	0.0000	0.0	2108.8	648.6
50-year	1.200	-2.0	-2.5	7.4		7.4	0.0000	0.0	2109.0	648.6
100-year	1.200	-0.6	-2.5	7.4		7.4	0.0000	0.0	2109.5	648.8
10-year	1.300	-0.3	-2.5	7.4		7.4	0.0000	0.0	1713.8	637.3
25-year	1.300	-0.7	-2.5	7.4		7.4	0.0000	0.0	1713.2	637.1
50-year	1.300	-0.1	-2.5	7.4		7.4	0.0000	0.0	1713.4	637.2
100-year	1.300	-0.3	-2.5	7.4		7.4	0.0000	0.0	1713.8	637.3
10-year	1.450	0.0	-2.5	7.4		7.4	0.0000	0.0	341.9	646.1
25-year	1.450	0.0	-2.5	7.4		7.4	0.0000	0.0	341.8	646.0
50-year	1.450	0.0	-2.5	7.4		7.4	0.0000	0.0	341.8	646.0
100-year	1.450	0.0	-2.5	7.4		7.4	0.0000	0.0	341.9	646.1
	1.485	Inl Struct								
10-year	1.520	110.0	-1.0	6.3	0.2	6.3	0.0000	0.7	167.0	569.5
25-year	1.520	141.7	-1.0	6.7	0.4	6.7	0.0000	0.8	175.1	585.1
50-year	1.520	151.6	-1.0	7.0	0.4	7.0	0.0000	0.8	182.5	588.0
100-year	1.520	175.3	-1.0	7.2	0.6	7.2	0.0000	0.9	186.4	598.6
10-year	1.570	126.9	0.7	6.4		6.4	0.0000	0.3	484.0	593.0
25-year	1.570	142.3	0.7	6.7		6.7	0.0000	0.3	515.0	627.0
50-year	1.570	150.2	0.7	7.0		7.0	0.0000	0.3	542.5	638.3
100-year	1.570	171.3	0.7	7.2		7.2	0.0000	0.3	557.8	643.8
10-year	1.620	122.7	0.7	6.4		6.4	0.0000	0.1	914.0	542.1
25-year	1.620	138.5	0.7	6.7		6.7	0.0000	0.1	976.0	582.5
50-year	1.620	142.5	0.7	7.0		7.0	0.0000	0.1	1031.1	589.9
100-year	1.620	159.8	0.7	7.2		7.2	0.0000	0.2	1061.6	602.1
10-year	1.670	122.7	0.7	6.4		6.4	0.0000	0.1	1170.0	487.3
25-year	1.670	138.5	0.7	6.7		6.7	0.0000	0.1	1255.8	512.4
50-year	1.670	142.5	0.7	7.0		7.0	0.0000	0.1	1332.3	522.2
100-year	1.670	159.9	0.7	7.2		7.2	0.0000	0.1	1374.8	527.2
10-year	1.720	110.6	0.7	6.4		6.4	0.0000	0.1	1168.0	479.9
25-year	1.720	119.7	0.7	6.7		6.7	0.0000	0.1	1274.0	556.7
50-year	1.720	120.5	0.7	7.0		7.0	0.0000	0.1	1369.2	618.6
100-year	1.720	133.8	0.7	7.2		7.2	0.0000	0.1	1422.5	656.6
10-year	1.770	109.9	0.8	6.4		6.4	0.0000	0.1	1054.4	541.6
25-year	1.770	119.8	0.8	6.7		6.7	0.0000	0.1	1171.3	557.2
50-year	1.770	120.5	0.8	7.0		7.0	0.0000	0.1	1276.7	592.3
100-year	1.770	133.8	0.8	7.2		7.2	0.0000	0.1	1336.0	626.4

10-year	1.820	109.2	0.8	6.4	6.4	0.0000	0.2	976.4	536.7
25-year	1.820	119.8	0.8	6.7	6.7	0.0000	0.2	1170.2	575.8
50-year	1.820	120.5	0.8	7.0	7.0	0.0000	0.2	1350.5	602.8
100-year	1.820	133.8	0.8	7.2	7.2	0.0000	0.2	1454.6	620.0
10-year	1.870	108.5	0.9	6.4	6.4	0.0000	0.2	845.2	524.4
25-year	1.870	119.8	0.9	6.7	6.7	0.0000	0.2	979.0	575.5
50-year	1.870	120.5	0.9	7.0	7.0	0.0000	0.2	1106.1	599.6
100-year	1.870	134.4	0.9	7.2	7.2	0.0000	0.2	1178.6	618.5
10-year	1.920	107.8	0.9	6.4	6.4	0.0000	0.2	669.2	496.2
25-year	1.920	119.8	0.9	6.7	6.7	0.0000	0.2	768.3	571.4
50-year	1.920	120.6	0.9	7.0	7.0	0.0000	0.2	861.2	610.2
100-year	1.920	134.5	0.9	7.2	7.2	0.0000	0.2	916.4	651.2
10-year	1.970	107.1	1.0	6.4	6.4	0.0000	0.3	646.2	400.0
25-year	1.970	119.8	1.0	6.7	6.7	0.0000	0.3	736.0	457.9
50-year	1.970	120.6	1.0	7.0	7.0	0.0000	0.3	819.4	487.9
100-year	1.970	135.0	1.0	7.2	7.2	0.0000	0.3	867.2	511.4
10-year	2.020	106.5	1.1	6.4	6.4	0.0000	0.3	582.3	365.5
25-year	2.020	119.8	1.1	6.7	6.7	0.0000	0.3	682.0	499.0
50-year	2.020	120.6	1.1	7.0	7.0	0.0000	0.3	779.6	566.5
100-year	2.020	135.0	1.1	7.2	7.2	0.0000	0.3	835.9	598.3
10-year	2.070	106.5	1.1	6.4	6.4	0.0000	0.3	565.0	321.9
25-year	2.070	119.8	1.1	6.7	6.7	0.0000	0.3	697.2	512.1
50-year	2.070	120.7	1.1	7.0	7.0	0.0000	0.3	850.8	609.8
100-year	2.070	134.5	1.1	7.2	7.2	0.0000	0.3	943.5	624.1
10-year	2.120	105.9	1.1	6.4	6.4	0.0000	0.3	542.3	297.6
25-year	2.120	119.8	1.1	6.7	6.7	0.0000	0.3	643.2	364.9
50-year	2.120	120.7	1.1	7.0	7.0	0.0000	0.3	750.4	499.8
100-year	2.120	134.6	1.1	7.2	7.2	0.0000	0.3	818.8	568.1
10-year	2.170	105.9	1.1	6.4	6.4	0.0000	0.3	532.5	335.2
25-year	2.170	119.9	1.1	6.7	6.7	0.0000	0.3	627.9	434.5
50-year	2.170	122.0	1.1	7.0	7.0	0.0000	0.3	716.4	547.4
100-year	2.170	134.6	1.1	7.2	7.2	0.0000	0.3	767.3	603.5
10-year	2.220	105.3	1.2	6.4	6.4	0.0000	0.3	537.4	341.5
25-year	2.220	119.9	1.2	6.7	6.7	0.0000	0.3	631.5	422.7
50-year	2.220	122.0	1.2	7.0	7.0	0.0000	0.3	728.6	605.4
100-year	2.220	134.6	1.2	7.2	7.2	0.0000	0.3	787.2	738.2
10-year	2.270	105.4	1.2	6.4	6.4	0.0000	0.3	568.3	326.5
25-year	2.270	119.9	1.2	6.7	6.7	0.0000	0.3	683.1	474.5
50-year	2.270	122.0	1.2	7.0	7.0	0.0000	0.3	798.3	653.2
100-year	2.270	134.6	1.2	7.2	7.2	0.0000	0.3	866.7	720.7
10-year	2.320	105.4	1.4	6.4	6.4	0.0000	0.4	499.3	375.0
25-year	2.320	119.9	1.4	6.7	6.7	0.0000	0.4	623.3	434.0
50-year	2.320	122.1	1.4	7.0	7.0	0.0000	0.4	742.5	582.7

100-year	2.320	134.6	1.4	7.2	7.2	0.0000	0.4	810.8	686.6
10-year	2.370	104.9	1.7	6.4	6.4	0.0000	0.5	478.1	332.9
25-year	2.370	120.0	1.7	6.7	6.7	0.0000	0.5	587.6	405.8
50-year	2.370	122.1	1.7	7.0	7.0	0.0000	0.4	695.9	536.3
100-year	2.370	135.0	1.7	7.2	7.2	0.0000	0.4	757.5	599.4
10-year	2.420	105.0	1.8	6.4	6.4	0.0000	0.5	430.5	352.5
25-year	2.420	120.0	1.8	6.7	6.7	0.0000	0.5	546.5	449.7
50-year	2.420	122.2	1.8	7.0	7.0	0.0000	0.4	661.0	535.4
100-year	2.420	135.0	1.8	7.2	7.2	0.0000	0.5	729.7	585.0
10-year	2.470	105.1	1.8	6.4	6.4	0.0000	0.6	368.9	354.4
25-year	2.470	120.0	1.8	6.7	6.7	0.0000	0.6	489.0	441.0
50-year	2.470	122.2	1.8	7.0	7.0	0.0000	0.5	602.3	467.3
100-year	2.470	135.3	1.8	7.2	7.2	0.0000	0.5	668.3	490.6
10-year	2.520	105.4	1.8	6.4	6.4	0.0001	0.7	317.5	294.9
25-year	2.520	120.0	1.8	6.7	6.7	0.0000	0.6	421.6	346.4
50-year	2.520	122.3	1.8	7.0	7.0	0.0000	0.5	529.1	424.1
100-year	2.520	135.3	1.8	7.2	7.2	0.0000	0.5	597.0	464.2
10-year	2.570	95.2	2.0	6.4	6.4	0.0001	0.8	278.9	289.4
25-year	2.570	105.6	2.0	6.7	6.7	0.0000	0.7	388.3	418.3
50-year	2.570	100.7	2.0	7.0	7.0	0.0000	0.5	506.7	465.3
100-year	2.570	107.1	2.0	7.2	7.2	0.0000	0.5	577.4	487.9
10-year	2.620	95.4	1.4	6.4	6.4	0.0000	0.4	330.3	243.3
25-year	2.620	106.3	1.4	6.7	6.7	0.0000	0.3	437.3	383.4
50-year	2.620	100.8	1.4	7.0	7.0	0.0000	0.3	578.0	519.2
100-year	2.620	107.1	1.4	7.2	7.2	0.0000	0.3	668.2	541.4
	2.650	Culvert							
10-year	2.675	101.1	1.6	6.6	6.6	0.0000	0.5	345.5	324.3
25-year	2.675	122.5	1.6	7.0	7.0	0.0000	0.5	490.7	388.2
50-year	2.675	144.8	1.6	7.3	7.3	0.0000	0.5	646.3	493.0
100-year	2.675	173.4	1.6	7.6	7.6	0.0000	0.5	811.7	668.8
10-year	2.725	98.3	0.0	6.6	6.6	0.0000	0.1	1057.4	265.4
25-year	2.725	118.4	0.0	7.0	7.0	0.0000	0.1	1178.5	327.4
50-year	2.725	140.1	0.0	7.3	7.3	0.0000	0.1	1308.8	423.1
100-year	2.725	168.1	0.0	7.6	7.6	0.0000	0.1	1439.7	500.3
10-year	2.775	98.3	0.0	6.6	6.6	0.0000	0.1	1252.4	343.2
25-year	2.775	118.5	0.0	7.0	7.0	0.0000	0.1	1398.9	376.3
50-year	2.775	140.1	0.0	7.3	7.3	0.0000	0.1	1537.7	418.1
100-year	2.775	168.1	0.0	7.6	7.6	0.0000	0.1	1660.3	437.1
10-year	2.825	98.3	0.0	6.6	6.6	0.0000	0.1	1198.4	356.7
25-year	2.825	118.5	0.0	7.0	7.0	0.0000	0.1	1283.5	393.8
50-year	2.825	140.1	0.0	7.3	7.3	0.0000	0.1	1357.1	421.0
100-year	2.825	168.1	0.0	7.6	7.6	0.0000	0.1	1417.1	456.3

10-year	2.875	98.3	0.0	6.6	6.6	0.0000	0.1	1252.8	334.5
25-year	2.875	118.5	0.0	7.0	7.0	0.0000	0.1	1340.4	380.8
50-year	2.875	140.2	0.0	7.3	7.3	0.0000	0.1	1416.1	408.5
100-year	2.875	168.1	0.0	7.6	7.6	0.0000	0.1	1477.8	422.4
10-year	2.925	98.3	1.0	6.6	6.6	0.0000	0.1	926.1	359.7
25-year	2.925	118.6	1.0	7.0	7.0	0.0000	0.1	1010.4	419.2
50-year	2.925	140.2	1.0	7.3	7.3	0.0000	0.1	1083.3	475.9
100-year	2.925	168.1	1.0	7.6	7.6	0.0000	0.2	1142.7	516.1
10-year	2.975	98.3	1.9	6.6	6.6	0.0002	1.4	72.1	258.4
25-year	2.975	118.6	1.9	7.0	7.0	0.0002	1.5	80.6	371.7
50-year	2.975	140.2	1.9	7.3	7.3	0.0001	0.9	367.2	400.3
100-year	2.975	168.1	1.9	7.6	7.6	0.0001	0.9	448.2	462.9
10-year	3.025	98.3	1.9	6.6	6.6	0.0002	1.4	71.5	237.6
25-year	3.025	118.6	1.9	7.0	7.0	0.0002	1.5	79.8	319.5
50-year	3.025	140.3	1.9	7.3	7.3	0.0001	1.0	323.0	381.7
100-year	3.025	168.1	1.9	7.6	7.6	0.0001	1.0	408.5	445.2
10-year	3.075	96.5	1.9	6.6	6.6	0.0002	1.3	73.9	147.3
25-year	3.075	116.4	1.9	7.0	7.0	0.0002	1.4	82.2	260.9
50-year	3.075	137.6	1.9	7.3	7.4	0.0002	1.5	89.3	410.4
100-year	3.075	165.1	1.9	7.6	7.6	0.0001	1.1	383.5	520.0
10-year	3.125	96.5	1.9	6.6	6.6	0.0002	1.4	69.7	213.8
25-year	3.125	116.6	1.9	7.0	7.0	0.0001	1.1	214.8	398.1
50-year	3.125	137.7	1.9	7.4	7.4	0.0001	1.1	296.8	541.9
100-year	3.125	165.1	1.9	7.6	7.6	0.0000	0.9	622.3	616.9
	3.150	Culvert							
10-year	3.175	98.2	2.0	6.8	6.8	0.0002	1.5	66.1	17.7
25-year	3.175	116.9	2.0	7.3	7.3	0.0002	1.5	121.2	615.4
50-year	3.175	137.8	2.0	7.6	7.6	0.0002	1.4	200.8	829.8
100-year	3.175	165.2	2.0	7.8	7.8	0.0002	1.5	238.5	915.1
10-year	3.225	97.5	2.1	6.8	6.8	0.0002	1.6	62.0	16.3
25-year	3.225	115.9	2.1	7.3	7.3	0.0002	1.7	70.4	393.1
50-year	3.225	136.6	2.1	7.6	7.7	0.0003	1.8	79.6	549.8
100-year	3.225	163.8	2.1	7.8	7.9	0.0003	2.1	85.6	612.1
10-year	3.275	96.4	2.2	6.8	6.8	0.0002	1.4	71.2	20.6
25-year	3.275	113.9	2.2	7.3	7.4	0.0002	1.4	82.4	793.9
50-year	3.275	134.1	2.2	7.7	7.7	0.0002	1.5	96.6	857.4
100-year	3.275	161.0	2.2	7.8	7.9	0.0002	1.7	106.7	889.3
10-year	3.325	96.5	2.2	6.8	6.8	0.0002	1.4	71.0	20.8
25-year	3.325	113.9	2.2	7.3	7.4	0.0002	1.3	118.7	993.1
50-year	3.325	134.1	2.2	7.7	7.7	0.0001	1.3	184.8	1021.8
100-year	3.325	161.0	2.2	7.9	7.9	0.0002	1.4	216.6	1035.4

	3.350	Culvert							
10-year	3.385	108.8	2.3	7.0	7.1	0.0001	1.1	122.7	896.3
25-year	3.385	116.8	2.3	7.6	7.6	0.0000	0.6	606.0	968.6
50-year	3.385	137.4	2.3	8.1	8.1	0.0000	0.5	1013.3	1047.8
100-year	3.385	161.5	2.3	8.4	8.4	0.0000	0.4	1308.5	1089.2
10-year	3.435	109.4	2.4	7.0	7.1	0.0001	1.0	209.9	968.8
25-year	3.435	116.8	2.4	7.6	7.6	0.0000	0.5	797.5	1027.7
50-year	3.435	138.1	2.4	8.1	8.1	0.0000	0.4	1298.1	1072.2
100-year	3.435	161.5	2.4	8.4	8.4	0.0000	0.3	1656.7	1095.4
10-year	3.485	109.7	2.4	7.0	7.1	0.0001	1.1	133.4	793.9
25-year	3.485	116.8	2.4	7.6	7.6	0.0000	0.6	615.1	849.6
50-year	3.485	138.7	2.4	8.1	8.1	0.0000	0.4	1035.9	947.8
100-year	3.485	161.6	2.4	8.4	8.4	0.0000	0.4	1353.5	972.6
10-year	3.560	110.3	2.5	7.1	7.1	0.0001	1.2	136.5	754.4
25-year	3.560	116.8	2.5	7.6	7.6	0.0000	0.6	586.8	795.7
50-year	3.560	139.6	2.5	8.1	8.1	0.0000	0.5	979.5	895.8
100-year	3.560	161.6	2.5	8.4	8.4	0.0000	0.4	1279.8	920.6
10-year	3.635	111.4	2.5	7.1	7.1	0.0002	1.2	136.2	708.9
25-year	3.635	117.6	2.5	7.6	7.6	0.0000	0.7	555.6	749.2
50-year	3.635	140.2	2.5	8.1	8.1	0.0000	0.5	923.3	834.4
100-year	3.635	161.8	2.5	8.4	8.4	0.0000	0.4	1204.2	864.2
10-year	3.710	112.9	2.6	7.1	7.1	0.0002	1.3	145.7	645.3
25-year	3.710	117.7	2.6	7.6	7.6	0.0000	0.7	525.4	690.7
50-year	3.710	144.6	2.6	8.1	8.1	0.0000	0.5	864.7	774.5
100-year	3.710	162.1	2.6	8.4	8.4	0.0000	0.5	1125.8	804.3
10-year	3.785	115.8	2.7	7.1	7.1	0.0002	1.3	209.9	522.1
25-year	3.785	118.7	2.7	7.6	7.6	0.0000	0.7	525.8	608.7
50-year	3.785	145.1	2.7	8.1	8.1	0.0000	0.6	828.6	678.8
100-year	3.785	162.4	2.7	8.4	8.4	0.0000	0.5	1060.2	721.8
10-year	3.850	117.6	2.7	7.1	7.1	0.0002	1.5	105.9	134.9
25-year	3.850	118.8	2.7	7.6	7.7	0.0001	1.1	203.8	219.4
50-year	3.850	150.1	2.7	8.1	8.1	0.0001	1.1	358.7	621.1
100-year	3.850	162.8	2.7	8.4	8.4	0.0000	0.8	570.4	655.9
10-year	3.925	123.6	2.8	7.1	7.1	0.0002	1.5	82.9	26.0
25-year	3.925	118.8	2.8	7.6	7.7	0.0001	1.2	133.2	133.2
50-year	3.925	128.9	2.8	8.1	8.1	0.0001	1.1	233.1	448.3
100-year	3.925	162.8	2.8	8.4	8.5	0.0001	1.1	402.1	568.9
10-year	4.000	131.4	2.9	7.1	7.2	0.0002	1.5	87.3	27.5
25-year	4.000	121.0	2.9	7.7	7.7	0.0001	1.2	102.3	29.6
50-year	4.000	129.1	2.9	8.1	8.1	0.0001	1.1	174.3	433.9
100-year	4.000	165.1	2.9	8.4	8.5	0.0001	1.1	336.4	546.3
10-year	4.075	135.0	2.9	7.1	7.2	0.0002	1.5	88.0	28.7

25-year	4.075	123.2	2.9	7.7	7.7	0.0001	1.2	103.5	31.0
50-year	4.075	162.4	2.9	8.1	8.2	0.0002	1.4	118.2	32.7
100-year	4.075	164.7	2.9	8.4	8.5	0.0001	1.3	133.3	74.6
10-year	4.150	141.5	3.0	7.2	7.2	0.0004	1.8	77.9	25.6
25-year	4.150	124.3	3.0	7.7	7.7	0.0002	1.4	92.0	29.6
50-year	4.150	164.6	3.0	8.1	8.2	0.0002	1.6	106.4	32.8
100-year	4.150	168.1	3.0	8.5	8.5	0.0002	1.4	117.4	35.0
10-year	4.225	150.1	3.1	7.2	7.2	0.0004	2.0	75.3	24.4
25-year	4.225	133.1	3.1	7.7	7.7	0.0002	1.5	88.1	27.3
50-year	4.225	166.5	3.1	8.1	8.2	0.0003	1.6	101.5	30.8
100-year	4.225	168.7	3.1	8.5	8.5	0.0002	1.5	111.9	33.2
10-year	4.300	150.9	3.1	7.2	7.3	0.0005	2.2	69.5	22.8
25-year	4.300	137.1	3.1	7.7	7.7	0.0003	1.7	81.2	25.1
50-year	4.300	166.6	3.1	8.2	8.2	0.0003	1.8	93.4	27.8
100-year	4.300	175.0	3.1	8.5	8.5	0.0003	1.7	102.6	29.9
10-year	4.375	151.4	3.2	7.2	7.3	0.0006	2.3	67.1	21.4
25-year	4.375	151.3	3.2	7.7	7.8	0.0004	2.0	77.6	23.3
50-year	4.375	192.6	3.2	8.2	8.2	0.0004	2.2	88.9	25.6
100-year	4.375	176.1	3.2	8.5	8.5	0.0003	1.8	97.3	27.5
10-year	4.450	151.6	3.3	7.2	7.4	0.0013	3.1	49.2	19.8
25-year	4.450	152.9	3.3	7.7	7.8	0.0008	2.6	58.9	21.6
50-year	4.450	194.2	3.3	8.2	8.3	0.0009	2.8	69.3	23.4
100-year	4.450	176.4	3.3	8.5	8.6	0.0005	2.3	77.0	25.0
10-year	4.525	160.6	3.3	7.4	7.5	0.0012	3.1	51.4	18.6
25-year	4.525	205.2	3.3	7.8	8.0	0.0013	3.4	60.4	20.1
50-year	4.525	194.2	3.3	8.2	8.4	0.0008	2.8	69.0	21.6
100-year	4.525	191.7	3.3	8.5	8.6	0.0006	2.5	75.6	22.8
10-year	4.600	164.2	3.4	7.5	7.6	0.0009	2.8	58.0	17.6
25-year	4.600	207.1	3.4	7.9	8.1	0.0010	3.1	66.6	18.8
50-year	4.600	198.7	3.4	8.3	8.4	0.0007	2.7	73.7	19.9
100-year	4.600	211.6	3.4	8.6	8.7	0.0007	2.7	79.5	20.8
	4.650	Culvert							
10-year	4.700	165.5	3.5	8.0	8.1	0.0006	2.3	73.1	26.4
25-year	4.700	217.2	3.5	9.0	9.0	0.0005	2.2	100.4	33.2
50-year	4.700	239.9	3.5	9.5	9.6	0.0004	2.0	119.9	955.7
100-year	4.700	291.4	3.5	10.1	10.1	0.0000	0.8	1129.9	976.2
10-year	4.800	165.5	3.6	8.1	8.2	0.0008	2.6	64.8	23.3
25-year	4.800	216.9	3.6	9.0	9.1	0.0006	2.4	94.7	61.3
50-year	4.800	240.4	3.6	9.6	9.6	0.0002	1.5	528.1	916.9
100-year	4.800	291.8	3.6	10.1	10.1	0.0001	0.9	1060.8	997.0

Existing Conditions - 25-year Storm Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-480.1	-2.6	10.3	-0.9	10.3	0.0000	-0.2	7247.4	1345.6
25-year	0.000	-489.2	-2.6	10.3	-0.9	10.3	0.0000	-0.2	7247.4	1345.6
50-year	0.000	-501.6	-2.6	10.3	-0.9	10.3	0.0000	-0.2	7247.4	1345.6
100-year	0.000	-486.0	-2.6	10.3	-0.9	10.3	0.0000	-0.2	7247.4	1345.6
10-year	0.150	-386.7	-2.7	10.3		10.3	0.0000	-0.1	8880.0	1351.1
25-year	0.150	-393.0	-2.7	10.3		10.3	0.0000	-0.1	8880.2	1351.2
50-year	0.150	-413.6	-2.7	10.3		10.3	0.0000	-0.1	8880.0	1351.1
100-year	0.150	-389.3	-2.7	10.3		10.3	0.0000	-0.1	8879.7	1351.1
10-year	0.300	-368.1	-2.7	10.3		10.3	0.0000	-0.1	8343.2	1404.5
25-year	0.300	-372.9	-2.7	10.3		10.3	0.0000	-0.1	8343.5	1404.5
50-year	0.300	-392.7	-2.7	10.3		10.3	0.0000	-0.1	8343.2	1404.5
100-year	0.300	-389.0	-2.7	10.3		10.3	0.0000	-0.1	8343.0	1404.5
10-year	0.400	-365.8	-2.8	10.3		10.3	0.0000	-0.1	7641.1	1181.7
25-year	0.400	-370.0	-2.8	10.3		10.3	0.0000	-0.1	7641.4	1181.7
50-year	0.400	-376.2	-2.8	10.3		10.3	0.0000	-0.1	7641.2	1181.7
100-year	0.400	-388.5	-2.8	10.3		10.3	0.0000	-0.1	7641.3	1181.7
10-year	0.500	-354.3	-2.8	10.3		10.3	0.0000	-0.1	5492.4	954.8
25-year	0.500	-357.2	-2.8	10.3		10.3	0.0000	-0.1	5492.7	954.9
50-year	0.500	-363.4	-2.8	10.3		10.3	0.0000	-0.1	5492.6	954.9
100-year	0.500	-387.9	-2.8	10.3		10.3	0.0000	-0.2	5493.0	954.9
10-year	0.650	-345.4	-2.7	10.3		10.3	0.0000	-0.1	5510.1	913.1
25-year	0.650	-347.2	-2.7	10.3		10.3	0.0000	-0.1	5510.5	913.1
50-year	0.650	-352.0	-2.7	10.3		10.3	0.0000	-0.1	5510.5	913.1
100-year	0.650	-387.3	-2.7	10.3		10.3	0.0000	-0.1	5511.3	913.2
10-year	0.750	-337.0	-2.6	10.3		10.3	0.0000	-0.1	5308.3	913.0
25-year	0.750	-337.8	-2.6	10.3		10.3	0.0000	-0.1	5308.7	913.0
50-year	0.750	-340.5	-2.6	10.3		10.3	0.0000	-0.1	5308.9	913.0
100-year	0.750	-386.6	-2.6	10.3		10.3	0.0000	-0.1	5309.9	913.1
10-year	1.000	-328.5	-2.5	10.3		10.3	0.0000	-0.1	5574.5	879.6
25-year	1.000	-328.4	-2.5	10.3		10.3	0.0000	-0.1	5575.0	879.6
50-year	1.000	-328.6	-2.5	10.3		10.3	0.0000	-0.1	5575.5	879.6
100-year	1.000	-384.9	-2.5	10.3		10.3	0.0000	-0.1	5576.8	879.7
10-year	1.075	-320.6	-2.5	10.3		10.3	0.0000	-0.1	5788.7	873.1
25-year	1.075	-319.9	-2.5	10.3		10.3	0.0000	-0.1	5789.2	873.1
50-year	1.075	-318.2	-2.5	10.3		10.3	0.0000	-0.1	5789.8	873.2
100-year	1.075	-383.3	-2.5	10.3		10.3	0.0000	-0.1	5791.1	873.2
10-year	1.150	-319.6	-2.5	10.3		10.3	0.0000	-0.1	5540.6	864.9

25-year	1.150	-319.0	-2.5	10.3	10.3	0.0000	-0.1	5541.1	864.9
50-year	1.150	-317.4	-2.5	10.3	10.3	0.0000	-0.1	5541.7	865.0
100-year	1.150	-381.9	-2.5	10.3	10.3	0.0000	-0.1	5543.1	865.0
10-year	1.200	-318.5	-2.5	10.3	10.3	0.0000	-0.1	5676.8	900.8
25-year	1.200	-317.8	-2.5	10.3	10.3	0.0000	-0.1	5677.3	900.8
50-year	1.200	-316.5	-2.5	10.3	10.3	0.0000	-0.1	5678.1	900.9
100-year	1.200	-380.8	-2.5	10.3	10.3	0.0000	-0.1	5679.5	901.0
10-year	1.300	-314.8	-2.5	10.3	10.3	0.0000	-0.1	5498.7	892.5
25-year	1.300	-315.9	-2.5	10.3	10.3	0.0000	-0.1	5499.2	892.5
50-year	1.300	-314.9	-2.5	10.3	10.3	0.0000	-0.1	5499.9	892.6
100-year	1.300	-379.1	-2.5	10.3	10.3	0.0000	-0.1	5501.4	892.6
10-year	1.450	-314.7	-2.5	10.3	10.3	0.0000	-0.2	3822.3	849.3
25-year	1.450	-314.0	-2.5	10.3	10.3	0.0000	-0.2	3822.7	849.3
50-year	1.450	-313.4	-2.5	10.3	10.3	0.0000	-0.2	3823.3	849.4
100-year	1.450	-375.5	-2.5	10.3	10.3	0.0000	-0.2	3824.5	849.4
	1.485	Culvert							
10-year	1.520	31.4	-1.0	8.0	8.0	0.0000	0.2	134.3	654.3
25-year	1.520	66.1	-1.0	8.2	8.2	0.0000	0.5	137.2	659.3
50-year	1.520	105.5	-1.0	8.5	8.5	0.0000	0.8	141.4	686.5
100-year	1.520	119.1	-1.0	8.9	8.9	0.0000	0.8	146.6	710.6
10-year	1.570	33.7	0.7	8.0	8.0	0.0000	0.1	636.7	715.8
25-year	1.570	65.9	0.7	8.2	8.2	0.0000	0.1	654.6	742.0
50-year	1.570	101.5	0.7	8.5	8.5	0.0000	0.2	680.2	753.1
100-year	1.570	113.6	0.7	8.9	8.9	0.0000	0.2	711.7	797.7
10-year	1.620	30.2	0.7	8.0	8.0	0.0000	0.0	1219.1	654.5
25-year	1.620	61.7	0.7	8.2	8.2	0.0000	0.1	1254.9	666.5
50-year	1.620	97.0	0.7	8.5	8.5	0.0000	0.1	1306.2	727.2
100-year	1.620	108.5	0.7	8.9	8.9	0.0000	0.1	1369.2	759.6
10-year	1.670	26.6	0.7	8.0	8.0	0.0000	0.0	1593.4	636.1
25-year	1.670	61.7	0.7	8.2	8.2	0.0000	0.0	1643.1	659.6
50-year	1.670	97.0	0.7	8.5	8.5	0.0000	0.1	1714.4	689.9
100-year	1.670	108.4	0.7	8.9	8.9	0.0000	0.1	1801.9	716.2
10-year	1.720	20.5	0.7	8.0	8.0	0.0000	0.0	1702.0	711.3
25-year	1.720	53.7	0.7	8.2	8.2	0.0000	0.0	1766.7	733.0
50-year	1.720	88.7	0.7	8.5	8.5	0.0000	0.1	1860.1	767.4
100-year	1.720	98.6	0.7	8.9	8.9	0.0000	0.1	1976.1	797.0
10-year	1.770	20.1	0.8	8.0	8.0	0.0000	0.0	1656.9	710.8
25-year	1.770	53.7	0.8	8.2	8.2	0.0000	0.0	1731.0	731.2
50-year	1.770	88.7	0.8	8.5	8.5	0.0000	0.1	1837.8	754.6
100-year	1.770	98.6	0.8	8.9	8.9	0.0000	0.1	1969.7	801.5
10-year	1.820	20.1	0.8	8.0	8.0	0.0000	0.0	2044.4	759.1
25-year	1.820	53.8	0.8	8.2	8.2	0.0000	0.1	2198.8	788.4

50-year	1.820	88.8	0.8	8.5	8.5	0.0000	0.1	2427.6	823.8
100-year	1.820	98.6	0.8	8.9	8.9	0.0000	0.1	2720.8	849.8
10-year	1.870	20.1	0.9	8.0	8.0	0.0000	0.0	1565.0	789.2
25-year	1.870	53.7	0.9	8.2	8.2	0.0000	0.1	1654.3	798.2
50-year	1.870	88.8	0.9	8.5	8.5	0.0000	0.1	1782.8	808.9
100-year	1.870	98.6	0.9	8.9	8.9	0.0000	0.1	1941.3	815.0
10-year	1.920	20.1	0.9	8.0	8.0	0.0000	0.0	1208.1	727.9
25-year	1.920	53.7	0.9	8.2	8.2	0.0000	0.1	1275.2	732.6
50-year	1.920	88.8	0.9	8.5	8.5	0.0000	0.1	1371.6	761.6
100-year	1.920	98.6	0.9	8.9	8.9	0.0000	0.1	1491.3	820.2
10-year	1.970	20.1	1.0	8.0	8.0	0.0000	0.0	1169.5	704.5
25-year	1.970	53.6	1.0	8.2	8.2	0.0000	0.1	1241.8	723.3
50-year	1.970	88.8	1.0	8.5	8.5	0.0000	0.1	1345.6	754.4
100-year	1.970	98.6	1.0	8.9	8.9	0.0000	0.1	1473.5	800.9
10-year	2.020	20.2	1.1	8.0	8.0	0.0000	0.0	1148.6	730.8
25-year	2.020	53.4	1.1	8.2	8.2	0.0000	0.1	1221.8	747.0
50-year	2.020	88.8	1.1	8.5	8.5	0.0000	0.1	1327.0	808.8
100-year	2.020	98.6	1.1	8.9	8.9	0.0000	0.1	1456.9	860.5
10-year	2.070	20.2	1.1	8.0	8.0	0.0000	0.0	1461.0	810.9
25-year	2.070	53.4	1.1	8.2	8.2	0.0000	0.1	1587.0	853.4
50-year	2.070	88.8	1.1	8.5	8.5	0.0000	0.1	1768.3	872.4
100-year	2.070	98.6	1.1	8.9	8.9	0.0000	0.1	1991.8	891.5
10-year	2.120	20.2	1.1	8.0	8.0	0.0000	0.0	1206.9	827.1
25-year	2.120	53.3	1.1	8.2	8.2	0.0000	0.1	1297.8	867.1
50-year	2.120	88.8	1.1	8.5	8.5	0.0000	0.1	1428.5	873.1
100-year	2.120	98.6	1.1	8.9	8.9	0.0000	0.1	1589.5	893.6
10-year	2.170	20.4	1.1	8.0	8.0	0.0000	0.0	1053.6	876.3
25-year	2.170	53.2	1.1	8.2	8.2	0.0000	0.1	1120.5	885.5
50-year	2.170	88.9	1.1	8.5	8.5	0.0000	0.1	1217.5	904.5
100-year	2.170	98.6	1.1	8.9	8.9	0.0000	0.1	1337.9	929.1
10-year	2.220	20.5	1.2	8.0	8.0	0.0000	0.0	1102.4	940.1
25-year	2.220	53.2	1.2	8.2	8.2	0.0000	0.1	1176.6	948.7
50-year	2.220	88.8	1.2	8.5	8.5	0.0000	0.1	1283.3	960.0
100-year	2.220	98.6	1.2	8.9	8.9	0.0000	0.1	1414.7	974.1
10-year	2.270	20.5	1.2	8.0	8.0	0.0000	0.0	1258.7	987.5
25-year	2.270	53.3	1.2	8.2	8.2	0.0000	0.1	1349.4	1014.2
50-year	2.270	88.9	1.2	8.5	8.5	0.0000	0.1	1480.0	1026.3
100-year	2.270	98.6	1.2	8.9	8.9	0.0000	0.1	1640.9	1035.7
10-year	2.320	20.7	1.4	8.0	8.0	0.0000	0.0	1164.4	1027.3
25-year	2.320	53.1	1.4	8.2	8.2	0.0000	0.1	1245.4	1045.3
50-year	2.320	88.9	1.4	8.5	8.5	0.0000	0.1	1361.7	1075.9
100-year	2.320	98.6	1.4	8.9	8.9	0.0000	0.1	1505.1	1079.6

10-year	2.370	16.9	1.7	8.0	8.0	0.0000	0.0	1080.5	941.3
25-year	2.370	53.1	1.7	8.2	8.2	0.0000	0.1	1155.0	998.2
50-year	2.370	88.9	1.7	8.5	8.5	0.0000	0.2	1262.0	1096.1
100-year	2.370	98.6	1.7	8.9	8.9	0.0000	0.2	1393.9	1109.9
10-year	2.420	16.9	1.8	8.0	8.0	0.0000	0.0	1116.5	890.7
25-year	2.420	53.1	1.8	8.2	8.2	0.0000	0.1	1211.5	1005.1
50-year	2.420	88.9	1.8	8.5	8.5	0.0000	0.2	1349.6	1134.2
100-year	2.420	98.6	1.8	8.9	8.9	0.0000	0.2	1521.3	1144.9
10-year	2.470	16.9	1.8	8.0	8.0	0.0000	0.0	1018.2	689.2
25-year	2.470	53.1	1.8	8.2	8.2	0.0000	0.1	1100.6	791.2
50-year	2.470	88.9	1.8	8.5	8.5	0.0000	0.2	1241.7	1048.3
100-year	2.470	98.6	1.8	8.9	8.9	0.0000	0.2	1437.2	1115.4
10-year	2.520	17.0	1.8	8.0	8.0	0.0000	0.0	975.9	800.5
25-year	2.520	53.2	1.8	8.2	8.2	0.0000	0.1	1069.0	913.2
50-year	2.520	88.9	1.8	8.5	8.5	0.0000	0.2	1204.7	1066.0
100-year	2.520	98.6	1.8	8.9	8.9	0.0000	0.2	1372.8	1170.6
10-year	2.570	8.3	2.0	8.0	8.0	0.0000	0.0	1000.0	812.4
25-year	2.570	42.6	2.0	8.2	8.2	0.0000	0.1	1107.6	854.8
50-year	2.570	77.6	2.0	8.5	8.5	0.0000	0.2	1274.7	1032.4
100-year	2.570	85.8	2.0	8.9	8.9	0.0000	0.2	1502.0	1159.7
10-year	2.620	8.4	1.4	8.0	8.0	0.0000	0.0	1290.6	870.5
25-year	2.620	42.7	1.4	8.2	8.2	0.0000	0.1	1472.3	998.8
50-year	2.620	77.6	1.4	8.5	8.5	0.0000	0.1	1788.4	1172.6
100-year	2.620	85.8	1.4	8.9	8.9	0.0000	0.1	2214.6	1260.9
	2.650	Culvert							
10-year	2.675	14.9	1.6	8.1	8.1	0.0000	0.0	1154.1	908.0
25-year	2.675	44.8	1.6	8.3	8.3	0.0000	0.1	1357.7	1075.5
50-year	2.675	77.6	1.6	8.5	8.5	0.0000	0.1	1697.1	1243.2
100-year	2.675	85.8	1.6	8.9	8.9	0.0000	0.1	2147.2	1329.2
10-year	2.725	12.1	1.0	8.1	8.1	0.0000	0.0	1443.3	585.3
25-year	2.725	41.6	1.0	8.3	8.3	0.0000	0.0	1567.1	636.3
50-year	2.725	74.1	1.0	8.5	8.5	0.0000	0.1	1767.7	767.1
100-year	2.725	81.7	1.0	8.9	8.9	0.0000	0.1	2063.5	958.6
10-year	2.775	12.2	1.6	8.1	8.1	0.0000	0.0	1604.7	511.3
25-year	2.775	41.6	1.6	8.3	8.3	0.0000	0.0	1719.0	605.6
50-year	2.775	74.1	1.6	8.5	8.5	0.0000	0.1	1909.1	735.2
100-year	2.775	81.7	1.6	8.9	8.9	0.0000	0.1	2196.2	906.9
10-year	2.825	12.1	1.5	8.1	8.1	0.0000	0.0	1529.8	482.8
25-year	2.825	41.6	1.5	8.3	8.3	0.0000	0.0	1629.6	508.9
50-year	2.825	74.1	1.5	8.5	8.5	0.0000	0.1	1789.7	630.8
100-year	2.825	81.7	1.5	8.9	8.9	0.0000	0.1	2045.9	828.4
10-year	2.875	12.1	1.1	8.1	8.1	0.0000	0.0	1513.4	536.2

25-year	2.875	41.7	1.1	8.3	8.3	0.0000	0.0	1628.2	604.6
50-year	2.875	74.1	1.1	8.5	8.5	0.0000	0.1	1821.1	729.3
100-year	2.875	81.7	1.1	8.9	8.9	0.0000	0.1	2094.5	833.3
10-year	2.925	12.1	1.9	8.1	8.1	0.0000	0.0	1465.7	560.2
25-year	2.925	41.6	1.9	8.3	8.3	0.0000	0.0	1583.0	598.1
50-year	2.925	74.1	1.9	8.5	8.5	0.0000	0.1	1769.0	718.9
100-year	2.925	81.8	1.9	8.9	8.9	0.0000	0.1	2056.0	897.6
10-year	2.975	12.1	1.9	8.1	8.1	0.0000	0.1	589.7	690.3
25-year	2.975	41.6	1.9	8.3	8.3	0.0000	0.1	984.9	769.6
50-year	2.975	74.1	1.9	8.5	8.5	0.0000	0.2	1239.7	953.4
100-year	2.975	81.8	1.9	8.9	8.9	0.0000	0.2	1585.9	1054.0
10-year	3.025	12.1	1.9	8.1	8.1	0.0000	0.1	541.2	607.9
25-year	3.025	41.6	1.9	8.3	8.3	0.0000	0.2	866.1	684.3
50-year	3.025	74.2	1.9	8.5	8.5	0.0000	0.2	1074.3	743.5
100-year	3.025	81.8	1.9	8.9	8.9	0.0000	0.2	1341.0	796.6
10-year	3.075	10.6	1.9	8.1	8.1	0.0000	0.1	546.5	649.0
25-year	3.075	39.7	1.9	8.3	8.3	0.0000	0.2	627.5	709.4
50-year	3.075	72.2	1.9	8.5	8.5	0.0000	0.2	1073.3	747.8
100-year	3.075	79.4	1.9	8.9	8.9	0.0000	0.2	1337.8	782.9
10-year	3.125	10.6	1.9	8.1	8.1	0.0000	0.0	892.9	678.9
25-year	3.125	39.7	1.9	8.3	8.3	0.0000	0.1	1032.8	701.0
50-year	3.125	72.2	1.9	8.5	8.5	0.0000	0.2	1240.7	726.5
100-year	3.125	79.5	1.9	8.9	8.9	0.0000	0.2	1494.6	743.3
	3.150	Culvert							
10-year	3.175	10.8	2.0	8.1	8.1	0.0000	0.1	876.9	1049.7
25-year	3.175	40.1	2.0	8.3	8.3	0.0000	0.1	1095.3	1069.3
50-year	3.175	73.2	2.0	8.6	8.6	0.0000	0.2	1425.8	1098.3
100-year	3.175	79.8	2.0	8.9	8.9	0.0000	0.2	1798.2	1130.1
10-year	3.225	10.1	2.1	8.1	8.1	0.0000	0.1	107.1	1054.0
25-year	3.225	39.3	2.1	8.3	8.3	0.0000	0.2	825.6	1083.2
50-year	3.225	72.3	2.1	8.6	8.6	0.0000	0.2	1161.1	1116.7
100-year	3.225	78.7	2.1	8.9	8.9	0.0000	0.2	1540.5	1153.5
10-year	3.275	8.9	2.2	8.1	8.1	0.0000	0.1	129.3	1040.3
25-year	3.275	37.6	2.2	8.3	8.3	0.0000	0.3	170.0	1074.0
50-year	3.275	70.4	2.2	8.6	8.6	0.0000	0.2	1510.8	1113.3
100-year	3.275	76.4	2.2	8.9	8.9	0.0000	0.1	1888.1	1145.1
10-year	3.325	8.9	2.2	8.1	8.1	0.0000	0.1	97.7	1050.9
25-year	3.325	37.7	2.2	8.3	8.3	0.0000	0.4	102.3	1072.5
50-year	3.325	71.1	2.2	8.6	8.6	0.0000	0.7	109.0	1108.3
100-year	3.325	76.5	2.2	8.9	8.9	0.0000	0.1	1745.6	1145.2
	3.350	Culvert							

10-year	3.385	27.3	2.3	8.8	8.8	0.0000	0.0	1655.5	1137.0
25-year	3.385	52.4	2.3	9.0	9.0	0.0000	0.1	2195.8	1160.3
50-year	3.385	79.7	2.3	9.0	9.0	0.0000	0.1	2226.0	1161.6
100-year	3.385	82.3	2.3	9.1	9.1	0.0000	0.1	2250.5	1162.6
10-year	3.435	27.3	2.5	8.8	8.8	0.0000	0.0	2077.1	1122.1
25-year	3.435	51.9	2.5	9.0	9.0	0.0000	0.1	2291.5	1135.2
50-year	3.435	80.0	2.5	9.0	9.0	0.0000	0.1	2321.1	1136.3
100-year	3.435	82.3	2.5	9.1	9.1	0.0000	0.1	2345.1	1137.1
10-year	3.485	27.3	2.7	8.8	8.8	0.0000	0.0	1725.4	1001.2
25-year	3.485	48.0	2.7	9.0	9.0	0.0000	0.1	1917.0	1015.1
50-year	3.485	79.8	2.7	9.0	9.0	0.0000	0.1	1943.4	1015.8
100-year	3.485	81.7	2.7	9.1	9.1	0.0000	0.1	1964.9	1016.3
10-year	3.560	27.4	2.9	8.8	8.8	0.0000	0.0	1629.7	949.2
25-year	3.560	48.5	2.9	9.0	9.0	0.0000	0.1	1811.5	963.2
50-year	3.560	80.3	2.9	9.0	9.0	0.0000	0.1	1836.4	964.2
100-year	3.560	82.3	2.9	9.1	9.1	0.0000	0.1	1856.8	965.0
10-year	3.635	27.3	3.1	8.8	8.8	0.0000	0.0	1530.5	898.4
25-year	3.635	48.5	3.1	9.0	9.0	0.0000	0.1	1703.0	915.3
50-year	3.635	80.8	3.1	9.0	9.0	0.0000	0.1	1726.6	916.4
100-year	3.635	83.2	3.1	9.1	9.1	0.0000	0.1	1746.0	917.4
10-year	3.710	27.4	3.3	8.8	8.8	0.0000	0.0	1427.6	838.4
25-year	3.710	48.9	3.3	9.0	9.0	0.0000	0.1	1588.8	855.5
50-year	3.710	81.2	3.3	9.0	9.0	0.0000	0.1	1610.9	857.4
100-year	3.710	85.2	3.3	9.1	9.1	0.0000	0.1	1629.1	859.0
10-year	3.785	27.4	3.5	8.8	8.8	0.0000	0.1	1330.7	771.0
25-year	3.785	49.3	3.5	9.0	9.0	0.0000	0.1	1480.0	795.6
50-year	3.785	82.3	3.5	9.0	9.0	0.0000	0.1	1500.5	798.0
100-year	3.785	85.8	3.5	9.1	9.1	0.0000	0.1	1517.4	800.0
10-year	3.850	27.5	3.7	8.8	8.8	0.0000	0.1	812.1	695.6
25-year	3.850	49.9	3.7	9.0	9.0	0.0000	0.1	947.1	795.3
50-year	3.850	83.5	3.7	9.0	9.0	0.0000	0.1	967.5	796.3
100-year	3.850	86.8	3.7	9.1	9.1	0.0000	0.1	984.4	797.1
10-year	3.925	27.6	3.7	8.8	8.8	0.0000	0.1	628.6	706.1
25-year	3.925	50.1	3.7	9.0	9.0	0.0000	0.1	770.0	774.0
50-year	3.925	88.3	3.7	9.0	9.0	0.0000	0.2	790.2	778.1
100-year	3.925	222.5	3.7	9.1	9.1	0.0001	0.6	807.4	781.6
10-year	4.000	27.8	3.7	8.8	8.8	0.0000	0.1	549.6	673.4
25-year	4.000	50.3	3.7	9.0	9.0	0.0000	0.2	684.5	737.0
50-year	4.000	108.1	3.7	9.0	9.0	0.0000	0.3	704.6	740.6
100-year	4.000	222.4	3.7	9.1	9.1	0.0001	0.6	725.4	744.4
10-year	4.075	28.0	3.6	8.8	8.8	0.0000	0.2	152.4	97.0
25-year	4.075	50.6	3.6	9.0	9.0	0.0000	0.4	177.2	711.2
50-year	4.075	113.1	3.6	9.0	9.1	0.0002	0.8	198.7	714.3

100-year	4.075	223.0	3.6	9.1	9.1	0.0008	1.5	227.5	718.3
10-year	4.150	28.2	3.6	8.8	8.8	0.0000	0.2	136.3	127.1
25-year	4.150	50.8	3.6	9.0	9.0	0.0001	0.4	172.8	779.9
50-year	4.150	123.0	3.6	9.1	9.1	0.0003	0.9	208.3	782.5
100-year	4.150	223.8	3.6	9.1	9.2	0.0009	1.5	270.3	787.0
10-year	4.225	28.3	3.6	8.8	8.8	0.0000	0.2	115.6	35.9
25-year	4.225	51.1	3.6	9.0	9.0	0.0001	0.4	133.9	715.7
50-year	4.225	125.0	3.6	9.1	9.1	0.0004	1.0	182.7	729.7
100-year	4.225	225.4	3.6	9.2	9.2	0.0010	1.5	270.9	754.3
10-year	4.300	28.4	3.7	8.8	8.8	0.0000	0.3	104.0	32.3
25-year	4.300	51.2	3.7	9.0	9.0	0.0001	0.5	120.6	485.5
50-year	4.300	125.1	3.7	9.1	9.1	0.0005	1.1	166.6	534.7
100-year	4.300	226.7	3.7	9.3	9.3	0.0011	1.6	259.2	623.8
10-year	4.375	28.4	3.8	8.8	8.8	0.0000	0.3	97.6	29.7
25-year	4.375	51.3	3.8	9.0	9.0	0.0001	0.5	120.1	600.8
50-year	4.375	125.0	3.8	9.2	9.2	0.0005	1.1	191.8	621.7
100-year	4.375	287.0	3.8	9.4	9.4	0.0014	1.9	331.7	660.7
10-year	4.450	29.3	3.8	8.8	8.8	0.0001	0.4	81.1	27.0
25-year	4.450	51.4	3.8	9.0	9.0	0.0002	0.6	110.5	672.3
50-year	4.450	243.3	3.8	9.2	9.3	0.0020	2.1	252.9	696.5
100-year	4.450	296.8	3.8	9.5	9.5	0.0013	1.7	413.0	722.8
10-year	4.525	31.4	3.9	8.8	8.8	0.0001	0.4	76.5	24.4
25-year	4.525	206.5	3.9	9.2	9.2	0.0021	2.1	197.0	757.0
50-year	4.525	257.2	3.9	9.4	9.4	0.0014	1.8	365.0	773.6
100-year	4.525	299.6	3.9	9.6	9.6	0.0010	1.5	508.7	787.6
10-year	4.600	163.5	4.0	8.9	8.9	0.0021	2.1	76.9	22.0
25-year	4.600	211.0	4.0	9.3	9.3	0.0014	1.8	289.5	763.4
50-year	4.600	259.8	4.0	9.5	9.5	0.0010	1.5	431.9	777.2
100-year	4.600	306.6	4.0	9.6	9.6	0.0008	1.4	557.5	789.2
	4.650	Culvert							
10-year	4.700	165.8	3.5	10.2	10.2	0.0000	0.2	1219.7	981.3
25-year	4.700	206.8	3.5	10.2	10.2	0.0000	0.3	1246.9	982.8
50-year	4.700	221.1	3.5	10.2	10.2	0.0000	0.3	1258.6	983.5
100-year	4.700	228.6	3.5	10.3	10.3	0.0000	0.3	1265.7	983.9
10-year	4.800	166.0	3.6	10.2	10.2	0.0000	0.3	1150.1	1005.0
25-year	4.800	211.8	3.6	10.2	10.2	0.0000	0.3	1179.8	1007.6
50-year	4.800	230.7	3.6	10.3	10.3	0.0000	0.4	1193.2	1008.8
100-year	4.800	244.0	3.6	10.3	10.3	0.0000	0.4	1201.6	1009.5

Proposed Conditions - 25-year Storm Tide

10- through 100-year rainfall events

Hydraulic results at time of maximum water surface elevation

	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
10-year	0.000	-197.8	-2.6	10.3	-1.5	10.3	0.0000	-0.1	7247.4	1345.6
25-year	0.000	-209.6	-2.6	10.3	-1.5	10.3	0.0000	-0.1	7247.4	1345.6
50-year	0.000	-182.1	-2.6	10.3	-1.6	10.3	0.0000	-0.1	7247.4	1345.6
100-year	0.000	-185.7	-2.6	10.3	-1.6	10.3	0.0000	-0.1	7247.4	1345.6
10-year	0.150	-103.0	-2.7	10.3		10.3	0.0000	0.0	8880.0	1351.1
25-year	0.150	-64.7	-2.7	10.3		10.3	0.0000	0.0	8879.9	1351.1
50-year	0.150	-98.3	-2.7	10.3		10.3	0.0000	0.0	8879.9	1351.1
100-year	0.150	-94.9	-2.7	10.3		10.3	0.0000	0.0	8880.0	1351.1
10-year	0.300	-63.1	-2.7	10.3		10.3	0.0000	0.0	8343.3	1404.5
25-year	0.300	-61.7	-2.7	10.3		10.3	0.0000	0.0	8343.1	1404.5
50-year	0.300	-79.4	-2.7	10.3		10.3	0.0000	0.0	8343.1	1404.5
100-year	0.300	-74.1	-2.7	10.3		10.3	0.0000	0.0	8343.3	1404.5
10-year	0.400	-59.4	-2.8	10.3		10.3	0.0000	0.0	7641.2	1181.7
25-year	0.400	-56.4	-2.8	10.3		10.3	0.0000	0.0	7641.0	1181.7
50-year	0.400	-71.1	-2.8	10.3		10.3	0.0000	0.0	7641.1	1181.7
100-year	0.400	-58.1	-2.8	10.3		10.3	0.0000	0.0	7641.3	1181.7
10-year	0.500	-33.9	-2.8	10.3		10.3	0.0000	0.0	5492.6	954.9
25-year	0.500	-51.1	-2.8	10.3		10.3	0.0000	0.0	5492.4	954.8
50-year	0.500	-59.2	-2.8	10.3		10.3	0.0000	0.0	5492.6	954.9
100-year	0.500	-46.2	-2.8	10.3		10.3	0.0000	0.0	5492.6	954.9
10-year	0.650	-33.0	-2.7	10.3		10.3	0.0000	0.0	5510.6	913.1
25-year	0.650	-16.0	-2.7	10.3		10.3	0.0000	0.0	5510.3	913.1
50-year	0.650	-48.7	-2.7	10.3		10.3	0.0000	0.0	5510.5	913.1
100-year	0.650	-45.3	-2.7	10.3		10.3	0.0000	0.0	5510.5	913.1
10-year	0.750	-30.9	-2.6	10.3		10.3	0.0000	0.0	5308.9	913.0
25-year	0.750	-15.3	-2.6	10.3		10.3	0.0000	0.0	5308.7	913.0
50-year	0.750	-43.3	-2.6	10.3		10.3	0.0000	0.0	5308.9	913.0
100-year	0.750	-35.0	-2.6	10.3		10.3	0.0000	0.0	5308.9	913.0
10-year	1.000	-11.3	-2.5	10.3		10.3	0.0000	0.0	5575.4	879.6
25-year	1.000	-12.8	-2.5	10.3		10.3	0.0000	0.0	5575.1	879.6
50-year	1.000	-16.5	-2.5	10.3		10.3	0.0000	0.0	5575.7	879.7
100-year	1.000	-15.0	-2.5	10.3		10.3	0.0000	0.0	5575.5	879.6
10-year	1.075	-9.2	-2.5	10.3		10.3	0.0000	0.0	5789.6	873.2
25-year	1.075	-9.9	-2.5	10.3		10.3	0.0000	0.0	5789.2	873.1
50-year	1.075	-10.3	-2.5	10.3		10.3	0.0000	0.0	5790.2	873.2
100-year	1.075	-5.4	-2.5	10.3		10.3	0.0000	0.0	5789.9	873.2

10-year	1.150	-7.1	-2.5	10.3		10.3	0.0000	0.0	5541.5	864.9
25-year	1.150	-7.4	-2.5	10.3		10.3	0.0000	0.0	5541.1	864.9
50-year	1.150	-4.6	-2.5	10.3		10.3	0.0000	0.0	5542.4	865.0
100-year	1.150	-4.7	-2.5	10.3		10.3	0.0000	0.0	5541.9	865.0
10-year	1.200	-5.1	-2.5	10.3		10.3	0.0000	0.0	5677.8	900.9
25-year	1.200	-5.3	-2.5	10.3		10.3	0.0000	0.0	5677.3	900.8
50-year	1.200	-3.7	-2.5	10.3		10.3	0.0000	0.0	5678.9	901.0
100-year	1.200	-3.6	-2.5	10.3		10.3	0.0000	0.0	5678.2	900.9
10-year	1.300	-2.4	-2.5	10.3		10.3	0.0000	0.0	5630.1	892.5
25-year	1.300	-2.4	-2.5	10.3		10.3	0.0000	0.0	5629.7	892.5
50-year	1.300	-0.3	-2.5	10.3		10.3	0.0000	0.0	5631.5	892.6
100-year	1.300	-1.8	-2.5	10.3		10.3	0.0000	0.0	5630.7	892.6
10-year	1.450	0.0	-2.5	10.3		10.3	0.0000	0.0	5430.4	849.3
25-year	1.450	0.0	-2.5	10.3		10.3	0.0000	0.0	5429.9	849.3
50-year	1.450	0.0	-2.5	10.3		10.3	0.0000	0.0	5431.7	849.4
100-year	1.450	0.0	-2.5	10.3		10.3	0.0000	0.0	5430.9	849.4
	1.485	Inl Struct								
10-year	1.520	0.0	-1.0	7.0	-1.0	7.0	0.0000	0.0	182.1	587.8
25-year	1.520	0.0	-1.0	7.4	-1.0	7.4	0.0000	0.0	191.5	631.6
50-year	1.520	51.6	-1.0	7.7	-0.2	7.7	0.0000	0.3	199.1	646.3
100-year	1.520	119.1	-1.0	7.9	0.3	7.9	0.0000	0.6	204.1	651.0
10-year	1.570	-1.6	0.7	7.0		7.0	0.0000	0.0	539.8	637.9
25-year	1.570	101.6	0.7	7.4		7.4	0.0000	0.2	575.5	652.3
50-year	1.570	290.7	0.7	7.7		7.7	0.0000	0.5	601.4	669.3
100-year	1.570	111.8	0.7	7.9		7.9	0.0000	0.2	623.1	698.5
10-year	1.620	-14.4	0.7	7.0		7.0	0.0000	0.0	1025.9	589.2
25-year	1.620	97.6	0.7	7.4		7.4	0.0000	0.1	1096.8	617.4
50-year	1.620	109.8	0.7	7.6		7.6	0.0000	0.1	1146.3	644.3
100-year	1.620	105.4	0.7	7.9		7.9	0.0000	0.1	1192.1	651.9
10-year	1.670	-7.7	0.7	7.0		7.0	0.0000	0.0	1325.0	521.3
25-year	1.670	97.6	0.7	7.4		7.4	0.0000	0.1	1423.7	557.3
50-year	1.670	108.9	0.7	7.6		7.6	0.0000	0.1	1492.3	603.2
100-year	1.670	105.6	0.7	7.9		7.9	0.0000	0.1	1556.0	610.9
10-year	1.720	-7.8	0.7	7.0		7.0	0.0000	0.0	1359.9	613.8
25-year	1.720	87.2	0.7	7.4		7.4	0.0000	0.1	1484.3	661.4
50-year	1.720	98.3	0.7	7.6		7.6	0.0000	0.1	1571.7	679.9
100-year	1.720	89.9	0.7	7.9		7.9	0.0000	0.1	1653.5	693.9
10-year	1.770	0.8	0.8	7.0		7.0	0.0000	0.0	1266.2	587.6
25-year	1.770	87.5	0.8	7.4		7.4	0.0000	0.1	1406.4	676.4
50-year	1.770	99.7	0.8	7.6		7.6	0.0000	0.1	1507.1	702.1
100-year	1.770	89.0	0.8	7.9		7.9	0.0000	0.1	1601.3	707.9

10-year	1.820	2.1	0.8	7.0	7.0	0.0000	0.0	1332.5	599.9
25-year	1.820	87.7	0.8	7.4	7.4	0.0000	0.1	1577.6	636.6
50-year	1.820	100.9	0.8	7.6	7.6	0.0000	0.1	1756.0	672.9
100-year	1.820	89.1	0.8	7.9	7.9	0.0000	0.1	1933.3	722.6
10-year	1.870	4.1	0.9	7.0	7.0	0.0000	0.0	1093.4	597.3
25-year	1.870	87.9	0.9	7.4	7.4	0.0000	0.1	1263.5	668.1
50-year	1.870	102.1	0.9	7.6	7.6	0.0000	0.1	1384.8	736.7
100-year	1.870	89.3	0.9	7.9	7.9	0.0000	0.1	1498.1	779.1
10-year	1.920	9.1	0.9	7.0	7.0	0.0000	0.0	852.0	606.6
25-year	1.920	85.6	0.9	7.4	7.4	0.0000	0.1	981.0	685.0
50-year	1.920	96.2	0.9	7.6	7.6	0.0000	0.1	1072.6	720.0
100-year	1.920	89.4	0.9	7.9	7.9	0.0000	0.1	1157.7	724.4
10-year	1.970	10.0	1.0	7.0	7.0	0.0000	0.0	811.1	485.0
25-year	1.970	85.8	1.0	7.4	7.4	0.0000	0.2	927.0	591.7
50-year	1.970	95.4	1.0	7.6	7.6	0.0000	0.2	1024.0	651.5
100-year	1.970	94.4	1.0	7.9	7.9	0.0000	0.2	1115.2	680.2
10-year	2.020	14.5	1.1	7.0	7.0	0.0000	0.0	770.0	561.5
25-year	2.020	44.1	1.1	7.4	7.4	0.0000	0.1	903.9	646.6
50-year	2.020	94.1	1.1	7.6	7.6	0.0000	0.2	1002.6	710.3
100-year	2.020	98.3	1.1	7.9	7.9	0.0000	0.2	1094.1	717.9
10-year	2.070	19.1	1.1	7.0	7.0	0.0000	0.0	834.9	603.1
25-year	2.070	54.0	1.1	7.4	7.4	0.0000	0.1	1052.9	655.4
50-year	2.070	93.7	1.1	7.6	7.6	0.0000	0.2	1213.2	689.3
100-year	2.070	101.2	1.1	7.9	7.9	0.0000	0.2	1367.4	734.7
10-year	2.120	19.5	1.1	7.0	7.0	0.0000	0.1	738.9	492.3
25-year	2.120	54.1	1.1	7.4	7.4	0.0000	0.1	903.1	657.8
50-year	2.120	93.1	1.1	7.6	7.6	0.0000	0.2	1023.8	757.3
100-year	2.120	104.3	1.1	7.9	7.9	0.0000	0.2	1138.9	796.1
10-year	2.170	23.4	1.1	7.0	7.0	0.0000	0.1	707.8	525.4
25-year	2.170	54.4	1.1	7.4	7.4	0.0000	0.1	828.9	663.2
50-year	2.170	92.9	1.1	7.6	7.6	0.0000	0.2	919.2	764.8
100-year	2.170	105.9	1.1	7.9	7.9	0.0000	0.2	1003.8	869.1
10-year	2.220	27.5	1.2	7.0	7.0	0.0000	0.1	718.7	578.9
25-year	2.220	55.0	1.2	7.4	7.4	0.0000	0.1	856.2	799.1
50-year	2.220	93.0	1.2	7.6	7.6	0.0000	0.2	953.5	907.9
100-year	2.220	107.4	1.2	7.9	7.9	0.0000	0.2	1047.3	932.5
10-year	2.270	27.9	1.2	7.0	7.0	0.0000	0.1	786.9	641.0
25-year	2.270	62.8	1.2	7.4	7.4	0.0000	0.1	953.0	832.5
50-year	2.270	93.4	1.2	7.6	7.6	0.0000	0.2	1075.7	923.8
100-year	2.270	108.8	1.2	7.9	7.9	0.0000	0.2	1191.4	932.2
10-year	2.320	31.5	1.4	7.0	7.0	0.0000	0.1	731.1	560.6
25-year	2.320	63.0	1.4	7.4	7.4	0.0000	0.2	890.9	799.9

50-year	2.320	94.1	1.4	7.6	7.6	0.0000	0.2	1001.0	997.5
100-year	2.320	108.9	1.4	7.9	7.9	0.0000	0.2	1104.4	1020.7
10-year	2.370	34.8	1.7	7.0	7.0	0.0000	0.1	685.6	520.2
25-year	2.370	63.4	1.7	7.4	7.4	0.0000	0.2	829.7	685.4
50-year	2.370	94.8	1.7	7.6	7.6	0.0000	0.2	930.3	811.7
100-year	2.370	109.0	1.7	7.9	7.9	0.0000	0.3	1025.5	893.6
10-year	2.420	34.9	1.8	7.0	7.0	0.0000	0.1	649.8	504.3
25-year	2.420	63.8	1.8	7.4	7.4	0.0000	0.2	812.3	665.1
50-year	2.420	93.1	1.8	7.6	7.6	0.0000	0.3	931.7	752.1
100-year	2.420	109.1	1.8	7.9	7.9	0.0000	0.3	1047.4	836.2
10-year	2.470	35.3	1.8	7.0	7.0	0.0000	0.1	591.3	463.8
25-year	2.470	64.3	1.8	7.4	7.4	0.0000	0.2	747.1	534.6
50-year	2.470	93.5	1.8	7.6	7.6	0.0000	0.2	855.6	573.1
100-year	2.470	109.2	1.8	7.9	7.9	0.0000	0.3	958.6	664.3
10-year	2.520	37.5	1.8	7.0	7.0	0.0000	0.2	517.8	411.6
25-year	2.520	64.8	1.8	7.4	7.4	0.0000	0.2	679.1	490.8
50-year	2.520	92.5	1.8	7.6	7.6	0.0000	0.3	795.7	566.9
100-year	2.520	109.3	1.8	7.9	7.9	0.0000	0.3	909.5	724.9
10-year	2.570	30.0	2.0	7.0	7.0	0.0000	0.2	494.3	460.0
25-year	2.570	55.1	2.0	7.4	7.4	0.0000	0.2	663.1	521.4
50-year	2.570	77.5	2.0	7.6	7.6	0.0000	0.3	790.9	602.0
100-year	2.570	94.0	2.0	7.9	7.9	0.0000	0.3	922.1	787.8
10-year	2.620	30.4	1.4	7.0	7.0	0.0000	0.1	561.7	512.2
25-year	2.620	56.0	1.4	7.4	7.4	0.0000	0.1	781.7	641.6
50-year	2.620	77.7	1.4	7.6	7.6	0.0000	0.2	971.9	746.1
100-year	2.620	94.1	1.4	7.9	7.9	0.0000	0.2	1167.1	818.7
	2.650	Culvert							
10-year	2.675	39.7	1.6	7.0	7.0	0.0000	0.1	500.0	393.9
25-year	2.675	70.3	1.6	7.5	7.5	0.0000	0.2	712.9	566.8
50-year	2.675	93.9	1.6	7.8	7.8	0.0000	0.2	951.6	787.9
100-year	2.675	116.6	1.6	8.2	8.2	0.0000	0.2	1252.4	1013.5
10-year	2.725	37.5	0.0	7.0	7.0	0.0000	0.0	1185.8	329.2
25-year	2.725	67.2	0.0	7.5	7.5	0.0000	0.1	1363.4	447.5
50-year	2.725	90.2	0.0	7.8	7.8	0.0000	0.1	1537.5	541.2
100-year	2.725	112.2	0.0	8.2	8.2	0.0000	0.1	1735.7	611.4
10-year	2.775	37.5	0.0	7.0	7.0	0.0000	0.0	1407.2	378.2
25-year	2.775	67.2	0.0	7.5	7.5	0.0000	0.1	1590.6	425.8
50-year	2.775	90.2	0.0	7.8	7.8	0.0000	0.1	1745.0	462.8
100-year	2.775	112.2	0.0	8.2	8.2	0.0000	0.1	1917.2	567.0
10-year	2.825	37.6	0.0	7.0	7.0	0.0000	0.0	1288.1	394.7
25-year	2.825	67.2	0.0	7.5	7.5	0.0000	0.1	1383.3	440.9

50-year	2.825	90.2	0.0	7.8	7.8	0.0000	0.1	1456.6	468.7
100-year	2.825	112.2	0.0	8.2	8.2	0.0000	0.1	1528.4	490.5
10-year	2.875	37.6	0.0	7.0	7.0	0.0000	0.0	1345.1	383.1
25-year	2.875	67.2	0.0	7.5	7.5	0.0000	0.1	1443.1	416.7
50-year	2.875	90.2	0.0	7.8	7.8	0.0000	0.1	1518.4	482.8
100-year	2.875	112.2	0.0	8.2	8.2	0.0000	0.1	1592.3	564.2
10-year	2.925	37.6	1.0	7.0	7.0	0.0000	0.0	1014.9	422.4
25-year	2.925	67.2	1.0	7.5	7.5	0.0000	0.1	1109.2	495.6
50-year	2.925	90.2	1.0	7.8	7.8	0.0000	0.1	1181.8	529.2
100-year	2.925	112.3	1.0	8.2	8.2	0.0000	0.1	1252.9	579.7
10-year	2.975	37.7	1.9	7.0	7.0	0.0000	0.3	275.0	376.6
25-year	2.975	67.1	1.9	7.5	7.5	0.0000	0.4	402.6	413.7
50-year	2.975	90.2	1.9	7.8	7.8	0.0000	0.4	504.3	553.3
100-year	2.975	112.3	1.9	8.2	8.2	0.0000	0.4	910.4	720.5
10-year	3.025	37.7	1.9	7.0	7.0	0.0000	0.5	80.2	321.9
25-year	3.025	67.1	1.9	7.5	7.5	0.0000	0.5	359.4	415.0
50-year	3.025	90.2	1.9	7.8	7.8	0.0000	0.5	465.7	502.7
100-year	3.025	112.3	1.9	8.2	8.2	0.0000	0.5	575.3	647.3
10-year	3.075	36.6	1.9	7.0	7.0	0.0000	0.4	82.4	268.5
25-year	3.075	65.4	1.9	7.5	7.5	0.0000	0.5	322.4	469.1
50-year	3.075	88.1	1.9	7.8	7.8	0.0000	0.5	453.4	582.6
100-year	3.075	109.8	1.9	8.2	8.2	0.0000	0.5	587.4	676.7
10-year	3.125	36.7	1.9	7.0	7.0	0.0000	0.4	211.5	385.0
25-year	3.125	65.4	1.9	7.5	7.5	0.0000	0.5	326.8	569.2
50-year	3.125	88.1	1.9	7.8	7.8	0.0000	0.4	736.3	644.1
100-year	3.125	109.8	1.9	8.2	8.2	0.0000	0.4	964.7	689.0
	3.150	Culvert							
10-year	3.175	37.8	2.0	7.0	7.0	0.0000	0.5	75.8	465.2
25-year	3.175	65.5	2.0	7.5	7.5	0.0000	0.7	180.7	782.2
50-year	3.175	88.1	2.0	7.8	7.8	0.0000	0.8	252.2	945.0
100-year	3.175	109.8	2.0	8.2	8.2	0.0000	0.4	993.1	1060.2
10-year	3.225	37.4	2.1	7.0	7.0	0.0000	0.6	66.1	290.3
25-year	3.225	64.7	2.1	7.5	7.6	0.0001	0.9	76.3	508.6
50-year	3.225	87.1	2.1	7.8	7.9	0.0001	1.1	87.2	626.5
100-year	3.225	108.6	2.1	8.2	8.2	0.0001	1.2	132.5	1071.0
10-year	3.275	36.6	2.2	7.0	7.0	0.0000	0.5	76.1	765.3
25-year	3.275	63.2	2.2	7.6	7.6	0.0000	0.7	90.4	835.1
50-year	3.275	85.1	2.2	7.8	7.9	0.0001	0.9	107.2	890.5
100-year	3.275	106.2	2.2	8.2	8.2	0.0001	1.0	151.1	1058.1
10-year	3.325	36.8	2.2	7.0	7.0	0.0000	0.5	76.3	846.4
25-year	3.325	63.1	2.2	7.6	7.6	0.0000	0.7	158.4	1010.5

50-year	3.325	85.1	2.2	7.9	7.9	0.0000	0.7	213.3	1034.0
100-year	3.325	106.3	2.2	8.2	8.2	0.0000	0.8	274.5	1063.0
	3.350	Culvert							
10-year	3.385	102.9	2.3	7.1	7.1	0.0001	1.0	175.9	904.5
25-year	3.385	99.0	2.3	7.7	7.7	0.0000	0.5	646.0	974.4
50-year	3.385	121.3	2.3	8.1	8.1	0.0000	0.4	985.9	1043.9
100-year	3.385	138.2	2.3	8.5	8.5	0.0000	0.3	1351.8	1095.2
10-year	3.435	103.9	2.4	7.1	7.1	0.0001	0.9	273.5	975.4
25-year	3.435	99.4	2.4	7.7	7.7	0.0000	0.4	846.3	1032.4
50-year	3.435	121.3	2.4	8.1	8.1	0.0000	0.3	1264.8	1070.0
100-year	3.435	138.2	2.4	8.5	8.5	0.0000	0.3	1709.2	1098.7
10-year	3.485	104.4	2.4	7.1	7.1	0.0001	1.0	185.1	800.1
25-year	3.485	99.4	2.4	7.7	7.7	0.0000	0.5	655.4	854.1
50-year	3.485	121.3	2.4	8.1	8.1	0.0000	0.4	1006.4	945.4
100-year	3.485	138.2	2.4	8.5	8.5	0.0000	0.3	1400.0	976.1
10-year	3.560	105.7	2.5	7.1	7.1	0.0001	1.1	184.6	758.9
25-year	3.560	99.7	2.5	7.7	7.7	0.0000	0.5	623.9	799.0
50-year	3.560	121.4	2.5	8.1	8.1	0.0000	0.4	951.7	893.5
100-year	3.560	138.1	2.5	8.5	8.5	0.0000	0.3	1323.7	924.2
10-year	3.635	106.4	2.5	7.1	7.1	0.0001	1.1	180.5	713.3
25-year	3.635	100.2	2.5	7.7	7.7	0.0000	0.5	589.9	752.4
50-year	3.635	121.6	2.5	8.1	8.1	0.0000	0.4	897.5	831.6
100-year	3.635	137.8	2.5	8.5	8.5	0.0000	0.4	1245.2	868.5
10-year	3.710	106.4	2.6	7.1	7.2	0.0001	1.2	184.9	650.1
25-year	3.710	100.6	2.6	7.7	7.7	0.0000	0.6	556.4	694.3
50-year	3.710	121.7	2.6	8.1	8.1	0.0000	0.5	840.9	771.7
100-year	3.710	137.7	2.6	8.5	8.5	0.0000	0.4	1163.7	808.5
10-year	3.785	107.0	2.7	7.1	7.2	0.0001	1.1	240.5	531.1
25-year	3.785	101.2	2.7	7.7	7.7	0.0000	0.6	552.6	615.5
50-year	3.785	122.0	2.7	8.1	8.1	0.0000	0.5	807.8	674.8
100-year	3.785	137.5	2.7	8.5	8.5	0.0000	0.4	1094.0	727.9
10-year	3.850	107.4	2.7	7.1	7.2	0.0002	1.4	113.6	143.4
25-year	3.850	100.6	2.7	7.7	7.7	0.0001	0.9	213.5	226.1
50-year	3.850	121.8	2.7	8.1	8.1	0.0001	0.9	340.0	617.9
100-year	3.850	137.2	2.7	8.5	8.5	0.0000	0.7	601.1	660.8
10-year	3.925	112.2	2.8	7.2	7.2	0.0002	1.3	84.6	41.8
25-year	3.925	100.1	2.8	7.7	7.7	0.0001	1.0	138.9	137.6
50-year	3.925	122.0	2.8	8.1	8.1	0.0001	1.0	219.8	437.4
100-year	3.925	136.9	2.8	8.5	8.5	0.0000	0.9	428.9	585.8
10-year	4.000	117.6	2.9	7.2	7.2	0.0002	1.3	88.6	27.7
25-year	4.000	106.5	2.9	7.7	7.7	0.0001	1.0	103.5	29.7

50-year	4.000	123.2	2.9	8.1	8.1	0.0001	1.1	161.1	423.4
100-year	4.000	137.0	2.9	8.5	8.5	0.0001	0.9	361.1	561.5
10-year	4.075	121.2	2.9	7.2	7.2	0.0002	1.4	89.2	28.9
25-year	4.075	109.9	2.9	7.7	7.7	0.0001	1.1	104.7	31.1
50-year	4.075	124.2	2.9	8.1	8.1	0.0001	1.1	117.1	32.6
100-year	4.075	137.0	2.9	8.5	8.5	0.0001	1.1	136.6	78.2
10-year	4.150	124.8	3.0	7.2	7.2	0.0003	1.6	78.9	25.9
25-year	4.150	110.5	3.0	7.7	7.7	0.0001	1.2	93.1	29.9
50-year	4.150	128.8	3.0	8.1	8.1	0.0001	1.2	105.3	32.6
100-year	4.150	138.0	3.0	8.5	8.5	0.0001	1.2	118.9	35.3
10-year	4.225	132.7	3.1	7.2	7.3	0.0003	1.7	76.1	24.5
25-year	4.225	119.2	3.1	7.7	7.7	0.0002	1.3	89.1	27.6
50-year	4.225	133.0	3.1	8.1	8.1	0.0002	1.3	100.4	30.5
100-year	4.225	157.0	3.1	8.5	8.5	0.0002	1.4	113.1	33.5
10-year	4.300	142.0	3.1	7.2	7.3	0.0004	2.0	70.1	22.9
25-year	4.300	122.3	3.1	7.7	7.8	0.0002	1.5	82.0	25.3
50-year	4.300	144.8	3.1	8.1	8.1	0.0002	1.6	92.3	27.5
100-year	4.300	157.9	3.1	8.5	8.5	0.0002	1.5	103.7	30.2
10-year	4.375	150.3	3.2	7.3	7.3	0.0005	2.2	67.6	21.5
25-year	4.375	137.4	3.2	7.7	7.8	0.0003	1.8	78.3	23.5
50-year	4.375	145.2	3.2	8.1	8.2	0.0003	1.7	87.8	25.3
100-year	4.375	164.8	3.2	8.5	8.6	0.0003	1.7	98.2	27.7
10-year	4.450	150.7	3.3	7.3	7.4	0.0013	3.0	49.7	19.9
25-year	4.450	137.4	3.3	7.7	7.8	0.0007	2.3	59.5	21.7
50-year	4.450	145.3	3.3	8.1	8.2	0.0005	2.1	68.2	23.2
100-year	4.450	165.2	3.3	8.5	8.6	0.0005	2.1	77.8	25.2
10-year	4.525	160.4	3.3	7.4	7.5	0.0012	3.1	51.7	18.6
25-year	4.525	206.3	3.3	7.8	8.0	0.0013	3.4	60.7	20.2
50-year	4.525	173.7	3.3	8.2	8.3	0.0007	2.6	67.8	21.4
100-year	4.525	175.9	3.3	8.6	8.6	0.0005	2.3	76.2	22.9
10-year	4.600	164.7	3.4	7.5	7.6	0.0009	2.8	58.2	17.6
25-year	4.600	206.3	3.4	7.9	8.1	0.0010	3.1	66.8	18.9
50-year	4.600	250.4	3.4	8.3	8.4	0.0012	3.4	72.9	19.8
100-year	4.600	211.3	3.4	8.6	8.7	0.0007	2.7	79.7	20.9
	4.650	Culvert							
10-year	4.700	165.6	3.5	8.0	8.1	0.0006	2.3	73.5	26.5
25-year	4.700	218.7	3.5	8.9	9.0	0.0005	2.2	100.1	33.2
50-year	4.700	267.1	3.5	9.2	9.3	0.0005	2.2	259.3	947.1
100-year	4.700	292.0	3.5	10.1	10.1	0.0000	0.8	1131.1	976.3
10-year	4.800	165.7	3.6	8.1	8.2	0.0008	2.6	65.1	23.4
25-year	4.800	218.7	3.6	9.0	9.1	0.0006	2.5	94.1	61.1

50-year	4.800	266.8	3.6	9.3		9.3	0.0006	2.5	245.9	906.6
100-year	4.800	292.1	3.6	10.1		10.1	0.0001	0.9	1062.0	997.2

APPENDIX G

HY-8 CULVERT ANALYSIS RESULTS

HY-8 Culvert Analysis Report

Proposed Culverts

First Boulevard – 10’x5’ RCBC

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 170 cfs

Design Flow: 225 cfs

Maximum Flow: 330 cfs

Table 1 - Summary of Culvert Flows at Crossing: First Blvd

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6.96	170.00	170.00	0.00	1
7.20	186.00	186.00	0.00	1
7.43	202.00	202.00	0.00	1
7.65	218.00	218.00	0.00	1
7.75	225.00	225.00	0.00	1
8.08	250.00	250.00	0.00	1
8.35	266.00	266.00	0.00	1
8.60	282.00	282.00	0.00	1
8.83	298.00	296.52	1.20	14
8.91	314.00	303.37	10.30	7
8.98	330.00	306.97	22.78	6
8.80	294.87	294.87	0.00	Overtopping

Rating Curve Plot for Crossing: First Blvd

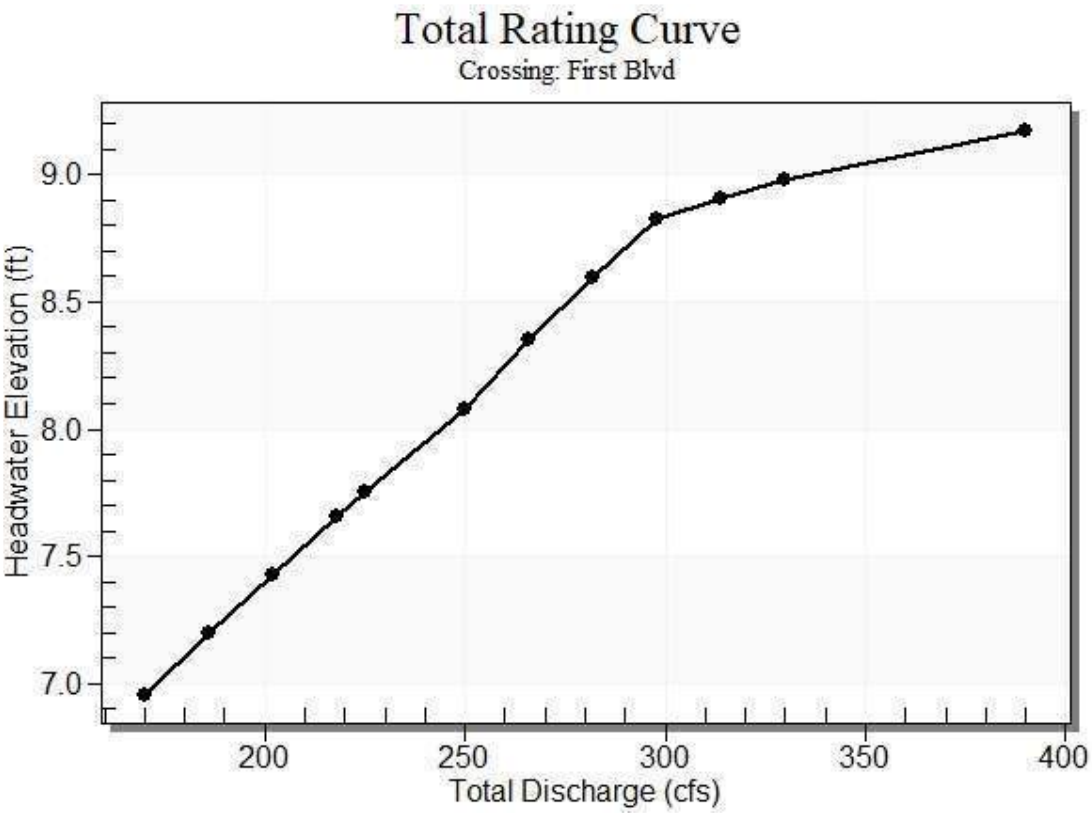


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
170.00	170.00	6.96	3.207	4.357	3-M1t	2.450	2.078	4.040	4.040	4.208	2.997
186.00	186.00	7.20	3.406	4.598	3-M1t	2.608	2.207	4.247	4.247	4.379	3.074
202.00	202.00	7.43	3.600	4.830	3-M1t	2.763	2.331	4.446	4.446	4.543	3.145
218.00	218.00	7.65	3.788	5.054	7-M1t	2.915	2.453	4.637	4.637	4.701	3.212
225.00	225.00	7.75	3.869	5.149	7-M1t	2.981	2.505	4.718	4.718	4.769	3.240
250.00	250.00	8.08	4.154	5.481	7-M1t	3.213	2.687	4.999	4.999	5.001	3.335
266.00	266.00	8.35	4.334	5.748	4-FFf	3.358	2.801	5.000	5.171	5.320	3.391
282.00	282.00	8.60	4.513	5.998	4-FFf	3.502	2.912	5.000	5.337	5.640	3.445
298.00	296.52	8.83	4.675	6.241	4-FFf	3.632	3.011	5.000	5.499	5.930	3.497
314.00	303.37	8.91	4.752	6.437	4-FFf	3.692	3.057	5.000	5.656	6.067	3.546
330.00	306.97	8.98	4.792	6.611	4-FFf	3.724	3.082	5.000	5.809	6.139	3.593

****

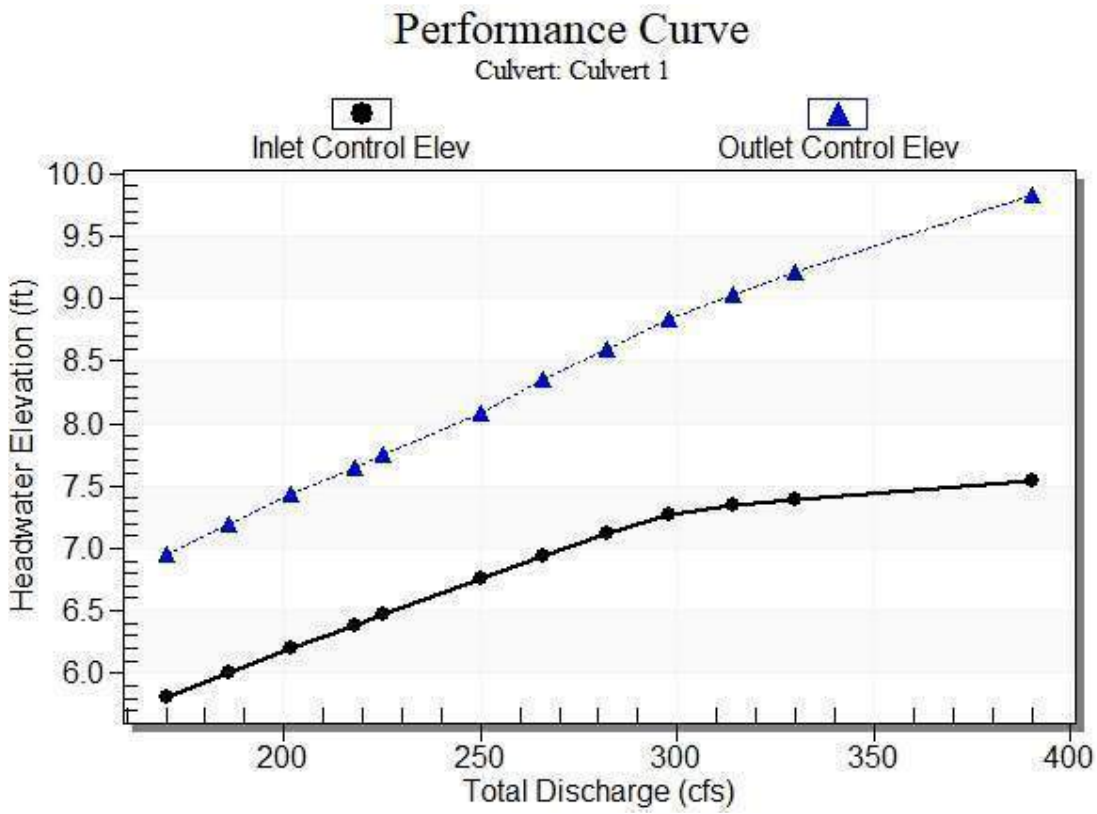
Straight Culvert

Inlet Elevation (invert): 2.60 ft, Outlet Elevation (invert): 2.50 ft

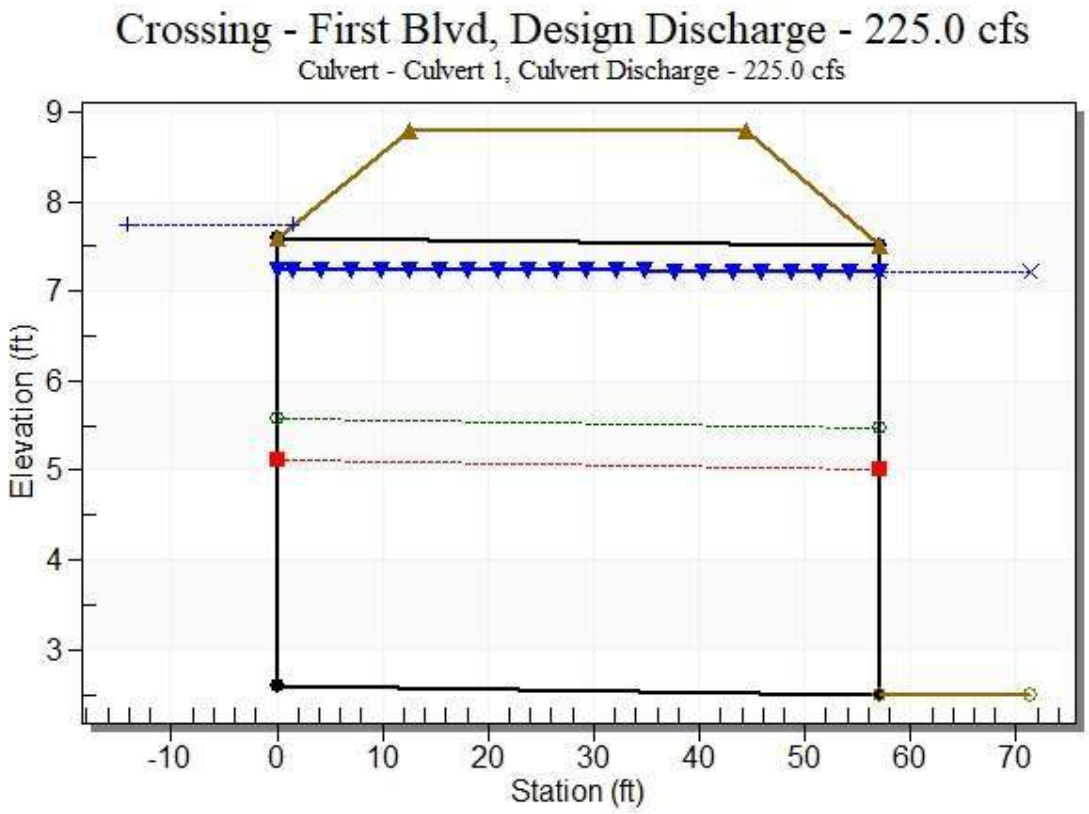
Culvert Length: 57.00 ft, Culvert Slope: 0.0018

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2.60 ft

Outlet Station: 57.00 ft

Outlet Elevation: 2.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75º flare) Wingwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: First Blvd)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
170.00	6.54	4.04	3.00	0.25	0.30
186.00	6.75	4.25	3.07	0.27	0.30
202.00	6.95	4.45	3.15	0.28	0.30
218.00	7.14	4.64	3.21	0.29	0.30
225.00	7.22	4.72	3.24	0.29	0.30
250.00	7.50	5.00	3.33	0.31	0.30
266.00	7.67	5.17	3.39	0.32	0.30
282.00	7.84	5.34	3.45	0.33	0.31
298.00	8.00	5.50	3.50	0.34	0.31
314.00	8.16	5.66	3.55	0.35	0.31
330.00	8.31	5.81	3.59	0.36	0.31

Tailwater Channel Data - First Blvd

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 1.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0300

Channel Invert Elevation: 2.50 ft

Roadway Data for Crossing: First Blvd

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 8.80 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Jane Way – 10’x5’ RCBC

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 170 cfs

Design Flow: 230 cfs

Maximum Flow: 340 cfs

Table 4 - Summary of Culvert Flows at Crossing: Jane Way

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6.68	170.00	170.00	0.00	1
6.93	187.00	187.00	0.00	1
7.18	204.00	204.00	0.00	1
7.43	221.00	221.00	0.00	1
7.57	230.00	230.00	0.00	1
7.96	255.00	255.00	0.00	1
8.12	272.00	265.51	6.35	7
8.23	289.00	275.28	16.35	6
8.32	306.00	278.88	26.98	5
8.41	323.00	283.71	39.21	5
8.49	340.00	288.57	51.24	4
8.00	257.28	257.28	0.00	Overtopping

Rating Curve Plot for Crossing: Jane Way

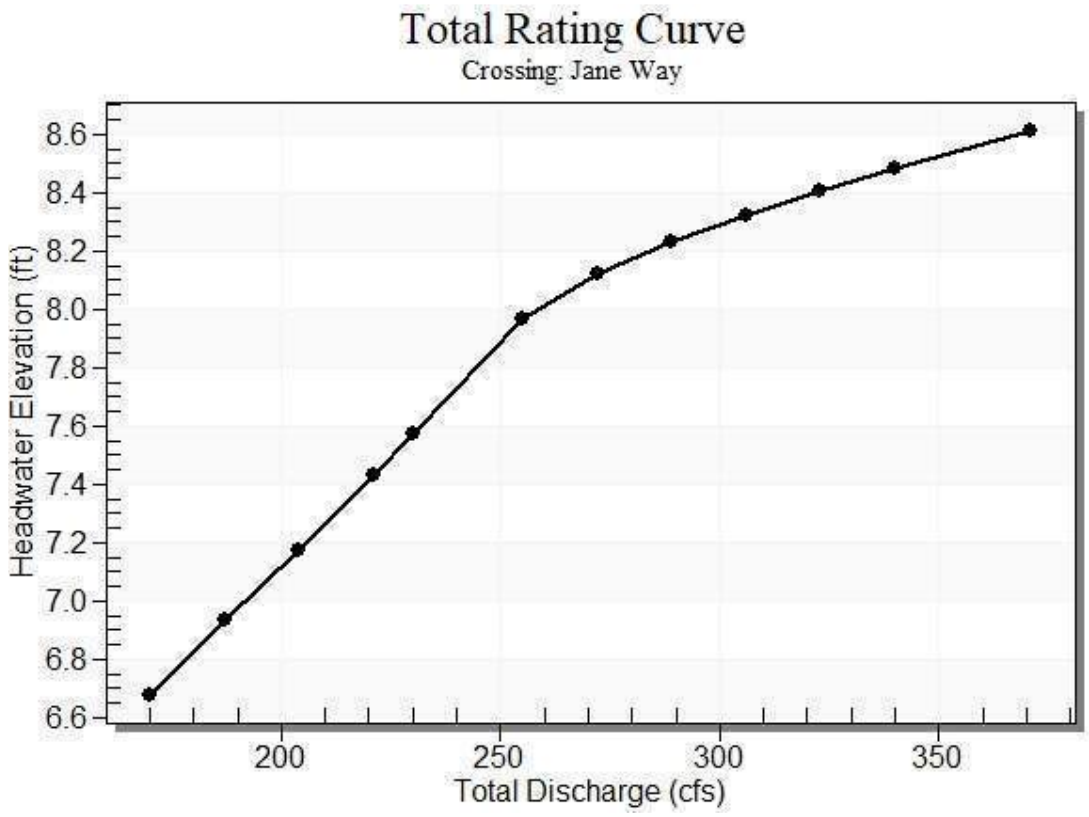


Table 5 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
170.00	170.00	6.68	3.206	4.680	3-M1t	2.275	2.078	4.440	4.040	3.829	2.997
187.00	187.00	6.93	3.417	4.932	3-M1t	2.430	2.215	4.660	4.260	4.013	3.078
204.00	204.00	7.18	3.622	5.175	7-M1t	2.581	2.347	4.870	4.470	4.189	3.154
221.00	221.00	7.43	3.822	5.431	4-FFf	2.729	2.475	5.000	4.672	4.420	3.224
230.00	230.00	7.57	3.926	5.573	4-FFf	2.807	2.542	5.000	4.776	4.600	3.259
255.00	255.00	7.96	4.210	5.965	4-FFf	3.019	2.723	5.000	5.053	5.100	3.352
272.00	265.51	8.12	4.328	6.197	4-FFf	3.107	2.797	5.000	5.234	5.310	3.412
289.00	275.28	8.23	4.437	6.421	4-FFf	3.188	2.866	5.000	5.408	5.506	3.468
306.00	278.88	8.32	4.477	6.609	4-FFf	3.217	2.891	5.000	5.578	5.578	3.522
323.00	283.71	8.41	4.531	6.800	4-FFf	3.257	2.924	5.000	5.743	5.674	3.573
340.00	288.57	8.49	4.585	6.986	4-FFf	3.297	2.957	5.000	5.903	5.771	3.622

****

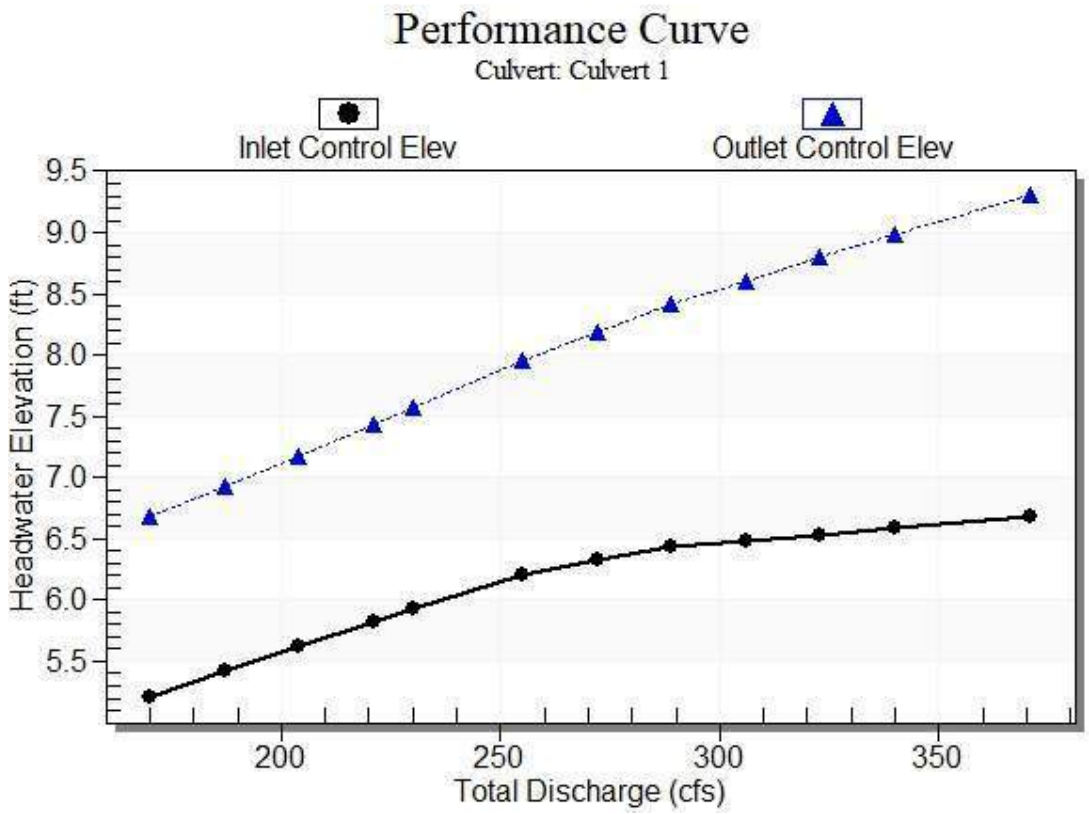
Straight Culvert

Inlet Elevation (invert): 2.00 ft, Outlet Elevation (invert): 1.90 ft

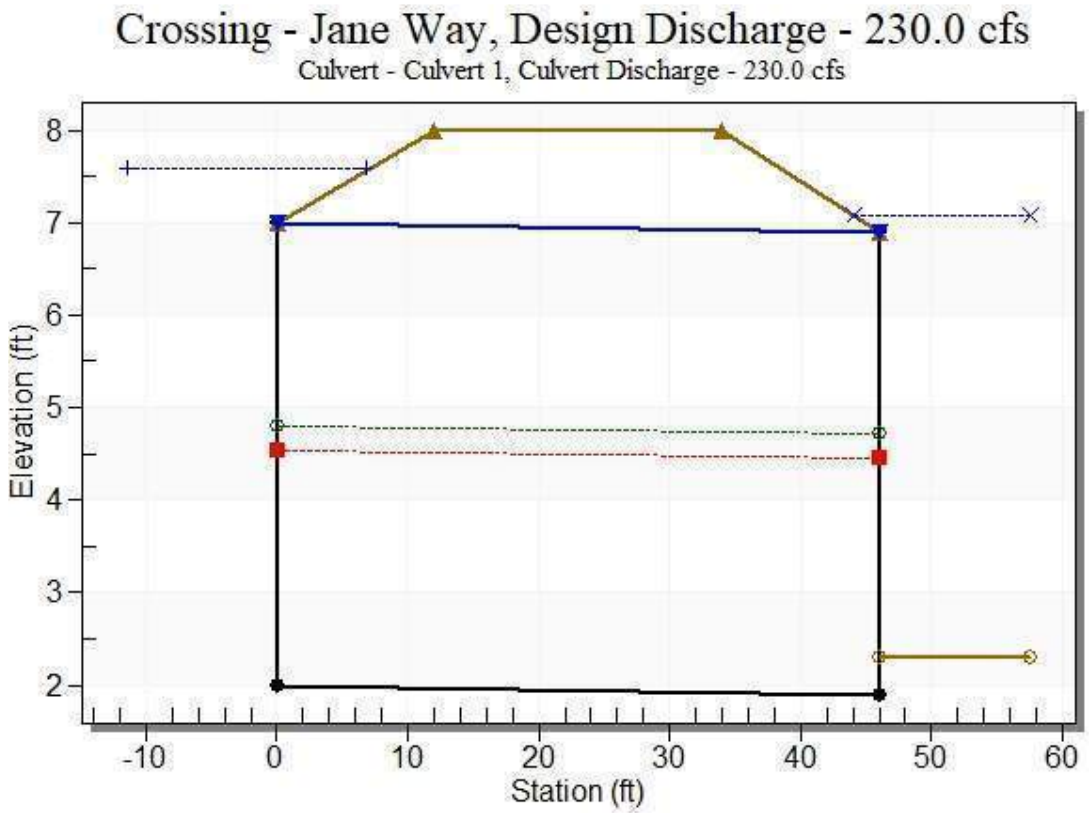
Culvert Length: 46.00 ft, Culvert Slope: 0.0022

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2.00 ft

Outlet Station: 46.00 ft

Outlet Elevation: 1.90 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75º flare) Wingwall

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: Jane Way)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
170.00	6.34	4.04	3.00	0.25	0.30
187.00	6.56	4.26	3.08	0.27	0.30
204.00	6.77	4.47	3.15	0.28	0.30
221.00	6.97	4.67	3.22	0.29	0.30
230.00	7.08	4.78	3.26	0.30	0.30
255.00	7.35	5.05	3.35	0.32	0.30
272.00	7.53	5.23	3.41	0.33	0.30
289.00	7.71	5.41	3.47	0.34	0.31
306.00	7.88	5.58	3.52	0.35	0.31
323.00	8.04	5.74	3.57	0.36	0.31
340.00	8.20	5.90	3.62	0.37	0.31

Tailwater Channel Data - Jane Way

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 1.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0300

Channel Invert Elevation: 2.30 ft

Roadway Data for Crossing: Jane Way

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 ft

Crest Elevation: 8.00 ft

Roadway Surface: Paved

Roadway Top Width: 22.00 ft

Battery Creek Road at Duck Pond

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 170 cfs

Design Flow: 235 cfs

Maximum Flow: 350 cfs

Table 7 - Summary of Culvert Flows at Crossing: Battery Creek Road_main

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5.54	170.00	170.00	0.00	1
5.77	188.00	188.00	0.00	1
6.00	206.00	206.00	0.00	1
6.22	224.00	224.00	0.00	1
6.35	235.00	235.00	0.00	1
6.64	260.00	260.00	0.00	1
6.84	278.00	278.00	0.00	1
7.04	296.00	296.00	0.00	1
7.24	314.00	314.00	0.00	1
7.43	332.00	332.00	0.00	1
7.67	350.00	350.00	0.00	1
9.00	442.80	442.80	0.00	Overtopping

Rating Curve Plot for Crossing: Battery Creek Road_main

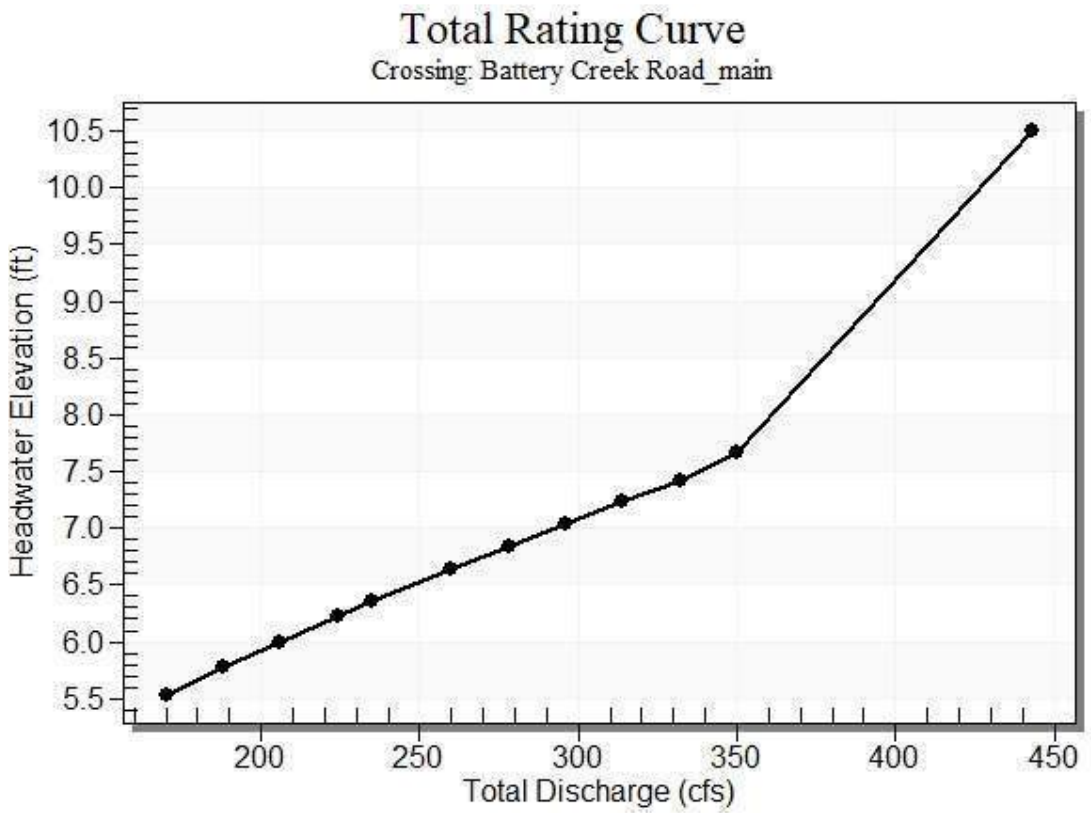


Table 8 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
170.00	170.00	5.54	3.203	3.937	1-S1t	1.966	2.078	3.590	3.090	4.735	2.101
188.00	188.00	5.77	3.427	4.172	1-S1t	2.105	2.222	3.769	3.269	4.988	2.167
206.00	206.00	6.00	3.643	4.400	1-S1t	2.241	2.362	3.939	3.439	5.230	2.229
224.00	224.00	6.22	3.854	4.620	1-S1t	2.374	2.498	4.102	3.602	5.460	2.286
235.00	235.00	6.35	3.980	4.751	1-S1t	2.455	2.579	4.199	3.699	5.597	2.319
260.00	260.00	6.64	4.263	5.042	1-S1t	2.633	2.759	4.410	3.910	5.895	2.390
278.00	278.00	6.84	4.464	5.244	1-S1t	2.760	2.885	4.556	4.056	6.102	2.438
296.00	296.00	7.04	4.666	5.442	1-S1t	2.884	3.008	4.697	4.197	6.302	2.484
314.00	314.00	7.24	4.867	5.636	1-S1t	3.007	3.128	4.834	4.334	6.495	2.527
332.00	332.00	7.43	5.071	5.826	1-S1t	3.128	3.247	4.967	4.467	6.684	2.569
350.00	350.00	7.67	5.278	6.075	4-FFf	3.248	3.363	5.000	4.596	7.000	2.608

****

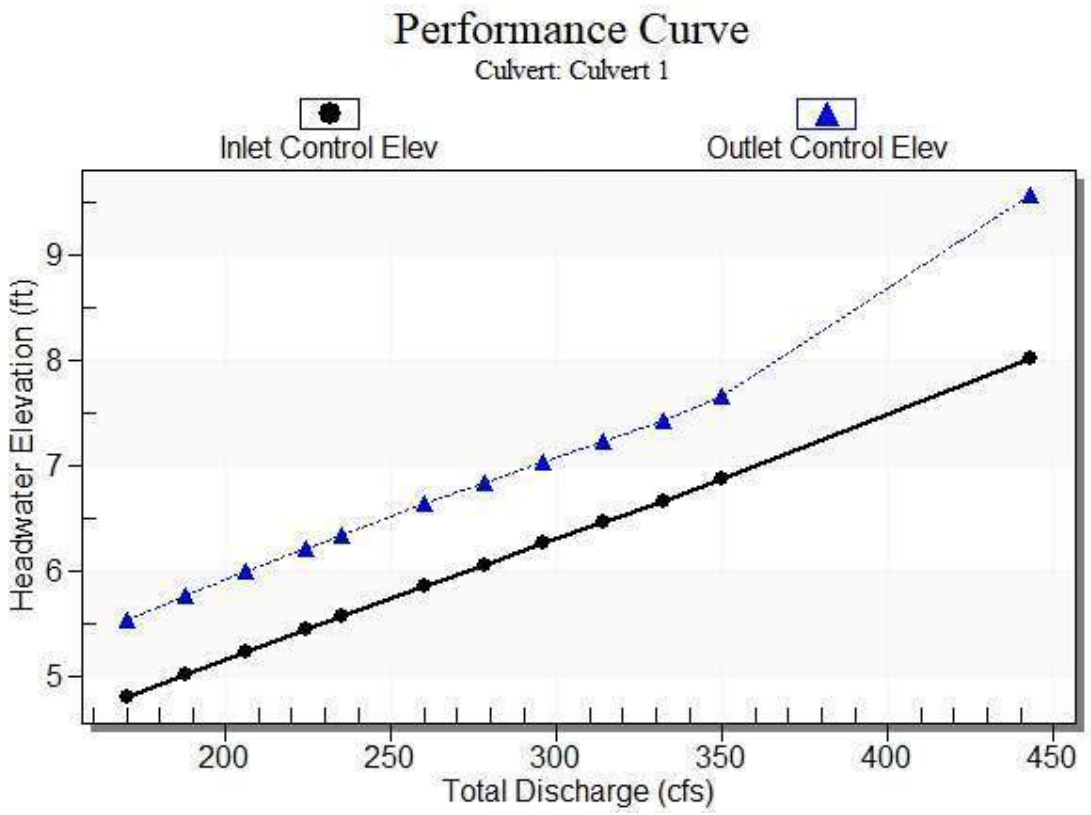
Straight Culvert

Inlet Elevation (invert): 1.60 ft, Outlet Elevation (invert): 1.40 ft

Culvert Length: 60.00 ft, Culvert Slope: 0.0033

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 1.60 ft

Outlet Station: 60.00 ft

Outlet Elevation: 1.40 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75º flare) Wingwall

Inlet Depression: None

Table 9 - Downstream Channel Rating Curve (Crossing: Battery Creek Road_main)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
170.00	4.99	3.09	2.10	0.19	0.23
188.00	5.17	3.27	2.17	0.20	0.24
206.00	5.34	3.44	2.23	0.21	0.24
224.00	5.50	3.60	2.29	0.22	0.24
235.00	5.60	3.70	2.32	0.23	0.24
260.00	5.81	3.91	2.39	0.24	0.24
278.00	5.96	4.06	2.44	0.25	0.24
296.00	6.10	4.20	2.48	0.26	0.24
314.00	6.23	4.33	2.53	0.27	0.24
332.00	6.37	4.47	2.57	0.28	0.25
350.00	6.50	4.60	2.61	0.29	0.25

Tailwater Channel Data - Battery Creek Road_main

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 20.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0400

Channel Invert Elevation: 1.90 ft

Roadway Data for Crossing: Battery Creek Road_main

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 9.00 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

Spanish Moss Trail – Double 5’x4’ RCBC

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 260 cfs

Design Flow: 360 cfs

Maximum Flow: 540 cfs

Table 10 - Summary of Culvert Flows at Crossing: Spanish Moss Trail

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.34	260.00	260.00	0.00	1
3.72	288.00	288.00	0.00	1
4.12	316.00	316.00	0.00	1
4.55	344.00	344.00	0.00	1
4.81	360.00	360.00	0.00	1
5.51	400.00	400.00	0.00	1
6.05	428.00	428.00	0.00	1
6.62	456.00	456.00	0.00	1
7.24	484.00	484.00	0.00	1
7.90	512.00	512.00	0.00	1
8.60	540.00	540.00	0.00	1
9.50	574.05	574.05	0.00	Overtopping

Rating Curve Plot for Crossing: Spanish Moss Trail

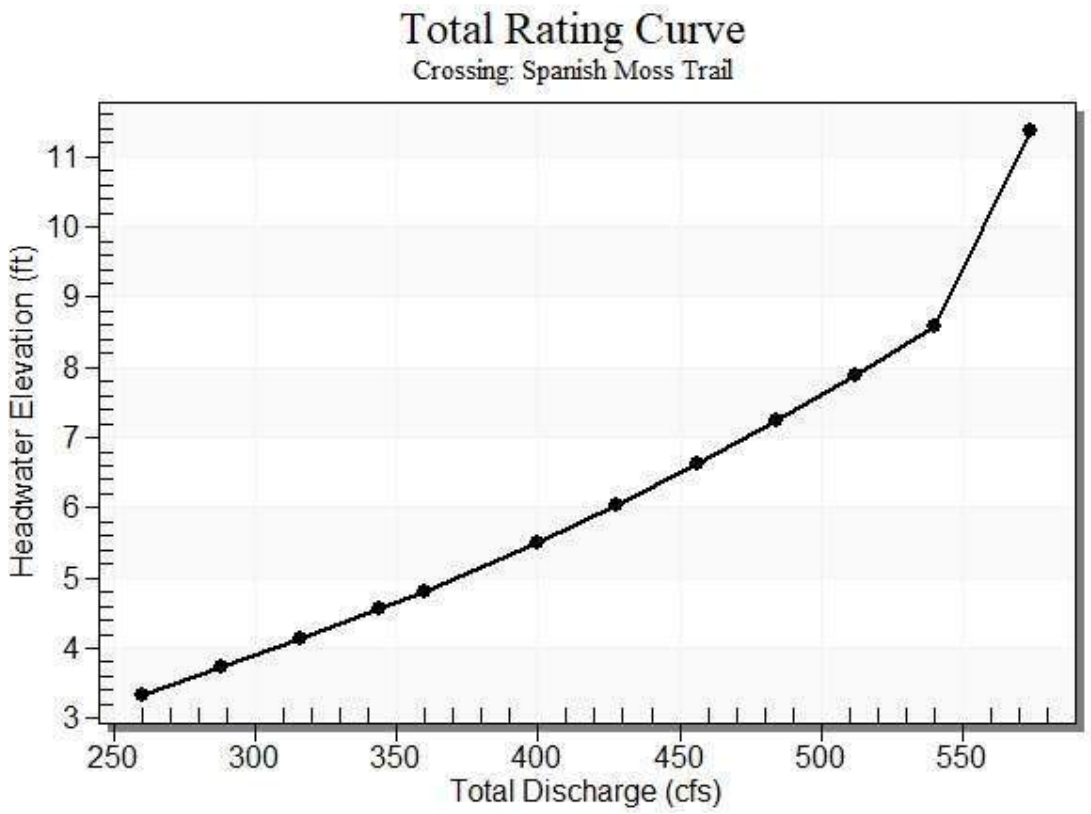


Table 11 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
260.00	260.00	3.34	4.343	3.545	5-S2n	2.629	2.759	2.703	2.500	9.618	0.000
288.00	288.00	3.72	4.721	3.986	5-S2n	2.842	2.953	2.842	2.500	10.134	0.000
316.00	316.00	4.12	5.121	4.875	5-S2n	3.052	3.142	3.137	2.500	10.075	0.000
344.00	344.00	4.55	5.551	5.264	5-S2n	3.259	3.325	3.259	2.500	10.554	0.000
360.00	360.00	4.81	5.810	5.496	5-S2n	3.377	3.427	3.377	2.500	10.660	0.000
400.00	400.00	5.51	6.510	6.109	5-S2n	3.668	3.676	3.668	2.500	10.904	0.000
428.00	428.00	6.05	7.047	6.531	7-M2c	3.871	3.846	3.846	2.500	11.128	0.000
456.00	456.00	6.62	7.623	7.041	6-FFc	4.000	4.000	3.000	2.500	15.200	0.000
484.00	484.00	7.24	8.239	7.464	6-FFc	4.000	4.000	3.000	2.500	16.133	0.000
512.00	512.00	7.90	8.897	7.912	6-FFc	4.000	4.000	3.000	2.500	17.067	0.000
540.00	540.00	8.60	9.596	8.385	6-FFc	4.000	4.000	3.000	2.500	18.000	0.000

****

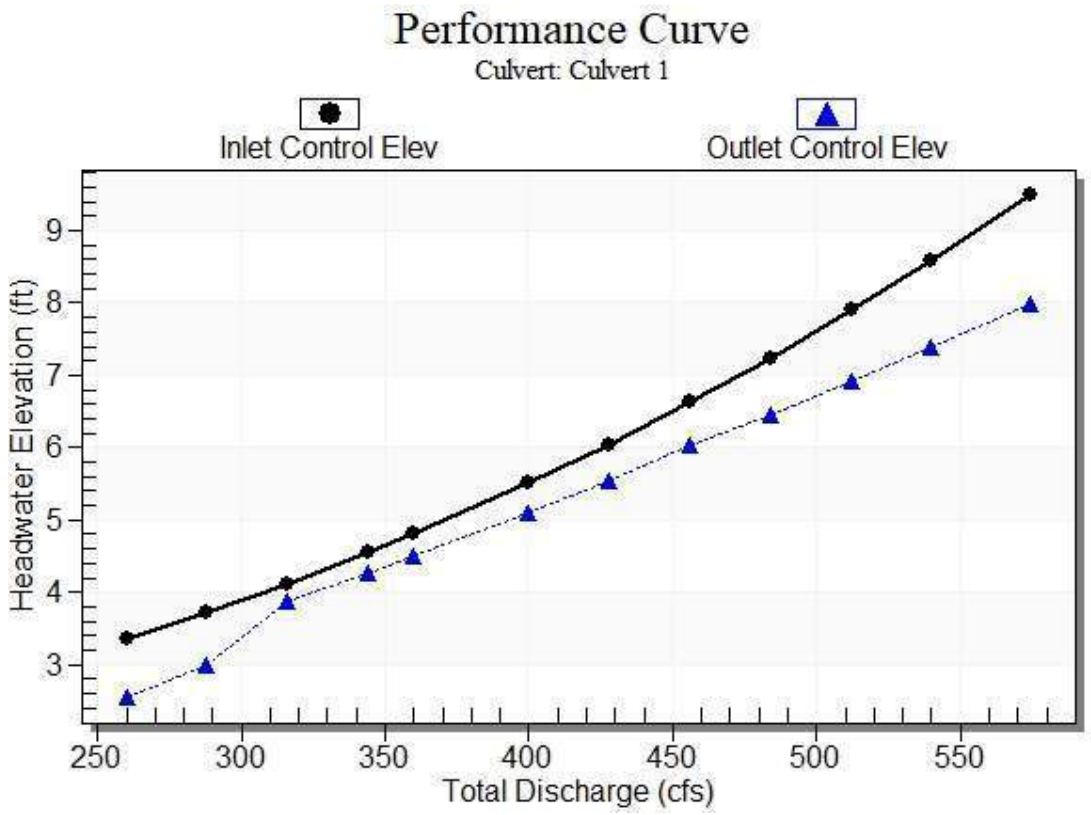
Straight Culvert

Inlet Elevation (invert): -1.00 ft, Outlet Elevation (invert): -1.30 ft

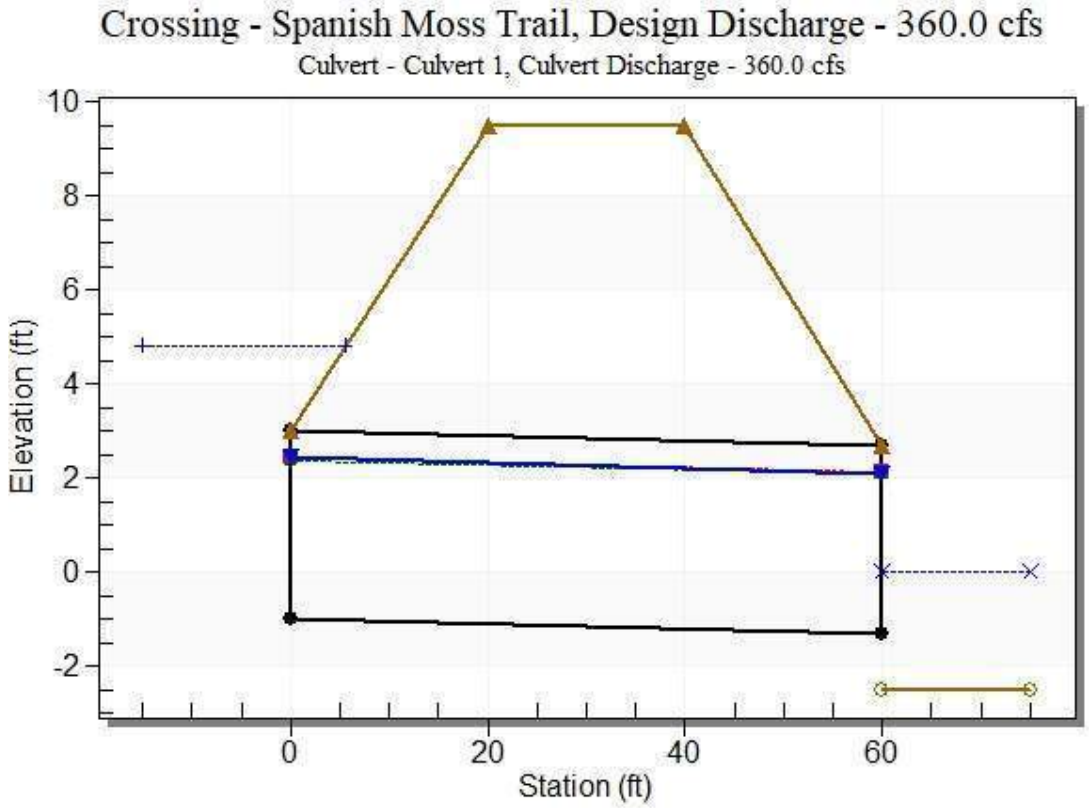
Culvert Length: 60.00 ft, Culvert Slope: 0.0050

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: -1.00 ft

Outlet Station: 60.00 ft

Outlet Elevation: -1.30 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75º flare) Wingwall

Inlet Depression: None

Table 12 - Downstream Channel Rating Curve (Crossing: Spanish Moss Trail)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
260.00	0.00	2.50
288.00	0.00	2.50
316.00	0.00	2.50
344.00	0.00	2.50
360.00	0.00	2.50
400.00	0.00	2.50
428.00	0.00	2.50
456.00	0.00	2.50
484.00	0.00	2.50
512.00	0.00	2.50
540.00	0.00	2.50

Tailwater Channel Data - Spanish Moss Trail

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 0.00 ft

Roadway Data for Crossing: Spanish Moss Trail

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 300.00 ft

Crest Elevation: 9.50 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Battery Creek Road (250’ east of West Royals Drive)

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 3 cfs

Design Flow: 5 cfs

Maximum Flow: 8 cfs

Table 13 - Summary of Culvert Flows at Crossing: Battery Creek Rd/W Royal Oaks (proposed)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7.12	3.00	3.00	0.00	1
7.19	3.50	3.50	0.00	1
7.26	4.00	4.00	0.00	1
7.32	4.50	4.50	0.00	1
7.39	5.00	5.00	0.00	1
7.46	5.50	5.50	0.00	1
7.52	6.00	6.00	0.00	1
7.57	6.50	6.50	0.00	1
7.63	7.00	7.00	0.00	1
7.68	7.50	7.50	0.00	1
7.74	8.00	8.00	0.00	1
10.40	29.11	29.11	0.00	Overtopping

Rating Curve Plot for Crossing: Battery Creek Rd/W Royal Oaks (proposed)

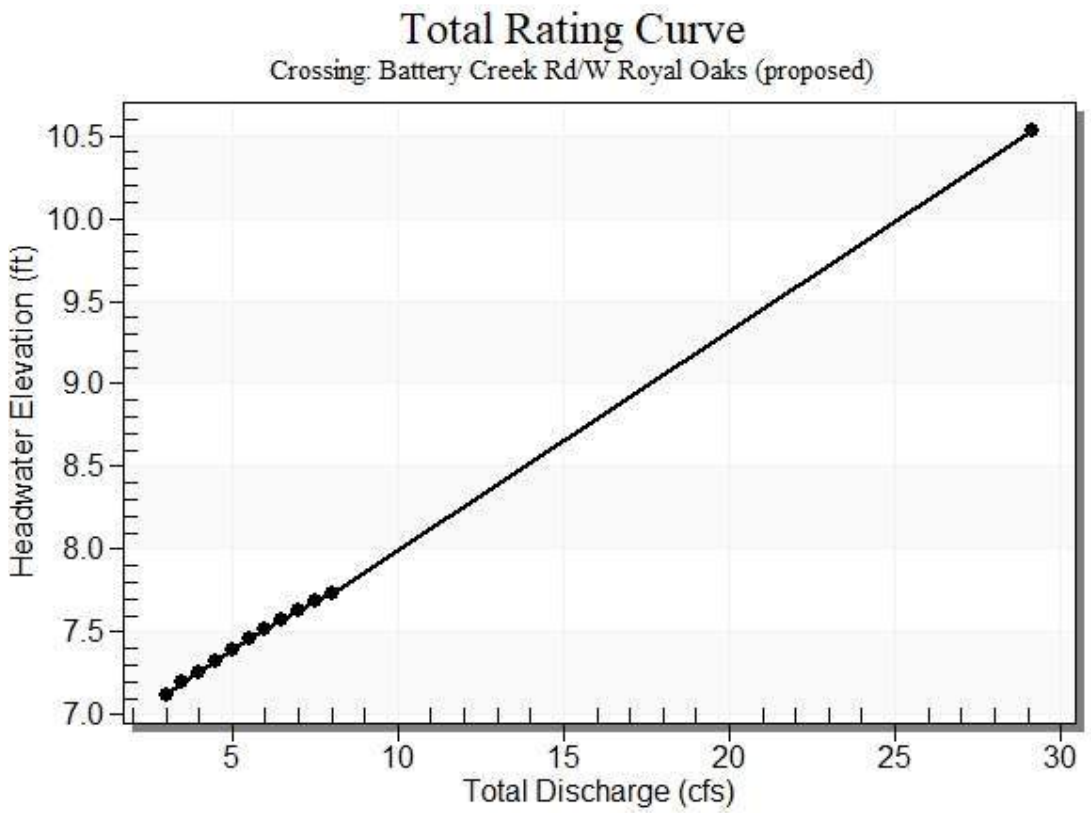


Table 14 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
3.00	3.00	7.12	0.823	0.371	1-S2n	0.540	0.601	0.540	0.571	4.229	1.671
3.50	3.50	7.19	0.893	0.480	1-S2n	0.585	0.649	0.585	0.619	4.414	1.745
4.00	4.00	7.26	0.959	0.538	1-S2n	0.627	0.697	0.627	0.664	4.579	1.811
4.50	4.50	7.32	1.024	0.594	1-S2n	0.668	0.743	0.688	0.705	4.542	1.870
5.00	5.00	7.39	1.091	0.544	1-S2n	0.706	0.783	0.727	0.744	4.682	1.925
5.50	5.50	7.46	1.155	0.701	1-S2n	0.743	0.825	0.743	0.781	5.001	1.975
6.00	6.00	7.52	1.216	0.756	1-S2n	0.779	0.865	0.802	0.816	4.924	2.023
6.50	6.50	7.57	1.274	0.809	1-S2n	0.814	0.903	0.839	0.850	5.028	2.067
7.00	7.00	7.63	1.330	0.862	1-S2n	0.848	0.939	0.874	0.882	5.125	2.108
7.50	7.50	7.68	1.384	0.915	1-S2n	0.882	0.974	0.909	0.913	5.220	2.147
8.00	8.00	7.74	1.436	0.967	1-S2n	0.915	1.006	0.943	0.943	5.309	2.185

****

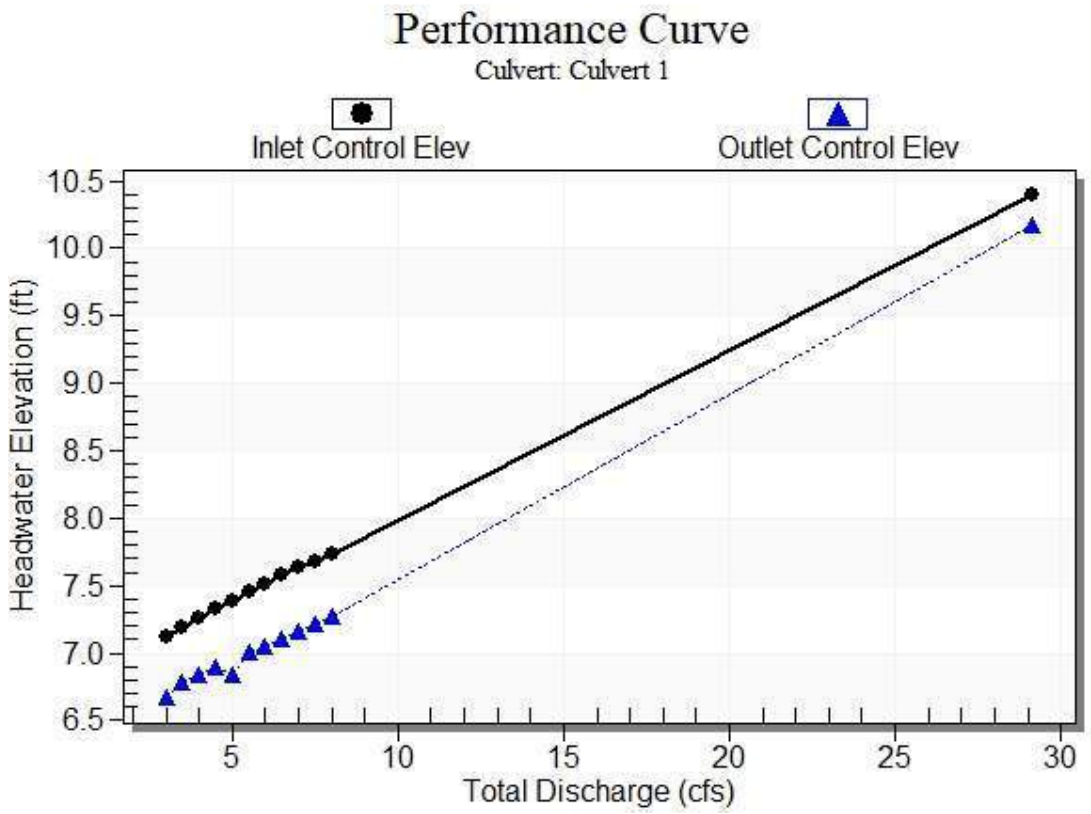
Straight Culvert

Inlet Elevation (invert): 6.30 ft, Outlet Elevation (invert): 6.10 ft

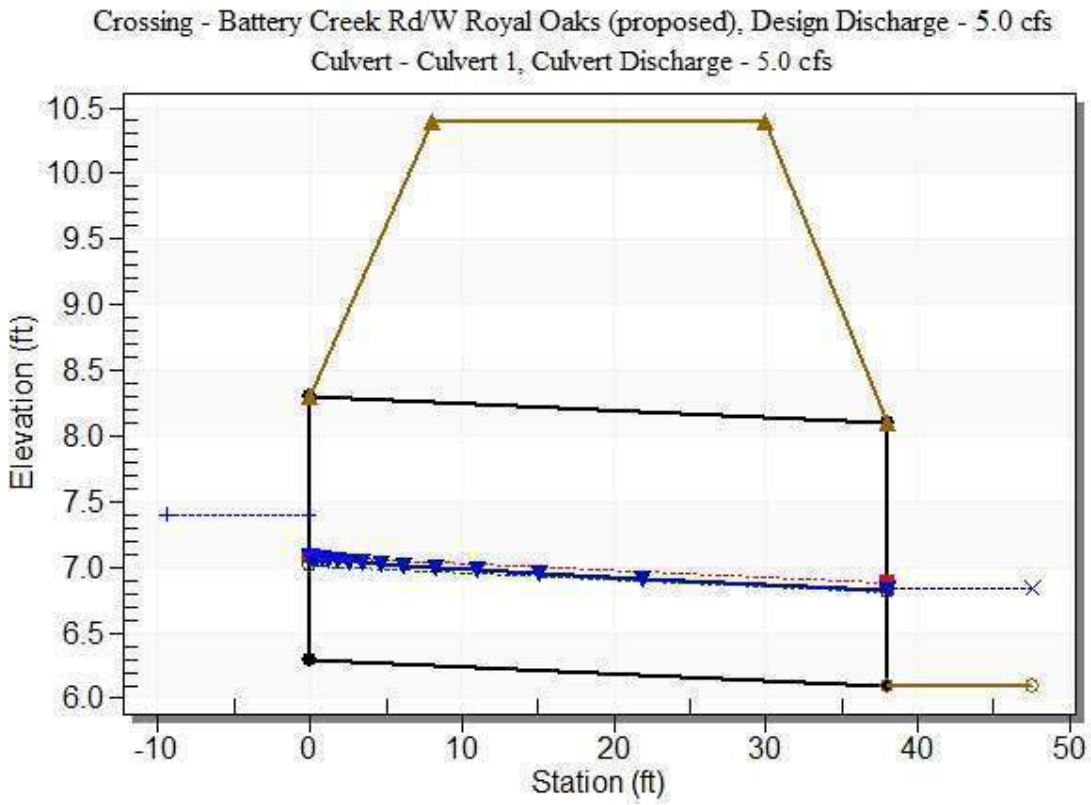
Culvert Length: 38.00 ft, Culvert Slope: 0.0053

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6.30 ft

Outlet Station: 38.00 ft

Outlet Elevation: 6.10 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 15 - Downstream Channel Rating Curve (Crossing: Battery Creek Rd/W Royal Oaks (proposed))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
3.00	6.67	0.57	1.67	0.25	0.45
3.50	6.72	0.62	1.74	0.27	0.46
4.00	6.76	0.66	1.81	0.29	0.46
4.50	6.81	0.71	1.87	0.31	0.47
5.00	6.84	0.74	1.93	0.33	0.47
5.50	6.88	0.78	1.98	0.34	0.47
6.00	6.92	0.82	2.02	0.36	0.47
6.50	6.95	0.85	2.07	0.37	0.48
7.00	6.98	0.88	2.11	0.39	0.48
7.50	7.01	0.91	2.15	0.40	0.48
8.00	7.04	0.94	2.18	0.41	0.48

Tailwater Channel Data - Battery Creek Rd/W Royal Oaks (proposed)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0070

Channel Manning's n: 0.0400

Channel Invert Elevation: 6.10 ft

Roadway Data for Crossing: Battery Creek Rd/W Royal Oaks (proposed)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 10.40 ft

Roadway Surface: Paved

Roadway Top Width: 22.00 ft

Coates Lane – 36” RCP

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 22 cfs

Design Flow: 33 cfs

Maximum Flow: 52 cfs

Table 16 - Summary of Culvert Flows at Crossing: Coates Lane (proposed)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5.86	22.00	22.00	0.00	1
6.03	25.00	25.00	0.00	1
6.20	28.00	28.00	0.00	1
6.37	31.00	31.00	0.00	1
6.48	33.00	33.00	0.00	1
6.70	37.00	37.00	0.00	1
6.86	40.00	40.00	0.00	1
7.04	43.00	43.00	0.00	1
7.21	46.00	46.00	0.00	1
7.41	49.00	49.00	0.00	1
7.63	52.00	52.00	0.00	1
8.30	60.83	60.83	0.00	Overtopping

Rating Curve Plot for Crossing: Coates Lane (proposed)

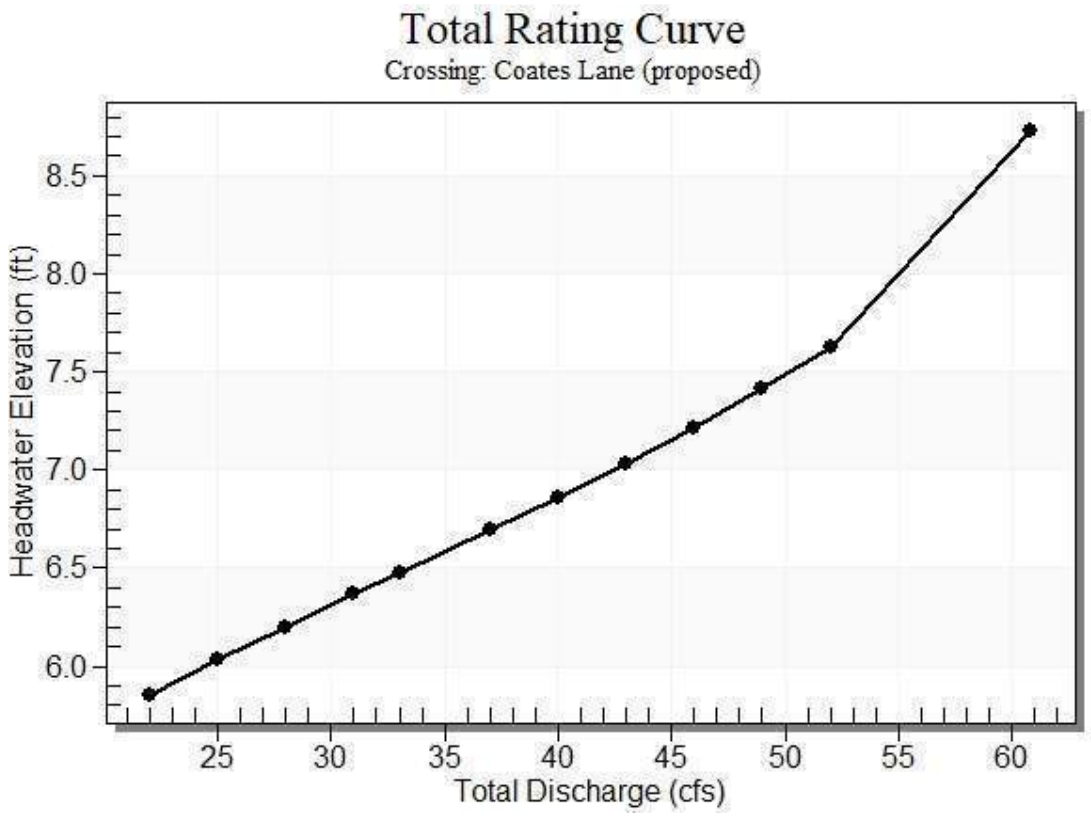


Table 17 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
22.00	22.00	5.86	2.157	2.357	3-M1t	1.767	1.508	2.033	2.033	4.314	1.783
25.00	25.00	6.03	2.319	2.531	3-M1t	1.928	1.609	2.153	2.153	4.605	1.842
28.00	28.00	6.20	2.475	2.701	3-M1t	2.099	1.708	2.263	2.263	4.894	1.895
31.00	31.00	6.37	2.626	2.867	3-M1t	2.292	1.803	2.367	2.367	5.182	1.945
33.00	33.00	6.48	2.726	2.977	3-M2t	3.000	1.862	2.433	2.433	5.374	1.976
37.00	37.00	6.70	2.929	3.197	3-M2t	3.000	1.974	2.557	2.557	5.764	2.034
40.00	40.00	6.86	3.085	3.364	3-M2t	3.000	2.057	2.645	2.645	6.062	2.074
43.00	43.00	7.04	3.247	3.535	3-M2t	3.000	2.134	2.730	2.730	6.368	2.112
46.00	46.00	7.21	3.416	3.715	3-M2t	3.000	2.207	2.810	2.810	6.685	2.148
49.00	49.00	7.41	3.594	3.913	7-M2t	3.000	2.276	2.888	2.888	7.017	2.182
52.00	52.00	7.63	3.783	4.129	7-M2t	3.000	2.342	2.962	2.962	7.374	2.215

****

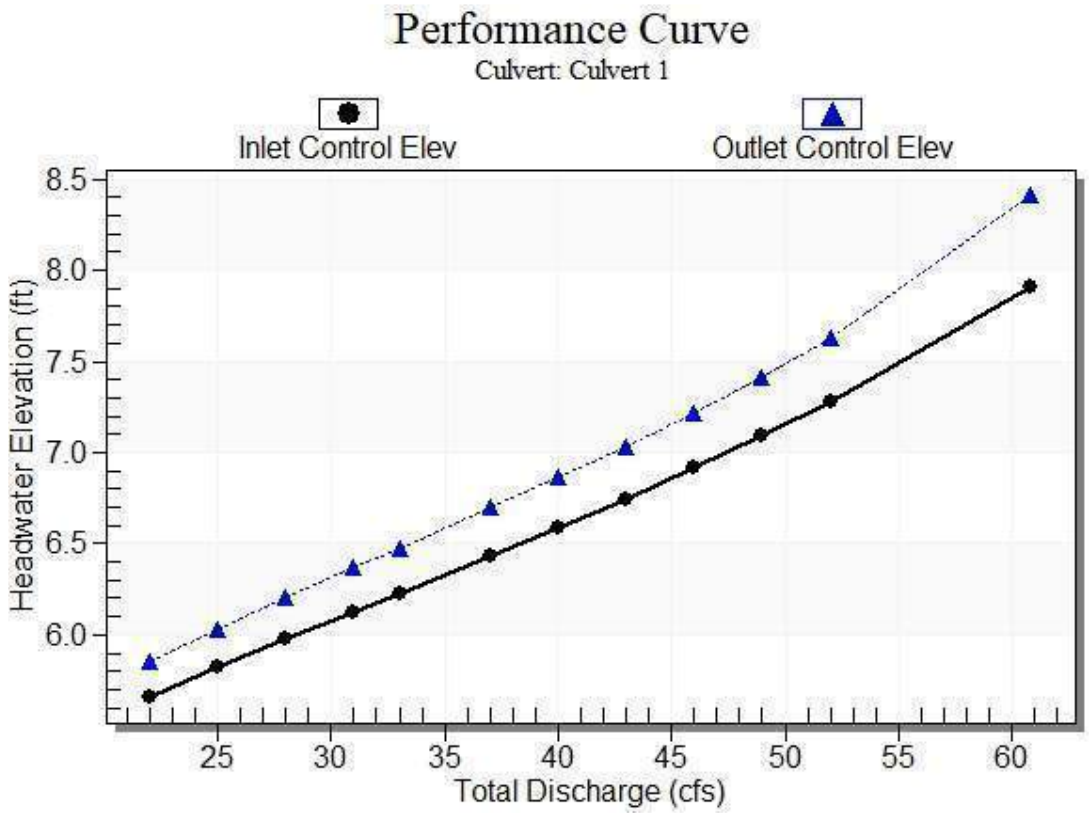
Straight Culvert

Inlet Elevation (invert): 3.50 ft, Outlet Elevation (invert): 3.40 ft

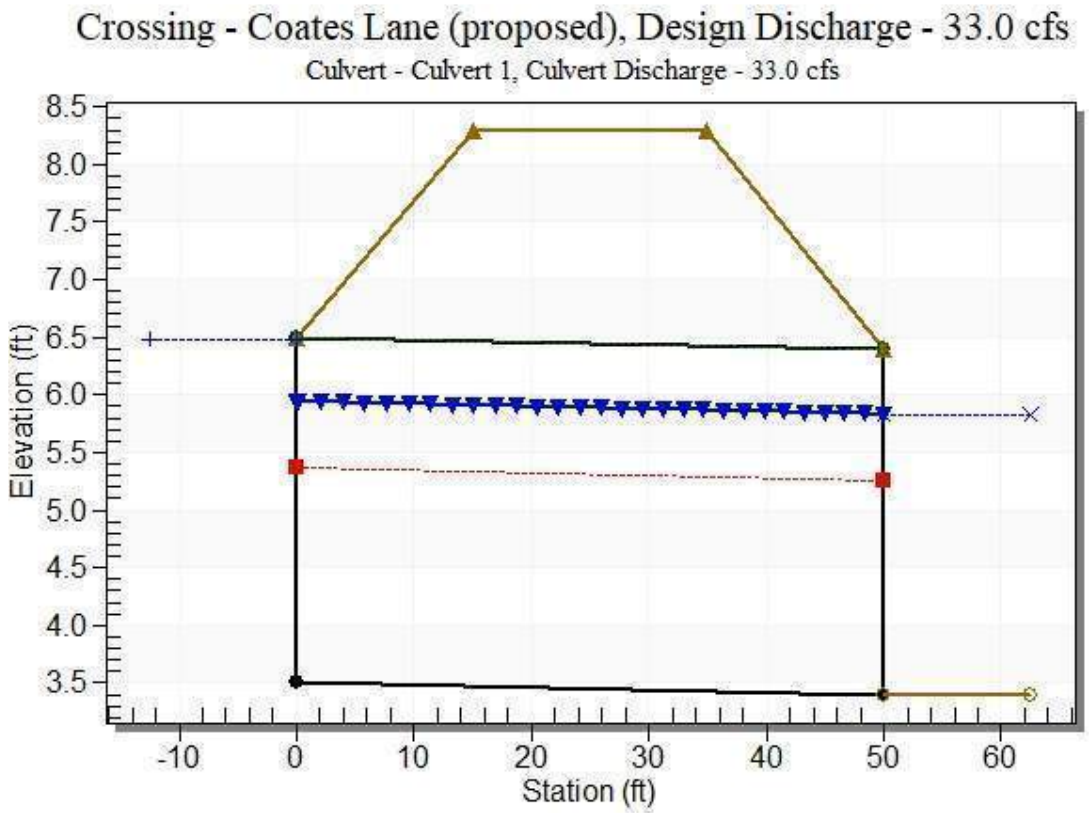
Culvert Length: 50.00 ft, Culvert Slope: 0.0020

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 3.50 ft

Outlet Station: 50.00 ft

Outlet Elevation: 3.40 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 18 - Downstream Channel Rating Curve (Crossing: Coates Lane (proposed))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
22.00	5.43	2.03	1.78	0.25	0.28
25.00	5.55	2.15	1.84	0.27	0.29
28.00	5.66	2.26	1.90	0.28	0.29
31.00	5.77	2.37	1.94	0.30	0.29
33.00	5.83	2.43	1.98	0.30	0.29
37.00	5.96	2.56	2.03	0.32	0.29
40.00	6.05	2.65	2.07	0.33	0.30
43.00	6.13	2.73	2.11	0.34	0.30
46.00	6.21	2.81	2.15	0.35	0.30
49.00	6.29	2.89	2.18	0.36	0.30
52.00	6.36	2.96	2.22	0.37	0.30

Tailwater Channel Data - Coates Lane (proposed)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 3.40 ft

Roadway Data for Crossing: Coates Lane (proposed)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 8.30 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

West Royal Oaks Drive – Double 36” RCPs

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 35 cfs

Design Flow: 52 cfs

Maximum Flow: 83 cfs

Table 19 - Summary of Culvert Flows at Crossing: W Royal Oaks (proposed)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
5.34	35.00	35.00	0.00	1
5.55	39.80	39.80	0.00	1
5.75	44.60	44.60	0.00	1
5.94	49.40	49.40	0.00	1
6.05	52.00	52.00	0.00	1
6.32	59.00	59.00	0.00	1
6.43	63.80	61.85	1.80	12
6.47	68.60	62.76	5.60	5
6.50	73.40	63.54	9.61	4
6.53	78.20	64.83	13.25	4
6.55	83.00	65.24	17.64	4
6.40	60.91	60.91	0.00	Overtopping

Rating Curve Plot for Crossing: W Royal Oaks (proposed)

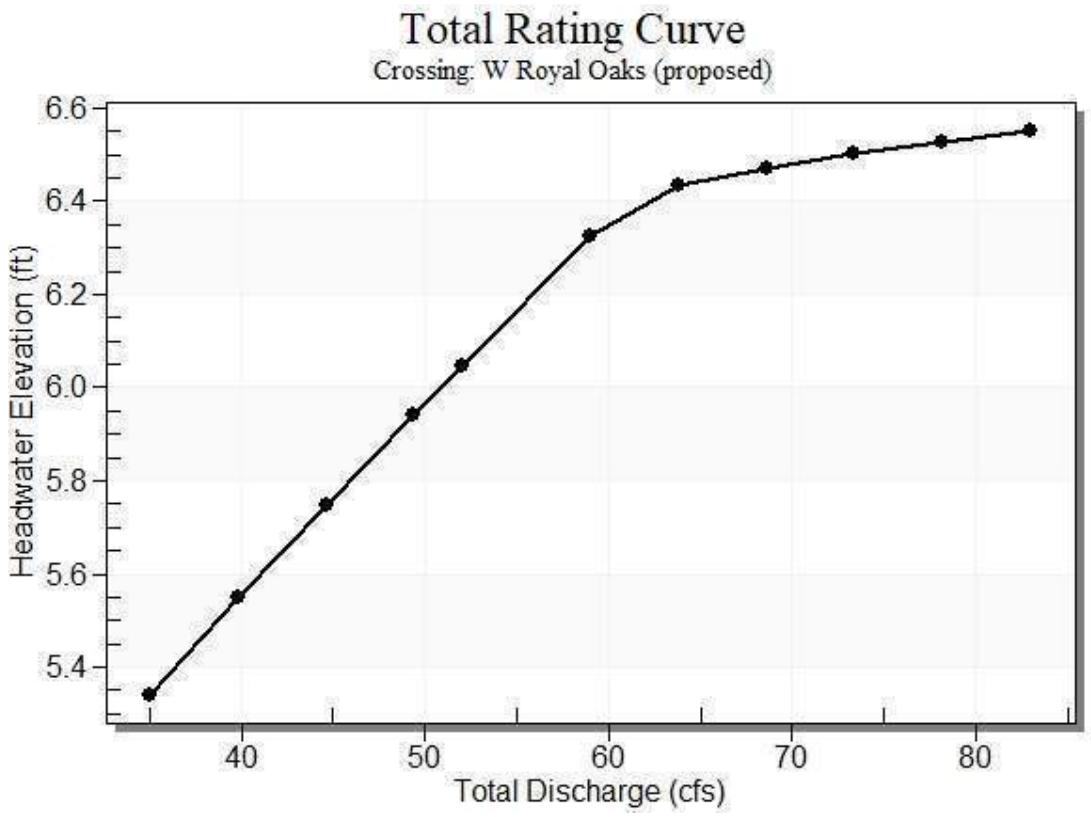


Table 20 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
35.00	35.00	5.34	1.891	2.942	3-M1t	1.512	1.338	2.900	2.900	2.501	1.547
39.80	39.80	5.55	2.036	3.148	4-FFf	1.636	1.432	3.000	3.064	2.815	1.598
44.60	44.60	5.75	2.173	3.348	4-FFf	1.759	1.519	3.000	3.217	3.155	1.644
49.40	49.40	5.94	2.303	3.542	4-FFf	1.884	1.600	3.000	3.359	3.494	1.687
52.00	52.00	6.05	2.372	3.647	4-FFf	1.954	1.641	3.000	3.433	3.678	1.709
59.00	59.00	6.32	2.551	3.925	4-FFf	2.153	1.754	3.000	3.620	4.173	1.764
63.80	61.85	6.43	2.622	4.085	4-FFf	2.243	1.797	3.000	3.741	4.375	1.798
68.60	62.76	6.47	2.645	4.214	4-FFf	2.274	1.814	3.000	3.857	4.439	1.831
73.40	63.54	6.50	2.664	4.336	4-FFf	2.300	1.826	3.000	3.967	4.494	1.863
78.20	64.83	6.53	2.697	4.461	4-FFf	2.348	1.845	3.000	4.073	4.586	1.892
83.00	65.24	6.55	2.707	4.569	4-FFf	2.363	1.851	3.000	4.175	4.615	1.921

****

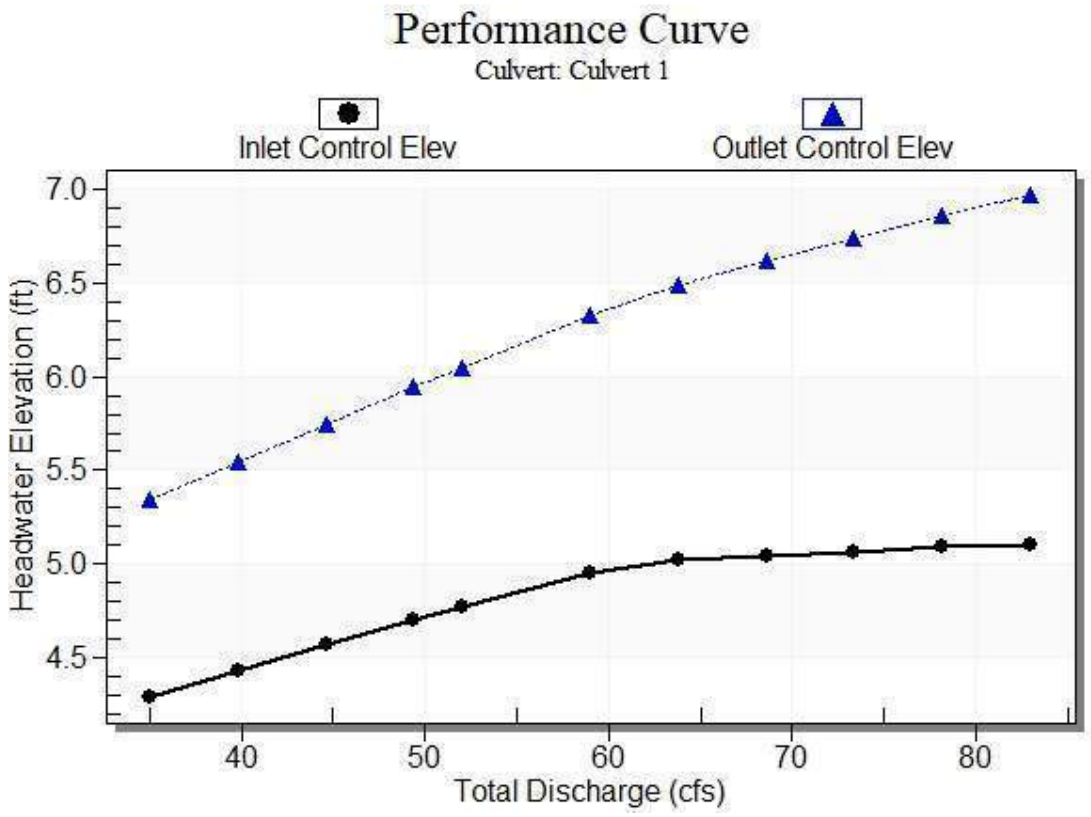
Straight Culvert

Inlet Elevation (invert): 2.40 ft, Outlet Elevation (invert): 2.30 ft

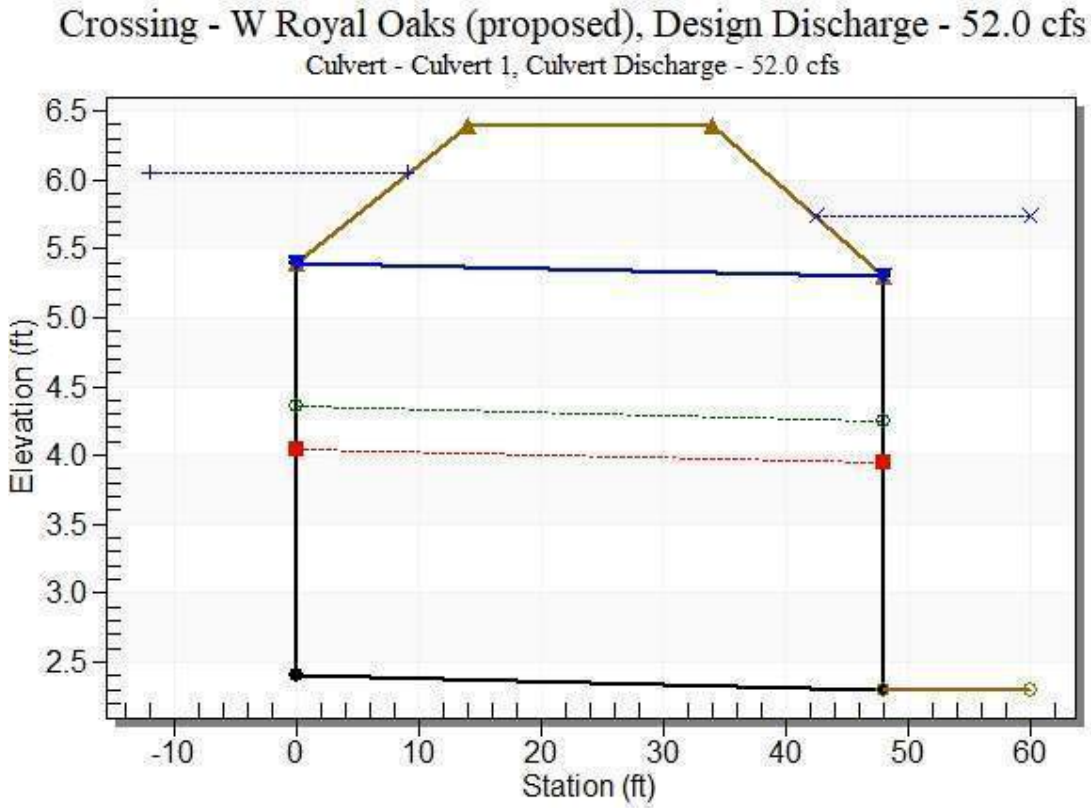
Culvert Length: 48.00 ft, Culvert Slope: 0.0021

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2.40 ft

Outlet Station: 48.00 ft

Outlet Elevation: 2.30 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 21 - Downstream Channel Rating Curve (Crossing: W Royal Oaks (proposed))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
35.00	5.20	2.90	1.55	0.18	0.21
39.80	5.36	3.06	1.60	0.19	0.21
44.60	5.52	3.22	1.64	0.20	0.21
49.40	5.66	3.36	1.69	0.21	0.22
52.00	5.73	3.43	1.71	0.21	0.22
59.00	5.92	3.62	1.76	0.23	0.22
63.80	6.04	3.74	1.80	0.23	0.22
68.60	6.16	3.86	1.83	0.24	0.22
73.40	6.27	3.97	1.86	0.25	0.22
78.20	6.37	4.07	1.89	0.25	0.22
83.00	6.48	4.18	1.92	0.26	0.22

Tailwater Channel Data - W Royal Oaks (proposed)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0400

Channel Invert Elevation: 2.30 ft

Roadway Data for Crossing: W Royal Oaks (proposed)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 6.40 ft

Roadway Surface: Paved

Roadway Top Width: 20.00 ft

Center Drive East – Double 48” RCPs

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 215 cfs

Maximum Flow: 310 cfs

Table 22 - Summary of Culvert Flows at Crossing: Center Drive East

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.50	0.00	0.00	0.00	1
5.23	31.00	31.00	0.00	1
6.09	62.00	62.00	0.00	1
6.80	93.00	93.00	0.00	1
7.44	124.00	124.00	0.00	1
8.10	155.00	155.00	0.00	1
8.87	186.00	186.00	0.00	1
9.61	215.00	215.00	0.00	1
10.13	248.00	234.56	13.20	9
10.26	279.00	239.47	39.37	6
10.37	310.00	243.40	66.48	5
10.00	229.86	229.86	0.00	Overtopping

Rating Curve Plot for Crossing: Center Drive East

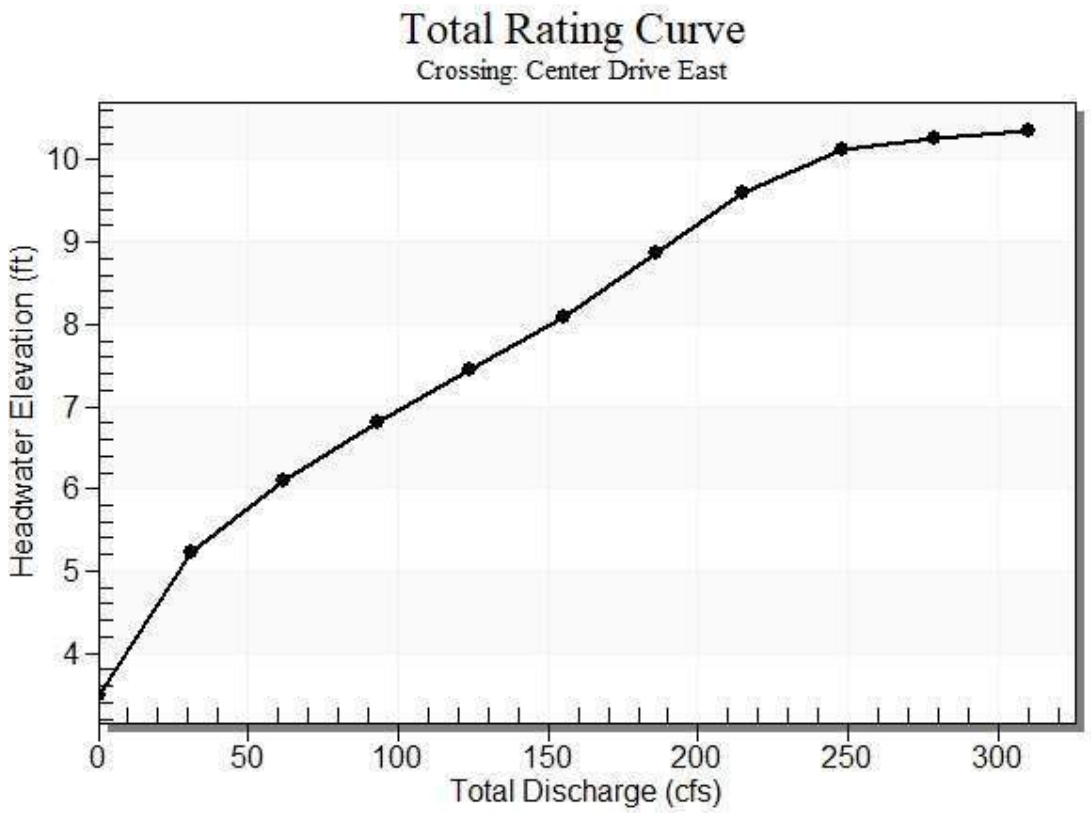


Table 23 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	3.50	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
31.00	31.00	5.23	1.570	1.727	1-S1t	1.103	1.151	1.677	1.677	2.998	1.385
62.00	62.00	6.09	2.310	2.592	1-S1t	1.591	1.647	2.448	2.448	3.730	1.700
93.00	93.00	6.80	2.921	3.298	1-S1t	2.006	2.041	3.034	3.034	4.430	1.907
124.00	124.00	7.44	3.446	3.941	3-M1t	2.403	2.371	3.522	3.522	5.291	2.066
155.00	155.00	8.10	3.954	4.598	7-M1t	2.825	2.663	3.946	3.946	6.183	2.195
186.00	186.00	8.87	4.499	5.366	4-FFf	4.000	2.920	4.000	4.326	7.401	2.305
215.00	215.00	9.61	5.073	6.107	4-FFf	4.000	3.133	4.000	4.649	8.555	2.396
248.00	234.56	10.13	5.506	6.761	4-FFf	4.000	3.262	4.000	4.988	9.333	2.489
279.00	239.47	10.26	5.621	7.140	4-FFf	4.000	3.292	4.000	5.283	9.528	2.568
310.00	243.40	10.37	5.715	7.485	4-FFf	4.000	3.316	4.000	5.560	9.685	2.640

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Straight Culvert

Inlet Elevation (invert): 3.50 ft, Outlet Elevation (invert): 3.30 ft

Culvert Length: 62.00 ft, Culvert Slope: 0.0032

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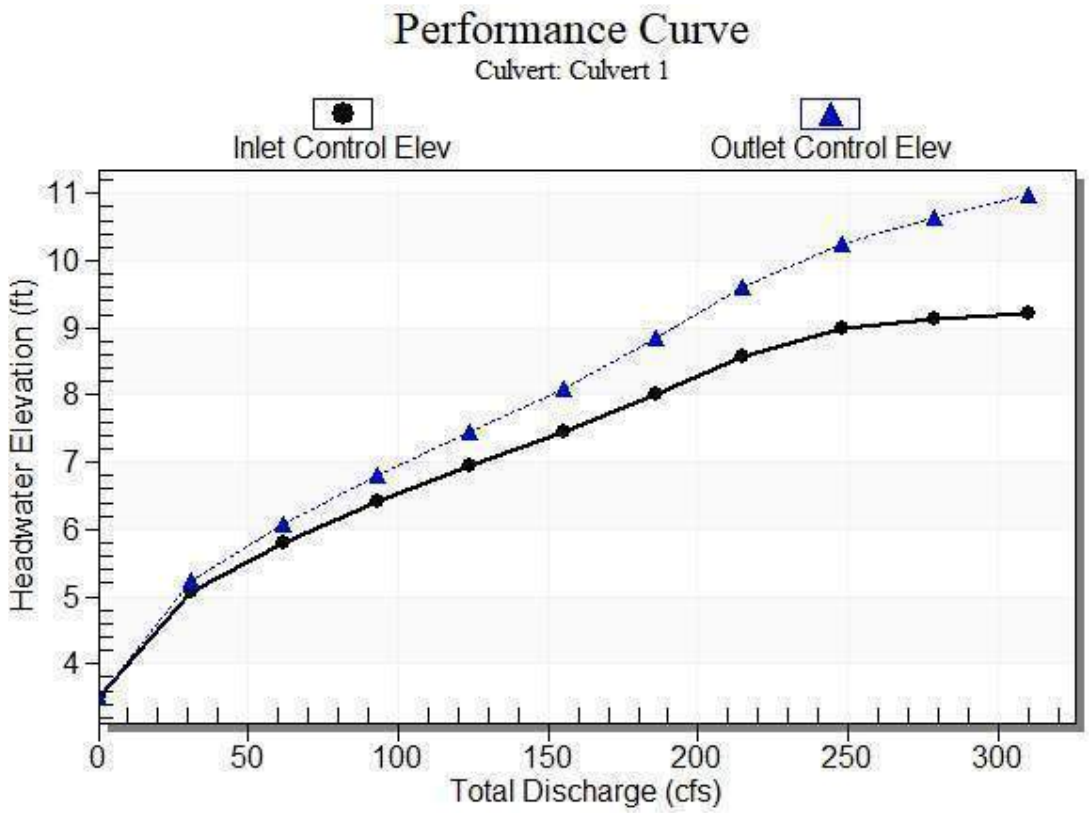
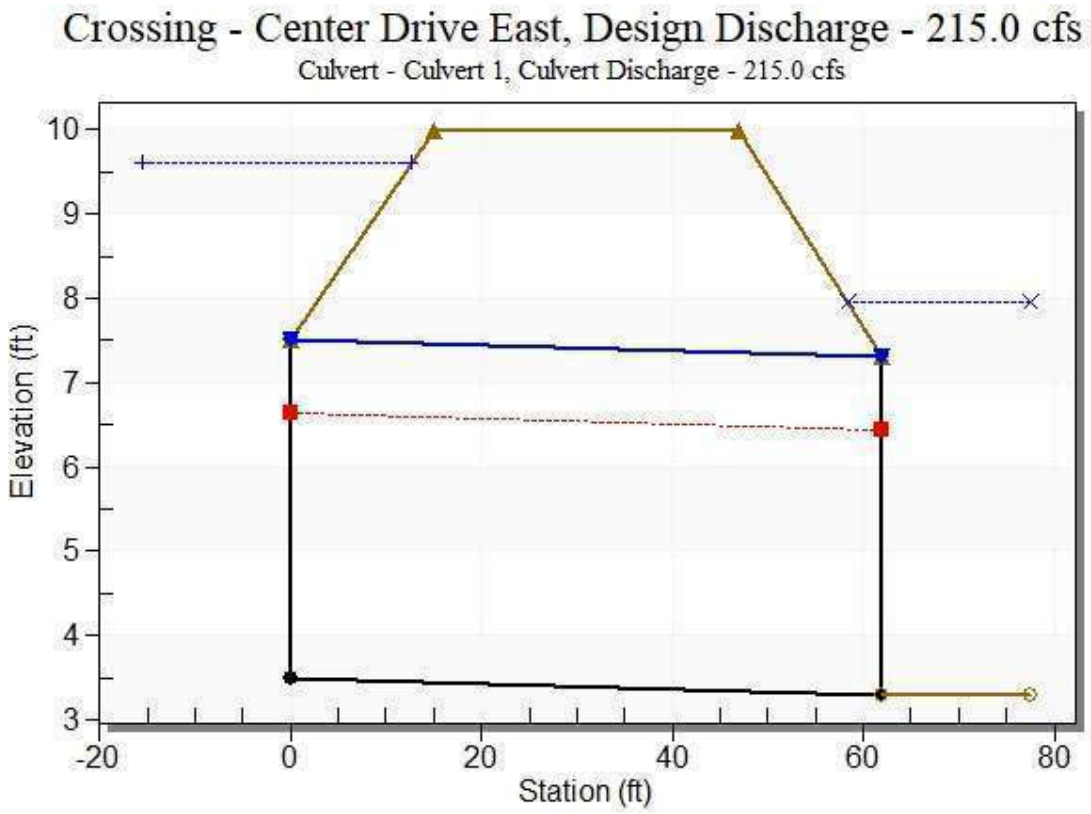
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 3.50 ft

Outlet Station: 62.00 ft

Outlet Elevation: 3.30 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 24 - Downstream Channel Rating Curve (Crossing: Center Drive East)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	3.30	0.00	0.00	0.00	0.00
31.00	4.98	1.68	1.38	0.10	0.21
62.00	5.75	2.45	1.70	0.15	0.22
93.00	6.33	3.03	1.91	0.19	0.23
124.00	6.82	3.52	2.07	0.22	0.23
155.00	7.25	3.95	2.20	0.25	0.23
186.00	7.63	4.33	2.31	0.27	0.24
215.00	7.95	4.65	2.40	0.29	0.24
248.00	8.29	4.99	2.49	0.31	0.24
279.00	8.58	5.28	2.57	0.33	0.24
310.00	8.86	5.56	2.64	0.35	0.24

Tailwater Channel Data - Center Drive East

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 10.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0010

Channel Manning's n: 0.0400

Channel Invert Elevation: 3.30 ft

Roadway Data for Crossing: Center Drive East

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 10.00 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Battery Creek Road (450’ east of West Royal Oaks Drive) – Double 36” RCPs

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 45 cfs

Design Flow: 65 cfs

Maximum Flow: 100 cfs

Table 25 - Summary of Culvert Flows at Crossing: Battery Creek Rd/N Royal Oaks (proposed)

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7.41	45.00	45.00	0.00	1
7.58	50.50	50.50	0.00	1
7.74	56.00	56.00	0.00	1
7.90	61.50	61.50	0.00	1
8.02	65.00	65.00	0.00	1
8.26	72.50	72.50	0.00	1
8.45	78.00	78.00	0.00	1
8.63	83.50	83.50	0.00	1
8.82	89.00	89.00	0.00	1
9.01	94.50	94.50	0.00	1
9.21	100.00	100.00	0.00	1
9.40	105.23	105.23	0.00	Overtopping

Rating Curve Plot for Crossing: Battery Creek Rd/N Royal Oaks (proposed)

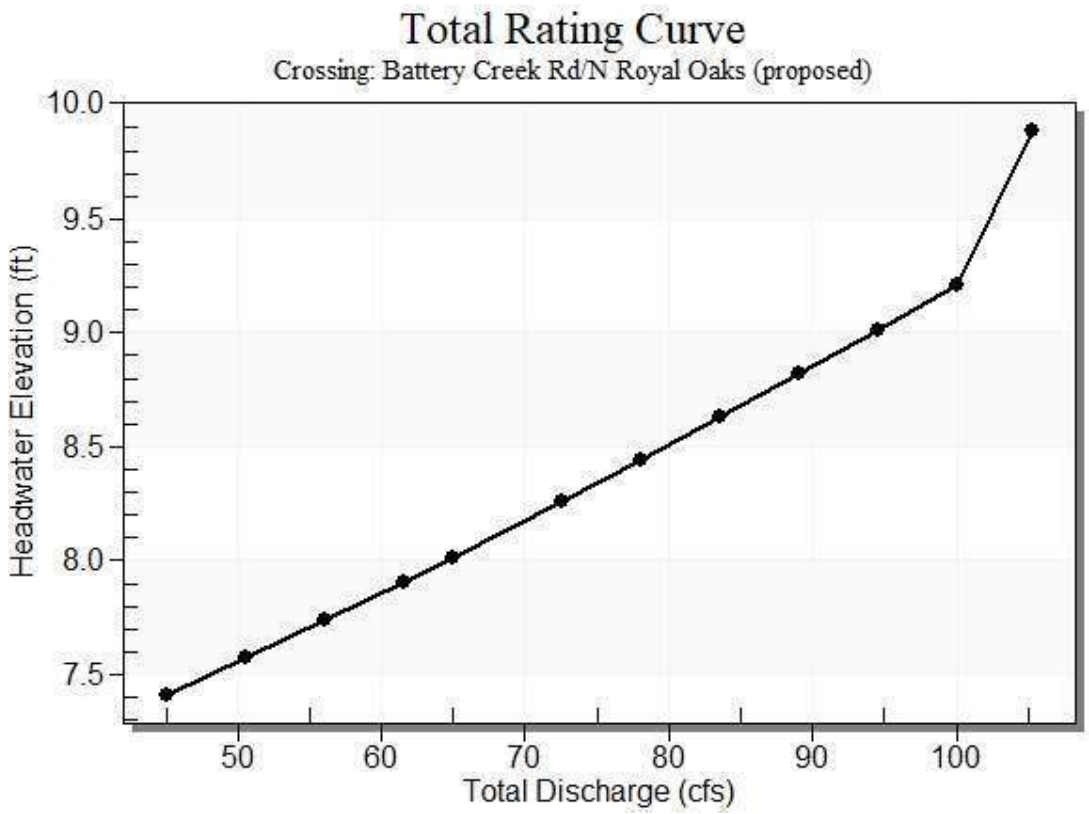


Table 26 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
45.00	45.00	7.41	2.177	2.613	1-S1t	1.227	1.526	2.647	2.247	3.340	3.083
50.50	50.50	7.58	2.325	2.776	1-S1t	1.308	1.617	2.765	2.365	3.649	3.174
56.00	56.00	7.74	2.467	2.938	1-S1t	1.388	1.708	2.874	2.474	3.971	3.258
61.50	61.50	7.90	2.606	3.104	1-S1t	1.466	1.792	2.977	2.577	4.350	3.335
65.00	65.00	8.02	2.694	3.215	1-S1f	1.515	1.847	3.000	2.640	4.598	3.382
72.50	72.50	8.26	2.883	3.463	1-S1f	1.619	1.953	3.000	2.768	5.128	3.476
78.00	78.00	8.45	3.024	3.645	4-FFf	1.695	2.027	3.000	2.856	5.517	3.541
83.50	83.50	8.63	3.171	3.830	4-FFf	1.772	2.102	3.000	2.941	5.906	3.602
89.00	89.00	8.82	3.322	4.019	4-FFf	1.849	2.171	3.000	3.022	6.295	3.660
94.50	94.50	9.01	3.481	4.212	4-FFf	1.928	2.236	3.000	3.101	6.685	3.716
100.00	100.00	9.21	3.648	4.409	4-FFf	2.009	2.298	3.000	3.176	7.074	3.769

****

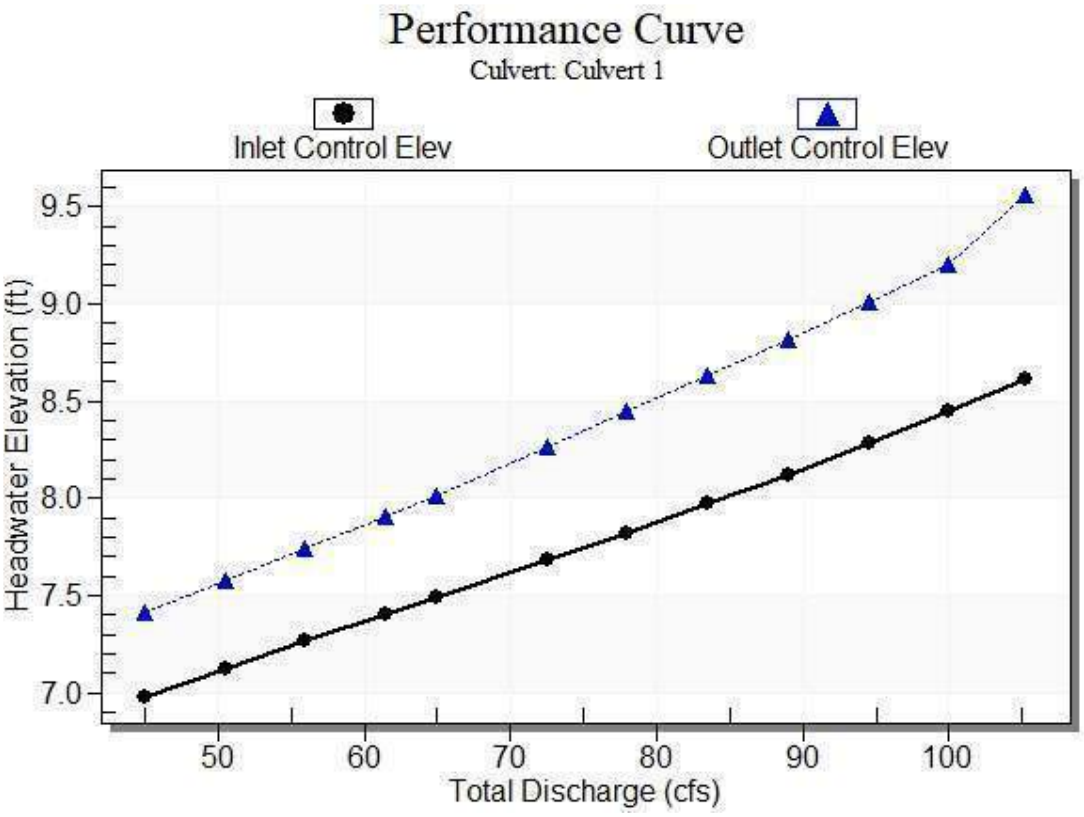
Straight Culvert

Inlet Elevation (invert): 4.80 ft, Outlet Elevation (invert): 4.50 ft

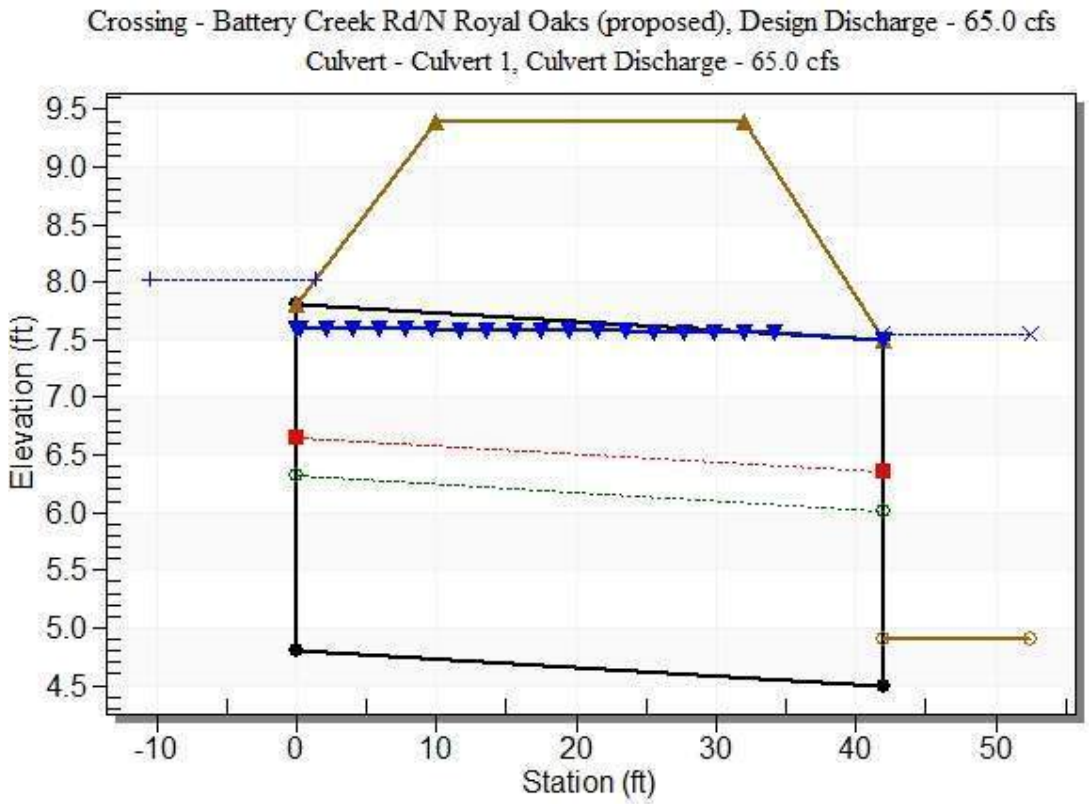
Culvert Length: 42.00 ft, Culvert Slope: 0.0071

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 4.80 ft

Outlet Station: 42.00 ft

Outlet Elevation: 4.50 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 27 - Downstream Channel Rating Curve (Crossing: Battery Creek Rd/N Royal Oaks (proposed))

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
45.00	7.15	2.25	3.08	0.42	0.47
50.50	7.26	2.36	3.17	0.44	0.47
56.00	7.37	2.47	3.26	0.46	0.48
61.50	7.48	2.58	3.34	0.48	0.48
65.00	7.54	2.64	3.38	0.49	0.48
72.50	7.67	2.77	3.48	0.52	0.49
78.00	7.76	2.86	3.54	0.53	0.49
83.50	7.84	2.94	3.60	0.55	0.49
89.00	7.92	3.02	3.66	0.57	0.49
94.50	8.00	3.10	3.72	0.58	0.49
100.00	8.08	3.18	3.77	0.59	0.49

Tailwater Channel Data - Battery Creek Rd/N Royal Oaks (proposed)

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 2.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0030

Channel Manning's n: 0.0300

Channel Invert Elevation: 4.90 ft

Roadway Data for Crossing: Battery Creek Rd/N Royal Oaks (proposed)

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 9.40 ft

Roadway Surface: Paved

Roadway Top Width: 22.00 ft

APPENDIX H

BASIN #1 PHOTOS

Downstream (Battery Creek) end of Spanish Moss Trail 48-in crossline pipe

Marsh on downstream (Battery Creek) side of Spanish Moss Trail 48-in crossline pipe

Outlet end of Spanish Moss Trail 48-in crossline pipe

Looking eastward toward marsh from Spanish Moss Trail to Battery Creek Road

Upstream (Mossy Oaks) end of Spanish Moss Trail 48-in crossline pipe

Battery Creek Road 24-inch crossline pipes (left); Duck Pond 36-inch CMP outlet pipe (right)

Duck Pond 36-inch CMP outlet pipe

Duck Pond outlet pipe (left); Battery Creek Road 24-inch crossline pipes (right)

Siltation on upper end of Duck Pond

Sideline ditch along First Boulevard, between Duck Pond and Jane Way

Jane Way 48-inch crossline pipe

Sideline ditch along First Boulevard, upstream of Jane Way crossing

Buried inlet end of First Boulevard 30-inch RCP crossline pipe

Jane Way canal, upstream of First Boulevard

Jane Way canal adjacent to Center Drive West

Jane Way canal adjacent to Center Drive West

Jane Way canal at the end of Jane Way

Jane Way canal along South Drive

Jane Way canal along South Drive

Jane Way canal along Center Drive East