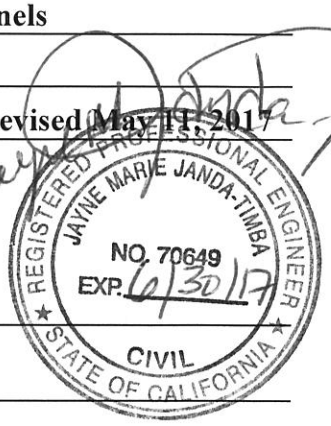
INDIVIDUAL HYDROLOGIC & HYDRAULIC ASSESSMENT (IHHA) REPORT

Site Name/Facility:	**Siempre Viva and Bristow Channels**
Master Program Map No.:	**Maps 126 and 127**
Date:	March 14, 2017; April 28, 2017; **Revised May 11, 2017**
Civil Engineer:	**Jayne Janda-Timba, R.C.E.** **Rick Engineering Company** **5620 Friars Road,** **San Diego, California 92110** **(619) 688-1448**
Registered Civil Engineer Number & Expiration Date:	**RCE# 70649** **Exp. 06/2017**



Instructions: This form must be completed for each target facility following the completion of the Individual Maintenance Plan (IMP) report form and prior to any work being conducted in the facility. Attach additional sheets if needed.

Executive Summary:

This Individual Hydrologic and Hydraulic Assessment (IHHA) report, and the corresponding analyses, concludes that sediment and vegetation removal from both Siempre Viva and Bristow Channels, mapped in the Master Storm Water System Maintenance Program (MMP) Maps 126 and 127, will affect capacity as follows:

Bristow Channel

- Reach 1 (HEC-RAS Cross Sections 72.6711 to 735.8522) – Sediment and vegetation removal is proposed for all portions of Reach 1. Maintenance will increase the static storage capacity of the detention basin at the downstream end of Bristow Channel from 57,000 ft^3 to 100,000 ft^3 (approximately a 76 percent increase) decreasing the overall limits of flooding.
- Reach 2 (HEC-RAS Cross Sections 735.8522 to 1459.6140) – Sediment and vegetation removal is proposed for all portions of Reach 2. Vegetation and sediment removal will not increase the capacity of the channel; however, the channels water surface elevation will decrease approximately 0.5 feet for the 100-year storm event thus decreasing the overall flooding limits.

Siempre Viva Channel

- Reach 3 (HEC-RAS Cross Sections 4.8674 to 1311.2390) – Sediment and vegetation removal is proposed for all portions of Reach 3. Maintenance will increase the static storage capacity of the detention basin at the downstream end of Siempre Viva Channel from 37,000 ft^3 to 59,000 ft^3 (approximately a 57 percent increase) decreasing the overall limits of flooding.

Siempre Viva and Bristow Channels are two channels serving the Brittania Commerce Center. While separate, both channels terminate at a shared detention facility. Bristow Channel is bound at the western (upstream) end by Britannia Boulevard. From here the channel flows east along the northern side of Bristow Court, then south into a detention basin. The total length of Bristow Channel is approximately 1,500 feet. Siempre Viva Channel is bound at the western side by the cul-de-sac at the eastern end of Britannia Court. From there Siempre Viva Channel flows east then north around a Border Patrol facility before discharging to a separate detention basin. The total length of Siempre Viva Channel is approximately 1,400 feet.

In the 2011 MMP, the entire length of both Siempre Viva Channel and Bristow Channel are identified as a channel. However, based on As-Built plans, the downstream portions of the channels form a shared detention facility along the eastern side of the Britannia Commerce Center. This shared detention facility consists of two detention basins, one at the downstream end of each channel, and a private wet well located between the two detention basins. Each detention basin is connected to the wet well by a 24-inch Corrugated Metal Pipe (CMP) riser. Additionally, the two detention basins are connected to each other by an 18-inch Reinforced Concrete Pipe (RCP), allowing water surface elevations to equalize within the detention facility. Throughout this IHHA, the two detention basins and the private wet well are referred to as the shared detention facility.

It is important to note that the water surface elevation in the shared detention facility and the limits of flooding associated with Siempre Viva and Bristow Channels are largely controlled by the height of the eastern bank of the shared detention facility. In the current condition, the eastern bank is approximately 2 - 4 feet higher than in the As-Built condition. Without returning the eastern bank of the shared detention facility to its As-Built height, maintenance will not resolve all of the flooding issues in Siempre Viva and Bristow Channels. However, sediment and vegetation removal within the channels will decrease the overall limits of flooding by increasing the channels/detention basins capacity to detain runoff.

Introduction:

The City of San Diego developed the Master Storm Water System Maintenance Program to optimize its business processes and environmental protection practices related to channel operation and maintenance activities. The MMP is intended to integrate operation and maintenance planning and implementation and assessment activities with its water quality protection programs. This document provides a summary of the IHHA activities conducted within the Siempre Viva and Bristow Channels south of Siempre Viva Road, East of Britannia Boulevard, and west of Otay Pacific Drive.

In the 2011 MMP the entire length of both Siempre Viva Channel and Bristow Channel are identified as channels. However, based on Britannia Commerce Center As-Built Plans 22611-26 & 33-D prepared by RICK, dated March 10, 1988 the downstream portions of the channels form a shared detention facility along the eastern side of the Britannia Commerce Center. Outflow from the shared detention facility is via a pump in the private wet well and via weir flow over the eastern banks of the facility. Based on the As-Built Plans, the eastern banks of the facility are designed lower than the western banks of the facility, allowing overflow to drain easterly away from Britannia Commerce Center. Throughout this IHHA, the term "detention basin" is used to refer to portions of the channels on the east side of the business park, which flow toward the wet well and have a lower eastern bank than western bank. For Bristow Channel, the detention basin is located where Bristow Channel runs north to south, approximately downstream of HEC-RAS Cross Section 174.4880. For Siempre Viva Channel, the detention basin is located where Siempre Viva Channel runs south to north, approximately downstream of HEC-RAS Cross Section 770.7793. It should be noted that storm water runoff is also detained in the channels upstream of the detention basins. However, water surface elevations in upstream portions of the channels are also controlled by open channel hydraulics, and as such, the upstream portions of the channels are not referred to as detention basins in this IHHA.

The detention basins at the downstream ends of Siempre Viva and Bristow Channels, and the private wet well between them, form the "shared detention facility." Each detention basin is connected to the wet well by an approximately 3-foot high 24-inch CMP riser connected to a 24-inch CMP outflow pipe. Additionally, the two detention basins are connected to each other by an 18-inch RCP that allows the water surface elevations to equalize between the two detention basins. It is the responsibility of the City of San Diego to maintain the detention basins at the downstream ends of Siempre Viva and Bristow Channels. The wet well and pump are the responsibility of the private owner to maintain.

Pursuant to Britannia Commerce Center As-Built Plans 22611-33-D prepared by RICK, dated March 10, 1988 storm water runoff detained in the shared detention facility is pumped from the wet well to an energy dissipater that drains to the property east of the shared detention facility. Based on the design shown on the As-Built Plans, the eastern bank of the shared detention facility is approximately 2 – 3 feet lower than the western bank. When the volume of storm water runoff received by the facility exceeds the facilities storage capacity, runoff should overflow the eastern bank of the shared detention facility and drain to the property east of the business park.

It is important to note that in the current condition the height of the eastern bank of the detention facility is approximately 2 to 4 feet higher than in the As-Built condition. In the current condition, the adjacent properties to the west of the detention facility are approximately 0 to 2 feet lower than the eastern bank. Therefore, when excess runoff is received in the current condition, the water surface elevation in the shared detention facility will exceed the elevation of the adjacent properties before excess runoff may overflow over the eastern bank. Additionally, a privately owned channel has been constructed east of the Britannia Commerce Center to collect the pump outflow and overflow from the shared detention facility. The privately owned channel flows south before discharging into Mexico. The privately owned channel has not been mapped as part of the 2011 MMP. Therefore the privately owned channel has not been included in the hydraulic analysis.

The following sections of this IHHA will describe in detail the analysis and results for the following channel conditions: Current Vegetated Condition, Ultimate Vegetated Condition, Maintained Condition-Vegetation Only, Maintained Condition – Sediment and Vegetation Removed, and As-Built Condition. Due to the detention basins at the downstream ends of Siempre Viva and Bristow Channels both flow-based and volume-based hydraulic analyses were performed as part of this IHHA.

EXISTING CONDITIONS

Description of creek/channel (limits of reach, surrounding land use and area, creek/channel geometry and vegetative condition):

Siempre Viva and Bristow Channels are two earthen trapezoidal channels serving the Britannia Commerce Center. While separate, both channels terminate at a shared detention facility.

Bristow Channel is located east of Britannia Boulevard and north of Bristow Court. The channel is bound at the upstream end by the outfall of the 6-foot wide by 3-foot high reinforced concrete box (RCB) located underneath Britannia Boulevard. The channel flows east along the northern side of Bristow Court, passing through two pairs of culverts underneath private driveways serving adjacent businesses. Downstream of these culverts, the channel flows east around the Coast Citrus Distributors warehouse (7599 Bristow Court) before turning south and entering the shared detention facility at the downstream end of the channel. The detention basin in Bristow Channel extends approximately downstream of HEC-RAS Cross Section 174.4880.

Siempre Viva Channel is located east of Britannia Court and southeast of a United States Border Patrol facility. The channel is bound at the upstream end where an 18-inch RCP discharges from the cul-de-sac at the eastern end of Britannia Court. The channel flows east then turns north, entering the shared detention facility at the downstream end of the channel. The detention basin in Siempre Viva Channel extends approximately downstream of HEC-RAS Cross Section 770.7793.

The shared detention facility at the downstream end of Siempre Viva and Bristow Channels consists of two separate detention basins and a private wet well. Each detention basin is connected to the wet well by an approximately 3-foot high 24-inch CMP riser connected to a 24-inch CMP outflow pipe. Additionally, the two detention basins are connected to each other by an 18-inch RCP that allows the water surface elevations to equalize between the two detention basins. Pursuant to Britannia Commerce Center As-Built Plans 22611-33-D prepared by RICK, dated March 10, 1988 storm water runoff detained in the shared detention facility is pumped from the wet well to a Type 1 energy dissipater that drains to the property east of shared detention facility. Based on the design shown on the As-Built Plans, when the volume of storm water runoff received exceeds the storage capacity of the shared detention facility, excess runoff should overflow the eastern bank of the shared detention facility, which was designed approximately 2 - 4 feet lower than the western bank, and drain into the property to the east of the business park.

East of the Britannia Commerce Center, a privately owned channel has been constructed to collect the pump outflow and overflow from the shared detention facility. The privately owned channel flows south before discharging into Mexico. Flows enter the Tijuana River in Mexico which crosses back into the United States, discharging into the Pacific Ocean at the Tijuana River Estuary. See Attachment 2 – Vicinity Map for the general project area.

For the purpose of this study, the two channels within the area of study have been divided into three reaches. The three reaches within the Siempre Viva and Bristow Channel study limits have been identified as:

- Reach 1: Bristow Channel (North Channel), HEC-RAS Cross Sections 72.6711 to 735.8522
- Reach 2: Bristow Channel (North Channel), HEC-RAS Cross Sections 735.8522 to 1459.6140
- Reach 3: Siempre Viva Channel (South Channel), HEC-RAS Cross Sections 4.8674 to 1311.2390

The limits of these reaches are identified in the hydraulic work maps located in Attachment 3. Unless otherwise stated, it is the responsibility of the City of San Diego to maintain the channel reaches within their jurisdictional boundaries as identified in the hydraulic work map.

The following text discusses the limits and configuration of each Reach and of the shared detention facility at the downstream end of Reaches 1 and 3.

Reach 1: Bristow Channel (North Channel), HEC-RAS Cross Sections 72.6711 to 735.8522

Reach 1 is bound at the downstream end by the shared detention facility and extends upstream approximately 730 feet to the outfall of the pair of culverts underneath the driveways at the eastern end of Bristow Court. Pursuant to the Britannia Commerce Center As-Built Plan 22611-12-D prepared by RICK, dated March 10, 1988, Reach 1 is entirely earthen and has a trapezoidal geometry. The majority of Reach 1 (HEC-RAS Cross Sections 174.4880 to 735.8522) has a base width of 4 feet and has 2-foot horizontal to 1-foot vertical (2H:1V) side slopes with a depth of 6 feet. Pursuant to Britannia Commerce Center As-Built Plan 22611-15-D prepared by RICK, dated March 10, 1988, the downstream portion of the reach (HEC-RAS Cross Sections 72.6711 to 174.4880) has a base width of 8 feet and 2H:1V side slopes. Spot elevation on this As-Built Plan show that the eastern side slopes are approximately 5 to 5.5 feet deep. As-Built Plans were not available for the pair of culverts at the upstream end of Reach 1. However, during the site visit conducted on December 15, 2016, the pair of culverts was observed to consist of two elliptical High-Density Polyethylene (HDPE) pipes. The northern pipe is approximately 7.5 feet wide by 5.5 feet tall. The southern pipe is approximately 6.5 feet wide by 5.5 feet tall.

As observed during the December 15, 2016 site visit, in Reach 1 the eastern side slope of the shared detention facility was approximately 7 to 9 feet tall. Additionally, Reach 1 contains accumulated sediment and dense stands of willows and palm trees throughout. Due to sediment deposition, the existing grade of the channel is approximately 2 inches above the invert of the pair of culverts at the upstream end of Reach 1. Approximately 1.0 feet of accumulated sediment was observed at the downstream end of the channel.

Reach 2: Bristow Channel (North Channel), HEC-RAS Cross Sections 735.8522 to 1459.6140

Reach 2 is bound at the downstream end by the upstream end of Reach 1 and extends upstream approximately 725 feet to the outfall of the 6-foot wide by 3-foot high RCB underneath Britannia Boulevard. Pursuant to the Britannia Commerce Center As-Built Plan 22611-22-D prepared by RICK, dated March 10, 1988, Reach 2 is entirely earthen and has a trapezoidal geometry throughout with a the base width of 4 feet and has 2H:1V side slopes with a depth of 6 feet. Two pairs of culverts are located along this reach. The downstream pair of culverts, located underneath the driveways at the eastern terminus of Bristow Court consists of two pipes and is approximately 130 feet in length. As-Built Plans were not available for this pair of culverts. However, during the site visit conducted on December 15, 2016, the culvert was observed to consist of two elliptical HDPE pipes. The northern pipe is approximately 7.5 feet wide by 5.5 feet tall. The southern pipe is approximately 6.5 feet wide by 5.5 feet tall. The upstream pair of culverts, located underneath a driveway in the middle of Reach 2 (HEC-RAS Cross Sections 1112.5730 to 1170.5770), also consists of two HDPE pipes and is approximately 50 feet in length. Both pipes were observed to be elliptical with a width of approximately 6.5 feet and a height of approximately 5.5 feet.

As observed during the December 15, 2016 site visit, Reach 2 contains vegetation and sediment deposition throughout. Due to sediment deposition, the existing grade of the channel is above the invert of both pairs of culverts and the RCB at the upstream end of Reach 2. Approximately 1.5 feet of accumulated sediment was observed in the channel between HEC-RAS Cross Sections 877.6657 and 1112.5730.

Reach 3: Siempre Viva Channel (South Channel), HEC-RAS Cross Sections 4.8674 to 1311.2390

Reach 3 is bound at the downstream end by the shared detention facility and extends approximately 1300 feet upstream to the outfall of the 18-inch RCP located at the eastern end of Britannia Court. Pursuant to the Britannia Commerce Center As-Built Plan 22611-12-D prepared by RICK, dated March 10, 1988, Reach 3 is entirely earthen and has a trapezoidal cross section with a 4-foot base width and has 2H:1V side slopes. The upstream portion of Reach 3 (HEC-RAS Cross Section 770.7793 to 1311.2390) is 6 feet deep. Pursuant to spot elevation shown on Britannia Commerce Center As-Built Plan 22611-15-D prepared by RICK, dated March 10, 1988, the eastern side slope is approximately 5 to 5.5 feet deep in the lower portion of the channel (HEC-RAS Cross Section 4.8674 to 770.7793).

As observed during the December 15, 2016 site visit, the eastern side slope was approximately 8 to 9 feet tall. Additionally, Reach 3 contains vegetation and sediment deposition. Reeds and other vegetation are present throughout the majority of this reach and dense stands of willow are established at two approximate locations:

HEC-RAS Cross Sections 222.0471 to 322.0501 and 522.0566 to 622.0599. At the 90-degree bend in the channel (HEC-RAS Cross Section 770.7793) approximately 1.0 to 1.5 feet of accumulated sediment was observed, resulting in negative drainage at this location.

Shared Detention Facility (Downstream end of Reaches 1 and 3)

Pursuant to Britannia Commerce Center As-Built Plan 22611-33-D prepared by RICK Engineering, dated March 10, 1988, the shared detention facility at the downstream end of Reaches 1 and 3 consists of two detention basins and a private wet well. An approximately 3-foot high 24-inch CMP riser is located in each detention basin and these risers are connected to the wet well between the two basins by 24-inch CMP outflow pipes. Pursuant to Britannia Commerce Center As-Built Plan 22611-32-D prepared by RICK Engineering, dated March 10, 1988, water is pumped out of the wet well by a Hydromatik SK-100 submersible pump. The pump is automatically turned on when the water surface in the wet well exceeds 460.67 feet NAVD 88 and turns off when water has been drawn down below 460.17 feet NAVD 88. As documented by Hydromatik, this pump has a maximum capacity of 155 gallons per minute (gpm) (0.34 cubic feet per second). Additionally, the two detention basins are connected by an 18-inch RCP that allows water surface elevations to equalize between the two detention basins.

As observed during the December 15, 2016 site visit, sediment accumulation was observed at the downstream ends of the detention basins, near the private wet well. In the basin at the downstream end of Bristow Channel, the depth of accumulated sediment was approximately 1 foot. In the basin at the downstream end of Siempre Viva Channel, the depth of accumulated sediment was approximately 1.5 feet. Numerous grasses and weeds were established in the downstream end of the two detention basins. However, no woody shrubs or trees were present. Note that this description of sediment and vegetation accumulation only applies to the downstream portions of the detention basins (i.e., within 50 feet of the private wet well). For a description of conditions within other portions of the detention basins, see the description for Reaches 1 and 3 as applicable.

Hydrologic information (source of hydrologic information, summary of flow rates and return frequencies):

The Siempre Viva and Bristow Channels are comprised of two separate drainage basins that discharge to a single shared detention facility. The combined area tributary to both channels consists of 120 acres of commercial/industrial lots. Some lots are currently developed while others are not developed but are planned for similar commercial/industrial land use based on planned land use data obtained from SanGIS dated October 2, 2014. In support of the two hydraulic analyses performed as part of this IHHA, the peak flow rates and total runoff volumes were calculated for each basin.

The peak flow rates were determined using available as-built plans and 6-hour precipitation data from the 2003 San Diego County Hydrology Manual. The 100-year peak flow rates (Q100) for Siempre Viva and Bristow Channels are shown on the Britannia Commerce Center As-Built Plan, Sheet 22611-33-D. The 2-, 5-, 10-, 25-, and 50-year storm event flow rates were then approximated by taking the ratio of the unknown storm event 6-hour precipitation and the 100-year storm event 6-hour precipitation, and multiplying Q100 by the ratio to estimate the flow rate for the unknown storm event.

Section A on Britannia Commerce Center As-Built Plan 22611-33-D prepared by RICK Engineering, dated March 10, 1988, shows that the Q100 for Bristow Channel is 104.7 cfs and that the Q100 for Siempre Viva Channel is 176.4 cfs. However, based on a review of the available data, it appears that the Q100 flow rates should be switched. Based on the 2014 2-foot contour data from SanGIS, the drainage area tributary to Bristow Channel is larger than the drainage area tributary to Siempre Viva Channel. Because both drainage areas have similar slopes and land uses, it is reasonable to assume that the larger Q100 will correspond to the larger drainage area. Additionally Britannia Commerce Center As-Built Plan 22611-20-D shows flow rates at internal points within the two channels; larger flow rates are listed for Bristow Channel. Therefore, this IHHA used a Q100 of 176.4 cfs for Bristow Channel and a Q100 of 104.7 for Siempre Viva Channel. Table 1 shows the flow rates for both channels.

Table 1

Summary of Approximate Hydrologic Data – Peak Flow Rates						
Total Drainage Area: 120 acres						
6-hour Precipitation (in)	0.9	1.2	1.4	1.7	2.0	2.3
Frequency	**2-Year**	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year (As-Built)**
Bristow Channel (North Channel) Discharge (cfs)	69.0	92.0	107.4	130.4	153.4	176.4
Siempre Viva Channel (South Channel) Discharge (cfs)	41.0	54.6	63.7	77.4	91.0	104.7

The total runoff volumes received by each detention basin in the shared detention facility were calculated using runoff coefficients from the 1984 City of San Diego Drainage Design Manual. The areas tributary to each of the channels/detention basins were delineated using 2014 2-foot contour data and 2015 storm drain data from SanGIS. Runoff coefficients were assigned based on current, not planned, land use data obtained from SanGIS dated October 2, 2014. Vacant and undeveloped areas were considered to be 0% impervious and were assigned a runoff coefficient of 0.40. Commercial and industrial areas were assigned a runoff coefficient of 0.90. Roads were considered to be 100% impervious and assigned a runoff coefficient of 0.95. Table 2 shows the parameters used to calculate the total runoff volume received by each channel/detention basin. Table 3 shows the total runoff volume received by each channel/detention basin. A detailed accounting of the runoff volume calculations is included in Attachment 5.

Table 2

Summary of Runoff Volume Parameters		
	North - Bristow Channel	**South - Siempre Viva Channel**
Total Basin Area (acres)	74.7	45.6
Composite Runoff Coefficient	0.71	0.72

Table 3

Summary of Approximate Hydrologic Data – Total Runoff Volume						
Total Drainage Area: 120 acres						
6-hour Precipitation (in)	0.9	1.2	1.4	1.7	2.0	2.3
Frequency	**2-Year**	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**
Bristow Channel (North Channel) Volume (ft^3)	174,000	233,000	271,000	330,000	388,000	446,000
Siempre Viva Channel (South Channel) Volume (ft^3)	106,000	142,000	166,000	201,000	237,000	272,000

Hydraulic analyses (description of hydraulic models created for project):

Two separate hydraulic analyses were performed as part of this IHHA assessment. The upper portions of Siempre Viva and Bristow Channels function as free-flowing open channels where the water surface elevation is controlled by open channel hydraulics. The lower portions of Siempre Viva and Bristow Channels function as detention basins where the water surface elevation is controlled by stage-storage relations. Therefore, two separate hydraulic analyses were performed as part of this IHHA. The first analysis determined the capacity of the upper portions of the channels to convey peak flows, assuming a constant discharge. The second analysis determined the capacity of the detention basins at the downstream end of the channels to store the total runoff volume.

Flow Based Hydrologic Analysis (HEC-RAS) - Channels

The US Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) Version 4.1.0 was used to analyze the hydraulic characteristics of the upper portions of Siempre Viva and Bristow Channels. HEC-RAS has the ability to perform one-dimensional hydraulic calculations for natural and engineered channels, by utilizing the energy equation and the momentum equation. For the purposes of this project, all HEC-RAS modeling was performed using a mixed flow regime.

HEC-RAS models were prepared for five channel conditions that consist of the Current Vegetated Condition, Ultimate Vegetated Condition, Maintained Condition – Vegetation Only, Maintained Condition – Sediment and Vegetation Removed, and As-Built Condition. All of the analyses are based on the 2014 City of San Diego LIDAR data. The topography and the hydraulic modeling performed for Siempre Viva and Bristow Channels are all on the North American Vertical Datum of 1988 (NAVD 88).

- Downstream Boundary Condition Methodology

  The downstream boundary condition of both channels is controlled by the depth of flows over the eastern bank of the shared detention facility. To establish the downstream boundary conditions in the HEC-RAS model for the five channel conditions, rating curves were calculated, relating discharge over the eastern bank to the water surface elevation in the shared detention facility. In total, four rating curves were derived. Because the current geometry of the eastern bank of the shared detention facility is different from the as-built geometry, rating curves were derived for both the current condition and as built condition geometries. For both bank geometries, separate rating curves were derived for each of

the two detention basins in the shared detention facility. The two as-built rating curves reflect an approximately 5 to 5.5-foot tall eastern bank pursuant to the spot elevations shown on Britannia Commerce Center As-Built Plan 22611-15-D and were only used for the As-Built Condition model. The two current condition rating curves reflect the 7 to 9-foot tall channel banks observed during the December 15, 2016 site visit and were used for the Current Vegetated Condition, Ultimate Vegetated Condition, Maintained Condition – Vegetation Only, and Maintained Condition – Sediment and Vegetation Removed models.

Each rating curve was derived to reflect site conditions using a combination of pump, weir, and normal depth calculations. Using these rating curves and the corresponding flow rate calculated for each channel, water surface elevations were calculated separately for both detention basins in the shared detention facility. It is important to note that the two detention basins within the shared detention facility are hydraulically connected by an 18-inch RCP. To account for this connectivity, the downstream boundary condition used for each storm event was calculated by averaging the water surface elevations in the two detention basins.

- Downstream Boundary Condition – As Built Condition

In the as-built condition both channels meet at a shared detention facility. This facility consists of two separate detention basins, with one basin at the end of each channel, and a private wet well. Each detention basin contains a 24-inch CMP riser that is connected to the private wet well. Ponded water from each basin flows into the wet well though the CMP risers and is pumped onto an energy dissipater that drains onto the property east of the shared detention facility. Pursuant to the Britannia Commerce Center As-Built Plan 22611-32-D, prepared by RICK, dated March 10, 1988, the shared pump located in the wet well is a Hydromatk model SK-100. As documented by Hydromatik, this pump has a maximum capacity of 155 gpm (0.34 cfs). The capacity of the pump is significantly less than the capacity of the 24-inch CMP risers connecting each detention basin to the shared pump; therefore, discharge through the wet well is limited by the capacity of the pump. It should be noted that outflow through the pump is negligible and that failure of the pump during a rain event will not significantly increase water surface elevations in the shared detention facility.

When the volume of storm water runoff received exceeds the storage capacity of the shared detention facility, excess water flows over the eastern bank of the facility and into a broad, shallow channel across a field. The as-built flowline of this channel is equal to the invert elevation of the eastern bank of the shared detention facility. Therefore, normal depth calculations were used to determine the capacity of this channel. The wet well located between the two basins effectively divides flows into the receiving channel into two portions.

Britannia Commerce Center As-Built Plan 22611-15-D shows elevations for the top of the eastern bank of the detention basin at the downstream end of Bristow Channel. Immediately adjacent to the private wet well, the elevation of the eastern bank is 466.37 feet NAVD 88. Approximately 175 feet north, at the northern end of the eastern bank, the elevation of the eastern bank is 466.87 feet NAVD 88. Using the 1999 2-foot contours obtained from SanGIS, the slope of the field adjacent to the detention basin at the downstream end Bristow Channel (Reach 1) was determined to be 0.003ft/ft. Britannia Commerce Center As-Built Plan also shows that the eastern bank of the detention basin at the downstream end of Siempre Viva Channel (Reach 3) has a consistent height of 5 feet, with the top of the bank rising to the south at the same 0.004 ft/ft slope as the channel flow line. Using the 1999 2-foot contours obtained from SanGIS, the slope of the field adjacent to the detention basin at the downstream end of Siempre Viva Channel was determined to be 0.006 ft/ft. At both locations the field consisted of weeds and light brush that would lie down during high flows.

The rating curve derived for the detention basin located at the downstream end of Bristow Channel (Reach 1) in the as-built condition consists of the following elements:

- A triangular channel with a vertical right side slope to represent the wet well, a 300H:1V left side slope, a slope of 0.003 ft/ft, a Manning Roughness Coefficient of 0.04, and an invert of 466.37 feet NAVD 88. Normal depth calculations were used to determine the capacity of the channel for given water surface elevations.

- A 24-inch CMP riser connected to a pump with a capacity of 0.17 cfs. Orifice and pump calculations were used to determine the capacity of this system for a given water surface elevation and the more limiting calculation was used. The operating head of the pump is less than the operating head associated with the maximum pump rate, therefore the pump was assumed to be operating at maximum capacity. Additionally, the pump is shared between the two detention basins therefore the capacity was halved.

The rating curve derived for detention basin at the downstream end of Siempre Viva Channel (Reach 3) in the as-built condition consists of the following elements:

- A triangular channel with a vertical left side slope to represent the wet well, a 250H:1V right side slope, a slope of 0.006 ft/ft, a Manning Roughness Coefficient of 0.04, and an invert of 466.37 feet NAVD 88. Normal depth calculations were used to determine the capacity of the channel for given water surface elevations.
- A 24-inch CMP riser connected to a pump with a capacity of 0.17 cfs. Orifice and pump calculations were used to determine the capacity of this system for a given water surface elevation and the more limiting calculation was used. The operating head of the pump is less than the operating head associated with the maximum pump rate, therefore the pump was assumed to be operating at maximum capacity. Additionally, the pump is shared between the two detention basins therefore the capacity was halved.

- <u>Downstream Boundary Condition – Current Condition</u>

In the current condition, as observed during the December 15, 2017 site visit, the configuration of the wet well, riser, and equalizer pipe within the shared detention facility are the same as in the as-built condition. However, the eastern bank of the shared detention facility is 2 to 4 feet higher than shown on the As-Built plans. Additionally, a privately owned channel has been constructed east of the shared detention facility to collect pump outflow and overflow from the facility. The flowline of the privately owned channel is approximately 2 feet lower than the eastern bank of the shared detention facility; therefore discharge over the eastern bank of the shared detention facility was modeled using the broad crested weir equation.

In the current condition, a 2-foot deep by 4-foot long notch is located between the detention basin at the downstream end of Bristow Channel and the privately owned channel to the east of the shared detention facility. This notch is approximately 4 feet above the finish grade of the detention basin. As water surface elevations increase, water will initially flow from the detention basin into the privately owned channel to the east through this notch. As water surface elevations increases further, a longer section of the eastern bank of the shared detention facility will be overtopped. Adjacent to the shared detention facility at the downstream end of Bristow Channel, the berm has a crest elevation of 468.37 feet NAVD 88. The berm extends 50 feet north of the detention basin before the crest elevation increases.

Water from the detention basin at the downstream end of Siempre Viva Channel enters the privately owned channel in a similar way. Initially, runoff will flow through a 12-foot wide low point between the eastern bank of the detention basin and the southeastern corner of the wet well. This low point has an invert elevation of 467.87 feet NAVD 88. As the water surface elevation increases, water will overtop a longer portion of the eastern bank. Adjacent to the detention basin, the eastern bank has an invert elevation of 468.37 feet NAVD 88. The bank extends approximately 100 feet south of the detention basin before increasing in elevation.

The rating curve derived for the detention basin located at the downstream end of Bristow Channel (Reach 1) in the current condition consists of the following elements:

- A 5-foot long broad-crested rectangular weir with an invert elevation of 465.37 feet NAVD 88.
- A 75-foot long broad crested weir with an invert elevation of 467.37 feet NAVD 88.
- A 24-inch CMP riser connected to a pump with a capacity of 0.17 cfs. Orifice and pump calculations were used to determine the capacity of this system for a given water surface elevation and the more limiting calculation was used. The operating head of the pump is less than the operating head associated with the maximum pump rate, therefore the pump was assumed to be operating at maximum capacity. Additionally, the pump is shared between the two detention basins therefore the capacity was halved.

The rating curve derived for the detention basin at the downstream end of Siempre Viva Channel (Reach 3) in the current condition consists of the following elements:

- A 4-foot long broad-crested weir with an invert elevation of 467.87 feet NAVD 88
- A 100-foot long broad-crested weir with an invert elevation of 468.37 feet NAVD 88
- A 24-inch CMP riser connected to a pump with a capacity of 0.17 cfs. Orifice and pump calculations were used to determine the capacity of this system for a given water surface elevation and the more limiting calculation was used. The operating head of the pump is less than the operating head associated with the maximum pump rate, therefore the pump was assumed to be operating at maximum capacity. Additionally, the pump is shared between the two detention basins therefore the capacity was halved.

Volume Based Hydraulic Analysis – Shared Detention Facility

The second hydraulic analysis analyzed the capacity of the shared detention facility to store the total volume of stormwater runoff without flooding the adjacent properties to the west using stage-storage relations. This analysis consisted of a simple comparison of the total volume of stormwater runoff received by the shared detention facility for each storm event with the available storage capacity of the facility. The static storage volume was calculated as the volume in the shared detention facility below the elevation of the lowest adjacent structure. The elevation of the lowest adjacent structure was determined to be 467.34 feet NAVD 88 using the 2014 LIDAR data and available aerial imagery.

It should be noted that a detailed detention analysis was not performed. Volume-based hydraulic analyses were performed only to approximate the static storage capacity of the shared detention facility for various maintenance conditions. The volume-based hydraulic analyses do not calculate specific water surface elevations when inflows exceed the static storage capacity of the basins or determine the timing of inflows using a hydrograph. Additionally, the analyses do not account for infiltration during the 6-hour storm event or reductions in static storage capacity due to vegetation.

Volume-based hydraulic analyses were performed for both the Current Vegetated Condition and the Maintained Condition – Sediment and Vegetation Removed. Separate analyses were not performed for the Ultimate Vegetated Condition and the Maintained Condition – Vegetation Only because the analyses do not account for changes in static storage volume due to vegetation. However, the static storage capacity for these conditions will be similar to that of the Current Vegetated Condition. In the Ultimate Vegetated Condition, the static storage capacity will be slightly lower due to increased vegetation density and in the Maintained Condition – Vegetation Only the static storage capacity will be slightly higher due to vegetation removal. Additionally, a model was not prepared for the As-Built Condition. In the As-Built Condition, the eastern bank of the shared detention facility is approximately 2 – 3 feet lower than the adjacent structures to the west. Therefore, when the volume of the shared detention facility is exceeded, excess runoff will overflow into the receiving channel to the east and not flood the higher adjacent properties to the west. Using the rating curves derived for the HEC-RAS model, the maximum height of water flowing over the eastern berm of the shared detention facility for the peak flows of the 100-year peak storm is approximately 467.10 feet NAVD 88. This is approximately 0.25 feet lower than adjacent structures to the west of the shared detention facility.

In the Current Vegetated Condition, the static storage volume of the shared detention facility was calculated using the 2014 LIDAR data. In the Maintained Condition – Sediment and Vegetation Removed, the surface obtained from the 2014 LIDAR data was modified to reflect the recommended maintenance condition

(Maintained Condition – Sediment and Vegetation Removed) using computer aided drafting and design (CADD) software. Specific details of the Maintained Condition – Sediment and Vegetation Removed are discussed in detail in following section.

Attachments 13 – 18 present the results of the hydraulic analyses. As-Builts for the channel were gathered and referenced, when applicable, for the various models created. Table 4 below lists the As-Builts utilized for Siempre Viva and Bristow Channels, which are included in Attachment 7.

Table 4

Plan Number	Reach	Description
22611-1, 8, 9, 12, 15, 17, 20, 22, 32, 33 - D	Reaches 1 – 3	"Britannia Commerce Center" – City of San Diego, As-built March 10, 1988
31066-7-D	Reach 1	Public Storm Drain Plan and Profile for Britannia Corporate Center

It is important to note the vertical datum of the As-Built drawings is the 1929 National Geodetic Vertical Datum (NGVD 29). Pursuant to the San Diego Regional Standard Drawing M-12, an adjustment of +2.17 feet has been applied to the As-Built elevations to convert them to NAVD 88.

The following provides general descriptions of hydraulic analyses/models that were prepared for this area of study. Note that the left and right channel bank designations refer to the downstream view.

Current Vegetated Condition:
The hydraulic analysis for the Current Vegetated Condition was created to reflect the current vegetation of the channel and determine the current channel capacity. A field visit was performed on December 15, 2016 to determine and evaluate the current Manning Roughness Coefficients, channel conditions, and channel properties within Siempre Viva and Bristow Channels. Based on the site visit, 2014 LIDAR data and As-Builts, the following factors for Siempre Viva and Bristow Channels were incorporated into the Current Vegetated Condition model.

Flow Based Hydraulic Analysis - Channels:

- Reach 1:
  A Manning Roughness Coefficient of 0.04 was used to represent portions of Bristow Channel with weeds and light brush. Areas of dense brush along the banks were represented using a Manning Roughness Coefficient of 0.06. Dense trees with submerged branches at the far upstream end of the reach as well as dense stands of willows and palm trees throughout the middle and downstream portion of the reach were modeled using a Manning Roughness Coefficient of 0.15. Concrete sidewalks and asphalt parking lots on either side of Bristow Channel were represented using a Manning Roughness Coefficient of 0.018.

- Reach 2:
  A Manning Roughness Coefficient of 0.04 was used to represent portions of the Bristow Channel with weeds and light brush. A Manning Roughness Coefficient of 0.035 was used to represent portions of the channel bottom that are un-vegetated or lined with short grasses. Concrete sidewalks and asphalt parking lots on either side of the channel were represented using a Manning Roughness Coefficient of 0.018.

- Reach 3:
  A Manning Roughness Coefficient of 0.035 was used to represent portions of the left bank of Siempre Viva Channel that are un-vegetated or lined with short grasses. A Manning Roughness Coefficient of 0.09 was used to represent dense reeds along the channel bottom and the lower portion of the right bank. Portions of the channel with dense willows were modeled using a Manning Roughness Coefficient of 0.15. A Manning Roughness Coefficient of 0.04 was used to represent areas of light

brush along the upper right bank and in the detention basin at the downstream end of Siempre Viva Channel. Asphalt parking lots on the north side of the channel were represented using a Manning Roughness Coefficient of 0.018.

The current condition rating curves were used to determine the HEC-RAS downstream boundary condition for this condition. Rating curves are included in Attachment 6. Relevant site photographs are included in Attachment 1.

Volume Based Hydraulic Analysis - Shared Detention Facility:
For the Current Vegetated Condition, the static storage capacity of the shared detention facility was determined using the 2014 LIDAR data and available aerial imagery. The static storage volume was calculated as the volume in the shared detention facility below the elevation of the lowest adjacent structure. The elevation of the lowest adjacent structure was determined to be 467.34 feet NAVD 88.

For the two pairs of culverts in Reach 2 of Bristow Channel, storage capacities were calculated using the culvert cross-sectional geometries listed in the Existing Conditions Section of this IHHA and the mean length and static storage depth for each pair of culverts. Using the 2014 LIDAR data, the average length of both pipes in the downstream pair of culverts was determined to be 130 feet. Similarly, the length of the upstream pair of culvert was determined to be 50 feet. The mean static storage depth was calculated using the static storage depths at the upstream and downstream end of each pair of culverts. The static storage depths at these four locations were calculated as the difference between the invert elevation of the detention facility and the flowline of the culverts determined using the 2014 LIDAR data. During the December 15, 2016 site visit, less than 3 inches of sediment was observed inside both pairs of culverts. Therefore, sediment accumulation inside the culverts was considered minimal and not included in the static storage calculations.

Ultimate Vegetated Condition:

The hydraulic analysis for the Ultimate Vegetated Condition was created to reflect the ultimate vegetation of the channel and determine the ultimate channel capacity. The Ultimate Vegetated Condition reflects dense vegetation throughout the entire channel reach, which assumes that in absence of maintenance, the vegetation that currently exists in the channel will become denser. This dense vegetation will reduce velocities. The slower velocities will cause sediment to drop out and ultimately cause deposition and vegetation throughout the channel reach. The vegetation will further decrease the capacity of the channel and potentially cause flooding to occur more frequently. The following factors were incorporated into the Ultimate Vegetation Condition model.

Flow Based Hydraulic Analysis - Channels:

A Manning Roughness Coefficient of 0.15 was used to represent the earthen bottom and side slopes of Siempre Viva and Bristow Channels in the ultimate vegetated condition. It is important to note that the Manning Roughness Coefficients were not adjusted for portion of the cross sections outside the limits of the channel. The current condition rating curves were used to determine the HEC-RAS downstream boundary condition for this condition. Rating curves are included in Attachment 6.

Volume Based Hydraulic Analysis - Shared Detention Facility:
A separate volume based analysis was not performed for the Ultimate Vegetated Condition. In the Ultimate Vegetated Condition, the static storage capacity of the shared detention facility will be slightly less than in the Current Vegetated Condition due to increased vegetation.

Maintained Condition-Vegetation Only (No sediment removed):
The hydraulic analysis for the Maintained-Vegetation Only Condition was created to reflect a maintained channel with vegetation removal only and determine the channel capacity. This Maintained condition-vegetation only (no sediment removed) assumes vegetation-only maintenance of the channel. This maintained condition models vegetation currently along the length of the channel to be trimmed to just above the sediment level.

Flow Based Hydraulic Analysis - Channels:
A Manning Roughness Coefficient of 0.035 was used to represent the earthen bottom and side slopes of Siempre Viva and Bristow Channels in the maintained condition-vegetation removal only. It is important to note that the Manning Roughness Coefficients were not adjusted for portion of the cross sections outside the limits of the channel. The current condition rating curves were used to determine the HEC-RAS downstream boundary condition for this condition. Rating curves are included in Attachment 6.

Volume Based Analysis - Shared Detention Facility:
A separate volume based analysis was not performed for the Maintained Condition – Vegetation Only. In the Maintained Condition – Vegetation Only, the static storage capacity of the shared detention facility will be slightly higher than in the Current Vegetated Condition due to the removal of vegetation.

Maintained Condition-Sediment and Vegetation removed:

In addition to the vegetation-only maintenance, a Maintained Condition was also prepared to model the removal of sediment and vegetation within the channels that has deposited over the years. Channel geometries were determined based on review of as-built information, 2014 Lidar topographic information and field reconnaissance. This maintained condition models no vegetation and no sediment deposition along the length of the channel. It is important to note that the Manning Roughness Coefficients were not adjusted for portions of the cross sections outside the limits of the channel. This condition models the eastern bank of the shared detention facility using the bank height observed during the December 15, 2016 site visit.

Flow Based Hydraulic Analysis - Channels:

- Reach 1:
  A Manning Roughness Coefficient of 0.03 was used to reflect earthen channel bottoms and side slopes with no vegetation.

  Pursuant to the Britannia Commerce Center As-Built Plan 22611-33-D, prepared by RICK Engineering, dated March 10, 1988, the finish surface of the detention basin at the downstream end of Reach 1 was determined to be 460.77 feet NAVD 88. Britannia Commerce Center As-Built Plan 22611-15-D shows that Reach 1 of Bristow Channel has a slope ranging from 0.0020 ft/ft to 0.0022 ft/ft. Pursuant to As-Built Plan 22611-12-D, prepared by RICK Engineering, dated March 10, 1988, the upper portion of Reach 1 (HEC-RAS Cross Sections 72.6711 to 174.4880) has a trapezoidal cross section with a base width of 4 feet and has 2H:1V side slopes that are 6 feet deep. Pursuant to Britannia Commerce Center As-Built Plan 22611-15-D, the lower portion of Reach 1 (HEC-RAS Cross-Sections 174.4880 to 735.8522) has a trapezoidal cross section with a base width of 8 feet and has 2H:1V side slopes with a depth of 5 feet. Along the eastern banks, where the side slopes are deeper than 5 feet in the current condition, a 2H:1V side slope was extended to match the existing grade.

- Reach 2:
  A Manning Roughness Coefficient of 0.03 was used to reflect earthen channel bottoms and side slopes with no vegetation.

  Pursuant to the Britannia Commerce Center As-Built Plan 22611-20-D prepared by RICK Engineering, dated March 10, 1988, the 6-foot wide by 3-foot high RCB at the upstream end of Reach 2 has an invert elevation of 464.67 feet NAVD 88. Britannia Commerce Center As-Built Plans 22611-15-D and 22611-20-D indicate that Reach 2 of Bristow Channel has a slope ranging from 0.0020 to 0.0038 ft/ft. Pursuant to the Britannia Commerce Center As-Built Plan 22611-12-D, prepared by RICK Engineering, dated March 10, 1988, Bristow Channel has a trapezoidal cross section with a base width of 4 feet and 2H:1V side slopes with a depth of 6 feet. This geometry was applied to all HEC-RAS Cross-Sections in Reach 2 except for cross sections containing transition structures upstream and downstream of the two pairs of culverts (HEC-RAS Cross Sections 735.8522, 877.6657, 1112.5730, 1170.5770). Here, channel cross sections were determined using the 2014 LIDAR data and measurements taken during the December 15, 2016 site visit.

- Reach 3:
  A Manning Roughness Coefficient of 0.03 was used to reflect earthen channel bottoms and side slopes with no vegetation.

  Pursuant to the Britannia Commerce Center As-Built Plan 22611-33-D, prepared by RICK Engineering and March 10, 1988, the finish surface of the detention basin at the downstream end of Reach 3 was determined to be 461.27 feet NAVD 88. Britannia Commerce Center As-Built Plans 22611-15-D, dated 22611-20-D indicates that Reach 3 has a slope ranging from 0.0020 to 0.0022 ft/ft. Pursuant to As-Built Plan 22611-12-D, prepared by RICK Engineering and March 10, 1988, Bristow Channel has a trapezoidal cross section with a base width of 4 feet and 2H:1V sides slopes with a depth of 5 feet. Along the eastern banks, where the side slopes are deeper than 5 feet in the current condition, a 2H:1V side slope was extended to match the existing grade.

The current condition rating curves were used to determine the HEC-RAS downstream boundary condition for this condition. Rating curves are included in Attachment 6.

Volume Based Hydraulic Analysis - Shared Detention Facility:
For the Maintained Condition – Sediment and Vegetation Removed, the static storage capacity of the shared detention facility was determined by modifying the 2014 LIDAR data using computer aided drafting and design (CADD) software. The LIDAR data was modified to reflect the maintenance activities listed above in the flow based analysis section. The thalwag of the channel in the Current Vegetated Condition was assumed to be the centerline of the channel. The static storage volume was calculated as the volume in the shared detention facility below the elevation of the lowest adjacent structure. The elevation of the lowest adjacent structure was determined to be 467.34 feet NAVD 88 using the 2014 LIDAR data and available aerial imagery.

For the two pairs of culverts in Reach 2, storage capacities were calculated using the culvert cross-sectional geometries listed in the Existing Conditions Section of this IHHA and the mean length and static storage depth for each pair of culverts. Using the 2014 LIDAR data, the average length of both pipes in the downstream pair of culverts was determined to be 130 feet. Similarly, the length of the upstream pair of culvert was determined to be 50 feet. The mean static storage depth was calculated using the static storage depths at the upstream and downstream end of each pair of culverts. The static storage depths at these four locations were calculated as the difference between the invert elevation of the detention facility and the flowline of the culverts determined using the 2014 LIDAR data. During the December 15, 2016 site visit, less than 3 inches of sediment was observed inside both pairs of culverts. Therefore, sediment accumulation inside the culverts was considered minimal and not included in the static storage calculations.

As-Built Channel Condition

A fifth channel condition was modeled in which all portions of Siempre Viva and Bristow channels, including the eastern banks, are returned to the As-Built condition. All Manning Roughness Coefficients, flow lines, slopes, and channel cross sections used in the Maintained Condition – Sediment and Vegetation Removed model were applied to this condition. Additionally, the eastern bank of the shared detention facility at the downstream end of Siempre Viva and Bristow Channels was returned to its As-Built elevation pursuant to the Britannia Commerce Center As-Built Plan As-Built Plan 22611-15-D, prepared by RICK Engineering, dated March 10, 1988.

Reach 1:
Pursuant to the Britannia Commerce Center As-Built Plan 22611-15-D, prepared by RICK Engineering and March 10, 1988, the as-built elevation of the east bank of the shared detention facility at the downstream end of Reach 1 is 466.27 feet NAVD 88, approximately 3.5 feet lower than existing bank at this location. At HEC-RAS Cross Section 174.4880, the as-built elevation of the eastern bank is 466.87 feet NAVD 88. All other Manning Roughness Coefficients, slopes, and channel geometries are the same as in the Maintained Condition – Sediment and Vegetation Removed model.

Reach 2:
All Manning Roughness Coefficients, slopes, and channel geometries are the same and as in the Maintained Condition – Sediment and Vegetation Removed model.

Reach 3:
Pursuant to the Britannia Commerce Center As-Built Plan 22611-15-D, prepared by RICK Engineering and March 10, 1988, the as-built elevation of the east bank of the shared detention facility at the downstream end of Reach 3 is 466.27 feet NAVD 88, approximately 3 feet lower than the existing bank at this location. As-built elevations were not available for the eastern bank further south of the shared detention basin. Therefore, extending south from the shared detention facility, the elevation of the eastern bank was assumed to increase at the same 0.0040 ft/ft slope as the flow line of the channel. All other Manning Roughness Coefficients, slopes, and channel geometries are the same and as in the Maintained Condition – Sediment and Vegetation Removed model.

The as-built condition rating curves were used to determine the HEC-RAS downstream boundary condition for this condition. Rating curves are included in Attachment 6.

MAINTENANCE IMPACTS

Hydraulics Results (Describe capacity of channel for each condition):
Based on the hydrologic and hydraulic assessment for this area of study, sediment and vegetation removal is proposed for all reaches of Siempre Viva and Bristow Channels.

The results of the hydraulic analyses are described below in more detail. Tables 5 – 11 summarize the channel capacity, storm event, and approximate 6-hour precipitation data for each maintenance condition. Table 12 compares the capacity and water surface elevations for all proposed maintenance conditions. It is important to note that Tables 4 – 10 only summarize channel capacity, storm event frequency, and 6-hour precipitation depths with respect to the six storm events analyzed as part of this IHHA. Maintenance may decrease water surface elevations without increasing the capacity of a reach to the next storm frequency analyzed as part of this IHHA. Additionally, the approximate 6-hour precipitation data for the channel was calculated by linear interpolation between 6-hour precipitation data from the 2003 San Diego County Hydrology Manual and approximate flow rates.

Current Vegetated Condition:

Table 5

Current Vegetated Condition Capacity – Flow Based			
Reach	**Approximate Flow Rate (cfs)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Reach 1 (Bristow)	5	Less than 2-Year	0.1
Reach 2 (Bristow)	137.2	25-Year	1.7
Reach 3 (Siempre Viva)	10	Less than 2-Year	0.2

Table 6

Current Vegetated Condition Capacity – Volume Based			
Channel/Basin	**Approximate Static Storage Capacity (ft^3)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Bristow	57,000	Less than 2-Year	0.29
Siempre Viva	38,000	Less than 2-Year	0.32

The hydraulic model determined that, based on the vegetation and sediment conditions observed during the December 15, 2016 site visit, Siempre Viva and Bristow Channels will have less than a 2-year event capacity. Reach 2 of Bristow Channel has a 25-year event capacity.

Ultimate Vegetated Condition:

Table 7

Ultimate Vegetated Condition Capacity – Flow Based			
Reach	**Approximate Flow Rate (cfs)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Reach 1 (Bristow)	5	Less than 2-Year	0.1
Reach 2 (Bristow)	35	Less Than 2-Year	0.5
Reach 3 (Siempre Viva)	10	Less than 2-Year	0.2

The hydraulic model determined that in the Ultimate Vegetated Condition all reaches of Siempre Viva and Bristow Channels will have less than a 2-year event capacity.

Note: A volume-based hydraulic analysis was not performed for the Ultimate Vegetated Condition. The static storage capacity of both channels will be slightly less than their static storage capacities in the Current Vegetated Condition due to the establishment of additional vegetation.

Maintained Condition-Vegetation Only (No sediment removed):

Table 8

Maintained Condition – Vegetation Only Capacity – Flow Based			
Reach	**Approximate Flow Rate (cfs)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Reach 1 (Bristow)	5	Less than 2-Year	0.1
Reach 2 (Bristow)	137.2	25-Year	1.7
Reach 3 (Siempre Viva)	10	Less than 2-Year	0.2

Based on the flow-based hydraulic analysis, vegetation removal will not increase the capacity of Reaches 1 and 2 of Bristow Channel or of Siempre Viva Channel (Reach 3).

Note: A volume-based hydraulic analysis was not performed for the Maintained Condition – Vegetation Only. The static storage capacity of both channels will be slightly higher than their static storage capacities in the Current Vegetated Condition due to the removal of vegetation.

Maintained Condition-Sediment and Vegetation removed:

Table 9

Maintained Condition – Sediment and Vegetation Removed Capacity – Flow Based			
Reach	**Approximate Flow Rate (cfs)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Reach 1 (Bristow)	5	Less than 2-Year	0.1
Reach 2 (Bristow)	137.2	25-Year	1.7
Reach 3 (Siempre Viva)	10	Less than 2-Year	0.2

Table 10

Maintained Condition – Sediment and Vegetation Removed Capacity – Volume Based			
Channel/Basin	**Approximate Static Storage Capacity (ft^3)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
North (Bristow)	100,000	Less than 2-Year	0.52
South (Siempre Viva)	59,000	Less than 2-Year	0.50

Based on the flow-based hydraulic analysis, sediment and vegetation removal will not increase the capacity of Reach 2 of Bristow Channel from its current 25-year storm event capacity; however, vegetation and sediment removal will decrease the water surface elevation by approximately 0.5 feet for the 100-year storm event, thus decreasing the overall limits of flooding. Based on the volume-based hydraulic analysis, in the Maintained Condition – Sediment and Vegetation Removed, both basins will have less than a 2-year capacity. However it is important to note that sediment and vegetation removal will increase the static storage volume of detention basin at the downstream end of Bristow Channel by approximately 76 percent and the static storage volume of the detention basin at the downstream end of Siempre Viva Channel by approximately 57 percent.

As-Built Condition:

Table 11

As-Built Condition Capacity – Flow Based			
Reach	**Approximate Flow Rate (cfs)**	**Storm Event (years)**	**Approximate 6-Hour Precipitation (inches)**
Reach 1 (Bristow)	176.4	100-Year	2.3
Reach 2 (Bristow)	176.4	100-Year	2.3
Reach 3 (Siempre Viva)	104.7	100-Year	2.3

Sediment and vegetation removal in addition to returning the eastern bank of the detention to its as-built condition will increase the capacity of Reach 1 of Bristow Channel and of Siempre Viva Channel (Reach 3) from less than a 2-year event to a 100-year event. This maintenance will increase the capacity of Reach 2 of Bristow Channel from a 25-year event to a 100-year event.

Note: A volume-based hydraulic analysis was not performed for the As-Built Condition. In the As-Built Condition, the eastern bank of the detention basins is approximately 2 – 3 feet lower than the adjacent structures to the west. Therefore, when the volume of the shared detention facility is exceeded, excess runoff will overflow into the receiving channel to the east and not impact the higher adjacent properties to the west. Using the rating curves derived for the HEC-RAS model, the maximum height of water flowing over the eastern berm of the shared detention facility for the peak flows of the 100-year peak storm is 467.10 feet NAVD 88, approximately 0.25 feet lower than the lowest adjacent structure.

Table 12 - Siempre Viva and Bristow Channel Capacity and 100-year Flow Rate Water Surface Elevation

Reach	River Sta	Current Condition Storm Event	Current Condition Capacity	Current Condition 100-year WSEL	Ultimate Vegetated Condition Storm Event	Ultimate Vegetated Condition Capacity	Ultimate Vegetated Condition 100-year WSEL	Maintained Condition - Vegetation Removed Storm Event	Maintained Condition - Vegetation Removed Capacity	Maintained Condition - Vegetation Removed 100-year WSEL	Maintenance Condition - Sediment and Vegetation Removed Storm Event	Maintenance Condition - Sediment and Vegetation Removed Capacity	Maintenance Condition - Sediment and Vegetation Removed 100-year WSEL	As-Built condition Storm Event	As-Built Condition Capacity	As-Built Condition 100-year WSEL	Recommended Maintenance Condition - Sediment and Vegetation Removed vs. Current Condition WSEL	As Built Condition vs. Current Condition WSEL
		(year)	(cfs)	(feet)	(year)	(cfs)	(feet)	(year)	(cfs)	(feet)	(year)	(cfs)	(feet)	(year)	(cfs)	(feet)	(feet)	(feet)
Bristow Channel - Reach 1	72.6711	10	63.7	468.45	5	92.0	468.45	10	107.4	468.45	10	107.4	468.45	100	176.4	467.23	0.00	-1.22
Bristow Channel - Reach 1	174.468	<2	45.0	468.56	<2	45.0	468.63	2	69.0	468.47	2	69.0	468.46	100	176.4	467.25	-0.10	-1.31
Bristow Channel - Reach 1	301.943	<2	40.0	468.71	<2	45.0	468.81	<2	45.0	468.48	25	130.4	468.46	100	176.4	467.23	-0.25	-1.48
Bristow Channel - Reach 1	427.219	<2	5.0	468.82	<2	5.0	468.93	<2	10.0	468.58	<2	15.0	468.48	100	176.4	467.28	-0.34	-1.54
Bristow Channel - Reach 1	539.494	10	107.4	468.92	2	69.0	469.02	100	176.4	468.57	100	176.4	468.48	100	176.4	467.33	-0.44	-1.59
Bristow Channel - Reach 1	639.507	100	176.4	469.1	2	69.0	469.57	100	176.4	468.73	100	176.4	468.5	100	176.4	467.4	-0.60	-1.70
Bristow Channel - Reach 1	735.852	2	69.0	469.31	<2	40.0	469.74	10	107.4	468.79	100	176.4	468.52	100	176.4	467.47	-0.79	-1.84
Bristow Channel - Reach 2	877.666	100	176.4	469.34	2	69.0	469.74	100	176.4	468.96	100	176.4	468.69	100	176.4	467.64	-0.65	-1.70
Bristow Channel - Reach 2	1012.570	100	176.4	469.21	100	176.4	469.69	100	176.4	468.56	100	176.4	468.75	100	176.4	467.78	-0.46	-1.43
Bristow Channel - Reach 2	1112.573	100	176.4	469.8	100	176.4	470.91	100	176.4	469.66	100	176.4	468.82	100	176.4	468	-0.98	-1.80
Bristow Channel - Reach 2	1170.577	100	176.4	470.04	2	69.0	471.14	100	176.4	469.89	100	176.4	469.02	100	176.4	468.27	-1.02	-1.77
Bristow Channel - Reach 2	1270.580	50	153.4	469.69	5	92.0	471.67	100	176.4	469.46	100	176.4	469.04	100	176.4	468.29	-0.65	-1.40
Bristow Channel - Reach 2	1370.583	25	130.4	471.2	<2	50.0	473.08	25	130.4	471.18	100	176.4	469.14	100	176.4	468.52	-2.06	-2.68
Bristow Channel - Reach 2	1459.614	100	176.4	471.7	<2	35.0	473.45	100	176.4	471.65	100	176.4	469.19	100	176.4	468.65	-2.51	-3.05
Siempre Viva Channel - Reach 3	4.867	100	104.7	468.45	100	104.7	468.57	100	104.7	468.45	100	104.7	468.45	100	104.7	467.23	0.00	-1.22
Siempre Viva Channel - Reach 3	54.279	100	104.7	468.45	100	104.7	469.13	100	104.7	468.49	100	104.7	468.46	100	104.7	467.23	0.01	-1.22
Siempre Viva Channel - Reach 3	222.046	100	104.7	468.57	100	104.7	469.2	100	104.7	468.52	100	104.7	468.47	100	104.7	467.24	-0.10	-1.33
Siempre Viva Channel - Reach 3	322.050	<2	10.0	468.72	<2	10.0	469.24	<2	10.0	468.54	<2	10.0	468.47	100	104.7	467.25	-0.25	-1.47
Siempre Viva Channel - Reach 3	422.053	2	41.0	468.76	<2	40.0	469.35	10	63.7	468.59	10	63.7	468.48	100	104.7	467.28	-0.28	-1.48
Siempre Viva Channel - Reach 3	522.057	5	54.6	468.86	<2	35.0	469.42	<2	30.0	468.66	50	91.0	468.5	100	104.7	467.32	-0.36	-1.54
Siempre Viva Channel - Reach 3	622.600	<2	30.0	469.04	<2	20.0	469.51	<2	20.0	468.73	<2	20.0	468.52	100	104.7	467.37	-0.52	-1.67
Siempre Viva Channel - Reach 3	727.944	<2	20.0	469.17	<2	10.0	469.52	<2	15.0	468.81	<2	10.0	468.56	100	104.7	467.47	-0.61	-1.70
Siempre Viva Channel - Reach 3	770.779	<2	30.0	469.2	<2	15.0	469.52	<2	25.0	468.81	<2	20.0	468.56	100	104.7	467.51	-0.64	-1.69
Siempre Viva Channel - Reach 3	802.548	<2	40.0	469.2	<2	20.0	469.53	2	41.0	468.82	10	63.7	468.57	100	104.7	467.55	-0.63	-1.65
Siempre Viva Channel - Reach 3	901.749	100	104.7	469.22	100	104.7	470.28	100	104.7	468.92	100	104.7	468.62	100	104.7	467.73	-0.60	-1.49
Siempre Viva Channel - Reach 3	1011.238	100	104.7	469.48	10	63.7	470.71	100	104.7	469.17	100	104.7	468.73	100	104.7	467.92	-0.75	-1.56
Siempre Viva Channel - Reach 3	1111.238	100	104.7	469.89	2	41.0	471.01	100	104.7	469.49	100	104.7	468.89	100	104.7	468.25	-1.00	-1.64
Siempre Viva Channel - Reach 3	1211.239	50	91.0	470.29	2	41.0	471.36	100	104.7	469.76	100	104.7	469.21	100	104.7	468.59	-1.08	-1.70
Siempre Viva Channel - Reach 3	1311.239	100	104.7	470.64	100	104.7	471.36	100	104.7	469.76	100	104.7	469.21	100	104.7	469.07	-1.43	-1.57

Notes:
If the water surface elevation (WSEL), at the specified HEC-RAS Cross Section, is negative "-" then the WSE of the specified condition is lower than the WSE of the Current condition.
If the water surface elevation (WSEL), at the specified HEC-RAS Cross Section, is positive "+" then the WSE of the specified condition is higher than the WSE of the Current condition.

Legend:

"WSEL"	Water Surface Elevation
"ft"	feet

Areas within channel that can be avoided (this section can be completed upon completion of Individual Biological Assessment Form):

The Individual Biological Assessment (IBA) (HELIX 2017) identified the following vegetation communities present within the Siempre Viva and Bristow Channels Map #126/127 maintenance boundary is composed of ornamental, disturbed land, developed land, and artificially created wetland communities. These artificially created wetland communities are composed of riparian woodland dominated by mature arroyo and black willow trees, southern willow scrub dominated by smaller willow trees, freshwater marsh dominated by California bulrush, cattail, bristly ox-tongue, and fennel, and disturbed wetland dominated by curly dock and tamarisk. No sensitive plant species were observed or detected, nor is there likely potential for sensitive plant species to occur within or adjacent to the channel. The IBA concluded that the artificial wetland areas need not avoided. However, it is recommended mature native riparian trees with a diameter at breast height [dbh] greater than 3 inches be retained to the extent feasible. Mature native riparian trees located within Reaches 1, 2 and 3 are infeasible to avoid without reducing hydraulic capacity; thus the proposed maintenance to increase hydraulic capacity is still recommended.

Would the velocity of storm water during a "bank-full" storm event exceed the velocities identified for unlined channels per Table 1-104.104 of the City's Design Manual? If so, describe the appropriate form of erosion control (e.g., check dam or comparable mechanism).

No. For the recommended channel maintenance condition, the channel velocities modeled for the 2-, 5-, 10-, 25, 50- and 100-year storm events of both Siempre Viva and Bristow Channels are less than the permissible velocities listed in Table 1-104.10A of the 1984 City of San Diego Drainage Design Manual.

MITIGATION

Conclusion/Recommendations (Describe the limits of recommended maintenance, degree to which native vegetation within the facility can be retained, and capacity of maintained channel):

The Program Environmental Impact Report (PEIR) for the Master Maintenance Program lists 4 alternatives that would help reduce the need for regular channel maintenance. The alternatives are listed below, followed by a response applicable to the Siempre Viva and Bristow Channels. Responses are based solely on the hydrologic and hydraulic analyses completed in this IHHA, additional studies may be necessary to fully assess the feasibility of these alternatives.

Raising the channel banks and constructing walls or berms along the top of the channels:

The tops of the banks of Siempre Viva and Bristow Channels extend to the edge of the existing drainage easement. Parking lots and other private structures are immediately adjacent to the tops of the banks. Construction of walls or berms along the channel would encroach on private property and could raise water surface elevations causing additional flooding potential and negative impacts to upstream properties. Additionally, the eastern bank is the overflow structure for the shared detention facility at the downstream of the channels. Raising the eastern banks will only increase the water surface elevation associated with each storm event.

Diverting storm water in pipes around constrained segments:

The capacity of Siempre Viva and Bristow Channels is limited by the tailwater condition formed by the water surface elevations in the detention basins. Diverting storm water around constrained sections of the channel will not reduce the extent of flooding due to downstream control of the water surface elevation.

Widening the channels to accommodate vegetation:

The tops of the banks of Siempre Viva and Bristow Channels extend to the edge of the existing drainage easement. Parking lots and other private structures are immediately adjacent to the tops of the banks. Widening these channels would encroach on private property.

Reducing off-site runoff generation through use of low impact development measures:

Low impact development measures are based on the 85th percentile flow and would not impact the flood flow rates in the channel.

Conclusion/Recommendation:

Several hydraulic models were created to determine the limits of maintenance. It is important to note that the limits of flooding are controlled by the water surface elevation in the shared detention facility at the downstream ends of Siempre Viva and Bristow Channels. Without returning the eastern bank of the shared detention facility to its as-built condition, maintenance will not resolve all of the flooding issues in Siempre Viva and Bristow Channels. However, it is also important to note that sediment and vegetation removal will significantly increase the static storage volume of the shared detention facility, potentially reducing the limits of flooding associated with each storm event. Therefore sediment and vegetation removal is recommended as follows:

Bristow Channel

- Reach 1 (HEC-RAS Cross Sections 72.6711 to 735.8522) – Sediment and vegetation removal is proposed for all portions of Reach 1. Maintenance will increase the static storage capacity of the detention basin at the downstream end of Bristow Channel from 57,000 ft^3 to 100,000 ft^3 (approximately a 76 percent increase) decreasing the overall limits of flooding.
- Reach 2 (HEC-RAS Cross Sections 735.8522 to 1459.6140) – Sediment and vegetation removal is proposed for all portions of Reach 2. Vegetation and sediment removal will not increase the capacity of the channel; however, the channels water surface elevation will decrease approximately 0.5 feet for the 100-year storm event thus decreasing the overall flooding limits.

Siempre Viva Channel

- Reach 3 (HEC-RAS Cross Sections 4.8674 to 1311.2390) – Sediment and vegetation removal is proposed for all portions of Reach 3. Maintenance will increase the static storage capacity of the detention basin at the downstream end of Siempre Viva Channel from 37,000 ft^3 to 59,000 ft^3 (approximately a 57 percent increase), decreasing the overall limits of flooding.

Please see Attachment 16 for the Maintained Condition – Sediment and Vegetation Removed HEC-RAS Analysis and Attachment 18 for the Maintained Condition – Sediment and Vegetation Removed storage volume analysis.

ADDITIONAL COMMENTS OR RECOMMENDATIONS

Additional Comments:

It should be noted that the maximum velocities modeled for all maintenance conditions analyzed as part of this IHHA (Vegetation Only, Vegetation and Sediment Removed, and As-Built) are lower than the permissible velocities listed in Table 1.104.10A of the 1984 City of San Diego Drainage Design Manual.

LIST OF ATTACHMENTS:

- ☑ Attachment 1 - Site Photos
- ☑ Attachment 2 – Vicinity Map
- ☑ Attachment 3 – Hydraulic Workmap
- ☑ Attachment 4 – Photo Location Map
- ☑ Attachment 5 – Hydrologic Support Material
- ☑ Attachment 6 – Calculations for HEC-RAS Downstream Boundary Condition
- ☑ Attachment 7 – As-Built Plans
- ☑ Attachment 8 – FEMA Firmette and FEMA FIS
- ☑ Attachment 9 – HEC-RAS Hydraulic Profiles for Current Vegetated Condition Model
- ☑ Attachment 10 – HEC-RAS Hydraulic Profiles for Ultimate Vegetated Condition Model
- ☑ Attachment 11 – HEC-RAS Hydraulic Profiles for Maintained Condition Model – Vegetation Only (No Sediment Removed)
- ☑ Attachment 12 – HEC-RAS Hydraulic Profiles for Maintained Condition Model – Sediment and Vegetation Removed
- ☑ Attachment 13 - Detailed HEC-RAS Hydraulic Results for Current Vegetated Condition Model
- ☑ Attachment 14 - Detailed HEC-RAS Hydraulic Results for Ultimate Vegetated Condition Model
- ☑ Attachment 15 - Detailed HEC-RAS Hydraulic Results for Maintained Condition Model – Vegetation Only (No Sediment Removed)
- ☑ Attachment 16 – Detailed HEC-RAS Hydraulic Results for Maintained Condition Model – Sediment and Vegetation Only
- ☑ Attachment 17 – HEC RAS Hydraulic Profiles and Detailed Hydraulic Results for As-Built Condition
- ☑ Attachment 18 – Storage Volume Calculations and Support Material

Attachment 1 - SITE PHOTOS:

1. Detention basin at the downstream end of Reach 1 (Bristow Channel) viewing northwest.



2. 24-inch CMP riser at the downstream end of Reach 1 (Bristow Channel) viewing north (upstream) towards downstream end of dense vegetation.



3. Reach 1 (Bristow Channel) viewing east towards upstream end of dense vegetation.



4. Reach 1 (Bristow Channel) viewing west towards dense vegetation at the outfall of the downstream pair of culverts.



5. Viewing west towards the inlet of the downstream pair of culverts (Reach 2 – Bristow Channel).



6. Reach 2 viewing west from immediately upstream of the downstream pair of culverts (Reach 2 – Bristow Channel).



7. Reach 2 (Bristow Channel) viewing east between the two pairs of culverts



8. Reach 2 viewing west towards the outfall of the upstream pair of culverts (Bristow Channel)



9. Reach 2 viewing east towards the inlet of the upstream pair of culverts (Bristow Channel)



10. Reach 2 (Bristow Channel) viewing west towards light vegetation established on the channel bottom in the upper portion of the Reach



11. Reach 2 (Bristow Channel) looking east at light vegetation established at the upper end of the reach



12. Reach 2 (Bristow Channel) viewing west towards the 6-foot wide by 3-foot high RCB at the upstream end of the reach.



13. Reach 3 (Siempre Viva Channel) viewing east towards the upstream end of the reach.



14. Dense vegetation located at the outfall of the 18-inch RCP at the upper end of Reach 3 (Siempre Viva Channel).



15. Reach 3 (Siempre Viva Channel) viewing east along a typical section of vegetated channel.



16. Damage to catch basin along the northern bank of Reach 3 (Siempre Viva Channel).



17. Downstream portion of Reach 3 (Siempre Viva Channel) viewing north towards a typical section of dense willows.



18. Middle portion of Reach 3 (Siempre Viva Channel) viewing north towards the lightly vegetated section in the middle of the reach.



19. Middle portion of Reach 3 (Siempre Viva Channel) viewing north towards northern portion of willows along the channel bottom



20. Downstream end of reach 3 (Siempre Viva Channel) viewing north towards the upstream portion of the southern detention basin



21. Downstream portion of Reach 3 (Siempre Viva Channel) viewing south towards the shared detention facility.



22. 18-inch RCP connecting the two detentions basins in the shared detention facility.



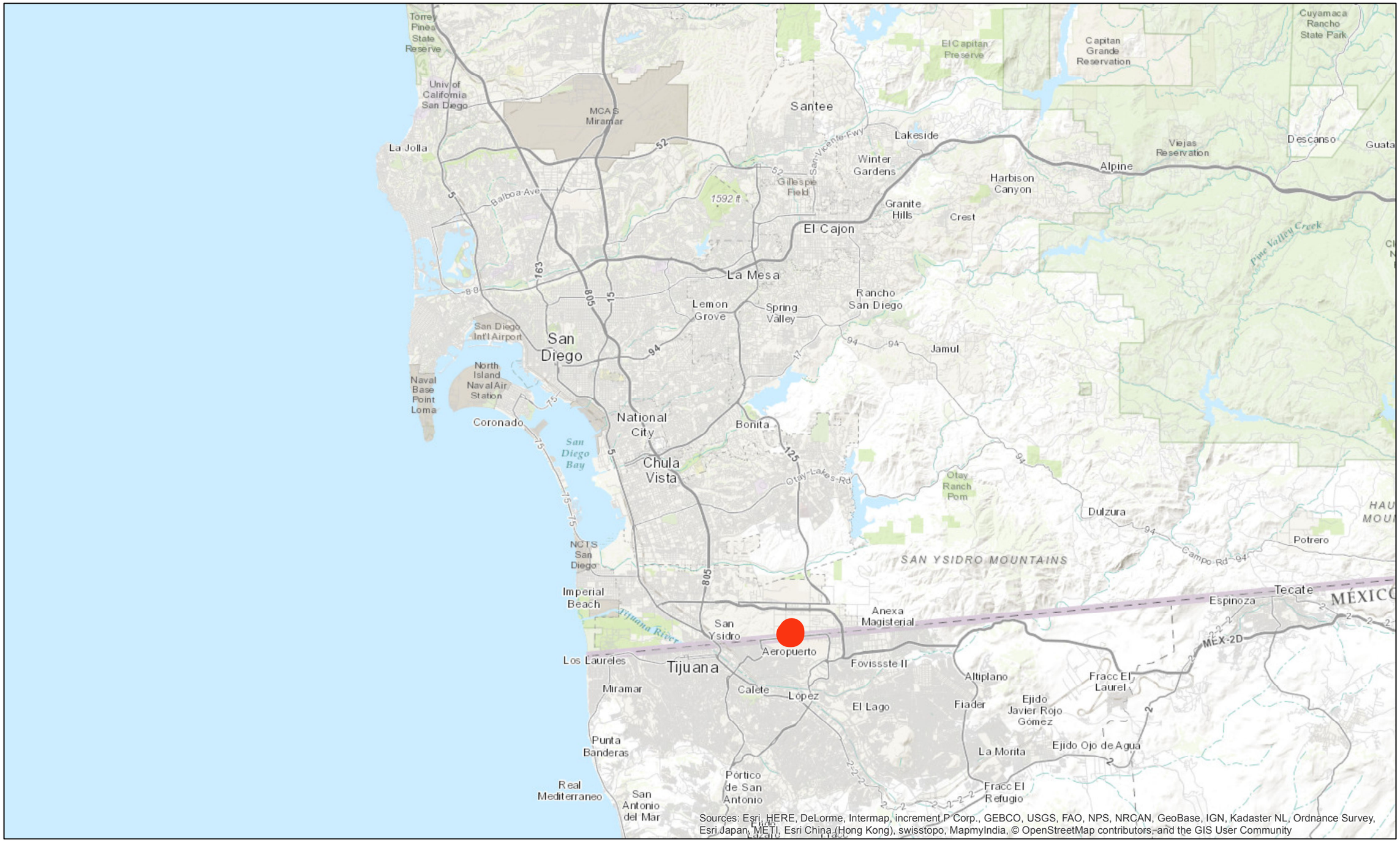
23. 2-foot deep by 4-foot wide gap in the eastern bank of the shared detention facility.



24. Viewing inside the private wet well in the shared detention facility.



Attachment 2 - VICINITY MAP



W:\17204-L_TO#39_JHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\GIS\17204-L_Siempre_LocationMap.mxd

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0 5 10

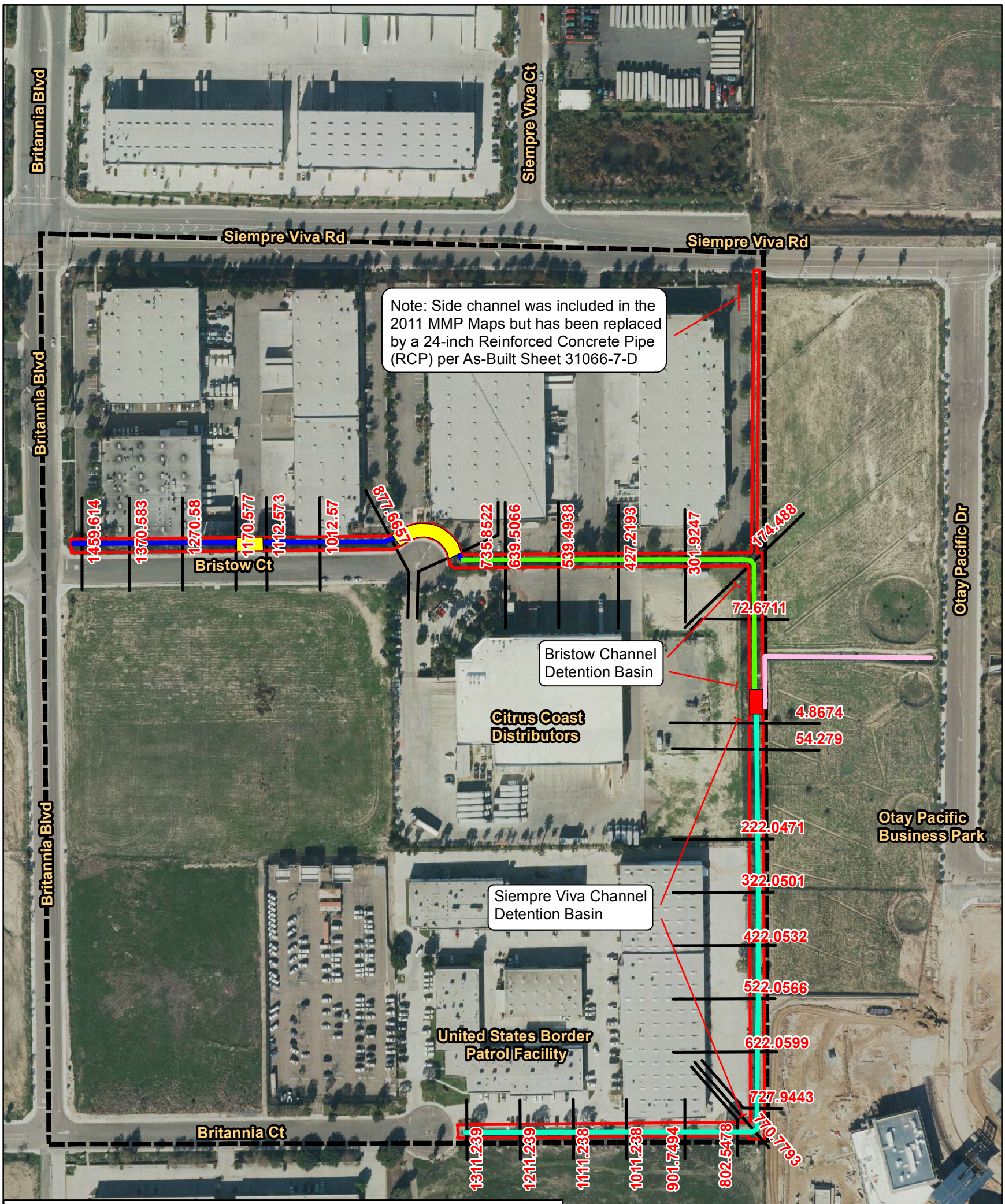
Date of Exhibit: 3/14/2017
DigitalGlobe Aerial Image: 04.2013

Siempre Viva and Bristow Channels

MMP Map Numbers 126 & 127 - Vicinity Map

J-17204-L

Attachment 3 - HYDRAULIC WORKMAP



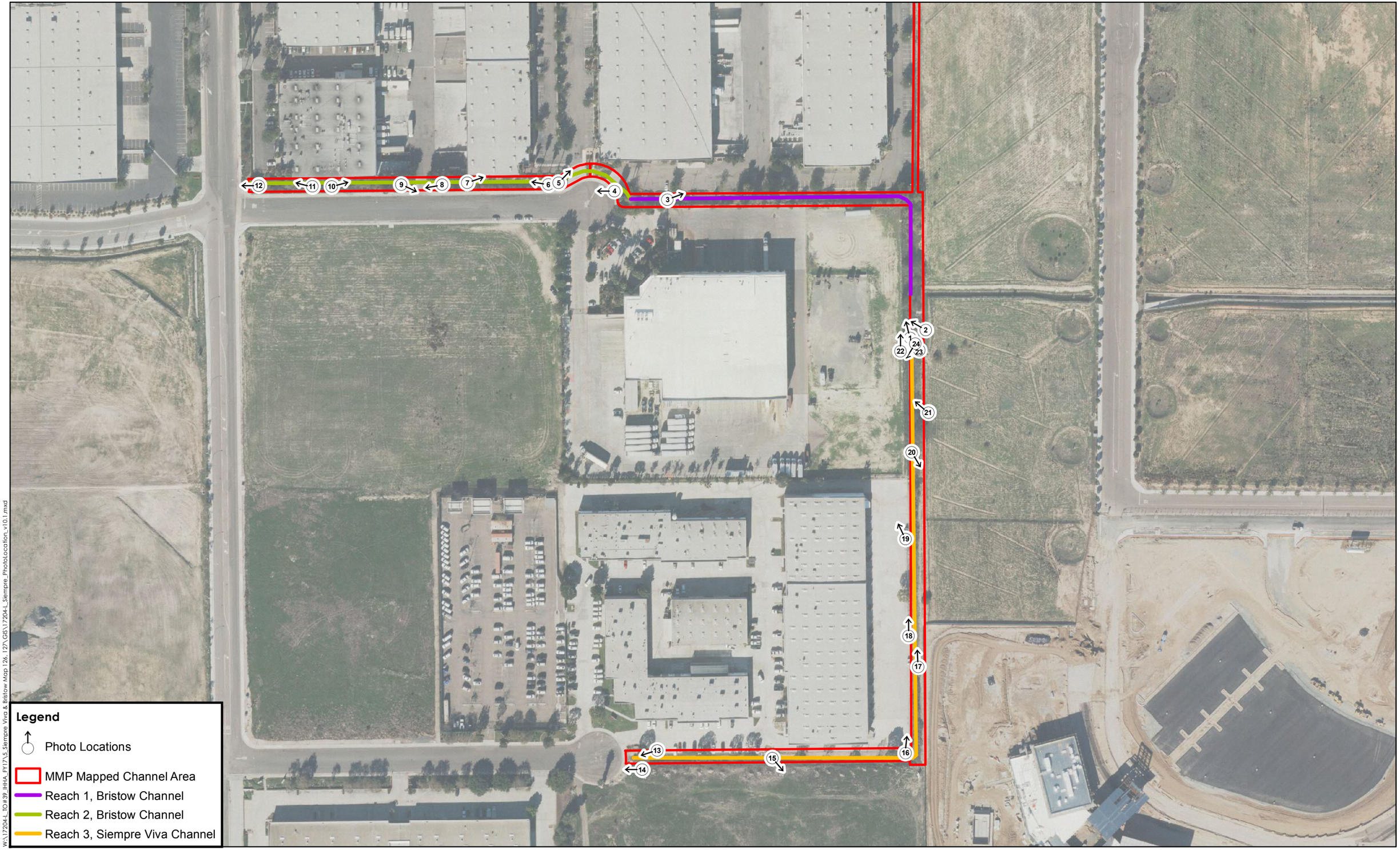
Siempre Viva and Bristow Channels

MMP Map Numbers 126 & 127 - Hydraulic Workmap

J-17204-L

Date of Exhibit: 4/25/2017
DigitalGlobe Aerial Image: 04.2013

Attachment 4 - PHOTO LOCATION MAP



W:\17204-L_TO#39_IIHA_FY17\5_Siempre Viva & Bristow Map 126, 127\GIS\17204-L_Siempre_PhotoLocation_v10.1.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 150 300
North

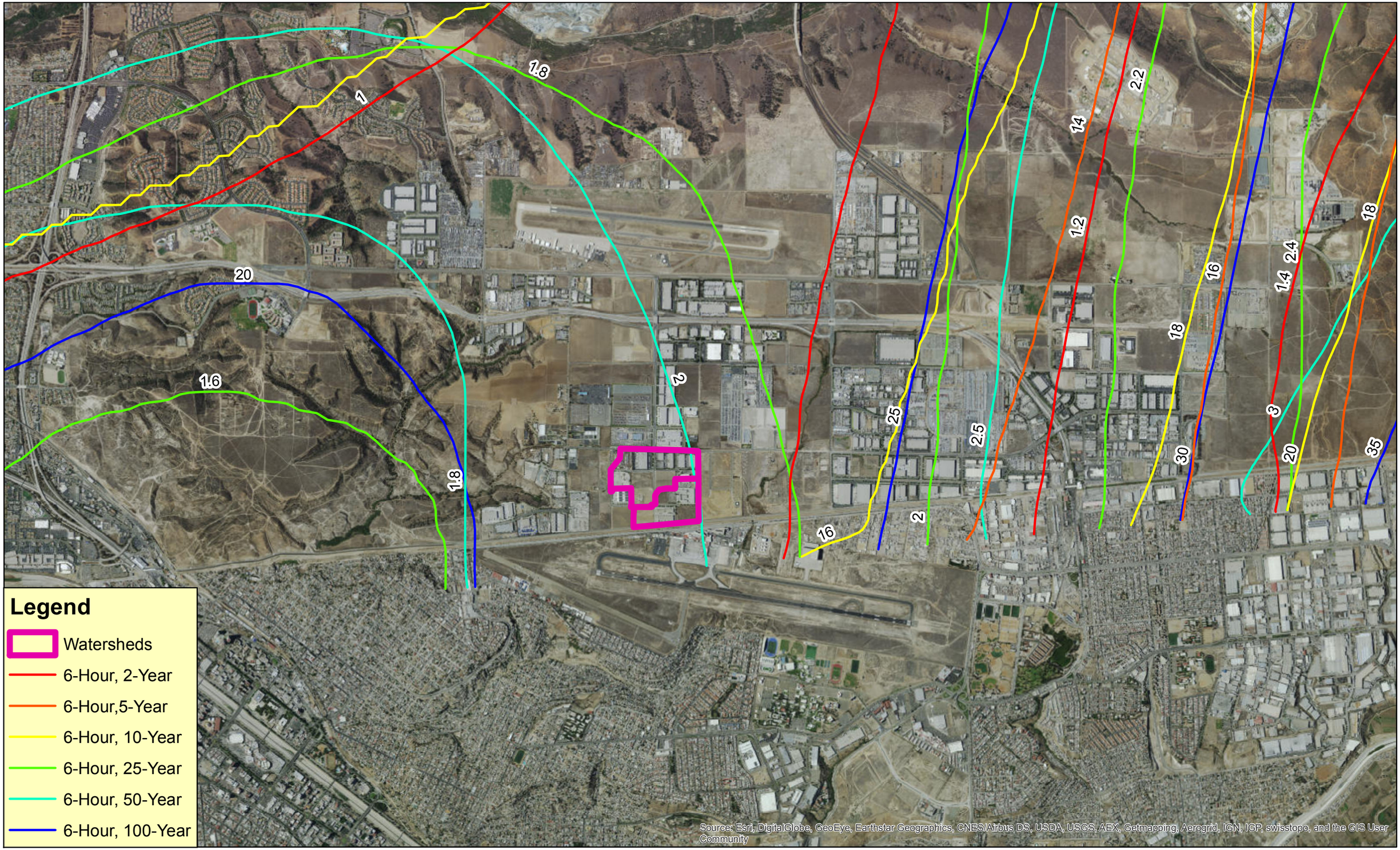
Date of Exhibit: 2/27/2017
SANGIS/USGS Aerial Imagery: 11/2014

Siempre Viva & Bristow

MMP Maps 126 & 127 - Photo Location Map

J-17204-L

Attachment 5 – HYDROLOGIC SUPPORT MATERIAL

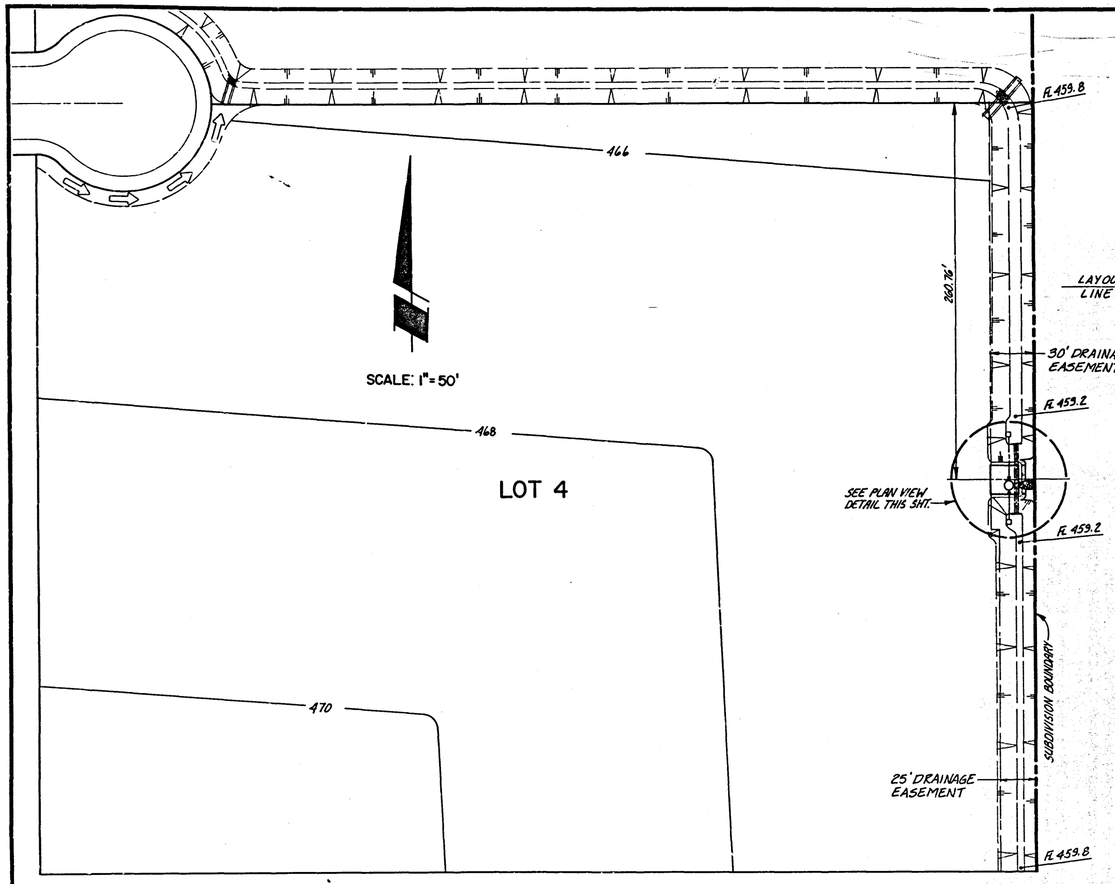


Siempre Viva & Bristow - MMP Map Numbes 126 & 127

RICK ENGINEERING COMPANY

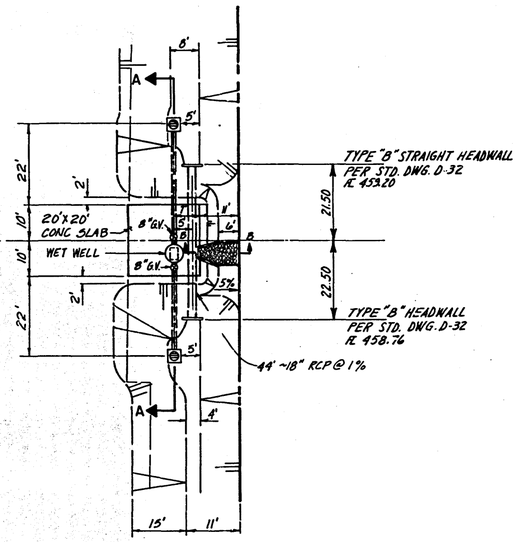
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Exhibit Date: 03-14-17
REC JN: 17204-J



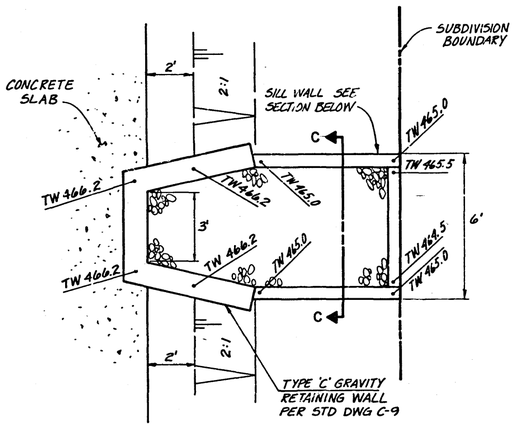
PLAN VIEW

SCALE: 1"=50'



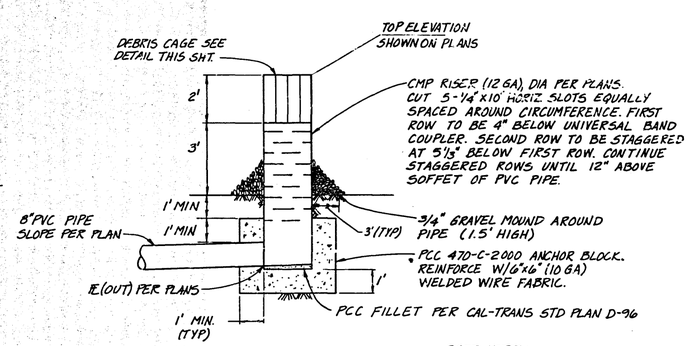
DETAIL: PLAN VIEW

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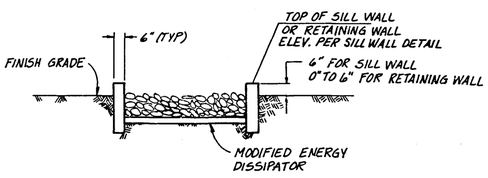
DETAIL: SILL WALL

NO SCALE



DETAIL: RISER

NO SCALE

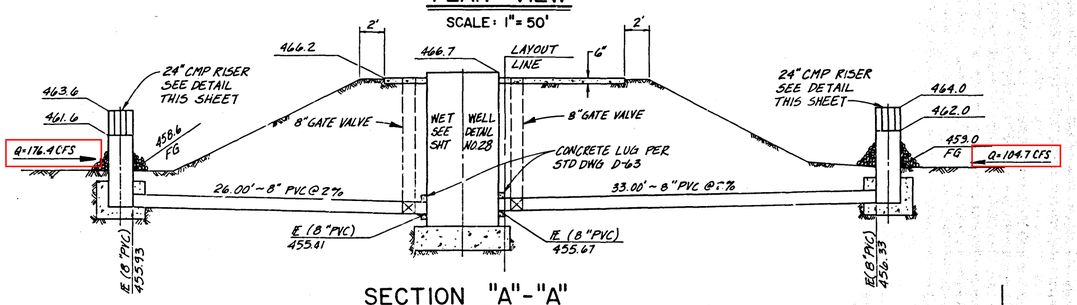


SECTION "C"-"C"

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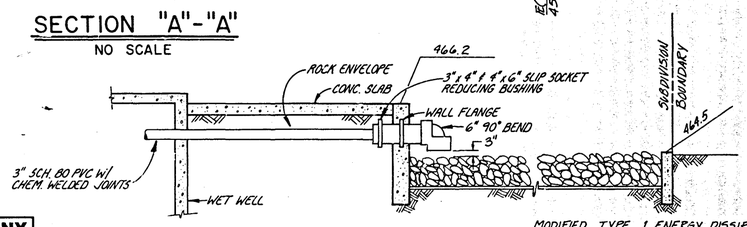
RISER NOTES:

1. FOR DETAILS NOT SHOWN HEREON SEE CAL-TRANS STANDARD PLAN D-96.
2. SEDIMENT TO BE REMOVED AFTER EVERY RAIN STORM OR WHEN REACHING AN ELEVATION OF 460.0.



SECTION "A"-"A"

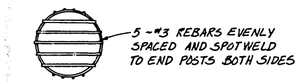
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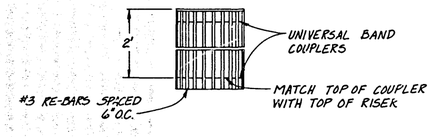
SECTION "B-B"

NO SCALE

MODIFIED TYPE 1 ENERGY DISSIPATER PER STD D-40.1 WITH NO.2 BACKING SEE SILL WALL DETAIL THIS SHEET



5-#3 REBARS EVENLY SPACED AND SPOTWELD TO END POSTS BOTH SIDES



DETAIL: DEBRIS CAGE

NO SCALE

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

U.S. NAVY PROPERTY COR. MON. S.W. OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEVATION: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert DATE: 4-2-87

JERALD L. VAN ERT R.C.E. 20984

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD, SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3388 PIO PICO DRIVE, CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD., SAN MARCOS, CA. 92069 (619) 744-4800

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

PRIVATE DRAINAGE PUMP

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 33 OF 35 SHEETS

T.M. 84-0843
W.O. NO. 840843

C.F. Lutland 5-1-87
FOR CITY ENGINEER DATE

DIVISION HEAD

DESCRIPTION	BY	APPROVED	DATE	FILMED
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AS-BUILT	R.E.C.	[illegible]	3-10-88	

DESIGN ENGINEER

CONTROL CERTIFICATION

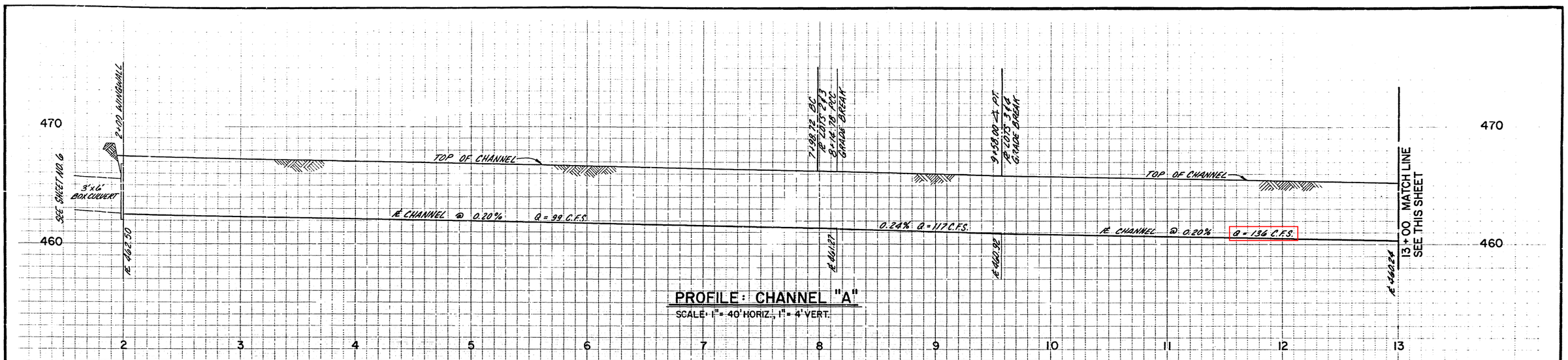
138-1773
LAMBERT COORDINATES

CONTRACTOR P.E. HOGGARD — DATE STARTED 8-17-87
INSPECTOR E. PANTOY — DATE COMPLETED 3-3-88

22611-33-D

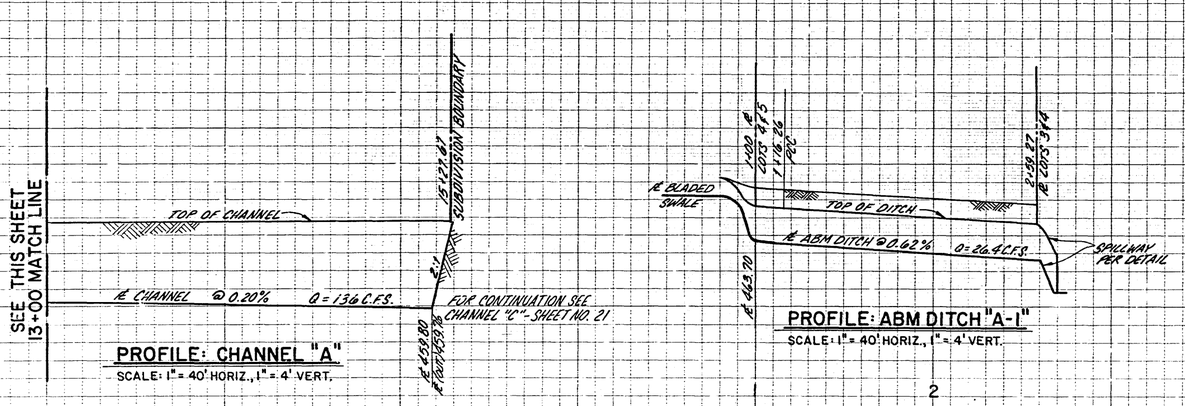
NEW SHEET

0 1 2 3 4IN



PROFILE: CHANNEL "A"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

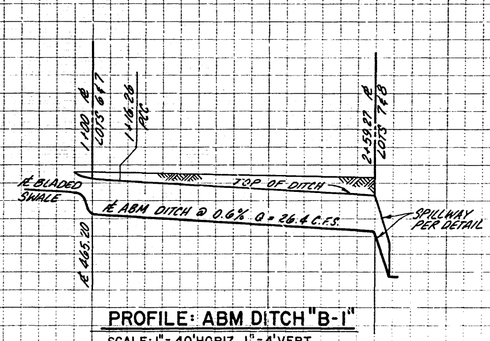


PROFILE: CHANNEL "A"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

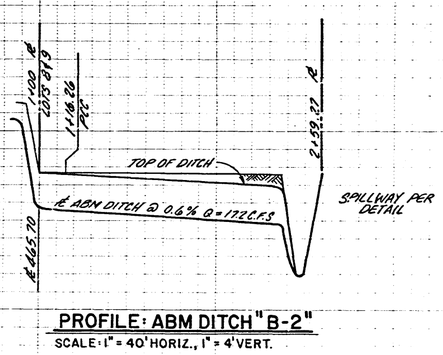
PROFILE: ABM DITCH "A-1"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



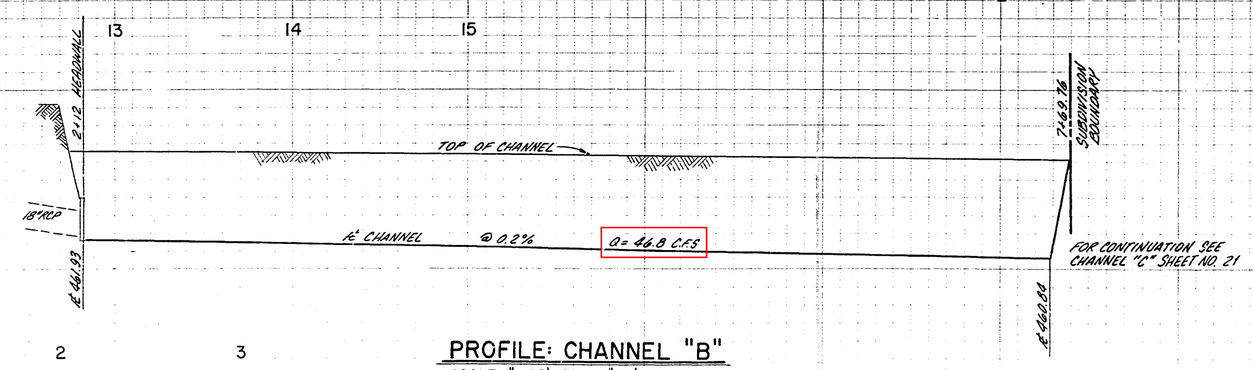
PROFILE: ABM DITCH "B-1"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



PROFILE: ABM DITCH "B-2"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



PROFILE: CHANNEL "B"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

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BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert 4-1-86

JERALD L. VAN ERT R.C.E. 20984 DATE

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD. SAN MARCOS, CA. 92069 (619) 744-4800

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

DRAINAGE CHANNEL PROFILES

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 20 OF 33 SHEETS

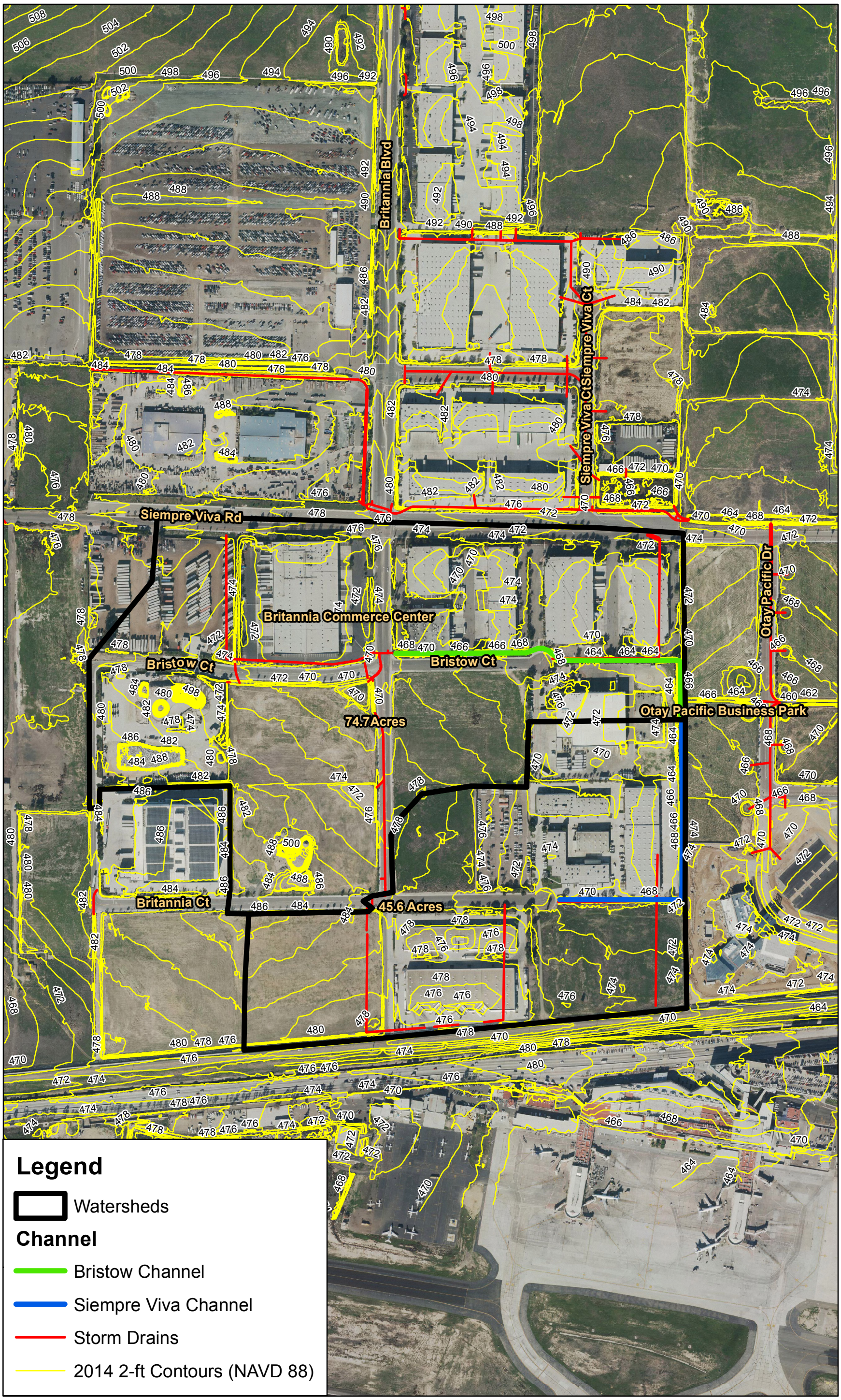
T.M. 84-0843
W.O. NO 840843

C.R. Fockler 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS BUILT	P.E.C.	GRM	3/10/88	

CONTRACTOR R.E. HAZARD DATE STARTED 6-1-86
INSPECTOR D. MARTIN DATE COMPLETED 1-8-88

CONTRACT IDENTIFICATION 138 73
LAMBERT COORDINATES
22611-20-D



W:\17204-L_TO#39_JHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\GIS\17204-L_Siempre_HydrologicWorkmap_v10.1.mxd

RICK ENGINEERING COMPANY

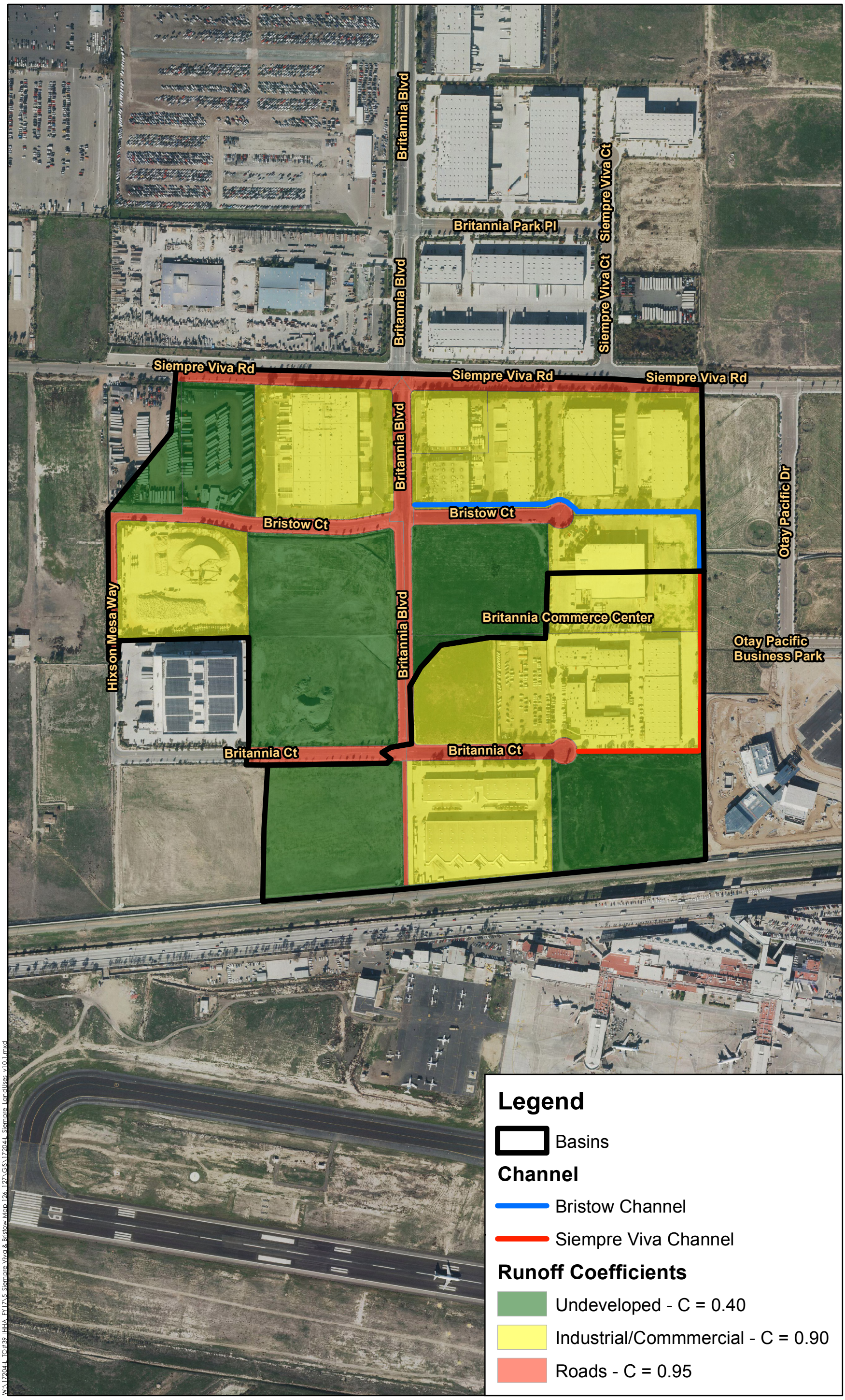
Feet
0 300 600

Date of Exhibit: 3/14/2017
DigitalGlobe Aerial Image: 04.2013

Siempre Viva and Bristow Channels

MMP Map Numbers 126 & 127 - 2014 Topography

J-17204-L



W:\17204-L TO#39 IRHA FY17\5 Siempre Viva & Bristow Map 126_127\GIS\17204-L Siempre_LandUses_v10.1.mxd

RICK ENGINEERING COMPANY

Feet
0 300 600

Date of Exhibit: 3/14/2017
DigitalGlobe Aerial Image: 04.2013

Siempre Viva and Bristow Channels

MMP Map Numbers 126 & 127 - Land Uses Exhibit

J-17204-L

Attachment 6 – CALCULATIONS FOR HEC-RAS DOWNSTREAM BOUNDARY CONDITIONS

Geometric Inputs	
Orifice Coefficent	0.61
Weir Coefficient	2.6
Pump System High Point (ft)	467.045
North Orifice Invert (ft)	464.17
North Orifice Diameter (ft)	2
North Orifice Obstructed Area (ft2)	0.210
North Orifice Effective Cross Sectional Area (ft2)	2.93
North Lower Weir Width (ft)	4
North Lower Weir Invert (ft)	465.37
North Upper Weir Width (ft)	75
North Upper Weir Invert (ft)	467.37

Rating Curve for Downstream Boundary Condition
Current Condition, Northern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Storm Event	Flow Rate (cfs)	Water Surface Elevation (ft NAVD 88)
2-Year	69	467.70
5-Year	92	467.80
10-Year	107.4	467.85
25-Year	130.4	467.95
50-Year	153,4	468.05
100-Year	176.4	468.10

Stage (ft)	Pump		North Inlet		North Wieir Lower		North Weir Upper		North Channel	
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Q (cfs)	Relative Stage (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)
466.00	2.27	0.334	1.83	19.41	0.63	5.20	-	0.00	Pump	5.37
466.05	2.22	0.334	1.88	19.68	0.68	5.83	-	0.00	Pump	6.00
466.10	2.17	0.334	1.93	19.94	0.73	6.49	-	0.00	Pump	6.65
466.15	2.12	0.334	1.98	20.19	0.78	7.16	-	0.00	Pump	7.33
466.20	2.07	0.334	2.03	20.45	0.83	7.86	-	0.00	Pump	8.03
466.25	2.02	0.334	2.08	20.70	0.88	8.59	-	0.00	Pump	8.75
466.30	1.97	0.334	2.13	20.94	0.93	9.33	-	0.00	Pump	9.49
466.35	1.92	0.334	2.18	21.19	0.98	10.09	-	0.00	Pump	10.26
466.40	1.87	0.334	2.23	21.43	1.03	10.87	-	0.00	Pump	11.04
466.45	1.82	0.334	2.28	21.67	1.08	11.67	-	0.00	Pump	11.84
466.50	1.77	0.334	2.33	21.91	1.13	12.49	-	0.00	Pump	12.66
466.55	1.72	0.334	2.38	22.14	1.18	13.33	-	0.00	Pump	13.50
466.60	1.67	0.334	2.43	22.37	1.23	14.19	-	0.00	Pump	14.35
466.65	1.62	0.334	2.48	22.60	1.28	15.06	-	0.00	Pump	15.23
466.70	1.57	0.334	2.53	22.83	1.33	15.95	-	0.00	Pump	16.12
466.75	1.52	0.334	2.58	23.05	1.38	16.86	-	0.00	Pump	17.03
466.80	1.47	0.334	2.63	23.27	1.43	17.78	-	0.00	Pump	17.95
466.85	1.42	0.334	2.68	23.49	1.48	18.73	-	0.00	Pump	18.89
466.90	1.37	0.334	2.73	23.71	1.53	19.68	-	0.00	Pump	19.85
466.95	1.32	0.334	2.78	23.93	1.58	20.65	-	0.00	Pump	20.82
467.00	1.27	0.334	2.83	24.14	1.63	21.64	-	0.00	Pump	21.81
467.05	1.22	0.334	2.88	24.35	1.68	22.65	-	0.00	Pump	22.81
467.10	1.17	0.334	2.93	24.56	1.73	23.66	-	0.00	Pump	23.83
467.15	1.12	0.334	2.98	24.77	1.78	24.70	-	0.00	Pump	24.87
467.20	1.07	0.334	3.03	24.98	1.83	25.75	-	0.00	Pump	25.91
467.25	1.02	0.334	3.08	25.19	1.88	26.81	-	0.00	Pump	26.98
467.30	0.97	0.334	3.13	25.39	1.93	27.88	-	0.00	Pump	28.05
467.35	0.92	0.334	3.18	25.59	1.98	28.98	-	0.00	Pump	29.14
467.40	0.87	0.334	3.23	25.79	2.03	30.08	0.03	1.01	Pump	31.26
467.45	0.82	0.334	3.28	25.99	2.08	31.20	0.08	4.41	Pump	35.78

Stage (ft)	Pump		North Inlet		North Wieir Lower		North Weir Upper		North Channel		
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Q (cfs)	Relative Stage (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)	
467.50	0.77	0.334	3.33	26.19	2.13	32.33	0.13	9.14	Pump	41.64	
467.55	0.72	0.334	3.38	26.38	2.18	33.47	0.18	14.89	Pump	48.53	
467.60	0.67	0.334	3.43	26.58	2.23	34.63	0.23	21.51	Pump	56.31	
467.65	0.62	0.334	3.48	26.77	2.28	35.80	0.28	28.89	Pump	64.86	
467.70	0.57	0.334	3.53	26.96	2.33	36.99	0.33	36.97	Pump	74.12	2-Year
467.75	0.52	0.334	3.58	27.15	2.38	38.19	0.38	45.68	Pump	84.03	
467.80	0.47	0.334	3.63	27.34	2.43	39.40	0.43	54.98	Pump	94.55	5-Year
467.85	0.42	0.334	3.68	27.53	2.48	40.62	0.48	64.85	Pump	105.63	10-Year
467.90	0.37	0.334	3.73	27.72	2.53	41.85	0.53	75.24	Pump	117.26	
467.95	0.32	0.334	3.78	27.90	2.58	43.10	0.58	86.13	Pump	129.40	25-Year
468.00	0.27	0.334	3.83	28.09	2.63	44.36	0.63	97.51	Pump	142.03	
468.05	0.22	0.334	3.88	28.27	2.68	45.63	0.68	109.34	Pump	155.14	50-Year
468.10	0.17	0.334	3.93	28.45	2.73	46.91	0.73	121.62	Pump	168.70	100-Year
468.15	0.12	0.334	3.98	28.63	2.78	48.21	0.78	134.33	Pump	182.70	
468.20	0.07	0.334	4.03	28.81	2.83	49.51	0.83	147.45	Pump	197.13	
468.25	0.02	0.334	4.08	28.99	2.88	50.83	0.88	160.98	Pump	211.97	
468.30	-0.03	0.334	4.13	29.16	2.93	52.16	0.93	174.89	Pump	227.21	
468.35	-0.08	0.334	4.18	29.34	2.98	53.50	0.98	189.18	Pump	242.85	
468.40	-0.13	0.334	4.23	29.52	3.03	54.85	1.03	203.84	Pump	258.86	
468.45	-0.18	0.334	4.28	29.69	3.08	56.22	1.08	218.86	Pump	275.24	
468.50	-0.23	0.334	4.33	29.86	3.13	57.59	1.13	234.24	Pump	291.99	
468.55	-0.28	0.334	4.38	30.03	3.18	58.98	1.18	249.95	Pump	309.10	
468.60	-0.33	0.334	4.43	30.20	3.23	60.37	1.23	266.01	Pump	326.55	
468.65	-0.38	0.334	4.48	30.37	3.28	61.78	1.28	282.39	Pump	344.34	
468.70	-0.43	0.334	4.53	30.54	3.33	63.20	1.33	299.10	Pump	362.46	
468.75	-0.48	0.334	4.58	30.71	3.38	64.63	1.38	316.12	Pump	380.91	
468.80	-0.53	0.334	4.63	30.88	3.43	66.07	1.43	333.46	Pump	399.69	
468.85	-0.58	0.334	4.68	31.05	3.48	67.52	1.48	351.10	Pump	418.78	
468.90	-0.63	0.334	4.73	31.21	3.53	68.98	1.53	369.04	Pump	438.18	
468.95	-0.68	0.334	4.78	31.38	3.58	70.45	1.58	387.28	Pump	457.89	
469.00	-0.73	0.334	4.83	31.54	3.63	71.93	1.63	405.80	Pump	477.90	

Rating Curve for Downstream Boundary Condition
Current Condition, Northern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Geometric Inputs	
Orifice Coefficent	0.61
Weir Coefficient	2.6
Pump System High Point (ft)	467.045
South Orifice Invert	463.77
South Orifice Diamter (ft)	2
North Orifice Obstructed Area (ft2)	0.210
South Orifice Effective Cross Sectional Area (ft2)	2.93
South Lower Weir Width (ft)	12
South Lower Weir Invert (ft)	467.87
South Upper Weir Width (ft)	100
South Upper Weir Invert (ft)	468.37

Rating Curve for Downstream Boundary Condition
Current Condition, Southern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Storm Event	Flow Rate (cfs)	Water Surface Elevation (ft NAVD 88)
2-Year	41	468.55
5-Year	54.6	468.60
10-Year	64.7	468.65
25-Year	77.4	468.70
50-Year	91	468.75
100-Year	104.7	468.80

Stage (ft)	Pump		South Inlet		South Weir Lower		South Weir Upper		South Channel	
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Q (cfs)	Relative Stage (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)
466.00	2.27	0.334	2.23	21.43	-	0	-	0.00	Pump	0.17
466.05	2.22	0.334	2.28	21.67	-	0	-	0.00	Pump	0.17
466.10	2.17	0.334	2.33	21.91	-	0	-	0.00	Pump	0.17
466.15	2.12	0.334	2.38	22.14	-	0	-	0.00	Pump	0.17
466.20	2.07	0.334	2.43	22.37	-	0	-	0.00	Pump	0.17
466.25	2.02	0.334	2.48	22.60	-	0	-	0.00	Pump	0.17
466.30	1.97	0.334	2.53	22.83	-	0	-	0.00	Pump	0.17
466.35	1.92	0.334	2.58	23.05	-	0	-	0.00	Pump	0.17
466.40	1.87	0.334	2.63	23.27	-	0	-	0.00	Pump	0.17
466.45	1.82	0.334	2.68	23.49	-	0	-	0.00	Pump	0.17
466.50	1.77	0.334	2.73	23.71	-	0	-	0.00	Pump	0.17
466.55	1.72	0.334	2.78	23.93	-	0	-	0.00	Pump	0.17
466.60	1.67	0.334	2.83	24.14	-	0	-	0.00	Pump	0.17
466.65	1.62	0.334	2.88	24.35	-	0	-	0.00	Pump	0.17
466.70	1.57	0.334	2.93	24.56	-	0	-	0.00	Pump	0.17
466.75	1.52	0.334	2.98	24.77	-	0	-	0.00	Pump	0.17
466.80	1.47	0.334	3.03	24.98	-	0	-	0.00	Pump	0.17
466.85	1.42	0.334	3.08	25.19	-	0	-	0.00	Pump	0.17
466.90	1.37	0.334	3.13	25.39	-	0	-	0.00	Pump	0.17
466.95	1.32	0.334	3.18	25.59	-	0	-	0.00	Pump	0.17
467.00	1.27	0.334	3.23	25.79	-	0	-	0.00	Pump	0.17
467.05	1.22	0.334	3.28	25.99	-	0	-	0.00	Pump	0.17
467.10	1.17	0.334	3.33	26.19	-	0	-	0.00	Pump	0.17
467.15	1.12	0.334	3.38	26.38	-	0	-	0.00	Pump	0.17
467.20	1.07	0.334	3.43	26.58	-	0	-	0.00	Pump	0.17
467.25	1.02	0.334	3.48	26.77	-	0	-	0.00	Pump	0.17
467.30	0.97	0.334	3.53	26.96	-	0	-	0.00	Pump	0.17
467.35	0.92	0.334	3.58	27.15	-	0	-	0.00	Pump	0.17
467.40	0.87	0.334	3.63	27.34	-	0	-	0.00	Pump	0.17
467.45	0.82	0.334	3.68	27.53	-	0	-	0.00	Pump	0.17

Stage (ft)	Pump		South Inlet		South Weir Lower		South Weir Upper		South Channel	
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Q (cfs)	Relative Stage (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)
467.50	0.77	0.334	3.73	27.72	-	0	-	0.00	Pump	0.17
467.55	0.72	0.334	3.78	27.90	-	0	-	0.00	Pump	0.17
467.60	0.67	0.334	3.83	28.09	-	0	-	0.00	Pump	0.17
467.65	0.62	0.334	3.88	28.27	-	0	-	0.00	Pump	0.17
467.70	0.57	0.334	3.93	28.45	-	0	-	0.00	Pump	0.17
467.75	0.52	0.334	3.98	28.63	-	0	-	0.00	Pump	0.17
467.80	0.47	0.334	4.03	28.81	-	0	-	0.00	Pump	0.17
467.85	0.42	0.334	4.08	28.99	-	0	-	0.00	Pump	0.17
467.90	0.37	0.334	4.13	29.16	0.03	0.16	-	0.00	Pump	0.33
467.95	0.32	0.334	4.18	29.34	0.08	0.71	-	0.00	Pump	0.87
468.00	0.27	0.334	4.23	29.52	0.13	1.46	-	0.00	Pump	1.63
468.05	0.22	0.334	4.28	29.69	0.18	2.38	-	0.00	Pump	2.55
468.10	0.17	0.334	4.33	29.86	0.23	3.44	-	0.00	Pump	3.61
468.15	0.12	0.334	4.38	30.03	0.28	4.62	-	0.00	Pump	4.79
468.20	0.07	0.334	4.43	30.20	0.33	5.91	-	0.00	Pump	6.08
468.25	0.02	0.334	4.48	30.37	0.38	7.31	-	0.00	Pump	7.48
468.30	-0.03	0.334	4.53	30.54	0.43	8.80	-	0.00	Pump	8.96
468.35	-0.08	0.334	4.58	30.71	0.48	10.38	-	0.00	Pump	10.54
468.40	-0.13	0.334	4.63	30.88	0.53	12.04	0.03	1.35	Pump	13.56
468.45	-0.18	0.334	4.68	31.05	0.58	13.78	0.08	5.88	Pump	19.83
468.50	-0.23	0.334	4.73	31.21	0.63	15.60	0.13	12.19	Pump	27.96
468.55	-0.28	0.334	4.78	31.38	0.68	17.50	0.18	19.86	Pump	37.52
468.60	-0.33	0.334	4.83	31.54	0.73	19.46	0.23	28.68	Pump	48.31
468.65	-0.38	0.334	4.88	31.70	0.78	21.49	0.28	38.52	Pump	60.18
468.70	-0.43	0.334	4.93	31.86	0.83	23.59	0.33	49.29	Pump	73.05
468.75	-0.48	0.334	4.98	32.03	0.88	25.76	0.38	60.90	Pump	86.83
468.80	-0.53	0.334	5.03	32.19	0.93	27.98	0.43	73.31	Pump	101.46
468.85	-0.58	0.334	5.08	32.35	0.98	30.27	0.48	86.46	Pump	116.90
468.90	-0.63	0.334	5.13	32.50	1.03	32.61	0.53	100.32	Pump	133.10
468.95	-0.68	0.334	5.18	32.66	1.08	35.02	0.58	114.85	Pump	150.03
469.00	-0.73	0.334	5.23	32.82	1.13	37.48	0.63	130.01	Pump	167.57

2-Year
5-Year
10-Year
25-Year
50-Year
100-Year

Rating Curve for Downstream Boundary Condition
Current Condition, Southern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Geometric Inputs	
Orifice Coefficent	0.61
Weir Coefficient	2.6
Pump System High Point (ft)	467.045
North Orifice Invert (ft)	464.17
North Orifice Diameter (ft)	2
North Orifice Obstructed Area (ft2)	0.210
North Orifice Effective Cross Sectional Area (ft2)	2.93
North Channel Invert (ft)	466.37
North Channel Base Width (ft)	0
North Channel Right Side Slope (xH:yV)	0
North channel Left Side Slope (xH:yV)	300
North Channel n ()	0.04
North Channel Slope (ft/ft)	0.003

Rating Curve for Downstream Boundary Condition
As-Built Condition, Northern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Storm Event	Flow Rate (cfs)	Water Surface Elevation (ft NAVD 88)
2-Year	69	467.05
5-Year	92	467.10
10-Year	107.4	467.15
25-Year	130.4	467.25
50-Year	153,4	467.35
100-Year	176.4	467.35

Stage (ft)	Pump		North Inlet		North "Channel"					Total North Channel		
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Cross Sectional Area (ft2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)	
466.35	1.92	0.334	2.18	21.19	-	-	-	-	0.00	Pump	0.17	
466.40	1.87	0.334	2.23	21.43	0.03	0.13	9.03	0.01	0.02	Pump	0.18	
466.45	1.82	0.334	2.28	21.67	0.08	0.96	24.08	0.04	0.24	Pump	0.41	
466.50	1.77	0.334	2.33	21.91	0.13	2.53	39.13	0.06	0.88	Pump	1.05	
466.55	1.72	0.334	2.38	22.14	0.18	4.86	54.18	0.09	2.09	Pump	2.26	
466.60	1.67	0.334	2.43	22.37	0.23	7.94	69.23	0.11	4.03	Pump	4.19	
466.65	1.62	0.334	2.48	22.60	0.28	11.76	84.28	0.14	6.80	Pump	6.97	
466.70	1.57	0.334	2.53	22.83	0.33	16.33	99.33	0.16	10.54	Pump	10.71	
466.75	1.52	0.334	2.58	23.05	0.38	21.66	114.38	0.19	15.36	Pump	15.53	
466.80	1.47	0.334	2.63	23.27	0.43	27.74	129.43	0.21	21.36	Pump	21.53	
466.85	1.42	0.334	2.68	23.49	0.48	34.56	144.48	0.24	28.64	Pump	28.81	
466.90	1.37	0.334	2.73	23.71	0.53	42.13	159.53	0.26	37.30	Pump	37.47	
466.95	1.32	0.334	2.78	23.93	0.58	50.46	174.58	0.29	47.44	Pump	47.61	
467.00	1.27	0.334	2.83	24.14	0.63	59.53	189.63	0.31	59.14	Pump	59.31	
467.05	1.22	0.334	2.88	24.35	0.68	69.36	204.68	0.34	72.50	Pump	72.67	2-Year
467.10	1.17	0.334	2.93	24.56	0.73	79.94	219.73	0.36	87.61	Pump	87.77	5-Year
467.15	1.12	0.334	2.98	24.77	0.78	91.26	234.78	0.39	104.53	Pump	104.70	10-Year
467.20	1.07	0.334	3.03	24.98	0.83	103.33	249.83	0.41	123.37	Pump	123.54	
467.25	1.02	0.334	3.08	25.19	0.88	116.16	264.88	0.44	144.20	Pump	144.37	25-Year
467.30	0.97	0.334	3.13	25.39	0.93	129.74	279.93	0.46	167.09	Pump	167.26	50 & 100-Year
467.35	0.92	0.334	3.18	25.59	0.98	144.06	294.98	0.49	192.14	Pump	192.30	
467.40	0.87	0.334	3.23	25.79	1.03	159.13	310.03	0.51	219.40	Pump	219.57	
467.45	0.82	0.334	3.28	25.99	1.08	174.96	325.08	0.54	248.96	Pump	249.13	
467.50	0.77	0.334	3.33	26.19	1.13	191.53	340.13	0.56	280.90	Pump	281.06	

Geometric Inputs	
Orifice Coefficent	0.61
Weir Coefficient	2.6
Pump System High Point (ft)	467.045
South Orifice Invert	463.77
South Orifice Diamter (ft)	2
North Orifice Obstructed Area (ft2)	0.210
South Orifice Effective Cross Sectional Area (ft2)	2.93
South Channel Invert (ft)	466.37
South Channel Base Width (ft)	0
South Channel Right Side Slope (xH:yV)	250
South channel Left Side Slope (xH:yV)	0
South Channel n ()	0.04
South Channel (ft/ft)	0.007

Rating Curve for Downstream Boundary Condition
As-Built Condition, Southern Detention Basin
MMP Map Nos 126 and 127
RICK Engineering Company
Prepared 02/09/2017
J-17204-L

Storm Event	Flow Rate (cfs)	Water Surface Elevation (ft NAVD 88)
2-Year	41	466.90
5-Year	54.6	466.95
10-Year	64.7	467.00
25-Year	77.4	467.05
50-Year	91	467.05
100-Year	104.7	467.10

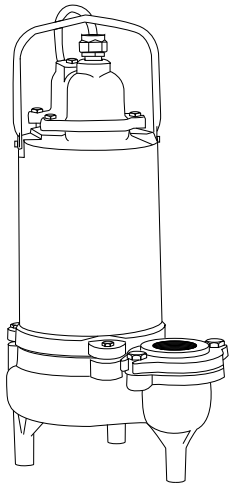
Stage (ft)	Pump		South Inlet		South "Channel"					Total South Channel		
	Relative Stage (ft)	Pump Limited Q (cfs)	Relative Stage (ft)	Orifice Limited Q (cfs)	Relative Stage (ft)	Cross Sectional Area (ft2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Q (cfs)	Pump/Orifice Limited	Total Q (cfs)	
466.35	1.92	0.334	2.58	23.05	-	-	-	-	0.00	Pump	0.17	
466.40	1.87	0.334	2.63	23.27	0.03	0.11	7.53	0.015	0.02	Pump	0.19	
466.45	1.82	0.334	2.68	23.49	0.08	0.80	20.08	0.040	0.28	Pump	0.45	
466.50	1.77	0.334	2.73	23.71	0.13	2.11	32.63	0.065	1.04	Pump	1.20	
466.55	1.72	0.334	2.78	23.93	0.18	4.05	45.18	0.090	2.47	Pump	2.63	
466.60	1.67	0.334	2.83	24.14	0.23	6.61	57.73	0.115	4.74	Pump	4.91	
466.65	1.62	0.334	2.88	24.35	0.28	9.80	70.28	0.139	8.01	Pump	8.18	
466.70	1.57	0.334	2.93	24.56	0.33	13.61	82.83	0.164	12.42	Pump	12.59	
466.75	1.52	0.334	2.98	24.77	0.38	18.05	95.38	0.189	18.10	Pump	18.26	
466.80	1.47	0.334	3.03	24.98	0.43	23.11	107.93	0.214	25.16	Pump	25.33	
466.85	1.42	0.334	3.08	25.19	0.48	28.80	120.48	0.239	33.74	Pump	33.91	
466.90	1.37	0.334	3.13	25.39	0.53	35.11	133.03	0.264	43.94	Pump	44.11	2-Year
466.95	1.32	0.334	3.18	25.59	0.58	42.05	145.58	0.289	55.88	Pump	56.05	5-Year
467.00	1.27	0.334	3.23	25.79	0.63	49.61	158.13	0.314	69.67	Pump	69.84	10-Year
467.05	1.22	0.334	3.28	25.99	0.68	57.80	170.68	0.339	85.41	Pump	85.58	25 & 50-Year
467.10	1.17	0.334	3.33	26.19	0.73	66.61	183.23	0.364	103.20	Pump	103.37	100-Year
467.15	1.12	0.334	3.38	26.38	0.78	76.05	195.78	0.388	123.14	Pump	123.31	
467.20	1.07	0.334	3.43	26.58	0.83	86.11	208.33	0.413	145.33	Pump	145.50	
467.25	1.02	0.334	3.48	26.77	0.88	96.80	220.88	0.438	169.86	Pump	170.03	
467.30	0.97	0.334	3.53	26.96	0.93	108.11	233.43	0.463	196.83	Pump	197.00	
467.35	0.92	0.334	3.58	27.15	0.98	120.05	245.98	0.488	226.33	Pump	226.50	
467.40	0.87	0.334	3.63	27.34	1.03	132.61	258.53	0.513	258.45	Pump	258.62	
467.45	0.82	0.334	3.68	27.53	1.08	145.80	271.08	0.538	293.28	Pump	293.44	
467.50	0.77	0.334	3.73	27.72	1.13	159.61	283.63	0.563	330.89	Pump	331.06	

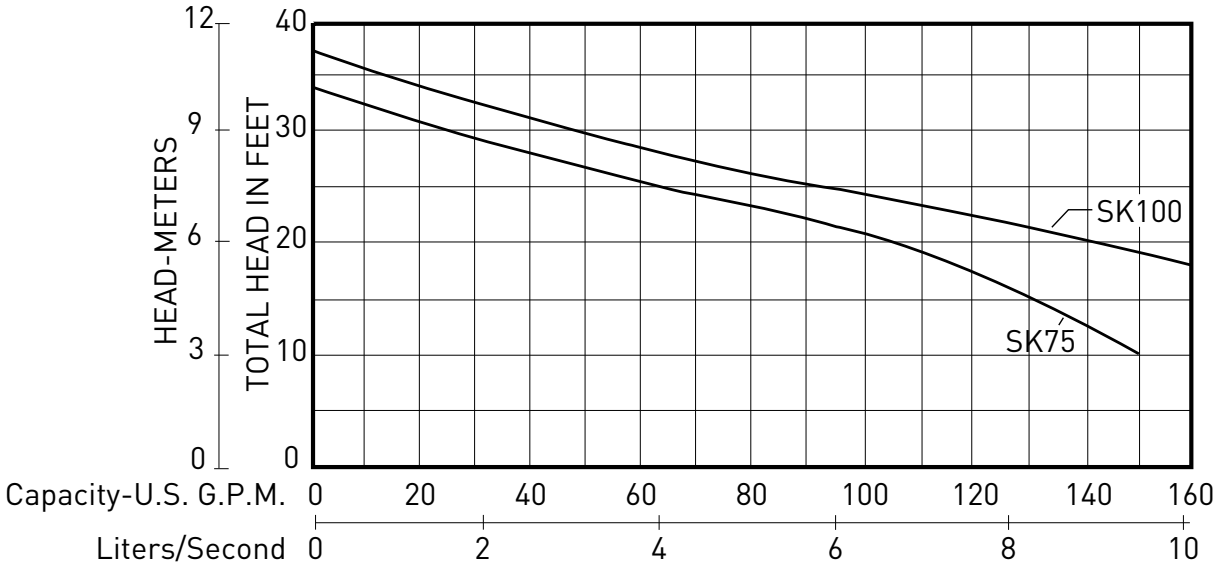
HYDROMATIC®

PERFORMANCE DATA

SK75/100
SUBMERSIBLE SEWAGE EJECTOR

Wholesale Products Page: 6300-1
Dated: January 2001
RPM: **1750** Discharge: **2”** Solids: **2”**





The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F. and 1280 feet site elevation.

PENTAIR

Conditions of Service:

GPM:_____ **TDH**:_____

Attachment 7 - AS-BUILT PLANS

BRITANNIA COMMERCE CENTER

SPECIAL NOTE

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTIONS TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY ENGINEER'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES AND THE CITY WILL NOT BE RESPONSIBLE FOR THEIR ENFORCEMENT.

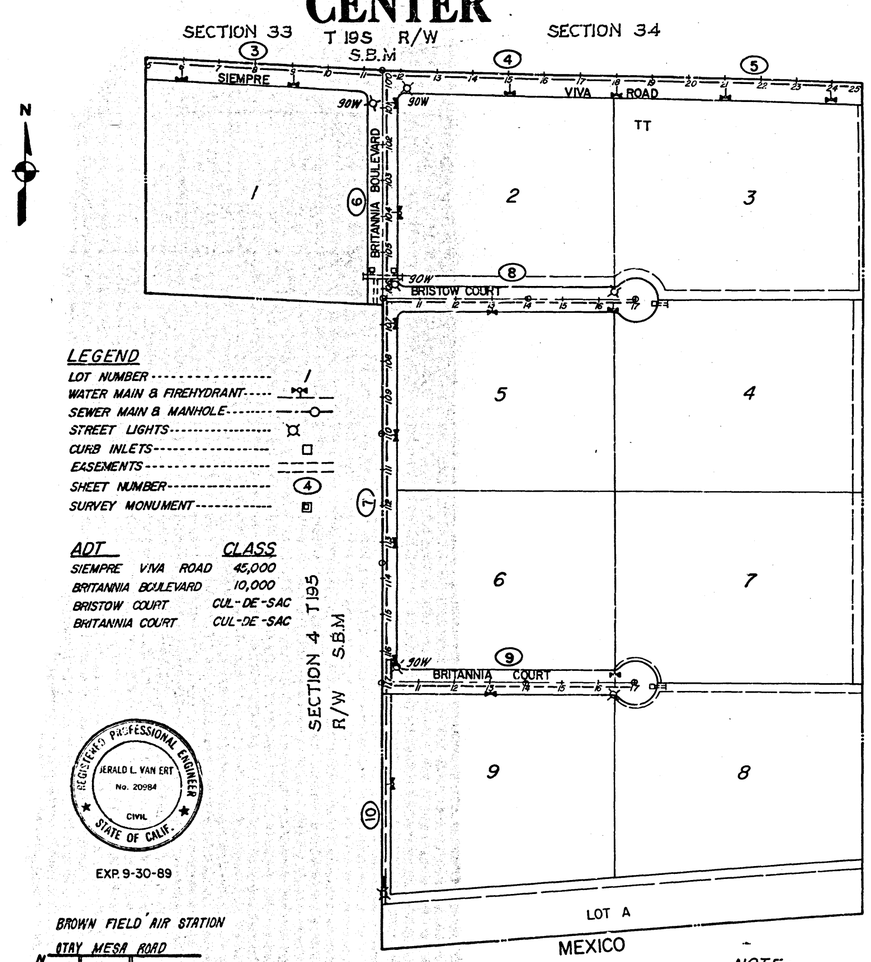
1. NEITHER THE OWNER, NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
2. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING: SAFETY OF ALL PERSONS AND PROPERTY, AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL SLOPES, STREETS, UTILITIES, AND STORM DRAINS ARE BUILT IN ACCORDANCE WITH THESE PLANS. IF THERE IS ANY QUESTION REGARDING THESE PLANS OR FIELD STAKES, THE CONTRACTOR SHALL REQUEST AN INTERPRETATION BEFORE DOING ANY WORK BY CALLING THE ENGINEER OF WORK AT 291-0707. THE CONTRACTOR SHALL ALSO TAKE THE NECESSARY STEPS TO PROTECT THE PROJECT AND ADJACENT PROPERTY FROM ANY EROSION AND SILTATION THAT RESULT FROM HIS OPERATIONS BY APPROPRIATE MEANS (SAND BAGS, HAY BALES, TEMPORARY DESILTING BASINS, DIKES, SHORING, ETC.) UNTIL SUCH TIME THAT THE PROJECT IS COMPLETED AND ACCEPTED FOR MAINTENANCE BY WHATEVER OWNER, AGENCY OR ASSOCIATION IS TO BE ULTIMATELY RESPONSIBLE FOR MAINTENANCE.
4. CONTRACTOR WILL MAKE EXPLORATION EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY BECAUSE OF ACTUAL LOCATION OF EXISTING FACILITIES.
5. LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK.
6. BEFORE EXCAVATING FOR THIS CONTRACT, VERIFY LOCATION OF UNDERGROUND UTILITIES. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS.
7. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
8. CONTRACTOR SHALL NOTIFY THE SAN DIEGO GAS & ELECTRIC COMPANY PRIOR TO STARTING WORK NEAR COMPANY FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.
   NOTICE: ALL ELECTRICAL AND GAS SERVICES WITHIN THIS SUBDIVISION ARE "UNDERGROUND INSTALLATIONS". FOR LOCATION OF ELECTRICAL CABLES AND GAS PIPING AND APPURTENANCES CONTACT THE SAN DIEGO GAS & ELECTRIC COMPANY. TELEPHONE: 800-422-4133
9. CONTRACTOR SHALL NOTIFY THE PACIFIC TELEPHONE COMPANY PRIOR TO STARTING WORK NEAR COMPANY FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.
   NOTICE: ALL TELEPHONE SERVICES WITHIN THIS SUBDIVISION ARE "UNDERGROUND INSTALLATIONS" FOR LOCATION OF CABLES AND APPURTENANCES CONTACT THE PACIFIC TELEPHONE COMPANY. TELEPHONE: 800-422-4133

GENERAL NOTES

1. WHERE TRENCHES ARE ADJACENT TO FUTURE BUILDING SITES, SOILS REPORTS SHALL BE SUBMITTED TO THE ENGINEER OF WORK BY A QUALIFIED SOILS ENGINEER WHICH CERTIFY THAT TRENCH BACKFILL WAS COMPACTED AS DIRECTED BY THE SOILS ENGINEER IN ACCORDANCE WITH THE ON-SITE EARTHWORK SPECIFICATIONS.
2. THESE PLANS ARE DRAWN SHOWING FULL IMPROVEMENTS WITHIN SPOT PORTIONS. AREAS BETWEEN SPOT PORTIONS SHALL BE CONSTRUED TO RECEIVE THE FULL IMPROVEMENTS AS SHOWN IN THE SPOT PORTIONS.
3. SIDE POLE MOUNT FOR STREET NAMES ON STREET LAMPS WITH STAINLESS STEEL STRAP
4. USE SIGNS, DELINEATORS, BARRICADES, ETC., AS PER 1977 STATE OF CALIFORNIA TRAFFIC CONTROL MANUAL. DELINEATORS AND STEADY BURN LIGHTS TO OUTLINE THE TRAFFIC PATH; BARRICADES TO PROTECT THE WORK AREA.
   MAINTAINING TRAFFIC - THE CONTRACTOR SHALL MAINTAIN ONE TRAFFIC LANE IN EACH DIRECTION ON TWO-LANE STREETS AND TWO LANES IN EACH DIRECTION FOR TRAFFIC ON ALL FOUR OR MORE LANE STREETS DURING THE WORKING HOURS OF 8:30 A.M. TO 3:30 P.M. FULL WIDTH OF ALL TRAVEL LANES ON EXISTING ROADWAYS MUST BE MAINTAINED DURING THE HOURS OF 3:30 P.M. TO 8:30 A.M. DAILY, AND ON SATURDAYS, SUNDAYS, AND DESIGNATED LEGAL HOLIDAYS, OR WHEN CONSTRUCTION OPERATIONS ARE NOT ACTIVELY IN PROGRESS ON WORKING DAYS. A FOUR-FOOT WIDE PEDESTRIAN ACCESS SHALL BE PROVIDED AND MAINTAINED IN ACCORDANCE WITH SECTION 7-10.1 OF THE STANDARD SPECIFICATIONS. FOR CLARIFICATION OF THE ABOVE, THE CONTRACTOR MAY CONTACT TRAFFIC ENGINEERING AT 236-6040. ANY MODIFICATION OR CHANGE IN ALIGNMENT OF THE EXISTING PARKING OR TRAVEL LANES OF ONE-WAY OR TWO-WAY STREETS SHALL RECEIVE PRIOR APPROVAL FROM THE CITY TRAFFIC ENGINEER AND SHALL BE IN ACCORDANCE WITH SECTION 7-10.3 OF THE STANDARD SPECIFICATIONS, 1979 EDITION.
5. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE NATIVE VEGETATION WITHIN THE OPEN SPACE AREAS. WITHIN ALL OPEN SPACE AREAS THE CONTRACTOR SHALL RESTORE DISTURBED SURFACES TO THEIR ORIGINAL NATURAL CONTOURS FOLLOWED BY HYDROSEEDING WITH A NONIRRIGATION TYPE MIXTURE OF NATIVE VEGETATION. CONTRACTOR SHALL MAINTAIN THE RESTORED NATURAL CONTOURS UNTIL PLANT GROWTH HAS BEEN ESTABLISHED
6. ALL EXISTING AND/OR PROPOSED PUBLIC UTILITY SYSTEM AND SERVICE FACILITIES SHALL BE INSTALLED UNDERGROUND IN ACCORDANCE WITH SECTION 102.0404 OF THE MUNICIPAL AND SUBDIVISION BOARD RESOLUTION NO. 3993.

BEFORE EXCAVATING, VERIFY LOCATION OF UNDERGROUND UTILITIES - CONTACT:

UNDERGROUND SERVICE ALERT	800-422-4133
SEWER	236-5650
COMMUNICATIONS DIVISION	236-5505
BUILDINGS & IRRIGATION	236-5500
CABLE T.V.	
WATER - OTAY WATER DISTRICT	462-2222



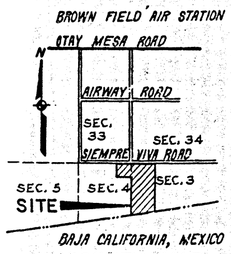
LEGEND

LOT NUMBER ---------- 1
WATER MAIN & FIREHYDRANT ----- ⋈
SEWER MAIN & MANHOLE ---------
STREET LIGHTS ----------
CURB INLETS ----------
EASEMENTS ----------
SHEET NUMBER ---------- (4)
SURVEY MONUMENT ----------

ADT	CLASS
SIEMPRE VIVA ROAD	45,000
BRITANNIA BOULEVARD	10,000
BRISTOW COURT	CUL-DE-SAC
BRITANNIA COURT	CUL-DE-SAC

REGISTERED PROFESSIONAL ENGINEER — JERALD L. VAN ERT — No. 20984 — CIVIL — STATE OF CALIF.

EXP. 9-30-89



VICINITY MAP
NO SCALE

KEY MAP
SCALE: 1" = 200'

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS -
(1) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1982 EDITION)
(2) STANDARD SPECIAL PROVISIONS, AND
(3) CITY OF SAN DIEGO STANDARD SPECIAL PROVISIONS, DOCUMENT NO. 768688, FILED MAY 5, 1983.
(4) STANDARD SPECIAL PROVISIONS ADDENDUM PERTAINING TO STREET LIGHTING, DOCUMENT NO. 768664, FILED APRIL 8, 1983.
(5) CALIFORNIA DEPARTMENT OF TRANSPORTATION, "MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES", (1985 EDITION), DOCUMENT NO. 769159, FILED APRIL 16, 1985.

STANDARD DRAWINGS
(1) SAN DIEGO REGIONAL STANDARD DRAWINGS (1982 EDITION), AND
(2) CITY OF SAN DIEGO STANDARD DRAWINGS DOCUMENT NO. 768710, FILED JUNE 22, 1983.

IMPROVEMENTS	STD DWG	SYMBOL
PREPARATION OF SUBGRADE AND A.C. PAVING PER SCHEDULE "I"	SDG-105	
TYPE "H" OR TYPE "G" CURB	G-2	
TYPE "6" CROSS GUTTER		
SIDEWALK	G-7, G-9	
WHEELCHAIR RAMP	SDG-101	
STREET SURVEY MONUMENT	M-10	
STREET NAME SIGN	SDM-102, SDM-103	
STORM DRAIN	D-6Q1	
TYPE "B" CURB INLET	D-21	
RIP-RAP ENERGY DISSIPATOR	D-40J	
GRAVITY TYPE HEADWALL	D-32	
TYPE "A" CLEANOUT	D-9	
CONCRETE LUG	D-63	
STREET LIGHT	E-1	
SERVICE POINT - PULL BOX		S.P. — P.B.
P.V.C. SEWER MAIN	S-18, SDW-105	
CONCRETE MANHOLE	S-17-1	
REDUCER		
4" P.V.C. SEWER HOUSE CONNECTION	S-13	(S)
A.C. WATER MAIN		8" A.C.P.
2" COPPER WATER SERVICE		(W)
FIRE HYDRANT ASSEMBLY (JAMES JONE J3765)		
2" BLOW OFF		2" B.O.
1" AIR AND VACUUM VALVE		1" A.V.
RESILIENT SEAT GATE VALVE (SIZE AS NOTED)		12" RSGV
GUARD POST	M-9	

(A)

NOTE:

GRADING QUANTITIES ARE ESTIMATED FOR PERMIT PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAY QUANTITIES.

EARTHWORK QUANTITIES:

EXCAVATION: 127,000 C.Y.
EMBANKMENT: 127,000 C.Y.

SITE DEVELOPMENT:

IMPROVEMENTS IN ACCORDANCE WITH SHT. NO. 1 TO 10
GRADING III ACCORDANCE WITH SHEET NO. 11 TO 19
LANDSCAPING IN ACCORDANCE WITH SHT. NO. 20 TO 25 AND 30 TO 35.

REFERENCE DWGS

21305-D

REGISTERED PROFESSIONAL ENGINEER — C. R. LOCKLEAR — No. 10154 — EXPIRES 12-31-86 — CIVIL — STATE OF CALIFORNIA

DECLARATION OF RESPONSIBLE CHARGE:

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTANT WITH THE CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

Jerald L Van Ert DATE 11-21-85

JERALD L. VAN ERT R.C.E. 20984
RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CALIFORNIA 92110
(619) 291-0707

OTAY WATER DISTRICT
I.D. 7
W.O. 1692

APPROVED BY: R.E. Barber Jr. DATE: 4/16/86
R.E. BARBER, JR., R.C.E. 22872
CHIEF ENGINEER

CITY OF SAN DIEGO FIRE DEPARTMENT

APPROVED BY _____ DATE 4/11/86

PROJECT NO. 9592 DATE _____
PRIVATE CONTRACT
PLANS FOR THE IMPROVEMENT OF:

BRITANNIA COMMERCE CENTER

(B)

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 1 OF 35 SHEETS

TM 84-0843
W.O. NO. 840843

C.R. Locklear 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
(A) CHANGE	R.E.C.	OK Held	10-17-86	
(B) CHANGE	REC	OK Held	5-1-87	
AS-BUILT	R.E.C.	HRM	5-10-88	

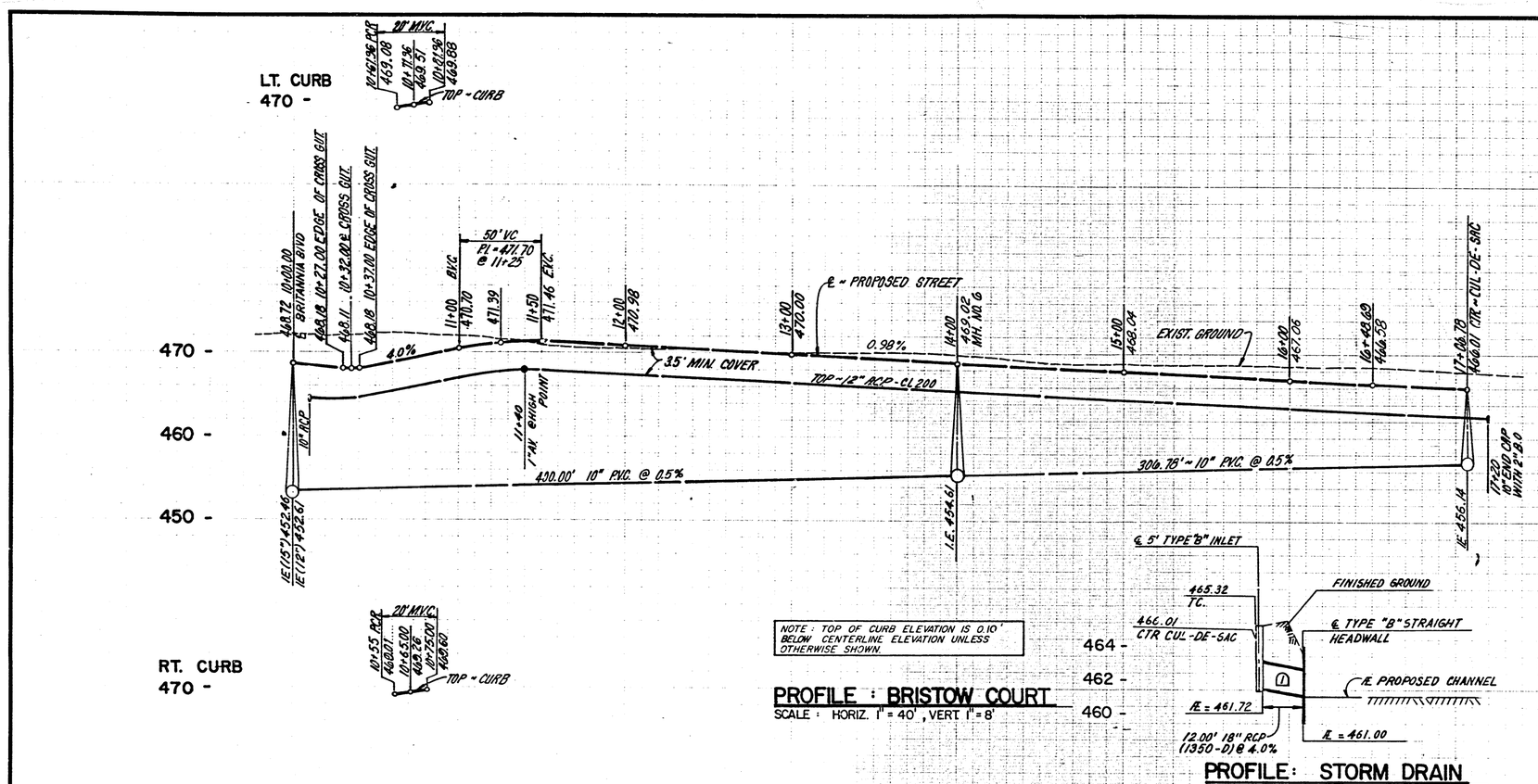
CONTROL CERTIFICATION
138-1773
LAMBERT COORDINATES
CONTRACTOR R.F. HAZARD DATE STARTED 8-1-86
INSPECTOR G. BARTON DATE COMPLETED 1-9-88
2261I-I-D

(A) ADD "A-9" GUARD POST TO LEGEND
(A) CHANGED NUMBER OF SHEETS

AS BUILT

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD, SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE, CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD., SAN MARCOS, CA. 92069 (619) 744-4800

0 1 2 3 4 IN.



CURB DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	Δ=89°57'37"	30.00'	47.10'	6" TYPE "G" CURB
2	Δ=90°00'00"	30.00'	47.12'	"
3	N89°43'30"E		586.72'	"
4	N89°43'30"E		593.69	"
5	Δ=46°34'03"	30.00'	24.38'	"
6	Δ=46°34'03"	30.00'	24.38'	"
7	Δ=273°08'06"	50.00'	238.36'	6" TYPE "G" CURB

STORM DRAIN DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	N89°43'30"E		12.00'	18" RCP

WATER DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	N89°43'30"E		740.00'	12" A.C.P.

SEWER DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
<1>	N89°43'30"E		400.00'	10" P.V.C.
<2>	N89°43'30"E		306.78'	10" P.V.C.

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV.: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

BRISTOW COURT

IN THE BRITTANIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 8 OF 33 SHEETS

T.M. 84-0843
W.O. NO 840843

C.P. Lashbrook 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS-BUILT	R.E.C.	[illegible]	3-10-87	

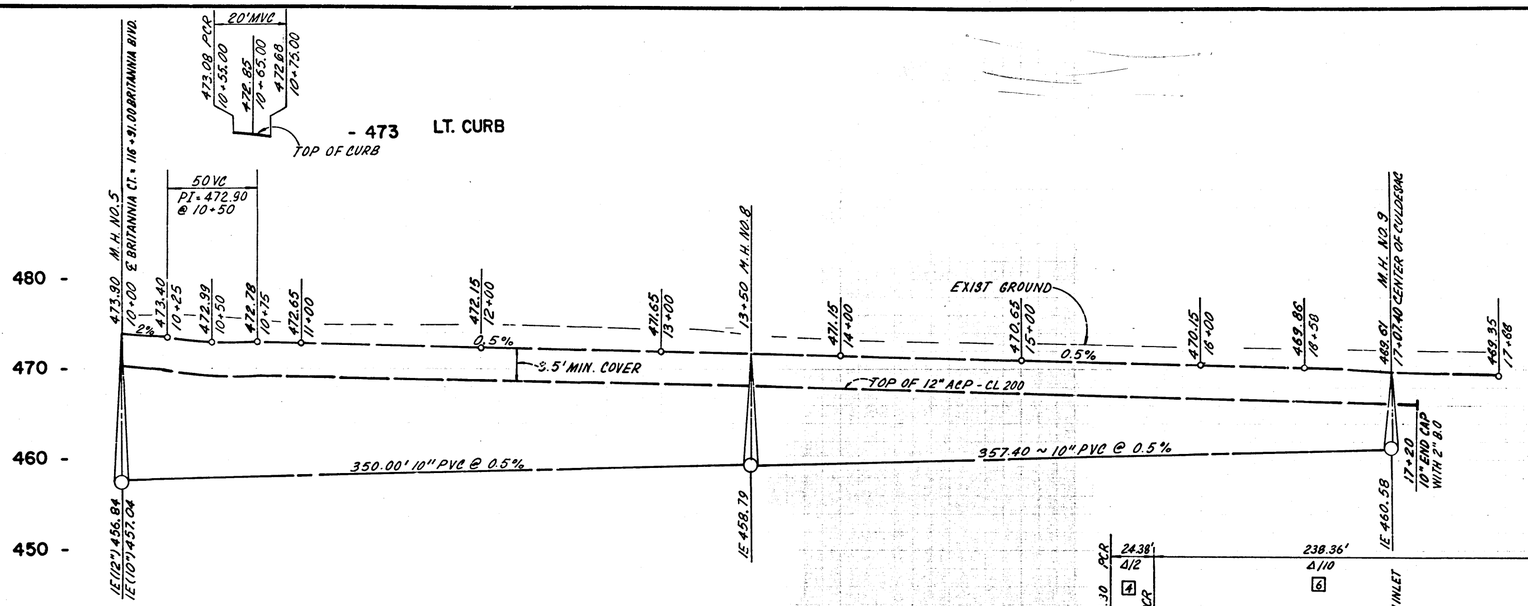
CONTRACTOR R.E. HAZARD DATE STARTED 8-1-86
INSPECTOR G. PARKER DATE COMPLETED 1-8-87

CONTROL: NOTIFICATION
138 LINES 73 ORDINATES

22611-8-D

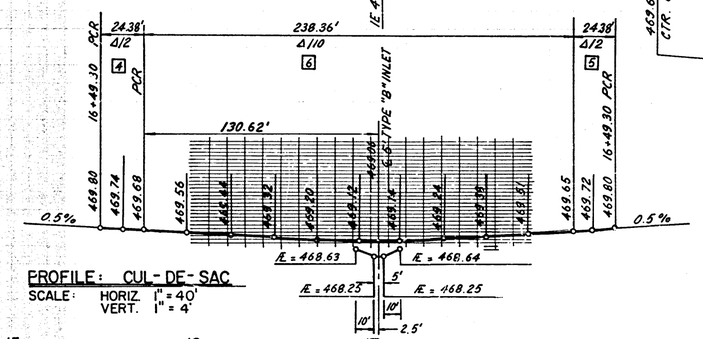
RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3058 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD. SAN MARCOS, CA. 92069 (619) 744-4800

0 1 2 3 4 IN.



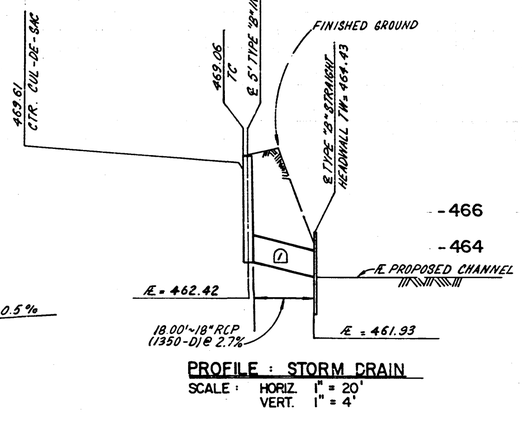
PROFILE : BRITANNIA COURT

SCALE : HORIZ. 1" = 40' , VERT. 1"=8'



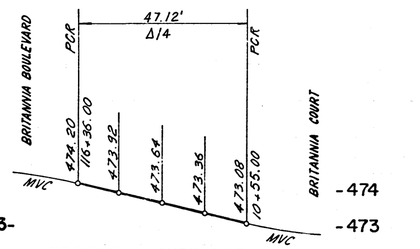
PROFILE : CUL-DE-SAC

SCALE : HORIZ. 1" = 40'
VERT. 1" = 4'



PROFILE : STORM DRAIN

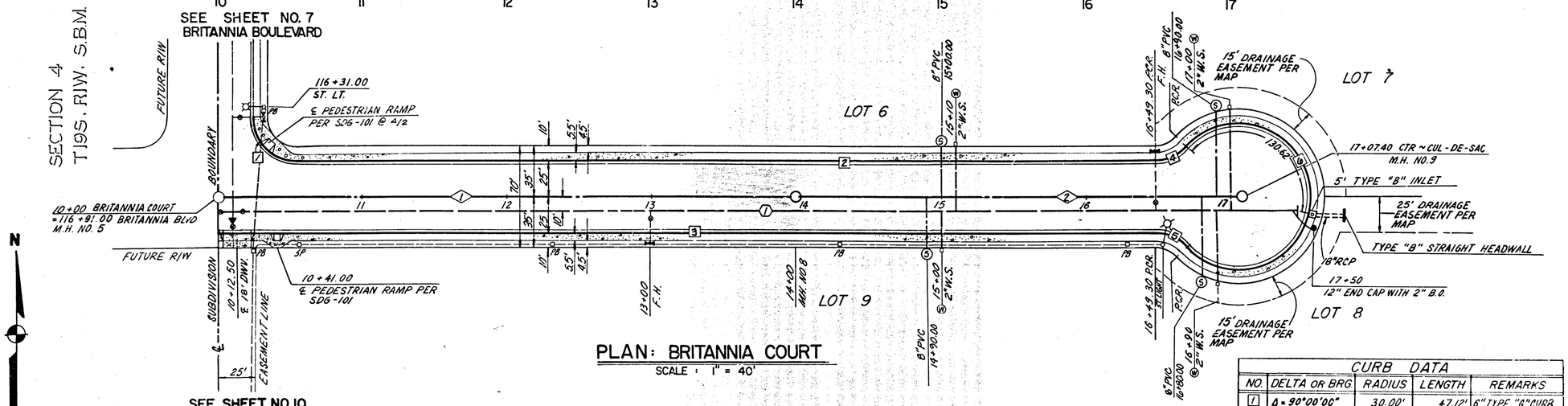
SCALE : HORIZ. 1" = 20'
VERT. 1" = 4'



PROFILE : CURB RETURN

SCALE : HORIZ. 1" = 20'
VERT. 1" = 2'

NOTE :
TOP OF CURB IS 0.10' BELOW CENTERLINE UNLESS OTHERWISE NOTED



PLAN: BRITANNIA COURT

SCALE : 1" = 40'

STORM DRAIN DATA

NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
(1)	N 89°43'30"E		18.00'	18" RCP

WATER DATA

NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
(1)	N 89°43'30"E		740.00'	12" ACP

SEWER DATA

NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
<1>	N89°43'30"E		400.00'	10" PVC
<2>	N89°43'30"E		307.40'	10" PVC

CURB DATA

NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	Δ = 90°00'00"	30.00'	47.12'	6" TYPE "G" CURB
2	N89°43'30"E		594.30'	"
3	N89°43'30"E		649.30'	"
4	Δ = 46°34'03"	30.00'	24.38'	"
5	Δ = 46°34'03"	30.00'	24.38'	"
6	Δ = 273°08'06"	50.00'	238.36'	6" TYPE "G" CURB

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV.: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert — 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

PRIVATE CONTRACT J- 9592

PLANS FOR THE IMPROVEMENT OF:

BRITANNIA COURT

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 9 OF 33 SHEETS

T.M. 84-0843
W.O. NO. 840843

C.R. Boelter — 5-30-86
FOR CITY ENGINEER DATE

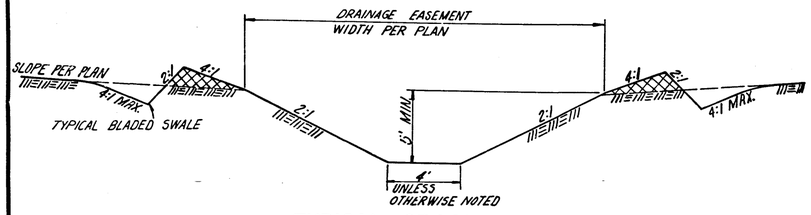
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS-BUILT	REC.	KRM	3-10-88	

CONSTRUCTION
LAMBERT COORDINATES 130 73

CONTRACTOR R.C. HAZARD — DATE STARTED 8-1-86
INSPECTOR G. MORTON — DATE COMPLETED 1-8-88

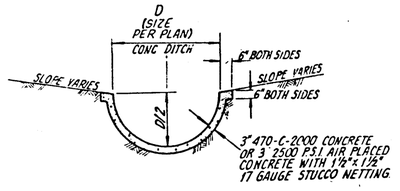
22611-9-D

0 1 2 3 4 IN.



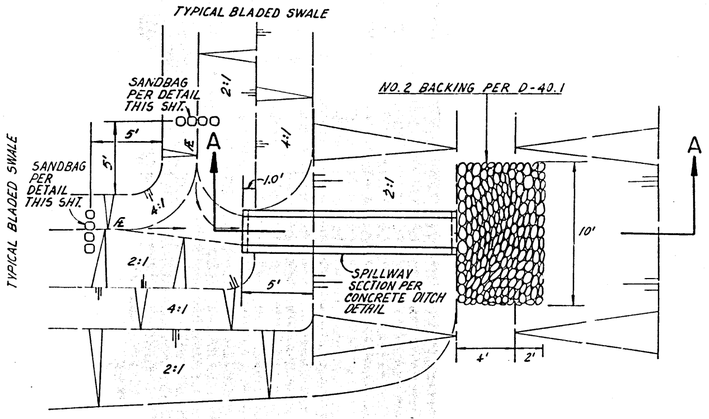
TYPICAL GRASSLINED CHANNEL

NO SCALE



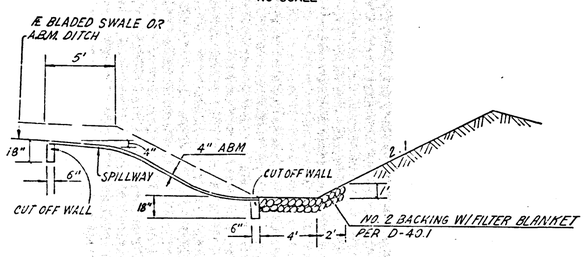
TYPICAL CONCRETE DITCH ⇨

NO SCALE (MODIFIED TYPE "B" ST'D. DWG. D-75.1)



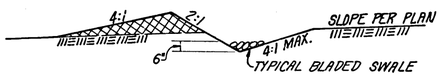
SPILLWAY DETAIL

NO SCALE



SECTION A - A

NO SCALE



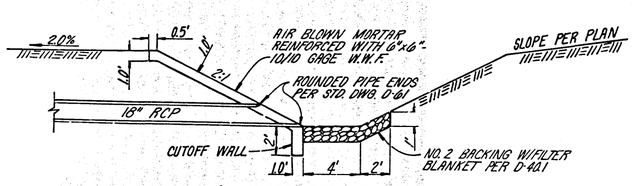
SANDBAG DETAIL

NO SCALE



TYPICAL BLADED SWALE

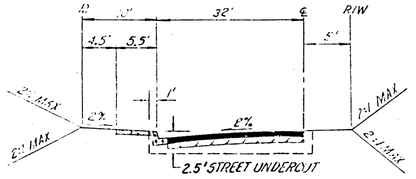
NO SCALE



(MODIFIED PER STD. DWG. D-73)

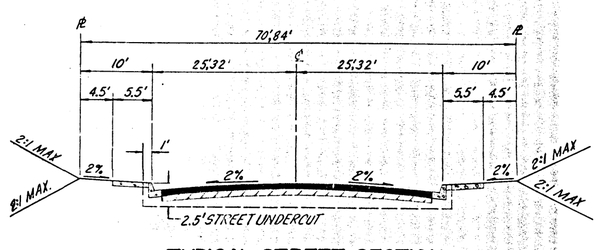
PIPE CONNECTION DETAIL

NO SCALE



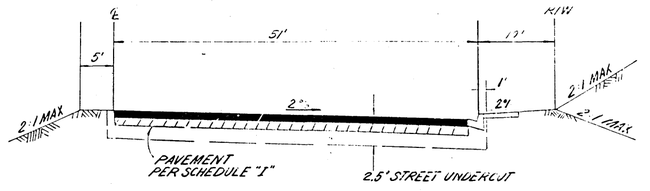
TYPICAL STREET SECTION

(BRITANNIA BOULEVARD FROM STA. 106+31.00 TO 116+91.00)
NO SCALE



TYPICAL STREET SECTION

(BRITANNIA BOULEVARD FROM STA. 100+00 TO 106+31.00, BRISTOW CT., BRITANNIA CT.)
NO SCALE



TYPICAL STREET SECTION

(SIEMPRE VIVA ROAD FROM STA. 4+89.52 TO 24+86.70)
NO SCALE.

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV.: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

PRIVATE CONTRACT J- 9592

GRADING PLANS FOR:

BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 12 OF 33 SHEETS

T.M. 84-0843
W.O. 840843

C.R. Ladlee 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS-BUILT	R.E.C.	[illegible]	3-10-86	

CONTROL NO. 138-[illegible] 3
LAMBERT COORDINATES

CONTRACTOR R.E. HAZARD DATE STARTED 8-1-86
INSPECTOR D. DAVIS DATE COMPLETED 1-2-88

22611-12-D

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD. SAN MARCOS, CA. 92069 (619) 744-4800

SEE SHEET NO. 14

LOT 1

LOT 3

LOT 4

LOT 5

LOT 6

LOT 7

5' TYPE "B" INLET

DRAINAGE EASEMENT WIDTH VARIES

SEE SPILLWAY DETAIL SHEET NO. 12

25' DRAINAGE EASEMENT

SEE A.B.M. DITCH BLADED SWALE CONNECTION DETAIL SHEET NO. 12

SEE SANDBAG DETAIL SHEET NO. 12

3'x6' BOX CULVERT

BRISTOW COURT

18" RCP

H.P.

0.95%

0.20%

2:1

CUT

FILL

10' DRAINAGE EASEMENT

30' DRAINAGE EASEMENT

SEE DRAINAGE PUMP PLAN - SHEET NO. 28, 29

SUBDIVISION BOUNDARY

SECTION 4 T 19 S R 1 W S.B.M.

SECTION 3 T 19 S R 1 W S.B.M.

FOR OFFSITE GRADING SEE LETTER OF PERMISSION DATED APRIL 24, 1986

SCALE 1"=50'

SEE SHEET NO. 16

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV.: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald J Van Ert 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD SAN MARCOS, CA 92069 (619) 744-4800

PRIVATE CONTRACT J-9592

GRADING PLANS FOR:

BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 15 OF 33 SHEETS

TM 84-0843
W.O. NO. 840843

C.R. Fowler 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
A CHANGE	REC	C.R. Fowler	5-1-87	
AS-BUILT	REC.	BRM	5-10-88	

CONT. CERTIFICATION
130 73
LAMB. COORDINATES

CONTRACTOR R.C. HARLAND DATE STARTED 8-1-88
INSPECTOR G. MARTIN DATE COMPLETED 2-2-89

22611-15-D

A REVISED DRAINAGE OUTLET

85845

SEE SHEET NO. 16

LOT 6

LOT 7

LOT 8

LOT 9

BRITANNIA COURT

SCALE 1"=50'

SECTION 4 T 19 S R 1 W S.B.M.

SECTION 3 T 19 S R 1 W S.B.M.

SUBDIVISION BOUNDARY

FOR OFFSITE GRADING SEE LETTER OF PERMISSION DATED APRIL 24, 1986

DECOMPOSED GRANITE ACCESS ROAD

ABM DITCH D=4'

15' DRAINAGE EASEMENT

HEADWALL

SEE SPILLWAY DETAIL SHEET NO. 12

SEE SANDBAG DETAIL SHEET NO. 12

18" RCP

5' TYPE "B" INLET

I.E. = 464.7

I.E. = 465.7

ABM DITCH - D=4'

25' DRAINAGE EASEMENT

0.20%

2:1

0.5%

FILL

CUT

TYPE "B" HDWL PER D-32 I.E. 472.50

30'-24" RCP (2000-D)@1%

0.8%

TYPE "B" HDWL PER D-32 I.E. 472.20

0.6%

25' DECOMPOSED GRANITE ACCESS ROAD 0.6%

I.E. 71.8

UNITED STATES

MEXICO

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US. NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV.: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

STORM DRAIN DATA				
NO.	DELTA OR BRG	RADIUS	LENGTH	REMARKS
(1)	N 0°50'26" W		30'	24" RCP

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291 0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729 4987
365 S. RANCHO SANTA FE RD SAN MARCOS, CA 92069 (619) 744 4800

PRIVATE CONTRACT J-9592

GRADING PLANS FOR:

BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 17 OF 33 SHEETS

C.R. Laulau 5-30-86
FOR CITY ENGINEER DATE

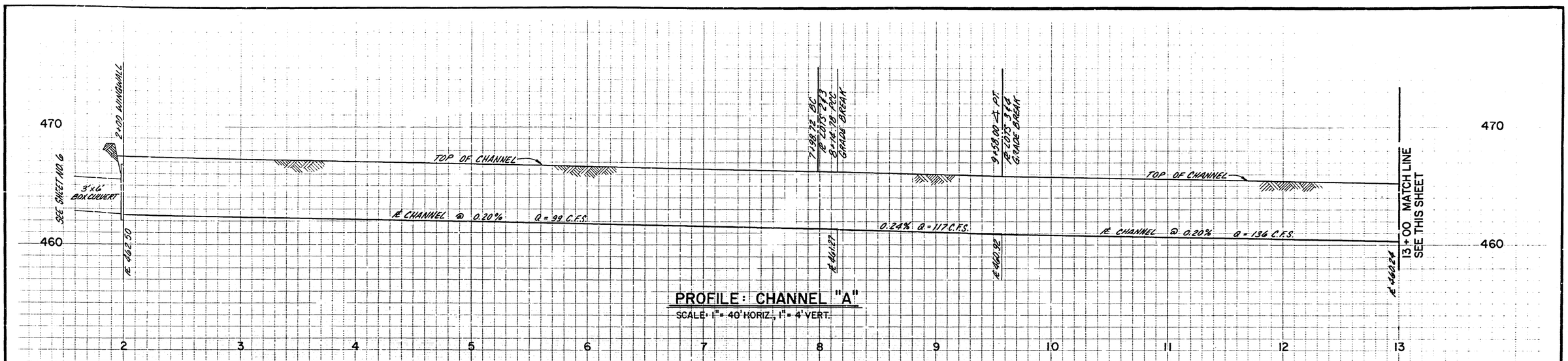
T.M. 84-0843
W.O. NO. 840843

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS-BUILT	REC.	[illegible]	2-10-88	

CONTROL CERTIFICATION
LAT. 135-[illegible]73 LONGITUDE

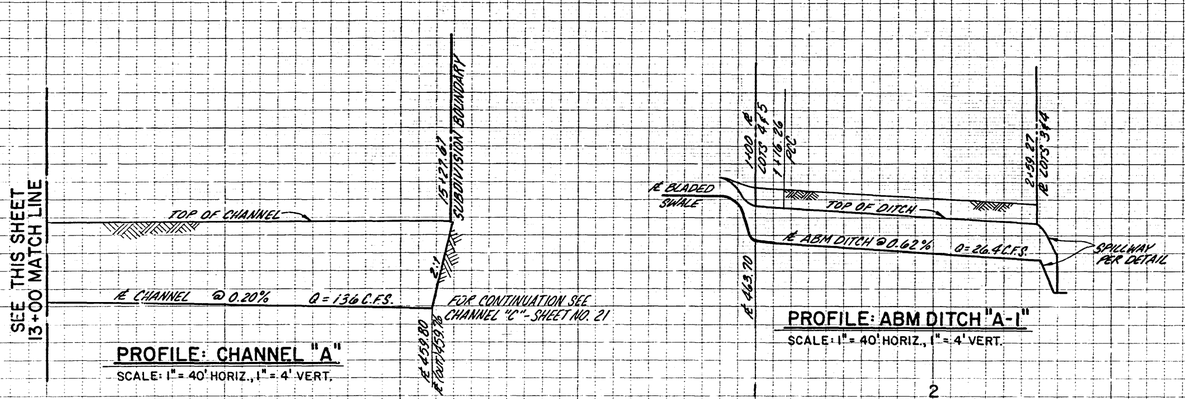
CONTRACTOR RC HAZARD DATE STARTED 8-1-86
INSPECTOR E. FARLEY DATE COMPLETED 12-88

22611-17-D



PROFILE: CHANNEL "A"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

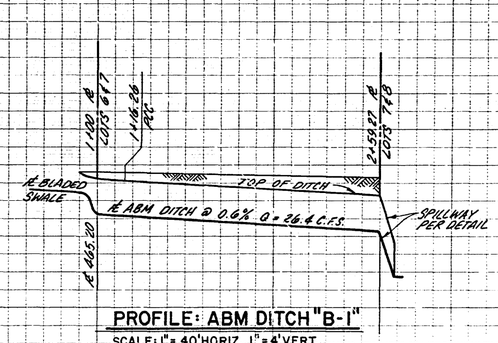


PROFILE: CHANNEL "A"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

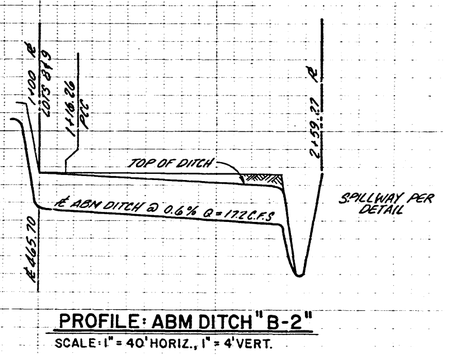
PROFILE: ABM DITCH "A-1"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



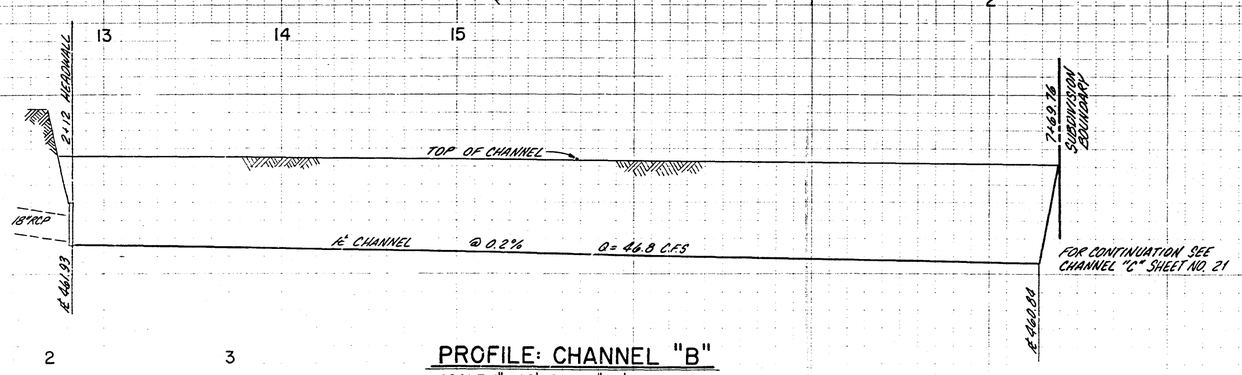
PROFILE: ABM DITCH "B-1"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



PROFILE: ABM DITCH "B-2"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.



PROFILE: CHANNEL "B"

SCALE: 1" = 40' HORIZ., 1" = 4' VERT.

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BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert 4-1-86

JERALD L. VAN ERT R.C.E. 20984 DATE

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD. SAN MARCOS, CA. 92069 (619) 744-4800

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

DRAINAGE CHANNEL PROFILES

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 20 OF 33 SHEETS

T.M. 84-0843
W.O. NO 840843

C.R. Tucker 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
AS BUILT	P.E.C.	GRM	3/10/88	

CONTRACTOR R.E. HAZARD DATE STARTED 6-1-86
INSPECTOR D. MARTIN DATE COMPLETED 1-8-88

CONTRACT IDENTIFICATION
138 73
LAMBERT COORDINATES
22611-20-D

0 1 2 3 4 IN.

SECTION 33
T 19 S
R 1 W S.B.M.

SECTION 34 T 19 S R 1 W S.B.M.

SCALE 1"=50'

EXIST. R/W

SUBDIVISION BOUNDARY

SIEMPRE VIVA ROAD

BOULEVARD

BRITANNIA

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

BRISTOW COURT

SECTION 3 T 19 S R 1 W S.B.M.

SECTION 4
T 19 S
R 1 W S.B.M.

SUBDIVISION BOUNDARY

10' DRAINAGE EASEMENT

25' DRAINAGE EASEMENT

DRAINAGE EASEMENT WIDTH VARIES

TYPE "B" INLET

TYPE "B-1" INLET

3'x5' BOX CULVERT

2'x5' BOX CULVERT

HEADWALL

HYDROSEED (TYPICAL)

SEE SPILLWAY SHEET NO.12

SEE SPILLWAY DETAIL SHEET NO.12

SEE A.B.M. DITCH BLADED SWALE CONNECTION DETAIL SHEET NO.12

HYDROSEED MIX

	pounds/acre
FIBER MULCH	2,000
GRO-POWER PLUS IRON (5-3-1)	1,000
ECOLOGY CONTROL "M" BINDER	150
ALYSSUM MARITIMUM "SWEET ALYSSUM"	3
ATRIPLEX SEMIBACCATA "PROSTRATE SALT BUSH"	15
BROMIS MOLLIS "BROME GRASS"	5
CYNODON DACTYLON (HULLED) "COMMON BERMUDA GRASS"	40
LOLIUM MULTIFLORUM "ANNUAL RYEGRASS"	250

APPLY HYDROSEED BETWEEN OCTOBER 15 AND MAY 15 TO TAKE ADVANTAGE OF NATURAL RAINFALL. AFTER MAY 15 APPLY WATER BY TANK TRUCK TWICE WEEKLY FOR ONE MONTH.

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

US NAVY PROPERTY COR. MON. SW OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEV: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Gerald L Van Ert 11-21-85

JERALD L. VAN ERT R.C.E. 20984 DATE

REGISTERED LANDSCAPE ARCHITECT
Eiji K. Nakamaki
DATE 1-31-86
STATE OF CALIFORNIA

SEE SHEET NO.23

PRIVATE CONTRACT J-9592

EROSION CONTROL PLAN FOR:

BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 22 OF 33 SHEETS

T.M. 84-0843
W.O. 840843

C.R. Taylor 5-30-86
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				11
AS BUILT	R.E.C.	C.R.T.	9-10-86	

CONTROL CERTIFICATION
138-1
LAMBERT AYES

CONTRACTOR R.E. HAZARD DATE STARTED 8-1-86
INSPECTOR G. NORTON DATE COMPLETED 1-8-88

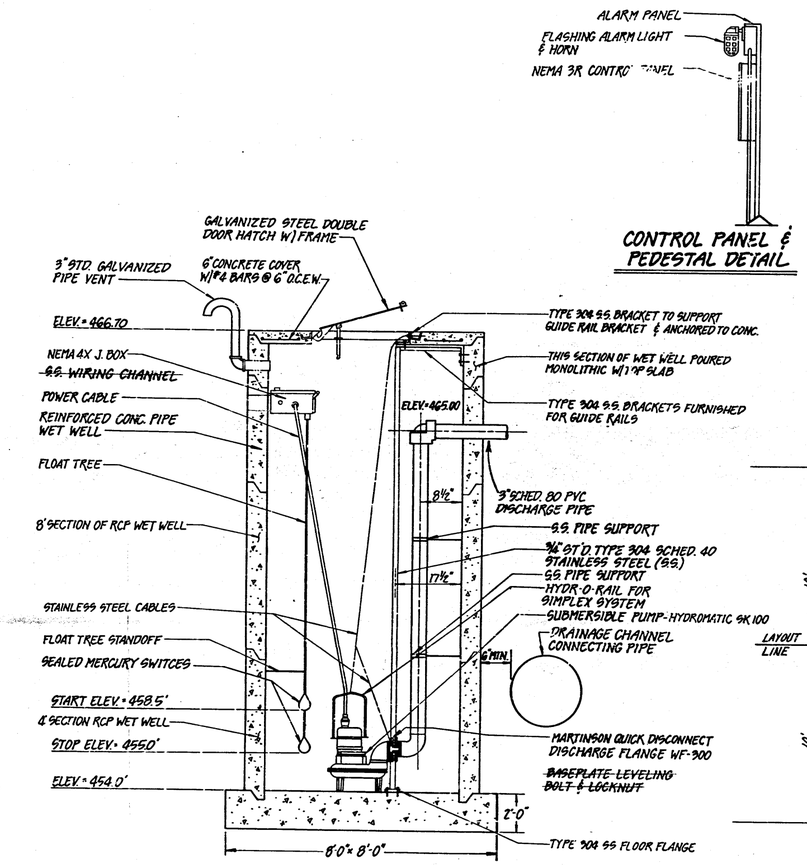
22611-22-D

AS BUILT

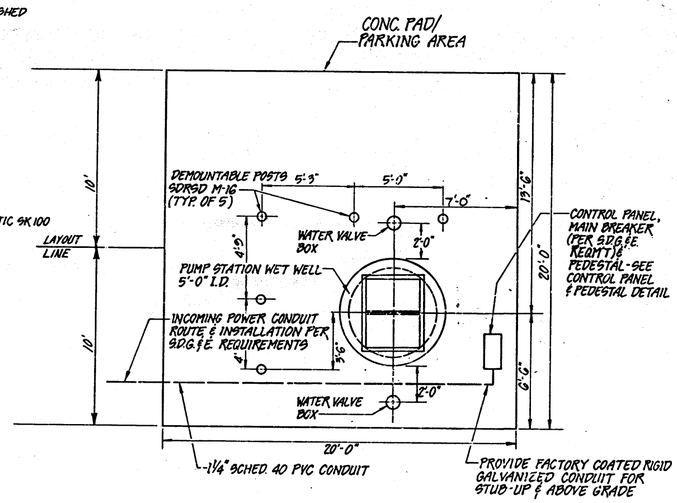
The Nakamaki Group
LANDSCAPE ARCHITECTURE
411 Camino Del Rio South • Suite 209
San Diego, California 92108

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3088 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD SAN MARCOS, CA 92069 (619) 744-4800

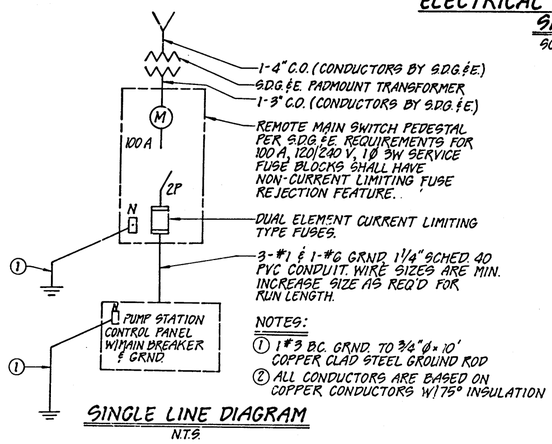
0 1 2 3 4 IN.



PUMP STATION ELEVATION
N.T.S.



ELECTRICAL AND PUMP STATION SITE PLAN
SCALE: 1/4"=1'-0"



SINGLE LINE DIAGRAM
N.T.S.

POWELL
John Powell & Associates, Inc.
Consulting Civil Engineers
175 Calle Magdalena, Suite 101
Encinitas, CA 92024
(619) 753-1120

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
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365 S. RANCHO SANTA FE RD. SAN MARCOS, CA 92069 (619) 744 4800

PUMP STATION NOTES

SCOPE - THE CONTRACTOR SHALL FURNISH AND INSTALL ONE PREFABRICATED SIMPLEX AUTOMATIC SUBMERSIBLE PUMP PUMP STATION. THE STATION SHALL BE COMPLETE WITH ALL EQUIPMENT SPECIFIED HEREIN AND ALL OTHER EQUIPMENT NEEDED FOR A COMPLETE AND PROPERLY OPERATING FACILITY. THE PRINCIPAL ITEMS OF EQUIPMENT SHALL INCLUDE ONE SUBMERSIBLE PUMP, HYDR-O-RAIL SYSTEM, VALVE, INTERNAL PIPING, MOTOR CONTROL PANEL, AUTOMATIC LIQUID LEVEL CONTROL SYSTEM, INTERNAL WIRING, WET WELL, ELECTRICAL POWER SUPPLY AND SITE WORK.

SUBMERSIBLE PUMP AND MOTOR - THE PUMP SHALL BE OF THE SEALED SUBMERSIBLE TYPE, HYDROMATIC MODEL SK100 WITH AN SK75 IMPELLER OR EQUAL. PUMP VOLUTE, MOTOR AND SEAL HOUSING ARE TO BE HIGH QUALITY GRAY CAST IRON. ALL EXTERNAL MATING PARTS SHALL BE MACHINED AND O-RING SEALED. ALL FASTENERS SHALL BE CORROSION-RESISTANT STAINLESS STEEL. IMPELLER IS TO BE TWO-VANE, SEMI-OPEN TYPE WITH PUMP OUT VANES ON THE BACK SHROUD. THE PUMP SHALL BE CAPABLE OF HANDLING A 2-INCH SPHERICAL SOLIDS. THE VERTICAL DISCHARGE SHALL BE EQUIPPED WITH 3" NPT. THE PUMP SHALL BE CAPABLE OF DISCHARGING 120 GPM AT 17 FT. TOTAL HEAD AND SHALL OPERATE PROPERLY OVER A RANGE OF DISCHARGE HEAD FROM 6 FT. TO 18 FT. WITHOUT VIBRATION, CAVITATION OR MOTOR OVERLOAD. THE MOTOR SHALL BE A MINIMUM OF ONE HORSEPOWER WITH A 1.15 MINIMUM SERVICE FACTOR. THE MOTOR SHALL OPERATE ON SINGLE PHASE, 60 HZ, 120/240 VOLT POWER.

POWER CORD - ELECTRICAL POWER CORD SHALL HAVE AN OUTER JACKET WHICH IS RESISTANT TO OIL AND OTHER MATERIALS NORMALLY FOUND IN SEWAGE OR DRAINAGE WATER. POWER CORD IS TO BE SEALED, NOT ONLY BY USE OF A CORD GRIP, BUT SHALL HAVE INDIVIDUAL CONDUCTORS SEALED INTO THE CORD CAP ASSEMBLY WITH EPOXY SEALING COMPOUND. THE CORD CAP ASSEMBLY SHALL BE SEALED WITH AN O-RING. THIS WILL PROVIDE A DOUBLE-SEALED, WATER-TIGHT POWER CORD ENTRY THROUGH WHICH LIQUID CANNOT ENTER THE MOTOR BY FOLLOWING INDIVIDUAL CONDUCTORS INSIDE THE INSULATION.

STATOR WINDINGS - THE STATOR WINDING, ROTOR AND BEARINGS ARE TO BE MOUNTED IN A SEALED SUBMERSIBLE TYPE HOUSING. THIS IS FILLED WITH HIGH-DIELECTRIC OIL TO GIVE SUPERIOR HEAT TRANSFER AND LONGER BEARING LIFE. THE PUMP AND MOTOR ARE TO BE SPECIFICALLY DESIGNED SO THAT THEY MAY BE OPERATED PARTIALLY OR COMPLETELY SUBMERGED IN THE LIQUID BEING PUMPED. THE PUMP SHOULD NOT REQUIRE COOLING WATER JACKETS. STATORS SHALL BE SECURELY HELD IN PLACE WITH FOUR BOLTS SO THAT THEY MAY BE EASILY REMOVED IN THE FIELD WITHOUT THE USE OF HEAT OR A PRESS. STATORS MUST BE CAPABLE OF BEING REPAIRED OR REWOUND BY A LOCAL MOTOR SERVICE STATION. NO SPECIAL TOOLS SHALL BE REQUIRED FOR PUMP AND MOTOR DISASSEMBLY.

MECHANICAL SEAL - THE PUMP SHALL BE MANUFACTURED WITH A CARBON AND CERAMIC FACED MECHANICAL SHAFT SEAL FOR LONG LEAK-PROOF LIFE.

CONTROL PANEL - THE CONTROL PANEL SHALL BE A HYDROMATIC BULLETIN 710-0 OR APPROVED EQUAL. THE CONTROL PANEL SHALL BE A NEMA 3R RAINPROOF ENCLOSURE WITH SEPARATE REMOVABLE INSIDE BASE PLATE TO MOUNT ALL COMPONENTS. THE OUTSIDE DOOR SHALL HAVE PROVISION FOR LOCKING. THE CONTROL COMPONENTS SHALL INCLUDE: PUMP CIRCUIT BREAKER, MAGNETIC CONTACTOR, FUSES, CONTROL TRANSFORMER, TERMINAL BLOCK FOR INCOMING POWER/NEUTRAL, TERMINAL BLOCK FOR FLOATS, HEAT SENSOR AND SEAL FAILURE, (ROUND LOG, RUN LIGHT, H.O.A. SWITCH, RUST INHIBITOR, UL LABEL (INSIDE DOOR). THE CONTROL PANEL SHALL BE MOUNTED ON A GALVANIZED STEEL PEDESTAL SECURELY MOUNTED TO THE CONCRETE PAD.

POWER SUPPLY - ALL POWER SUPPLY COMPONENTS INCLUDING CONDUIT, TRANSFORMER, METER, CIRCUIT BREAKERS, CABINETS, AND OTHER ITEMS SHALL CONFORM TO AND BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SDG&E.

MERCURY SWITCH LEVEL CONTROL - MERCURY SWITCH LEVEL CONTROLS SHALL BE HYDROMATIC MODEL 3900, BULLETIN 710.1 OR APPROVED EQUAL. SEALED FLOAT TYPE MERCURY SWITCHES SHALL BE SUPPLIED TO CONTROL SUMP LEVEL AND ALARM SIGNAL. THE MERCURY TUBE SWITCHES SHALL BE SEALED IN A SOLID POLYURETHANE FLOAT FOR CORROSION AND SHOCK RESISTANCE. THE SUPPORT WIRE SHALL HAVE HEAVY NEOPRENE JACKET AND A WEIGHT SHALL BE ATTACHED TO CORD ABOVE THE FLOAT TO HOLD SWITCH IN PLACE IN SUMP. WEIGHT SHALL BE ABOVE THE FLOAT TO PREVENT SHARP BENDS IN THE CORD WHEN THE FLOAT OPERATES UNDER WATER. THE FLOAT SWITCHES SHALL HANG IN THE SUMP SUPPORTED ONLY BY THE CORD THAT IS HELD TO THE NEMA 4 JUNCTION BOX OR THE WIRING CHANNEL. TWO FLOAT SWITCHES SHALL BE USED, ONE FOR PUMP TURN-ON ONE FOR PUMP TURN-OFF.

ALARM SYSTEM PANEL - A SEPARATE HYDROMATIC NEMA 3R PANEL SHALL BE PROVIDED FOR THE ALARM SYSTEM. THE WARNING SIGNAL SHALL INCLUDE BOTH FLASHING LIGHT AND AUDIBLE HORN. THE PANEL SHALL INCLUDE THE FOLLOWING FEATURES: TEST BUTTONS FOR LIGHT AND HORN ALARMS.

CONDUIT - ALL CONDUIT AND FITTINGS SHALL BE UL LISTED. LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE CONSTRUCTED OF A SMOOTH, FLEXIBLE GALVANIZED STEEL CORE WITH A SMOOTH ABRASION RESISTANT, LIQUID TIGHT, POLYVINYL CHLORIDE COVER.

OPERATION OF SYSTEM - THE LEVEL CONTROL SYSTEM SHALL CONTINUOUSLY MONITOR THE WET WELL LEVEL. WHEN THE WATER LEVEL IN THE WET WELL REACHES THE UPPER LEVEL MERCURY SWITCH THE PUMP SHALL BE CALLED ON. WHEN THE LEVEL IN THE WET WELL DROPS TO THE LOWER MERCURY SWITCH THE PUMP SHALL BE SHUT OFF. IF THE WATER LEVEL RISES TO THE START LEVEL MERCURY SWITCH AND THE PUMP DOES NOT START WHEN CALLED TO DO SO, THE ALARM SYSTEM SHALL BE ACTIVATED.

WET WELL - CONCRETE WET WELL SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS. THE WET WELL WALLS SHALL BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE PIPE. ALL CONCRETE SHALL CONTAIN 7 SACKS OF PORTLAND TYPE II CEMENT PER CUBIC YARD.

WET WELL COVER - THE WET WELL COVER SHALL CONSIST OF A HINGED DOUBLE DOOR STEEL HATCH WITH UPPER RAILGUIDES (FOR HYDR-O-RAIL SYSTEM) AND SET INTO A PRECAST CONCRETE LID AS SHOWN ON THE DRAWINGS. HATCH AND FRAME SHALL BE GALVANIZED STEEL WITH LOCKING MECHANISM, SAFETY LATCH TO HOLD THE DOORS OPEN, AND DROP HANDLE.

PVC (POLYVINYL CHLORIDE) DISCHARGE PIPE - PVC DISCHARGE PIPE SHALL BE MADE FROM ALL NEW RIGID UNPLASTICIZED POLYVINYL CHLORIDE AND SHALL BE NORMAL IMPACT (TYPE I) SCHEDULE 80, UNLESS OTHERWISE SHOWN. ELBOWS AND TEES SHALL BE OF THE SAME MATERIAL AS THE PIPE. JOINTS SHALL BE SOLVENT-WELDED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS INCLUDING PRIMER. ALL EXPOSED PIPE AND FITTINGS SHALL UTILIZE A SOLVENT COLOR WHICH MATCHES THE COLOR OF THE PIPE AND FITTINGS. PVC DISCHARGE PIPE SHALL CONFORM TO THE REQUIREMENTS OF THE "STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PLASTIC PIPE, SCHEDULES 40, 80, AND 120," ASTM D1785.

PVC INLET PIPE - INLET PIPE SHALL BE 8-INCH PVC WATER PIPE WITH INTEGRAL BELL AND SPIGOT JOINTS AND SHALL MEET THE REQUIREMENTS OF AWWA C900.

INLET GATE VALVE - THE INLET GATE VALVES SHALL BE AN 8-INCH RESILIENT SEATED GATE VALVE RATED FOR 150 PSI AND SHALL CONFORM TO AWWA STANDARD C509. A VALVE WELL AND VALVE STEM EXTENSION SHALL BE PROVIDED.

AN EPOXY COATING SHALL BE APPLIED TO ALL FERROUS SURFACES IN THE WATER PASSAGE OF THE VALVE, EXCLUSIVE OF STAINLESS STEEL.

RAIL MOUNTING SYSTEM - THE RAIL MOUNTING SYSTEM SHALL BE A HYDR-O-RAIL SIMPLEX SYSTEM BULLETIN 610.5A OR APPROVED EQUAL. THE SYSTEM SHALL INCLUDE THE FOLLOWING COMPONENTS: BASE PLATE WITH LOWER RAIL GUIDES, CAST IRON BASE ELBOW, SEALING FLANGE ASSEMBLY, PUMP CARRIER CHAIN, STEEL HATCH WITH UPPER RAIL GUIDE AND WIRING CHANNEL.

MISCELLANEOUS METAL - THE CONTRACTOR SHALL FURNISH, FABRICATE AND INSTALL ALL STRUCTURAL STEEL AND MISCELLANEOUS METALWORK AS SPECIFIED AND SHOWN. ALL STRUCTURAL STEEL SHAPES, PLATES, BARS, AND THEIR PRODUCTS SHALL CONFORM TO THE "SPECIFICATIONS FOR STRUCTURAL STEEL" (ASTM A36). UNLESS OTHERWISE SHOWN, ALL MISCELLANEOUS METALWORK OF FABRICATED STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION.

TESTING AND START-UP - FOLLOWING COMPLETION OF THE PUMP STATION INSTALLATION, ALL COMPONENTS AND FUNCTIONS SHALL BE TESTED AND DEMONSTRATED TO OPERATE PROPERLY AS SPECIFIED OR WARRANTED. SHOULD THE STATION FAIL TO OPERATE PROPERLY OR TO MEET ALL SPECIFIED CONDITIONS, THE CONTRACTOR SHALL MAKE ALL NEEDED REPAIRS OR REPLACEMENTS AT NO EXTRA COST AS IS NECESSARY TO ASSURE A COMPLETE AND PROPERLY FUNCTIONING PUMP STATION.

OVERALL PUMP STATION - THE EQUIPMENT, APPARATUS, AND PARTS FURNISHED SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR, EXCEPTING ONLY THOSE ITEMS THAT ARE NORMALLY CONSUMED IN SERVICE, SUCH AS LIGHT BULBS, OIL, GREASE, PACKING, GASKETS, O-RINGS, ETC. THE PUMP STATION MANUFACTURER SHALL BE SOLELY RESPONSIBLE FOR THE WARRANTY OF THE STATION AND ALL COMPONENTS.

COMPONENTS FAILING TO PERFORM AS SPECIFIED BY THE ENGINEER, OR AS REPRESENTED BY THE MANUFACTURER, OR PROVEN DEFECTIVE IN SERVICE DURING THE WARRANTY PERIOD, SHALL BE REPLACED, REPAIRED, OR SATISFACTORILY MODIFIED BY THE MANUFACTURER WITHOUT COST OF PARTS OR LABOR TO THE OWNER.

EFFECTIVE DATE - THE WARRANTY SHALL BECOME EFFECTIVE UPON THE ACCEPTANCE BY THE PURCHASER OR THE PURCHASER'S AUTHORIZED AGENT, OR NINETY (90) DAYS AFTER INSTALLATION, WHICHEVER OCCURS FIRST.

SUBSTITUTIONS - AFTER THE EXECUTION OF THE CONTRACT, SHOULD THE CONTRACTOR DESIRE TO SUBSTITUTE EQUIPMENT OTHER THAN THAT SPECIFIED IN THE CONTRACT, SUCH SUBSTITUTION WILL BE CONSIDERED FOR ONE REASON ONLY: THE EQUIPMENT PROPOSED FOR SUBSTITUTION IS SUPERIOR IN CONSTRUCTION AND EFFICIENCY TO THAT SPECIFIED IN THE CONTRACT, AND HIGHER QUALITY HAS BEEN DEMONSTRATED BY SERVICE IN A SIMILAR INSTALLATION.

IN THE EVENT THE CONTRACTOR OBTAINS ENGINEER'S APPROVAL OF EQUIPMENT OTHER THAN THAT FOR WHICH WAS ORIGINALLY SPECIFIED, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, MAKE ANY CHANGES IN THE STRUCTURES, BUILDINGS OR PIPING NECESSARY TO ACCOMMODATE THE EQUIPMENT, AND SHALL FURNISH AS-BUILT DRAWINGS TO ENGINEER.

IT WILL BE ASSUMED THAT THE COST TO THE CONTRACTOR OF THE EQUIPMENT PROPOSED TO BE SUBSTITUTED IS LESS THAN THAT OF THE EQUIPMENT SPECIFIED IN THE CONTRACT AND IF THE SUBSTITUTION IS APPROVED, THE CONTRACT PRICE SHALL BE REDUCED BY THE AMOUNT EQUAL TO THE SAVINGS.

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

U.S. NAVY PROPERTY COR. MON. S.W. OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEVATION: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L. Van Ert DATE: 4-2-87

JERALD L. VAN ERT R.C.E. 20984

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

PRIVATE DRAINAGE PUMP

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 32 OF 333 SHEETS

T.M. 84-0843
W.O. 840843

C.R. Ladley 5-1-87
FOR CITY ENGINEER — DATE — DIVISION HEAD

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	R.E.C.			
AS-BUILT	J.P.A.	[illegible]	3-10-88	

DESIGN ENGINEER

CONTROL CERTIFICATION

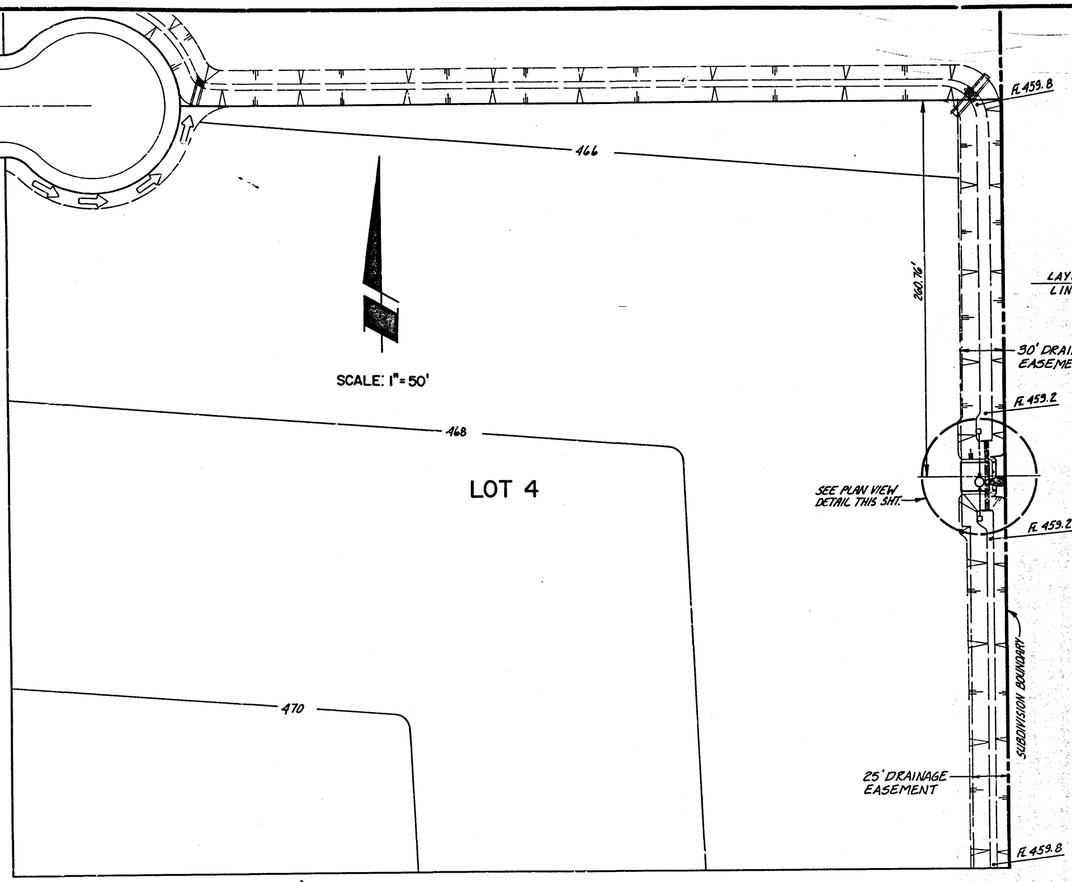
138-1773
LAMBERT COORDINATES

CONTRACTOR R.C. RICHARD DATE STARTED 8-1-86
INSPECTOR C. CRITTEN DATE COMPLETED 1-6-88

22611-32-D

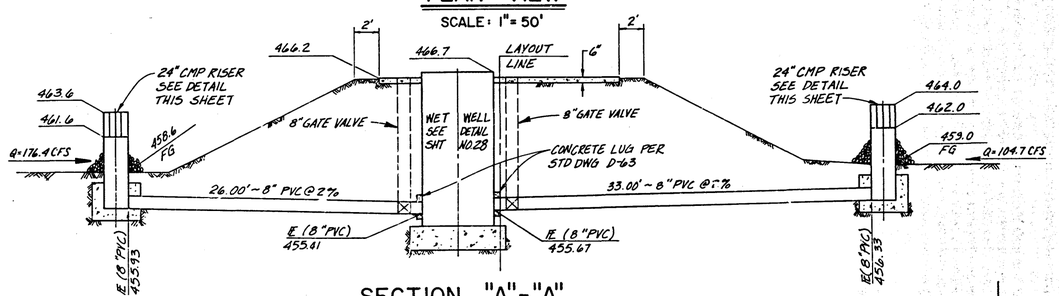
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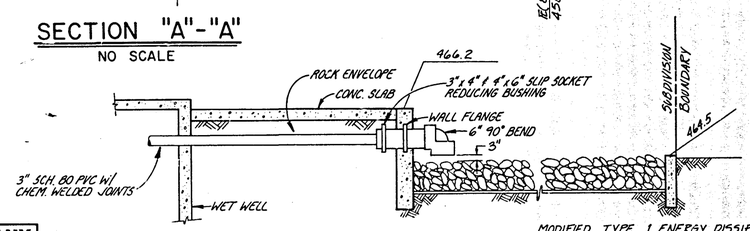
PLAN VIEW

SCALE: 1"= 50'



SECTION "A"-"A"

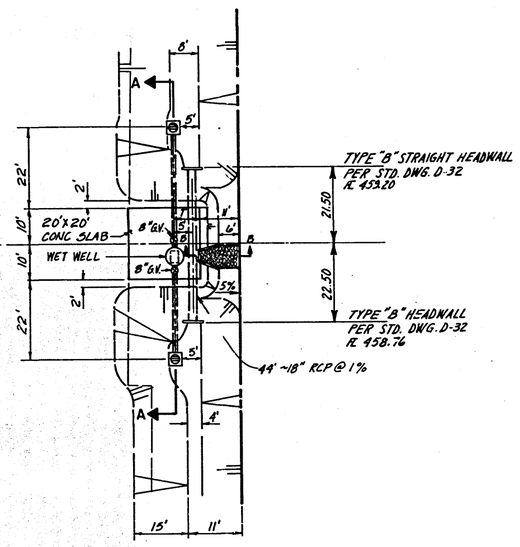
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MODIFIED TYPE I ENERGY DISSIPATER PER STD D-401 WITH NO.2 BACKING SEE SILL WALL DETAIL THIS SHEET

SECTION "B-B"

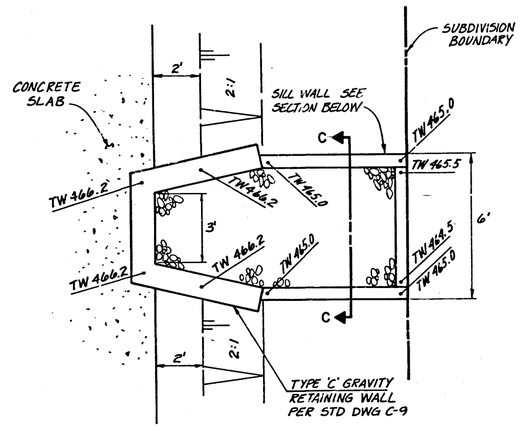
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LAYOUT LINE

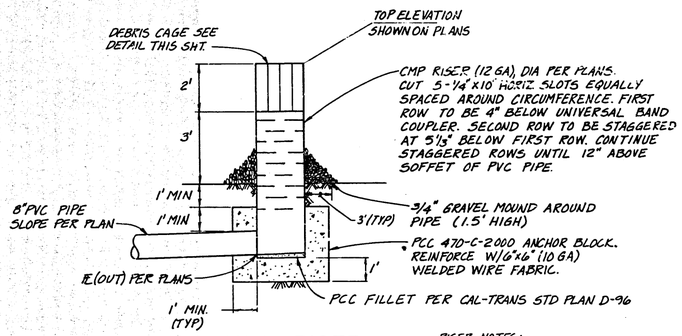
DETAIL: PLAN VIEW

NO SCALE



DETAIL: SILL WALL

NO SCALE

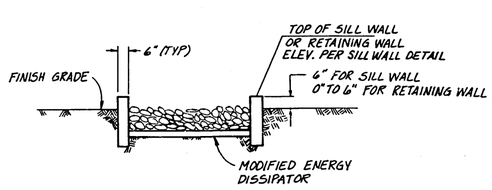


DETAIL: RISER

NO SCALE

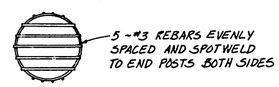
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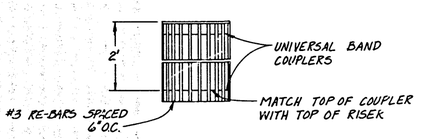
1. FOR DETAILS NOT SHOWN HEREON SEE CAL-TRANS STANDARD PLAN D-96.
2. SEDIMENT TO BE REMOVED AFTER EVERY RAIN STORM OR WHEN REACHING AN ELEVATION OF 460.0.



SECTION "C"-"C"

NO SCALE





DETAIL: DEBRIS CAGE

NO SCALE

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION UNTIL THE NOTICE TO PROCEED OR A BONDED SUBDIVISION PERMIT HAS BEEN ISSUED BY THE CITY ENGINEER.

BENCH MARK

U.S. NAVY PROPERTY COR. MON. S.W. OF INTERSECTION OTAY MESA & HERITAGE ROAD AT COR. CHAIN LINK FENCE.

ELEVATION: 504.644 DATUM: M.S.L.

ENGINEER OF WORK

Jerald L Van Ert DATE: 4-2-87

JERALD L. VAN ERT R.C.E. 20984

RICK ENGINEERING COMPANY
CIVIL ENGINEERS · PLANNING CONSULTANTS · SURVEYORS
5620 FRIARS ROAD SAN DIEGO, CALIFORNIA 92110 (619) 291-0707
3388 PIO PICO DRIVE CARLSBAD, CALIFORNIA 92008 (619) 729-4987
365 S. RANCHO SANTA FE RD SAN MARCOS, CA 92069 (619) 744-4900

PRIVATE CONTRACT J-9592

PLANS FOR THE IMPROVEMENT OF:

PRIVATE DRAINAGE PUMP

IN THE BRITANNIA COMMERCE CENTER

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 33 OF 33 SHEETS

T.M. 84-0843
W.O. NO. 840843

P.K. Lardner FOR CITY ENGINEER — 5-1-87 DATE — DIVISION HEAD

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	R.E.C.			
AS-BUILT	R.E.C.	[illegible]	3-10-88	

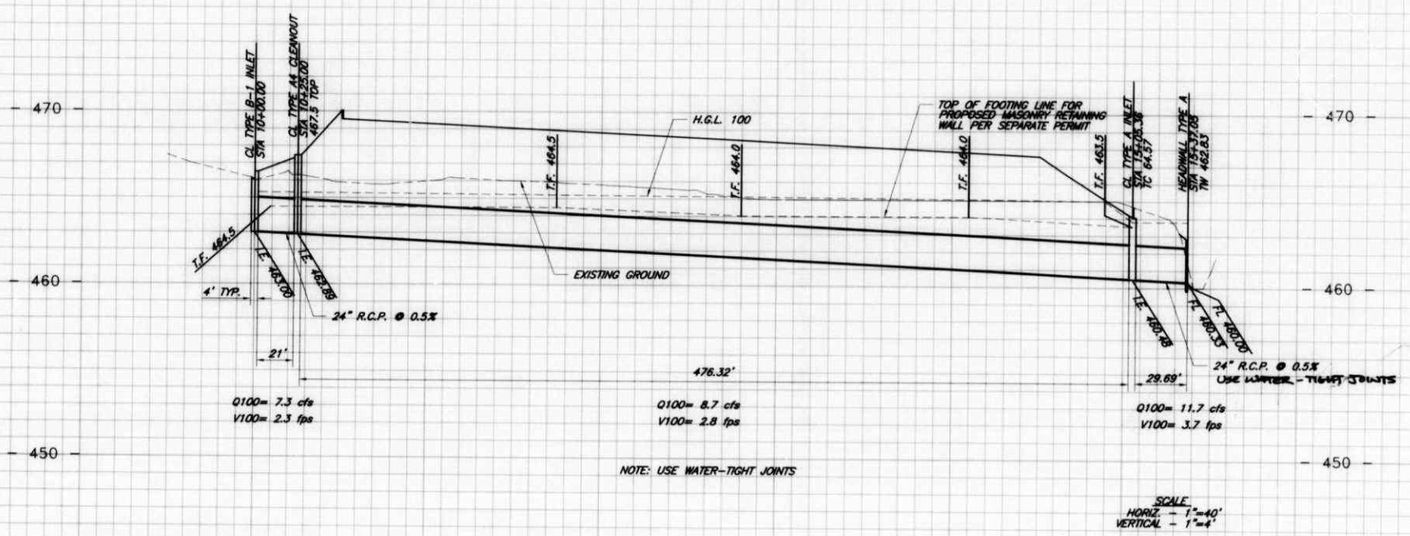
DESIGN ENGINEER

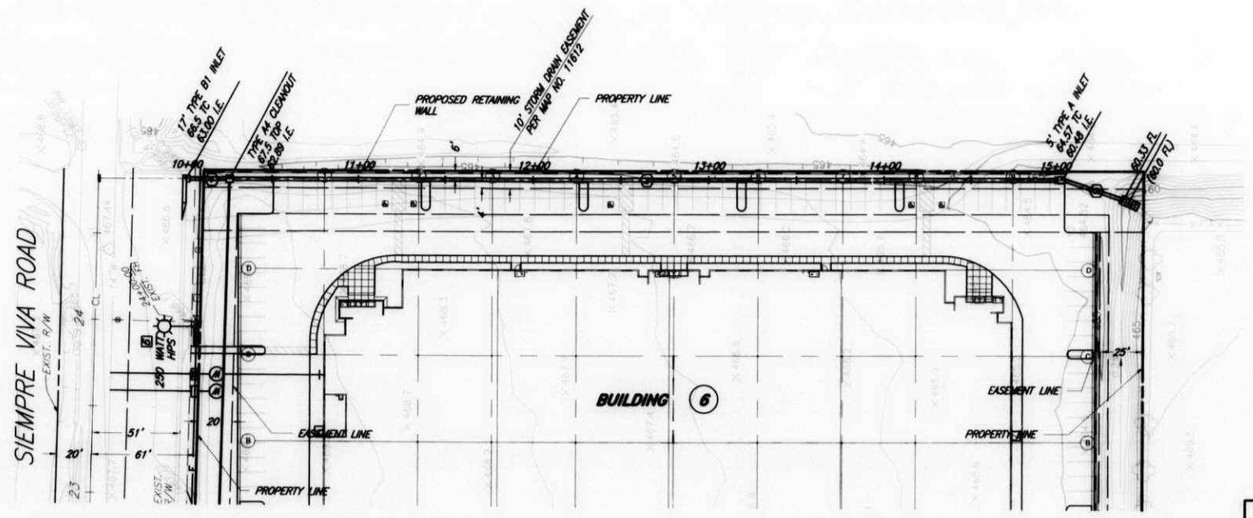
CONTROL CERTIFICATION 138-1773

LAMBERT COORDINATES 22611-33-D

CONTRACTOR AE HAZARD — DATE STARTED 8-1-88
INSPECTOR G. BRATTON — DATE COMPLETED 8-3-88

NEW SHEET





PUBLIC STORM DRAIN TABLE			
NO.	BEARING	LENGTH	DESCRIPTION
1	N0°18'30"W	21.00'	24" R.C.P. S.D. @ 0.5%
2	N0°18'30"W	476.32'	24" R.C.P. S.D. @ 0.5%
3	N44°23'17"W	29.69'	24" R.C.P. S.D. @ 0.5%

USE WATER TIGHT JOINTS FOR ALL REACHES OF 24" R.C.P. PER THIS SHEET.

SCALE: 1"= 40'

GRAPHIC SCALE

0 20 40 80 120

PRIVATE CONTRACT

PUBLIC STORM DRAIN PLAN AND PROFILE FOR:
BRITANNIA CORPORATE CENTER
LOTS 2 AND 3 OF MAP 11612

SB&O
PLANNING DESIGN CONSULTATION
Land Planning
Civil Engineering
Land Surveying
SB&O, Inc.
27715 JEFFERSON AVENUE, SUITE 201
Temecula, California 92590 (909) 693-3310

REGISTERED PROFESSIONAL ENGINEER — DANIEL J. O'ROURKE — No. 47677 — Exp. 12/31/03 — CIVIL — STATE OF CALIFORNIA

7-23-01
DANIEL J. O'ROURKE R.C.E. 47677 DATE

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 7 OF 23 SHEETS

7/23/01
CITY ENGINEER DATE

W.O. NO. 410184

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				

1780-6335
NAD 83 COORDINATES

138-1773
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

31066-7-D

07-24-01

56712G07.DWG

56712.20

FILMED FROM THE ORIGINAL. BEST QUALITY OBTAINABLE. EXCESSIVE GRAY BACKGROUND MAY CAUSE A POOR QUALITY REPRODUCTION.

0 1 2 3 4IN

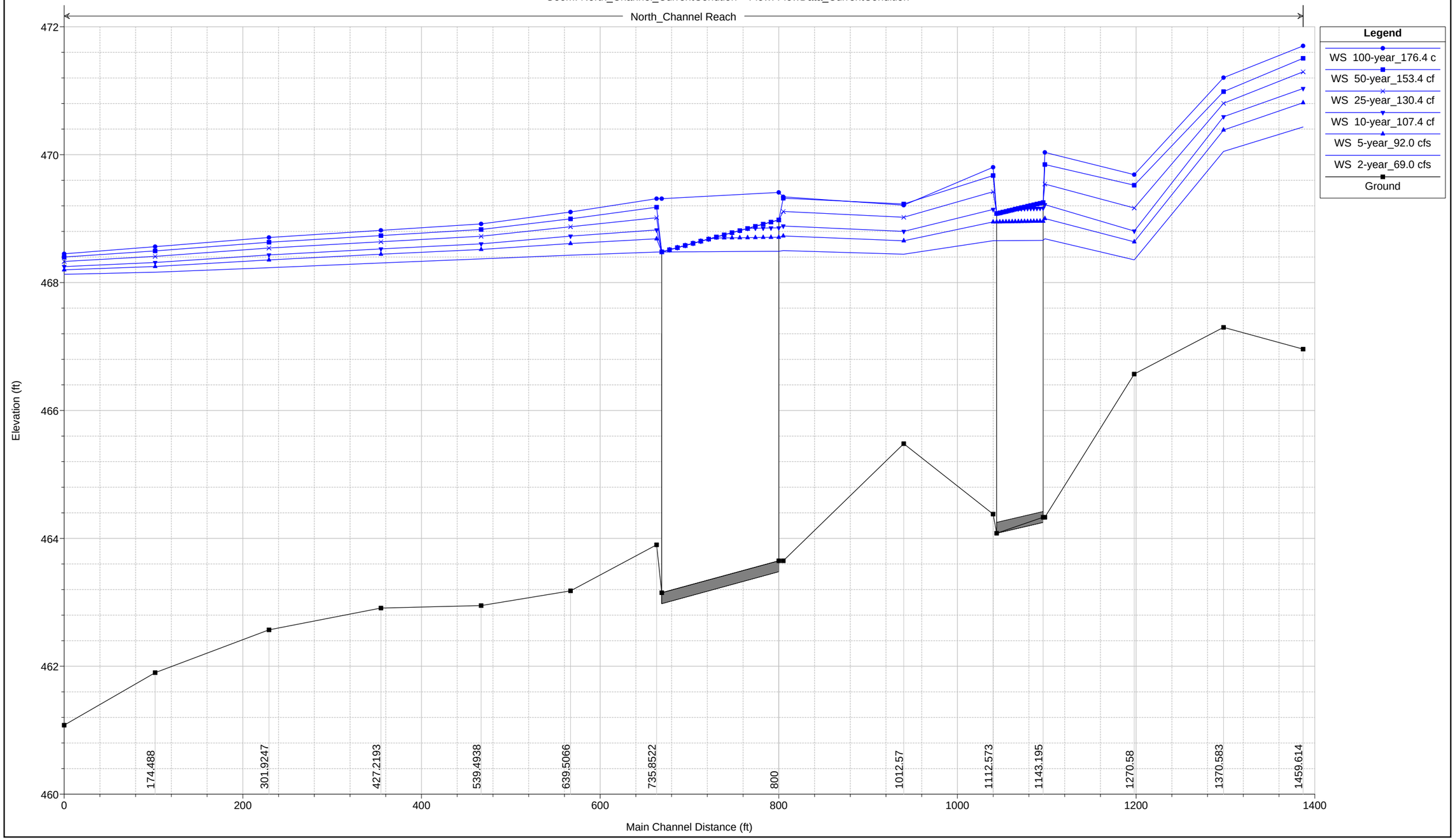
Attachment 8 – FEMA FIRMETTE AND FEMA FIS

No FEMA FIRM Map
is Available for this Channel

Attachment 9 – HEC-RAS HTDRAULIC PROFILES FOR CURRENT VEGETATED CONDITION MODEL

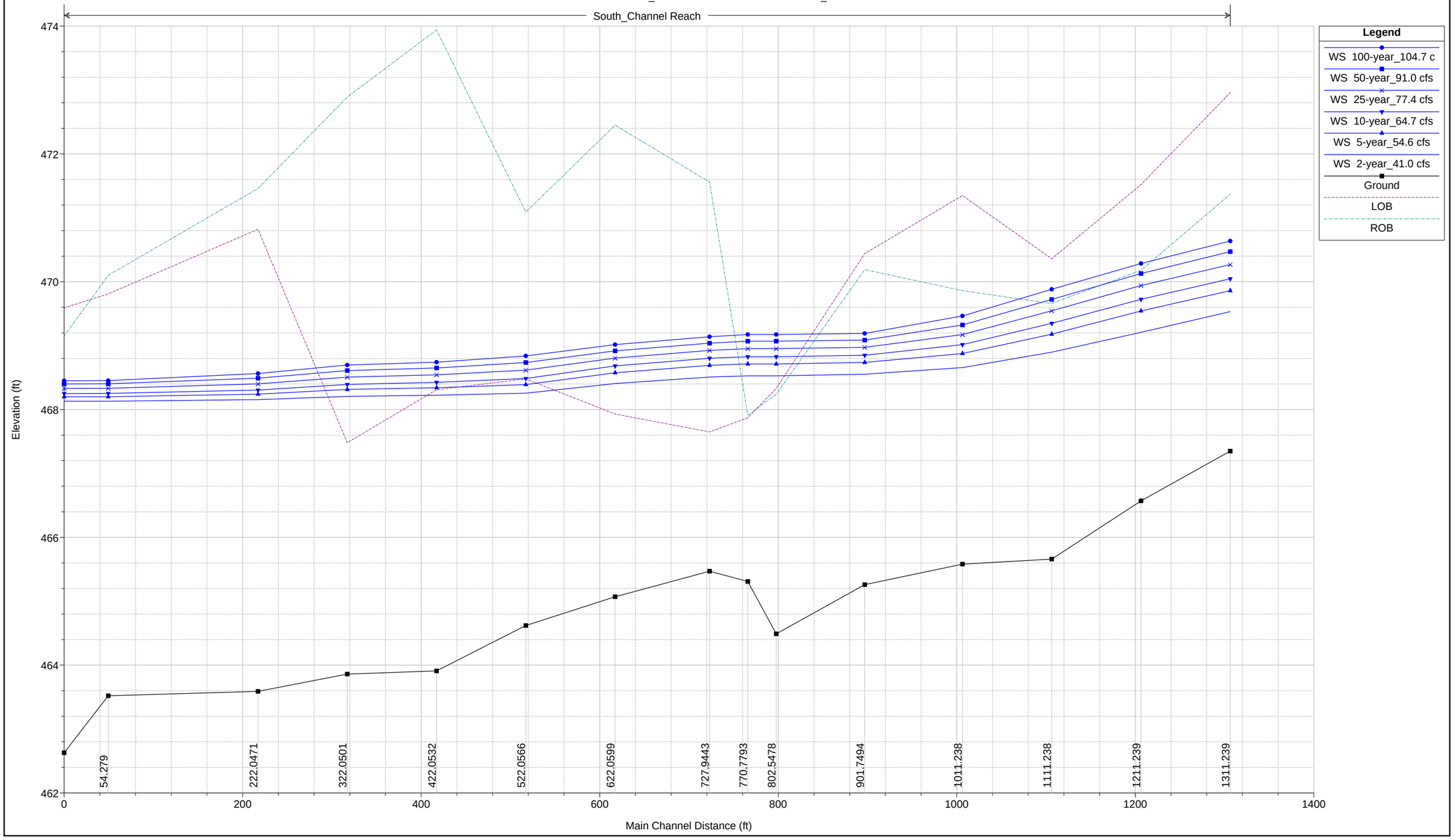
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017

Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition



17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017

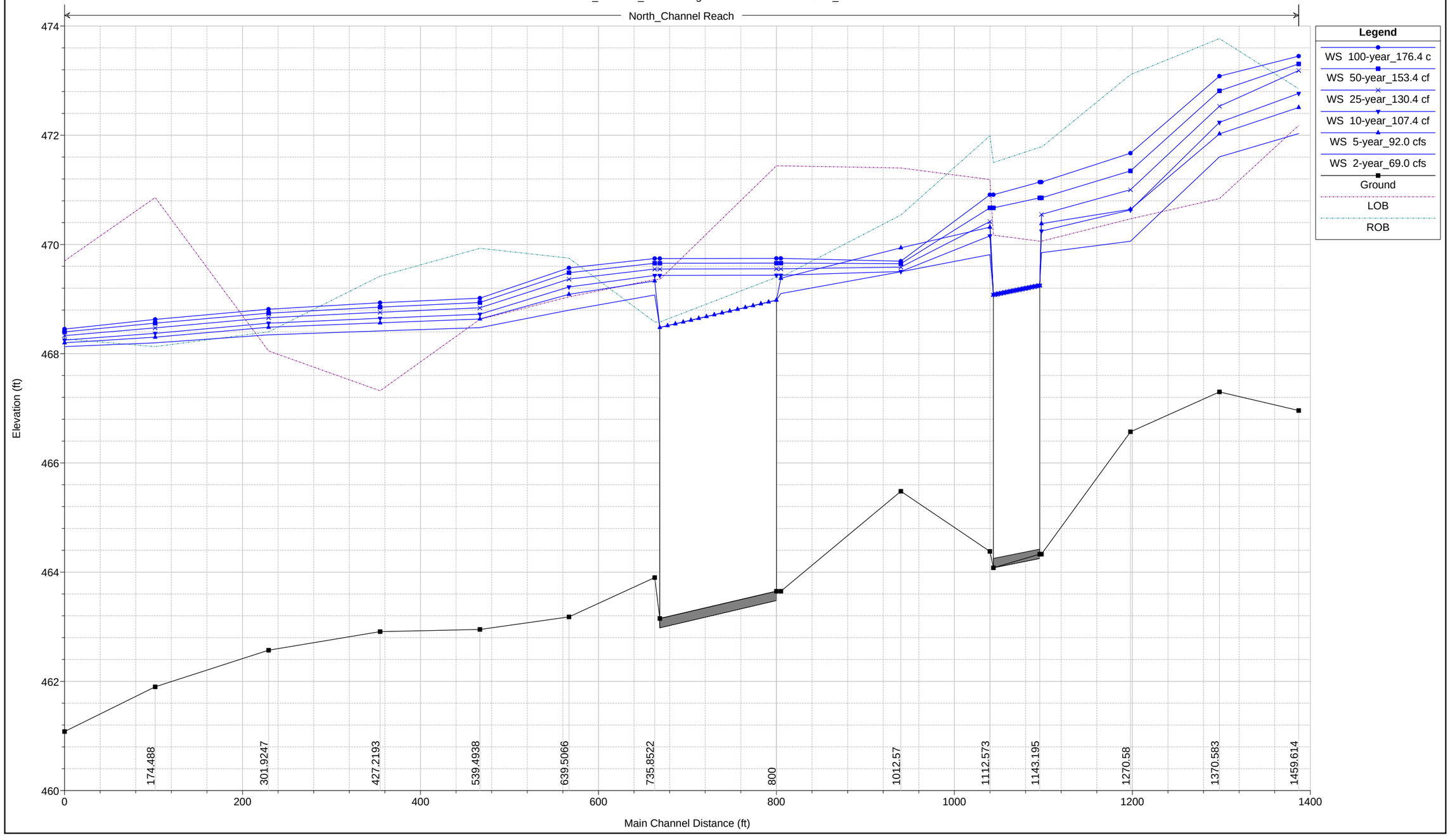
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition



Attachment 10 – HEC-RAS HYDRAULIC PROFILES FOR ULTIMATE VEGETATED CONDITION MODEL

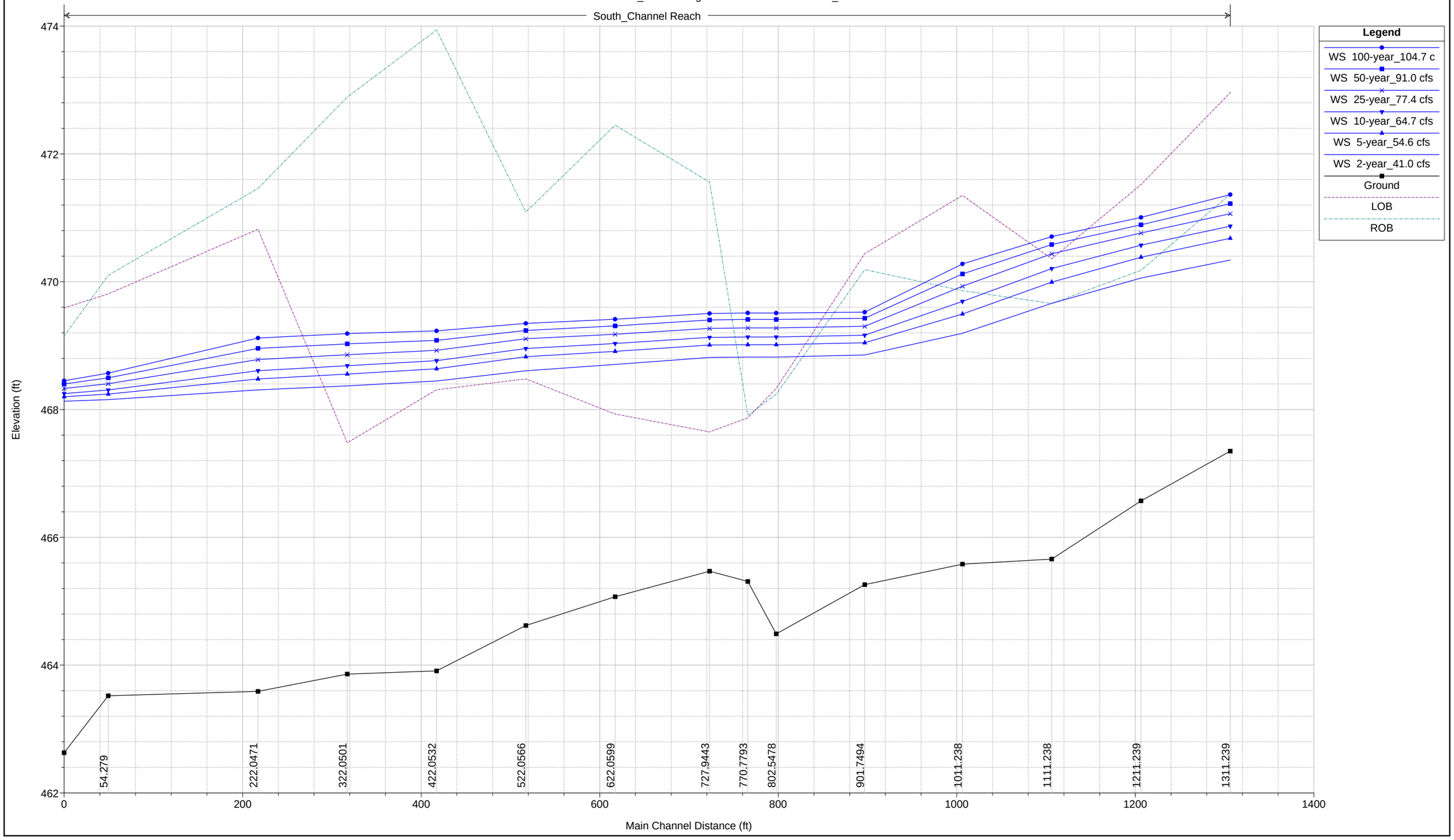
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017

Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition



17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017

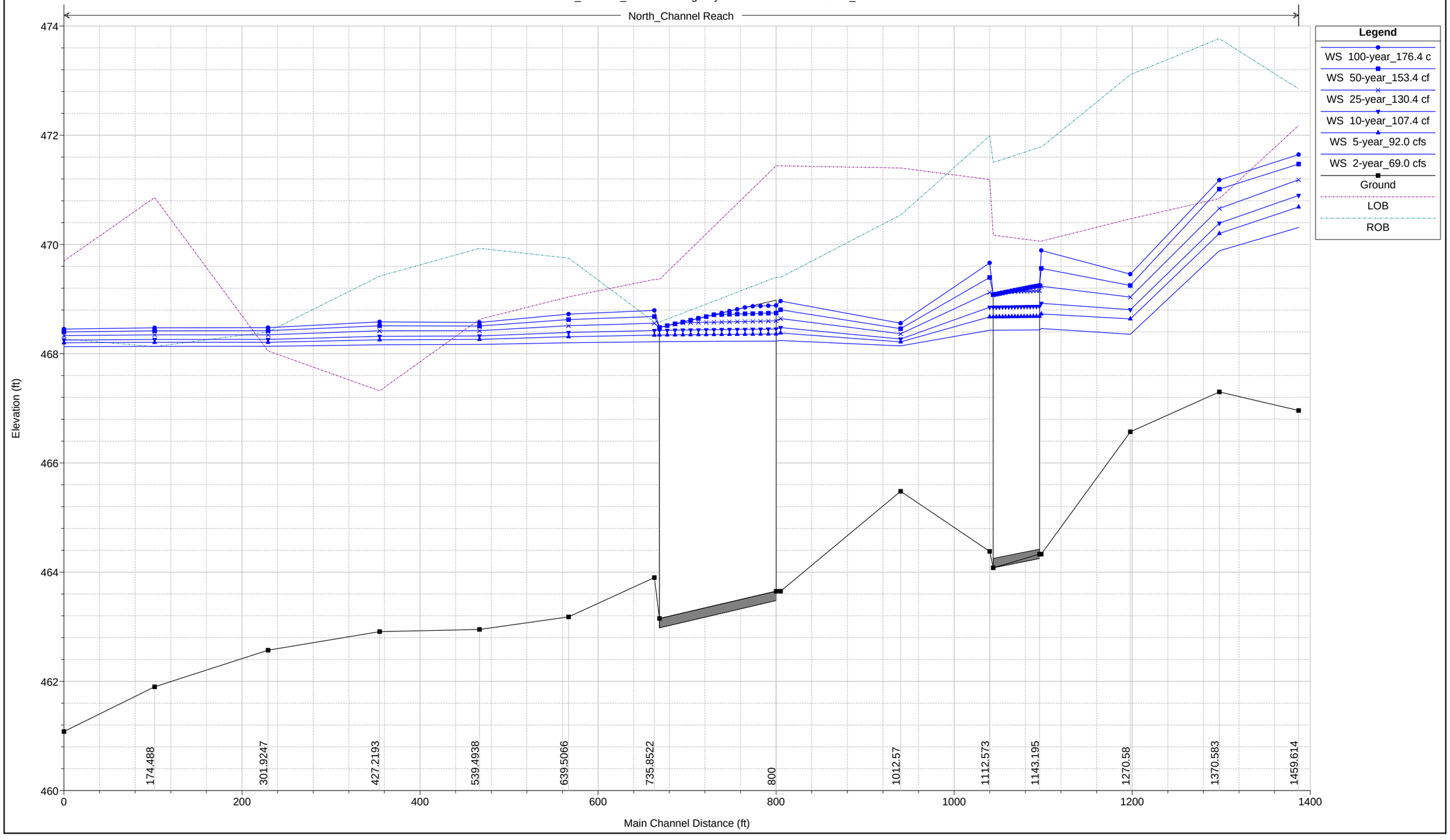
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition



Attachment 11 – HEC-RAS HYDRAULIC PROFILES FOR MAINTAINED CONDITION MODEL – VEGETATION ONLY (NO SEDIMENT REMOVED)

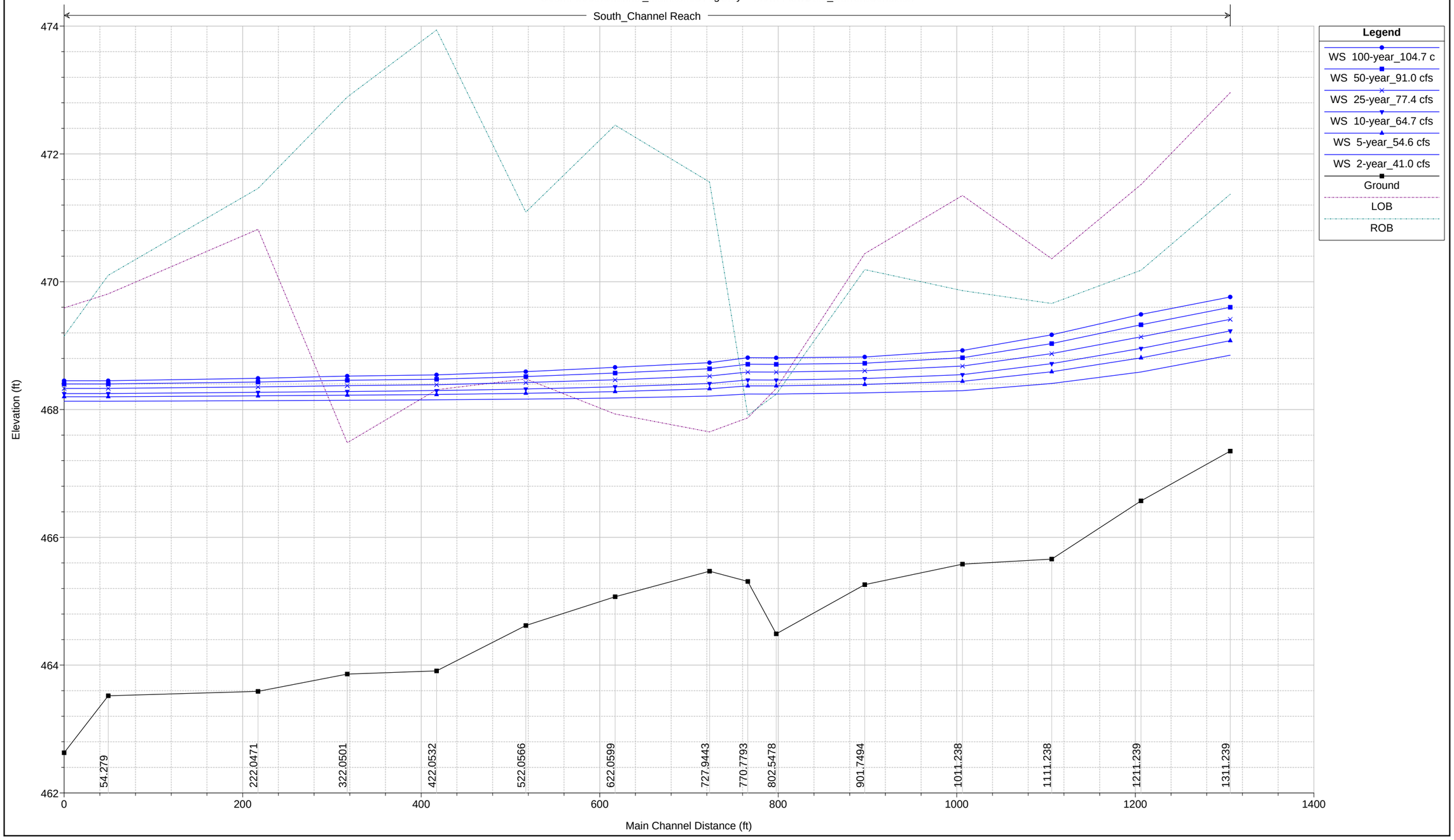
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017

Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition



17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017

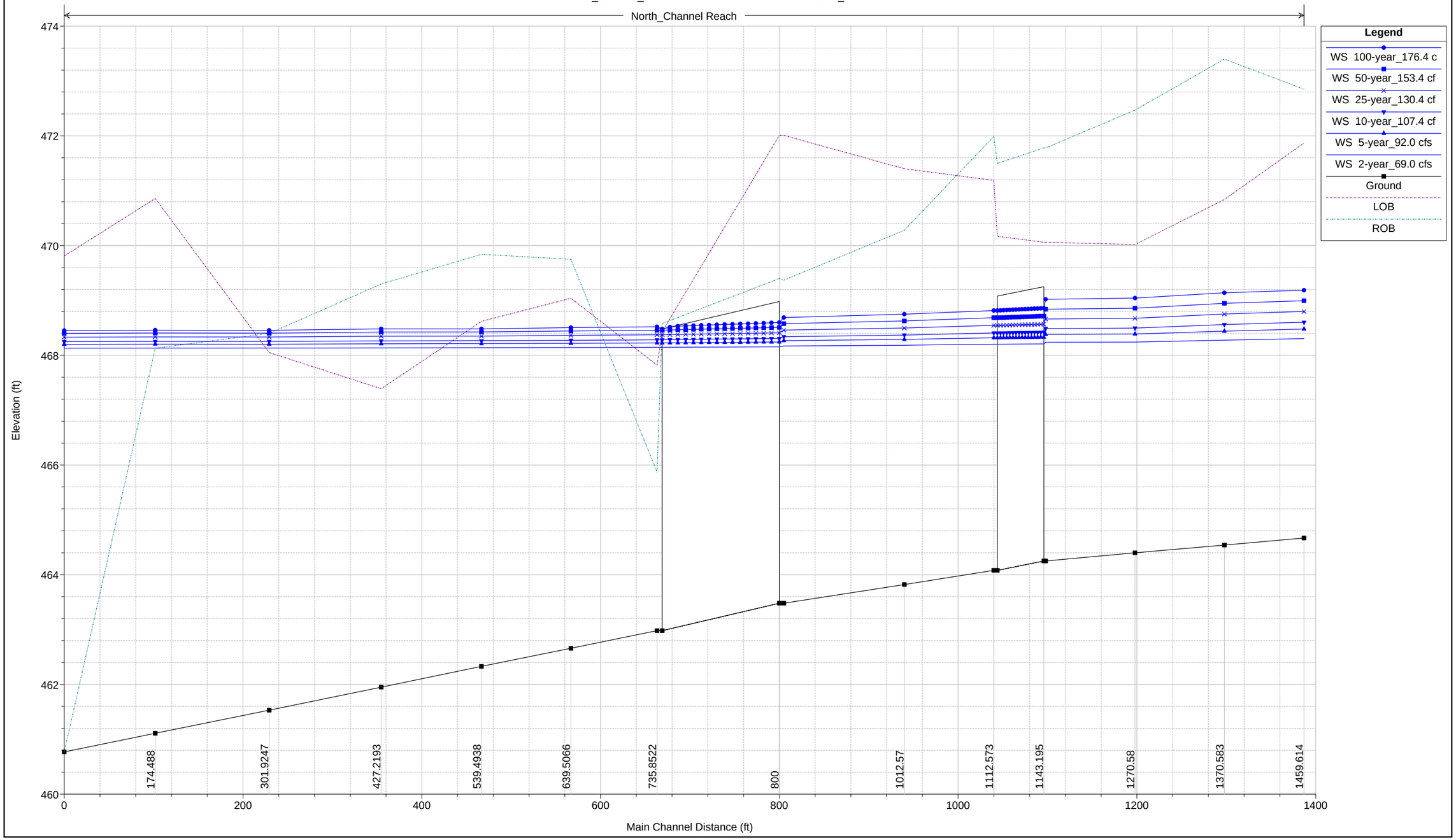
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition



Attachment 12 – HEC-RAS HYDRAULIC PROFILES FOR MAINTAINED CONDITION MODEL – SEDIMENT AND VEGETATION REMOVED

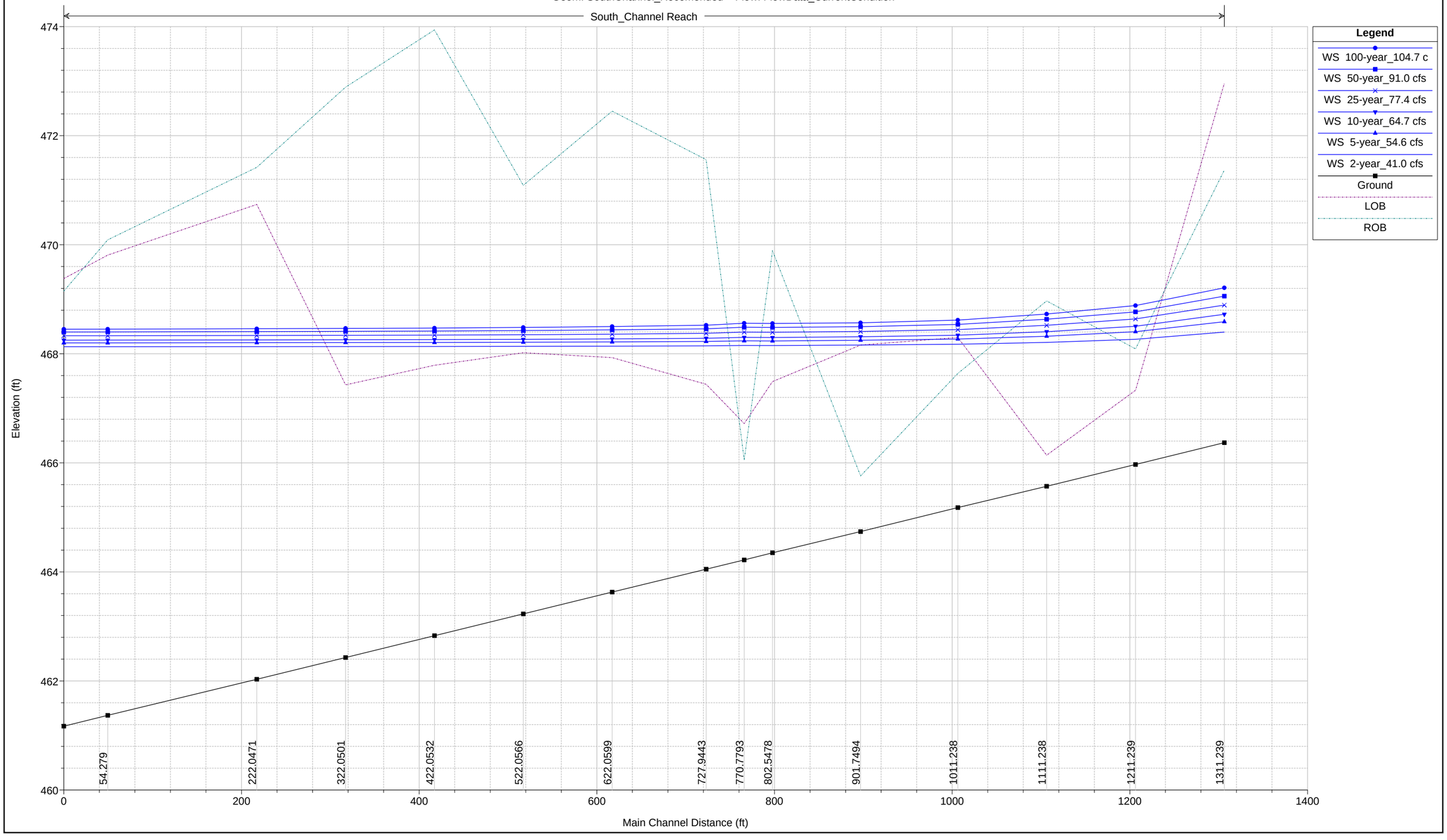
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017

Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition



17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017

Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition



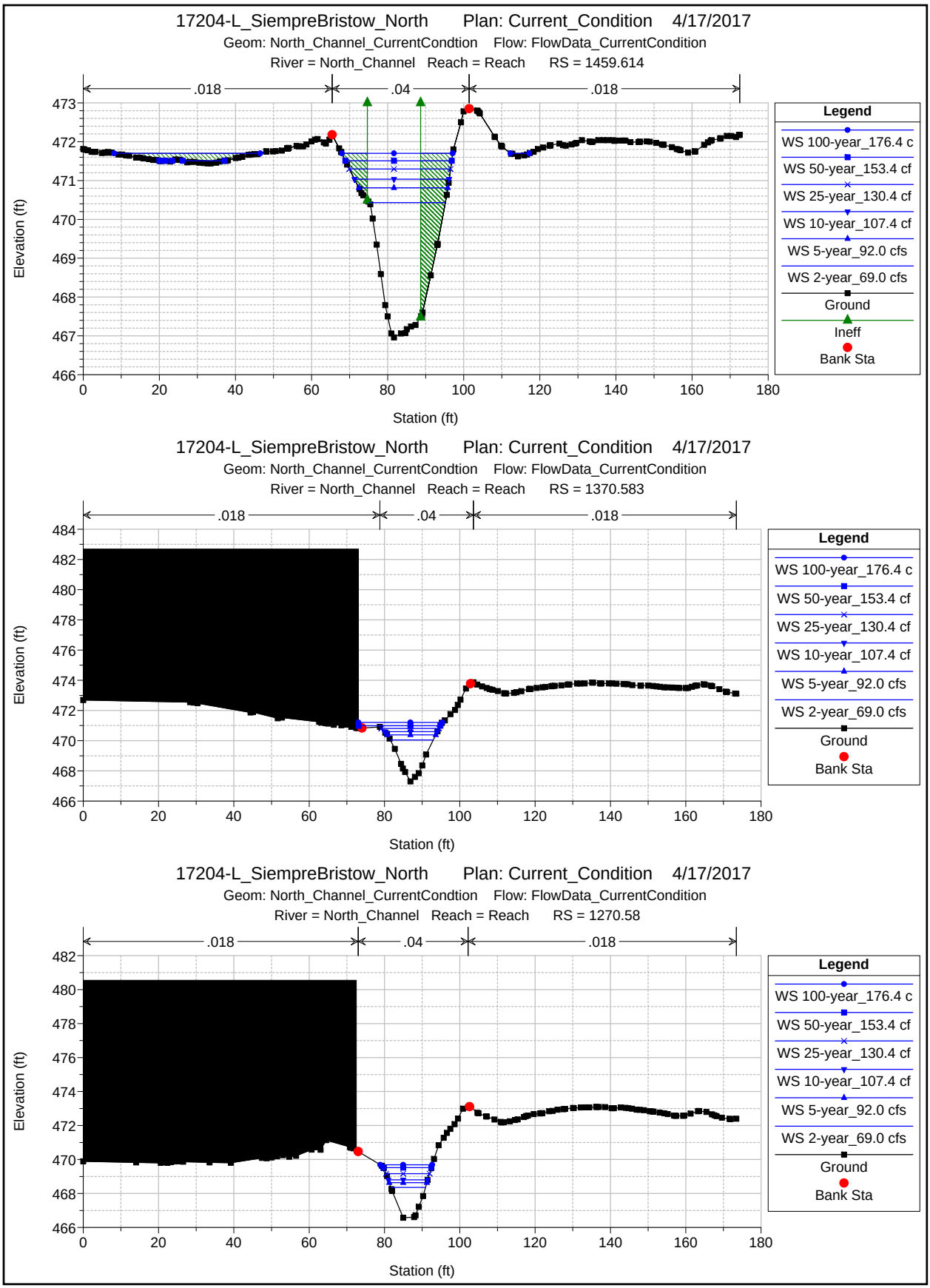
Attachment 13 - DETAILED HEC-RAS HYDRAULIC RESULTS FOR CURRENT VEGETATED CONDITION MODEL

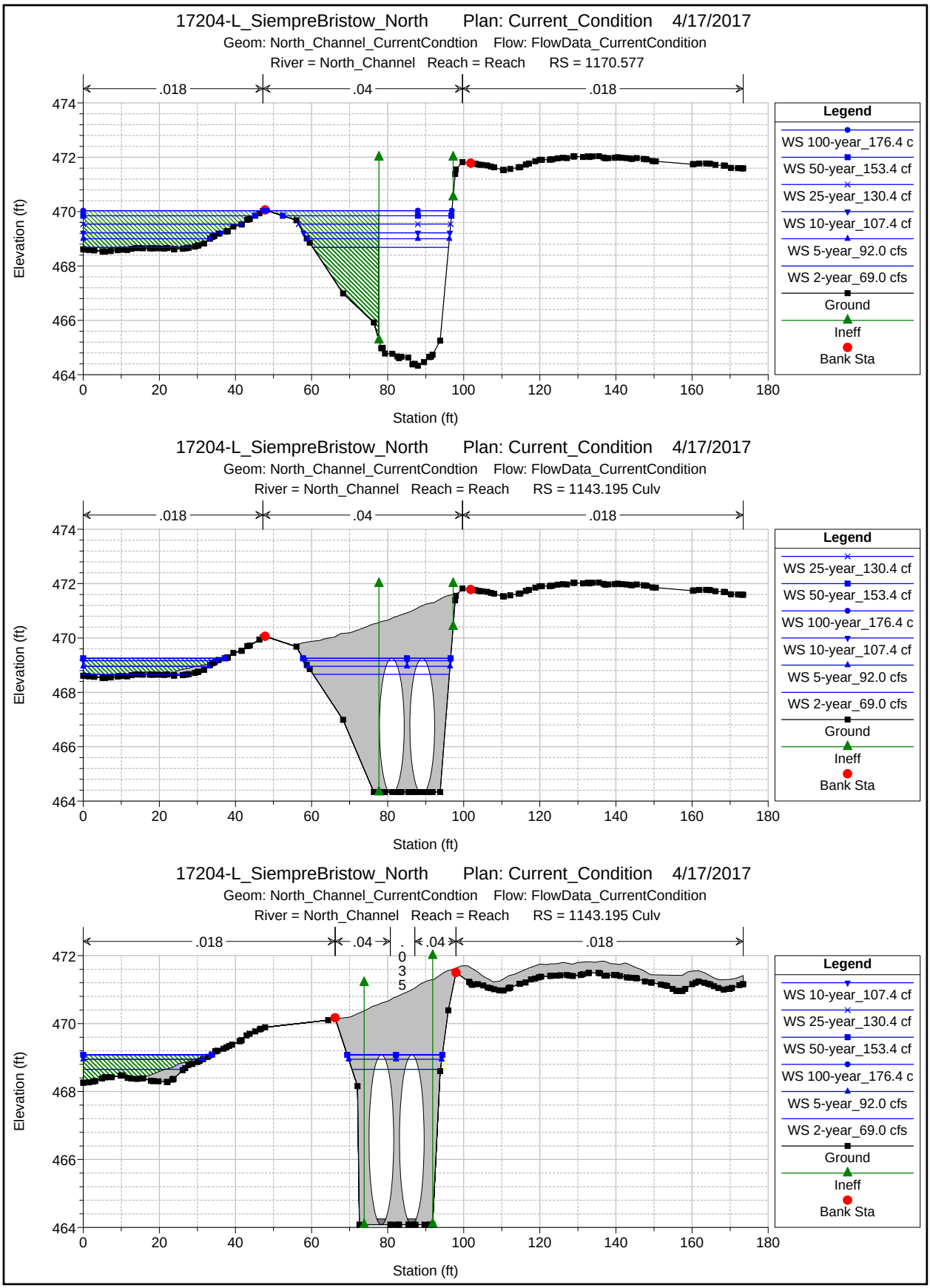
HEC-RAS Plan: Current_Cond River: North_Channel Reach: Reach

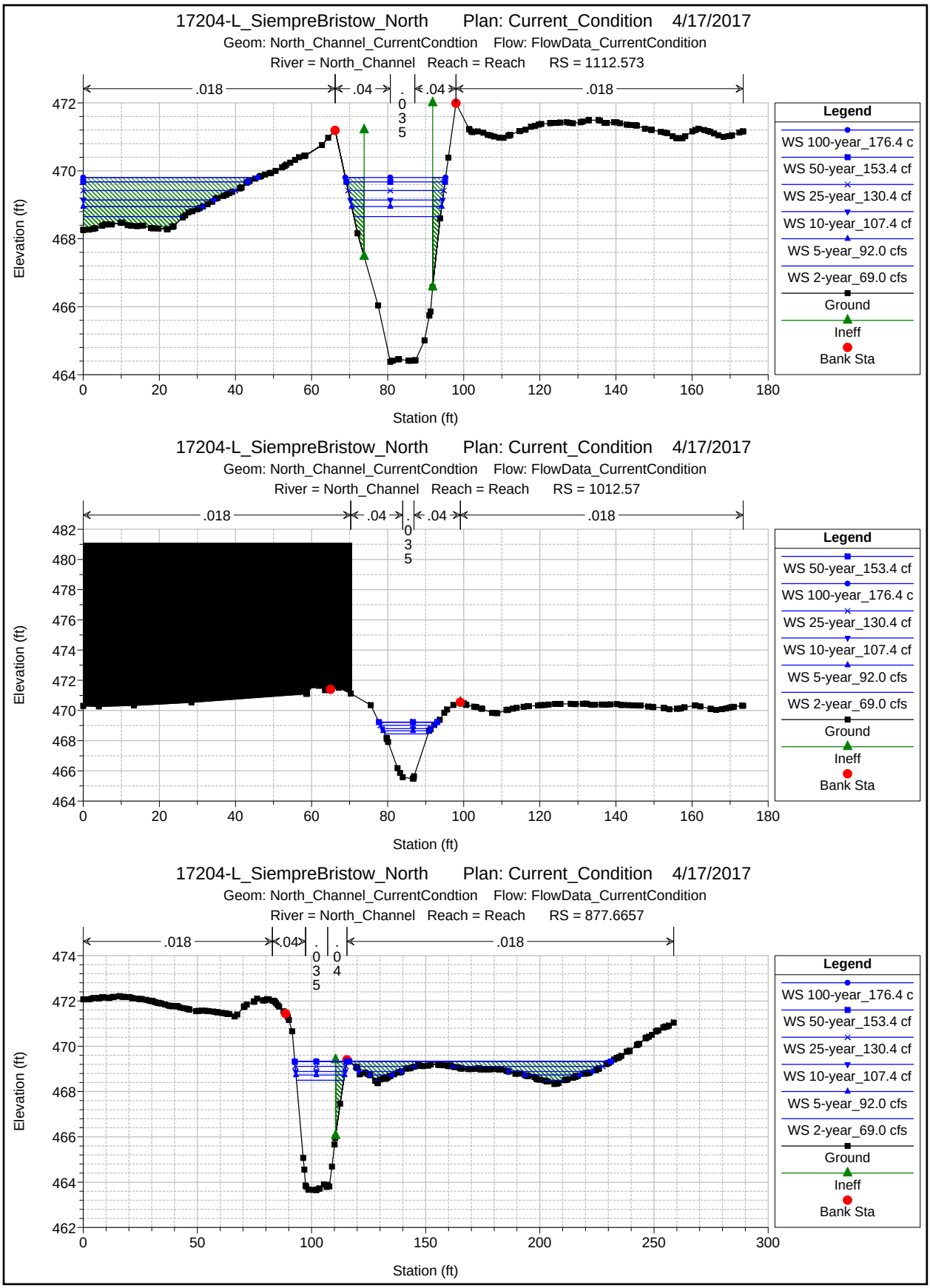
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1459.614	2-year_69.0 cfs	69.00	466.96	470.43	468.40	470.49	0.000858	1.96	35.16	20.03	0.21
Reach	1459.614	5-year_92.0 cfs	92.00	466.96	470.81	468.65	470.89	0.000997	2.27	40.45	23.38	0.24
Reach	1459.614	10-year_107.4 cf	107.40	466.96	471.04	468.80	471.13	0.001060	2.46	43.58	24.87	0.25
Reach	1459.614	25-year_130.4 cf	130.40	466.96	471.30	469.01	471.42	0.001195	2.76	47.24	26.61	0.26
Reach	1459.614	50-year_153.4 cf	153.40	466.96	471.51	469.22	471.65	0.001352	3.06	50.19	41.71	0.28
Reach	1459.614	100-year_176.4 c	176.40	466.96	471.70	469.40	471.87	0.001500	3.33	52.90	72.48	0.30
Reach	1370.583	2-year_69.0 cfs	69.00	467.30	470.05	469.43	470.30	0.007849	4.01	17.19	11.43	0.58
Reach	1370.583	5-year_92.0 cfs	92.00	467.30	470.39	469.73	470.68	0.008011	4.33	21.25	12.82	0.59
Reach	1370.583	10-year_107.4 cf	107.40	467.30	470.59	469.91	470.90	0.008143	4.46	24.05	14.08	0.60
Reach	1370.583	25-year_130.4 cf	130.40	467.30	470.80	470.14	471.16	0.008929	4.80	27.14	15.30	0.64
Reach	1370.583	50-year_153.4 cf	153.40	467.30	470.99	470.35	471.38	0.009283	5.02	30.66	21.77	0.73
Reach	1370.583	100-year_176.4 c	176.40	467.30	471.20	470.56	471.59	0.008284	4.99	35.48	22.30	0.69
Reach	1270.58	2-year_69.0 cfs	69.00	466.57	468.36	468.36	468.96	0.025478	6.26	11.01	9.20	1.01
Reach	1270.58	5-year_92.0 cfs	92.00	466.57	468.64	468.64	469.34	0.024636	6.71	13.72	9.99	1.01
Reach	1270.58	10-year_107.4 cf	107.40	466.57	468.81	468.81	469.56	0.024210	6.95	15.44	10.47	1.01
Reach	1270.58	25-year_130.4 cf	130.40	466.57	469.17	469.04	469.87	0.019177	6.72	19.41	11.55	0.91
Reach	1270.58	50-year_153.4 cf	153.40	466.57	469.52		470.17	0.015514	6.46	23.74	12.73	0.83
Reach	1270.58	100-year_176.4 c	176.40	466.57	469.69	469.46	470.41	0.016981	6.81	25.91	13.81	0.88
Reach	1170.577	2-year_69.0 cfs	69.00	464.33	468.68	465.51	468.70	0.000148	1.01	68.24	64.02	0.09
Reach	1170.577	5-year_92.0 cfs	92.00	464.33	469.00	465.68	469.03	0.000205	1.24	74.07	70.79	0.11
Reach	1170.577	10-year_107.4 cf	107.40	464.33	469.22	465.79	469.25	0.000238	1.37	78.11	74.80	0.12
Reach	1170.577	25-year_130.4 cf	130.40	464.33	469.54	465.94	469.58	0.000281	1.55	84.14	81.68	0.13
Reach	1170.577	50-year_153.4 cf	153.40	464.33	469.85	466.09	469.89	0.000319	1.71	89.93	89.51	0.14
Reach	1170.577	100-year_176.4 c	176.40	464.33	470.04	466.22	470.09	0.000374	1.89	93.56	95.98	0.15
Reach	1143.195		Culvert									
Reach	1112.573	2-year_69.0 cfs	69.00	464.38	468.65		468.67	0.000177	1.12	61.71	49.15	0.11
Reach	1112.573	5-year_92.0 cfs	92.00	464.38	468.95		468.98	0.000240	1.37	67.00	55.10	0.13
Reach	1112.573	10-year_107.4 cf	107.40	464.38	469.14		469.18	0.000275	1.52	70.51	58.69	0.14
Reach	1112.573	25-year_130.4 cf	130.40	464.38	469.42		469.47	0.000323	1.73	75.50	65.05	0.15
Reach	1112.573	50-year_153.4 cf	153.40	464.38	469.67		469.73	0.000368	1.92	80.06	69.25	0.16
Reach	1112.573	100-year_176.4 c	176.40	464.38	469.80		469.88	0.000442	2.14	82.40	72.24	0.18
Reach	1012.57	2-year_69.0 cfs	69.00	465.48	468.44		468.61	0.003979	3.28	21.01	11.39	0.43
Reach	1012.57	5-year_92.0 cfs	92.00	465.48	468.65		468.89	0.005311	3.92	23.47	12.08	0.50
Reach	1012.57	10-year_107.4 cf	107.40	465.48	468.80		469.08	0.006129	4.24	25.32	12.92	0.53
Reach	1012.57	25-year_130.4 cf	130.40	465.48	469.02		469.35	0.006954	4.61	28.31	14.07	0.57
Reach	1012.57	50-year_153.4 cf	153.40	465.48	469.23		469.60	0.007641	4.89	31.34	15.32	0.60
Reach	1012.57	100-year_176.4 c	176.40	465.48	469.21		469.71	0.010321	5.68	31.05	15.20	0.70
Reach	877.6657	2-year_69.0 cfs	69.00	463.65	468.50	464.82	468.52	0.000126	1.00	68.68	32.73	0.09
Reach	877.6657	5-year_92.0 cfs	92.00	463.65	468.73	465.04	468.75	0.000190	1.27	72.63	55.81	0.11
Reach	877.6657	10-year_107.4 cf	107.40	463.65	468.89	465.18	468.92	0.000233	1.43	75.35	77.36	0.12
Reach	877.6657	25-year_130.4 cf	130.40	463.65	469.11	465.36	469.15	0.000295	1.64	79.35	114.11	0.14
Reach	877.6657	50-year_153.4 cf	153.40	463.65	469.32	465.53	469.37	0.000357	1.85	83.03	137.24	0.15
Reach	877.6657	100-year_176.4 c	176.40	463.65	469.34	465.70	469.41	0.000467	2.12	83.40	137.88	0.17
Reach	800		Culvert									
Reach	735.8522	2-year_69.0 cfs	69.00	463.90	468.48		468.50	0.002958	1.13	60.89	76.79	0.11
Reach	735.8522	5-year_92.0 cfs	92.00	463.90	468.69		468.72	0.004266	1.42	64.84	99.11	0.14
Reach	735.8522	10-year_107.4 cf	107.40	463.90	468.82		468.86	0.005098	1.59	67.44	112.13	0.15
Reach	735.8522	25-year_130.4 cf	130.40	463.90	469.01		469.07	0.013095	1.82	72.95	149.91	0.22
Reach	735.8522	50-year_153.4 cf	153.40	463.90	469.18		469.22	0.009790	1.63	97.96	157.09	0.19
Reach	735.8522	100-year_176.4 c	176.40	463.90	469.31		469.34	0.006792	1.38	122.82	214.24	0.16
Reach	639.5066	2-year_69.0 cfs	69.00	463.18	468.43		468.44	0.000218	1.02	67.94	26.93	0.11
Reach	639.5066	5-year_92.0 cfs	92.00	463.18	468.61		468.63	0.000341	1.26	73.04	29.28	0.14
Reach	639.5066	10-year_107.4 cf	107.40	463.18	468.73		468.76	0.000447	1.40	76.60	33.10	0.16
Reach	639.5066	25-year_130.4 cf	130.40	463.18	468.87		468.91	0.000566	1.60	81.39	39.48	0.18
Reach	639.5066	50-year_153.4 cf	153.40	463.18	469.00		469.05	0.000692	1.79	85.56	47.04	0.20
Reach	639.5066	100-year_176.4 c	176.40	463.18	469.10		469.16	0.000810	1.97	90.44	54.44	0.22
Reach	539.4938	2-year_69.0 cfs	69.00	462.95	468.37		468.39	0.002669	1.17	59.17	45.21	0.12
Reach	539.4938	5-year_92.0 cfs	92.00	462.95	468.52		468.55	0.004050	1.48	62.22	56.65	0.15
Reach	539.4938	10-year_107.4 cf	107.40	462.95	468.61		468.65	0.005033	1.68	64.07	61.37	0.17
Reach	539.4938	25-year_130.4 cf	130.40	462.95	468.73		468.78	0.006018	1.88	70.84	68.54	0.19
Reach	539.4938	50-year_153.4 cf	153.40	462.95	468.83		468.89	0.006231	1.95	78.22	73.47	0.19
Reach	539.4938	100-year_176.4 c	176.40	462.95	468.92		468.99	0.006282	1.99	84.79	78.46	0.19
Reach	427.2193	2-year_69.0 cfs	69.00	462.91	468.31		468.32	0.000274	0.42	107.52	81.87	0.04
Reach	427.2193	5-year_92.0 cfs	92.00	462.91	468.44		468.46	0.000314	0.46	118.75	82.10	0.05
Reach	427.2193	10-year_107.4 cf	107.40	462.91	468.53		468.55	0.000335	0.49	125.56	82.23	0.05
Reach	427.2193	25-year_130.4 cf	130.40	462.91	468.64		468.67	0.000363	0.52	134.78	82.40	0.05

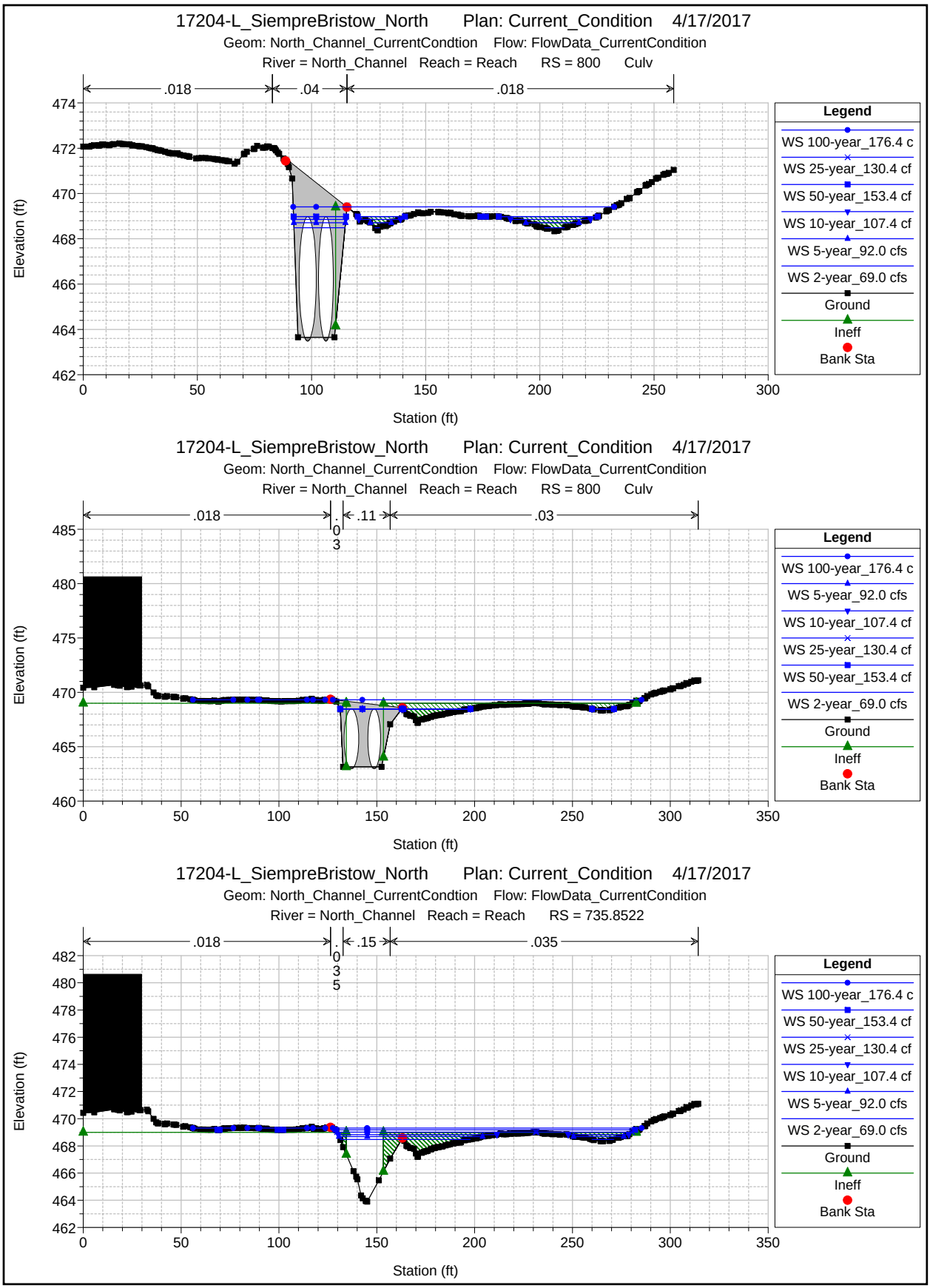
HEC-RAS Plan: Current_Cond River: North_Channel Reach: Reach (Continued)

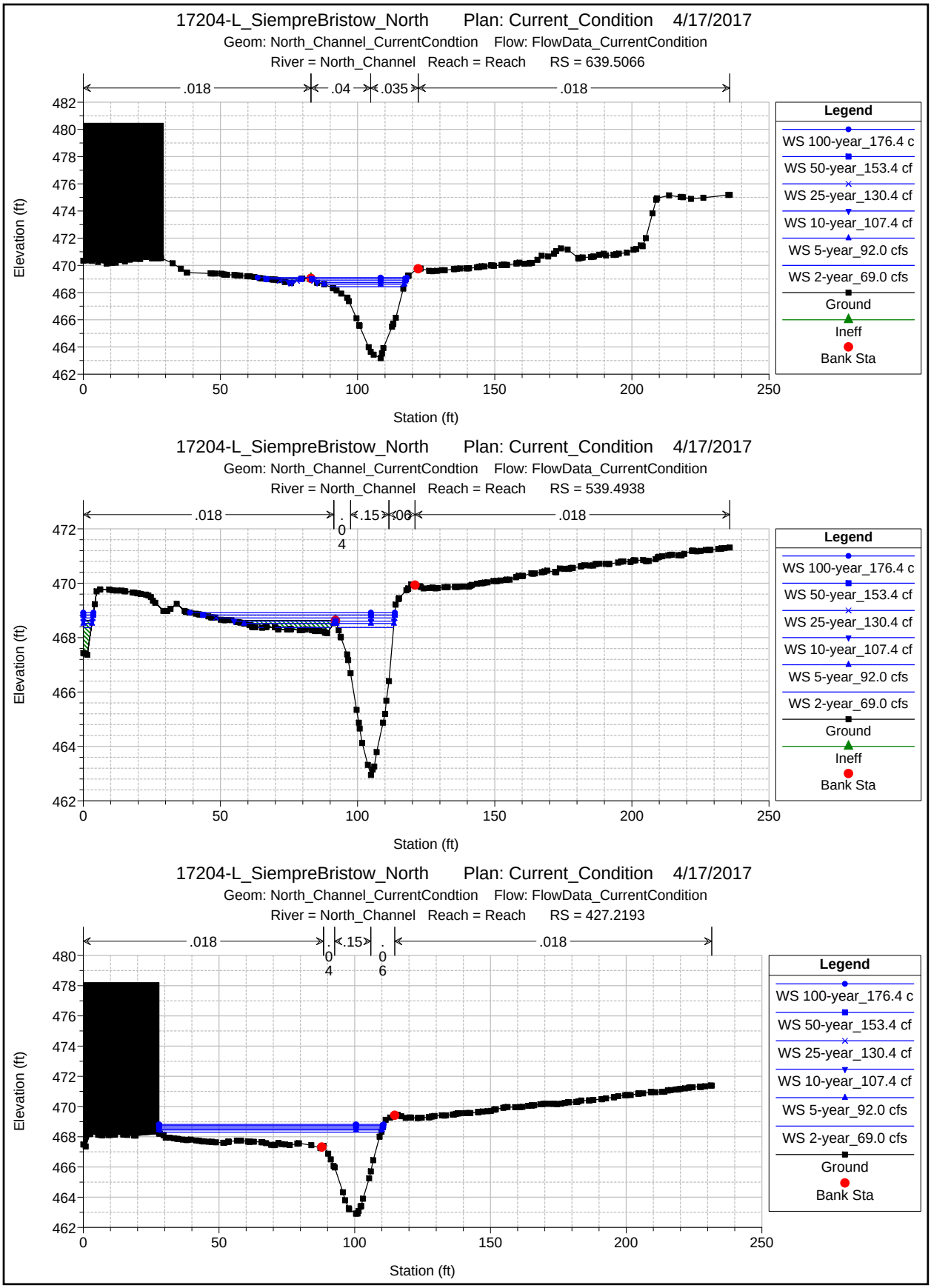
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	427.2193	50-year_153.4 cf	153.40	462.91	468.74		468.77	0.000392	0.55	142.76	82.61	0.05
Reach	427.2193	100-year_176.4 c	176.40	462.91	468.82		468.86	0.000427	0.58	149.44	82.79	0.05
Reach	301.9247	2-year_69.0 cfs	69.00	462.57	468.23		468.25	0.001536	1.01	68.78	49.96	0.12
Reach	301.9247	5-year_92.0 cfs	92.00	462.57	468.35		468.38	0.002127	1.22	76.42	76.53	0.14
Reach	301.9247	10-year_107.4 cf	107.40	462.57	468.43		468.46	0.002312	1.30	82.73	85.99	0.15
Reach	301.9247	25-year_130.4 cf	130.40	462.57	468.54		468.57	0.002364	1.35	92.75	96.89	0.15
Reach	301.9247	50-year_153.4 cf	153.40	462.57	468.63		468.67	0.002365	1.38	101.86	103.37	0.15
Reach	301.9247	100-year_176.4 c	176.40	462.57	468.71		468.75	0.002398	1.42	109.73	108.69	0.15
Reach	174.488	2-year_69.0 cfs	69.00	461.90	468.16		468.17	0.000333	0.52	135.42	118.17	0.05
Reach	174.488	5-year_92.0 cfs	92.00	461.90	468.25		468.26	0.000499	0.64	146.07	121.28	0.07
Reach	174.488	10-year_107.4 cf	107.40	461.90	468.31		468.32	0.000588	0.71	153.69	123.06	0.07
Reach	174.488	25-year_130.4 cf	130.40	461.90	468.41		468.42	0.000680	0.78	165.66	126.25	0.08
Reach	174.488	50-year_153.4 cf	153.40	461.90	468.50		468.51	0.000749	0.83	176.51	127.56	0.08
Reach	174.488	100-year_176.4 c	176.40	461.90	468.56		468.58	0.000830	0.88	185.00	129.27	0.09
Reach	72.67111	2-year_69.0 cfs	69.00	461.08	468.13	462.77	468.13	0.000291	0.55	125.43	46.08	0.05
Reach	72.67111	5-year_92.0 cfs	92.00	461.08	468.20	463.04	468.21	0.000480	0.72	128.90	51.67	0.07
Reach	72.67111	10-year_107.4 cf	107.40	461.08	468.25	463.20	468.26	0.000619	0.82	131.58	55.46	0.08
Reach	72.67111	25-year_130.4 cf	130.40	461.08	468.33	463.42	468.34	0.000826	0.96	136.23	60.06	0.09
Reach	72.67111	50-year_153.4 cf	153.40	461.08	468.40	463.63	468.42	0.001038	1.09	140.49	61.77	0.10
Reach	72.67111	100-year_176.4 c	176.40	461.08	468.45	463.82	468.47	0.001282	1.22	143.64	63.69	0.12

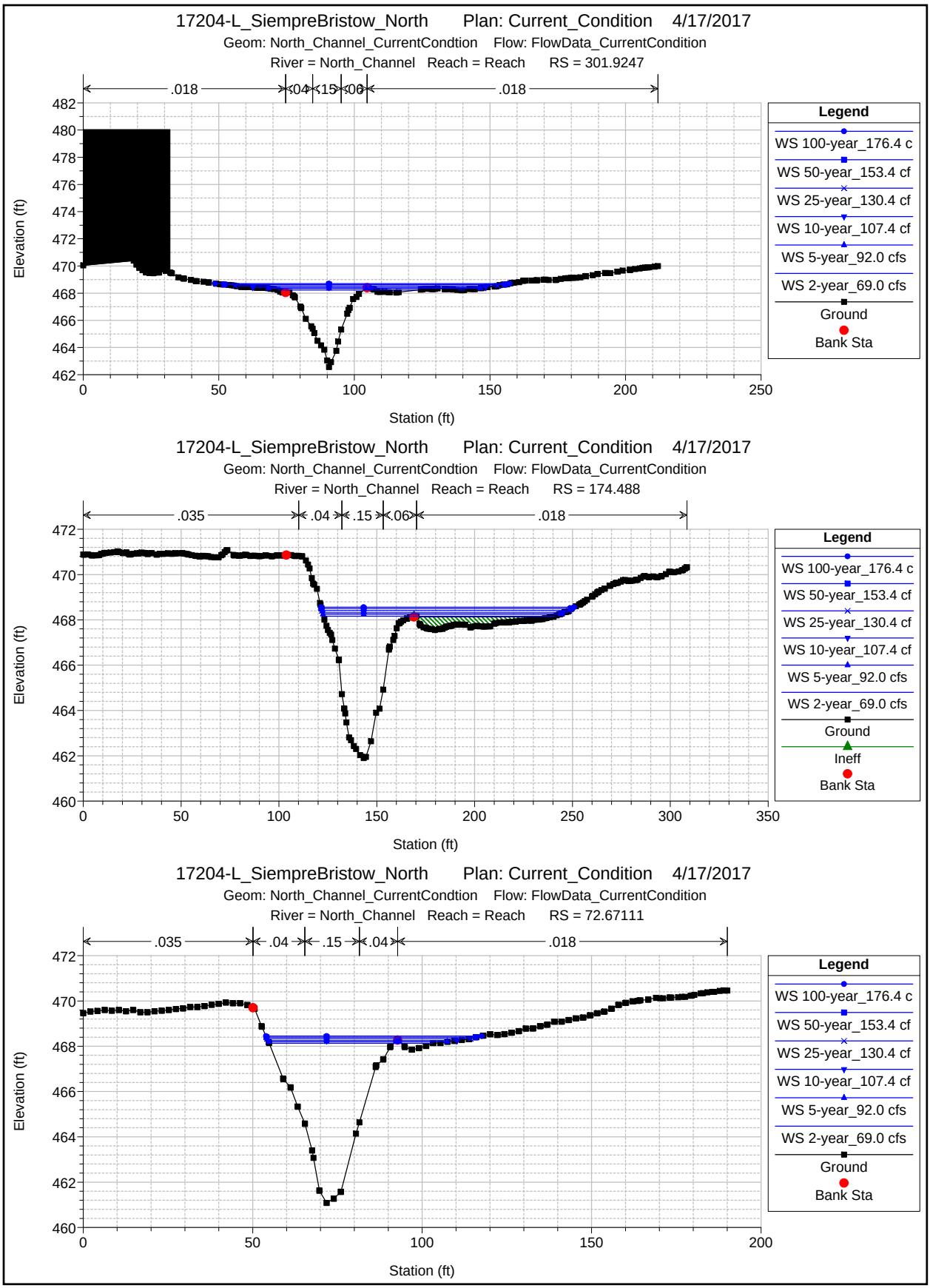

17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1459.614
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1370.583
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1270.58
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1170.577
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 10-year_107.4 cf
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1112.573
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1012.57
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 877.6657
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.03
.11
.03
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 5-year_92.0 cfs
WS 10-year_107.4 cf
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 735.8522
.018
.035
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 639.5066
.018
.04
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 539.4938
.018
.04
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 427.2193
.018
.04
.15
.06
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 301.9247
.018
.04
.15
.06
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 174.488
.035
.04
.15
.06
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Current_Condition 4/17/2017
Geom: North_Channel_CurrentCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 72.67111
.035
.04
.15
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_North
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 4/17/2017 2:15:44 PM

Project in English units

Project Description:
78

PLAN DATA

Plan Title: Current_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.p01

Geometry Title: North_Channel_CurrentCondtion
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g02

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Plan Summary Information:
Number of: Cross Sections = 14 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Flow Data (cfs)

River	Reach	RS	2-year_69.0 cfs	5-year_92.0 cfs	10-year_107.4 cfs	25-year_130.4 cfs	50-year_153.4 cfs	100-year_176.4 cfs	PF 7	PF 8
North_Channel	Reach	1459.614	69	92	107.4	130.4	153.4	176.4	10	15

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
North_Channel	Reach	1459.614	20	25	30	35	40	45

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
North_Channel	Reach	2-year_69.0 cfs	Normal S = 0.004	Known WS = 468.13
North_Channel	Reach	5-year_92.0 cfs	Normal S = 0.004	Known WS = 468.2
North_Channel	Reach	10-year_107.4 cfs	Normal S = 0.004	Known WS = 468.25
North_Channel	Reach	25-year_130.4 cfs	Normal S = 0.004	Known WS = 468.33
North_Channel	Reach	50-year_153.4 cfs	Normal S = 0.004	Known WS = 468.4
North_Channel	Reach	100-year_176.4 cfs	Normal S = 0.004	Known WS = 468.45
North_Channel	Reach	PF 7	Normal S = 0.004	Known WS = 467.35
North_Channel	Reach	PF 8	Normal S = 0.004	Known WS = 467.53
North_Channel	Reach	PF 9	Normal S = 0.004	Known WS = 467.68
North_Channel	Reach	PF 10	Normal S = 0.004	Known WS = 467.83
North_Channel	Reach	PF 11	Normal S = 0.004	Known WS = 467.95
North_Channel	Reach	PF 12	Normal S = 0.004	Known WS = 467.98
North_Channel	Reach	PF 13	Normal S = 0.004	Known WS = 468.03
North_Channel	Reach	PF 14	Normal S = 0.004	Known WS = 468.05

GEOMETRY DATA

Geometry Title: North_Channel_CurrentCondtion
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g02

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1459.614

INPUT
Description:
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.81	.31	471.8	1.07	471.78	1.25	471.78	2.19	471.74
2.61	471.74	2.89	471.74	3.11	471.74	3.17	471.74	4.87	471.71
5.63	471.72	5.9	471.72	6.45	471.73	6.69	471.73	7.1	471.72
7.42	471.72	9.27	471.67	10.25	471.67	11.22	471.65	12.06	471.64
13.89	471.59	14.96	471.59	15.78	471.57	17.27	471.55	18.34	471.53
19.24	471.53	20.24	471.5	21.4	471.51	22.89	471.49	24.25	471.54
24.83	471.54	25.49	471.53	27.3	471.47	27.99	471.48	29.08	471.48
30.47	471.46	31.66	471.45	32.69	471.44	33.5	471.44	34.94	471.46
35.9	471.49	37.3	471.51	37.6	471.51	38.06	471.52	40.07	471.58
40.79	471.59	41.8	471.61	43.47	471.66	44.16	471.67	44.98	471.68
45.86	471.68	48.1	471.75	48.13	471.75	48.16	471.75	49.86	471.75
50.57	471.76	52.19	471.77	53.57	471.83	53.76	471.82	54.01	471.84
56.05	471.89	56.63	471.88	57.76	471.88	58.66	471.93	59.99	472.01
60.9	472.05	61.59	472.07	63.2	471.98	63.78	471.95	64.71	472.05
65.42	472.18	67.25	471.83	67.72	471.74	67.83	471.73	69.34	471.41
72.61	470.78	73.12	470.68	73.62	470.62	74.94	470.46	75.43	470.39
76.07	470.02	77.11	469.35	78.21	468.59	79.37	467.79	80.01	467.5
80.98	467.06	81.66	466.96	83.49	467.06	84.66	467.07	85.03	467.17
86.15	467.24	87.34	467.28	88.79	467.5	89	467.51	89.17	467.6
91.33	468.56	93.06	469.34	93.1	469.35	93.14	469.37	95.54	470.63
96.02	470.94	97.27	471.8	99.28	472.5	99.96	472.78	101.43	472.85
101.49	472.86	101.5	472.86	101.52	472.86	101.63	472.85	103.46	472.8
103.66	472.8	103.99	472.76	104.23	472.73	108.1	472.13	108.17	472.12
109.82	471.9	109.91	471.89	110.07	471.87	112.43	471.69	112.77	471.69
114.24	471.62	115.84	471.65	116.62	471.67	117.38	471.71	118.37	471.74
119.5	471.81	120.89	471.85	122.56	471.9	122.7	471.9	122.83	471.91
125.12	471.95	126.09	471.91	126.81	471.9	128.32	471.93	129.29	471.95
129.6	471.97	131.08	472.04	133.1	472.01	133.58	471.99	133.91	472
135.35	472.04	136.77	472.04	137.76	472.04	139.16	472.04	139.58	472.02
140.73	472.03	142.03	472.03	142.48	472.03	143.81	471.99	145.92	471.99
146.25	472	146.33	472	148.09	472.01	148.92	472	150.57	471.97
152.07	471.93	152.3	471.93	152.57	471.92	154.71	471.86	155.98	471.81
156.51	471.8	156.95	471.78	158.95	471.72	160.69	471.75	160.76	471.75
160.83	471.75	163.17	471.92	164.16	471.98	164.89	472.02	165.16	472.04
167.36	472.08	167.57	472.09	169.14	472.15	170.34	472.15	171.53	472.12
172.33	472.17	172.53	472.18						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	65.42	.04	101.43	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
65.42	101.43	89.03	89.03	89.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	74.66	473	T
88.66	172.53	473	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1370.583

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.69	28.36	472.55	29.33	472.52	30.37	472.48	44.41	471.87
45.08	471.89	51.64	471.48	52.77	471.53	62.65	471.25	63.17	471.19
63.72	471.24	64.33	471.16	65	471.13	66.56	471.05	68.56	471.02
69.77	471.06	71.18	470.92	72.49	470.84	72.89	470.85	72.94	470.85
74.04	470.84	74.25	470.84	78.77	470.91	80.19	470.53	80.66	470.45
81.34	470.14	82.75	469.46	84.42	468.46	84.89	468.16	85.47	467.93
86.9	467.3	88.08	467.6	89.1	467.84	90.04	468.36	91.05	469.08
94.08	470.62	95.26	471.18	96.04	471.34	97.5	471.76	98.73	472.03
99.46	472.36	100.19	472.71	101.64	473.45	102.85	473.77	102.87	473.77
103.6	473.87	104.63	473.72	105.91	473.59	107.12	473.49	107.92	473.42
108.63	473.37	110.09	473.29	111.79	473.14	112.06	473.12	112.31	473.13
114.35	473.16	115.05	473.21	116.33	473.28	118.34	473.41	118.56	473.43
118.82	473.43	120.43	473.49	121.99	473.53	122.72	473.56	124.33	473.6
124.71	473.62	125.2	473.63	126.98	473.66	128.62	473.71	128.94	473.72
129.08	473.72	131.15	473.78	132	473.78	133.15	473.79	135.13	473.84
135.4	473.84	137.21	473.8	137.37	473.79	137.63	473.79	139.58	473.79
140.45	473.79	141.61	473.77	143.46	473.75	143.87	473.75	144.55	473.73
145.83	473.68	147.97	473.65	148.03	473.65	148.11	473.65	150.04	473.65
151.37	473.62	152.24	473.59	153.22	473.57	154.25	473.53	155.11	473.53
156.44	473.52	157.81	473.5	158.33	473.49	160.05	473.48	160.61	473.49
161.68	473.57	162.56	473.63	163.03	473.66	164.77	473.73	165.07	473.71
166.67	473.64	167.03	473.61	168.92	473.41	170.65	473.24	170.84	473.22
170.95	473.22	173.13	473.12	173.44	473.11				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	78.77	.04	103.6	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
74.04	102.87	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	73.08	482.688

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1270.58

INPUT
Description:
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.89	14.05	469.83	20.59	469.8	21.46	469.84	22.35	469.8
23.3	469.84	24.31	469.88	25.37	469.89	26.54	469.87	33.53	469.83
39.21	469.81	47.48	470.09	48.73	470.07	50.05	470.12	51.49	470.19
53.05	470.25	54.69	470.16	56.53	470.22	60.63	470.58	63.03	470.57
64.52	471.14	70.83	470.74	71.07	470.69	71.77	470.66	72.61	470.53
73.04	470.47	79.31	469.63	79.83	469.5	80.66	469.03	81.85	468.25
82.02	468.15	84.98	466.57	87.85	466.61	88.25	466.71	89.1	467.21
90.24	467.85	91.45	468.79	92.42	469.49	93.15	470.03	94.38	470.84

```
   95.72  471.28   96.56  471.56   97.49   471.8   98.62  472.08   99.52  472.41
  100.84  472.99  102.21  473.07   102.6  473.11  102.76  473.12  104.67  472.75
  104.95  472.72  106.97  472.54  107.01  472.54  107.15  472.53  109.22  472.35
  110.87  472.21   111.2  472.18  111.68   472.2  113.29  472.25  114.63  472.32
  115.36  472.36  117.05   472.5  117.57  472.55  118.09  472.59  119.63  472.67
  121.38  472.71  121.77  472.72  121.93  472.73  123.73  472.84  124.65  472.86
  125.96  472.93  127.54  472.96  127.97  472.98  130.08  473.03  130.15  473.03
  130.26  473.03  132.13  473.06  133.33  473.07   134.4  473.07   136.2  473.09
  136.41  473.09  136.93  473.09  138.59  473.08   140.3  473.02  140.54  473.02
  140.93  473.02  142.76  473.06  144.03  473.04  144.74  473.02  145.69  472.99
  146.95  472.93  147.78  472.92   148.9   472.9  150.45  472.84  151.02  472.83
  151.42  472.81  153.05  472.76  154.28  472.72  155.22  472.67  156.91  472.58
  157.18  472.58  157.45  472.57   159.3  472.57  159.64  472.59   161.3   472.7
  163.25  472.84  163.46  472.85  163.55  472.85  165.48   472.8  166.96  472.66
  167.61   472.6  168.19  472.55  169.59  472.46  171.64  472.39   171.8  472.38
   171.9  472.38  173.44   472.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   73.04     .04  102.21    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         73.04   102.6           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   72.51 480.547

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1170.577

INPUT
Description:
Station Elevation Data    num=     136
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.61     .07  468.61     .98   468.6    1.48  468.59    2.88  468.57
    5.08  468.53    5.45  468.53    5.77  468.53    7.23  468.55    9.05  468.58
    9.64   468.6   10.43   468.6   11.55  468.59   12.75  468.63   13.99  468.66
   14.59  468.66   15.72  468.65   17.51  468.65   18.03  468.65   18.42  468.65
   19.81  468.65   21.29  468.64   22.16  468.66   23.82  468.62   23.85  468.62
   23.92  468.62   26.16  468.63   27.07  468.65   27.74  468.67   29.36  468.71
   30.07  468.75   30.31  468.76   31.77  468.83   33.35     469   33.96  469.07
   34.45   469.1   35.58  469.19   37.72  469.27    37.9  469.28   37.99  469.28
   39.45  469.45   41.61  469.53   41.63  469.53   43.12   469.7   43.77  469.72
   46.28  469.94   47.22  470.02   47.83  470.06   56.04  469.68   58.75  469.01
    59.5  468.86   68.27  466.99   76.37  465.92   78.33  464.97    78.6  464.98
    78.7  464.99   79.31  464.78   81.24  464.77   82.55  464.67      83  464.61
   83.61  464.66   85.41  464.63   86.51  464.38   87.15   464.4   87.94  464.33
   89.55  464.46   90.92  464.65   91.36  464.66   91.81  464.73    93.8  465.25
   97.75  471.38   97.89  471.55   99.68  471.82  101.86  471.78  103.13  471.76
  103.86  471.73  104.63  471.72  106.16   471.7  107.14  471.66  107.99  471.63
  110.31  471.53  110.43  471.53  110.53  471.53  112.22  471.57  114.43  471.63
  114.61  471.63  114.86  471.64  116.32  471.73  117.14  471.77   118.8  471.85
  119.97   471.9  120.54  471.91  122.57  471.91  122.93  471.92   123.3  471.92
  124.69  471.96  126.07  471.98  127.16  471.97  128.86  472.03  128.93  472.03
  129.12  472.03  131.33  472.01  132.65  472.03  133.05  472.01  133.82  472.03
   135.5  472.04  136.73  471.99  137.21  471.96  138.01  471.97  139.64  471.98
  140.52     472  141.35  471.98  142.75  471.97  143.69  471.95  144.23  471.94
  145.48  471.97  147.27  471.94  147.86  471.93  148.06  471.92   149.6  471.86
  150.49  471.85   160.2  471.74  160.53  471.75  161.92  471.77   163.7  471.77
  164.37  471.77  164.71  471.76  166.16  471.72  168.38  471.69  168.54  471.69
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  168.63  471.69   170.2  471.61  172.08   471.6  172.67   471.6  173.27  471.59
  173.44  471.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.22     .04   99.68    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
         47.83  101.86            58.01      58      58             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   77.71     472       T
   97.21  173.44     472       T

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 1143.195

INPUT
Description:
Distance from Upstream XS =       2
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=     168
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23             .16  468.23            2.54  468.17
    2.79  468.16            2.98  468.17             4.5  468.22
    6.21  468.24            6.97  468.26            7.94  468.27
    8.82  468.29             9.9  468.34           11.34  468.39
      12  468.39           12.99  468.36           14.99  468.44
   15.37  468.46           15.65  468.45           17.09  468.46
   18.45  468.52           19.47  468.57           20.94  468.63
   21.11  468.64           21.44  468.65           23.48  468.71
   24.42  468.77           25.02  468.81           26.96  468.87
   27.38  468.88           27.52  468.88           29.01  468.94
   30.78  468.97           31.27  469.01           31.66     469
   32.83  469.05           35.12  469.11           35.18  469.11
   36.61  469.22            36.7  469.22           37.92   469.2
   38.94  469.18           39.12  469.19           40.46  469.24
   41.46  469.28           42.75  469.29           43.49  469.32
   44.31  469.29            46.4   469.4           46.56  469.41
   46.63  469.41           48.09  469.45           48.58  469.46
   50.31  469.54            51.3  469.54           51.94  469.56
   53.42  469.63           54.27  469.66           55.36  469.73
    55.8  469.75           57.99  469.83           58.03  469.83
   58.04  469.83           59.68  469.87           61.35   469.9
   62.05  469.91           62.82  469.94           63.68  469.98
   64.55     470           65.98  470.03            67.6  470.16
   67.61  470.16           67.61  470.16           70.07  470.19
   71.34  470.25           71.79  470.28           72.53  470.31
   74.23   470.4           74.97  470.44           75.85   470.5
    77.3  470.55           78.46  470.61           79.17  470.63
   80.15  470.66           81.51  470.76            82.6   470.8
   83.22  470.84           84.27  470.89           85.75  470.96
   86.75  471.02           87.56  471.08           88.51  471.16
   90.04  471.24           91.02  471.28           92.15   471.3
   92.66  471.34           94.81  471.51           95.13  471.52
   95.32  471.54           96.87  471.59           97.66  471.62
   99.35   471.7          100.89   471.7          101.04   471.7
  101.32  471.68            103.4  471.54          104.66  471.43
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105.16	471.39	107.13	471.27	107.65	471.23
108	471.23	109.4	471.25	111.55	471.39
111.82	471.41	111.9	471.41	113.48	471.46
114.64	471.52	116.02	471.58	117.58	471.66
117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Upstream Bridge Cross Section Data

Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	464.33	78.33	464.33	78.6	464.33
78.7	464.33	79.31	464.33	81.24	464.33	82.55	464.33	83	464.33
83.61	464.33	85.41	464.33	86.51	464.33	87.15	464.33	87.94	464.33
89.55	464.33	90.92	464.33	91.36	464.33	91.81	464.33	93.8	464.33
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92
124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59
173.44	471.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.22	.04	99.68	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
47.83	101.86	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.71	472	T

97.21	173.44	472	T

Downstream Deck/Roadway Coordinates

num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	
46.63	469.41		48.09	469.45		48.58	469.46	
50.31	469.54		51.3	469.54		51.94	469.56	
53.42	469.63		54.27	469.66		55.36	469.73	
55.8	469.75		57.99	469.83		58.03	469.83	
58.04	469.83		59.68	469.87		61.35	469.9	
62.05	469.91		62.82	469.94		63.68	469.98	
64.55	470		65.98	470.03		67.6	470.16	
67.61	470.16		67.61	470.16		70.07	470.19	
71.34	470.25		71.79	470.28		72.53	470.31	
74.23	470.4		74.97	470.44		75.85	470.5	
77.3	470.55		78.46	470.61		79.17	470.63	
80.15	470.66		81.51	470.76		82.6	470.8	
83.22	470.84		84.27	470.89		85.75	470.96	
86.75	471.02		87.56	471.08		88.51	471.16	
90.04	471.24		91.02	471.28		92.15	471.3	
92.66	471.34		94.81	471.51		95.13	471.52	
95.32	471.54		96.87	471.59		97.66	471.62	
99.35	471.7		100.89	471.7		101.04	471.7	
101.32	471.68		103.4	471.54		104.66	471.43	
105.16	471.39		107.13	471.27		107.65	471.23	
108	471.23		109.4	471.25		111.55	471.39	
111.82	471.41		111.9	471.41		113.48	471.46	
114.64	471.52		116.02	471.58		117.58	471.66	
117.7	471.66		120.03	471.75		120.14	471.75	
120.23	471.75		121.83	471.74		122.84	471.76	
124.34	471.76		125.63	471.79		126.07	471.8	
127.19	471.78		128.53	471.75		130.05	471.8	
130.19	471.8		130.47	471.8		132.67	471.82	
133.55	471.82		134.34	471.8		135.72	471.83	
136.82	471.84		137.4	471.82		138.48	471.77	
140.33	471.75		140.86	471.74		142.27	471.78	
142.58	471.78		143.65	471.73		145.02	471.66	
145.42	471.64		146.7	471.59		147.27	471.56	
149.04	471.44		155.4	471.42		157.58	471.42	
157.96	471.46		159	471.53		161.45	471.56	
161.51	471.56		161.54	471.56		163.22	471.5	
164.48	471.42		165.65	471.35		166.31	471.32	
167.26	471.29		169.68	471.3		169.75	471.3	
169.82	471.3		171.47	471.33		173.84	471.43	
173.92	471.43		173.96	471.43		175	471.47	

Downstream Bridge Cross Section Data

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Station Elevation Data    num=     143
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.26     .04  468.26    1.57  468.27    2.65  468.29    3.18  468.31
    4.93  468.38    5.76  468.42    6.03  468.42     7.5  468.42    9.86  468.47
   10.08  468.48   10.29  468.47   11.67   468.4   12.62  468.38   14.08  468.37
   15.08  468.38   15.73  468.39   17.81  468.32   18.23  468.31   18.34  468.31
   19.79   468.3   21.97  468.28   22.19  468.28   23.39  468.35   23.65  468.36
   23.75  468.37   26.12  468.63   26.83  468.69   27.64  468.78   28.71  468.81
   29.98  468.87   30.59   468.9   31.47  468.95   32.71  469.02   33.89  469.09
   34.79  469.18   35.33   469.2   36.86  469.26   37.62   469.3   38.33  469.34
   39.09  469.38   41.09  469.48   41.43   469.5   41.61  469.51   42.92  469.65
   43.73   469.7   45.24  469.77    46.4  469.83   46.72  469.85   47.83  469.89
   64.38   470.1    66.2  470.17   72.08  468.16   72.58  464.08   80.71  464.08
   81.31  464.08   82.82  464.08   82.89  464.08   82.99  464.08   85.45  464.08
   85.89  464.08   87.14  464.08   87.31  464.08    89.7  464.08   90.97  464.08
   91.27  464.08   91.81  464.08   93.79   468.6   95.94  470.39   97.97   471.5
  101.43  471.23  101.48  471.22  102.02  471.16  102.28  471.14   103.7  471.16
  105.16  471.12   106.3  471.06  107.04  471.04  107.95  471.01  109.31  470.98
  110.47  470.97  111.75  471.03  112.03  471.05  112.25  471.06  114.63  471.17
  114.78  471.17  116.25  471.21  117.66   471.3  118.75  471.32  119.72  471.36
  120.37  471.38   122.7   471.4  122.96  471.41  123.46  471.41  124.59  471.41
   125.4  471.42  127.12  471.43  127.84  471.41   128.7   471.4  130.71  471.43
  131.27  471.45  132.83  471.49  132.85  471.49   132.9  471.49  135.41  471.49
   135.8  471.48  136.99  471.41  137.64  471.41  139.46  471.43  140.14  471.43
  141.09   471.4  142.83  471.36   143.6  471.35  145.06  471.34  145.22  471.34
  145.49  471.33  147.62  471.24  149.22  471.21  149.28  471.21   149.4  471.21
  151.77  471.15  152.79  471.13  153.43  471.11  154.91  471.02  155.87  470.96
  156.61  470.96  157.48  470.96  158.23  471.02  160.05  471.16  160.92   471.2
   161.7  471.24  163.22   471.2  164.19  471.17  164.83  471.15  165.74   471.1
  166.87  471.05  168.31     471  169.56  471.02  169.93  471.02  170.51  471.05
  172.45  471.13  173.41  471.16  173.44  471.16

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018    66.2     .04   80.71    .035   87.14     .04   97.97    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
          66.2   97.97            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  469.71
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                  2      52     .018     .018      .17                   .2
1
Upstream   Elevation =  464.25
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```
           Centerline Station =  81.085
Downstream Elevation =  464.08
           Centerline Station =  78.345

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018      .17                    .2
1
Upstream   Elevation =  464.25
           Centerline Station =  89.085
Downstream Elevation =  464.08
           Centerline Station =  86.345

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1112.573

INPUT
Description:
Station Elevation Data    num=     156
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.26     .04  468.26    1.57  468.27    2.65  468.29    3.18  468.31
    4.93  468.38    5.76  468.42    6.03  468.42     7.5  468.42    9.86  468.47
   10.08  468.48   10.29  468.47   11.67   468.4   12.62  468.38   14.08  468.37
   15.08  468.38   15.73  468.39   17.81  468.32   18.23  468.31   18.34  468.31
   19.79   468.3   21.97  468.28   22.19  468.28   23.39  468.35   23.65  468.36
   23.75  468.37   26.12  468.63   26.83  468.69   27.64  468.78   28.71  468.81
   29.98  468.87   30.59   468.9   31.47  468.95   32.71  469.02   33.89  469.09
   34.79  469.18   35.33   469.2   36.86  469.26   37.62   469.3   38.33  469.34
   39.09  469.38   41.09  469.48   41.43   469.5   41.61  469.51   42.92  469.65
   43.73   469.7   45.24  469.77    46.4  469.83   46.72  469.85   47.83  469.89
      49  469.93   49.36  469.94   50.54     470   52.26   470.1   52.93  470.14
   53.38  470.18    54.4  470.24   55.65  470.32    56.7   470.4   58.08  470.44
   58.28  470.45    58.4  470.45   62.75  470.76   64.38  470.97    66.2  471.19
   72.08  468.16    77.5  466.04   80.71  464.38   81.31  464.41   82.82  464.46
   82.89  464.45   82.99  464.46   85.45  464.41   85.89  464.41   87.14  464.41
   87.31  464.43    89.7  465.01   90.97  465.74   91.27  465.86   91.81  466.57
   93.79   468.6   95.94  470.39   97.97  471.99  101.43  471.23  101.48  471.22
  102.02  471.16  102.28  471.14   103.7  471.16  105.16  471.12   106.3  471.06
  107.04  471.04  107.95  471.01  109.31  470.98  110.47  470.97  111.75  471.03
  112.03  471.05  112.25  471.06  114.63  471.17  114.78  471.17  116.25  471.21
  117.66   471.3  118.75  471.32  119.72  471.36  120.37  471.38   122.7   471.4
  122.96  471.41  123.46  471.41  124.59  471.41   125.4  471.42  127.12  471.43
  127.84  471.41   128.7   471.4  130.71  471.43  131.27  471.45  132.83  471.49
  132.85  471.49   132.9  471.49  135.41  471.49   135.8  471.48  136.99  471.41
  137.64  471.41  139.46  471.43  140.14  471.43  141.09   471.4  142.83  471.36
   143.6  471.35  145.06  471.34  145.22  471.34  145.49  471.33  147.62  471.24
  149.22  471.21  149.28  471.21   149.4  471.21  151.77  471.15  152.79  471.13
  153.43  471.11  154.91  471.02  155.87  470.96  156.61  470.96  157.48  470.96
  158.23  471.02  160.05  471.16  160.92   471.2   161.7  471.24  163.22   471.2
  164.19  471.17  164.83  471.15  165.74   471.1  166.87  471.05  168.31     471
  169.56  471.02  169.93  471.02  170.51  471.05  172.45  471.13  173.41  471.16
  173.44  471.16

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
```

```
       0    .018    66.2     .04   80.71    .035   87.14     .04   97.97    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          66.2   97.97           100.02     100     100             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 1012.57

INPUT
Description:
Station Elevation Data    num=     106
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   470.3     4.1  470.27   13.31  470.33   28.44  470.53   58.63   471.1
   58.84  471.11   60.31  471.67   61.88  471.63   63.52  471.34   65.02   471.4
   67.18   471.5   70.31  471.12   75.58  470.35   79.73  468.18   79.77  468.15
    79.8   468.1   80.12  467.91    82.6  466.18   83.25  465.87   83.97  465.58
   86.65  465.48   86.72  465.48   86.73  465.49   86.93  465.64   90.89  468.65
    91.3  468.75   92.28  469.05   93.69  469.38   94.89  469.85   95.63  470.06
   97.29  470.36   99.13  470.54  100.09  470.47  100.58  470.38  100.69  470.37
  102.73  470.25  103.27  470.23  104.59  470.13  104.64  470.13  104.85  470.11
  107.44  469.84  108.19  469.83  108.83  469.82  111.22  470.02  111.56  470.05
  111.66  470.05  112.94  470.12  113.91  470.17  115.72  470.24  116.72  470.28
  117.13  470.29  119.49  470.33  119.86  470.34  120.33  470.35  121.22  470.36
  122.32  470.39     124  470.43  125.32  470.43  125.36  470.43  125.43  470.43
  128.11  470.44  128.89  470.42  129.45  470.42  131.32  470.44  132.12  470.45
  132.34  470.44  133.52  470.38  134.51  470.38  136.25  470.39   137.2  470.38
  137.62  470.39  138.58   470.4  140.24  470.42  141.29  470.37  141.64  470.36
   143.2  470.35  144.38  470.34  144.48  470.34  145.79  470.33  146.48  470.33
  148.46  470.26  149.51  470.24  149.82  470.22  152.54  470.17  152.63  470.17
  152.69  470.16  154.04  470.08  156.03  470.11  156.73  470.12  157.06  470.14
  158.05  470.21  160.69  470.33  160.83  470.34  160.88  470.34   162.2  470.27
  164.89   470.1  164.94   470.1  164.98   470.1  166.33  470.04  167.89  470.09
  168.95  470.13  169.77  470.18  170.36  470.21  170.97  470.24  173.15  470.31
  173.44  470.31

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   70.31     .04   83.97    .035   86.93     .04   99.13    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.02   99.13           127.93   134.9  144.08             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   99.13  173.44  470.54       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   70.55 481.086

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 877.6657

INPUT
Description:
```

Station Elevation Data num= 255

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	96.32	465.07	96.86	464.55	97.35	463.85	97.61	463.8
98.6	463.67	98.77	463.67	100.78	463.66	102.05	463.65	102.16	463.65
103.31	463.71	103.62	463.72	105.43	463.9	106.62	463.79	107.07	463.88
107.79	463.81	108.93	464.69	110.09	465.66	110.39	465.95	112.51	467.46
115.52	469.4	119.54	469.09	119.76	469.09	119.96	469.05	120.03	469.03
121.08	468.76	121.25	468.77	123.57	468.84	124.46	468.78	125.36	468.74
125.62	468.72	127.91	468.47	128.91	468.38	129.02	468.37	130.06	468.53
131.27	468.57	132.57	468.56	133.41	468.62	134.17	468.68	134.56	468.69
136.17	468.76	137.87	468.84	138.89	468.85	139	468.86	139.18	468.86
139.52	468.89	141.37	469.01	142.32	469.03	142.87	469.02	143.42	469.04
144.85	469.09	146.75	469.17	147.49	469.13	147.83	469.13	148.68	469.12
151.09	469.14	152.21	469.19	155.52	469.18	155.61	469.18	156.62	469.18
157.83	469.16	159.83	469.12	160.11	469.14	160.94	469.15	162.42	469.08
164.26	469.07	165.17	469.02	165.41	469.02	165.94	469.01	168.66	469
168.87	468.99	169.72	468.99	170.85	469	172.75	469.02	173.1	469.03
173.53	469	174.13	468.97	175.58	468.97	177.18	468.99	177.62	468.98
178.15	468.98	180.01	468.99	181.25	469	182.02	468.98	182.26	468.97
182.99	468.97	185.34	468.92	185.66	468.91	186.34	468.88	189.28	468.79
189.36	468.79	189.38	468.79	190.39	468.81	191.4	468.79	193.5	468.72
194.4	468.69	194.52	468.69	195.03	468.69	197.64	468.64	198.37	468.58
198.76	468.54	199.71	468.52	202.06	468.49	202.98	468.45	203.13	468.45
203.5	468.44	206.37	468.33	207.37	468.35	207.5	468.35	208.21	468.38
211	468.5	211.41	468.51	212.17	468.53	214.54	468.61	215.49	468.65
215.74	468.66	216.59	468.69	219.59	468.79	220.03	468.79	221.09	468.82
221.18	468.82	221.5	468.83	224.57	468.94	225.64	469	225.67	469
225.9	469.02	229.13	469.21	229.54	469.24	230.27	469.27	232.52	469.41
233.65	469.47	234.25	469.49	234.75	469.51	235.67	469.57	238.08	469.76
239.21	469.79	239.22	469.79	239.34	469.8	242.48	470.05	242.92	470.08
243.56	470.11	246.31	470.35	246.62	470.37	246.76	470.38	247.72	470.42
249.02	470.5	250.87	470.65	251.5	470.69	251.89	470.7	254.08	470.82
254.71	470.85	254.9	470.87	255.72	470.87	256.51	470.91	258.65	471.04

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	97.35	.035	107.07	.04	115.52	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
88.65	115.52	174.52	141.81	121.21	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

CULVERT

RIVER: North_Channel
REACH: Reach RS: 800

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 131
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		82.88	472.01		115.52	469.4	

Upstream Bridge Cross Section Data
Station Elevation Data num= 238

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	94.05	463.65	110.05	463.65	115.52	469.4	119.54	469.09
119.76	469.09	119.96	469.05	120.03	469.03	121.08	468.76	121.25	468.77
123.57	468.84	124.46	468.78	125.36	468.74	125.62	468.72	127.91	468.47
128.91	468.38	129.02	468.37	130.06	468.53	131.27	468.57	132.57	468.56
133.41	468.62	134.17	468.68	134.56	468.69	136.17	468.76	137.87	468.84
138.89	468.85	139	468.86	139.18	468.86	139.52	468.89	141.37	469.01
142.32	469.03	142.87	469.02	143.42	469.04	144.85	469.09	146.75	469.17
147.49	469.13	147.83	469.13	148.68	469.12	151.09	469.14	152.21	469.19
155.52	469.18	155.61	469.18	156.62	469.18	157.83	469.16	159.83	469.12
160.11	469.14	160.94	469.15	162.42	469.08	164.26	469.07	165.17	469.02
165.41	469.02	165.94	469.01	168.66	469	168.87	468.99	169.72	468.99
170.85	469	172.75	469.02	173.1	469.03	173.53	469	174.13	468.97
175.58	468.97	177.18	468.99	177.62	468.98	178.15	468.98	180.01	468.99
181.25	469	182.02	468.98	182.26	468.97	182.99	468.97	185.34	468.92
185.66	468.91	186.34	468.88	189.28	468.79	189.36	468.79	189.38	468.79
190.39	468.81	191.4	468.79	193.5	468.72	194.4	468.69	194.52	468.69
195.03	468.69	197.64	468.64	198.37	468.58	198.76	468.54	199.71	468.52
202.06	468.49	202.98	468.45	203.13	468.45	203.5	468.44	206.37	468.33
207.37	468.35	207.5	468.35	208.21	468.38	211	468.5	211.41	468.51
212.17	468.53	214.54	468.61	215.49	468.65	215.74	468.66	216.59	468.69
219.59	468.79	220.03	468.79	221.09	468.82	221.18	468.82	221.5	468.83
224.57	468.94	225.64	469	225.67	469	225.9	469.02	229.13	469.21
229.54	469.24	230.27	469.27	232.52	469.41	233.65	469.47	234.25	469.49

234.75	469.51	235.67	469.57	238.08	469.76	239.21	469.79	239.22	469.79
239.34	469.8	242.48	470.05	242.92	470.08	243.56	470.11	246.31	470.35
246.62	470.37	246.76	470.38	247.72	470.42	249.02	470.5	250.87	470.65
251.5	470.69	251.89	470.7	254.08	470.82	254.71	470.85	254.9	470.87
255.72	470.87	256.51	470.91	258.65	471.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	115.52	.018

Bank Sta: Left Right Coeff Contr. Expan.

88.65	115.52	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

Downstream Deck/Roadway Coordinates num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		126.34	469.36		163.13	468.58	

Downstream Bridge Cross Section Data

Station Elevation Data num= 269

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	463.15
152.43	463.15	156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01
165.76	467.96	167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79
169.98	467.44	170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55
175.25	467.6	176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83
179.69	467.85	180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94
183.7	467.97	185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18
189.39	468.2	190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26
193.02	468.28	194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48
198.8	468.51	200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65
204.53	468.7	204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75
208.93	468.79	210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89
213.77	468.89	214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87
218.06	468.9	218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9
223.96	468.92	224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97
227.06	468.97	227.28	468.97	227.55	468.97	227.74	468.97	229.89	469
230.56	469.01	230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98
234.7	468.93	235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89

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   239.6  468.88  239.77  468.86  240.06  468.87   242.8  468.86  243.45  468.83
  243.78  468.83  246.86  468.85  246.94  468.85  246.97  468.85  247.93  468.82
  250.05   468.7  251.09  468.67  251.54  468.66  252.15  468.67   254.8  468.64
  255.52  468.62  255.65  468.63  256.54   468.6  258.95  468.52  259.81  468.49
  260.13  468.47  260.91  468.42  264.32  468.35  264.43  468.35  264.76  468.35
  265.57  468.34  265.73  468.35  268.95  468.37  269.01  468.37     270  468.43
  270.63  468.45  273.49   468.6  273.66   468.6  274.61  468.65  277.36  468.71
  278.03  468.73  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23
  283.66  469.18  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45
  287.09  469.46  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89
  292.07  469.91  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13
  296.95  470.17  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37
  301.48  470.37  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68
  308.18  470.85  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08
  313.15  471.05  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .03  132.79     .11  156.85     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        126.34  163.13             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  115.52
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     5.5     7.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  98.3
Downstream Elevation =  462.98
           Centerline Station =  137.04

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     5.5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
```

Upstream   Elevation = 463.48
           Centerline Station = 106.3
Downstream Elevation = 462.98
           Centerline Station = 148.68

CROSS SECTION

RIVER: North_Channel
REACH: Reach   RS: 735.8522

INPUT
Description:
Station Elevation Data   num=   278

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	467.91
138.13	466.14	139.52	465.74	140.11	465.54	141.99	464.35	142.8	464.14
144.43	463.95	144.45	463.95	144.46	463.95	145.1	463.9	151.06	465.47
156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01	165.76	467.96
167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79	169.98	467.44
170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55	175.25	467.6
176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83	179.69	467.85
180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94	183.7	467.97
185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18	189.39	468.2
190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26	193.02	468.28
194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48	198.8	468.51
200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65	204.53	468.7
204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75	208.93	468.79
210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89	213.77	468.89
214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87	218.06	468.9
218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9	223.96	468.92
224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97	227.06	468.97
227.28	468.97	227.55	468.97	227.74	468.97	229.89	469	230.56	469.01
230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98	234.7	468.93
235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89	239.6	468.88
239.77	468.86	240.06	468.87	242.8	468.86	243.45	468.83	243.78	468.83
246.86	468.85	246.94	468.85	246.97	468.85	247.93	468.82	250.05	468.7
251.09	468.67	251.54	468.66	252.15	468.67	254.8	468.64	255.52	468.62
255.65	468.63	256.54	468.6	258.95	468.52	259.81	468.49	260.13	468.47
260.91	468.42	264.32	468.35	264.43	468.35	264.76	468.35	265.57	468.34
265.73	468.35	268.95	468.37	269.01	468.37	270	468.43	270.63	468.45
273.49	468.6	273.66	468.6	274.61	468.65	277.36	468.71	278.03	468.73

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  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23  283.66  469.18
  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45  287.09  469.46
  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89  292.07  469.91
  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13  296.95  470.17
  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37  301.48  470.37
  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68  308.18  470.85
  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08  313.15  471.05
  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34    .035  132.79     .15  156.85    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        126.34  163.13             67.5   96.35  120.06             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 639.5066

INPUT
Description:
Station Elevation Data    num=     159
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.34    1.51  470.37     3.1  470.33    5.36  470.25    8.48  470.13
   10.32  470.17   11.85   470.2   13.49  470.39   15.15  470.29   16.94  470.42
   18.82  470.48   20.76  470.47   22.86  470.62   24.98  470.52   25.36  470.51
    27.2  470.51   27.23  470.51   28.25  470.54   28.32  470.54   32.57  470.16
   35.55  469.76   37.67  469.48   37.87  469.47   46.39  469.41   46.86  469.41
   48.13   469.4   50.44  469.39   51.16  469.34   51.49  469.32    52.4  469.31
    55.1  469.29   55.86  469.27   56.15  469.27   57.22  469.25   59.76   469.2
   60.35  469.21   60.78  469.19    62.4  469.15   64.39  469.07   64.88  469.04
   65.47  469.03   67.36  468.98   69.02  468.95   69.46  468.95      70  468.96
    70.9  468.91   73.45  468.78   75.71   468.7   79.84  469.03   83.01  469.04
   85.24  468.72    87.8  468.61   91.06  468.33   91.07  468.33   91.08  468.33
   91.12  468.33   92.35  468.15      94  467.93   96.18  467.63   96.33  467.61
   96.84  467.37   99.61  466.11  100.61  465.59  100.62  465.58  100.68  465.56
  104.04  463.99   104.8  463.65  105.84  463.44  108.41  463.18  108.87  463.52
  109.39  463.92  112.56  465.49  112.93  465.68  113.01  465.72  113.96  466.15
  116.67  468.29   117.5  468.95  118.46  469.24  118.48  469.24  118.58  469.26
   121.9  469.76  122.09  469.75  122.52  469.74  122.98  469.77   126.1   469.6
  126.37  469.58  126.52  469.58  127.35  469.57  128.89   469.6  130.76  469.64
  131.55  469.64  131.78  469.64  135.11  469.73  135.22  469.73  135.36  469.73
  136.28  469.76  137.42  469.77  139.66  469.77  140.38  469.78  140.64  469.79
  143.52  469.85  144.15  469.87  144.35  469.88  145.23  469.93  146.28  469.93
  148.69  469.99  149.24     470  149.74  469.97  152.42  470.03  153.31  470.06
  154.26  470.03  154.36  470.03  154.46  470.03   157.9  470.14  158.13  470.15
  158.99   470.2  160.79  470.12  162.57  470.14   162.9  470.18   163.6  470.18
  165.58  470.41  167.13  470.71  169.49  470.65   171.6  470.85  172.39  471.05
  174.19  471.25  176.59  471.17  180.43  470.55  180.58   470.5  181.18  470.54
  181.64  470.57  182.08  470.58   185.1  470.61  185.81  470.64  186.17  470.65
  188.19  470.78  189.82  470.85   190.6  470.73  193.31  470.77  194.18  470.78
  194.36  470.82  195.26  470.86   198.2  470.93  200.62  471.15  201.62   471.2
   203.3  471.46  203.94  471.41  205.11     472  207.54  473.83  208.86  474.83
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209.23	474.93	213.58	475.15	217.78	475.03	218.1	475.04	218.63	475.01
221.58	474.89	226.05	474.98	235.18	475.18	235.68	475.19		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	83.01	.04	104.8	.035	122.09	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
83.01	122.09	100	100.01	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	83.01	469.04	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	29.23	480.456

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 539.4938

INPUT
Description:
Station Elevation Data num= 210

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	467.43	.16	467.42	.85	467.41	1.44	467.37	4.2	469.23
4.85	469.7	6.07	469.77	6.1	469.77	6.19	469.77	9.41	469.77
9.63	469.76	10.73	469.74	12.09	469.73	14.01	469.73	14.94	469.71
15.33	469.7	17.94	469.66	18.67	469.65	19.67	469.63	19.92	469.63
20.86	469.61	22.87	469.58	23.72	469.55	24.61	469.49	25.35	469.36
26.23	469.28	29.18	468.98	30.59	468.98	31.78	469.06	34.04	469.24
36.93	468.98	37.42	468.95	37.58	468.94	38.76	468.92	41.01	468.88
41.95	468.86	42.37	468.85	43.29	468.84	45.57	468.78	46.64	468.74
47.01	468.74	47.95	468.74	50.13	468.66	51.27	468.64	51.74	468.64
52.58	468.65	54.03	468.64	55.93	468.57	56.68	468.57	57.21	468.55
58.58	468.52	60.59	468.46	61.48	468.4	61.84	468.38	62.73	468.38
65.18	468.36	66.47	468.39	66.57	468.39	66.81	468.39	69.84	468.38
71.06	468.31	71.07	468.31	71.09	468.31	74.28	468.3	75.61	468.31
75.63	468.31	75.67	468.31	78.88	468.27	79.75	468.28	80.12	468.29
81.05	468.3	83.24	468.28	83.99	468.28	84.49	468.24	85.88	468.24
87.64	468.23	88.19	468.18	88.89	468.16	91.32	468.53	91.93	468.63
92.1	468.6	93.12	468.27	93.8	468.03	93.87	468.01	96.2	467.38
96.57	467.17	97.42	466.69	99.64	465.34	100.44	464.87	100.78	464.66
101.68	464.13	103.76	463.32	104.86	462.95	105.51	463.15	106.08	463.26
106.94	463.79	109.27	464.87	109.99	465.19	110.5	465.68	111.42	466.4
113.86	469.21	114.93	469.41	115.11	469.45	117.8	469.74	118.37	469.79
118.49	469.81	119.57	469.95	120.95	469.93	121.07	469.93	122.76	469.89
123.08	469.86	124.07	469.81	126.21	469.82	127.22	469.83	127.4	469.84
128.43	469.81	129.24	469.82	131.59	469.85	132.38	469.85	132.87	469.86
135.5	469.86	136.08	469.86	136.2	469.86	137.37	469.87	138.45	469.88
140.51	469.87	141.22	469.91	141.72	469.94	143.53	469.98	145.01	470
145.63	470	146.32	470.02	147.4	470.03	149.54	470.08	150.58	470.08
150.82	470.08	152.14	470.1	154.16	470.12	154.46	470.13	155.45	470.13
157.8	470.22	158.73	470.27	159.81	470.26	160.04	470.26	160.25	470.27
163.39	470.36	163.99	470.35	164.67	470.36	167.15	470.4	167.95	470.42
168.15	470.43	169.16	470.46	172.02	470.41	172.42	470.41	172.46	470.41
173.73	470.54	175.53	470.53	177.01	470.53	177.7	470.55	178.26	470.56
178.47	470.56	181.4	470.62	181.6	470.63	182.72	470.66	184.68	470.65
185.9	470.65	186.76	470.7	187.22	470.71	188.12	470.72	190.42	470.71
191.65	470.71	191.68	470.71	191.74	470.71	195	470.76	196.04	470.79
196.31	470.8	196.91	470.8	199.53	470.78	200.59	470.83	200.8	470.84
201.3	470.84	204.1	470.85	205.06	470.82	205.38	470.81	206.24	470.82

208.68	470.88	209.53	470.95	209.96	470.97	211.11	470.99	213.28	471.02
214.05	471.04	214.56	471.05	216.85	471.03	217.81	471.03	218.17	471.03
219.12	471.08	221.91	471.19	222.34	471.2	222.67	471.19	223.68	471.17
225.05	471.19	226.99	471.22	227.88	471.22	228.21	471.22	228.65	471.23
231.47	471.26	232.5	471.27	232.78	471.28	233.82	471.29	235.68	471.31

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	91.32	.04	97.42	.15	111.42	.06	120.95	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
91.93	120.95	112.3	112.27	112.24	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	91.93	468.63	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 427.2193

INPUT
Description:
Station Elevation Data num= 196

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	467.48	.89	467.36	2.41	468.18	2.42	468.18	2.49	468.18
5.46	468.13	6.22	468.12	7.02	468.09	9.27	468.11	10.04	468.12
11.57	468.15	11.61	468.15	11.63	468.15	14.7	468.15	14.81	468.14
16.21	468.12	18.7	468.08	19.26	468.08	27.91	468.2	28.26	468.21
29.55	468.1	30.33	467.94	31.79	467.94	33.41	467.9	34.52	467.87
35.06	467.85	36.64	467.81	37.94	467.78	38.48	467.79	39.55	467.81
41.6	467.76	42.63	467.73	43.75	467.7	44.21	467.69	46.13	467.67
47.23	467.66	47.5	467.66	48.84	467.63	51.56	467.6	51.93	467.6
53.42	467.67	53.46	467.67	53.55	467.67	56.59	467.74	57.11	467.74
58.13	467.74	60.65	467.68	61.18	467.67	61.3	467.67	62.82	467.67
65.62	467.64	65.84	467.64	65.95	467.64	67.32	467.58	69.2	467.47
70.24	467.44	70.75	467.47	71.88	467.59	73.12	467.51	74.39	467.49
76.07	467.45	78.83	467.54	79.27	467.56	79.4	467.57	84	467.44
87.31	467.25	87.87	467.32	88.49	467.4	90.21	466.88	91.16	466.5
92.2	466.06	92.62	465.97	95.66	464.33	96.43	463.8	97.78	463.26
97.92	463.2	100.48	462.91	101.02	462.92	101.43	463.08	102.12	463.37
102.37	463.42	103.05	463.9	105.29	465.25	105.93	465.71	106.81	466.45
109.16	468	109.85	468.34	110.31	468.64	111.37	469.12	113.04	469.27
114.39	469.4	114.74	469.42	115.4	469.44	115.84	469.45	117.13	469.36
118.75	469.25	120.2	469.27	120.33	469.27	120.78	469.27	123.22	469.23
123.84	469.26	124.69	469.26	127.29	469.29	127.58	469.29	128.38	469.33
129.12	469.36	129.43	469.37	132.06	469.42	133.03	469.4	133.62	469.42
136.09	469.47	136.52	469.47	137.26	469.51	137.99	469.54	138.85	469.55
140.98	469.57	142.04	469.57	142.58	469.57	145.44	469.63	145.5	469.63
145.56	469.63	147.08	469.67	148.98	469.69	150.13	469.71	151.42	469.79
151.71	469.81	151.98	469.82	154.73	469.91	155.5	469.95	156.31	469.97
159.12	469.95	159.35	469.95	159.8	469.95	160.9	469.96	161.81	469.98
163.95	470.05	165.17	470.07	165.43	470.07	166.13	470.09	168.38	470.15
169.22	470.16	169.99	470.19	171.64	470.18	172.98	470.18	173.63	470.18
174.49	470.16	176.06	470.19	177.38	470.24	178.65	470.28	178.96	470.28
181.55	470.3	181.9	470.3	182.47	470.34	183.47	470.4	186.33	470.4
186.4	470.4	186.45	470.4	187.92	470.44	190.84	470.49	191	470.49
191.11	470.49	192.57	470.54	195.48	470.62	195.52	470.62	195.55	470.62
197.07	470.69	199.65	470.74	200.09	470.75	200.29	470.76	201.67	470.76
204.41	470.85	204.65	470.86	204.77	470.86	206.24	470.87	209.07	470.96
209.28	470.96	209.39	470.96	210.83	470.95	213.3	470.97	213.81	470.98
214.1	470.98	215.39	471.06	216.39	471.09	218.32	471.12	219.22	471.14

```
  219.98  471.17  221.67   471.2     223  471.24   223.6  471.27  224.51  471.28
  227.22   471.3   227.5   471.3  227.62   471.3  229.11  471.34  231.18  471.39
  231.51  471.39

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   88.49     .04   92.62     .15  105.93     .06  114.74    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         87.87  114.74           125.23  125.29   125.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   27.91   478.2

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 301.9247

INPUT
Description:
Station Elevation Data    num=     168
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.04   18.59  470.39    19.6   470.1   20.67  469.86   21.83  469.69
   23.08  469.52   24.39  469.48   25.85  469.47    25.9  469.47   27.75  469.52
   27.83  469.52   27.97  469.52   30.43  469.63   32.08  469.52   32.34  469.49
   32.71  469.46   35.09  469.16   36.84  469.09   36.99  469.08   37.17  469.07
   39.72  468.97   41.46  468.89   41.59  468.88   41.85  468.88   44.38  468.84
   46.18  468.79   46.25  468.79   46.35  468.78   49.04  468.69   50.47  468.66
   50.88  468.65   51.51  468.64   53.61  468.61   54.77  468.58   55.58  468.56
   56.69  468.51    58.3  468.45   59.34  468.46   60.07  468.46   60.94  468.45
   62.73  468.43   63.98   468.4   64.65  468.39   65.64  468.39   67.29  468.39
   68.16  468.36   69.13  468.32   70.31   468.3   71.69  468.24   72.62  468.12
   73.49  468.05   74.64  468.05   76.05  468.07   77.27  467.85   77.86  467.76
   78.07  467.69   80.09  467.01   80.34  466.94   80.42   466.9   82.09  466.11
   84.07  465.56   84.61  465.39   85.22  465.07   86.39  464.49    87.7  464.16
   88.88  463.84      90  463.05   90.65  462.57   91.38  462.92   93.34  463.75
      94  464.44   95.15  465.32   97.35  466.49   97.78  466.76   98.26  466.92
   99.55  467.57  100.75  467.72  101.69  467.94  104.71   468.4   104.9  468.43
  106.81  468.31  107.24  468.27  108.55   468.1  109.37  468.08  111.17  468.09
  112.58  468.07  113.04  468.06  115.43  468.05  115.63  468.05  116.37  468.07
  124.47  468.26  125.12  468.28  126.33  468.32  128.35   468.3  128.93  468.29
  129.74  468.31  130.71  468.35  133.36   468.3  133.39   468.3  133.41   468.3
   135.3  468.29  136.39  468.27  137.92  468.24  139.46  468.21  139.79  468.21
  140.48  468.23  142.52   468.3  143.58   468.3  144.42  468.29  146.67  468.36
  147.11  468.38  148.98  468.45  149.01  468.45  149.17  468.45  151.74  468.48
  152.36   468.5  153.61  468.59  154.94  468.62  156.34  468.65  157.51  468.72
  158.11  468.76  158.84  468.77  160.77  468.81  162.28   468.9   162.7  468.92
  163.16  468.93  165.37  468.93  167.01  468.94  167.17  468.94  167.53  468.95
   169.8  468.99  170.53     469  171.67  468.96  174.17  468.97  174.29  468.97
  174.48  468.98  176.17  469.05  177.89  469.09  178.79   469.1  179.82  469.12
  180.63  469.13  181.81  469.13  183.39  469.16  185.19  469.25  185.29  469.25
  185.43  469.26  187.91  469.32  189.64  469.41  189.75  469.42  192.46  469.48
  192.51  469.48  192.81  469.48  194.38  469.48  196.99  469.58  197.07  469.58
  197.14  469.58  198.94  469.66  201.62  469.71  201.67  469.71  201.71  469.71
  203.54  469.77  205.26  469.82  206.26  469.86  207.19  469.88   208.1  469.89
  208.68   469.9  210.73  469.95  211.98  469.99

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   74.64     .04   84.61     .15   95.15     .06  104.71    .018
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Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         74.64  104.71           150.72  127.44  115.85             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   31.99 480.035

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 174.488

INPUT
Description:
Station Elevation Data    num=     304
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.88     .43  470.88     .77  470.88    2.37  470.89    4.12  470.86
    4.32  470.85    4.65  470.84    6.23  470.85    7.23  470.85    8.13  470.86
    9.12  470.91   10.02  470.92   10.83  470.95   11.99  470.96      14  470.97
   15.85  470.99   17.49  471.02   17.75  471.02   18.55  470.99   20.19  470.95
   20.74  470.95   22.05  470.98   23.25  470.91   23.73  470.88   24.26  470.89
   26.04  470.92   27.47  470.94    28.2  470.93   28.86  470.95   29.85  470.97
   30.92  470.96    31.4  470.95   31.92  470.94   32.96   470.9   33.96  470.94
   34.95  470.95   37.39  470.89   37.58  470.88   37.77  470.88   39.17  470.92
   40.64  470.92    40.8  470.92   41.25  470.92   43.33  470.94   44.08  470.93
   45.27  470.91   46.71  470.93   46.99  470.94   47.24  470.94   49.43  470.94
   50.62  470.95   51.55  470.93   52.67  470.91   53.35   470.9   53.92  470.88
   55.44  470.86   57.31  470.83    57.6  470.83   57.94  470.82   59.44  470.79
   60.69  470.81   61.34  470.83   62.43  470.82   63.38  470.81   63.93  470.81
   65.36  470.77   67.19  470.76   67.33  470.76    67.5  470.76   69.22  470.76
   70.58  470.85   71.19  470.89    72.3  470.99   73.15  471.06   73.67  471.08
   76.77  470.87   77.07  470.85   77.14  470.85   77.37  470.85   79.59  470.83
   80.29  470.84   81.49  470.85   82.67  470.87   83.15  470.87   83.61  470.86
   85.38  470.82   86.86  470.83   87.48  470.83   88.07  470.83   89.02  470.82
   90.01  470.81   90.97  470.82   93.16  470.85   93.78  470.84   96.26  470.81
   96.52  470.81    98.9  470.84   99.41  470.85   99.46  470.85  101.85  470.84
  102.57  470.84  103.79  470.86  104.11  470.86  105.64  470.86  106.27  470.86
  107.81  470.83  108.39  470.82  108.64  470.82  110.12  470.83  111.75  470.81
   111.8  470.81  111.85   470.8  113.77  470.62  114.86  470.44  115.68  470.27
  116.81  469.84   117.5   469.6     118  469.56  119.38  469.37  120.99  468.74
  121.28  468.66  121.69  468.52  123.21  468.01  124.31  467.74  125.02  467.55
  125.92  467.43  126.69  467.35  127.26  467.11  128.58  466.73  130.57  466.25
   130.6  466.24  130.63  466.22  132.18  464.72  133.46  464.08  133.85  463.87
  134.45  463.47  135.88  462.81  136.83  462.69  138.26  462.43  139.44   462.3
  141.47  462.03  143.33   461.9  144.47  461.95  147.04  462.64  149.63   463.9
  151.42  464.08  153.29  464.92  156.18  466.69  156.29  466.74  156.33  466.76
  156.65  466.82  158.45  467.11   159.1  467.29  160.18  467.63  161.16  467.84
  161.76  467.86  162.44  467.92  163.52  467.98  165.41  468.06  165.44  468.06
  165.46  468.06  167.04   468.1  168.44  468.12  168.65  468.12  168.89  468.12
  169.02  468.13  170.37  468.16  171.86  467.82  172.12  467.79  172.42  467.75
  173.91  467.67  175.24  467.65  175.69  467.62  176.37  467.61  177.45  467.59
  178.14  467.59  179.65  467.55  181.68  467.58  182.01  467.59  182.38   467.6
  183.63   467.6  184.71  467.66   185.4  467.69  186.47  467.71  187.52  467.73
  188.19  467.74  189.23  467.78  190.36  467.79  190.76  467.79  191.14  467.79
  192.88  467.79  194.76  467.79   195.2  467.78  197.78  467.67  197.91  467.67
  198.15  467.68  200.26  467.72  201.35  467.74  202.73  467.71  204.32   467.7
  205.27   467.7  207.19  467.71  207.73  467.71  207.99  467.72  210.01  467.83
   210.9  467.86  212.67  467.88  214.58  467.89  215.38  467.88  217.36  467.89
  217.61  467.89  217.82   467.9  219.26  467.91  220.94  467.92  220.96  467.92
     221  467.92  222.98  467.96   223.9  467.95  225.04  467.95  226.63  467.97
  227.15  467.98  227.52  467.97  229.11  467.96  230.35     468  231.02  468.01
   231.8  468.01  232.91  468.01  233.87  468.03   234.7  468.03  235.94  468.07
  236.43  468.08  236.75  468.08  238.34  468.11  240.26  468.14  240.29  468.14
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  240.32  468.14  241.95   468.2  243.19  468.24  243.73  468.25  244.59  468.28
  245.96  468.34  246.82  468.35  247.79  468.37  249.11  468.48  249.39   468.5
   249.6  468.51  251.77   468.6  253.41  468.67  253.92  468.68  254.47  468.72
  255.42  468.77  256.28  468.82  257.47  468.89   259.9  469.02  260.12  469.03
  260.36  469.05   261.6  469.13  262.68   469.2  263.12  469.23  263.45  469.25
  264.77  469.32  266.42  469.38  266.45  469.38  266.49  469.38  268.92   469.5
  269.32  469.51  270.79  469.58  272.05  469.62  272.53  469.63  273.09  469.63
  274.77  469.69  275.86  469.75  276.86  469.76  277.73  469.74  278.64  469.71
  279.68  469.72  280.65  469.73  282.45  469.76  282.85  469.76  283.28  469.78
  284.83  469.85  286.26  469.91  286.89  469.93     289  469.89  289.13  469.89
  289.33   469.9  291.34  469.92  292.72  469.89   293.5  469.88  295.43  469.93
  295.51  469.93  295.54  469.93  297.74  470.02  299.45  470.12  299.88  470.13
  300.88  470.11  301.67   470.1  302.01   470.1  304.13  470.14  305.92  470.18
  306.44   470.2  307.39  470.26   308.2  470.31  308.51  470.32

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .035  110.12     .04  132.18     .15  153.29     .06  170.37    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        103.79  169.02           126.48  101.82   81.84             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  169.02  308.51 468.134       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 72.67111

INPUT
Description:
Station Elevation Data    num=     181
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.46     .01  469.46     2.1  469.53    2.13  469.53     4.2  469.56
    4.23  469.56    6.32   469.6    6.36   469.6    8.42  469.57    8.46  469.57
   10.52   469.6   10.56   469.6   12.62  469.54   12.66  469.54   14.72   469.6
   14.76   469.6   16.82   469.5   16.86   469.5   18.92   469.5   18.97   469.5
   21.02  469.54   21.06  469.54   23.11  469.57   23.19  469.57   25.22   469.6
    25.3   469.6   27.33  469.64   27.39  469.64   29.43  469.67   29.49  469.67
   31.52  469.73    31.6  469.73   33.65  469.73   33.72  469.73   35.74  469.77
   35.82  469.77   37.85  469.83   37.92  469.83   39.94  469.87   40.02  469.87
   42.04  469.93   42.12  469.93   44.13   469.9   44.24   469.9   46.23   469.9
   46.35   469.9   48.37  469.82   48.48  469.82   50.07   469.7   50.47  469.67
   50.59  469.65   52.61  468.89    52.7  468.86   54.75  468.17   54.83  468.14
   58.95  466.58   59.02  466.56   59.08  466.54   61.16  466.19   61.21  466.17
   63.26  465.34    63.3  465.33   65.39  464.59   65.43  464.57   67.53   463.4
   67.54   463.4   67.94  463.07   69.67  461.63   69.69  461.62    71.8  461.08
   71.82  461.08    73.9  461.27   73.92  461.27      76  461.57   76.02  461.57
   76.03  461.58   80.46  464.14   81.48  464.64   86.27  467.08   86.37  467.13
   86.47  467.16   88.47  467.41   88.57  467.43   90.55  467.96   90.69  467.99
   92.66  468.26   92.77  468.27   92.79  468.27   94.75     468   94.89  467.96
   96.88  467.85   97.02  467.85   98.98  467.91   99.12  467.92  101.08  468.01
  101.22  468.01  103.18  468.14  103.32  468.14  105.32  468.14  105.45  468.14
  107.41   468.2  107.57   468.2  109.51  468.23  109.67  468.24  111.61  468.27
  111.78  468.28  113.74  468.31   113.9  468.31  115.84   468.4     116   468.4
  117.93  468.46  118.09  468.47  120.03  468.53   120.2  468.53  122.14  468.49
  122.31   468.5   124.2  468.53  124.37  468.54   126.3  468.59  126.47   468.6
  128.43  468.66  128.62  468.67  130.52  468.78  130.73  468.78  132.63  468.78
  132.83  468.79  134.75  468.88  134.96  468.89  136.83  468.94  137.03  468.96
  138.92  469.08  139.14  469.08  141.06  469.08  141.26  469.09  143.16  469.15
  143.36  469.16  145.25  469.23  145.46  469.23  147.35  469.26  147.59  469.27
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149.46	469.36	149.69	469.37	151.51	469.45	151.75	469.46	153.61	469.52
153.85	469.53	155.75	469.65	155.99	469.66	157.85	469.82	158.09	469.83
159.95	469.91	160.19	469.92	162.05	469.98	162.28	469.98	163.63	470
164.09	470.02	164.41	470.03	166.7	470.06	166.71	470.06	166.72	470.06
168.98	470.14	170.22	470.12	171.13	470.12	173.01	470.15	173.21	470.15
173.54	470.15	175.5	470.16	176.66	470.18	177.58	470.18	179.23	470.23
179.55	470.24	180.35	470.27	182.17	470.33	182.88	470.34	184.17	470.38
185.56	470.4	186.17	470.4	187.8	470.44	188.91	470.47	189.33	470.46
190.03	470.46								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	50.07	.04	65.39	.15	81.48	.04	92.77	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50.07	92.77	149.26	72.67	167.63	.1	.3

SUMMARY OF REACH LENGTHS

River: North_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1459.614	89.03	89.03	89.04
Reach	1370.583	100.01	100	100
Reach	1270.58	100.01	100	100
Reach	1170.577	58.01	58	58
Reach	1143.195	Culvert		
Reach	1112.573	100.02	100	100
Reach	1012.57	127.93	134.9	144.08
Reach	877.6657	174.52	141.81	121.21
Reach	800	Culvert		
Reach	735.8522	67.5	96.35	120.06
Reach	639.5066	100	100.01	100
Reach	539.4938	112.3	112.27	112.24
Reach	427.2193	125.23	125.29	125.4
Reach	301.9247	150.72	127.44	115.85
Reach	174.488	126.48	101.82	81.84
Reach	72.67111	149.26	72.67	167.63

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: North_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1459.614	.1	.3
Reach	1370.583	.1	.3
Reach	1270.58	.1	.3
Reach	1170.577	.1	.3
Reach	1143.195	Culvert	
Reach	1112.573	.1	.3
Reach	1012.57	.1	.3
Reach	877.6657	.1	.3
Reach	800	Culvert	
Reach	735.8522	.1	.3
Reach	639.5066	.1	.3
Reach	539.4938	.1	.3

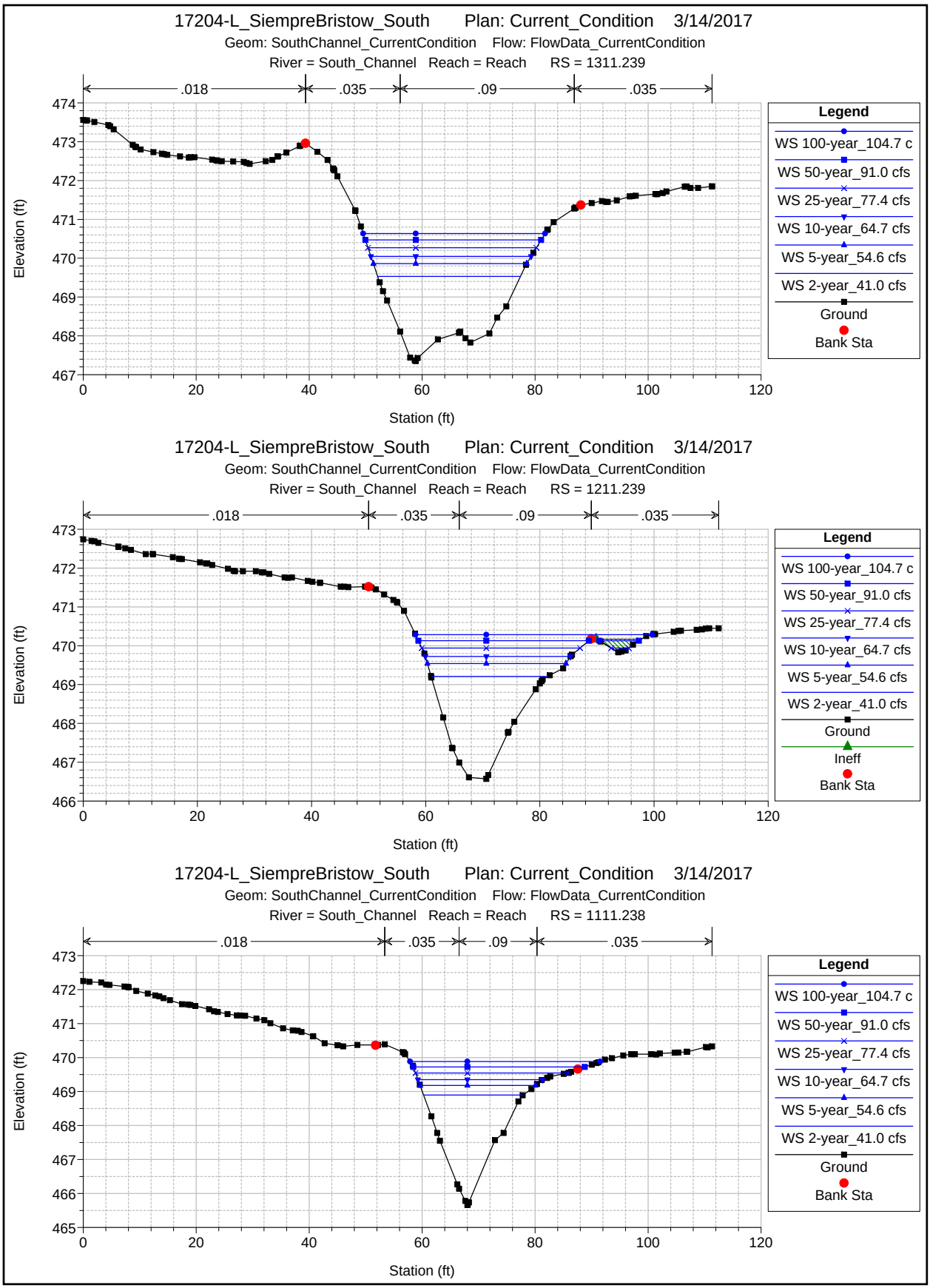
Reach	427.2193	.1	.3
Reach	301.9247	.1	.3
Reach	174.488	.1	.3
Reach	72.67111	.1	.3

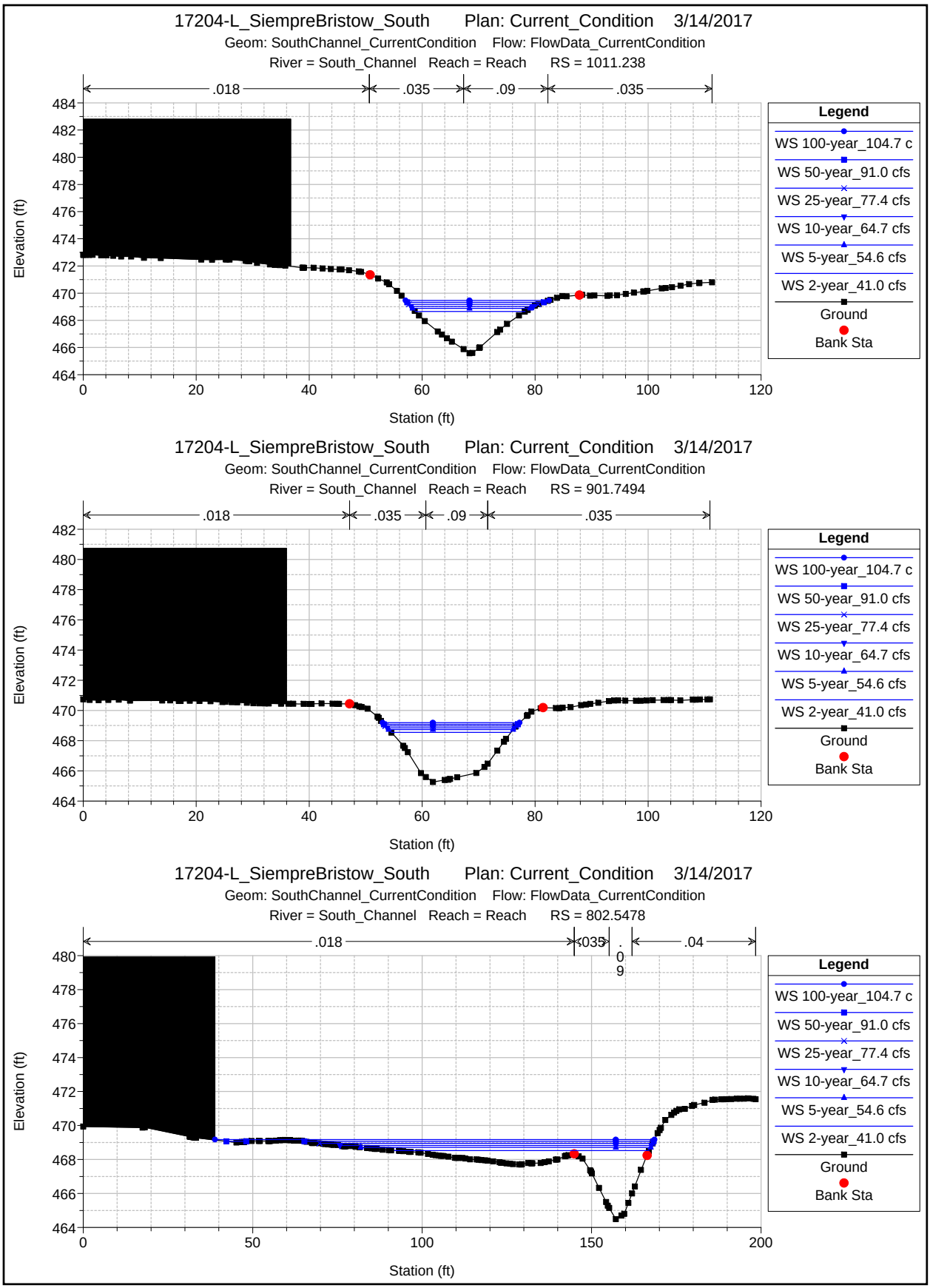
HEC-RAS Plan: Current_Cond River: South_Channel Reach: Reach

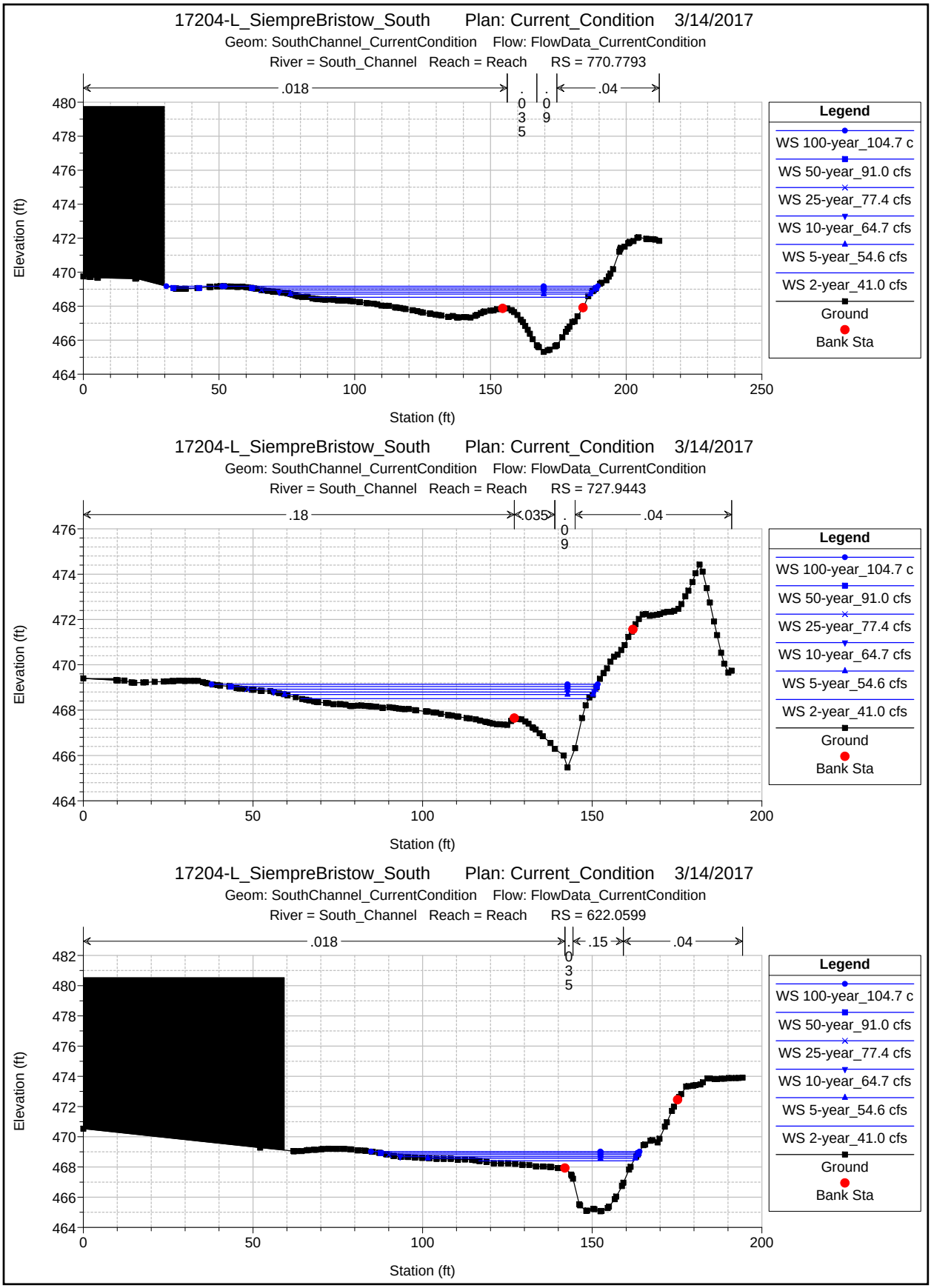
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1311.239	2-year_41.0 cfs	41.00	467.35	469.53	468.42	469.55	0.003132	1.21	33.96	25.27	0.18
Reach	1311.239	5-year_54.6 cfs	54.60	467.35	469.86	468.54	469.89	0.002829	1.28	42.54	27.13	0.18
Reach	1311.239	10-year_64.7 cfs	64.70	467.35	470.05	468.63	470.08	0.002846	1.36	47.73	28.35	0.18
Reach	1311.239	25-year_77.4 cfs	77.40	467.35	470.27	468.72	470.30	0.002824	1.43	54.20	29.81	0.19
Reach	1311.239	50-year_91.0 cfs	91.00	467.35	470.47	468.82	470.51	0.002870	1.51	60.33	31.12	0.19
Reach	1311.239	100-year_104.7 c	104.70	467.35	470.64	468.91	470.68	0.002991	1.60	65.60	32.21	0.20
Reach	1211.239	2-year_41.0 cfs	41.00	466.57	469.21		469.24	0.003171	1.35	30.26	20.43	0.20
Reach	1211.239	5-year_54.6 cfs	54.60	466.57	469.54		469.57	0.003400	1.44	37.83	24.29	0.20
Reach	1211.239	10-year_64.7 cfs	64.70	466.57	469.72		469.76	0.003458	1.53	42.37	25.41	0.21
Reach	1211.239	25-year_77.4 cfs	77.40	466.57	469.94		469.98	0.003628	1.61	48.09	30.74	0.22
Reach	1211.239	50-year_91.0 cfs	91.00	466.57	470.13		470.17	0.003863	1.70	53.50	36.80	0.22
Reach	1211.239	100-year_104.7 c	104.70	466.57	470.29		470.33	0.003912	1.79	59.36	41.50	0.23
Reach	1111.238	2-year_41.0 cfs	41.00	465.66	468.90		468.93	0.002960	1.46	28.15	17.62	0.20
Reach	1111.238	5-year_54.6 cfs	54.60	465.66	469.18		469.22	0.003634	1.63	33.51	20.43	0.22
Reach	1111.238	10-year_64.7 cfs	64.70	465.66	469.35		469.40	0.003818	1.74	37.12	22.06	0.24
Reach	1111.238	25-year_77.4 cfs	77.40	465.66	469.55		469.60	0.004019	1.85	41.86	27.00	0.26
Reach	1111.238	50-year_91.0 cfs	91.00	465.66	469.72		469.78	0.003941	1.94	46.98	30.36	0.27
Reach	1111.238	100-year_104.7 c	104.70	465.66	469.88		469.95	0.003827	2.02	52.05	33.66	0.27
Reach	1011.238	2-year_41.0 cfs	41.00	465.58	468.66		468.68	0.002071	1.31	31.32	19.47	0.18
Reach	1011.238	5-year_54.6 cfs	54.60	465.58	468.88		468.91	0.002606	1.53	35.76	20.83	0.21
Reach	1011.238	10-year_64.7 cfs	64.70	465.58	469.02		469.06	0.002981	1.67	38.70	21.69	0.22
Reach	1011.238	25-year_77.4 cfs	77.40	465.58	469.17		469.23	0.003461	1.83	42.21	22.86	0.24
Reach	1011.238	50-year_91.0 cfs	91.00	465.58	469.32		469.39	0.003989	1.99	45.76	24.18	0.25
Reach	1011.238	100-year_104.7 c	104.70	465.58	469.46		469.53	0.004409	2.13	49.24	25.39	0.27
Reach	901.7494	2-year_41.0 cfs	41.00	465.26	468.55		468.56	0.000632	0.91	45.08	21.23	0.11
Reach	901.7494	5-year_54.6 cfs	54.60	465.26	468.74		468.76	0.000862	1.11	49.08	22.05	0.13
Reach	901.7494	10-year_64.7 cfs	64.70	465.26	468.85		468.87	0.001039	1.25	51.59	22.54	0.15
Reach	901.7494	25-year_77.4 cfs	77.40	465.26	468.97		469.00	0.001262	1.42	54.42	23.13	0.16
Reach	901.7494	50-year_91.0 cfs	91.00	465.26	469.09		469.13	0.001510	1.59	57.07	23.72	0.18
Reach	901.7494	100-year_104.7 c	104.70	465.26	469.19		469.24	0.001753	1.76	59.59	24.27	0.20
Reach	802.5478	2-year_41.0 cfs	41.00	464.49	468.53		468.53	0.000172	0.55	70.26	75.17	0.07
Reach	802.5478	5-year_54.6 cfs	54.60	464.49	468.71		468.72	0.000170	0.58	85.25	85.54	0.07
Reach	802.5478	10-year_64.7 cfs	64.70	464.49	468.83		468.83	0.000170	0.60	95.33	92.00	0.07
Reach	802.5478	25-year_77.4 cfs	77.40	464.49	468.95		468.96	0.000168	0.61	107.38	98.29	0.07
Reach	802.5478	50-year_91.0 cfs	91.00	464.49	469.07		469.08	0.000167	0.63	119.43	108.94	0.07
Reach	802.5478	100-year_104.7 c	104.70	464.49	469.17		469.19	0.000191	0.69	132.34	129.66	0.07
Reach	770.7793	2-year_41.0 cfs	41.00	465.31	468.53		468.53	0.000060	0.34	102.89	102.79	0.04
Reach	770.7793	5-year_54.6 cfs	54.60	465.31	468.71		468.72	0.000060	0.36	122.92	110.47	0.04
Reach	770.7793	10-year_64.7 cfs	64.70	465.31	468.83		468.83	0.000062	0.38	135.72	115.20	0.04
Reach	770.7793	25-year_77.4 cfs	77.40	465.31	468.95		468.96	0.000065	0.40	150.82	122.50	0.05
Reach	770.7793	50-year_91.0 cfs	91.00	465.31	469.07		469.08	0.000067	0.42	165.67	136.25	0.05
Reach	770.7793	100-year_104.7 c	104.70	465.31	469.18		469.18	0.000073	0.45	180.91	157.98	0.05
Reach	727.9443	2-year_41.0 cfs	41.00	465.47	468.51		468.52	0.000736	1.01	70.12	84.91	0.14
Reach	727.9443	5-year_54.6 cfs	54.60	465.47	468.69		468.71	0.000874	1.15	86.19	90.94	0.16
Reach	727.9443	10-year_64.7 cfs	64.70	465.47	468.80		468.82	0.000965	1.26	96.48	94.54	0.17
Reach	727.9443	25-year_77.4 cfs	77.40	465.47	468.93		468.95	0.001086	1.38	108.58	102.65	0.18
Reach	727.9443	50-year_91.0 cfs	91.00	465.47	469.04		469.07	0.001204	1.50	120.55	107.87	0.19
Reach	727.9443	100-year_104.7 c	104.70	465.47	469.14		469.17	0.001325	1.62	131.68	113.81	0.20
Reach	622.0599	2-year_41.0 cfs	41.00	465.07	468.41		468.42	0.001358	0.72	52.34	45.76	0.08
Reach	622.0599	5-year_54.6 cfs	54.60	465.07	468.58		468.59	0.001444	0.77	61.08	61.15	0.09
Reach	622.0599	10-year_64.7 cfs	64.70	465.07	468.68		468.70	0.001367	0.77	68.05	69.60	0.09
Reach	622.0599	25-year_77.4 cfs	77.40	465.07	468.81		468.83	0.001175	0.74	76.85	73.35	0.08
Reach	622.0599	50-year_91.0 cfs	91.00	465.07	468.92		468.95	0.001047	0.72	85.23	76.00	0.08
Reach	622.0599	100-year_104.7 c	104.70	465.07	469.02		469.05	0.000980	0.71	92.85	79.13	0.08
Reach	522.0566	2-year_41.0 cfs	41.00	464.62	468.26		468.27	0.001681	0.81	50.60	24.25	0.10
Reach	522.0566	5-year_54.6 cfs	54.60	464.62	468.39		468.41	0.002436	1.01	53.91	25.31	0.12
Reach	522.0566	10-year_64.7 cfs	64.70	464.62	468.49		468.51	0.002974	1.15	56.50	30.23	0.14
Reach	522.0566	25-year_77.4 cfs	77.40	464.62	468.62		468.64	0.003402	1.28	60.86	36.37	0.15
Reach	522.0566	50-year_91.0 cfs	91.00	464.62	468.74		468.77	0.003759	1.39	65.61	43.99	0.16
Reach	522.0566	100-year_104.7 c	104.70	464.62	468.84		468.87	0.003981	1.47	70.41	49.41	0.17
Reach	422.0532	2-year_41.0 cfs	41.00	463.91	468.22		468.23	0.000140	0.73	55.87	25.70	0.09
Reach	422.0532	5-year_54.6 cfs	54.60	463.91	468.34		468.35	0.000214	0.93	59.34	32.75	0.11
Reach	422.0532	10-year_64.7 cfs	64.70	463.91	468.43		468.44	0.000267	1.05	62.21	35.68	0.12
Reach	422.0532	25-year_77.4 cfs	77.40	463.91	468.54		468.57	0.000324	1.19	66.73	40.72	0.13
Reach	422.0532	50-year_91.0 cfs	91.00	463.91	468.65		468.68	0.000385	1.32	71.47	48.28	0.15
Reach	422.0532	100-year_104.7 c	104.70	463.91	468.74		468.77	0.000445	1.44	76.08	53.83	0.16
Reach	322.0501	2-year_41.0 cfs	41.00	463.86	468.21		468.21	0.000336	0.52	72.92	53.38	0.06

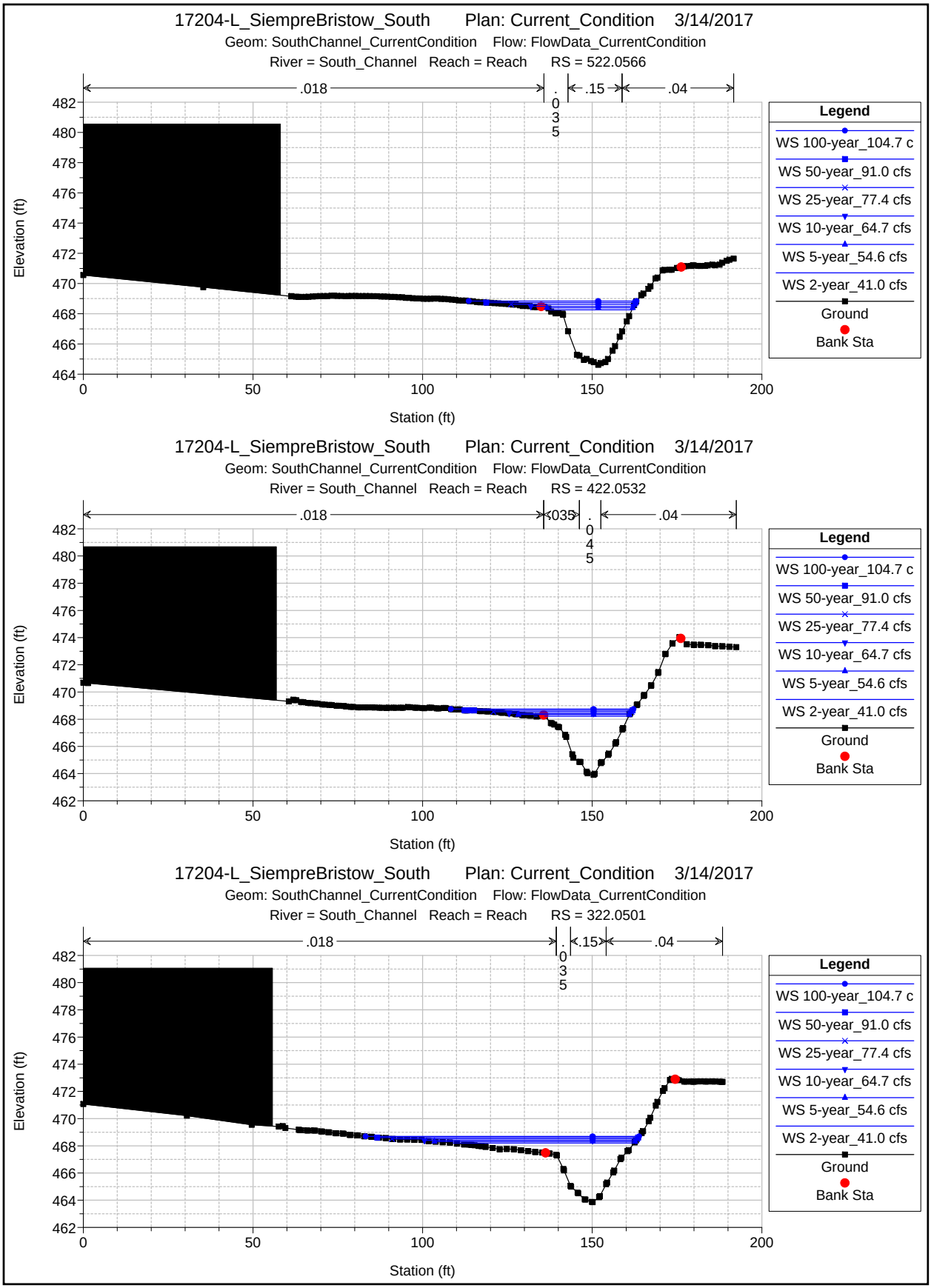
HEC-RAS Plan: Current_Cond River: South_Channel Reach: Reach (Continued)

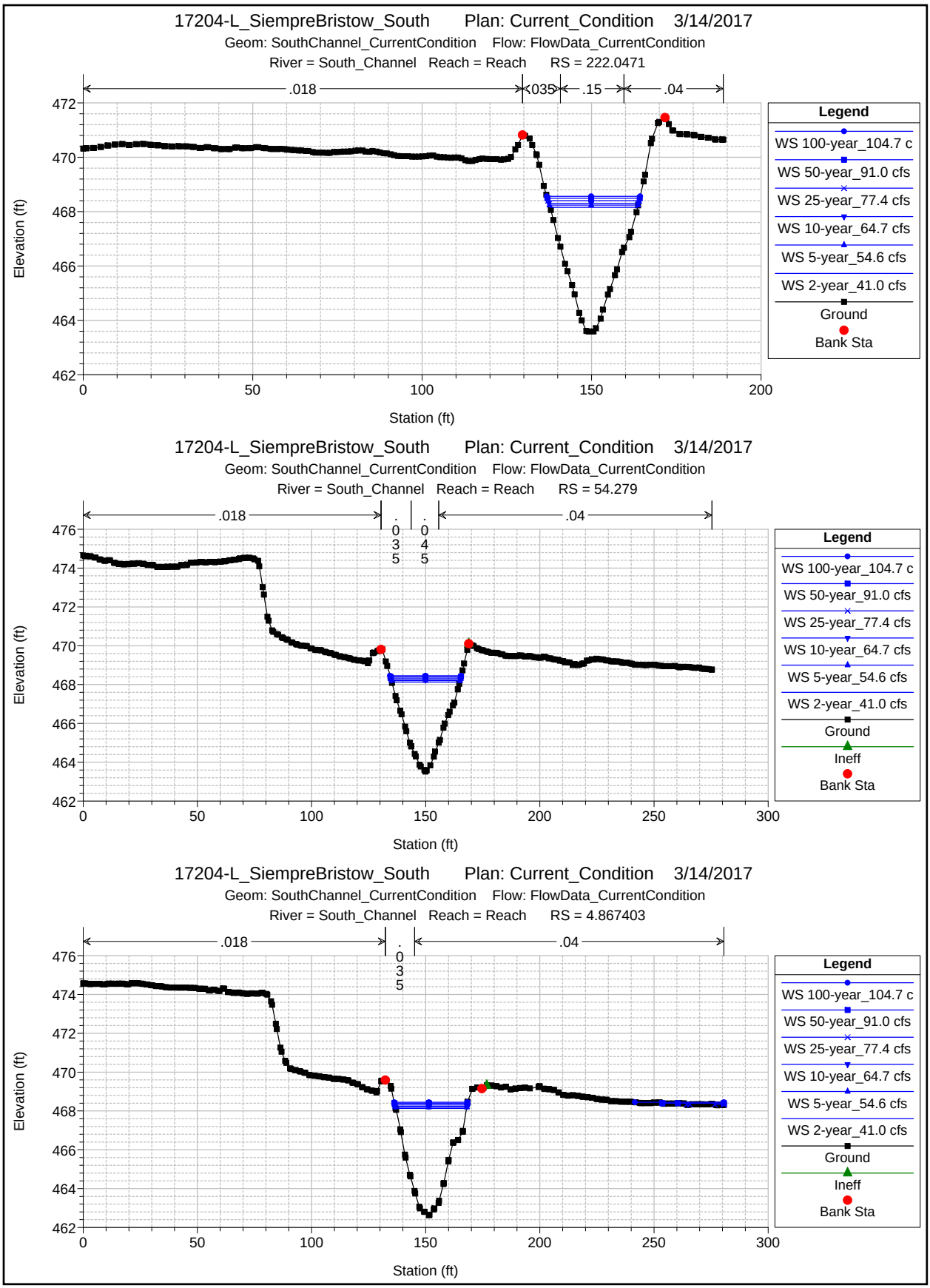
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	322.0501	5-year_54.6 cfs	54.60	463.86	468.31		468.32	0.000459	0.63	79.03	59.18	0.07
Reach	322.0501	10-year_64.7 cfs	64.70	463.86	468.39		468.40	0.000525	0.69	83.85	62.36	0.08
Reach	322.0501	25-year_77.4 cfs	77.40	463.86	468.51		468.52	0.000586	0.74	91.41	72.28	0.08
Reach	322.0501	50-year_91.0 cfs	91.00	463.86	468.61		468.63	0.000611	0.78	99.05	76.91	0.08
Reach	322.0501	100-year_104.7 c	104.70	463.86	468.70		468.72	0.000641	0.81	105.84	80.62	0.09
Reach	222.0471	2-year_41.0 cfs	41.00	463.59	468.16		468.16	0.000812	0.61	66.86	25.84	0.07
Reach	222.0471	5-year_54.6 cfs	54.60	463.59	468.24		468.25	0.001294	0.79	69.09	26.20	0.09
Reach	222.0471	10-year_64.7 cfs	64.70	463.59	468.30		468.32	0.001682	0.91	70.76	26.47	0.10
Reach	222.0471	25-year_77.4 cfs	77.40	463.59	468.40		468.42	0.002144	1.06	73.34	26.88	0.11
Reach	222.0471	50-year_91.0 cfs	91.00	463.59	468.49		468.51	0.002667	1.20	75.77	27.26	0.13
Reach	222.0471	100-year_104.7 c	104.70	463.59	468.56		468.59	0.003247	1.35	77.77	27.57	0.14
Reach	54.279	2-year_41.0 cfs	41.00	463.52	468.13		468.13	0.000062	0.53	77.69	29.73	0.06
Reach	54.279	5-year_54.6 cfs	54.60	463.52	468.20		468.21	0.000102	0.68	79.80	30.03	0.07
Reach	54.279	10-year_64.7 cfs	64.70	463.52	468.25		468.26	0.000135	0.80	81.31	30.25	0.09
Reach	54.279	25-year_77.4 cfs	77.40	463.52	468.33		468.35	0.000178	0.92	83.76	30.60	0.10
Reach	54.279	50-year_91.0 cfs	91.00	463.52	468.40		468.42	0.000229	1.06	85.93	30.92	0.11
Reach	54.279	100-year_104.7 c	104.70	463.52	468.45		468.48	0.000288	1.20	87.50	31.15	0.13
Reach	4.867403	2-year_41.0 cfs	41.00	462.63	468.13	463.76	468.13	0.000025	0.40	101.51	31.08	0.04
Reach	4.867403	5-year_54.6 cfs	54.60	462.63	468.20	463.93	468.20	0.000042	0.53	103.70	31.31	0.05
Reach	4.867403	10-year_64.7 cfs	64.70	462.63	468.25	464.04	468.26	0.000057	0.61	105.26	31.47	0.06
Reach	4.867403	25-year_77.4 cfs	77.40	462.63	468.33	464.17	468.34	0.000076	0.72	107.79	37.18	0.07
Reach	4.867403	50-year_91.0 cfs	91.00	462.63	468.40	464.30	468.41	0.000099	0.83	110.02	58.38	0.08
Reach	4.867403	100-year_104.7 c	104.70	462.63	468.45	464.42	468.46	0.000125	0.94	111.62	70.67	0.09


17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1311.239
.018
.035
.09
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1211.239
.018
.035
.09
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1111.238
.018
.035
.09
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1011.238
.018
.035
.09
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 901.7494
.018
.035
.09
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 802.5478
.018
.035
.09
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 770.7793
.018
.035
.09
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 727.9443
.18
.035
.09
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 622.0599
.018
.035
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 522.0566
.018
.035
.15
.04
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 422.0532
.018
.035
.045
.04
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 322.0501
.018
.035
.15
.04
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
Elevation (ft)
Station (ft)


17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 222.0471
.018
.035
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 54.279
.018
.035
.045
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: Current_Condition 3/14/2017
Geom: SouthChannel_CurrentCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 4.867403
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_South
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/14/2017 8:43:09 AM

Project in English units

PLAN DATA

Plan Title: Current_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.p01

Geometry Title: SouthChannel_CurrentCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g02

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Plan Summary Information:
Number of: Cross Sections = 15 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Flow Data (cfs)

River	Reach	RS	2-year_41.0 cfs	5-year_54.6 cfs	10-year_64.7 cfs	25-year_77.4 cfs	50-year_91.0 cfs	100-year_104.7 cfs	PF 7	PF 8
South_Channel	Reach	1311.239	41	54.6	64.7	77.4	91	104.7	5	10

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
South_Channel	Reach	1311.239	15	20	25	30	35	40

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
South_Channel	Reach	2-year_41.0 cfs	Critical	Known WS = 468.13
South_Channel	Reach	5-year_54.6 cfs	Critical	Known WS = 468.2
South_Channel	Reach	10-year_64.7 cfs	Critical	Known WS = 468.25
South_Channel	Reach	25-year_77.4 cfs	Critical	Known WS = 468.33
South_Channel	Reach	50-year_91.0 cfs	Critical	Known WS = 468.4
South_Channel	Reach	100-year_104.7 cfs	Critical	Known WS = 468.45
South_Channel	Reach	PF 7	Critical	Known WS = 467.35
South_Channel	Reach	PF 8	Critical	Known WS = 467.53
South_Channel	Reach	PF 9	Critical	Known WS = 467.68
South_Channel	Reach	PF 10	Critical	Known WS = 467.83
South_Channel	Reach	PF 11	Critical	Known WS = 467.95
South_Channel	Reach	PF 12	Critical	Known WS = 467.98
South_Channel	Reach	PF 13	Critical	Known WS = 468.03
South_Channel	Reach	PF 14	Critical	Known WS = 468.05

GEOMETRY DATA

Geometry Title: SouthChannel_CurrentCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g02

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1311.239

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.56	.52	473.55	.67	473.55	1.96	473.51	4.44	473.43
4.75	473.4	5.38	473.32	8.75	472.92	9.21	472.87	9.36	472.86
10.16	472.8	12.43	472.73	13.91	472.69	14.32	472.68	14.87	472.66
17.15	472.62	18.7	472.59	19	472.6	19.69	472.6	22.83	472.54
23.55	472.52	23.72	472.51	24.52	472.5	26.56	472.49	28.42	472.48
28.93	472.45	29.47	472.43	32.32	472.5	33.46	472.53	34.42	472.62
34.48	472.62	35.97	472.72	38.32	472.89	38.43	472.9	39.35	472.96
41.46	472.74	43.25	472.53	44.23	472.31	44.32	472.29	44.46	472.26
44.99	472.11	48.14	471.23	48.16	471.22	48.17	471.22	49.14	470.82
52.48	469.38	53.06	469.15	53.79	468.91	56.1	468.11	57.88	467.44
58.67	467.37	58.87	467.35	59.21	467.43	62.78	467.91	66.51	468.08
66.75	468.11	67.66	467.94	68.52	467.83	71.9	468.06	73.29	468.47
74.89	468.76	78.37	469.83	79.68	470.14	82.16	470.73	82.21	470.74
82.23	470.74	83.29	470.93	86.94	471.28	87.13	471.3	87.19	471.3
88.1	471.37	90.01	471.42	91.84	471.47	92.57	471.45	92.87	471.45
94.46	471.49	96.76	471.59	97.2	471.6	97.82	471.61	101.29	471.65
101.57	471.65	101.63	471.65	102.59	471.68	103.25	471.72	106.49	471.84
106.83	471.85	107.51	471.81	108.86	471.81	111.32	471.85	111.33	471.85

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	39.35	.035	56.1	.09	86.94	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.35	88.1	102.88	100	100	.1	.3

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1211.239

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.74	1.46	472.7	1.98	472.69	2.65	472.65	6.13	472.55
6.15	472.55	6.18	472.55	7.37	472.51	8.36	472.47	10.96	472.36
12.19	472.36	12.22	472.36	15.69	472.28	16.8	472.24	16.92	472.24
17.28	472.23	20.48	472.15	21.5	472.12	21.74	472.12	22.58	472.08
25.37	471.98	26.34	471.93	26.58	471.92	27.97	471.92	30.24	471.92
31.32	471.89	31.56	471.89	32.59	471.85	35.27	471.76	35.83	471.75
36.57	471.76	39.35	471.67	40.16	471.65	41.47	471.62	41.49	471.62
45.11	471.52	45.77	471.52	46.43	471.51	49.38	471.52	50.01	471.52
50.5	471.5	51.26	471.45	52.72	471.32	54.33	471.18	54.94	471.13
55.03	471.11	56.21	470.9	58.13	470.31	59.78	469.8	60.93	469.22
61	469.18	63.07	468.15	64.65	467.37	64.69	467.36	65.87	466.99
67.58	466.61	70.61	466.57	70.95	466.67	74.4	467.76	74.52	467.78
75.52	468.04	79.28	468.88	80	469.03	80.3	469.09	80.5	469.13
81.74	469.24	84.08	469.42	85.36	469.73	85.42	469.74	85.64	469.77
89.01	470.18	89.76	470.18	90.65	470.11	93.73	469.83	94.31	469.85
95.02	469.88	96.31	470.03	98.63	470.25	99.86	470.29	99.93	470.3

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  100.19   470.3  103.46  470.36  104.31  470.38  104.72  470.39  107.47  470.41
  108.38  470.42  109.06  470.44  109.67  470.45  111.33  470.45

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.01    .035   65.87     .09   89.01    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.01   89.01              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   89.85  111.33  470.17        T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1111.238

INPUT
Description:
Station Elevation Data    num=      89
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.25     1.1  472.23    3.18  472.21    4.04  472.15    4.64  472.14
    7.31  472.09     7.9  472.08    8.05  472.07    9.38  471.96   11.42  471.88
   12.74  471.83   13.47   471.8   14.21  471.75   15.34  471.69   17.49  471.57
   18.57  471.56   18.97  471.55   19.85  471.52   22.28  471.42   23.15  471.36
   23.82  471.34   25.55  471.28    27.2  471.24   27.76  471.24   28.66  471.23
   30.65  471.15   32.06   471.1   33.14  471.01   35.38  470.86   37.09   470.8
   37.97  470.79   38.65  470.75   40.71  470.63   42.74  470.42   45.01  470.36
   46.02  470.33   48.53  470.37   51.67  470.37   51.77  470.36   51.85  470.36
   52.18  470.37   53.38  470.39   56.59  470.16    56.8  470.14   56.99   470.1
   58.35  469.76   59.58   469.2   61.64  468.27   62.67  467.78   63.14  467.55
   66.22  466.27   66.53  466.14   67.65  465.78   68.01  465.66   68.08  465.68
   68.27  465.74   72.88  467.57   74.42  467.78   77.04  468.71    77.8  468.89
   79.34  469.07   80.32  469.22   81.17  469.34   82.14   469.4   82.67  469.44
   85.06  469.52   85.97  469.55   86.39  469.58   87.57  469.66   90.04  469.79
   90.89  469.84    91.2  469.86   92.35  469.94   93.61  469.98   95.61  470.06
   97.02   470.1   97.19   470.1   97.65   470.1  100.52   470.1  101.45  470.09
  102.08  470.12   104.7  470.14  105.36  470.15  106.85  470.17  106.87  470.17
  106.92  470.17  110.25  470.31  110.53   470.3  111.33  470.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   53.38    .035   66.53     .09   80.32    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         51.77   87.57              100     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1011.238

INPUT
Description:
Station Elevation Data    num=      90
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.82     .05  472.81     .52  472.82    1.05  472.81    1.66  472.82
    3.17  472.78    4.13  472.78     5.3  472.75    6.71   472.7    8.49   472.7
   10.76   472.6   13.73  472.58   20.89  472.47   22.81  472.46   25.22  472.48
    25.4  472.48    25.9  472.47   28.74  472.38   29.05  472.37   29.41  472.35
```

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   30.77  472.23   33.05  472.11   33.91  472.08   34.78  472.06   35.77  472.03
   38.81  471.87   38.93  471.87   39.08  471.87   40.78  471.87   42.37  471.82
   43.85  471.77    45.4  471.75   45.72  471.75   47.05  471.69   48.81   471.6
   49.18  471.56   50.66  471.38   50.81  471.35    52.2  471.08   53.73  470.79
   54.15  470.66   55.53  470.17   56.35  469.81   58.67   468.7   59.43  468.36
   60.47  467.95   62.77  467.18    63.5  466.95   64.39  466.68   65.26  466.43
   67.34  465.88   68.39  465.58   68.89   465.6   70.11  465.97   70.15  465.98
    70.2     466   73.28  467.14   73.78  467.31   75.03  467.74   77.15  468.36
   78.17  468.64   78.69  468.77   79.96  469.08   80.64  469.19   82.26  469.43
   82.73  469.51   83.88  469.66   84.82  469.79   85.56  469.77   87.85  469.86
   88.31  469.88   89.72  469.81   90.49  469.83   92.79   469.8   93.22  469.84
   94.49  469.85   96.05  469.94    97.5  470.04   99.15  470.12   99.32  470.13
   99.86  470.17  102.42  470.35  103.11  470.38  104.24  470.44  105.75  470.55
  107.25  470.67  109.03  470.75  109.04  470.75  109.08  470.75  111.33   470.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.66    .035   67.34     .09   82.26    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.81   87.85           109.55  109.49   109.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.76 482.816

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 901.7494

INPUT
Description:
Station Elevation Data    num=      88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.74    1.14   470.7    2.72  470.68    4.45   470.7    6.29  470.71
    8.27  470.65   13.97  470.66   15.39  470.67   16.92  470.63   17.25  470.63
   18.87  470.64   20.59  470.63   22.53  470.61   24.65  470.56   25.17  470.57
   26.28  470.55   27.26  470.54   28.96  470.51   30.12  470.48   31.16  470.47
   32.15  470.46   32.84  470.46   35.01  470.45   36.33  470.45   37.18  470.45
   39.02  470.44   40.04  470.43   40.43  470.43   42.18  470.46   44.13  470.45
   44.99  470.44   45.29  470.44   47.15  470.44   48.11  470.35   48.88  470.27
    49.3  470.23   50.33  470.12   52.09  469.59    52.3  469.51   52.71  469.31
   54.55  468.53   56.64  467.66   56.95  467.51   57.46  467.24    59.8  465.85
   60.66  465.59    61.9  465.26      64   465.4   64.66  465.41   64.94  465.47
    66.2  465.58   69.57  465.86   71.02  466.26   71.62  466.48   73.31  467.34
   74.48  467.93   74.83  468.12   76.51  468.93   78.54  469.64    78.7   469.7
   79.34  469.92   80.98  470.14   81.41  470.19   83.69  470.16   84.27  470.16
   84.88  470.19   86.28  470.22   88.14  470.35   89.02  470.39   89.75  470.44
   91.19  470.51   93.07  470.62   93.97  470.66    94.7  470.67   95.96  470.65
   97.84  470.64    98.7  470.64   99.75  470.66  100.82  470.68  102.74  470.69
  103.63  470.69  104.06  470.69  105.71  470.67   107.9  470.71  108.45  470.71
  109.16  470.73  110.51  470.73  110.94  470.74

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.15    .035   60.66     .09   71.62    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.15   81.41             99.3    99.2   99.08             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.01 480.742
```

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 802.5478

INPUT
Description:
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	17.5	469.88	17.83	469.9	18.17	469.89	31.38	469.35
31.53	469.34	31.68	469.34	31.83	469.33	31.99	469.33	32.16	469.32
32.32	469.32	32.5	469.31	32.68	469.3	32.87	469.3	33.07	469.29
33.27	469.28	45.18	469	46.75	469.03	46.88	469.03	47.35	469.03
47.46	469.03	48.12	469.07	49.68	469.09	51.79	469.09	52.11	469.09
54.6	469.08	54.89	469.08	55.26	469.09	56.85	469.11	58.1	469.13
58.71	469.14	59.45	469.15	60.33	469.14	61.06	469.13	62.13	469.11
63.49	469.11	64.1	469.11	64.58	469.1	65.89	469.04	67.48	468.97
67.65	468.97	67.86	468.97	69.48	468.96	70.85	468.92	71.33	468.91
72.23	468.89	73.26	468.87	73.82	468.86	75.15	468.85	76.58	468.79
76.99	468.77	77.36	468.77	79.05	468.79	80.35	468.75	81.51	468.72
83.72	468.68	84.22	468.67	85.04	468.65	86.01	468.62	86.59	468.62
88.35	468.57	90.14	468.55	90.86	468.54	93.14	468.51	93.4	468.51
94.41	468.49	96.15	468.45	96.6	468.45	98.88	468.42	99.55	468.4
101.71	468.33	103.11	468.28	103.93	468.25	104.85	468.23	105.55	468.21
106.18	468.21	107.77	468.17	109.65	468.1	110.14	468.09	110.79	468.09
111.89	468.09	112.71	468.06	114.15	468.01	116.11	468	116.64	467.99
117.49	467.97	118.59	467.95	119.29	467.93	120.97	467.89	122.83	467.84
123.27	467.81	123.75	467.81	124.88	467.77	125.94	467.75	126.78	467.73
128.59	467.71	129.16	467.7	129.43	467.72	131.33	467.79	132.1	467.78
132.38	467.77	132.52	467.78	134.97	467.79	136.17	467.84	137.39	467.89
139.46	467.99	139.93	468	142.14	468.19	142.36	468.21	142.79	468.23
143.18	468.25	144.9	468.33	146.16	468.19	147.33	468.05	149.56	467.37
149.84	467.3	150.1	467.18	152.18	466.33	154.27	465.5	154.77	465.28
155.19	465.15	157.13	464.49	158.79	464.7	159.63	464.8	160.83	465.44
161.94	466	162.75	466.41	164.56	467.39	166.39	468.24	166.9	468.49
168	468.95	169.47	469.55	170.06	469.73	170.44	469.86	171.76	470.32
173.53	470.62	174.33	470.76	175.02	470.86	175.86	470.95	177.5	470.98
179.65	471.15	180.25	471.21	183.31	471.34	185.66	471.51	186.46	471.52
188.29	471.54	188.96	471.54	189.65	471.55	191.21	471.56	192.84	471.58
193.7	471.58	194.96	471.58	196.11	471.6	197.74	471.57	198.39	471.55

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	144.9	.035	155.19	.09	161.94	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
144.9	166.39	22.62	31.77	46.56	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	38.89	479.938

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 770.7793

INPUT
Description:
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
      0  469.75    2.14  469.73    2.71  469.72    5.13  469.68    5.39  469.67
  19.12  469.62   19.31  469.63   19.51  469.63   34.16  469.03   34.17  469.03
  34.18  469.03   34.19  469.03    34.2  469.03   34.21  469.03   34.22  469.03
  34.23  469.03   34.65  469.02    34.7  469.02    36.6  469.02   37.23  469.02
  37.42  469.03   37.75  469.03   42.04  469.06   46.44  469.13    46.8  469.13
  46.89  469.13    49.3  469.16    50.5  469.17   51.88  469.18   53.41  469.15
  54.39  469.16   56.48  469.14   56.83  469.14      57  469.14   58.69  469.15
  59.98  469.12   60.64   469.1   61.79  469.08   62.96  469.05   63.62  469.03
  65.67  468.95   66.43  468.94   67.93   468.9   69.88  468.85   69.92  468.85
  69.96  468.85   71.55  468.84    72.9  468.81   73.24   468.8   73.69  468.79
  75.19  468.75   76.34  468.71   77.06  468.68    78.1  468.63   78.81   468.6
   79.3  468.57   80.63  468.54   82.26  468.55   82.47  468.55   82.63  468.55
  84.38  468.46   85.63  468.43   86.29  468.42   87.03  468.41   88.14  468.39
  89.11  468.38    90.1  468.39   92.14  468.39   92.17  468.39   92.21  468.39
  93.79  468.33   95.38  468.33   95.42  468.33   95.46  468.33   97.26  468.33
  98.38   468.3    99.4  468.29   101.7  468.24  101.84  468.24   101.9  468.24
 104.32  468.18  104.89  468.17  107.02  468.15  108.29  468.11  109.79  468.04
 111.32  468.02  112.58  468.02  114.81  467.94  115.13  467.92  115.48  467.92
 116.76   467.9  117.92  467.86   118.7  467.83  121.35  467.76  121.36  467.76
 121.37  467.76  123.08  467.71   124.4  467.65  125.11  467.62  127.71  467.56
 127.77  467.56  127.78  467.56  129.75  467.51  130.99  467.48  131.96  467.45
 134.49  467.37  134.52  467.37  134.56  467.37  136.16  467.42  137.65  467.34
 137.87  467.33  138.35  467.34  140.27  467.36  141.08  467.35  142.66  467.33
 144.42  467.43  145.08  467.49  146.47  467.59   147.4  467.66  147.84  467.69
 150.03  467.74  151.16  467.75   152.4  467.82  154.53  467.87  154.55  467.87
 154.58  467.87  156.19  467.87  157.75  467.77  157.86  467.75  158.69  467.65
 159.95  467.48  161.19  467.21  161.96  467.07  162.82  466.84  163.74  466.61
 164.52  466.38  165.58  466.06   167.1   465.7  167.51  465.62  167.81  465.59
 169.61  465.31  171.09   465.4  171.82  465.44  173.87  465.64  174.31  465.68
 174.46  465.71  176.46  466.17  177.79  466.49  178.42  466.66  179.12   466.8
 180.15  467.07  181.03  467.11  182.05   467.4  184.13  467.91  184.23  467.94
 184.28  467.95  186.05  468.59  187.65  468.88  187.89  468.93  188.65  469.02
  190.4  469.32  190.93  469.38  192.73  469.52  193.57  469.74  194.22  469.91
 195.18  470.18  197.49  471.21  197.78  471.34  198.06  471.43  199.42   471.5
 200.74   471.7  201.04  471.72  201.34  471.78  202.71  471.83  204.11  472.02
 204.61  472.05   207.4  471.96   207.6  471.95  208.21  471.95  210.03  471.94
 210.65  471.91   212.2  471.84

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  156.19    .035   167.1     .09  174.46     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.53  184.13            32.88   42.84   62.72             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.88 479.748

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 727.9443

INPUT
Description:
Station Elevation Data    num=     167
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   469.4    9.74  469.32    9.81  469.32   10.15  469.31   10.18  469.31
   12.07   469.3    12.1   469.3   12.13   469.3   14.21  469.22   14.52  469.22
   15.03  469.21   17.67  469.22   18.39  469.23   21.02  469.25    23.7  469.26
   24.63  469.27   26.31  469.28   26.44  469.28   26.57  469.28   28.17   469.3
   29.85  469.29   29.91  469.29   30.01  469.29   31.74  469.29   32.75  469.29
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   33.77  469.29   35.26  469.24   36.02   469.2   36.53  469.18   38.07  469.13
   39.54  469.11   40.31  469.08   43.04  469.05   43.08  469.05   43.18  469.05
   45.16  468.97   46.02  468.95   47.59  468.94   49.65   468.9    50.2   468.9
   52.25  468.85   52.51  468.85   52.57  468.85   55.12  468.84   56.12   468.8
   57.67  468.75   59.12   468.7   60.17  468.65   62.63  468.57   64.51  468.49
   65.68  468.46   66.57  468.43   68.03  468.38   68.79  468.36   69.24  468.35
   71.53  468.32   72.12  468.31   73.71  468.26   75.53  468.26   75.69  468.26
   75.87  468.26    77.3  468.24   78.58  468.19   78.99  468.18   79.57  468.19
   80.97   468.2   81.96  468.21   82.84  468.19   84.08  468.18   84.61  468.17
   84.99  468.16    86.4  468.15    88.2   468.1   88.21   468.1   88.22   468.1
   90.17  468.13    91.3  468.11   92.09  468.09      93  468.07   93.94  468.05
   94.72  468.04   95.91  468.05   97.78     468   98.11  467.99  101.02  467.94
  101.16  467.94   101.5  467.94  103.23   467.9  104.01  467.89  105.41  467.84
  107.48  467.78   107.7  467.78  108.64  467.76   110.2  467.72  110.56  467.71
  112.97  467.65  113.89  467.63  115.69  467.59  116.95  467.54  118.47  467.49
  118.92  467.47  119.79  467.44  120.69  467.41  121.91  467.38  122.81  467.38
  123.98  467.36  124.93  467.35   126.1  467.52  127.02  467.65  128.18  467.61
  129.12  467.59  130.28   467.5  131.22   467.4  132.38  467.24  132.56  467.22
  133.32  467.15  134.47  466.98  135.43  466.85   137.7  466.55  138.98  466.29
   141.6     466  142.72  465.47  144.95  466.32  146.98  467.65  148.07  468.21
  149.14  468.56  150.17  468.67  151.23     469  152.27  469.38  153.32  469.64
  154.36  469.84  155.37  470.14  156.45  470.36  157.47  470.45  158.55  470.65
  159.56  470.87  160.65  471.23  161.65  471.46  161.99  471.56  162.75  471.79
  163.73  472.02  164.86  472.22  165.83  472.24  166.97  472.16  167.91  472.19
  169.06  472.21  170.01  472.24  171.16  472.31   172.1  472.34  173.26  472.34
  174.19  472.38  175.36  472.47  176.27  472.68  177.44  473.02  178.35  473.27
  179.54  473.65  180.43  474.04  181.64  474.42  182.52  474.11  183.76  473.38
  184.66  472.75   185.9  471.91  186.78  471.31     188  470.53  188.88  470.05
   190.1  469.65  191.08  469.74

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .18  127.02    .035  138.98     .09  144.95     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        127.02  161.99           105.78  105.88  106.14             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0    9.54469.3978

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 622.0599

INPUT
Description:
Station Elevation Data    num=     135
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.53    52.1  469.28   61.95  469.05   61.99  469.05   62.02  469.04
   62.12  469.05   62.86  469.05   64.37  469.05   65.92   469.1   66.45  469.12
   68.03  469.14   68.54  469.14   70.14  469.17   70.63  469.19   72.27  469.21
   72.73   469.2   74.37   469.2   74.82   469.2   76.49   469.2    76.9   469.2
   78.62  469.17   79.02  469.16   80.78   469.1   81.13   469.1   82.89  469.08
   83.22  469.07   84.99  469.01   85.32     469   87.13  468.94   87.42  468.93
   89.24  468.84   89.51  468.83   91.35  468.74   91.59  468.73   93.46  468.68
   93.68  468.67   95.57  468.67   95.77  468.66   97.67  468.63   97.85  468.63
   99.79   468.6   99.95   468.6   101.9  468.57  102.04  468.57  104.05  468.54
  104.15  468.54  106.15  468.54  106.25  468.54  108.27  468.54  108.33  468.54
  110.37  468.47  110.42  468.47  112.48   468.5  112.51   468.5  114.59  468.47
   114.6  468.47  115.54  468.44  116.72   468.4  116.74   468.4  116.75   468.4
  118.84  468.34  118.87  468.34  120.97  468.24  121.03  468.24  123.07  468.24
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  123.14  468.24  125.17  468.24  125.26  468.24  127.24  468.21  127.35  468.21
  129.34  468.14  129.47  468.14  131.42  468.13  133.35  468.04  133.52  468.03
  135.44  468.03  135.62  468.03  137.51     468  137.72     468  137.93     468
  139.86  467.93  140.08  467.93  141.96  467.93  143.79   467.5  143.94  467.42
  144.31  467.22  146.16  465.53  146.42  465.46  148.23  465.09  148.51  465.11
  150.33  465.23  150.63  465.21  152.43  465.07  152.75  465.09  154.55  465.28
   154.9  465.37  156.65  465.87  157.05  466.04  158.76  466.74  159.17  466.96
  160.86  467.83  161.29  468.01  162.96  468.68  163.44  468.83  165.09  469.44
  165.59  469.48  167.18  469.73  167.71  469.77  169.28  469.62  169.83  469.87
  171.38  470.67  171.98  470.96  173.48  471.71  174.09  471.99  175.16  472.45
  175.58  472.63  176.23  472.82  177.68  473.32  178.36  473.35  179.76  473.38
  179.78  473.38  180.48  473.42  181.87  473.46  182.59   473.6  183.97  473.86
  184.71  473.86  186.05  473.82   186.8  473.82  188.15  473.84  188.91  473.84
  190.25  473.88  191.02  473.88  192.35  473.88  193.15  473.89  194.31  473.91

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  141.96    .035  144.31     .15  159.17     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        141.96  175.16           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   59.24 480.533

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 522.0566

INPUT
Description:
Station Elevation Data    num=     129
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.56   35.34  469.76    61.3  469.15   61.33  469.17   62.65  469.13
   63.43  469.11   64.21  469.11   65.56  469.11   66.36  469.12   67.66  469.14
   68.47  469.15   69.77  469.17   71.03  469.17   71.87  469.17   73.15  469.19
   73.98   469.2   74.84  469.18   76.07  469.18   77.29  469.16   78.17  469.17
   79.04  469.18   80.29  469.18   81.19  469.17   82.39  469.17    83.3  469.17
   84.46  469.17   85.64  469.16    86.6  469.16   87.76  469.14    88.7  469.14
   89.66  469.13    90.8  469.11   91.77  469.11    92.9  469.09      94  469.09
      95  469.05      96  469.05    97.1  469.03   98.18  469.01    99.2  469.01
  100.26  468.99  101.32  468.99  102.37  468.99  103.42     469  104.43     469
   105.5  468.98  106.51  468.98  107.59  468.96   108.6  468.93  109.69  468.92
  110.67  468.88  111.77  468.87  112.76  468.87  113.87  468.83  114.84  468.82
     116  468.78  116.96  468.75  118.11  468.75  119.06  468.73  120.23  468.72
  121.16   468.7  122.34  468.69  123.26  468.67  124.44  468.65  125.36  468.64
  126.56   468.6  127.44   468.6  128.66  468.56  129.53  468.51  130.76  468.51
  131.62   468.5  132.86  468.44   133.7  468.44  134.96  468.48  135.78  468.47
  137.08  468.35  137.89  468.14  139.17  468.02  139.98  468.03  141.27  468.01
  141.38  467.93  142.85  466.84  145.46  465.29  146.26  465.22  147.54  464.94
  148.34  465.01  149.65  464.87  150.42  464.79  151.76  464.62  152.52  464.73
  153.88   464.8  154.63     465  155.98  465.55  156.71  465.85  158.08  466.48
   158.8  466.83  160.19  467.49  160.88  467.84   162.3  468.57  162.98  468.82
  164.44  469.22  165.08  469.33  166.53  469.65  167.16  469.81  168.63  470.33
  169.23  470.39  170.72  470.86  171.32   470.9  172.83  470.91   173.4  470.91
  174.95  471.03   175.5  471.03  176.26  471.09  177.04  471.14   177.6  471.15
  179.15  471.16  179.68   471.2   179.9   471.2  181.24  471.17  181.83  471.16
  183.33  471.17  183.98  471.21  185.43  471.25  186.15  471.21  187.53  471.25
  188.29  471.38  189.63   471.5  190.44  471.58  191.67  471.65

Manning's n Values        num=       4
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     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.78    .035  142.85     .15   158.8     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        134.96  176.26           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   58.08 480.557

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 422.0532

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.68    1.41  470.65   60.58  469.31   61.94  469.43   62.05   469.4
   62.77   469.4   64.15  469.27   64.87  469.25   66.25   469.2   66.94  469.18
   68.35  469.16   69.03  469.14   70.45  469.09   71.12  469.07   72.56  469.05
   73.21  469.04   74.65  468.99    75.3  468.99   76.78  468.97   77.43  468.94
   78.88   468.9   79.52   468.9   80.99  468.87   81.63  468.87    83.1  468.87
   83.72  468.87   85.21  468.87   85.81  468.86   87.31  468.84   87.91  468.84
   89.42  468.84      90  468.84   91.52  468.84   92.08  468.84   93.63  468.84
   94.18  468.84   95.72  468.89   96.27  468.88   97.82  468.84   98.36  468.84
   99.92  468.82  100.46  468.81  102.06  468.84  102.59  468.85  104.17   468.8
  104.68  468.79  106.28  468.82  106.77  468.82  108.38  468.74  108.87  468.72
  110.49  468.72  110.95  468.72  112.59  468.64  113.05  468.64  114.72  468.66
  115.18  468.65  116.82   468.6  117.27  468.59  118.93  468.57  119.36  468.57
  121.03  468.54  121.46  468.53  123.14  468.48  123.54  468.47  125.22  468.44
  125.61  468.42  127.32  468.37   127.7  468.36  129.39   468.3  129.77  468.29
  131.47  468.27  131.84  468.26  133.57   468.2  133.93  468.23  135.68  468.31
  136.04  468.22   137.8  467.72  138.13  467.69  138.82   467.6   139.9  467.45
  140.22  467.41  142.01  466.85  142.33   466.7   144.1  465.42  144.43  465.16
   146.2  464.86  146.52  464.86   148.3  464.14  148.63  464.02   150.4  463.91
  150.71  463.99  152.54  464.77  152.82  464.85  154.65  465.37  154.91  465.47
  156.79   466.2  157.03  466.31   158.9  467.25   159.1  467.35  161.01  468.36
   161.2  468.43  163.11  469.03  163.28  469.09  165.18  469.71  165.34  469.78
   167.3  470.45  167.42   470.5  169.41   471.4   169.5  471.46  171.54  472.78
  171.61  472.81  173.63  473.56  173.67  473.58  175.73  474.03  175.77  474.02
  176.12  473.94  177.84  473.51  177.85  473.51  179.93  473.47  179.96  473.47
  180.04  473.47  182.04  473.47  182.05  473.47  184.14  473.44  184.25  473.44
  186.24  473.37  186.25  473.37  188.34  473.36  188.36  473.36  190.43  473.33
  190.47  473.33  192.44   473.3

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.68    .035   146.2    .045  152.54     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        135.68  176.12           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   56.91  480.68

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 322.0501
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INPUT
Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.07	30.54	470.22	49.62	469.55	57.58	469.42	58.78	469.45
59.56	469.31	63.51	469.18	63.76	469.16	64.13	469.15	65.86	469.13
66.21	469.12	67.97	469.12	68.31	469.12	70.07	469.06	70.39	469.05
72.18	469	72.48	468.99	74.28	468.93	74.57	468.92	76.41	468.9
76.69	468.89	78.52	468.8	78.78	468.8	80.62	468.77	80.87	468.76
82.73	468.7	82.96	468.7	84.83	468.67	85.05	468.66	86.95	468.6
87.15	468.6	89.05	468.57	89.23	468.56	91.18	468.5	91.35	468.5
93.28	468.47	93.44	468.47	95.39	468.47	95.53	468.47	97.5	468.44
97.62	468.44	99.6	468.44	99.71	468.43	101.71	468.34	101.8	468.34
103.78	468.31	103.86	468.31	105.89	468.27	105.95	468.27	108.02	468.24
108.07	468.24	110.14	468.16	110.16	468.16	112.24	468.1	112.26	468.1
113.8	468.08	114.34	468.07	114.35	468.07	115.35	468.04	116.44	468
116.45	468	117.4	467.97	118.54	467.93	118.55	467.93	120.63	467.84
120.66	467.84	122.69	467.74	122.73	467.74	124.78	467.77	124.84	467.77
126.87	467.74	126.95	467.74	128.96	467.67	129.06	467.67	131.06	467.61
131.17	467.61	133.15	467.54	133.28	467.54	135.22	467.51	135.36	467.51
136.25	467.48	137.31	467.44	137.47	467.43	139.4	467.34	139.58	467.29
141.5	466.3	141.67	466.19	143.59	465.05	143.78	465	145.7	464.55
145.87	464.51	147.79	464.06	147.98	464.05	149.91	463.87	150.12	463.86
152.01	464.22	152.24	464.3	154.09	465.18	154.38	465.29	156.18	466.04
156.48	466.17	158.29	467.02	158.62	467.13	160.39	467.6	160.74	467.68
162.48	468.25	162.87	468.39	164.57	468.94	164.98	469.08	166.65	469.81
167.1	470.06	168.74	470.96	169.21	471.23	170.82	472.04	171.32	472.24
172.89	472.83	173.44	472.92	174.46	472.89	175.02	472.87	175.56	472.82
177.12	472.72	177.67	472.72	179.21	472.72	179.78	472.71	180.19	472.72
181.31	472.74	181.87	472.74	183.42	472.72	183.95	472.73	185.53	472.73
186.06	472.73	187.65	472.71	188.14	472.7	188.39	472.7		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	139.4	.035	143.59	.15	154.09	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
136.25	174.46	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	55.74	481.067

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 222.0471

INPUT
Description:
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.32	.86	470.33	1.04	470.33	2.95	470.34	3.15	470.34
5.07	470.38	5.29	470.38	7.17	470.43	7.39	470.43	9.28	470.46
9.52	470.47	11.37	470.48	11.63	470.49	13.45	470.45	13.73	470.45
15.54	470.48	15.84	470.48	17.63	470.49	17.94	470.49	19.72	470.46
20.04	470.45	21.81	470.44	22.14	470.44	23.89	470.41	24.25	470.41
25.98	470.4	26.36	470.39	28.1	470.41	28.49	470.4	30.18	470.4
30.59	470.4	32.27	470.38	32.7	470.38	34.35	470.34	34.79	470.34
36.44	470.37	36.9	470.37	38.51	470.33	38.98	470.33	40.6	470.3
41.09	470.3	42.71	470.3	43.21	470.3	44.8	470.35	45.32	470.36
46.88	470.33	47.42	470.33	49	470.33	49.55	470.34	51.08	470.37
51.67	470.37	53.18	470.34	53.77	470.33	55.26	470.31	55.87	470.3

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   57.35   470.3   57.97  470.31   59.43   470.3   60.08  470.28   61.52  470.27
   62.18  470.26   63.61  470.25   64.29  470.25   65.69  470.23   66.39  470.23
   67.77  470.19   68.49  470.17   69.85  470.17    70.6  470.17   71.96  470.16
   72.71  470.16   74.05  470.19   74.84  470.19   76.14   470.2   76.94  470.21
   78.21  470.21   79.06  470.22   80.32  470.24   81.17  470.25   82.42  470.25
   83.27  470.21   84.49   470.2   85.37  470.23   86.58  470.21   87.48  470.18
   88.66  470.15   89.59  470.14   90.75  470.11   91.69  470.08   92.84  470.05
   93.79  470.04   94.92  470.04    95.9  470.04   96.99  470.02   97.99  470.02
   99.07  470.02   100.1  470.03  101.16  470.04   102.2  470.06  103.26  470.07
  104.32  470.02  105.35     470  106.42     470  107.44  469.99  108.55  469.98
  109.53  469.99  110.63  469.99   111.6  469.96  112.74  469.89  113.68  469.86
  114.82  469.86  115.77   469.9  116.93  469.93  117.84  469.95  119.02  469.94
   119.9  469.93  121.12  469.93  122.01  469.93  123.26  469.91  124.12  469.92
  125.37  469.94   126.2  470.01   127.5  470.29   128.3  470.45  129.62  470.82
  130.38  470.79  131.72  470.69  132.47  470.45  133.69  470.11  133.81  470.08
  134.54  469.72  135.87  468.95  136.63  468.62  137.97  468.06  138.72  467.69
  140.07  467.03  140.81  466.71  142.17  466.08   142.9  465.81  144.27   465.3
  144.99  464.96  146.35  464.27  147.07     464  148.45  463.61  149.16  463.59
  150.57  463.59  151.27  463.71  152.68  464.06  153.33  464.39  154.79  464.95
  155.43  465.15   156.9  465.66  157.48  465.88     159  466.51  159.54  466.67
  161.11  467.06  161.61  467.26  163.25  467.98  163.72  468.23  165.34  469.11
  165.77  469.36  167.49  470.52  167.84  470.68  169.59  471.26  169.93   471.3
  171.69  471.46  171.99   471.4   172.8  471.22  173.79  470.99  174.07  470.98
  175.89  470.86  176.16  470.85  177.99  470.85  178.23  470.84  180.09  470.82
  180.32  470.81  180.33  470.81  182.19  470.75  182.41  470.75  184.29  470.72
  184.51  470.72  186.39  470.66  186.61  470.65  188.46  470.65  188.65  470.65
  188.87  470.65

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  129.62    .035  140.81     .15  159.54     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        129.62  171.69             167.9  167.77  167.53             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 54.279

INPUT
Description:
Station Elevation Data    num=     265
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.65     .84  474.62     1.2  474.61    2.94  474.61    3.29   474.6
    5.06  474.55    5.41  474.54    7.16  474.45    7.53  474.44    9.26  474.38
    9.65  474.38   11.37  474.41   11.74   474.4   13.47  474.28   13.87  474.26
   15.57  474.21   15.97  474.22   17.67  474.19   18.07   474.2   19.77   474.2
   20.18  474.21   21.85  474.23   22.27  474.22   23.96  474.25   24.39  474.25
   26.07  474.22   26.48  474.22   28.19  474.16    28.6  474.17   30.28  474.17
   30.72  474.14   32.38  474.06   32.82  474.06   34.48  474.06   34.92  474.06
   36.58  474.06   37.05  474.07   38.71  474.07   39.17  474.07   40.82  474.07
   41.28  474.07   42.91  474.15    43.4  474.15   45.02  474.15    45.5  474.18
   47.14  474.28   47.62  474.28   49.24  474.28   49.72  474.29   51.34  474.31
   51.84  474.32   53.44  474.29   53.94   474.3   55.55  474.32   56.04  474.32
   57.65   474.3   58.18  474.32   59.76  474.33   60.28  474.33   61.86  474.35
   62.38  474.35   63.96   474.4    64.5   474.4   66.03  474.43   66.57  474.43
   68.16  474.46   68.69   474.5   70.26  474.52   70.81  474.53   72.36  474.53
   72.91  474.53   74.46   474.5   75.02  474.45   76.56  474.38    77.1  474.09
   78.61  473.02   79.13  472.63   80.68  471.49   81.18  471.29   82.75  470.79
   83.24  470.72   84.85   470.6   85.35  470.57   86.95  470.44   87.45   470.4
   89.03  470.33   89.52   470.3   91.13  470.18   91.64  470.16   93.26  470.08
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   93.78  470.06   95.34  470.01   95.85     470   97.44     470   97.96  469.97
   99.57  469.87  100.09  469.86  101.65  469.79  102.18  469.78  103.75  469.78
  104.28  469.76  105.85  469.69  106.37  469.66  107.94  469.63   108.5  469.62
  110.05  469.54   110.6  469.53  112.18  469.46  112.73  469.45  114.25  469.42
  114.79   469.4  116.35  469.36  116.91  469.34  118.43  469.29  118.99  469.27
  120.51  469.24  121.07  469.25  122.59  469.23  123.14   469.2  124.69   469.1
  125.28  469.24   126.8  469.62  127.39  469.65  128.93  469.72  129.63  469.76
  130.44  469.81  131.04  469.81  132.55  469.19  133.14  468.96  134.68  468.34
  135.24  468.09  136.76  467.41  137.32  467.19  138.87  466.66  139.42  466.47
  140.96  465.84  141.51   465.6   143.1     465   143.6  464.81   145.2  464.43
   145.7   464.3   147.3  463.87   147.8  463.78  149.41   463.6   149.9  463.52
   150.4  463.58  152.01  463.84  153.57  464.29  154.12  464.55  155.68  465.01
  156.22  465.15  157.78  465.78  158.35  465.99  159.86  466.43  160.45   466.6
  161.94  466.92  162.55  467.07  164.03  467.75  164.69  468.04  166.12  468.73
  166.79  469.08   168.2  469.79  168.89   470.1  170.29  470.03  170.99  469.99
  172.41  469.88   173.1  469.83  174.51  469.78  175.21  469.76   176.6  469.71
  177.31  469.68   178.7  469.64  179.41  469.64   180.8  469.64   181.5  469.62
  182.87  469.57  183.58  469.56  184.95  469.49  185.68  469.47  187.05  469.47
  187.78  469.47  189.15  469.47  189.88  469.47  191.26   469.5  191.99   469.5
  193.37  469.45  194.11  469.45  195.47  469.47  196.21  469.45  197.59  469.41
   198.3   469.4  199.65  469.38   200.4  469.39  201.75  469.43  202.51  469.42
  203.86  469.35  204.61  469.35  205.96  469.31  206.72  469.29  208.05  469.28
  208.81  469.23  210.17  469.21  210.94  469.15  212.27  469.15  213.02  469.14
  214.39  469.01  215.14  469.06  216.46     469  217.23  469.03  218.55  469.07
  219.33  469.09  220.62  469.23  221.41  469.25  222.72   469.3  223.51  469.29
  224.82  469.33  225.63  469.31  226.92   469.3  227.73  469.29  229.04  469.25
  229.85  469.24  231.14   469.2  231.95  469.19  233.25  469.19  234.05  469.19
  235.33  469.17  236.16  469.12  237.44  469.12  238.26  469.13  239.53  469.09
  240.35  469.07  241.64  469.03  242.46  469.02  243.74  469.02  244.56  469.02
  245.84     469  246.68     469  247.96  469.02  248.79  469.02  250.05  469.02
  250.88  469.01  252.12  468.98  252.96  468.97  254.23  468.95  255.06  468.95
  256.32  468.95  257.16  468.95   258.4  468.95  259.27  468.96  260.52  468.92
  261.39  468.89  262.62  468.91  263.49  468.91  264.71  468.91   265.6   468.9
  266.83  468.88   267.7  468.86  268.93  468.86   269.8  468.88  271.03  468.82
   271.9  468.81  273.12  468.81  274.02  468.79  275.24  468.77  275.36  468.77

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  130.44    .035   143.6    .045  155.68     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.44  168.89            49.37   49.41    49.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  168.89  275.36   470.1       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 4.867403

INPUT
Description:
Station Elevation Data    num=     271
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.56     .19  474.57       1  474.57     2.3  474.55    3.09  474.53
     4.4  474.55    5.18  474.55    6.49  474.55    7.27  474.55     8.6  474.52
    9.37  474.52    10.7  474.54   11.45  474.56   12.83  474.56   13.57  474.55
   14.93  474.55   15.66  474.56   17.03  474.56   17.76  474.55   19.13  474.52
   19.85  474.53   21.26  474.58   21.96  474.58   23.36  474.58   24.05  474.58
   25.46  474.56   26.15  474.54   27.56  474.52   28.23  474.51   29.67  474.48
   30.33  474.47   31.78  474.43   32.43  474.43   33.88  474.43   34.53  474.41
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      36  474.38   36.63  474.37    38.1  474.35   38.74  474.36   40.21  474.36
   40.84  474.35   42.31  474.35   42.94  474.35   44.41  474.35   45.01  474.36
   46.49  474.34   47.08  474.34   48.59  474.34   49.18  474.33    50.7   474.3
   51.27  474.29    52.8  474.29   53.36  474.29   54.93  474.22   55.47   474.2
   57.03  474.25   57.57  474.24   59.13  474.19   59.68  474.18   61.25  474.31
   61.76   474.3   63.35  474.13   63.85  474.12   65.44   474.1   65.95  474.08
   67.56  474.08   68.07   474.1   69.67  474.07   70.14  474.05   71.77  474.03
   72.24  474.04   73.87  474.06   74.34  474.05   75.98  474.05   76.43  474.04
   78.07  474.07   78.51  474.09   80.17  474.03    80.6  473.99   82.28  473.65
    82.7  473.47   84.35  472.49   84.79  472.22   86.39  471.26   86.84  471.05
   88.46  470.58    88.9  470.48   90.56  470.19      91  470.17   92.66  470.11
   93.09   470.1   94.76  470.05   95.19  470.03   96.86  469.97   97.28  469.96
   98.98  469.86    99.4  469.84  101.09  469.82  101.48  469.81   103.2  469.79
  103.57  469.78   105.3  469.74  105.67  469.74  107.43  469.72   107.8  469.71
  109.54  469.66  109.89  469.65  111.63  469.65  111.98  469.65  113.74  469.62
  114.07  469.62  115.81  469.59  116.14  469.57  117.92  469.46  118.22  469.45
  120.03  469.39  120.32  469.37  122.09  469.23  122.38  469.22  124.23  469.12
  124.51  469.11  126.33  469.05   126.6  469.04   128.4  468.95  128.68  469.02
  130.51  469.53  130.76  469.56  132.34  469.59  132.58  469.59  132.82  469.56
  134.68  469.29  134.92  469.15  136.79  468.13  137.02  468.06  138.85  467.05
   139.1  466.91  140.95  465.75   141.2   465.6  143.05  464.71  143.32  464.63
  145.11  463.88  145.38  463.75  147.21  463.06  147.47  462.98  149.28  462.81
  149.55   462.8  151.41  462.63  151.67  462.65  153.53  462.92  153.76  462.98
  155.66  463.26  155.88  463.37  157.76  464.23  157.95  464.29   159.9   465.4
  160.06  465.48     162  466.36  162.13  466.38   164.1   466.5  164.22  466.51
  166.21  466.92  166.29  466.97  168.31  468.45  168.37  468.47  170.42  469.14
  170.44  469.14  172.56  469.21  172.57  469.21  174.62  469.15  174.69  469.15
   174.7  469.15  175.35   469.2  176.77  469.31  176.79  469.31  178.84  469.31
  178.88  469.31  180.94  469.28  180.98  469.28     183  469.21  183.05  469.21
  185.08  469.25  185.16  469.25  187.17  469.11  187.26  469.11  189.31  469.15
   189.4  469.15   191.4  469.18   191.5  469.18  193.47   469.2  193.61   469.2
  195.63  469.16  199.41  469.23  199.84  469.26  199.95  469.28  201.86  469.15
  202.05  469.13  203.93  469.13  204.13  469.11  206.02  469.08  206.23  469.08
  208.12  468.96  208.33  468.94   210.2  468.83  210.44  468.82  212.28  468.79
  212.53  468.79  214.38  468.81  214.63  468.81  216.51  468.78  216.77  468.78
  218.59  468.74  218.88  468.73  220.69  468.71  220.98  468.71  222.78  468.68
  223.08  468.68  224.88  468.62  225.18  468.61  226.97  468.59  227.29  468.58
  229.06  468.58  229.39  468.57  231.12  468.51  231.47   468.5  233.22   468.5
  233.58   468.5  235.34  468.48   235.7  468.48  237.42  468.48  237.81  468.47
  239.54  468.47  239.93  468.48  241.64  468.45  242.04  468.45  243.72  468.42
  244.15   468.4  245.82   468.4  246.25  468.41  247.92  468.41  248.36   468.4
  250.02  468.43  250.46  468.43   252.1  468.43  252.57  468.44  254.19  468.38
  254.67  468.37  256.29  468.38  256.77  468.38  258.39  468.38  258.88  468.38
  260.46   468.4  260.98   468.4  262.55  468.38  263.08  468.39  264.64  468.31
  265.18  468.32  266.74  468.35  267.28  468.34  268.82  468.34   269.4  468.35
  270.93  468.35   271.5  468.34  273.02  468.34   273.6  468.34  275.12  468.36
   275.7  468.36  277.19  468.31  277.81  468.29  279.29  468.32  279.91  468.31
   280.6  468.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  132.34    .035  145.11     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        132.34  174.62            37.89    4.87   40.87             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  176.77   280.6  469.31       T



SUMMARY OF REACH LENGTHS
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River: South_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1311.239	102.88	100	100
Reach	1211.239	100	100	100
Reach	1111.238	100	100	100
Reach	1011.238	109.55	109.49	109.4
Reach	901.7494	99.3	99.2	99.08
Reach	802.5478	22.62	31.77	46.56
Reach	770.7793	32.88	42.84	62.72
Reach	727.9443	105.78	105.88	106.14
Reach	622.0599	100.01	100	100
Reach	522.0566	100.01	100	100
Reach	422.0532	100.01	100	100
Reach	322.0501	100.01	100	100
Reach	222.0471	167.9	167.77	167.53
Reach	54.279	49.37	49.41	49.5
Reach	4.867403	37.89	4.87	40.87

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: South_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1311.239	.1	.3
Reach	1211.239	.1	.3
Reach	1111.238	.1	.3
Reach	1011.238	.1	.3
Reach	901.7494	.1	.3
Reach	802.5478	.1	.3
Reach	770.7793	.1	.3
Reach	727.9443	.1	.3
Reach	622.0599	.1	.3
Reach	522.0566	.1	.3
Reach	422.0532	.1	.3
Reach	322.0501	.1	.3
Reach	222.0471	.1	.3
Reach	54.279	.1	.3
Reach	4.867403	.1	.3

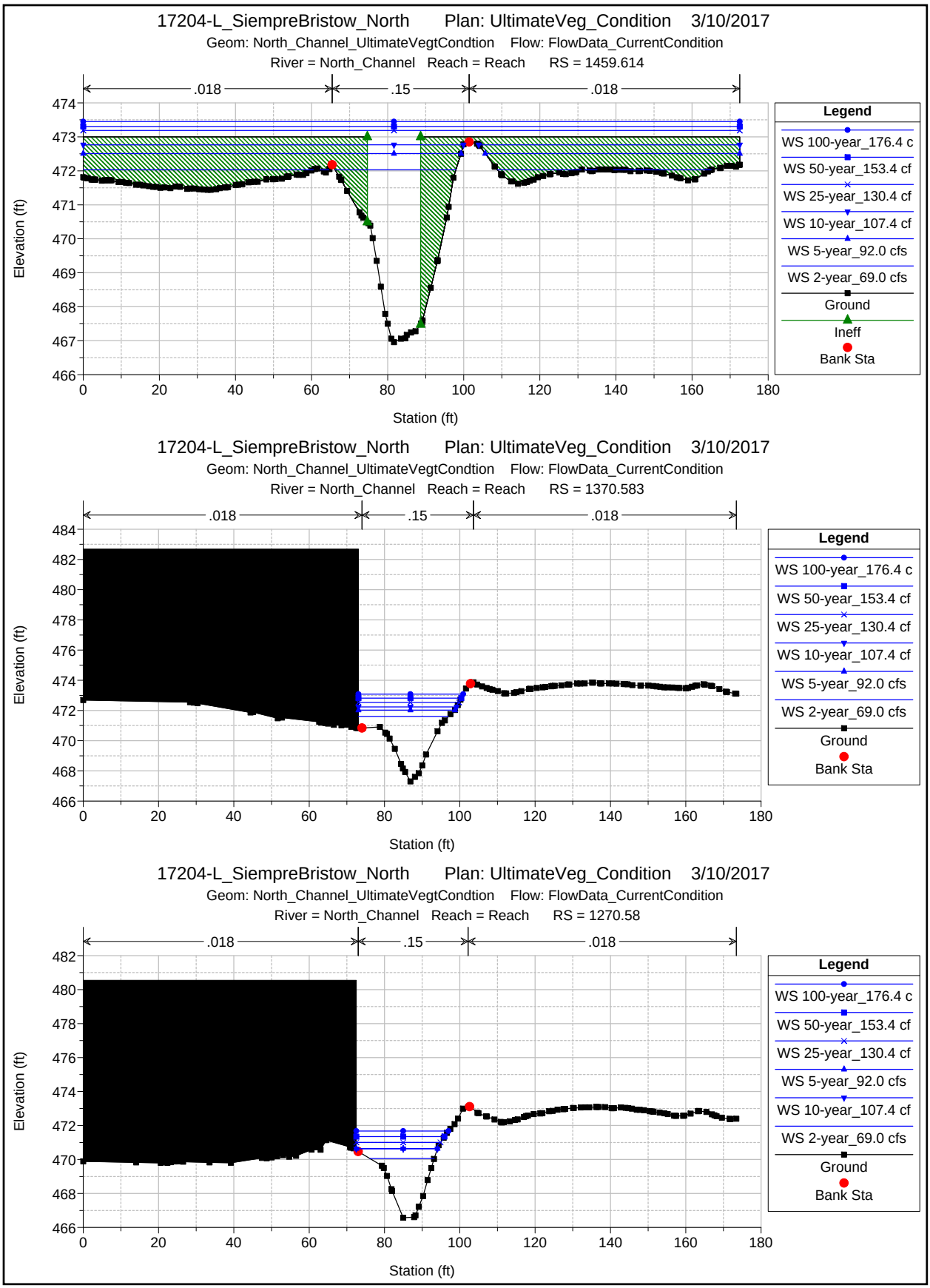
Attachment 14 - DETAILED HEC-RAS HYDRAULIC RESULTS FOR ULTIMATE VEGETATED CONDITION MODEL

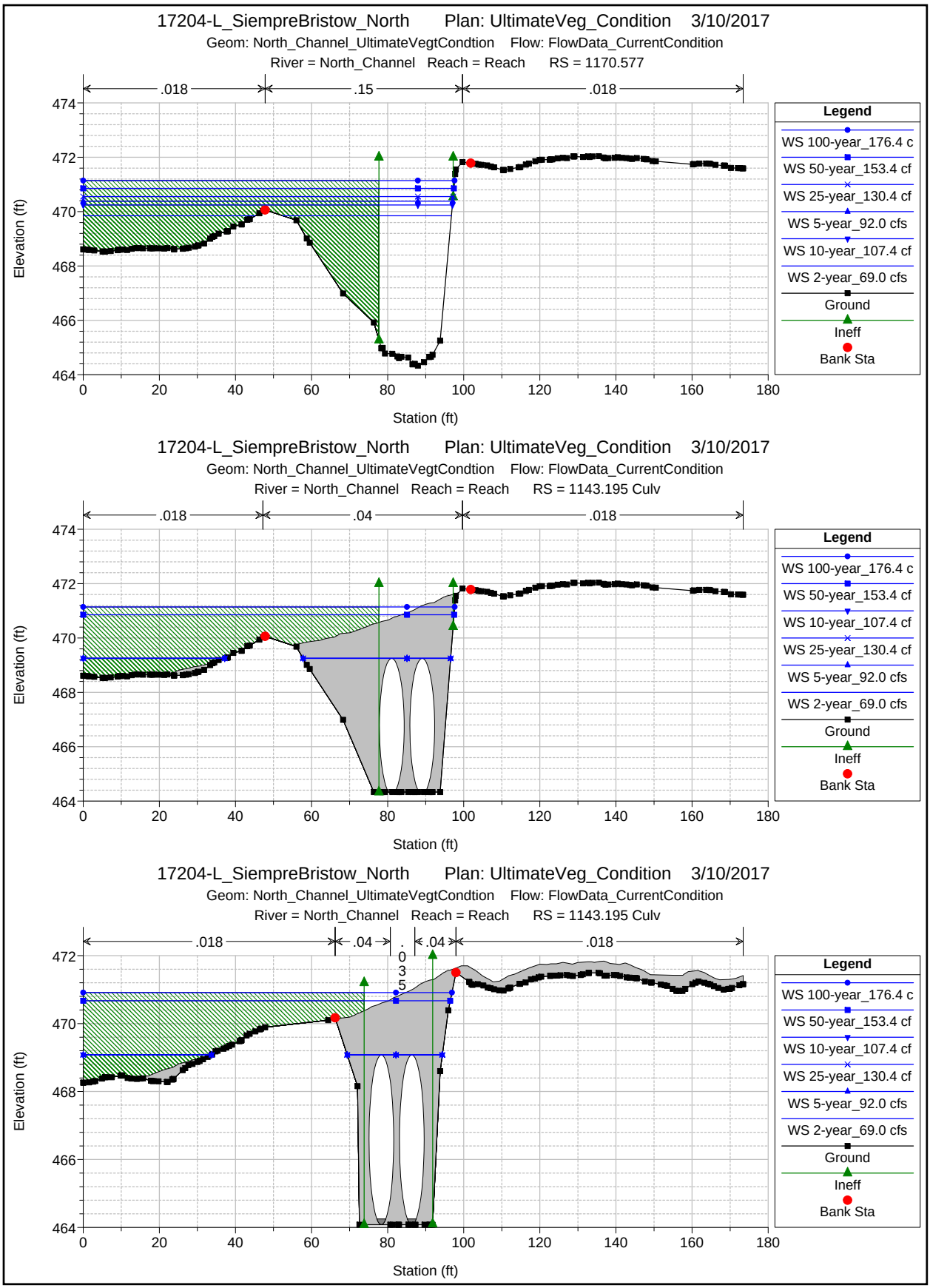
HEC-RAS Plan: UltimateVegCond River: North_Channel Reach: Reach

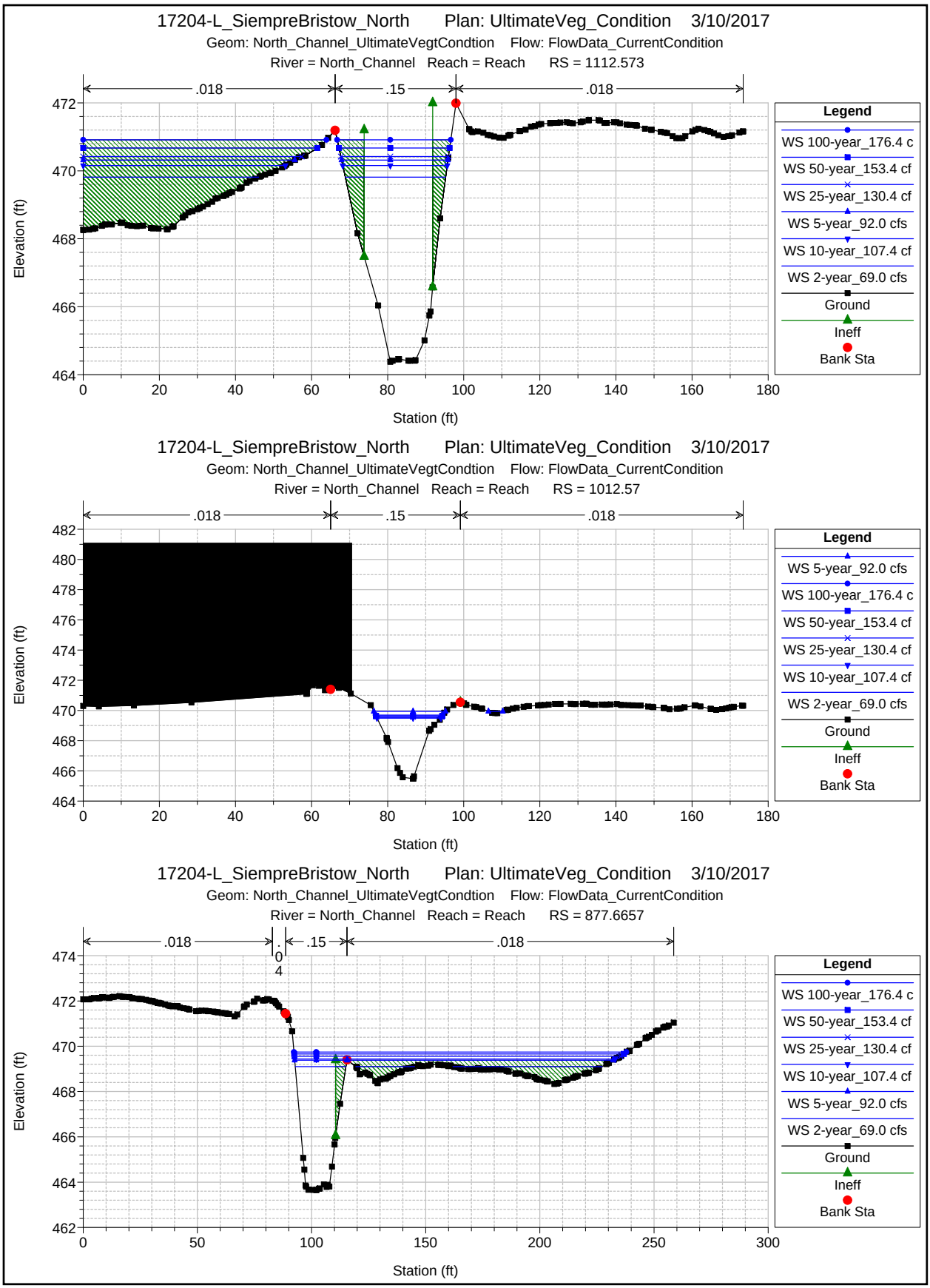
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1459.614	2-year_69.0 cfs	69.00	466.96	472.03	468.40	472.05	0.002441	1.20	57.52	145.50	0.10
Reach	1459.614	5-year_92.0 cfs	92.00	466.96	472.51	468.65	472.54	0.003005	1.43	64.22	166.18	0.12
Reach	1459.614	10-year_107.4 cf	107.40	466.96	472.77	468.80	472.80	0.003417	1.58	67.81	168.51	0.13
Reach	1459.614	25-year_130.4 cf	130.40	466.96	473.19	469.01	473.22	0.004662	1.08	103.21	172.53	0.13
Reach	1459.614	50-year_153.4 cf	153.40	466.96	473.31	469.21	473.34	0.002785	0.87	124.10	172.53	0.10
Reach	1459.614	100-year_176.4 c	176.40	466.96	473.45	469.40	473.49	0.001595	0.68	148.55	172.53	0.08
Reach	1370.583	2-year_69.0 cfs	69.00	467.30	471.60		471.66	0.010455	1.49	44.75	23.88	0.19
Reach	1370.583	5-year_92.0 cfs	92.00	467.30	472.03		472.09	0.009978	1.59	55.14	25.63	0.19
Reach	1370.583	10-year_107.4 cf	107.40	467.30	472.24		472.31	0.010137	1.68	60.61	26.11	0.19
Reach	1370.583	25-year_130.4 cf	130.40	467.30	472.53		472.62	0.010295	1.81	68.41	26.74	0.20
Reach	1370.583	50-year_153.4 cf	153.40	467.30	472.81		472.91	0.010320	1.91	76.04	27.31	0.20
Reach	1370.583	100-year_176.4 c	176.40	467.30	473.08		473.19	0.010295	2.00	83.45	27.84	0.20
Reach	1270.58	2-year_69.0 cfs	69.00	466.57	470.06		470.13	0.024487	2.18	31.64	17.08	0.28
Reach	1270.58	5-year_92.0 cfs	92.00	466.57	470.64		470.72	0.020186	2.13	43.15	21.57	0.26
Reach	1270.58	10-year_107.4 cf	107.40	466.57	470.63		470.73	0.028058	2.50	42.88	21.55	0.31
Reach	1270.58	25-year_130.4 cf	130.40	466.57	471.00		471.11	0.024277	2.54	51.00	22.37	0.29
Reach	1270.58	50-year_153.4 cf	153.40	466.57	471.35		471.46	0.021969	2.58	58.90	23.41	0.28
Reach	1270.58	100-year_176.4 c	176.40	466.57	471.67		471.79	0.020331	2.61	66.65	24.48	0.28
Reach	1170.577	2-year_69.0 cfs	69.00	464.33	469.85	465.50	469.86	0.000904	0.77	90.00	89.63	0.06
Reach	1170.577	5-year_92.0 cfs	92.00	464.33	470.38	465.68	470.40	0.001166	0.92	100.24	97.11	0.07
Reach	1170.577	10-year_107.4 cf	107.40	464.33	470.25	465.79	470.26	0.001721	1.10	97.59	97.02	0.09
Reach	1170.577	25-year_130.4 cf	130.40	464.33	470.55	465.94	470.58	0.002126	1.26	103.55	97.22	0.10
Reach	1170.577	50-year_153.4 cf	153.40	464.33	470.85	466.09	470.88	0.002447	1.40	109.43	97.41	0.10
Reach	1170.577	100-year_176.4 c	176.40	464.33	471.14	466.22	471.18	0.002739	1.53	115.05	97.60	0.11
Reach	1143.195		Culvert									
Reach	1112.573	2-year_69.0 cfs	69.00	464.38	469.81		469.83	0.001025	0.84	82.59	72.48	0.07
Reach	1112.573	5-year_92.0 cfs	92.00	464.38	470.32		470.33	0.001289	1.00	91.63	83.56	0.08
Reach	1112.573	10-year_107.4 cf	107.40	464.38	470.16		470.18	0.001954	1.21	88.76	80.58	0.10
Reach	1112.573	25-year_130.4 cf	130.40	464.38	470.42		470.45	0.002423	1.39	93.49	85.68	0.11
Reach	1112.573	50-year_153.4 cf	153.40	464.38	470.67		470.71	0.002865	1.57	98.00	90.59	0.12
Reach	1112.573	100-year_176.4 c	176.40	464.38	470.91		470.96	0.003281	1.72	102.32	93.78	0.13
Reach	1012.57	2-year_69.0 cfs	69.00	465.48	469.50		469.56	0.016445	1.93	35.73	16.80	0.23
Reach	1012.57	5-year_92.0 cfs	92.00	465.48	469.94		470.01	0.017567	2.11	43.51	22.59	0.25
Reach	1012.57	10-year_107.4 cf	107.40	465.48	469.50		469.64	0.039674	3.00	35.79	16.81	0.36
Reach	1012.57	25-year_130.4 cf	130.40	465.48	469.59		469.78	0.053040	3.51	37.16	17.17	0.42
Reach	1012.57	50-year_153.4 cf	153.40	465.48	469.65		469.90	0.068015	4.01	38.26	17.46	0.48
Reach	1012.57	100-year_176.4 c	176.40	465.48	469.69		470.01	0.085268	4.52	39.05	17.66	0.54
Reach	877.6657	2-year_69.0 cfs	69.00	463.65	469.10	464.82	469.11	0.001315	0.87	79.17	113.32	0.07
Reach	877.6657	5-year_92.0 cfs	92.00	463.65	469.38	465.04	469.40	0.001953	1.09	84.13	139.17	0.09
Reach	877.6657	10-year_107.4 cf	107.40	463.65	469.44	465.18	469.45	0.000340	0.41	159.73	140.46	0.04
Reach	877.6657	25-year_130.4 cf	130.40	463.65	469.55	465.36	469.57	0.000324	0.41	176.33	142.96	0.04
Reach	877.6657	50-year_153.4 cf	153.40	463.65	469.66	465.53	469.68	0.000313	0.41	191.29	144.41	0.03
Reach	877.6657	100-year_176.4 c	176.40	463.65	469.74	465.70	469.77	0.000314	0.41	203.80	145.58	0.04
Reach	800		Culvert									
Reach	735.8522	2-year_69.0 cfs	69.00	463.90	469.07		469.09	0.003041	0.89	82.07	151.27	0.11
Reach	735.8522	5-year_92.0 cfs	92.00	463.90	469.33		469.34	0.001670	0.68	127.09	222.92	0.08
Reach	735.8522	10-year_107.4 cf	107.40	463.90	469.43		469.44	0.001269	0.60	150.51	234.79	0.07
Reach	735.8522	25-year_130.4 cf	130.40	463.90	469.55		469.56	0.000965	0.54	178.50	240.13	0.06
Reach	735.8522	50-year_153.4 cf	153.40	463.90	469.66		469.67	0.000798	0.51	204.14	249.64	0.06
Reach	735.8522	100-year_176.4 c	176.40	463.90	469.74		469.76	0.000705	0.49	225.83	252.26	0.05
Reach	639.5066	2-year_69.0 cfs	69.00	463.18	468.80		468.81	0.002667	0.87	78.87	36.39	0.10
Reach	639.5066	5-year_92.0 cfs	92.00	463.18	469.09		469.10	0.003461	1.03	89.59	54.00	0.11
Reach	639.5066	10-year_107.4 cf	107.40	463.18	469.22		469.24	0.003681	1.09	97.20	59.79	0.12
Reach	639.5066	25-year_130.4 cf	130.40	463.18	469.37		469.39	0.004002	1.16	106.39	68.48	0.12
Reach	639.5066	50-year_153.4 cf	153.40	463.18	469.48		469.52	0.004280	1.22	115.20	82.40	0.13
Reach	639.5066	100-year_176.4 c	176.40	463.18	469.57		469.62	0.004339	1.24	122.50	83.68	0.13
Reach	539.4938	2-year_69.0 cfs	69.00	462.95	468.48		468.50	0.003663	1.12	61.37	54.79	0.12
Reach	539.4938	5-year_92.0 cfs	92.00	462.95	468.63		468.67	0.005700	1.42	64.87	62.50	0.14
Reach	539.4938	10-year_107.4 cf	107.40	462.95	468.72		468.76	0.006403	1.53	70.75	68.50	0.15
Reach	539.4938	25-year_130.4 cf	130.40	462.95	468.84		468.89	0.006512	1.58	78.99	73.95	0.16
Reach	539.4938	50-year_153.4 cf	153.40	462.95	468.94		468.99	0.006405	1.59	86.29	79.63	0.15
Reach	539.4938	100-year_176.4 c	176.40	462.95	469.02		469.09	0.006184	1.58	92.75	83.40	0.15
Reach	427.2193	2-year_69.0 cfs	69.00	462.91	468.42		468.43	0.000230	0.30	116.52	82.06	0.03
Reach	427.2193	5-year_92.0 cfs	92.00	462.91	468.57		468.58	0.000257	0.33	128.75	82.29	0.03
Reach	427.2193	10-year_107.4 cf	107.40	462.91	468.65		468.67	0.000278	0.35	135.56	82.42	0.03
Reach	427.2193	25-year_130.4 cf	130.40	462.91	468.76		468.79	0.000307	0.37	144.65	82.66	0.03

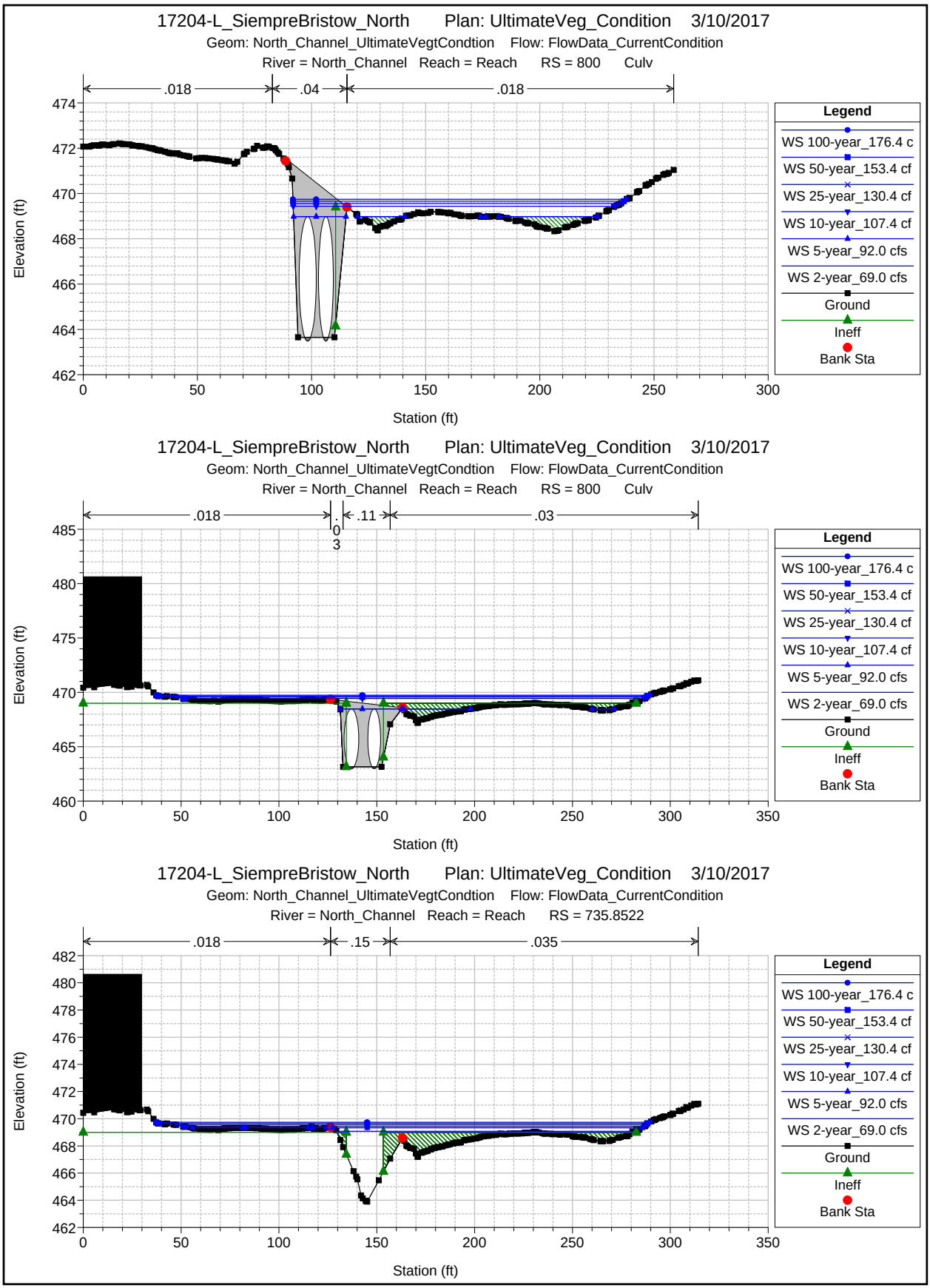
HEC-RAS Plan: UltimateVegCond River: North_Channel Reach: Reach (Continued)

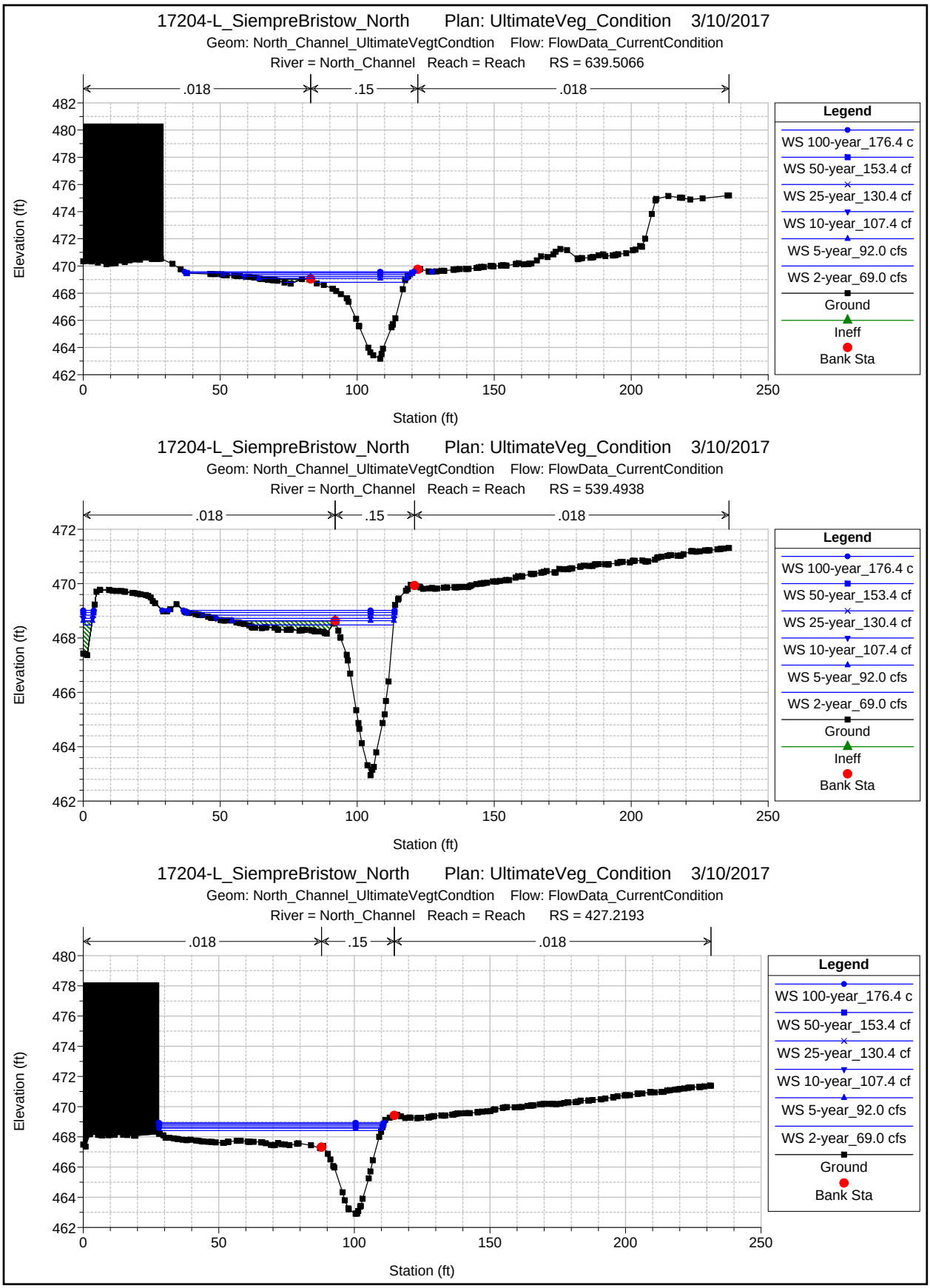
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	427.2193	50-year_153.4 cf	153.40	462.91	468.85		468.89	0.000338	0.39	152.38	82.87	0.04
Reach	427.2193	100-year_176.4 c	176.40	462.91	468.93		468.98	0.000371	0.41	159.12	83.05	0.04
Reach	301.9247	2-year_69.0 cfs	69.00	462.57	468.34		468.36	0.002866	0.89	75.67	75.35	0.10
Reach	301.9247	5-year_92.0 cfs	92.00	462.57	468.48		468.51	0.003059	0.94	87.41	94.49	0.11
Reach	301.9247	10-year_107.4 cf	107.40	462.57	468.56		468.59	0.002944	0.94	94.65	97.59	0.10
Reach	301.9247	25-year_130.4 cf	130.40	462.57	468.66		468.70	0.002817	0.95	104.76	105.99	0.10
Reach	301.9247	50-year_153.4 cf	153.40	462.57	468.74		468.79	0.002703	0.95	113.71	110.34	0.10
Reach	301.9247	100-year_176.4 c	176.40	462.57	468.81		468.88	0.002670	0.96	121.88	115.53	0.10
Reach	174.488	2-year_69.0 cfs	69.00	461.90	468.20		468.20	0.000656	0.50	139.79	119.28	0.05
Reach	174.488	5-year_92.0 cfs	92.00	461.90	468.30		468.31	0.000891	0.59	152.42	122.79	0.06
Reach	174.488	10-year_107.4 cf	107.40	461.90	468.37		468.38	0.000989	0.63	161.03	125.70	0.06
Reach	174.488	25-year_130.4 cf	130.40	461.90	468.47		468.48	0.001059	0.67	173.68	127.19	0.07
Reach	174.488	50-year_153.4 cf	153.40	461.90	468.56		468.58	0.001112	0.69	184.77	129.22	0.07
Reach	174.488	100-year_176.4 c	176.40	461.90	468.63		468.65	0.001185	0.72	193.76	131.06	0.07
Reach	72.67111	2-year_69.0 cfs	69.00	461.08	468.13	462.77	468.13	0.000681	0.55	125.43	46.08	0.05
Reach	72.67111	5-year_92.0 cfs	92.00	461.08	468.20	463.04	468.21	0.001138	0.71	128.90	51.67	0.07
Reach	72.67111	10-year_107.4 cf	107.40	461.08	468.25	463.20	468.26	0.001476	0.81	131.58	55.46	0.08
Reach	72.67111	25-year_130.4 cf	130.40	461.08	468.33	463.42	468.34	0.001963	0.94	136.23	60.06	0.09
Reach	72.67111	50-year_153.4 cf	153.40	461.08	468.40	463.63	468.42	0.002438	1.06	140.49	61.77	0.10
Reach	72.67111	100-year_176.4 c	176.40	461.08	468.45	463.82	468.48	0.002984	1.18	143.64	63.69	0.11

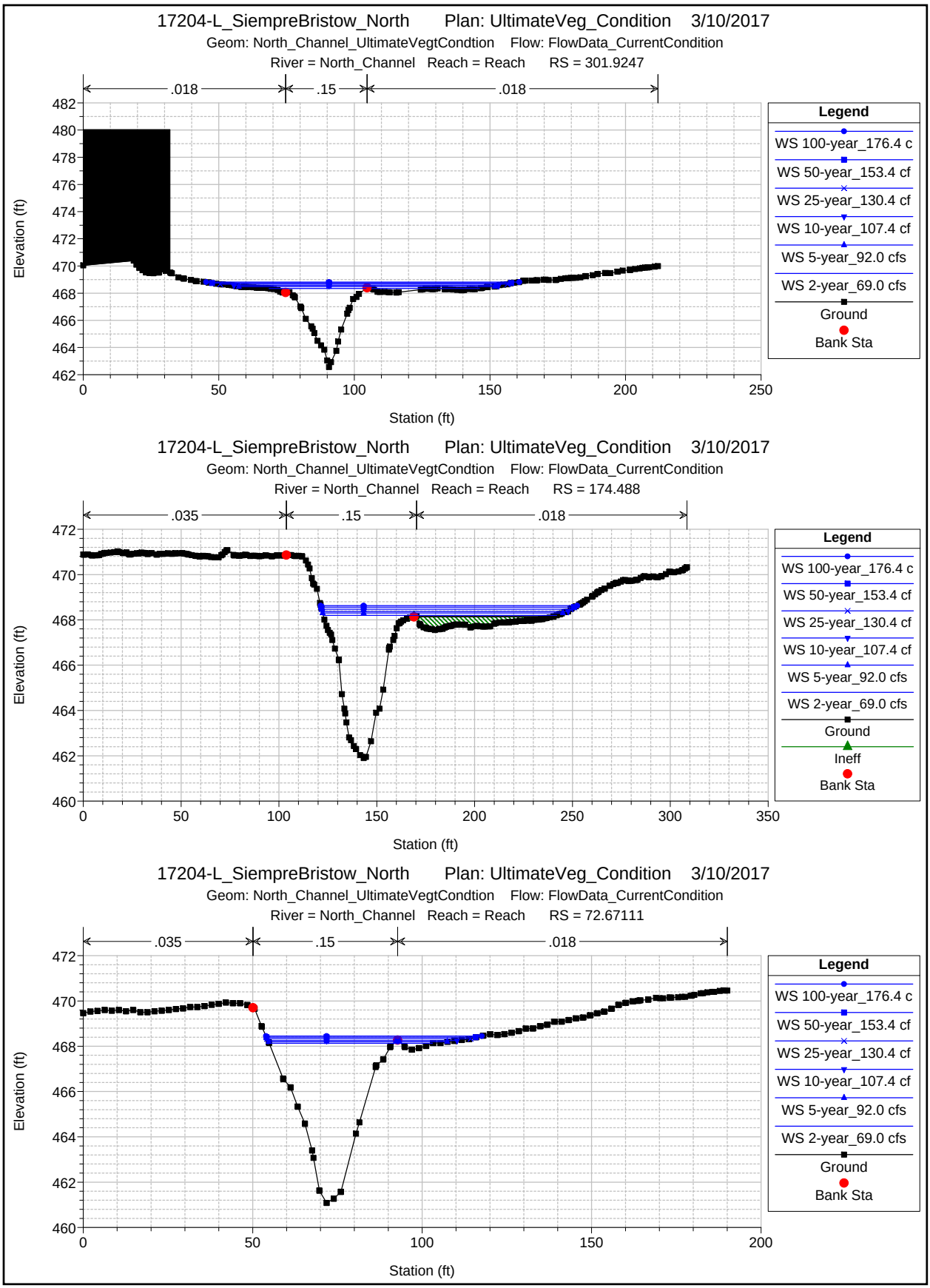

17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1459.614
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1370.583
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1270.58
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 5-year_92.0 cfs
WS 10-year_107.4 cf
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1170.577
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 5-year_92.0 cfs
WS 10-year_107.4 cf
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 10-year_107.4 cf
WS 25-year_130.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 10-year_107.4 cf
WS 25-year_130.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1112.573
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 5-year_92.0 cfs
WS 10-year_107.4 cf
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1012.57
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 5-year_92.0 cfs
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 877.6657
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.11
.03
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 735.8522
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 639.5066
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 539.4938
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 427.2193
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 301.9247
.018
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 174.488
.035
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: UltimateVeg_Condition 3/10/2017
Geom: North_Channel_UltimateVegtCondtion Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 72.67111
.035
.15
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_North
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 3:07:21 PM

Project in English units

Project Description:
78

PLAN DATA

Plan Title: UltimateVeg_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.p02

Geometry Title: North_Channel_UltimateVegtCondtion
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g04

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Plan Summary Information:

Number of:	Cross Sections	= 14	Multiple Openings	=	0
	Culverts	= 2	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Flow Data (cfs)

River	Reach	RS	2-year_69.0 cfs	5-year_92.0 cfs	10-year_107.4 cfs	25-year_130.4 cfs	50-year_153.4 cfs	100-year_176.4 cfs	PF 7	PF 8
North_Channel	Reach	1459.614	69	92	107.4	130.4	153.4	176.4	10	15

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
North_Channel	Reach	1459.614	20	25	30	35	40	45

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
North_Channel	Reach	2-year_69.0 cfs	Normal S = 0.004	Known WS = 468.13
North_Channel	Reach	5-year_92.0 cfs	Normal S = 0.004	Known WS = 468.2
North_Channel	Reach	10-year_107.4 cfs	Normal S = 0.004	Known WS = 468.25
North_Channel	Reach	25-year_130.4 cfs	Normal S = 0.004	Known WS = 468.33
North_Channel	Reach	50-year_153.4 cfs	Normal S = 0.004	Known WS = 468.4
North_Channel	Reach	100-year_176.4 cfs	Normal S = 0.004	Known WS = 468.45
North_Channel	Reach	PF 7	Normal S = 0.004	Known WS = 467.35
North_Channel	Reach	PF 8	Normal S = 0.004	Known WS = 467.53
North_Channel	Reach	PF 9	Normal S = 0.004	Known WS = 467.68
North_Channel	Reach	PF 10	Normal S = 0.004	Known WS = 467.83
North_Channel	Reach	PF 11	Normal S = 0.004	Known WS = 467.95
North_Channel	Reach	PF 12	Normal S = 0.004	Known WS = 467.98
North_Channel	Reach	PF 13	Normal S = 0.004	Known WS = 468.03
North_Channel	Reach	PF 14	Normal S = 0.004	Known WS = 468.05

GEOMETRY DATA

Geometry Title: North_Channel_UltimateVegtCondtion
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g04

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1459.614

INPUT
Description:
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.81	.31	471.8	1.07	471.78	1.25	471.78	2.19	471.74
2.61	471.74	2.89	471.74	3.11	471.74	3.17	471.74	4.87	471.71
5.63	471.72	5.9	471.72	6.45	471.73	6.69	471.73	7.1	471.72
7.42	471.72	9.27	471.67	10.25	471.67	11.22	471.65	12.06	471.64
13.89	471.59	14.96	471.59	15.78	471.57	17.27	471.55	18.34	471.53
19.24	471.53	20.24	471.5	21.4	471.51	22.89	471.49	24.25	471.54
24.83	471.54	25.49	471.53	27.3	471.47	27.99	471.48	29.08	471.48
30.47	471.46	31.66	471.45	32.69	471.44	33.5	471.44	34.94	471.46
35.9	471.49	37.3	471.51	37.6	471.51	38.06	471.52	40.07	471.58
40.79	471.59	41.8	471.61	43.47	471.66	44.16	471.67	44.98	471.68
45.86	471.68	48.1	471.75	48.13	471.75	48.16	471.75	49.86	471.75
50.57	471.76	52.19	471.77	53.57	471.83	53.76	471.82	54.01	471.84
56.05	471.89	56.63	471.88	57.76	471.88	58.66	471.93	59.99	472.01
60.9	472.05	61.59	472.07	63.2	471.98	63.78	471.95	64.71	472.05
65.42	472.18	67.25	471.83	67.72	471.74	67.83	471.73	69.34	471.41
72.61	470.78	73.12	470.68	73.62	470.62	74.94	470.46	75.43	470.39
76.07	470.02	77.11	469.35	78.21	468.59	79.37	467.79	80.01	467.5
80.98	467.06	81.66	466.96	83.49	467.06	84.66	467.07	85.03	467.17
86.15	467.24	87.34	467.28	88.79	467.5	89	467.51	89.17	467.6
91.33	468.56	93.06	469.34	93.1	469.35	93.14	469.37	95.54	470.63
96.02	470.94	97.27	471.8	99.28	472.5	99.96	472.78	101.43	472.85
101.49	472.86	101.5	472.86	101.52	472.86	101.63	472.85	103.46	472.8
103.66	472.8	103.99	472.76	104.23	472.73	108.1	472.13	108.17	472.12
109.82	471.9	109.91	471.89	110.07	471.87	112.43	471.69	112.77	471.69
114.24	471.62	115.84	471.65	116.62	471.67	117.38	471.71	118.37	471.74
119.5	471.81	120.89	471.85	122.56	471.9	122.7	471.9	122.83	471.91
125.12	471.95	126.09	471.91	126.81	471.9	128.32	471.93	129.29	471.95
129.6	471.97	131.08	472.04	133.1	472.01	133.58	471.99	133.91	472
135.35	472.04	136.77	472.04	137.76	472.04	139.16	472.04	139.58	472.02
140.73	472.03	142.03	472.03	142.48	472.03	143.81	471.99	145.92	471.99
146.25	472	146.33	472	148.09	472.01	148.92	472	150.57	471.97
152.07	471.93	152.3	471.93	152.57	471.92	154.71	471.86	155.98	471.81
156.51	471.8	156.95	471.78	158.95	471.72	160.69	471.75	160.76	471.75
160.83	471.75	163.17	471.92	164.16	471.98	164.89	472.02	165.16	472.04
167.36	472.08	167.57	472.09	169.14	472.15	170.34	472.15	171.53	472.12
172.33	472.17	172.53	472.18						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	65.42	.15	101.43	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
65.42	101.43	89.03	89.03	89.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	74.66	473	T
88.66	172.53	473	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1370.583

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.69	28.36	472.55	29.33	472.52	30.37	472.48	44.41	471.87
45.08	471.89	51.64	471.48	52.77	471.53	62.65	471.25	63.17	471.19
63.72	471.24	64.33	471.16	65	471.13	66.56	471.05	68.56	471.02
69.77	471.06	71.18	470.92	72.49	470.84	72.89	470.85	72.94	470.85
74.04	470.84	74.25	470.84	78.77	470.91	80.19	470.53	80.66	470.45
81.34	470.14	82.75	469.46	84.42	468.46	84.89	468.16	85.47	467.93
86.9	467.3	88.08	467.6	89.1	467.84	90.04	468.36	91.05	469.08
94.08	470.62	95.26	471.18	96.04	471.34	97.5	471.76	98.73	472.03
99.46	472.36	100.19	472.71	101.64	473.45	102.85	473.77	102.87	473.77
103.6	473.87	104.63	473.72	105.91	473.59	107.12	473.49	107.92	473.42
108.63	473.37	110.09	473.29	111.79	473.14	112.06	473.12	112.31	473.13
114.35	473.16	115.05	473.21	116.33	473.28	118.34	473.41	118.56	473.43
118.82	473.43	120.43	473.49	121.99	473.53	122.72	473.56	124.33	473.6
124.71	473.62	125.2	473.63	126.98	473.66	128.62	473.71	128.94	473.72
129.08	473.72	131.15	473.78	132	473.78	133.15	473.79	135.13	473.84
135.4	473.84	137.21	473.8	137.37	473.79	137.63	473.79	139.58	473.79
140.45	473.79	141.61	473.77	143.46	473.75	143.87	473.75	144.55	473.73
145.83	473.68	147.97	473.65	148.03	473.65	148.11	473.65	150.04	473.65
151.37	473.62	152.24	473.59	153.22	473.57	154.25	473.53	155.11	473.53
156.44	473.52	157.81	473.5	158.33	473.49	160.05	473.48	160.61	473.49
161.68	473.57	162.56	473.63	163.03	473.66	164.77	473.73	165.07	473.71
166.67	473.64	167.03	473.61	168.92	473.41	170.65	473.24	170.84	473.22
170.95	473.22	173.13	473.12	173.44	473.11				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	74.04	.15	103.6	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
74.04	102.87	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	73.08	482.688

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1270.58

INPUT
Description:
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.89	14.05	469.83	20.59	469.8	21.46	469.84	22.35	469.8
23.3	469.84	24.31	469.88	25.37	469.89	26.54	469.87	33.53	469.83
39.21	469.81	47.48	470.09	48.73	470.07	50.05	470.12	51.49	470.19
53.05	470.25	54.69	470.16	56.53	470.22	60.63	470.58	63.03	470.57
64.52	471.14	70.83	470.74	71.07	470.69	71.77	470.66	72.61	470.53
73.04	470.47	79.31	469.63	79.83	469.5	80.66	469.03	81.85	468.25
82.02	468.15	84.98	466.57	87.85	466.61	88.25	466.71	89.1	467.21
90.24	467.85	91.45	468.79	92.42	469.49	93.15	470.03	94.38	470.84
95.72	471.28	96.56	471.56	97.49	471.8	98.62	472.08	99.52	472.41

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  100.84  472.99  102.21  473.07   102.6  473.11  102.76  473.12  104.67  472.75
  104.95  472.72  106.97  472.54  107.01  472.54  107.15  472.53  109.22  472.35
  110.87  472.21   111.2  472.18  111.68   472.2  113.29  472.25  114.63  472.32
  115.36  472.36  117.05   472.5  117.57  472.55  118.09  472.59  119.63  472.67
  121.38  472.71  121.77  472.72  121.93  472.73  123.73  472.84  124.65  472.86
  125.96  472.93  127.54  472.96  127.97  472.98  130.08  473.03  130.15  473.03
  130.26  473.03  132.13  473.06  133.33  473.07   134.4  473.07   136.2  473.09
  136.41  473.09  136.93  473.09  138.59  473.08   140.3  473.02  140.54  473.02
  140.93  473.02  142.76  473.06  144.03  473.04  144.74  473.02  145.69  472.99
  146.95  472.93  147.78  472.92   148.9   472.9  150.45  472.84  151.02  472.83
  151.42  472.81  153.05  472.76  154.28  472.72  155.22  472.67  156.91  472.58
  157.18  472.58  157.45  472.57   159.3  472.57  159.64  472.59   161.3   472.7
  163.25  472.84  163.46  472.85  163.55  472.85  165.48   472.8  166.96  472.66
  167.61   472.6  168.19  472.55  169.59  472.46  171.64  472.39   171.8  472.38
   171.9  472.38  173.44   472.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   73.04     .15  102.21    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         73.04   102.6           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   72.51 480.547

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1170.577

INPUT
Description:
Station Elevation Data    num=     136
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.61     .07  468.61     .98   468.6    1.48  468.59    2.88  468.57
    5.08  468.53    5.45  468.53    5.77  468.53    7.23  468.55    9.05  468.58
    9.64   468.6   10.43   468.6   11.55  468.59   12.75  468.63   13.99  468.66
   14.59  468.66   15.72  468.65   17.51  468.65   18.03  468.65   18.42  468.65
   19.81  468.65   21.29  468.64   22.16  468.66   23.82  468.62   23.85  468.62
   23.92  468.62   26.16  468.63   27.07  468.65   27.74  468.67   29.36  468.71
   30.07  468.75   30.31  468.76   31.77  468.83   33.35     469   33.96  469.07
   34.45   469.1   35.58  469.19   37.72  469.27    37.9  469.28   37.99  469.28
   39.45  469.45   41.61  469.53   41.63  469.53   43.12   469.7   43.77  469.72
   46.28  469.94   47.22  470.02   47.83  470.06   56.04  469.68   58.75  469.01
    59.5  468.86   68.27  466.99   76.37  465.92   78.33  464.97    78.6  464.98
    78.7  464.99   79.31  464.78   81.24  464.77   82.55  464.67      83  464.61
   83.61  464.66   85.41  464.63   86.51  464.38   87.15   464.4   87.94  464.33
   89.55  464.46   90.92  464.65   91.36  464.66   91.81  464.73    93.8  465.25
   97.75  471.38   97.89  471.55   99.68  471.82  101.86  471.78  103.13  471.76
  103.86  471.73  104.63  471.72  106.16   471.7  107.14  471.66  107.99  471.63
  110.31  471.53  110.43  471.53  110.53  471.53  112.22  471.57  114.43  471.63
  114.61  471.63  114.86  471.64  116.32  471.73  117.14  471.77   118.8  471.85
  119.97   471.9  120.54  471.91  122.57  471.91  122.93  471.92   123.3  471.92
  124.69  471.96  126.07  471.98  127.16  471.97  128.86  472.03  128.93  472.03
  129.12  472.03  131.33  472.01  132.65  472.03  133.05  472.01  133.82  472.03
   135.5  472.04  136.73  471.99  137.21  471.96  138.01  471.97  139.64  471.98
  140.52     472  141.35  471.98  142.75  471.97  143.69  471.95  144.23  471.94
  145.48  471.97  147.27  471.94  147.86  471.93  148.06  471.92   149.6  471.86
  150.49  471.85   160.2  471.74  160.53  471.75  161.92  471.77   163.7  471.77
  164.37  471.77  164.71  471.76  166.16  471.72  168.38  471.69  168.54  471.69
  168.63  471.69   170.2  471.61  172.08   471.6  172.67   471.6  173.27  471.59
```

```
  173.44  471.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.83     .15   99.68    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.83  101.86           58.01      58      58             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   77.71     472       T
   97.21  173.44     472       T

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 1143.195

INPUT
Description:
Distance from Upstream XS =       2
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=     168
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23             .16  468.23            2.54  468.17
    2.79  468.16            2.98  468.17             4.5  468.22
    6.21  468.24            6.97  468.26            7.94  468.27
    8.82  468.29             9.9  468.34           11.34  468.39
      12  468.39           12.99  468.36           14.99  468.44
   15.37  468.46           15.65  468.45           17.09  468.46
   18.45  468.52           19.47  468.57           20.94  468.63
   21.11  468.64           21.44  468.65           23.48  468.71
   24.42  468.77           25.02  468.81           26.96  468.87
   27.38  468.88           27.52  468.88           29.01  468.94
   30.78  468.97           31.27  469.01           31.66     469
   32.83  469.05           35.12  469.11           35.18  469.11
   36.61  469.22            36.7  469.22           37.92   469.2
   38.94  469.18           39.12  469.19           40.46  469.24
   41.46  469.28           42.75  469.29           43.49  469.32
   44.31  469.29            46.4   469.4           46.56  469.41
   46.63  469.41           48.09  469.45           48.58  469.46
   50.31  469.54            51.3  469.54           51.94  469.56
   53.42  469.63           54.27  469.66           55.36  469.73
    55.8  469.75           57.99  469.83           58.03  469.83
   58.04  469.83           59.68  469.87           61.35   469.9
   62.05  469.91           62.82  469.94           63.68  469.98
   64.55     470           65.98  470.03            67.6  470.16
   67.61  470.16           67.61  470.16           70.07  470.19
   71.34  470.25           71.79  470.28           72.53  470.31
   74.23   470.4           74.97  470.44           75.85   470.5
    77.3  470.55           78.46  470.61           79.17  470.63
   80.15  470.66           81.51  470.76            82.6   470.8
   83.22  470.84           84.27  470.89           85.75  470.96
   86.75  471.02           87.56  471.08           88.51  471.16
   90.04  471.24           91.02  471.28           92.15   471.3
   92.66  471.34           94.81  471.51           95.13  471.52
   95.32  471.54           96.87  471.59           97.66  471.62
   99.35   471.7          100.89   471.7          101.04   471.7
  101.32  471.68           103.4  471.54          104.66  471.43
  105.16  471.39          107.13  471.27          107.65  471.23
```

108	471.23	109.4	471.25	111.55	471.39
111.82	471.41	111.9	471.41	113.48	471.46
114.64	471.52	116.02	471.58	117.58	471.66
117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Upstream Bridge Cross Section Data

Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	464.33	78.33	464.33	78.6	464.33
78.7	464.33	79.31	464.33	81.24	464.33	82.55	464.33	83	464.33
83.61	464.33	85.41	464.33	86.51	464.33	87.15	464.33	87.94	464.33
89.55	464.33	90.92	464.33	91.36	464.33	91.81	464.33	93.8	464.33
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92
124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59
173.44	471.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.22	.04	99.68	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
47.83	101.86	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.71	472	T
97.21	173.44	472	T

Downstream Deck/Roadway Coordinates
num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	
46.63	469.41		48.09	469.45		48.58	469.46	
50.31	469.54		51.3	469.54		51.94	469.56	
53.42	469.63		54.27	469.66		55.36	469.73	
55.8	469.75		57.99	469.83		58.03	469.83	
58.04	469.83		59.68	469.87		61.35	469.9	
62.05	469.91		62.82	469.94		63.68	469.98	
64.55	470		65.98	470.03		67.6	470.16	
67.61	470.16		67.61	470.16		70.07	470.19	
71.34	470.25		71.79	470.28		72.53	470.31	
74.23	470.4		74.97	470.44		75.85	470.5	
77.3	470.55		78.46	470.61		79.17	470.63	
80.15	470.66		81.51	470.76		82.6	470.8	
83.22	470.84		84.27	470.89		85.75	470.96	
86.75	471.02		87.56	471.08		88.51	471.16	
90.04	471.24		91.02	471.28		92.15	471.3	
92.66	471.34		94.81	471.51		95.13	471.52	
95.32	471.54		96.87	471.59		97.66	471.62	
99.35	471.7		100.89	471.7		101.04	471.7	
101.32	471.68		103.4	471.54		104.66	471.43	
105.16	471.39		107.13	471.27		107.65	471.23	
108	471.23		109.4	471.25		111.55	471.39	
111.82	471.41		111.9	471.41		113.48	471.46	
114.64	471.52		116.02	471.58		117.58	471.66	
117.7	471.66		120.03	471.75		120.14	471.75	
120.23	471.75		121.83	471.74		122.84	471.76	
124.34	471.76		125.63	471.79		126.07	471.8	
127.19	471.78		128.53	471.75		130.05	471.8	
130.19	471.8		130.47	471.8		132.67	471.82	
133.55	471.82		134.34	471.8		135.72	471.83	
136.82	471.84		137.4	471.82		138.48	471.77	
140.33	471.75		140.86	471.74		142.27	471.78	
142.58	471.78		143.65	471.73		145.02	471.66	
145.42	471.64		146.7	471.59		147.27	471.56	
149.04	471.44		155.4	471.42		157.58	471.42	
157.96	471.46		159	471.53		161.45	471.56	
161.51	471.56		161.54	471.56		163.22	471.5	
164.48	471.42		165.65	471.35		166.31	471.32	
167.26	471.29		169.68	471.3		169.75	471.3	
169.82	471.3		171.47	471.33		173.84	471.43	
173.92	471.43		173.96	471.43		175	471.47	

Downstream Bridge Cross Section Data
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.26	.04	468.26	1.57	468.27	2.65	468.29	3.18	468.31
4.93	468.38	5.76	468.42	6.03	468.42	7.5	468.42	9.86	468.47
10.08	468.48	10.29	468.47	11.67	468.4	12.62	468.38	14.08	468.37
15.08	468.38	15.73	468.39	17.81	468.32	18.23	468.31	18.34	468.31
19.79	468.3	21.97	468.28	22.19	468.28	23.39	468.35	23.65	468.36
23.75	468.37	26.12	468.63	26.83	468.69	27.64	468.78	28.71	468.81
29.98	468.87	30.59	468.9	31.47	468.95	32.71	469.02	33.89	469.09
34.79	469.18	35.33	469.2	36.86	469.26	37.62	469.3	38.33	469.34
39.09	469.38	41.09	469.48	41.43	469.5	41.61	469.51	42.92	469.65
43.73	469.7	45.24	469.77	46.4	469.83	46.72	469.85	47.83	469.89
64.38	470.1	66.2	470.17	72.08	468.16	72.58	464.08	80.71	464.08
81.31	464.08	82.82	464.08	82.89	464.08	82.99	464.08	85.45	464.08
85.89	464.08	87.14	464.08	87.31	464.08	89.7	464.08	90.97	464.08
91.27	464.08	91.81	464.08	93.79	468.6	95.94	470.39	97.97	471.5
101.43	471.23	101.48	471.22	102.02	471.16	102.28	471.14	103.7	471.16
105.16	471.12	106.3	471.06	107.04	471.04	107.95	471.01	109.31	470.98
110.47	470.97	111.75	471.03	112.03	471.05	112.25	471.06	114.63	471.17
114.78	471.17	116.25	471.21	117.66	471.3	118.75	471.32	119.72	471.36
120.37	471.38	122.7	471.4	122.96	471.41	123.46	471.41	124.59	471.41
125.4	471.42	127.12	471.43	127.84	471.41	128.7	471.4	130.71	471.43
131.27	471.45	132.83	471.49	132.85	471.49	132.9	471.49	135.41	471.49
135.8	471.48	136.99	471.41	137.64	471.41	139.46	471.43	140.14	471.43
141.09	471.4	142.83	471.36	143.6	471.35	145.06	471.34	145.22	471.34
145.49	471.33	147.62	471.24	149.22	471.21	149.28	471.21	149.4	471.21
151.77	471.15	152.79	471.13	153.43	471.11	154.91	471.02	155.87	470.96
156.61	470.96	157.48	470.96	158.23	471.02	160.05	471.16	160.92	471.2
161.7	471.24	163.22	471.2	164.19	471.17	164.83	471.15	165.74	471.1
166.87	471.05	168.31	471	169.56	471.02	169.93	471.02	170.51	471.05
172.45	471.13	173.41	471.16	173.44	471.16				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	66.2	.04	80.71	.035	87.14	.04	97.97	.018

Bank Sta: Left Right Coeff Contr. Expan.
66.2 97.97 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	73.82	471.2	T
91.82	173.44	472	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 469.71
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 2

Culvert Name Shape Rise Span
Culvert #1 Ellipse 5 6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	2	52	.018	.018	.17	.2	1

Upstream Elevation = 464.25
Centerline Station = 81.085

```
Downstream Elevation =  464.08
          Centerline Station =  78.345

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018      .17                    .2
1
Upstream   Elevation =  464.25
          Centerline Station =  89.085
Downstream Elevation =  464.08
          Centerline Station =  86.345

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1112.573

INPUT
Description:
Station Elevation Data    num=     156
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.26     .04  468.26    1.57  468.27    2.65  468.29    3.18  468.31
    4.93  468.38    5.76  468.42    6.03  468.42     7.5  468.42    9.86  468.47
   10.08  468.48   10.29  468.47   11.67   468.4   12.62  468.38   14.08  468.37
   15.08  468.38   15.73  468.39   17.81  468.32   18.23  468.31   18.34  468.31
   19.79   468.3   21.97  468.28   22.19  468.28   23.39  468.35   23.65  468.36
   23.75  468.37   26.12  468.63   26.83  468.69   27.64  468.78   28.71  468.81
   29.98  468.87   30.59   468.9   31.47  468.95   32.71  469.02   33.89  469.09
   34.79  469.18   35.33   469.2   36.86  469.26   37.62   469.3   38.33  469.34
   39.09  469.38   41.09  469.48   41.43   469.5   41.61  469.51   42.92  469.65
   43.73   469.7   45.24  469.77    46.4  469.83   46.72  469.85   47.83  469.89
      49  469.93   49.36  469.94   50.54     470   52.26   470.1   52.93  470.14
   53.38  470.18    54.4  470.24   55.65  470.32    56.7   470.4   58.08  470.44
   58.28  470.45    58.4  470.45   62.75  470.76   64.38  470.97    66.2  471.19
   72.08  468.16    77.5  466.04   80.71  464.38   81.31  464.41   82.82  464.46
   82.89  464.45   82.99  464.46   85.45  464.41   85.89  464.41   87.14  464.41
   87.31  464.43    89.7  465.01   90.97  465.74   91.27  465.86   91.81  466.57
   93.79   468.6   95.94  470.39   97.97  471.99  101.43  471.23  101.48  471.22
  102.02  471.16  102.28  471.14   103.7  471.16  105.16  471.12   106.3  471.06
  107.04  471.04  107.95  471.01  109.31  470.98  110.47  470.97  111.75  471.03
  112.03  471.05  112.25  471.06  114.63  471.17  114.78  471.17  116.25  471.21
  117.66   471.3  118.75  471.32  119.72  471.36  120.37  471.38   122.7   471.4
  122.96  471.41  123.46  471.41  124.59  471.41   125.4  471.42  127.12  471.43
  127.84  471.41   128.7   471.4  130.71  471.43  131.27  471.45  132.83  471.49
  132.85  471.49   132.9  471.49  135.41  471.49   135.8  471.48  136.99  471.41
  137.64  471.41  139.46  471.43  140.14  471.43  141.09   471.4  142.83  471.36
   143.6  471.35  145.06  471.34  145.22  471.34  145.49  471.33  147.62  471.24
  149.22  471.21  149.28  471.21   149.4  471.21  151.77  471.15  152.79  471.13
  153.43  471.11  154.91  471.02  155.87  470.96  156.61  470.96  157.48  470.96
  158.23  471.02  160.05  471.16  160.92   471.2   161.7  471.24  163.22   471.2
  164.19  471.17  164.83  471.15  165.74   471.1  166.87  471.05  168.31     471
  169.56  471.02  169.93  471.02  170.51  471.05  172.45  471.13  173.41  471.16
  173.44  471.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018    66.2     .15   97.97    .018
```

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Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          66.2   97.97           100.02     100     100             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 1012.57

INPUT
Description:
Station Elevation Data    num=     106
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   470.3     4.1  470.27   13.31  470.33   28.44  470.53   58.63   471.1
   58.84  471.11   60.31  471.67   61.88  471.63   63.52  471.34   65.02   471.4
   67.18   471.5   70.31  471.12   75.58  470.35   79.73  468.18   79.77  468.15
    79.8   468.1   80.12  467.91    82.6  466.18   83.25  465.87   83.97  465.58
   86.65  465.48   86.72  465.48   86.73  465.49   86.93  465.64   90.89  468.65
    91.3  468.75   92.28  469.05   93.69  469.38   94.89  469.85   95.63  470.06
   97.29  470.36   99.13  470.54  100.09  470.47  100.58  470.38  100.69  470.37
  102.73  470.25  103.27  470.23  104.59  470.13  104.64  470.13  104.85  470.11
  107.44  469.84  108.19  469.83  108.83  469.82  111.22  470.02  111.56  470.05
  111.66  470.05  112.94  470.12  113.91  470.17  115.72  470.24  116.72  470.28
  117.13  470.29  119.49  470.33  119.86  470.34  120.33  470.35  121.22  470.36
  122.32  470.39     124  470.43  125.32  470.43  125.36  470.43  125.43  470.43
  128.11  470.44  128.89  470.42  129.45  470.42  131.32  470.44  132.12  470.45
  132.34  470.44  133.52  470.38  134.51  470.38  136.25  470.39   137.2  470.38
  137.62  470.39  138.58   470.4  140.24  470.42  141.29  470.37  141.64  470.36
   143.2  470.35  144.38  470.34  144.48  470.34  145.79  470.33  146.48  470.33
  148.46  470.26  149.51  470.24  149.82  470.22  152.54  470.17  152.63  470.17
  152.69  470.16  154.04  470.08  156.03  470.11  156.73  470.12  157.06  470.14
  158.05  470.21  160.69  470.33  160.83  470.34  160.88  470.34   162.2  470.27
  164.89   470.1  164.94   470.1  164.98   470.1  166.33  470.04  167.89  470.09
  168.95  470.13  169.77  470.18  170.36  470.21  170.97  470.24  173.15  470.31
  173.44  470.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   65.02     .15   99.13    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.02   99.13           127.93   134.9  144.08             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   99.13  173.44  470.54       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   70.55 481.086

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 877.6657

INPUT
Description:
Station Elevation Data    num=     255
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	96.32	465.07	96.86	464.55	97.35	463.85	97.61	463.8
98.6	463.67	98.77	463.67	100.78	463.66	102.05	463.65	102.16	463.65
103.31	463.71	103.62	463.72	105.43	463.9	106.62	463.79	107.07	463.88
107.79	463.81	108.93	464.69	110.09	465.66	110.39	465.95	112.51	467.46
115.52	469.4	119.54	469.09	119.76	469.09	119.96	469.05	120.03	469.03
121.08	468.76	121.25	468.77	123.57	468.84	124.46	468.78	125.36	468.74
125.62	468.72	127.91	468.47	128.91	468.38	129.02	468.37	130.06	468.53
131.27	468.57	132.57	468.56	133.41	468.62	134.17	468.68	134.56	468.69
136.17	468.76	137.87	468.84	138.89	468.85	139	468.86	139.18	468.86
139.52	468.89	141.37	469.01	142.32	469.03	142.87	469.02	143.42	469.04
144.85	469.09	146.75	469.17	147.49	469.13	147.83	469.13	148.68	469.12
151.09	469.14	152.21	469.19	155.52	469.18	155.61	469.18	156.62	469.18
157.83	469.16	159.83	469.12	160.11	469.14	160.94	469.15	162.42	469.08
164.26	469.07	165.17	469.02	165.41	469.02	165.94	469.01	168.66	469
168.87	468.99	169.72	468.99	170.85	469	172.75	469.02	173.1	469.03
173.53	469	174.13	468.97	175.58	468.97	177.18	468.99	177.62	468.98
178.15	468.98	180.01	468.99	181.25	469	182.02	468.98	182.26	468.97
182.99	468.97	185.34	468.92	185.66	468.91	186.34	468.88	189.28	468.79
189.36	468.79	189.38	468.79	190.39	468.81	191.4	468.79	193.5	468.72
194.4	468.69	194.52	468.69	195.03	468.69	197.64	468.64	198.37	468.58
198.76	468.54	199.71	468.52	202.06	468.49	202.98	468.45	203.13	468.45
203.5	468.44	206.37	468.33	207.37	468.35	207.5	468.35	208.21	468.38
211	468.5	211.41	468.51	212.17	468.53	214.54	468.61	215.49	468.65
215.74	468.66	216.59	468.69	219.59	468.79	220.03	468.79	221.09	468.82
221.18	468.82	221.5	468.83	224.57	468.94	225.64	469	225.67	469
225.9	469.02	229.13	469.21	229.54	469.24	230.27	469.27	232.52	469.41
233.65	469.47	234.25	469.49	234.75	469.51	235.67	469.57	238.08	469.76
239.21	469.79	239.22	469.79	239.34	469.8	242.48	470.05	242.92	470.08
243.56	470.11	246.31	470.35	246.62	470.37	246.76	470.38	247.72	470.42
249.02	470.5	250.87	470.65	251.5	470.69	251.89	470.7	254.08	470.82
254.71	470.85	254.9	470.87	255.72	470.87	256.51	470.91	258.65	471.04

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	88.65	.15	115.52	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
88.65	115.52	174.52	141.81	121.21	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

CULVERT

RIVER: North_Channel
REACH: Reach RS: 800

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 131
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		82.88	472.01		115.52	469.4	

Upstream Bridge Cross Section Data
Station Elevation Data num= 238

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	94.05	463.65	110.05	463.65	115.52	469.4	119.54	469.09
119.76	469.09	119.96	469.05	120.03	469.03	121.08	468.76	121.25	468.77
123.57	468.84	124.46	468.78	125.36	468.74	125.62	468.72	127.91	468.47
128.91	468.38	129.02	468.37	130.06	468.53	131.27	468.57	132.57	468.56
133.41	468.62	134.17	468.68	134.56	468.69	136.17	468.76	137.87	468.84
138.89	468.85	139	468.86	139.18	468.86	139.52	468.89	141.37	469.01
142.32	469.03	142.87	469.02	143.42	469.04	144.85	469.09	146.75	469.17
147.49	469.13	147.83	469.13	148.68	469.12	151.09	469.14	152.21	469.19
155.52	469.18	155.61	469.18	156.62	469.18	157.83	469.16	159.83	469.12
160.11	469.14	160.94	469.15	162.42	469.08	164.26	469.07	165.17	469.02
165.41	469.02	165.94	469.01	168.66	469	168.87	468.99	169.72	468.99
170.85	469	172.75	469.02	173.1	469.03	173.53	469	174.13	468.97
175.58	468.97	177.18	468.99	177.62	468.98	178.15	468.98	180.01	468.99
181.25	469	182.02	468.98	182.26	468.97	182.99	468.97	185.34	468.92
185.66	468.91	186.34	468.88	189.28	468.79	189.36	468.79	189.38	468.79
190.39	468.81	191.4	468.79	193.5	468.72	194.4	468.69	194.52	468.69
195.03	468.69	197.64	468.64	198.37	468.58	198.76	468.54	199.71	468.52
202.06	468.49	202.98	468.45	203.13	468.45	203.5	468.44	206.37	468.33
207.37	468.35	207.5	468.35	208.21	468.38	211	468.5	211.41	468.51
212.17	468.53	214.54	468.61	215.49	468.65	215.74	468.66	216.59	468.69
219.59	468.79	220.03	468.79	221.09	468.82	221.18	468.82	221.5	468.83
224.57	468.94	225.64	469	225.67	469	225.9	469.02	229.13	469.21
229.54	469.24	230.27	469.27	232.52	469.41	233.65	469.47	234.25	469.49
234.75	469.51	235.67	469.57	238.08	469.76	239.21	469.79	239.22	469.79

239.34	469.8	242.48	470.05	242.92	470.08	243.56	470.11	246.31	470.35
246.62	470.37	246.76	470.38	247.72	470.42	249.02	470.5	250.87	470.65
251.5	470.69	251.89	470.7	254.08	470.82	254.71	470.85	254.9	470.87
255.72	470.87	256.51	470.91	258.65	471.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	115.52	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
88.65	115.52	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

Downstream Deck/Roadway Coordinates num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		126.34	469.36		163.13	468.58	

Downstream Bridge Cross Section Data

Station Elevation Data num= 269

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	463.15
152.43	463.15	156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01
165.76	467.96	167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79
169.98	467.44	170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55
175.25	467.6	176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83
179.69	467.85	180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94
183.7	467.97	185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18
189.39	468.2	190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26
193.02	468.28	194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48
198.8	468.51	200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65
204.53	468.7	204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75
208.93	468.79	210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89
213.77	468.89	214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87
218.06	468.9	218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9
223.96	468.92	224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97
227.06	468.97	227.28	468.97	227.55	468.97	227.74	468.97	229.89	469
230.56	469.01	230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98
234.7	468.93	235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89
239.6	468.88	239.77	468.86	240.06	468.87	242.8	468.86	243.45	468.83

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  243.78  468.83  246.86  468.85  246.94  468.85  246.97  468.85  247.93  468.82
  250.05   468.7  251.09  468.67  251.54  468.66  252.15  468.67   254.8  468.64
  255.52  468.62  255.65  468.63  256.54   468.6  258.95  468.52  259.81  468.49
  260.13  468.47  260.91  468.42  264.32  468.35  264.43  468.35  264.76  468.35
  265.57  468.34  265.73  468.35  268.95  468.37  269.01  468.37     270  468.43
  270.63  468.45  273.49   468.6  273.66   468.6  274.61  468.65  277.36  468.71
  278.03  468.73  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23
  283.66  469.18  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45
  287.09  469.46  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89
  292.07  469.91  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13
  296.95  470.17  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37
  301.48  470.37  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68
  308.18  470.85  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08
  313.15  471.05  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .03  132.79     .11  156.85     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        126.34  163.13             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  115.52
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     5.5     7.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  98.3
Downstream Elevation =  462.98
           Centerline Station =  137.04

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     5.5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
Upstream   Elevation =  463.48
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           Centerline Station =  106.3
Downstream Elevation =  462.98
           Centerline Station =  148.68

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 735.8522

INPUT
Description:
Station Elevation Data    num=     278
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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	467.91
138.13	466.14	139.52	465.74	140.11	465.54	141.99	464.35	142.8	464.14
144.43	463.95	144.45	463.95	144.46	463.95	145.1	463.9	151.06	465.47
156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01	165.76	467.96
167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79	169.98	467.44
170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55	175.25	467.6
176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83	179.69	467.85
180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94	183.7	467.97
185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18	189.39	468.2
190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26	193.02	468.28
194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48	198.8	468.51
200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65	204.53	468.7
204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75	208.93	468.79
210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89	213.77	468.89
214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87	218.06	468.9
218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9	223.96	468.92
224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97	227.06	468.97
227.28	468.97	227.55	468.97	227.74	468.97	229.89	469	230.56	469.01
230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98	234.7	468.93
235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89	239.6	468.88
239.77	468.86	240.06	468.87	242.8	468.86	243.45	468.83	243.78	468.83
246.86	468.85	246.94	468.85	246.97	468.85	247.93	468.82	250.05	468.7
251.09	468.67	251.54	468.66	252.15	468.67	254.8	468.64	255.52	468.62
255.65	468.63	256.54	468.6	258.95	468.52	259.81	468.49	260.13	468.47
260.91	468.42	264.32	468.35	264.43	468.35	264.76	468.35	265.57	468.34
265.73	468.35	268.95	468.37	269.01	468.37	270	468.43	270.63	468.45
273.49	468.6	273.66	468.6	274.61	468.65	277.36	468.71	278.03	468.73
278.21	468.74	279.07	468.86	280.64	469.06	282.57	469.23	283.66	469.18

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  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45  287.09  469.46
  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89  292.07  469.91
  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13  296.95  470.17
  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37  301.48  470.37
  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68  308.18  470.85
  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08  313.15  471.05
  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .15  156.85    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        126.34  163.13             67.5   96.35  120.06             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 639.5066

INPUT
Description:
Station Elevation Data    num=     159
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.34    1.51  470.37     3.1  470.33    5.36  470.25    8.48  470.13
   10.32  470.17   11.85   470.2   13.49  470.39   15.15  470.29   16.94  470.42
   18.82  470.48   20.76  470.47   22.86  470.62   24.98  470.52   25.36  470.51
    27.2  470.51   27.23  470.51   28.25  470.54   28.32  470.54   32.57  470.16
   35.55  469.76   37.67  469.48   37.87  469.47   46.39  469.41   46.86  469.41
   48.13   469.4   50.44  469.39   51.16  469.34   51.49  469.32    52.4  469.31
    55.1  469.29   55.86  469.27   56.15  469.27   57.22  469.25   59.76   469.2
   60.35  469.21   60.78  469.19    62.4  469.15   64.39  469.07   64.88  469.04
   65.47  469.03   67.36  468.98   69.02  468.95   69.46  468.95      70  468.96
    70.9  468.91   73.45  468.78   75.71   468.7   79.84  469.03   83.01  469.04
   85.24  468.72    87.8  468.61   91.06  468.33   91.07  468.33   91.08  468.33
   91.12  468.33   92.35  468.15      94  467.93   96.18  467.63   96.33  467.61
   96.84  467.37   99.61  466.11  100.61  465.59  100.62  465.58  100.68  465.56
  104.04  463.99   104.8  463.65  105.84  463.44  108.41  463.18  108.87  463.52
  109.39  463.92  112.56  465.49  112.93  465.68  113.01  465.72  113.96  466.15
  116.67  468.29   117.5  468.95  118.46  469.24  118.48  469.24  118.58  469.26
   121.9  469.76  122.09  469.75  122.52  469.74  122.98  469.77   126.1   469.6
  126.37  469.58  126.52  469.58  127.35  469.57  128.89   469.6  130.76  469.64
  131.55  469.64  131.78  469.64  135.11  469.73  135.22  469.73  135.36  469.73
  136.28  469.76  137.42  469.77  139.66  469.77  140.38  469.78  140.64  469.79
  143.52  469.85  144.15  469.87  144.35  469.88  145.23  469.93  146.28  469.93
  148.69  469.99  149.24     470  149.74  469.97  152.42  470.03  153.31  470.06
  154.26  470.03  154.36  470.03  154.46  470.03   157.9  470.14  158.13  470.15
  158.99   470.2  160.79  470.12  162.57  470.14   162.9  470.18   163.6  470.18
  165.58  470.41  167.13  470.71  169.49  470.65   171.6  470.85  172.39  471.05
  174.19  471.25  176.59  471.17  180.43  470.55  180.58   470.5  181.18  470.54
  181.64  470.57  182.08  470.58   185.1  470.61  185.81  470.64  186.17  470.65
  188.19  470.78  189.82  470.85   190.6  470.73  193.31  470.77  194.18  470.78
  194.36  470.82  195.26  470.86   198.2  470.93  200.62  471.15  201.62   471.2
   203.3  471.46  203.94  471.41  205.11     472  207.54  473.83  208.86  474.83
  209.23  474.93  213.58  475.15  217.78  475.03   218.1  475.04  218.63  475.01
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  221.58  474.89  226.05  474.98  235.18  475.18  235.68  475.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   83.01     .15  122.09    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         83.01  122.09              100  100.01     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   83.01  469.04       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.23 480.456

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 539.4938

INPUT
Description:
Station Elevation Data    num=     210
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.43     .16  467.42     .85  467.41    1.44  467.37     4.2  469.23
    4.85   469.7    6.07  469.77     6.1  469.77    6.19  469.77    9.41  469.77
    9.63  469.76   10.73  469.74   12.09  469.73   14.01  469.73   14.94  469.71
   15.33   469.7   17.94  469.66   18.67  469.65   19.67  469.63   19.92  469.63
   20.86  469.61   22.87  469.58   23.72  469.55   24.61  469.49   25.35  469.36
   26.23  469.28   29.18  468.98   30.59  468.98   31.78  469.06   34.04  469.24
   36.93  468.98   37.42  468.95   37.58  468.94   38.76  468.92   41.01  468.88
   41.95  468.86   42.37  468.85   43.29  468.84   45.57  468.78   46.64  468.74
   47.01  468.74   47.95  468.74   50.13  468.66   51.27  468.64   51.74  468.64
   52.58  468.65   54.03  468.64   55.93  468.57   56.68  468.57   57.21  468.55
   58.58  468.52   60.59  468.46   61.48   468.4   61.84  468.38   62.73  468.38
   65.18  468.36   66.47  468.39   66.57  468.39   66.81  468.39   69.84  468.38
   71.06  468.31   71.07  468.31   71.09  468.31   74.28   468.3   75.61  468.31
   75.63  468.31   75.67  468.31   78.88  468.27   79.75  468.28   80.12  468.29
   81.05   468.3   83.24  468.28   83.99  468.28   84.49  468.24   85.88  468.24
   87.64  468.23   88.19  468.18   88.89  468.16   91.32  468.53   91.93  468.63
    92.1   468.6   93.12  468.27    93.8  468.03   93.87  468.01    96.2  467.38
   96.57  467.17   97.42  466.69   99.64  465.34  100.44  464.87  100.78  464.66
  101.68  464.13  103.76  463.32  104.86  462.95  105.51  463.15  106.08  463.26
  106.94  463.79  109.27  464.87  109.99  465.19   110.5  465.68  111.42   466.4
  113.86  469.21  114.93  469.41  115.11  469.45   117.8  469.74  118.37  469.79
  118.49  469.81  119.57  469.95  120.95  469.93  121.07  469.93  122.76  469.89
  123.08  469.86  124.07  469.81  126.21  469.82  127.22  469.83   127.4  469.84
  128.43  469.81  129.24  469.82  131.59  469.85  132.38  469.85  132.87  469.86
   135.5  469.86  136.08  469.86   136.2  469.86  137.37  469.87  138.45  469.88
  140.51  469.87  141.22  469.91  141.72  469.94  143.53  469.98  145.01     470
  145.63     470  146.32  470.02   147.4  470.03  149.54  470.08  150.58  470.08
  150.82  470.08  152.14   470.1  154.16  470.12  154.46  470.13  155.45  470.13
   157.8  470.22  158.73  470.27  159.81  470.26  160.04  470.26  160.25  470.27
  163.39  470.36  163.99  470.35  164.67  470.36  167.15   470.4  167.95  470.42
  168.15  470.43  169.16  470.46  172.02  470.41  172.42  470.41  172.46  470.41
  173.73  470.54  175.53  470.53  177.01  470.53   177.7  470.55  178.26  470.56
  178.47  470.56   181.4  470.62   181.6  470.63  182.72  470.66  184.68  470.65
   185.9  470.65  186.76   470.7  187.22  470.71  188.12  470.72  190.42  470.71
  191.65  470.71  191.68  470.71  191.74  470.71     195  470.76  196.04  470.79
  196.31   470.8  196.91   470.8  199.53  470.78  200.59  470.83   200.8  470.84
   201.3  470.84   204.1  470.85  205.06  470.82  205.38  470.81  206.24  470.82
  208.68  470.88  209.53  470.95  209.96  470.97  211.11  470.99  213.28  471.02
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  214.05  471.04  214.56  471.05  216.85  471.03  217.81  471.03  218.17  471.03
  219.12  471.08  221.91  471.19  222.34   471.2  222.67  471.19  223.68  471.17
  225.05  471.19  226.99  471.22  227.88  471.22  228.21  471.22  228.65  471.23
  231.47  471.26   232.5  471.27  232.78  471.28  233.82  471.29  235.68  471.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   91.93     .15  120.95    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         91.93  120.95            112.3  112.27  112.24             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   91.93  468.63       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 427.2193

INPUT
Description:
Station Elevation Data    num=     196
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.48     .89  467.36    2.41  468.18    2.42  468.18    2.49  468.18
    5.46  468.13    6.22  468.12    7.02  468.09    9.27  468.11   10.04  468.12
   11.57  468.15   11.61  468.15   11.63  468.15    14.7  468.15   14.81  468.14
   16.21  468.12    18.7  468.08   19.26  468.08   27.91   468.2   28.26  468.21
   29.55   468.1   30.33  467.94   31.79  467.94   33.41   467.9   34.52  467.87
   35.06  467.85   36.64  467.81   37.94  467.78   38.48  467.79   39.55  467.81
    41.6  467.76   42.63  467.73   43.75   467.7   44.21  467.69   46.13  467.67
   47.23  467.66    47.5  467.66   48.84  467.63   51.56   467.6   51.93   467.6
   53.42  467.67   53.46  467.67   53.55  467.67   56.59  467.74   57.11  467.74
   58.13  467.74   60.65  467.68   61.18  467.67    61.3  467.67   62.82  467.67
   65.62  467.64   65.84  467.64   65.95  467.64   67.32  467.58    69.2  467.47
   70.24  467.44   70.75  467.47   71.88  467.59   73.12  467.51   74.39  467.49
   76.07  467.45   78.83  467.54   79.27  467.56    79.4  467.57      84  467.44
   87.31  467.25   87.87  467.32   88.49   467.4   90.21  466.88   91.16   466.5
    92.2  466.06   92.62  465.97   95.66  464.33   96.43   463.8   97.78  463.26
   97.92   463.2  100.48  462.91  101.02  462.92  101.43  463.08  102.12  463.37
  102.37  463.42  103.05   463.9  105.29  465.25  105.93  465.71  106.81  466.45
  109.16     468  109.85  468.34  110.31  468.64  111.37  469.12  113.04  469.27
  114.39   469.4  114.74  469.42   115.4  469.44  115.84  469.45  117.13  469.36
  118.75  469.25   120.2  469.27  120.33  469.27  120.78  469.27  123.22  469.23
  123.84  469.26  124.69  469.26  127.29  469.29  127.58  469.29  128.38  469.33
  129.12  469.36  129.43  469.37  132.06  469.42  133.03   469.4  133.62  469.42
  136.09  469.47  136.52  469.47  137.26  469.51  137.99  469.54  138.85  469.55
  140.98  469.57  142.04  469.57  142.58  469.57  145.44  469.63   145.5  469.63
  145.56  469.63  147.08  469.67  148.98  469.69  150.13  469.71  151.42  469.79
  151.71  469.81  151.98  469.82  154.73  469.91   155.5  469.95  156.31  469.97
  159.12  469.95  159.35  469.95   159.8  469.95   160.9  469.96  161.81  469.98
  163.95  470.05  165.17  470.07  165.43  470.07  166.13  470.09  168.38  470.15
  169.22  470.16  169.99  470.19  171.64  470.18  172.98  470.18  173.63  470.18
  174.49  470.16  176.06  470.19  177.38  470.24  178.65  470.28  178.96  470.28
  181.55   470.3   181.9   470.3  182.47  470.34  183.47   470.4  186.33   470.4
   186.4   470.4  186.45   470.4  187.92  470.44  190.84  470.49     191  470.49
  191.11  470.49  192.57  470.54  195.48  470.62  195.52  470.62  195.55  470.62
  197.07  470.69  199.65  470.74  200.09  470.75  200.29  470.76  201.67  470.76
  204.41  470.85  204.65  470.86  204.77  470.86  206.24  470.87  209.07  470.96
  209.28  470.96  209.39  470.96  210.83  470.95   213.3  470.97  213.81  470.98
   214.1  470.98  215.39  471.06  216.39  471.09  218.32  471.12  219.22  471.14
  219.98  471.17  221.67   471.2     223  471.24   223.6  471.27  224.51  471.28
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  227.22   471.3   227.5   471.3  227.62   471.3  229.11  471.34  231.18  471.39
  231.51  471.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   87.87     .15  114.74    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         87.87  114.74           125.23  125.29   125.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   27.91   478.2

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 301.9247

INPUT
Description:
Station Elevation Data    num=     168
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.04   18.59  470.39    19.6   470.1   20.67  469.86   21.83  469.69
   23.08  469.52   24.39  469.48   25.85  469.47    25.9  469.47   27.75  469.52
   27.83  469.52   27.97  469.52   30.43  469.63   32.08  469.52   32.34  469.49
   32.71  469.46   35.09  469.16   36.84  469.09   36.99  469.08   37.17  469.07
   39.72  468.97   41.46  468.89   41.59  468.88   41.85  468.88   44.38  468.84
   46.18  468.79   46.25  468.79   46.35  468.78   49.04  468.69   50.47  468.66
   50.88  468.65   51.51  468.64   53.61  468.61   54.77  468.58   55.58  468.56
   56.69  468.51    58.3  468.45   59.34  468.46   60.07  468.46   60.94  468.45
   62.73  468.43   63.98   468.4   64.65  468.39   65.64  468.39   67.29  468.39
   68.16  468.36   69.13  468.32   70.31   468.3   71.69  468.24   72.62  468.12
   73.49  468.05   74.64  468.05   76.05  468.07   77.27  467.85   77.86  467.76
   78.07  467.69   80.09  467.01   80.34  466.94   80.42   466.9   82.09  466.11
   84.07  465.56   84.61  465.39   85.22  465.07   86.39  464.49    87.7  464.16
   88.88  463.84      90  463.05   90.65  462.57   91.38  462.92   93.34  463.75
      94  464.44   95.15  465.32   97.35  466.49   97.78  466.76   98.26  466.92
   99.55  467.57  100.75  467.72  101.69  467.94  104.71   468.4   104.9  468.43
  106.81  468.31  107.24  468.27  108.55   468.1  109.37  468.08  111.17  468.09
  112.58  468.07  113.04  468.06  115.43  468.05  115.63  468.05  116.37  468.07
  124.47  468.26  125.12  468.28  126.33  468.32  128.35   468.3  128.93  468.29
  129.74  468.31  130.71  468.35  133.36   468.3  133.39   468.3  133.41   468.3
   135.3  468.29  136.39  468.27  137.92  468.24  139.46  468.21  139.79  468.21
  140.48  468.23  142.52   468.3  143.58   468.3  144.42  468.29  146.67  468.36
  147.11  468.38  148.98  468.45  149.01  468.45  149.17  468.45  151.74  468.48
  152.36   468.5  153.61  468.59  154.94  468.62  156.34  468.65  157.51  468.72
  158.11  468.76  158.84  468.77  160.77  468.81  162.28   468.9   162.7  468.92
  163.16  468.93  165.37  468.93  167.01  468.94  167.17  468.94  167.53  468.95
   169.8  468.99  170.53     469  171.67  468.96  174.17  468.97  174.29  468.97
  174.48  468.98  176.17  469.05  177.89  469.09  178.79   469.1  179.82  469.12
  180.63  469.13  181.81  469.13  183.39  469.16  185.19  469.25  185.29  469.25
  185.43  469.26  187.91  469.32  189.64  469.41  189.75  469.42  192.46  469.48
  192.51  469.48  192.81  469.48  194.38  469.48  196.99  469.58  197.07  469.58
  197.14  469.58  198.94  469.66  201.62  469.71  201.67  469.71  201.71  469.71
  203.54  469.77  205.26  469.82  206.26  469.86  207.19  469.88   208.1  469.89
  208.68   469.9  210.73  469.95  211.98  469.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   74.64     .15  104.71    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
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         74.64  104.71           150.72  127.44  115.85             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   31.99 480.035

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 174.488

INPUT
Description:
Station Elevation Data    num=     304
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.88     .43  470.88     .77  470.88    2.37  470.89    4.12  470.86
    4.32  470.85    4.65  470.84    6.23  470.85    7.23  470.85    8.13  470.86
    9.12  470.91   10.02  470.92   10.83  470.95   11.99  470.96      14  470.97
   15.85  470.99   17.49  471.02   17.75  471.02   18.55  470.99   20.19  470.95
   20.74  470.95   22.05  470.98   23.25  470.91   23.73  470.88   24.26  470.89
   26.04  470.92   27.47  470.94    28.2  470.93   28.86  470.95   29.85  470.97
   30.92  470.96    31.4  470.95   31.92  470.94   32.96   470.9   33.96  470.94
   34.95  470.95   37.39  470.89   37.58  470.88   37.77  470.88   39.17  470.92
   40.64  470.92    40.8  470.92   41.25  470.92   43.33  470.94   44.08  470.93
   45.27  470.91   46.71  470.93   46.99  470.94   47.24  470.94   49.43  470.94
   50.62  470.95   51.55  470.93   52.67  470.91   53.35   470.9   53.92  470.88
   55.44  470.86   57.31  470.83    57.6  470.83   57.94  470.82   59.44  470.79
   60.69  470.81   61.34  470.83   62.43  470.82   63.38  470.81   63.93  470.81
   65.36  470.77   67.19  470.76   67.33  470.76    67.5  470.76   69.22  470.76
   70.58  470.85   71.19  470.89    72.3  470.99   73.15  471.06   73.67  471.08
   76.77  470.87   77.07  470.85   77.14  470.85   77.37  470.85   79.59  470.83
   80.29  470.84   81.49  470.85   82.67  470.87   83.15  470.87   83.61  470.86
   85.38  470.82   86.86  470.83   87.48  470.83   88.07  470.83   89.02  470.82
   90.01  470.81   90.97  470.82   93.16  470.85   93.78  470.84   96.26  470.81
   96.52  470.81    98.9  470.84   99.41  470.85   99.46  470.85  101.85  470.84
  102.57  470.84  103.79  470.86  104.11  470.86  105.64  470.86  106.27  470.86
  107.81  470.83  108.39  470.82  108.64  470.82  110.12  470.83  111.75  470.81
   111.8  470.81  111.85   470.8  113.77  470.62  114.86  470.44  115.68  470.27
  116.81  469.84   117.5   469.6     118  469.56  119.38  469.37  120.99  468.74
  121.28  468.66  121.69  468.52  123.21  468.01  124.31  467.74  125.02  467.55
  125.92  467.43  126.69  467.35  127.26  467.11  128.58  466.73  130.57  466.25
   130.6  466.24  130.63  466.22  132.18  464.72  133.46  464.08  133.85  463.87
  134.45  463.47  135.88  462.81  136.83  462.69  138.26  462.43  139.44   462.3
  141.47  462.03  143.33   461.9  144.47  461.95  147.04  462.64  149.63   463.9
  151.42  464.08  153.29  464.92  156.18  466.69  156.29  466.74  156.33  466.76
  156.65  466.82  158.45  467.11   159.1  467.29  160.18  467.63  161.16  467.84
  161.76  467.86  162.44  467.92  163.52  467.98  165.41  468.06  165.44  468.06
  165.46  468.06  167.04   468.1  168.44  468.12  168.65  468.12  168.89  468.12
  169.02  468.13  170.37  468.16  171.86  467.82  172.12  467.79  172.42  467.75
  173.91  467.67  175.24  467.65  175.69  467.62  176.37  467.61  177.45  467.59
  178.14  467.59  179.65  467.55  181.68  467.58  182.01  467.59  182.38   467.6
  183.63   467.6  184.71  467.66   185.4  467.69  186.47  467.71  187.52  467.73
  188.19  467.74  189.23  467.78  190.36  467.79  190.76  467.79  191.14  467.79
  192.88  467.79  194.76  467.79   195.2  467.78  197.78  467.67  197.91  467.67
  198.15  467.68  200.26  467.72  201.35  467.74  202.73  467.71  204.32   467.7
  205.27   467.7  207.19  467.71  207.73  467.71  207.99  467.72  210.01  467.83
   210.9  467.86  212.67  467.88  214.58  467.89  215.38  467.88  217.36  467.89
  217.61  467.89  217.82   467.9  219.26  467.91  220.94  467.92  220.96  467.92
     221  467.92  222.98  467.96   223.9  467.95  225.04  467.95  226.63  467.97
  227.15  467.98  227.52  467.97  229.11  467.96  230.35     468  231.02  468.01
   231.8  468.01  232.91  468.01  233.87  468.03   234.7  468.03  235.94  468.07
  236.43  468.08  236.75  468.08  238.34  468.11  240.26  468.14  240.29  468.14
  240.32  468.14  241.95   468.2  243.19  468.24  243.73  468.25  244.59  468.28
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  245.96  468.34  246.82  468.35  247.79  468.37  249.11  468.48  249.39   468.5
   249.6  468.51  251.77   468.6  253.41  468.67  253.92  468.68  254.47  468.72
  255.42  468.77  256.28  468.82  257.47  468.89   259.9  469.02  260.12  469.03
  260.36  469.05   261.6  469.13  262.68   469.2  263.12  469.23  263.45  469.25
  264.77  469.32  266.42  469.38  266.45  469.38  266.49  469.38  268.92   469.5
  269.32  469.51  270.79  469.58  272.05  469.62  272.53  469.63  273.09  469.63
  274.77  469.69  275.86  469.75  276.86  469.76  277.73  469.74  278.64  469.71
  279.68  469.72  280.65  469.73  282.45  469.76  282.85  469.76  283.28  469.78
  284.83  469.85  286.26  469.91  286.89  469.93     289  469.89  289.13  469.89
  289.33   469.9  291.34  469.92  292.72  469.89   293.5  469.88  295.43  469.93
  295.51  469.93  295.54  469.93  297.74  470.02  299.45  470.12  299.88  470.13
  300.88  470.11  301.67   470.1  302.01   470.1  304.13  470.14  305.92  470.18
  306.44   470.2  307.39  470.26   308.2  470.31  308.51  470.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .035  103.79     .15  170.37    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        103.79  169.02           126.48  101.82   81.84             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  169.02  308.51 468.134       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 72.67111

INPUT
Description:
Station Elevation Data    num=     181
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.46     .01  469.46     2.1  469.53    2.13  469.53     4.2  469.56
    4.23  469.56    6.32   469.6    6.36   469.6    8.42  469.57    8.46  469.57
   10.52   469.6   10.56   469.6   12.62  469.54   12.66  469.54   14.72   469.6
   14.76   469.6   16.82   469.5   16.86   469.5   18.92   469.5   18.97   469.5
   21.02  469.54   21.06  469.54   23.11  469.57   23.19  469.57   25.22   469.6
    25.3   469.6   27.33  469.64   27.39  469.64   29.43  469.67   29.49  469.67
   31.52  469.73    31.6  469.73   33.65  469.73   33.72  469.73   35.74  469.77
   35.82  469.77   37.85  469.83   37.92  469.83   39.94  469.87   40.02  469.87
   42.04  469.93   42.12  469.93   44.13   469.9   44.24   469.9   46.23   469.9
   46.35   469.9   48.37  469.82   48.48  469.82   50.07   469.7   50.47  469.67
   50.59  469.65   52.61  468.89    52.7  468.86   54.75  468.17   54.83  468.14
   58.95  466.58   59.02  466.56   59.08  466.54   61.16  466.19   61.21  466.17
   63.26  465.34    63.3  465.33   65.39  464.59   65.43  464.57   67.53   463.4
   67.54   463.4   67.94  463.07   69.67  461.63   69.69  461.62    71.8  461.08
   71.82  461.08    73.9  461.27   73.92  461.27      76  461.57   76.02  461.57
   76.03  461.58   80.46  464.14   81.48  464.64   86.27  467.08   86.37  467.13
   86.47  467.16   88.47  467.41   88.57  467.43   90.55  467.96   90.69  467.99
   92.66  468.26   92.77  468.27   92.79  468.27   94.75     468   94.89  467.96
   96.88  467.85   97.02  467.85   98.98  467.91   99.12  467.92  101.08  468.01
  101.22  468.01  103.18  468.14  103.32  468.14  105.32  468.14  105.45  468.14
  107.41   468.2  107.57   468.2  109.51  468.23  109.67  468.24  111.61  468.27
  111.78  468.28  113.74  468.31   113.9  468.31  115.84   468.4     116   468.4
  117.93  468.46  118.09  468.47  120.03  468.53   120.2  468.53  122.14  468.49
  122.31   468.5   124.2  468.53  124.37  468.54   126.3  468.59  126.47   468.6
  128.43  468.66  128.62  468.67  130.52  468.78  130.73  468.78  132.63  468.78
  132.83  468.79  134.75  468.88  134.96  468.89  136.83  468.94  137.03  468.96
  138.92  469.08  139.14  469.08  141.06  469.08  141.26  469.09  143.16  469.15
  143.36  469.16  145.25  469.23  145.46  469.23  147.35  469.26  147.59  469.27
  149.46  469.36  149.69  469.37  151.51  469.45  151.75  469.46  153.61  469.52
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153.85	469.53	155.75	469.65	155.99	469.66	157.85	469.82	158.09	469.83
159.95	469.91	160.19	469.92	162.05	469.98	162.28	469.98	163.63	470
164.09	470.02	164.41	470.03	166.7	470.06	166.71	470.06	166.72	470.06
168.98	470.14	170.22	470.12	171.13	470.12	173.01	470.15	173.21	470.15
173.54	470.15	175.5	470.16	176.66	470.18	177.58	470.18	179.23	470.23
179.55	470.24	180.35	470.27	182.17	470.33	182.88	470.34	184.17	470.38
185.56	470.4	186.17	470.4	187.8	470.44	188.91	470.47	189.33	470.46
190.03	470.46								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	50.07	.15	92.77	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50.07	92.77	149.26	72.67	167.63	.1	.3

SUMMARY OF REACH LENGTHS

River: North_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1459.614	89.03	89.03	89.04
Reach	1370.583	100.01	100	100
Reach	1270.58	100.01	100	100
Reach	1170.577	58.01	58	58
Reach	1143.195	Culvert		
Reach	1112.573	100.02	100	100
Reach	1012.57	127.93	134.9	144.08
Reach	877.6657	174.52	141.81	121.21
Reach	800	Culvert		
Reach	735.8522	67.5	96.35	120.06
Reach	639.5066	100	100.01	100
Reach	539.4938	112.3	112.27	112.24
Reach	427.2193	125.23	125.29	125.4
Reach	301.9247	150.72	127.44	115.85
Reach	174.488	126.48	101.82	81.84
Reach	72.67111	149.26	72.67	167.63

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: North_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1459.614	.1	.3
Reach	1370.583	.1	.3
Reach	1270.58	.1	.3
Reach	1170.577	.1	.3
Reach	1143.195	Culvert	
Reach	1112.573	.1	.3
Reach	1012.57	.1	.3
Reach	877.6657	.1	.3
Reach	800	Culvert	
Reach	735.8522	.1	.3
Reach	639.5066	.1	.3
Reach	539.4938	.1	.3
Reach	427.2193	.1	.3

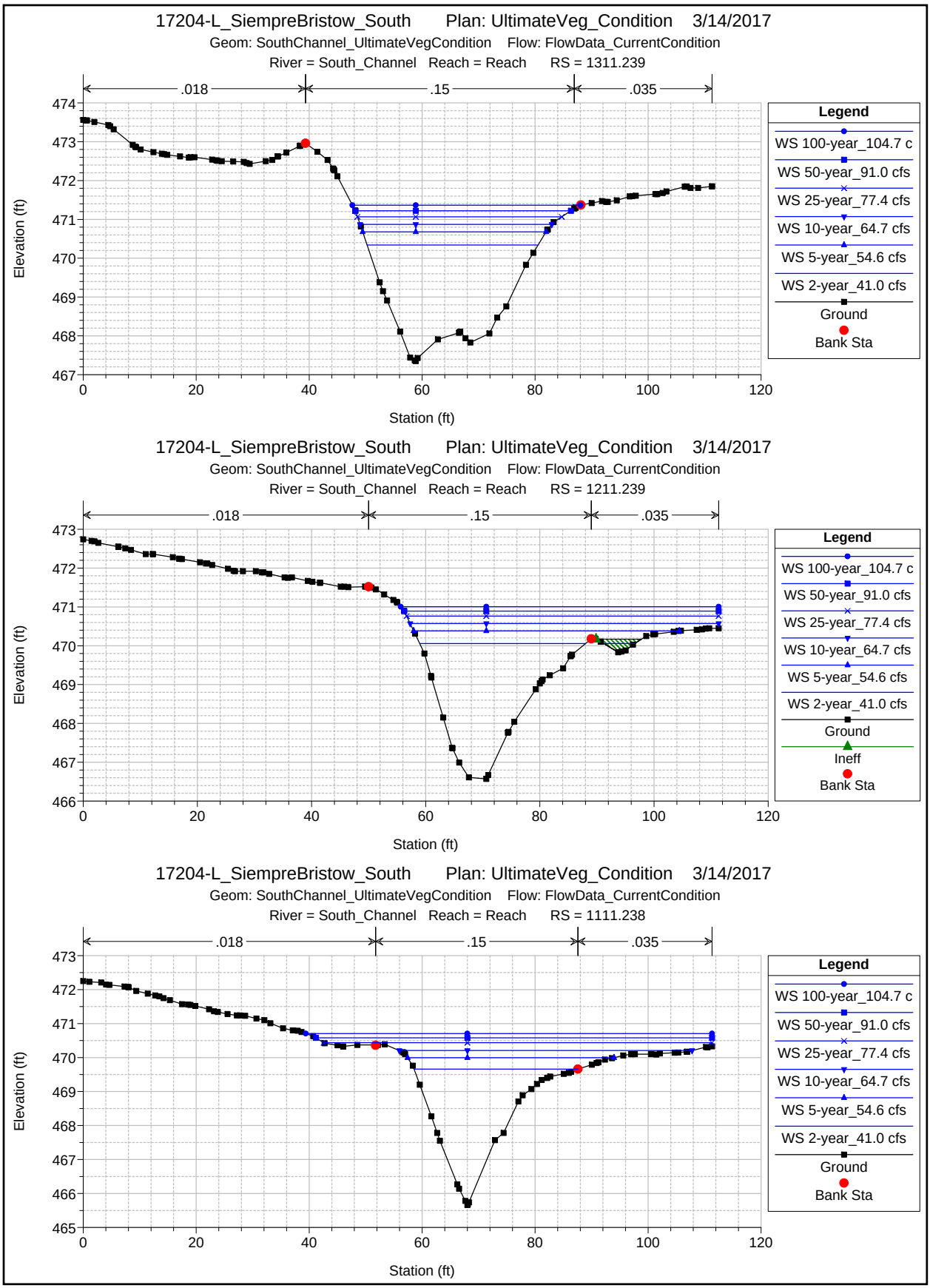
Reach	301.9247	.1	.3
Reach	174.488	.1	.3
Reach	72.67111	.1	.3

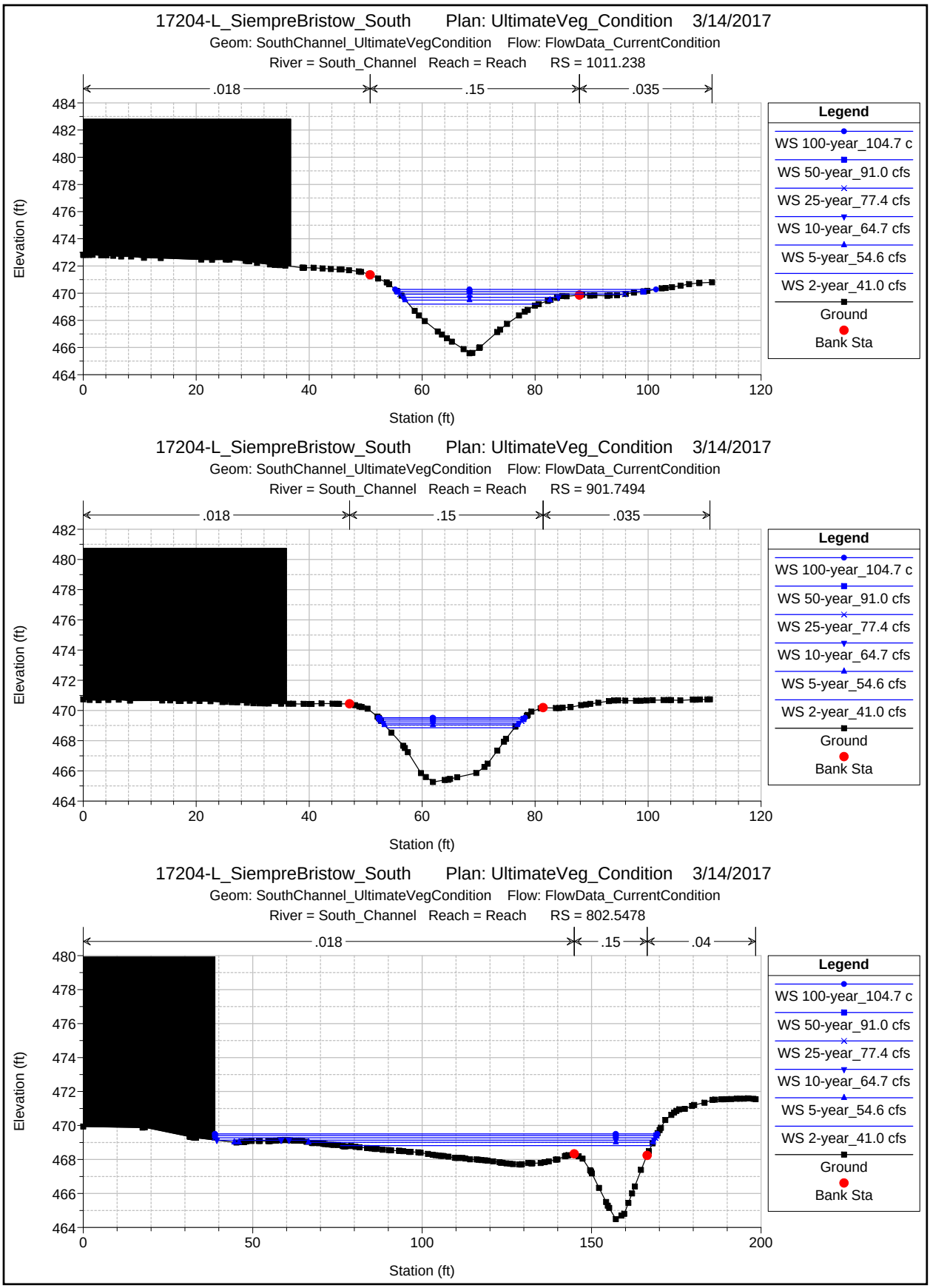
HEC-RAS Plan: UltimateVeg River: South_Channel Reach: Reach

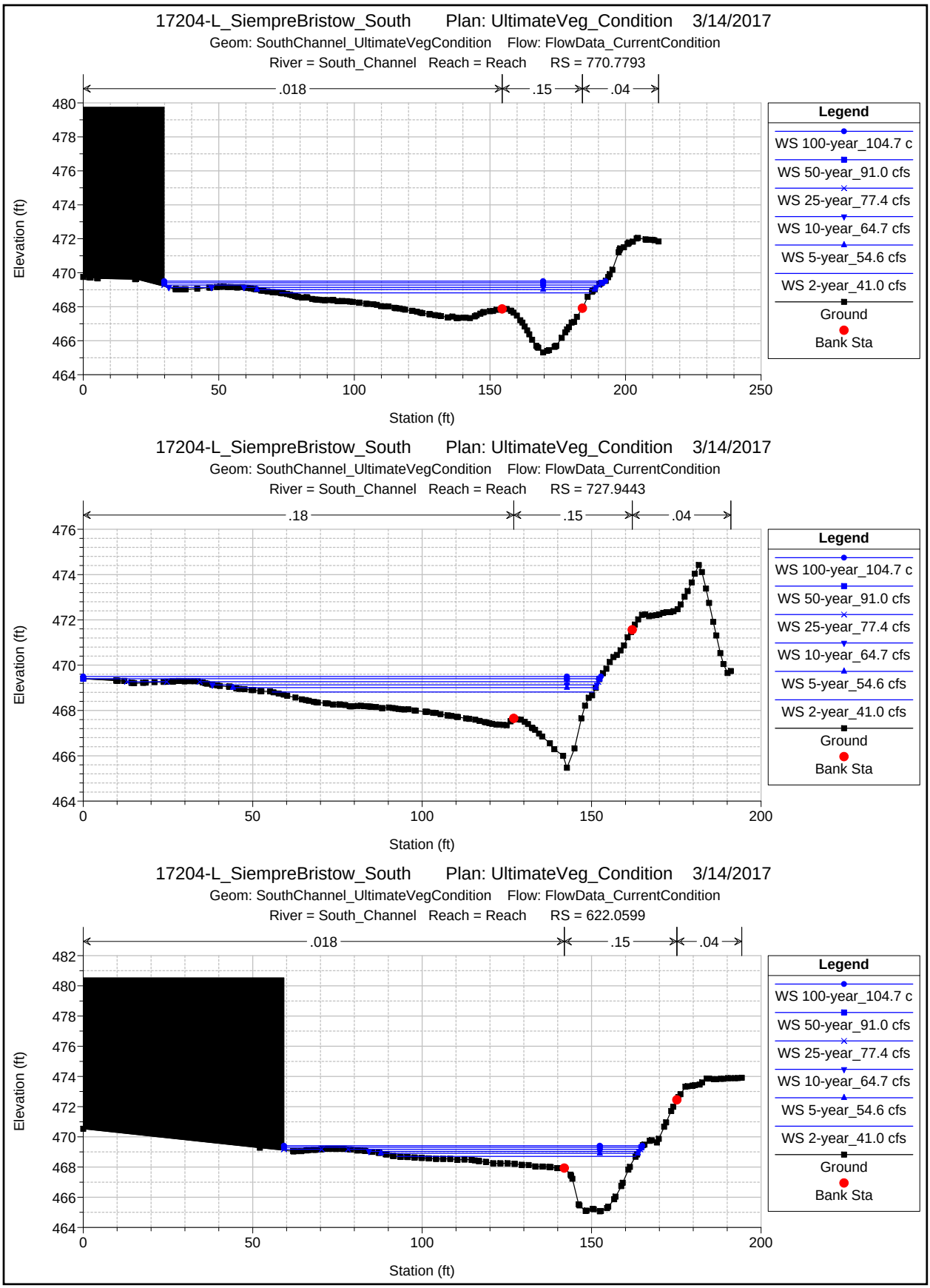
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1311.239	2-year_41.0 cfs	41.00	467.35	470.34	468.42	470.35	0.002460	0.73	56.29	30.26	0.09
Reach	1311.239	5-year_54.6 cfs	54.60	467.35	470.68	468.54	470.69	0.002691	0.82	66.98	32.48	0.10
Reach	1311.239	10-year_64.7 cfs	64.70	467.35	470.87	468.63	470.88	0.002970	0.88	73.26	33.93	0.11
Reach	1311.239	25-year_77.4 cfs	77.40	467.35	471.07	468.72	471.08	0.003433	0.97	80.11	36.15	0.11
Reach	1311.239	50-year_91.0 cfs	91.00	467.35	471.22	468.82	471.24	0.004030	1.06	85.97	38.19	0.12
Reach	1311.239	100-year_104.7 c	104.70	467.35	471.36	468.91	471.38	0.004504	1.14	91.50	40.36	0.13
Reach	1211.239	2-year_41.0 cfs	41.00	466.57	470.06		470.07	0.003185	0.80	51.41	34.43	0.11
Reach	1211.239	5-year_54.6 cfs	54.60	466.57	470.38		470.39	0.003235	0.86	63.68	46.55	0.11
Reach	1211.239	10-year_64.7 cfs	64.70	466.57	470.57		470.58	0.002972	0.87	73.54	54.05	0.11
Reach	1211.239	25-year_77.4 cfs	77.40	466.57	470.76		470.78	0.002686	0.86	83.93	54.67	0.10
Reach	1211.239	50-year_91.0 cfs	91.00	466.57	470.89		470.91	0.002762	0.90	90.98	55.09	0.10
Reach	1211.239	100-year_104.7 c	104.70	466.57	471.01		471.03	0.002859	0.94	97.35	55.72	0.11
Reach	1111.238	2-year_41.0 cfs	41.00	465.66	469.66		469.67	0.004971	0.91	45.13	29.04	0.13
Reach	1111.238	5-year_54.6 cfs	54.60	465.66	469.99		470.01	0.004666	0.98	55.96	36.56	0.13
Reach	1111.238	10-year_64.7 cfs	64.70	465.66	470.21		470.22	0.004449	1.00	65.16	51.84	0.13
Reach	1111.238	25-year_77.4 cfs	77.40	465.66	470.44		470.45	0.003881	0.93	78.82	68.76	0.12
Reach	1111.238	50-year_91.0 cfs	91.00	465.66	470.58		470.60	0.003389	0.91	88.84	70.15	0.11
Reach	1111.238	100-year_104.7 c	104.70	465.66	470.71		470.73	0.003058	0.90	97.72	71.94	0.11
Reach	1011.238	2-year_41.0 cfs	41.00	465.58	469.19		469.21	0.004419	0.96	42.65	23.02	0.12
Reach	1011.238	5-year_54.6 cfs	54.60	465.58	469.49		469.51	0.005314	1.09	50.00	25.63	0.14
Reach	1011.238	10-year_64.7 cfs	64.70	465.58	469.69		469.71	0.005870	1.17	55.25	27.52	0.15
Reach	1011.238	25-year_77.4 cfs	77.40	465.58	469.93		469.95	0.006676	1.23	63.06	39.80	0.16
Reach	1011.238	50-year_91.0 cfs	91.00	465.58	470.12		470.15	0.006485	1.28	71.03	43.54	0.15
Reach	1011.238	100-year_104.7 c	104.70	465.58	470.28		470.31	0.006397	1.32	78.07	46.18	0.16
Reach	901.7494	2-year_41.0 cfs	41.00	465.26	468.85		468.86	0.002310	0.79	51.71	22.57	0.09
Reach	901.7494	5-year_54.6 cfs	54.60	465.26	469.05		469.06	0.003298	0.97	56.10	23.50	0.11
Reach	901.7494	10-year_64.7 cfs	64.70	465.26	469.16		469.18	0.004074	1.10	58.90	24.12	0.12
Reach	901.7494	25-year_77.4 cfs	77.40	465.26	469.30		469.33	0.005029	1.24	62.31	24.85	0.14
Reach	901.7494	50-year_91.0 cfs	91.00	465.26	469.43		469.46	0.006095	1.39	65.47	25.46	0.15
Reach	901.7494	100-year_104.7 c	104.70	465.26	469.52		469.56	0.007316	1.54	67.93	25.94	0.17
Reach	802.5478	2-year_41.0 cfs	41.00	464.49	468.82		468.83	0.000143	0.20	94.78	91.84	0.02
Reach	802.5478	5-year_54.6 cfs	54.60	464.49	469.01		469.02	0.000129	0.20	113.60	103.10	0.02
Reach	802.5478	10-year_64.7 cfs	64.70	464.49	469.14		469.14	0.000124	0.21	127.20	126.72	0.02
Reach	802.5478	25-year_77.4 cfs	77.40	464.49	469.28		469.28	0.000123	0.21	145.61	129.91	0.02
Reach	802.5478	50-year_91.0 cfs	91.00	464.49	469.41		469.42	0.000107	0.20	162.85	130.24	0.02
Reach	802.5478	100-year_104.7 c	104.70	464.49	469.51		469.52	0.000103	0.20	175.90	130.48	0.02
Reach	770.7793	2-year_41.0 cfs	41.00	465.31	468.82		468.82	0.000045	0.11	135.07	114.91	0.01
Reach	770.7793	5-year_54.6 cfs	54.60	465.31	469.02		469.02	0.000046	0.12	158.50	124.61	0.01
Reach	770.7793	10-year_64.7 cfs	64.70	465.31	469.14		469.14	0.000047	0.12	174.91	145.78	0.01
Reach	770.7793	25-year_77.4 cfs	77.40	465.31	469.28		469.28	0.000054	0.14	197.31	160.27	0.01
Reach	770.7793	50-year_91.0 cfs	91.00	465.31	469.41		469.42	0.000049	0.14	218.69	161.44	0.01
Reach	770.7793	100-year_104.7 c	104.70	465.31	469.51		469.52	0.000049	0.14	234.96	162.73	0.01
Reach	727.9443	2-year_41.0 cfs	41.00	465.47	468.82		468.82	0.001713	0.59	97.67	94.89	0.08
Reach	727.9443	5-year_54.6 cfs	54.60	465.47	469.01		469.01	0.001975	0.67	117.42	107.07	0.08
Reach	727.9443	10-year_64.7 cfs	64.70	465.47	469.13		469.13	0.002140	0.72	130.61	113.46	0.09
Reach	727.9443	25-year_77.4 cfs	77.40	465.47	469.27		469.28	0.002245	0.76	147.27	129.34	0.09
Reach	727.9443	50-year_91.0 cfs	91.00	465.47	469.40		469.41	0.002696	0.86	165.91	152.36	0.10
Reach	727.9443	100-year_104.7 c	104.70	465.47	469.50		469.51	0.002801	0.89	181.26	152.77	0.10
Reach	622.0599	2-year_41.0 cfs	41.00	465.07	468.71		468.72	0.000625	0.43	69.71	70.57	0.05
Reach	622.0599	5-year_54.6 cfs	54.60	465.07	468.91		468.92	0.000464	0.38	84.69	75.84	0.04
Reach	622.0599	10-year_64.7 cfs	64.70	465.07	469.03		469.05	0.000415	0.37	94.21	79.68	0.04
Reach	622.0599	25-year_77.4 cfs	77.40	465.07	469.18		469.20	0.000370	0.36	107.20	97.36	0.04
Reach	622.0599	50-year_91.0 cfs	91.00	465.07	469.31		469.33	0.000365	0.36	120.75	105.49	0.04
Reach	622.0599	100-year_104.7 c	104.70	465.07	469.41		469.43	0.000328	0.35	131.76	105.78	0.04
Reach	522.0566	2-year_41.0 cfs	41.00	464.62	468.61		468.61	0.001799	0.68	60.50	36.05	0.08
Reach	522.0566	5-year_54.6 cfs	54.60	464.62	468.83		468.84	0.002017	0.75	69.81	48.74	0.09
Reach	522.0566	10-year_64.7 cfs	64.70	464.62	468.95		468.97	0.002031	0.78	76.55	55.71	0.09
Reach	522.0566	25-year_77.4 cfs	77.40	464.62	469.11		469.12	0.001910	0.77	86.51	72.12	0.09
Reach	522.0566	50-year_91.0 cfs	91.00	464.62	469.24		469.26	0.001817	0.77	98.63	106.46	0.08
Reach	522.0566	100-year_104.7 c	104.70	464.62	469.35		469.37	0.001429	0.69	110.42	107.08	0.07
Reach	422.0532	2-year_41.0 cfs	41.00	463.91	468.45		468.45	0.001453	0.65	62.97	36.38	0.07
Reach	422.0532	5-year_54.6 cfs	54.60	463.91	468.64		468.65	0.001756	0.74	70.88	46.29	0.08
Reach	422.0532	10-year_64.7 cfs	64.70	463.91	468.76		468.78	0.001813	0.77	77.37	54.38	0.08
Reach	422.0532	25-year_77.4 cfs	77.40	463.91	468.93		468.94	0.001753	0.77	88.64	84.88	0.08
Reach	422.0532	50-year_91.0 cfs	91.00	463.91	469.08		469.10	0.001317	0.69	102.38	92.55	0.07
Reach	422.0532	100-year_104.7 c	104.70	463.91	469.23		469.25	0.000986	0.61	116.52	98.31	0.06
Reach	322.0501	2-year_41.0 cfs	41.00	463.86	468.37		468.38	0.000454	0.38	82.42	61.78	0.04

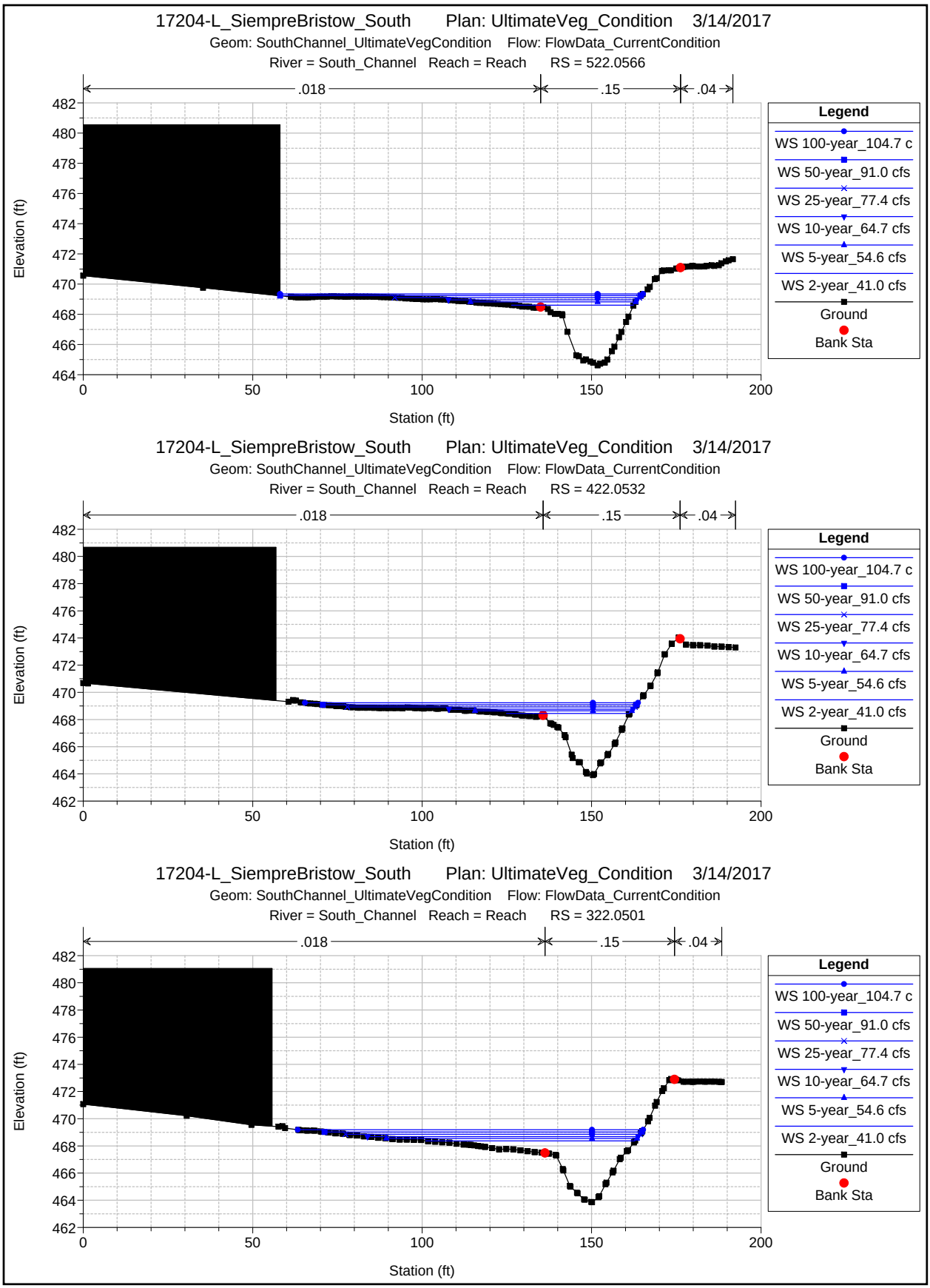
HEC-RAS Plan: UltimateVeg River: South_Channel Reach: Reach (Continued)

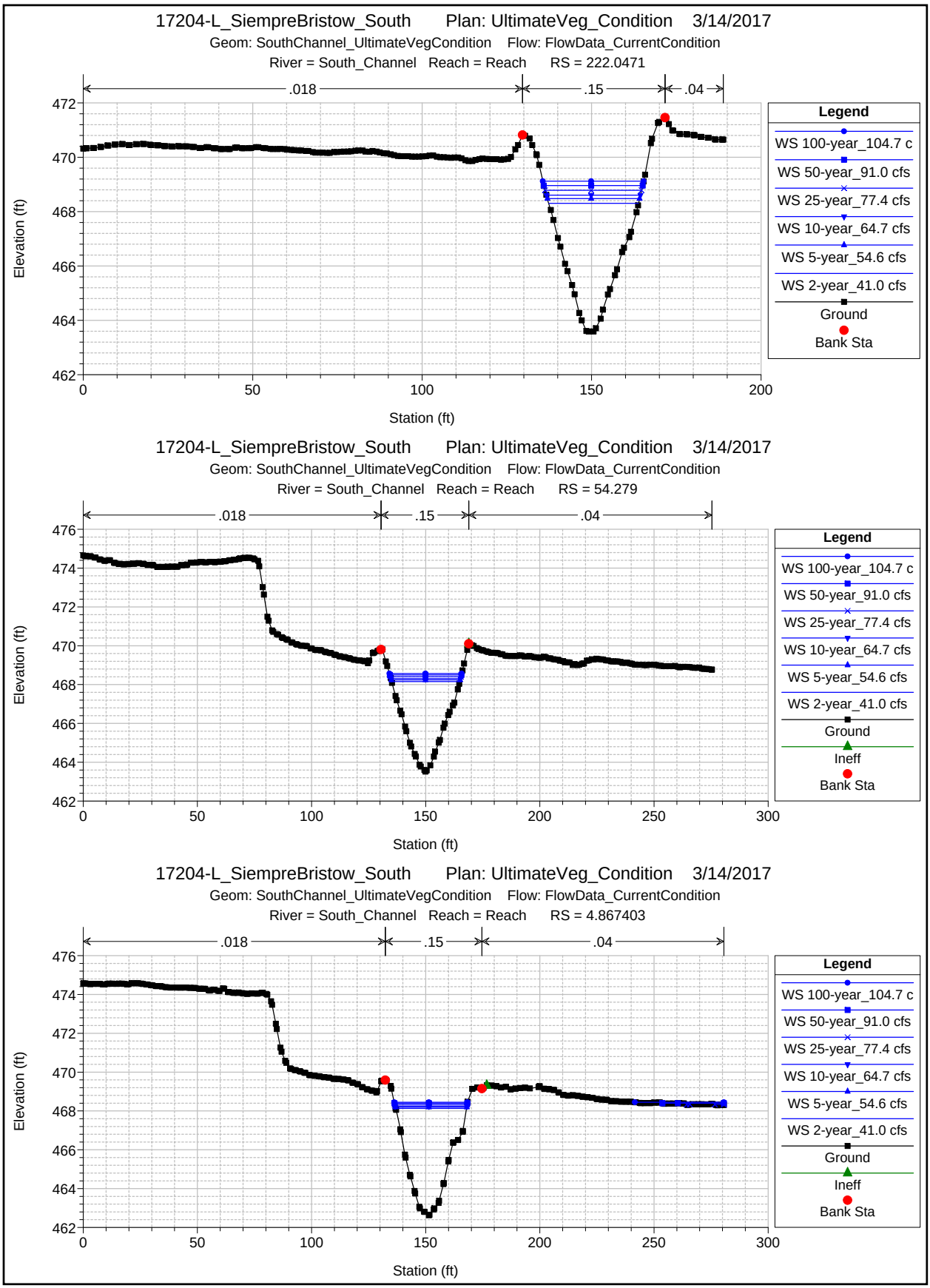
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	322.0501	5-year_54.6 cfs	54.60	463.86	468.55		468.57	0.000478	0.40	94.89	73.97	0.04
Reach	322.0501	10-year_64.7 cfs	64.70	463.86	468.69		468.70	0.000443	0.39	104.99	79.93	0.04
Reach	322.0501	25-year_77.4 cfs	77.40	463.86	468.86		468.87	0.000374	0.37	119.35	86.95	0.04
Reach	322.0501	50-year_91.0 cfs	91.00	463.86	469.03		469.04	0.000317	0.35	134.76	93.64	0.04
Reach	322.0501	100-year_104.7 c	104.70	463.86	469.19		469.20	0.000280	0.34	150.38	101.95	0.03
Reach	222.0471	2-year_41.0 cfs	41.00	463.59	468.31		468.31	0.001006	0.58	70.83	26.48	0.06
Reach	222.0471	5-year_54.6 cfs	54.60	463.59	468.48		468.49	0.001502	0.72	75.42	27.21	0.08
Reach	222.0471	10-year_64.7 cfs	64.70	463.59	468.61		468.62	0.001859	0.82	78.98	27.75	0.09
Reach	222.0471	25-year_77.4 cfs	77.40	463.59	468.78		468.80	0.002254	0.92	83.90	28.48	0.09
Reach	222.0471	50-year_91.0 cfs	91.00	463.59	468.96		468.97	0.002654	1.02	88.95	29.20	0.10
Reach	222.0471	100-year_104.7 c	104.70	463.59	469.12		469.14	0.003036	1.12	93.71	29.78	0.11
Reach	54.279	2-year_41.0 cfs	41.00	463.52	468.16		468.16	0.000821	0.52	78.43	29.84	0.06
Reach	54.279	5-year_54.6 cfs	54.60	463.52	468.24		468.25	0.001329	0.67	81.03	30.21	0.07
Reach	54.279	10-year_64.7 cfs	64.70	463.52	468.31		468.32	0.001747	0.78	82.97	30.48	0.08
Reach	54.279	25-year_77.4 cfs	77.40	463.52	468.40		468.42	0.002264	0.90	85.98	30.92	0.10
Reach	54.279	50-year_91.0 cfs	91.00	463.52	468.50		468.51	0.002860	1.02	88.83	31.34	0.11
Reach	54.279	100-year_104.7 c	104.70	463.52	468.57		468.59	0.003523	1.15	91.17	31.68	0.12
Reach	4.867403	2-year_41.0 cfs	41.00	462.63	468.13	463.76	468.13	0.000380	0.40	101.51	31.08	0.04
Reach	4.867403	5-year_54.6 cfs	54.60	462.63	468.20	463.93	468.20	0.000634	0.53	103.70	31.31	0.05
Reach	4.867403	10-year_64.7 cfs	64.70	462.63	468.25	464.04	468.26	0.000853	0.61	105.26	31.47	0.06
Reach	4.867403	25-year_77.4 cfs	77.40	462.63	468.33	464.17	468.34	0.001141	0.72	107.79	37.18	0.07
Reach	4.867403	50-year_91.0 cfs	91.00	462.63	468.40	464.30	468.41	0.001488	0.83	110.02	58.38	0.08
Reach	4.867403	100-year_104.7 c	104.70	462.63	468.45	464.42	468.46	0.001891	0.94	111.62	70.67	0.09


17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1311.239
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1211.239
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1111.238
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1011.238
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 901.7494
.018
.15
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 802.5478
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 770.7793
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 727.9443
.18
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 622.0599
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 522.0566
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 422.0532
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 322.0501
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 222.0471
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 54.279
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: UltimateVeg_Condition 3/14/2017
Geom: SouthChannel_UltimateVegCondition Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 4.867403
.018
.15
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: 17204-L_SiempreBristow_South
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/14/2017 8:49:22 AM

Project in English units

PLAN DATA

Plan Title: UltimateVeg_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.p02

Geometry Title: SouthChannel_UltimateVegCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g04

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Plan Summary Information:

Number of:	Cross Sections	= 15	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Flow Data (cfs)

River	Reach	RS	2-year_41.0 cfs	5-year_54.6 cfs	10-year_64.7 cfs	25-year_77.4 cfs	50-year_91.0 cfs	100-year_104.7 cfs	PF 7	PF 8
South_Channel	Reach	1311.239	41	54.6	64.7	77.4	91	104.7	5	10

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
South_Channel	Reach	1311.239	15	20	25	30	35	40

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
South_Channel	Reach	2-year_41.0 cfs	Critical	Known WS = 468.13
South_Channel	Reach	5-year_54.6 cfs	Critical	Known WS = 468.2
South_Channel	Reach	10-year_64.7 cfs	Critical	Known WS = 468.25
South_Channel	Reach	25-year_77.4 cfs	Critical	Known WS = 468.33
South_Channel	Reach	50-year_91.0 cfs	Critical	Known WS = 468.4
South_Channel	Reach	100-year_104.7 cfs	Critical	Known WS = 468.45
South_Channel	Reach	PF 7	Critical	Known WS = 467.35
South_Channel	Reach	PF 8	Critical	Known WS = 467.53
South_Channel	Reach	PF 9	Critical	Known WS = 467.68
South_Channel	Reach	PF 10	Critical	Known WS = 467.83
South_Channel	Reach	PF 11	Critical	Known WS = 467.95
South_Channel	Reach	PF 12	Critical	Known WS = 467.98
South_Channel	Reach	PF 13	Critical	Known WS = 468.03
South_Channel	Reach	PF 14	Critical	Known WS = 468.05

GEOMETRY DATA

Geometry Title: SouthChannel_UltimateVegCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g04

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1311.239

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.56	.52	473.55	.67	473.55	1.96	473.51	4.44	473.43
4.75	473.4	5.38	473.32	8.75	472.92	9.21	472.87	9.36	472.86
10.16	472.8	12.43	472.73	13.91	472.69	14.32	472.68	14.87	472.66
17.15	472.62	18.7	472.59	19	472.6	19.69	472.6	22.83	472.54
23.55	472.52	23.72	472.51	24.52	472.5	26.56	472.49	28.42	472.48
28.93	472.45	29.47	472.43	32.32	472.5	33.46	472.53	34.42	472.62
34.48	472.62	35.97	472.72	38.32	472.89	38.43	472.9	39.35	472.96
41.46	472.74	43.25	472.53	44.23	472.31	44.32	472.29	44.46	472.26
44.99	472.11	48.14	471.23	48.16	471.22	48.17	471.22	49.14	470.82
52.48	469.38	53.06	469.15	53.79	468.91	56.1	468.11	57.88	467.44
58.67	467.37	58.87	467.35	59.21	467.43	62.78	467.91	66.51	468.08
66.75	468.11	67.66	467.94	68.52	467.83	71.9	468.06	73.29	468.47
74.89	468.76	78.37	469.83	79.68	470.14	82.16	470.73	82.21	470.74
82.23	470.74	83.29	470.93	86.94	471.28	87.13	471.3	87.19	471.3
88.1	471.37	90.01	471.42	91.84	471.47	92.57	471.45	92.87	471.45
94.46	471.49	96.76	471.59	97.2	471.6	97.82	471.61	101.29	471.65
101.57	471.65	101.63	471.65	102.59	471.68	103.25	471.72	106.49	471.84
106.83	471.85	107.51	471.81	108.86	471.81	111.32	471.85	111.33	471.85

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	39.35	.15	86.94	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.35	88.1	102.88	100	100	.1	.3

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1211.239

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.74	1.46	472.7	1.98	472.69	2.65	472.65	6.13	472.55
6.15	472.55	6.18	472.55	7.37	472.51	8.36	472.47	10.96	472.36
12.19	472.36	12.22	472.36	15.69	472.28	16.8	472.24	16.92	472.24
17.28	472.23	20.48	472.15	21.5	472.12	21.74	472.12	22.58	472.08
25.37	471.98	26.34	471.93	26.58	471.92	27.97	471.92	30.24	471.92
31.32	471.89	31.56	471.89	32.59	471.85	35.27	471.76	35.83	471.75
36.57	471.76	39.35	471.67	40.16	471.65	41.47	471.62	41.49	471.62
45.11	471.52	45.77	471.52	46.43	471.51	49.38	471.52	50.01	471.52
50.5	471.5	51.26	471.45	52.72	471.32	54.33	471.18	54.94	471.13
55.03	471.11	56.21	470.9	58.13	470.31	59.78	469.8	60.93	469.22
61	469.18	63.07	468.15	64.65	467.37	64.69	467.36	65.87	466.99
67.58	466.61	70.61	466.57	70.95	466.67	74.4	467.76	74.52	467.78
75.52	468.04	79.28	468.88	80	469.03	80.3	469.09	80.5	469.13
81.74	469.24	84.08	469.42	85.36	469.73	85.42	469.74	85.64	469.77
89.01	470.18	89.76	470.18	90.65	470.11	93.73	469.83	94.31	469.85
95.02	469.88	96.31	470.03	98.63	470.25	99.86	470.29	99.93	470.3

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  100.19   470.3  103.46  470.36  104.31  470.38  104.72  470.39  107.47  470.41
  108.38  470.42  109.06  470.44  109.67  470.45  111.33  470.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.01     .15   89.01    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.01   89.01              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   89.85  111.33  470.17       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1111.238

INPUT
Description:
Station Elevation Data    num=      89
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.25     1.1  472.23    3.18  472.21    4.04  472.15    4.64  472.14
    7.31  472.09     7.9  472.08    8.05  472.07    9.38  471.96   11.42  471.88
   12.74  471.83   13.47   471.8   14.21  471.75   15.34  471.69   17.49  471.57
   18.57  471.56   18.97  471.55   19.85  471.52   22.28  471.42   23.15  471.36
   23.82  471.34   25.55  471.28    27.2  471.24   27.76  471.24   28.66  471.23
   30.65  471.15   32.06   471.1   33.14  471.01   35.38  470.86   37.09   470.8
   37.97  470.79   38.65  470.75   40.71  470.63   42.74  470.42   45.01  470.36
   46.02  470.33   48.53  470.37   51.67  470.37   51.77  470.36   51.85  470.36
   52.18  470.37   53.38  470.39   56.59  470.16    56.8  470.14   56.99   470.1
   58.35  469.76   59.58   469.2   61.64  468.27   62.67  467.78   63.14  467.55
   66.22  466.27   66.53  466.14   67.65  465.78   68.01  465.66   68.08  465.68
   68.27  465.74   72.88  467.57   74.42  467.78   77.04  468.71    77.8  468.89
   79.34  469.07   80.32  469.22   81.17  469.34   82.14   469.4   82.67  469.44
   85.06  469.52   85.97  469.55   86.39  469.58   87.57  469.66   90.04  469.79
   90.89  469.84    91.2  469.86   92.35  469.94   93.61  469.98   95.61  470.06
   97.02   470.1   97.19   470.1   97.65   470.1  100.52   470.1  101.45  470.09
  102.08  470.12   104.7  470.14  105.36  470.15  106.85  470.17  106.87  470.17
  106.92  470.17  110.25  470.31  110.53   470.3  111.33  470.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   51.77     .15   87.57    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         51.77   87.57              100     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1011.238

INPUT
Description:
Station Elevation Data    num=      90
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.82     .05  472.81     .52  472.82    1.05  472.81    1.66  472.82
    3.17  472.78    4.13  472.78     5.3  472.75    6.71   472.7    8.49   472.7
   10.76   472.6   13.73  472.58   20.89  472.47   22.81  472.46   25.22  472.48
    25.4  472.48    25.9  472.47   28.74  472.38   29.05  472.37   29.41  472.35
```

30.77	472.23	33.05	472.11	33.91	472.08	34.78	472.06	35.77	472.03
38.81	471.87	38.93	471.87	39.08	471.87	40.78	471.87	42.37	471.82
43.85	471.77	45.4	471.75	45.72	471.75	47.05	471.69	48.81	471.6
49.18	471.56	50.66	471.38	50.81	471.35	52.2	471.08	53.73	470.79
54.15	470.66	55.53	470.17	56.35	469.81	58.67	468.7	59.43	468.36
60.47	467.95	62.77	467.18	63.5	466.95	64.39	466.68	65.26	466.43
67.34	465.88	68.39	465.58	68.89	465.6	70.11	465.97	70.15	465.98
70.2	466	73.28	467.14	73.78	467.31	75.03	467.74	77.15	468.36
78.17	468.64	78.69	468.77	79.96	469.08	80.64	469.19	82.26	469.43
82.73	469.51	83.88	469.66	84.82	469.79	85.56	469.77	87.85	469.86
88.31	469.88	89.72	469.81	90.49	469.83	92.79	469.8	93.22	469.84
94.49	469.85	96.05	469.94	97.5	470.04	99.15	470.12	99.32	470.13
99.86	470.17	102.42	470.35	103.11	470.38	104.24	470.44	105.75	470.55
107.25	470.67	109.03	470.75	109.04	470.75	109.08	470.75	111.33	470.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	50.81	.15	87.85	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50.81	87.85	109.55	109.49	109.4	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	36.76	482.816

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 901.7494

INPUT
Description:
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.74	1.14	470.7	2.72	470.68	4.45	470.7	6.29	470.71
8.27	470.65	13.97	470.66	15.39	470.67	16.92	470.63	17.25	470.63
18.87	470.64	20.59	470.63	22.53	470.61	24.65	470.56	25.17	470.57
26.28	470.55	27.26	470.54	28.96	470.51	30.12	470.48	31.16	470.47
32.15	470.46	32.84	470.46	35.01	470.45	36.33	470.45	37.18	470.45
39.02	470.44	40.04	470.43	40.43	470.43	42.18	470.46	44.13	470.45
44.99	470.44	45.29	470.44	47.15	470.44	48.11	470.35	48.88	470.27
49.3	470.23	50.33	470.12	52.09	469.59	52.3	469.51	52.71	469.31
54.55	468.53	56.64	467.66	56.95	467.51	57.46	467.24	59.8	465.85
60.66	465.59	61.9	465.26	64	465.4	64.66	465.41	64.94	465.47
66.2	465.58	69.57	465.86	71.02	466.26	71.62	466.48	73.31	467.34
74.48	467.93	74.83	468.12	76.51	468.93	78.54	469.64	78.7	469.7
79.34	469.92	80.98	470.14	81.41	470.19	83.69	470.16	84.27	470.16
84.88	470.19	86.28	470.22	88.14	470.35	89.02	470.39	89.75	470.44
91.19	470.51	93.07	470.62	93.97	470.66	94.7	470.67	95.96	470.65
97.84	470.64	98.7	470.64	99.75	470.66	100.82	470.68	102.74	470.69
103.63	470.69	104.06	470.69	105.71	470.67	107.9	470.71	108.45	470.71
109.16	470.73	110.51	470.73	110.94	470.74				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.15	.15	81.41	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47.15	81.41	99.3	99.2	99.08	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	36.01	480.742

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 802.5478

INPUT
Description:
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	17.5	469.88	17.83	469.9	18.17	469.89	31.38	469.35
31.53	469.34	31.68	469.34	31.83	469.33	31.99	469.33	32.16	469.32
32.32	469.32	32.5	469.31	32.68	469.3	32.87	469.3	33.07	469.29
33.27	469.28	45.18	469	46.75	469.03	46.88	469.03	47.35	469.03
47.46	469.03	48.12	469.07	49.68	469.09	51.79	469.09	52.11	469.09
54.6	469.08	54.89	469.08	55.26	469.09	56.85	469.11	58.1	469.13
58.71	469.14	59.45	469.15	60.33	469.14	61.06	469.13	62.13	469.11
63.49	469.11	64.1	469.11	64.58	469.1	65.89	469.04	67.48	468.97
67.65	468.97	67.86	468.97	69.48	468.96	70.85	468.92	71.33	468.91
72.23	468.89	73.26	468.87	73.82	468.86	75.15	468.85	76.58	468.79
76.99	468.77	77.36	468.77	79.05	468.79	80.35	468.75	81.51	468.72
83.72	468.68	84.22	468.67	85.04	468.65	86.01	468.62	86.59	468.62
88.35	468.57	90.14	468.55	90.86	468.54	93.14	468.51	93.4	468.51
94.41	468.49	96.15	468.45	96.6	468.45	98.88	468.42	99.55	468.4
101.71	468.33	103.11	468.28	103.93	468.25	104.85	468.23	105.55	468.21
106.18	468.21	107.77	468.17	109.65	468.1	110.14	468.09	110.79	468.09
111.89	468.09	112.71	468.06	114.15	468.01	116.11	468	116.64	467.99
117.49	467.97	118.59	467.95	119.29	467.93	120.97	467.89	122.83	467.84
123.27	467.81	123.75	467.81	124.88	467.77	125.94	467.75	126.78	467.73
128.59	467.71	129.16	467.7	129.43	467.72	131.33	467.79	132.1	467.78
132.38	467.77	132.52	467.78	134.97	467.79	136.17	467.84	137.39	467.89
139.46	467.99	139.93	468	142.14	468.19	142.36	468.21	142.79	468.23
143.18	468.25	144.9	468.33	146.16	468.19	147.33	468.05	149.56	467.37
149.84	467.3	150.1	467.18	152.18	466.33	154.27	465.5	154.77	465.28
155.19	465.15	157.13	464.49	158.79	464.7	159.63	464.8	160.83	465.44
161.94	466	162.75	466.41	164.56	467.39	166.39	468.24	166.9	468.49
168	468.95	169.47	469.55	170.06	469.73	170.44	469.86	171.76	470.32
173.53	470.62	174.33	470.76	175.02	470.86	175.86	470.95	177.5	470.98
179.65	471.15	180.25	471.21	183.31	471.34	185.66	471.51	186.46	471.52
188.29	471.54	188.96	471.54	189.65	471.55	191.21	471.56	192.84	471.58
193.7	471.58	194.96	471.58	196.11	471.6	197.74	471.57	198.39	471.55

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	144.9	.15	166.39	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
144.9	166.39	22.62	31.77	46.56	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	38.89	479.938

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 770.7793

INPUT
Description:
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
      0  469.75    2.14  469.73    2.71  469.72    5.13  469.68    5.39  469.67
  19.12  469.62   19.31  469.63   19.51  469.63   34.16  469.03   34.17  469.03
  34.18  469.03   34.19  469.03    34.2  469.03   34.21  469.03   34.22  469.03
  34.23  469.03   34.65  469.02    34.7  469.02    36.6  469.02   37.23  469.02
  37.42  469.03   37.75  469.03   42.04  469.06   46.44  469.13    46.8  469.13
  46.89  469.13    49.3  469.16    50.5  469.17   51.88  469.18   53.41  469.15
  54.39  469.16   56.48  469.14   56.83  469.14      57  469.14   58.69  469.15
  59.98  469.12   60.64   469.1   61.79  469.08   62.96  469.05   63.62  469.03
  65.67  468.95   66.43  468.94   67.93   468.9   69.88  468.85   69.92  468.85
  69.96  468.85   71.55  468.84    72.9  468.81   73.24   468.8   73.69  468.79
  75.19  468.75   76.34  468.71   77.06  468.68    78.1  468.63   78.81   468.6
   79.3  468.57   80.63  468.54   82.26  468.55   82.47  468.55   82.63  468.55
  84.38  468.46   85.63  468.43   86.29  468.42   87.03  468.41   88.14  468.39
  89.11  468.38    90.1  468.39   92.14  468.39   92.17  468.39   92.21  468.39
  93.79  468.33   95.38  468.33   95.42  468.33   95.46  468.33   97.26  468.33
  98.38   468.3    99.4  468.29   101.7  468.24  101.84  468.24   101.9  468.24
 104.32  468.18  104.89  468.17  107.02  468.15  108.29  468.11  109.79  468.04
 111.32  468.02  112.58  468.02  114.81  467.94  115.13  467.92  115.48  467.92
 116.76   467.9  117.92  467.86   118.7  467.83  121.35  467.76  121.36  467.76
 121.37  467.76  123.08  467.71   124.4  467.65  125.11  467.62  127.71  467.56
 127.77  467.56  127.78  467.56  129.75  467.51  130.99  467.48  131.96  467.45
 134.49  467.37  134.52  467.37  134.56  467.37  136.16  467.42  137.65  467.34
 137.87  467.33  138.35  467.34  140.27  467.36  141.08  467.35  142.66  467.33
 144.42  467.43  145.08  467.49  146.47  467.59   147.4  467.66  147.84  467.69
 150.03  467.74  151.16  467.75   152.4  467.82  154.53  467.87  154.55  467.87
 154.58  467.87  156.19  467.87  157.75  467.77  157.86  467.75  158.69  467.65
 159.95  467.48  161.19  467.21  161.96  467.07  162.82  466.84  163.74  466.61
 164.52  466.38  165.58  466.06   167.1   465.7  167.51  465.62  167.81  465.59
 169.61  465.31  171.09   465.4  171.82  465.44  173.87  465.64  174.31  465.68
 174.46  465.71  176.46  466.17  177.79  466.49  178.42  466.66  179.12   466.8
 180.15  467.07  181.03  467.11  182.05   467.4  184.13  467.91  184.23  467.94
 184.28  467.95  186.05  468.59  187.65  468.88  187.89  468.93  188.65  469.02
  190.4  469.32  190.93  469.38  192.73  469.52  193.57  469.74  194.22  469.91
 195.18  470.18  197.49  471.21  197.78  471.34  198.06  471.43  199.42   471.5
 200.74   471.7  201.04  471.72  201.34  471.78  202.71  471.83  204.11  472.02
 204.61  472.05   207.4  471.96   207.6  471.95  208.21  471.95  210.03  471.94
 210.65  471.91   212.2  471.84

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  154.53     .15  184.13     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.53  184.13            32.88   42.84   62.72             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.88 479.748

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 727.9443

INPUT
Description:
Station Elevation Data    num=     167
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   469.4    9.74  469.32    9.81  469.32   10.15  469.31   10.18  469.31
   12.07   469.3    12.1   469.3   12.13   469.3   14.21  469.22   14.52  469.22
   15.03  469.21   17.67  469.22   18.39  469.23   21.02  469.25    23.7  469.26
   24.63  469.27   26.31  469.28   26.44  469.28   26.57  469.28   28.17   469.3
   29.85  469.29   29.91  469.29   30.01  469.29   31.74  469.29   32.75  469.29
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   33.77  469.29   35.26  469.24   36.02   469.2   36.53  469.18   38.07  469.13
   39.54  469.11   40.31  469.08   43.04  469.05   43.08  469.05   43.18  469.05
   45.16  468.97   46.02  468.95   47.59  468.94   49.65   468.9    50.2   468.9
   52.25  468.85   52.51  468.85   52.57  468.85   55.12  468.84   56.12   468.8
   57.67  468.75   59.12   468.7   60.17  468.65   62.63  468.57   64.51  468.49
   65.68  468.46   66.57  468.43   68.03  468.38   68.79  468.36   69.24  468.35
   71.53  468.32   72.12  468.31   73.71  468.26   75.53  468.26   75.69  468.26
   75.87  468.26    77.3  468.24   78.58  468.19   78.99  468.18   79.57  468.19
   80.97   468.2   81.96  468.21   82.84  468.19   84.08  468.18   84.61  468.17
   84.99  468.16    86.4  468.15    88.2   468.1   88.21   468.1   88.22   468.1
   90.17  468.13    91.3  468.11   92.09  468.09      93  468.07   93.94  468.05
   94.72  468.04   95.91  468.05   97.78     468   98.11  467.99  101.02  467.94
  101.16  467.94   101.5  467.94  103.23   467.9  104.01  467.89  105.41  467.84
  107.48  467.78   107.7  467.78  108.64  467.76   110.2  467.72  110.56  467.71
  112.97  467.65  113.89  467.63  115.69  467.59  116.95  467.54  118.47  467.49
  118.92  467.47  119.79  467.44  120.69  467.41  121.91  467.38  122.81  467.38
  123.98  467.36  124.93  467.35   126.1  467.52  127.02  467.65  128.18  467.61
  129.12  467.59  130.28   467.5  131.22   467.4  132.38  467.24  132.56  467.22
  133.32  467.15  134.47  466.98  135.43  466.85   137.7  466.55  138.98  466.29
   141.6     466  142.72  465.47  144.95  466.32  146.98  467.65  148.07  468.21
  149.14  468.56  150.17  468.67  151.23     469  152.27  469.38  153.32  469.64
  154.36  469.84  155.37  470.14  156.45  470.36  157.47  470.45  158.55  470.65
  159.56  470.87  160.65  471.23  161.65  471.46  161.99  471.56  162.75  471.79
  163.73  472.02  164.86  472.22  165.83  472.24  166.97  472.16  167.91  472.19
  169.06  472.21  170.01  472.24  171.16  472.31   172.1  472.34  173.26  472.34
  174.19  472.38  175.36  472.47  176.27  472.68  177.44  473.02  178.35  473.27
  179.54  473.65  180.43  474.04  181.64  474.42  182.52  474.11  183.76  473.38
  184.66  472.75   185.9  471.91  186.78  471.31     188  470.53  188.88  470.05
   190.1  469.65  191.08  469.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .18  127.02     .15  161.99     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        127.02  161.99           105.78  105.88  106.14             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0    9.54469.3978

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 622.0599

INPUT
Description:
Station Elevation Data    num=     135
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.53    52.1  469.28   61.95  469.05   61.99  469.05   62.02  469.04
   62.12  469.05   62.86  469.05   64.37  469.05   65.92   469.1   66.45  469.12
   68.03  469.14   68.54  469.14   70.14  469.17   70.63  469.19   72.27  469.21
   72.73   469.2   74.37   469.2   74.82   469.2   76.49   469.2    76.9   469.2
   78.62  469.17   79.02  469.16   80.78   469.1   81.13   469.1   82.89  469.08
   83.22  469.07   84.99  469.01   85.32     469   87.13  468.94   87.42  468.93
   89.24  468.84   89.51  468.83   91.35  468.74   91.59  468.73   93.46  468.68
   93.68  468.67   95.57  468.67   95.77  468.66   97.67  468.63   97.85  468.63
   99.79   468.6   99.95   468.6   101.9  468.57  102.04  468.57  104.05  468.54
  104.15  468.54  106.15  468.54  106.25  468.54  108.27  468.54  108.33  468.54
  110.37  468.47  110.42  468.47  112.48   468.5  112.51   468.5  114.59  468.47
   114.6  468.47  115.54  468.44  116.72   468.4  116.74   468.4  116.75   468.4
  118.84  468.34  118.87  468.34  120.97  468.24  121.03  468.24  123.07  468.24
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  123.14  468.24  125.17  468.24  125.26  468.24  127.24  468.21  127.35  468.21
  129.34  468.14  129.47  468.14  131.42  468.13  133.35  468.04  133.52  468.03
  135.44  468.03  135.62  468.03  137.51     468  137.72     468  137.93     468
  139.86  467.93  140.08  467.93  141.96  467.93  143.79   467.5  143.94  467.42
  144.31  467.22  146.16  465.53  146.42  465.46  148.23  465.09  148.51  465.11
  150.33  465.23  150.63  465.21  152.43  465.07  152.75  465.09  154.55  465.28
   154.9  465.37  156.65  465.87  157.05  466.04  158.76  466.74  159.17  466.96
  160.86  467.83  161.29  468.01  162.96  468.68  163.44  468.83  165.09  469.44
  165.59  469.48  167.18  469.73  167.71  469.77  169.28  469.62  169.83  469.87
  171.38  470.67  171.98  470.96  173.48  471.71  174.09  471.99  175.16  472.45
  175.58  472.63  176.23  472.82  177.68  473.32  178.36  473.35  179.76  473.38
  179.78  473.38  180.48  473.42  181.87  473.46  182.59   473.6  183.97  473.86
  184.71  473.86  186.05  473.82   186.8  473.82  188.15  473.84  188.91  473.84
  190.25  473.88  191.02  473.88  192.35  473.88  193.15  473.89  194.31  473.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  141.96     .15  175.16     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        141.96  175.16           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   59.24 480.533

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 522.0566

INPUT
Description:
Station Elevation Data    num=     129
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.56   35.34  469.76    61.3  469.15   61.33  469.17   62.65  469.13
   63.43  469.11   64.21  469.11   65.56  469.11   66.36  469.12   67.66  469.14
   68.47  469.15   69.77  469.17   71.03  469.17   71.87  469.17   73.15  469.19
   73.98   469.2   74.84  469.18   76.07  469.18   77.29  469.16   78.17  469.17
   79.04  469.18   80.29  469.18   81.19  469.17   82.39  469.17    83.3  469.17
   84.46  469.17   85.64  469.16    86.6  469.16   87.76  469.14    88.7  469.14
   89.66  469.13    90.8  469.11   91.77  469.11    92.9  469.09      94  469.09
      95  469.05      96  469.05    97.1  469.03   98.18  469.01    99.2  469.01
  100.26  468.99  101.32  468.99  102.37  468.99  103.42     469  104.43     469
   105.5  468.98  106.51  468.98  107.59  468.96   108.6  468.93  109.69  468.92
  110.67  468.88  111.77  468.87  112.76  468.87  113.87  468.83  114.84  468.82
     116  468.78  116.96  468.75  118.11  468.75  119.06  468.73  120.23  468.72
  121.16   468.7  122.34  468.69  123.26  468.67  124.44  468.65  125.36  468.64
  126.56   468.6  127.44   468.6  128.66  468.56  129.53  468.51  130.76  468.51
  131.62   468.5  132.86  468.44   133.7  468.44  134.96  468.48  135.78  468.47
  137.08  468.35  137.89  468.14  139.17  468.02  139.98  468.03  141.27  468.01
  141.38  467.93  142.85  466.84  145.46  465.29  146.26  465.22  147.54  464.94
  148.34  465.01  149.65  464.87  150.42  464.79  151.76  464.62  152.52  464.73
  153.88   464.8  154.63     465  155.98  465.55  156.71  465.85  158.08  466.48
   158.8  466.83  160.19  467.49  160.88  467.84   162.3  468.57  162.98  468.82
  164.44  469.22  165.08  469.33  166.53  469.65  167.16  469.81  168.63  470.33
  169.23  470.39  170.72  470.86  171.32   470.9  172.83  470.91   173.4  470.91
  174.95  471.03   175.5  471.03  176.26  471.09  177.04  471.14   177.6  471.15
  179.15  471.16  179.68   471.2   179.9   471.2  181.24  471.17  181.83  471.16
  183.33  471.17  183.98  471.21  185.43  471.25  186.15  471.21  187.53  471.25
  188.29  471.38  189.63   471.5  190.44  471.58  191.67  471.65

Manning's n Values        num=       3
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     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  134.96     .15  176.26     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        134.96  176.26           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   58.08 480.557

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 422.0532

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.68    1.41  470.65   60.58  469.31   61.94  469.43   62.05   469.4
   62.77   469.4   64.15  469.27   64.87  469.25   66.25   469.2   66.94  469.18
   68.35  469.16   69.03  469.14   70.45  469.09   71.12  469.07   72.56  469.05
   73.21  469.04   74.65  468.99    75.3  468.99   76.78  468.97   77.43  468.94
   78.88   468.9   79.52   468.9   80.99  468.87   81.63  468.87    83.1  468.87
   83.72  468.87   85.21  468.87   85.81  468.86   87.31  468.84   87.91  468.84
   89.42  468.84      90  468.84   91.52  468.84   92.08  468.84   93.63  468.84
   94.18  468.84   95.72  468.89   96.27  468.88   97.82  468.84   98.36  468.84
   99.92  468.82  100.46  468.81  102.06  468.84  102.59  468.85  104.17   468.8
  104.68  468.79  106.28  468.82  106.77  468.82  108.38  468.74  108.87  468.72
  110.49  468.72  110.95  468.72  112.59  468.64  113.05  468.64  114.72  468.66
  115.18  468.65  116.82   468.6  117.27  468.59  118.93  468.57  119.36  468.57
  121.03  468.54  121.46  468.53  123.14  468.48  123.54  468.47  125.22  468.44
  125.61  468.42  127.32  468.37   127.7  468.36  129.39   468.3  129.77  468.29
  131.47  468.27  131.84  468.26  133.57   468.2  133.93  468.23  135.68  468.31
  136.04  468.22   137.8  467.72  138.13  467.69  138.82   467.6   139.9  467.45
  140.22  467.41  142.01  466.85  142.33   466.7   144.1  465.42  144.43  465.16
   146.2  464.86  146.52  464.86   148.3  464.14  148.63  464.02   150.4  463.91
  150.71  463.99  152.54  464.77  152.82  464.85  154.65  465.37  154.91  465.47
  156.79   466.2  157.03  466.31   158.9  467.25   159.1  467.35  161.01  468.36
   161.2  468.43  163.11  469.03  163.28  469.09  165.18  469.71  165.34  469.78
   167.3  470.45  167.42   470.5  169.41   471.4   169.5  471.46  171.54  472.78
  171.61  472.81  173.63  473.56  173.67  473.58  175.73  474.03  175.77  474.02
  176.12  473.94  177.84  473.51  177.85  473.51  179.93  473.47  179.96  473.47
  180.04  473.47  182.04  473.47  182.05  473.47  184.14  473.44  184.25  473.44
  186.24  473.37  186.25  473.37  188.34  473.36  188.36  473.36  190.43  473.33
  190.47  473.33  192.44   473.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.68     .15  176.12     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        135.68  176.12           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   56.91  480.68

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 322.0501
```

INPUT
Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.07	30.54	470.22	49.62	469.55	57.58	469.42	58.78	469.45
59.56	469.31	63.51	469.18	63.76	469.16	64.13	469.15	65.86	469.13
66.21	469.12	67.97	469.12	68.31	469.12	70.07	469.06	70.39	469.05
72.18	469	72.48	468.99	74.28	468.93	74.57	468.92	76.41	468.9
76.69	468.89	78.52	468.8	78.78	468.8	80.62	468.77	80.87	468.76
82.73	468.7	82.96	468.7	84.83	468.67	85.05	468.66	86.95	468.6
87.15	468.6	89.05	468.57	89.23	468.56	91.18	468.5	91.35	468.5
93.28	468.47	93.44	468.47	95.39	468.47	95.53	468.47	97.5	468.44
97.62	468.44	99.6	468.44	99.71	468.43	101.71	468.34	101.8	468.34
103.78	468.31	103.86	468.31	105.89	468.27	105.95	468.27	108.02	468.24
108.07	468.24	110.14	468.16	110.16	468.16	112.24	468.1	112.26	468.1
113.8	468.08	114.34	468.07	114.35	468.07	115.35	468.04	116.44	468
116.45	468	117.4	467.97	118.54	467.93	118.55	467.93	120.63	467.84
120.66	467.84	122.69	467.74	122.73	467.74	124.78	467.77	124.84	467.77
126.87	467.74	126.95	467.74	128.96	467.67	129.06	467.67	131.06	467.61
131.17	467.61	133.15	467.54	133.28	467.54	135.22	467.51	135.36	467.51
136.25	467.48	137.31	467.44	137.47	467.43	139.4	467.34	139.58	467.29
141.5	466.3	141.67	466.19	143.59	465.05	143.78	465	145.7	464.55
145.87	464.51	147.79	464.06	147.98	464.05	149.91	463.87	150.12	463.86
152.01	464.22	152.24	464.3	154.09	465.18	154.38	465.29	156.18	466.04
156.48	466.17	158.29	467.02	158.62	467.13	160.39	467.6	160.74	467.68
162.48	468.25	162.87	468.39	164.57	468.94	164.98	469.08	166.65	469.81
167.1	470.06	168.74	470.96	169.21	471.23	170.82	472.04	171.32	472.24
172.89	472.83	173.44	472.92	174.46	472.89	175.02	472.87	175.56	472.82
177.12	472.72	177.67	472.72	179.21	472.72	179.78	472.71	180.19	472.72
181.31	472.74	181.87	472.74	183.42	472.72	183.95	472.73	185.53	472.73
186.06	472.73	187.65	472.71	188.14	472.7	188.39	472.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	136.25	.15	174.46	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Contr.	Expan.
136.25	174.46	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	55.74	481.067

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 222.0471

INPUT
Description:
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.32	.86	470.33	1.04	470.33	2.95	470.34	3.15	470.34
5.07	470.38	5.29	470.38	7.17	470.43	7.39	470.43	9.28	470.46
9.52	470.47	11.37	470.48	11.63	470.49	13.45	470.45	13.73	470.45
15.54	470.48	15.84	470.48	17.63	470.49	17.94	470.49	19.72	470.46
20.04	470.45	21.81	470.44	22.14	470.44	23.89	470.41	24.25	470.41
25.98	470.4	26.36	470.39	28.1	470.41	28.49	470.4	30.18	470.4
30.59	470.4	32.27	470.38	32.7	470.38	34.35	470.34	34.79	470.34
36.44	470.37	36.9	470.37	38.51	470.33	38.98	470.33	40.6	470.3
41.09	470.3	42.71	470.3	43.21	470.3	44.8	470.35	45.32	470.36
46.88	470.33	47.42	470.33	49	470.33	49.55	470.34	51.08	470.37
51.67	470.37	53.18	470.34	53.77	470.33	55.26	470.31	55.87	470.3

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   57.35   470.3   57.97  470.31   59.43   470.3   60.08  470.28   61.52  470.27
   62.18  470.26   63.61  470.25   64.29  470.25   65.69  470.23   66.39  470.23
   67.77  470.19   68.49  470.17   69.85  470.17    70.6  470.17   71.96  470.16
   72.71  470.16   74.05  470.19   74.84  470.19   76.14   470.2   76.94  470.21
   78.21  470.21   79.06  470.22   80.32  470.24   81.17  470.25   82.42  470.25
   83.27  470.21   84.49   470.2   85.37  470.23   86.58  470.21   87.48  470.18
   88.66  470.15   89.59  470.14   90.75  470.11   91.69  470.08   92.84  470.05
   93.79  470.04   94.92  470.04    95.9  470.04   96.99  470.02   97.99  470.02
   99.07  470.02   100.1  470.03  101.16  470.04   102.2  470.06  103.26  470.07
  104.32  470.02  105.35     470  106.42     470  107.44  469.99  108.55  469.98
  109.53  469.99  110.63  469.99   111.6  469.96  112.74  469.89  113.68  469.86
  114.82  469.86  115.77   469.9  116.93  469.93  117.84  469.95  119.02  469.94
   119.9  469.93  121.12  469.93  122.01  469.93  123.26  469.91  124.12  469.92
  125.37  469.94   126.2  470.01   127.5  470.29   128.3  470.45  129.62  470.82
  130.38  470.79  131.72  470.69  132.47  470.45  133.69  470.11  133.81  470.08
  134.54  469.72  135.87  468.95  136.63  468.62  137.97  468.06  138.72  467.69
  140.07  467.03  140.81  466.71  142.17  466.08   142.9  465.81  144.27   465.3
  144.99  464.96  146.35  464.27  147.07     464  148.45  463.61  149.16  463.59
  150.57  463.59  151.27  463.71  152.68  464.06  153.33  464.39  154.79  464.95
  155.43  465.15   156.9  465.66  157.48  465.88     159  466.51  159.54  466.67
  161.11  467.06  161.61  467.26  163.25  467.98  163.72  468.23  165.34  469.11
  165.77  469.36  167.49  470.52  167.84  470.68  169.59  471.26  169.93   471.3
  171.69  471.46  171.99   471.4   172.8  471.22  173.79  470.99  174.07  470.98
  175.89  470.86  176.16  470.85  177.99  470.85  178.23  470.84  180.09  470.82
  180.32  470.81  180.33  470.81  182.19  470.75  182.41  470.75  184.29  470.72
  184.51  470.72  186.39  470.66  186.61  470.65  188.46  470.65  188.65  470.65
  188.87  470.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  129.62     .15  171.69     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        129.62  171.69             167.9  167.77  167.53             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 54.279

INPUT
Description:
Station Elevation Data    num=     265
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.65     .84  474.62     1.2  474.61    2.94  474.61    3.29   474.6
    5.06  474.55    5.41  474.54    7.16  474.45    7.53  474.44    9.26  474.38
    9.65  474.38   11.37  474.41   11.74   474.4   13.47  474.28   13.87  474.26
   15.57  474.21   15.97  474.22   17.67  474.19   18.07   474.2   19.77   474.2
   20.18  474.21   21.85  474.23   22.27  474.22   23.96  474.25   24.39  474.25
   26.07  474.22   26.48  474.22   28.19  474.16    28.6  474.17   30.28  474.17
   30.72  474.14   32.38  474.06   32.82  474.06   34.48  474.06   34.92  474.06
   36.58  474.06   37.05  474.07   38.71  474.07   39.17  474.07   40.82  474.07
   41.28  474.07   42.91  474.15    43.4  474.15   45.02  474.15    45.5  474.18
   47.14  474.28   47.62  474.28   49.24  474.28   49.72  474.29   51.34  474.31
   51.84  474.32   53.44  474.29   53.94   474.3   55.55  474.32   56.04  474.32
   57.65   474.3   58.18  474.32   59.76  474.33   60.28  474.33   61.86  474.35
   62.38  474.35   63.96   474.4    64.5   474.4   66.03  474.43   66.57  474.43
   68.16  474.46   68.69   474.5   70.26  474.52   70.81  474.53   72.36  474.53
   72.91  474.53   74.46   474.5   75.02  474.45   76.56  474.38    77.1  474.09
   78.61  473.02   79.13  472.63   80.68  471.49   81.18  471.29   82.75  470.79
   83.24  470.72   84.85   470.6   85.35  470.57   86.95  470.44   87.45   470.4
   89.03  470.33   89.52   470.3   91.13  470.18   91.64  470.16   93.26  470.08
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   93.78  470.06   95.34  470.01   95.85     470   97.44     470   97.96  469.97
   99.57  469.87  100.09  469.86  101.65  469.79  102.18  469.78  103.75  469.78
  104.28  469.76  105.85  469.69  106.37  469.66  107.94  469.63   108.5  469.62
  110.05  469.54   110.6  469.53  112.18  469.46  112.73  469.45  114.25  469.42
  114.79   469.4  116.35  469.36  116.91  469.34  118.43  469.29  118.99  469.27
  120.51  469.24  121.07  469.25  122.59  469.23  123.14   469.2  124.69   469.1
  125.28  469.24   126.8  469.62  127.39  469.65  128.93  469.72  129.63  469.76
  130.44  469.81  131.04  469.81  132.55  469.19  133.14  468.96  134.68  468.34
  135.24  468.09  136.76  467.41  137.32  467.19  138.87  466.66  139.42  466.47
  140.96  465.84  141.51   465.6   143.1     465   143.6  464.81   145.2  464.43
   145.7   464.3   147.3  463.87   147.8  463.78  149.41   463.6   149.9  463.52
   150.4  463.58  152.01  463.84  153.57  464.29  154.12  464.55  155.68  465.01
  156.22  465.15  157.78  465.78  158.35  465.99  159.86  466.43  160.45   466.6
  161.94  466.92  162.55  467.07  164.03  467.75  164.69  468.04  166.12  468.73
  166.79  469.08   168.2  469.79  168.89   470.1  170.29  470.03  170.99  469.99
  172.41  469.88   173.1  469.83  174.51  469.78  175.21  469.76   176.6  469.71
  177.31  469.68   178.7  469.64  179.41  469.64   180.8  469.64   181.5  469.62
  182.87  469.57  183.58  469.56  184.95  469.49  185.68  469.47  187.05  469.47
  187.78  469.47  189.15  469.47  189.88  469.47  191.26   469.5  191.99   469.5
  193.37  469.45  194.11  469.45  195.47  469.47  196.21  469.45  197.59  469.41
   198.3   469.4  199.65  469.38   200.4  469.39  201.75  469.43  202.51  469.42
  203.86  469.35  204.61  469.35  205.96  469.31  206.72  469.29  208.05  469.28
  208.81  469.23  210.17  469.21  210.94  469.15  212.27  469.15  213.02  469.14
  214.39  469.01  215.14  469.06  216.46     469  217.23  469.03  218.55  469.07
  219.33  469.09  220.62  469.23  221.41  469.25  222.72   469.3  223.51  469.29
  224.82  469.33  225.63  469.31  226.92   469.3  227.73  469.29  229.04  469.25
  229.85  469.24  231.14   469.2  231.95  469.19  233.25  469.19  234.05  469.19
  235.33  469.17  236.16  469.12  237.44  469.12  238.26  469.13  239.53  469.09
  240.35  469.07  241.64  469.03  242.46  469.02  243.74  469.02  244.56  469.02
  245.84     469  246.68     469  247.96  469.02  248.79  469.02  250.05  469.02
  250.88  469.01  252.12  468.98  252.96  468.97  254.23  468.95  255.06  468.95
  256.32  468.95  257.16  468.95   258.4  468.95  259.27  468.96  260.52  468.92
  261.39  468.89  262.62  468.91  263.49  468.91  264.71  468.91   265.6   468.9
  266.83  468.88   267.7  468.86  268.93  468.86   269.8  468.88  271.03  468.82
   271.9  468.81  273.12  468.81  274.02  468.79  275.24  468.77  275.36  468.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  130.44     .15  168.89     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.44  168.89            49.37   49.41    49.5             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  168.89  275.36   470.1       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 4.867403

INPUT
Description:
Station Elevation Data    num=     271
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.56     .19  474.57       1  474.57     2.3  474.55    3.09  474.53
     4.4  474.55    5.18  474.55    6.49  474.55    7.27  474.55     8.6  474.52
    9.37  474.52    10.7  474.54   11.45  474.56   12.83  474.56   13.57  474.55
   14.93  474.55   15.66  474.56   17.03  474.56   17.76  474.55   19.13  474.52
   19.85  474.53   21.26  474.58   21.96  474.58   23.36  474.58   24.05  474.58
   25.46  474.56   26.15  474.54   27.56  474.52   28.23  474.51   29.67  474.48
   30.33  474.47   31.78  474.43   32.43  474.43   33.88  474.43   34.53  474.41
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      36  474.38   36.63  474.37    38.1  474.35   38.74  474.36   40.21  474.36
   40.84  474.35   42.31  474.35   42.94  474.35   44.41  474.35   45.01  474.36
   46.49  474.34   47.08  474.34   48.59  474.34   49.18  474.33    50.7   474.3
   51.27  474.29    52.8  474.29   53.36  474.29   54.93  474.22   55.47   474.2
   57.03  474.25   57.57  474.24   59.13  474.19   59.68  474.18   61.25  474.31
   61.76   474.3   63.35  474.13   63.85  474.12   65.44   474.1   65.95  474.08
   67.56  474.08   68.07   474.1   69.67  474.07   70.14  474.05   71.77  474.03
   72.24  474.04   73.87  474.06   74.34  474.05   75.98  474.05   76.43  474.04
   78.07  474.07   78.51  474.09   80.17  474.03    80.6  473.99   82.28  473.65
    82.7  473.47   84.35  472.49   84.79  472.22   86.39  471.26   86.84  471.05
   88.46  470.58    88.9  470.48   90.56  470.19      91  470.17   92.66  470.11
   93.09   470.1   94.76  470.05   95.19  470.03   96.86  469.97   97.28  469.96
   98.98  469.86    99.4  469.84  101.09  469.82  101.48  469.81   103.2  469.79
  103.57  469.78   105.3  469.74  105.67  469.74  107.43  469.72   107.8  469.71
  109.54  469.66  109.89  469.65  111.63  469.65  111.98  469.65  113.74  469.62
  114.07  469.62  115.81  469.59  116.14  469.57  117.92  469.46  118.22  469.45
  120.03  469.39  120.32  469.37  122.09  469.23  122.38  469.22  124.23  469.12
  124.51  469.11  126.33  469.05   126.6  469.04   128.4  468.95  128.68  469.02
  130.51  469.53  130.76  469.56  132.34  469.59  132.58  469.59  132.82  469.56
  134.68  469.29  134.92  469.15  136.79  468.13  137.02  468.06  138.85  467.05
   139.1  466.91  140.95  465.75   141.2   465.6  143.05  464.71  143.32  464.63
  145.11  463.88  145.38  463.75  147.21  463.06  147.47  462.98  149.28  462.81
  149.55   462.8  151.41  462.63  151.67  462.65  153.53  462.92  153.76  462.98
  155.66  463.26  155.88  463.37  157.76  464.23  157.95  464.29   159.9   465.4
  160.06  465.48     162  466.36  162.13  466.38   164.1   466.5  164.22  466.51
  166.21  466.92  166.29  466.97  168.31  468.45  168.37  468.47  170.42  469.14
  170.44  469.14  172.56  469.21  172.57  469.21  174.62  469.15  174.69  469.15
   174.7  469.15  175.35   469.2  176.77  469.31  176.79  469.31  178.84  469.31
  178.88  469.31  180.94  469.28  180.98  469.28     183  469.21  183.05  469.21
  185.08  469.25  185.16  469.25  187.17  469.11  187.26  469.11  189.31  469.15
   189.4  469.15   191.4  469.18   191.5  469.18  193.47   469.2  193.61   469.2
  195.63  469.16  199.41  469.23  199.84  469.26  199.95  469.28  201.86  469.15
  202.05  469.13  203.93  469.13  204.13  469.11  206.02  469.08  206.23  469.08
  208.12  468.96  208.33  468.94   210.2  468.83  210.44  468.82  212.28  468.79
  212.53  468.79  214.38  468.81  214.63  468.81  216.51  468.78  216.77  468.78
  218.59  468.74  218.88  468.73  220.69  468.71  220.98  468.71  222.78  468.68
  223.08  468.68  224.88  468.62  225.18  468.61  226.97  468.59  227.29  468.58
  229.06  468.58  229.39  468.57  231.12  468.51  231.47   468.5  233.22   468.5
  233.58   468.5  235.34  468.48   235.7  468.48  237.42  468.48  237.81  468.47
  239.54  468.47  239.93  468.48  241.64  468.45  242.04  468.45  243.72  468.42
  244.15   468.4  245.82   468.4  246.25  468.41  247.92  468.41  248.36   468.4
  250.02  468.43  250.46  468.43   252.1  468.43  252.57  468.44  254.19  468.38
  254.67  468.37  256.29  468.38  256.77  468.38  258.39  468.38  258.88  468.38
  260.46   468.4  260.98   468.4  262.55  468.38  263.08  468.39  264.64  468.31
  265.18  468.32  266.74  468.35  267.28  468.34  268.82  468.34   269.4  468.35
  270.93  468.35   271.5  468.34  273.02  468.34   273.6  468.34  275.12  468.36
   275.7  468.36  277.19  468.31  277.81  468.29  279.29  468.32  279.91  468.31
   280.6  468.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  132.34     .15  174.62     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        132.34  174.62            37.89    4.87   40.87             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  176.77   280.6  469.31       T



SUMMARY OF REACH LENGTHS
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River: South_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1311.239	102.88	100	100
Reach	1211.239	100	100	100
Reach	1111.238	100	100	100
Reach	1011.238	109.55	109.49	109.4
Reach	901.7494	99.3	99.2	99.08
Reach	802.5478	22.62	31.77	46.56
Reach	770.7793	32.88	42.84	62.72
Reach	727.9443	105.78	105.88	106.14
Reach	622.0599	100.01	100	100
Reach	522.0566	100.01	100	100
Reach	422.0532	100.01	100	100
Reach	322.0501	100.01	100	100
Reach	222.0471	167.9	167.77	167.53
Reach	54.279	49.37	49.41	49.5
Reach	4.867403	37.89	4.87	40.87

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: South_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1311.239	.1	.3
Reach	1211.239	.1	.3
Reach	1111.238	.1	.3
Reach	1011.238	.1	.3
Reach	901.7494	.1	.3
Reach	802.5478	.1	.3
Reach	770.7793	.1	.3
Reach	727.9443	.1	.3
Reach	622.0599	.1	.3
Reach	522.0566	.1	.3
Reach	422.0532	.1	.3
Reach	322.0501	.1	.3
Reach	222.0471	.1	.3
Reach	54.279	.1	.3
Reach	4.867403	.1	.3

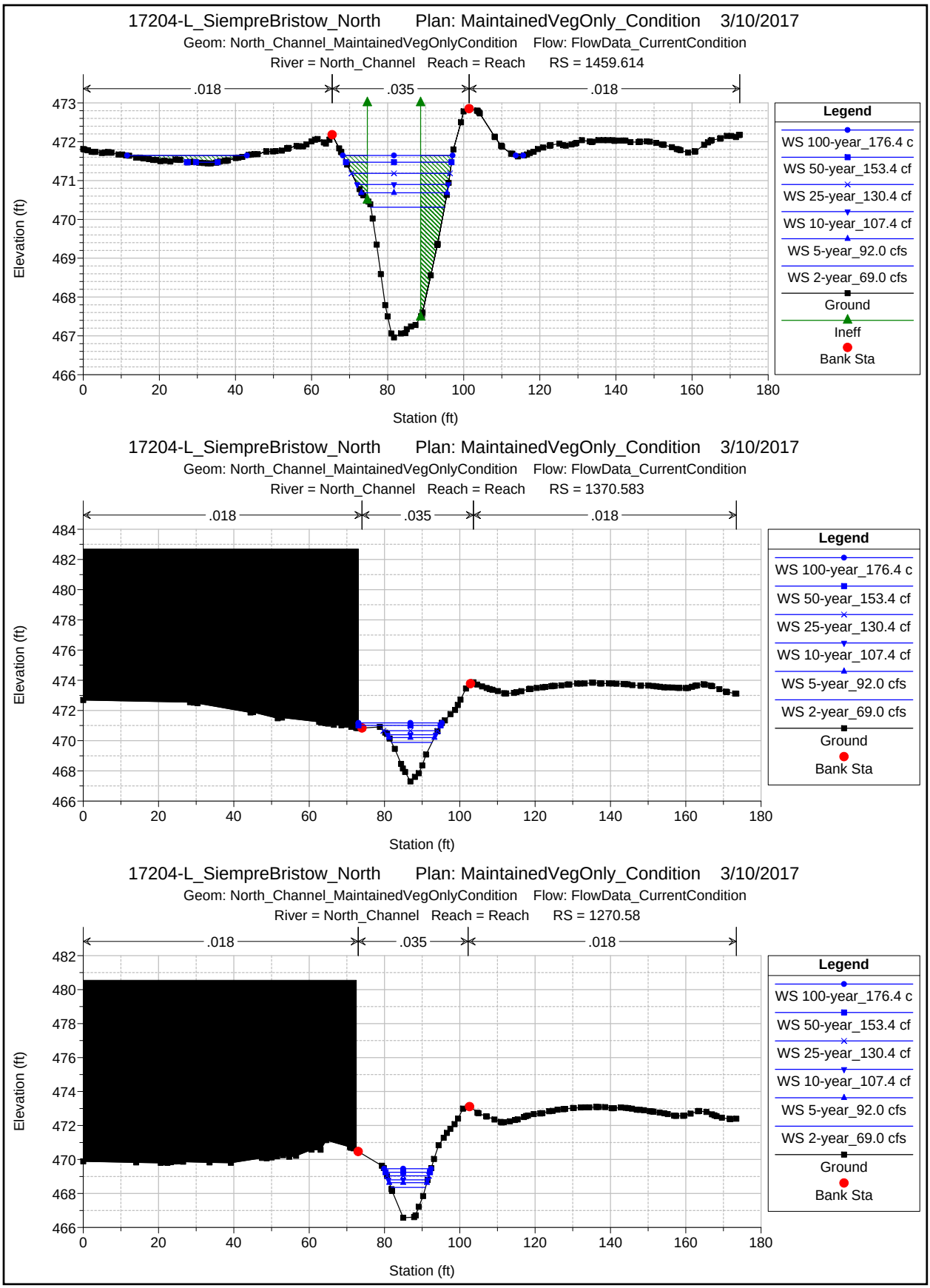
Attachment 15 - DETAILED HEC-RAS HYDRAULIC RESULTS FOR MAINTAINED CONDITION MODEL – VEGETATION ONLY (NO SEDIMENT REMOVED)

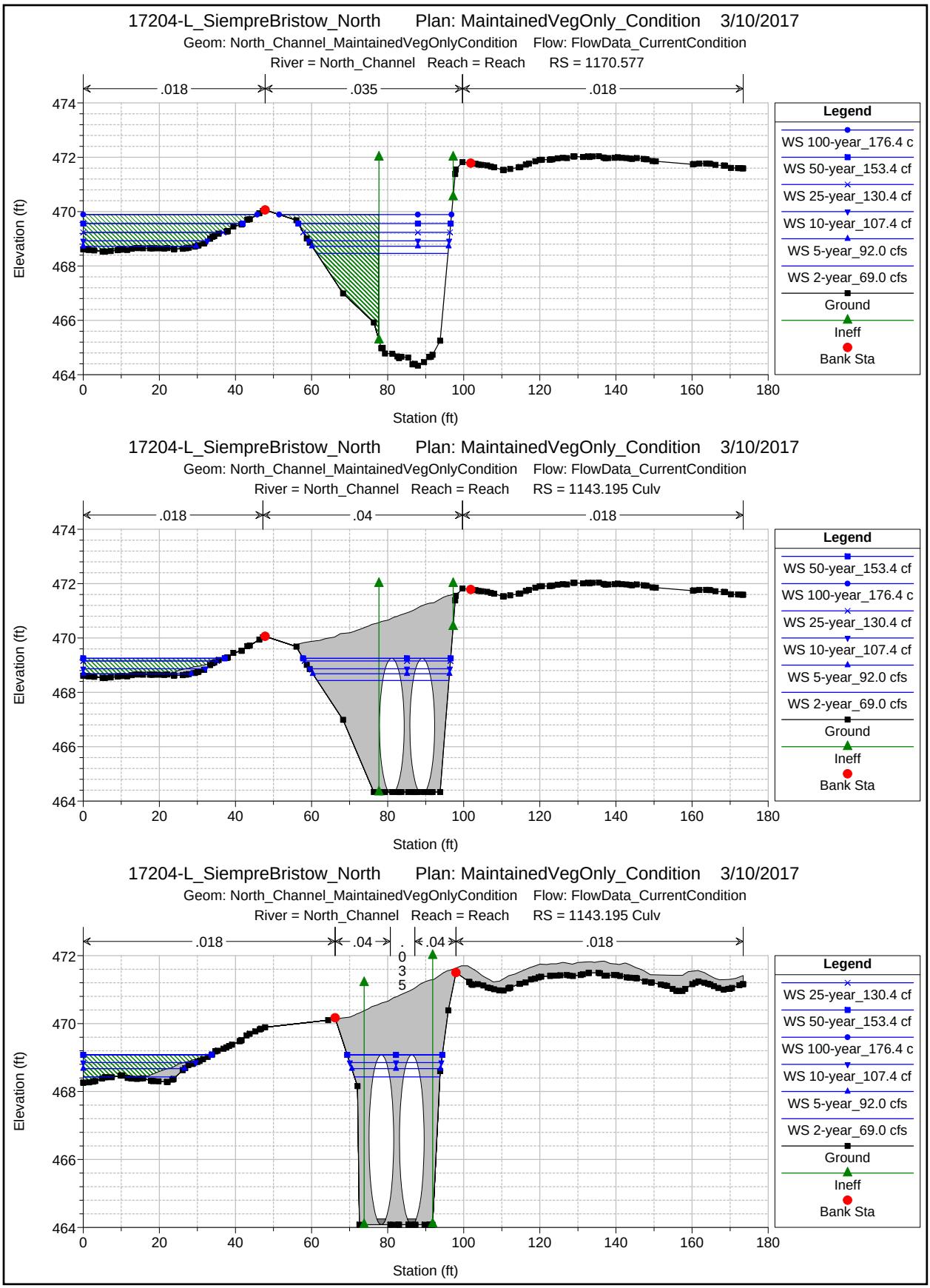
HEC-RAS Plan: VegOnly River: North_Channel Reach: Reach

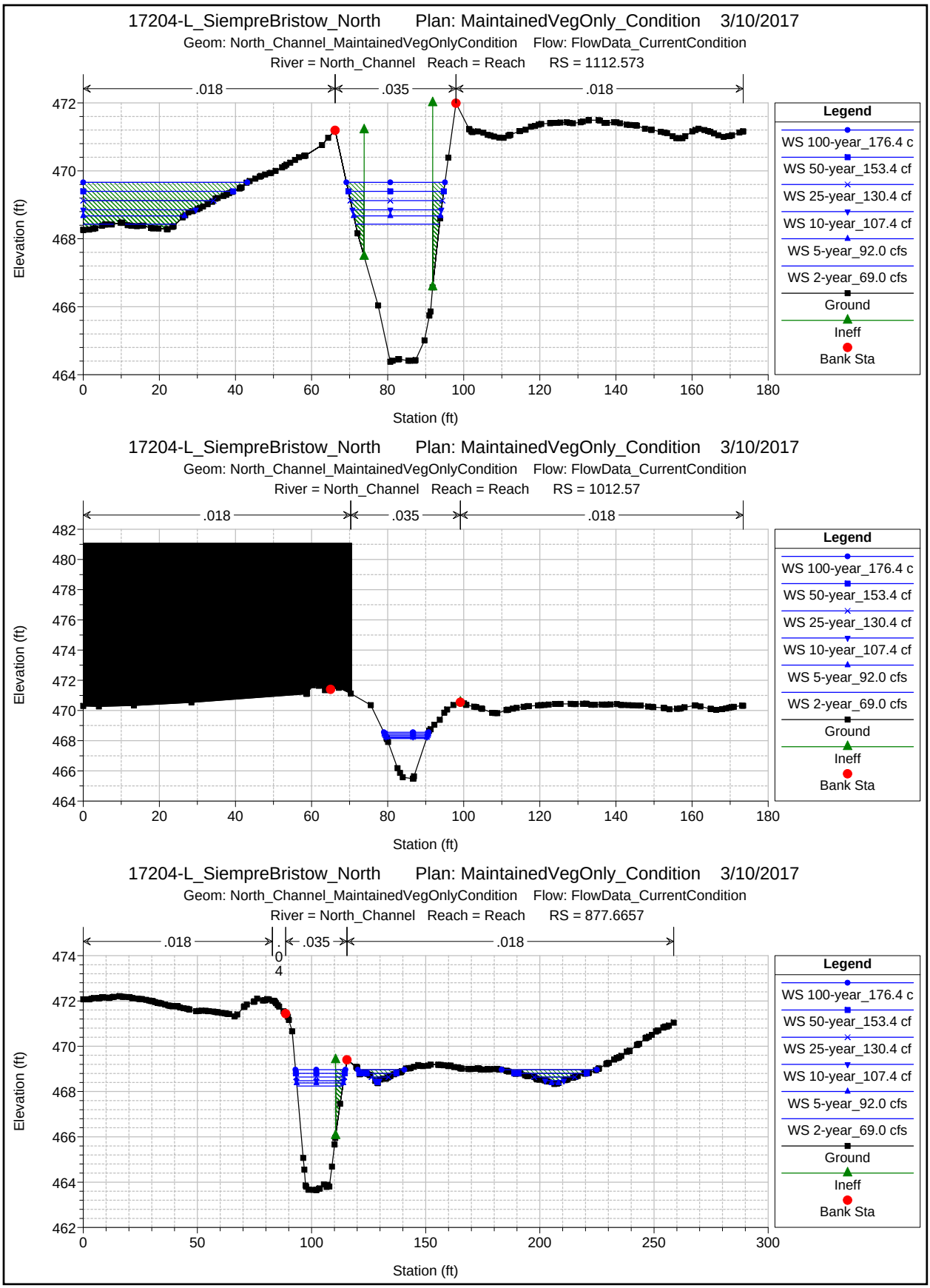
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1459.614	2-year_69.0 cfs	69.00	466.96	470.31	468.40	470.38	0.000735	2.06	33.56	19.37	0.23
Reach	1459.614	5-year_92.0 cfs	92.00	466.96	470.69	468.65	470.77	0.000886	2.38	38.69	22.54	0.25
Reach	1459.614	10-year_107.4 cf	107.40	466.96	470.90	468.80	471.00	0.000944	2.58	41.66	23.96	0.26
Reach	1459.614	25-year_130.4 cf	130.40	466.96	471.19	469.01	471.31	0.001023	2.85	45.69	25.87	0.28
Reach	1459.614	50-year_153.4 cf	153.40	466.96	471.47	469.22	471.62	0.001069	3.09	49.70	33.72	0.29
Reach	1459.614	100-year_176.4 c	176.40	466.96	471.65	469.40	471.82	0.001205	3.38	52.13	62.24	0.31
Reach	1370.583	2-year_69.0 cfs	69.00	467.30	469.88	469.43	470.20	0.008088	4.49	15.35	10.76	0.66
Reach	1370.583	5-year_92.0 cfs	92.00	467.30	470.20	469.73	470.57	0.008258	4.85	18.97	12.05	0.68
Reach	1370.583	10-year_107.4 cf	107.40	467.30	470.39	469.91	470.78	0.008300	5.04	21.31	12.83	0.69
Reach	1370.583	25-year_130.4 cf	130.40	467.30	470.66	470.14	471.08	0.008373	5.22	24.99	14.46	0.70
Reach	1370.583	50-year_153.4 cf	153.40	467.30	471.01	470.35	471.39	0.008756	4.92	31.27	21.83	0.71
Reach	1370.583	100-year_176.4 c	176.40	467.30	471.18	470.56	471.58	0.008247	5.07	34.94	22.18	0.70
Reach	1270.58	2-year_69.0 cfs	69.00	466.57	468.36	468.36	468.96	0.019506	6.26	11.01	9.20	1.01
Reach	1270.58	5-year_92.0 cfs	92.00	466.57	468.64	468.64	469.34	0.018862	6.71	13.72	9.99	1.01
Reach	1270.58	10-year_107.4 cf	107.40	466.57	468.81	468.81	469.56	0.018536	6.95	15.44	10.47	1.01
Reach	1270.58	25-year_130.4 cf	130.40	466.57	469.04	469.04	469.86	0.018112	7.26	17.95	11.15	1.01
Reach	1270.58	50-year_153.4 cf	153.40	466.57	469.25	469.25	470.13	0.017789	7.52	20.39	11.82	1.01
Reach	1270.58	100-year_176.4 c	176.40	466.57	469.46	469.46	470.38	0.017227	7.70	22.90	12.47	1.00
Reach	1170.577	2-year_69.0 cfs	69.00	464.33	468.46	465.51	468.48	0.000137	1.08	64.17	34.50	0.10
Reach	1170.577	5-year_92.0 cfs	92.00	464.33	468.73	465.68	468.76	0.000195	1.33	69.04	65.60	0.12
Reach	1170.577	10-year_107.4 cf	107.40	464.33	468.92	465.79	468.96	0.000228	1.48	72.63	69.62	0.13
Reach	1170.577	25-year_130.4 cf	130.40	464.33	469.24	465.94	469.28	0.000266	1.66	78.43	75.33	0.14
Reach	1170.577	50-year_153.4 cf	153.40	464.33	469.56	466.09	469.61	0.000293	1.81	84.55	81.97	0.15
Reach	1170.577	100-year_176.4 c	176.40	464.33	469.89	466.22	469.95	0.000314	1.94	90.79	91.02	0.16
Reach	1143.195		Culvert									
Reach	1112.573	2-year_69.0 cfs	69.00	464.38	468.43		468.45	0.000185	1.20	57.66	43.21	0.12
Reach	1112.573	5-year_92.0 cfs	92.00	464.38	468.67		468.71	0.000257	1.48	62.06	49.44	0.14
Reach	1112.573	10-year_107.4 cf	107.40	464.38	468.85		468.89	0.000297	1.65	65.24	52.92	0.15
Reach	1112.573	25-year_130.4 cf	130.40	464.38	469.12		469.18	0.000343	1.86	70.16	58.44	0.17
Reach	1112.573	50-year_153.4 cf	153.40	464.38	469.40		469.46	0.000380	2.04	75.06	64.48	0.18
Reach	1112.573	100-year_176.4 c	176.40	464.38	469.66		469.74	0.000408	2.21	79.85	69.03	0.18
Reach	1012.57	2-year_69.0 cfs	69.00	465.48	468.14		468.38	0.005035	3.89	17.74	10.45	0.53
Reach	1012.57	5-year_92.0 cfs	92.00	465.48	468.22		468.60	0.008001	4.97	18.50	10.66	0.66
Reach	1012.57	10-year_107.4 cf	107.40	465.48	468.27		468.76	0.010061	5.63	19.08	10.83	0.75
Reach	1012.57	25-year_130.4 cf	130.40	465.48	468.36		469.02	0.012893	6.48	20.13	11.14	0.85
Reach	1012.57	50-year_153.4 cf	153.40	465.48	468.46	468.35	469.27	0.015616	7.24	21.18	11.44	0.94
Reach	1012.57	100-year_176.4 c	176.40	465.48	468.56	468.56	469.53	0.017929	7.89	22.35	11.76	1.01
Reach	877.6657	2-year_69.0 cfs	69.00	463.65	468.24	464.82	468.26	0.000133	1.07	64.26	20.12	0.10
Reach	877.6657	5-year_92.0 cfs	92.00	463.65	468.38	465.04	468.41	0.000213	1.38	66.60	23.67	0.12
Reach	877.6657	10-year_107.4 cf	107.40	463.65	468.48	465.18	468.52	0.000269	1.57	68.32	30.80	0.14
Reach	877.6657	25-year_130.4 cf	130.40	463.65	468.64	465.36	468.69	0.000351	1.83	71.13	46.27	0.16
Reach	877.6657	50-year_153.4 cf	153.40	463.65	468.80	465.53	468.87	0.000433	2.07	73.94	67.18	0.18
Reach	877.6657	100-year_176.4 c	176.40	463.65	468.96	465.70	469.05	0.000513	2.30	76.72	83.93	0.19
Reach	800		Culvert									
Reach	735.8522	2-year_69.0 cfs	69.00	463.90	468.22		468.24	0.000214	1.23	55.95	55.19	0.13
Reach	735.8522	5-year_92.0 cfs	92.00	463.90	468.34		468.38	0.000332	1.58	58.25	60.17	0.16
Reach	735.8522	10-year_107.4 cf	107.40	463.90	468.43		468.48	0.000412	1.79	59.89	71.78	0.18
Reach	735.8522	25-year_130.4 cf	130.40	463.90	468.56		468.63	0.000530	2.09	62.40	84.73	0.20
Reach	735.8522	50-year_153.4 cf	153.40	463.90	468.68		468.77	0.000649	2.37	64.75	98.58	0.23
Reach	735.8522	100-year_176.4 c	176.40	463.90	468.79		468.90	0.000771	2.64	66.86	108.85	0.25
Reach	639.5066	2-year_69.0 cfs	69.00	463.18	468.20		468.22	0.000226	1.11	62.08	24.55	0.12
Reach	639.5066	5-year_92.0 cfs	92.00	463.18	468.31		468.34	0.000363	1.42	64.85	25.45	0.16
Reach	639.5066	10-year_107.4 cf	107.40	463.18	468.39		468.43	0.000468	1.61	66.89	26.43	0.18
Reach	639.5066	25-year_130.4 cf	130.40	463.18	468.51		468.57	0.000631	1.86	70.22	28.01	0.21
Reach	639.5066	50-year_153.4 cf	153.40	463.18	468.63		468.69	0.000807	2.09	73.47	29.64	0.23
Reach	639.5066	100-year_176.4 c	176.40	463.18	468.73		468.81	0.001023	2.30	76.56	33.03	0.26
Reach	539.4938	2-year_69.0 cfs	69.00	462.95	468.17		468.19	0.000263	1.25	55.18	22.59	0.13
Reach	539.4938	5-year_92.0 cfs	92.00	462.95	468.26		468.30	0.000429	1.61	56.98	27.99	0.17
Reach	539.4938	10-year_107.4 cf	107.40	462.95	468.32		468.38	0.000553	1.84	58.25	42.17	0.19
Reach	539.4938	25-year_130.4 cf	130.40	462.95	468.42		468.49	0.000748	2.17	60.23	52.99	0.22
Reach	539.4938	50-year_153.4 cf	153.40	462.95	468.51		468.60	0.000961	2.47	61.99	56.14	0.25
Reach	539.4938	100-year_176.4 c	176.40	462.95	468.57		468.69	0.001200	2.78	63.37	60.07	0.28
Reach	427.2193	2-year_69.0 cfs	69.00	462.91	468.16		468.17	0.000097	0.81	95.85	80.69	0.08
Reach	427.2193	5-year_92.0 cfs	92.00	462.91	468.25		468.27	0.000141	0.99	103.25	81.77	0.10
Reach	427.2193	10-year_107.4 cf	107.40	462.91	468.32		468.34	0.000167	1.09	108.54	81.90	0.11
Reach	427.2193	25-year_130.4 cf	130.40	462.91	468.42		468.44	0.000199	1.21	116.80	82.06	0.12

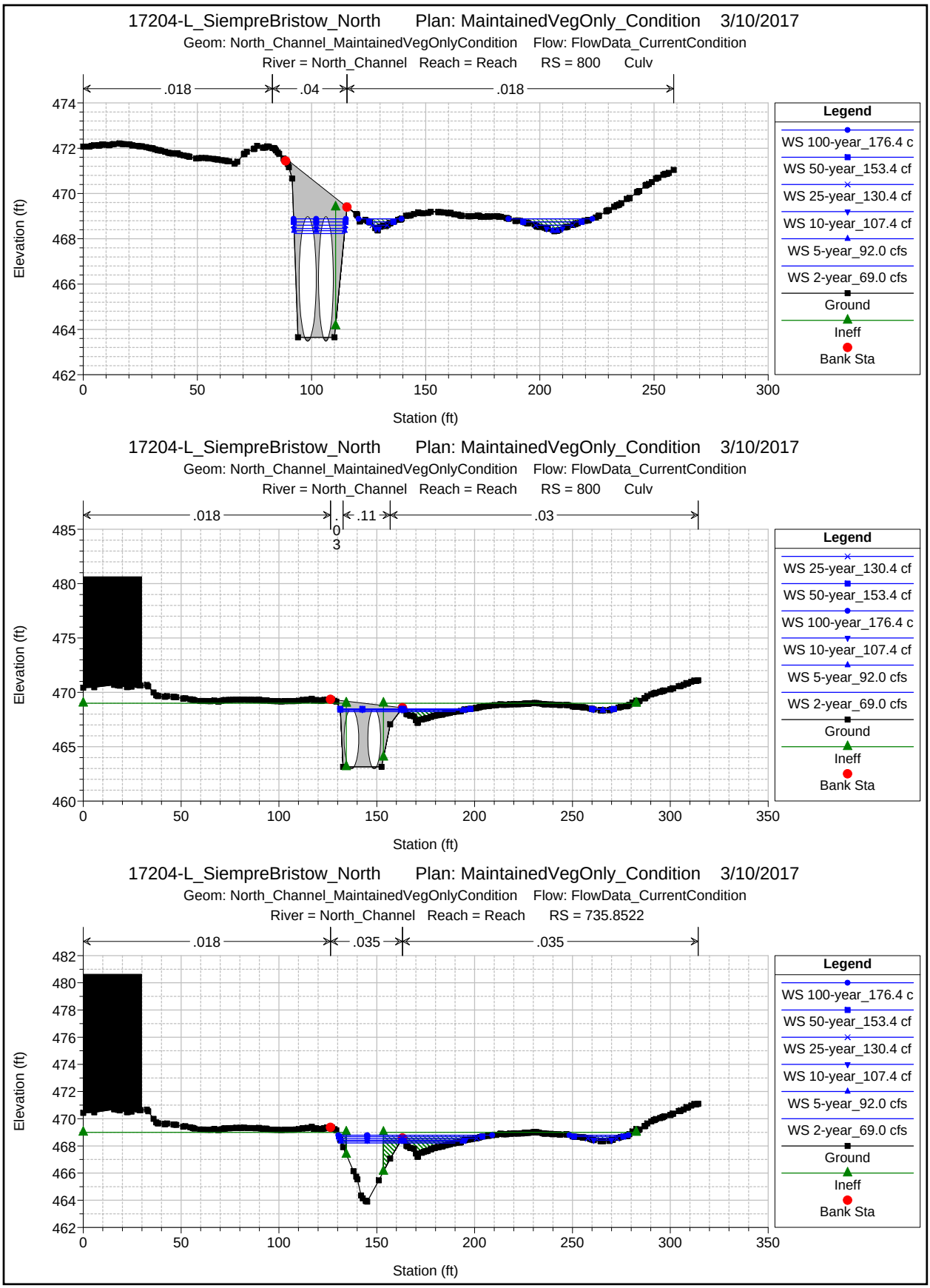
HEC-RAS Plan: VegOnly River: North_Channel Reach: Reach (Continued)

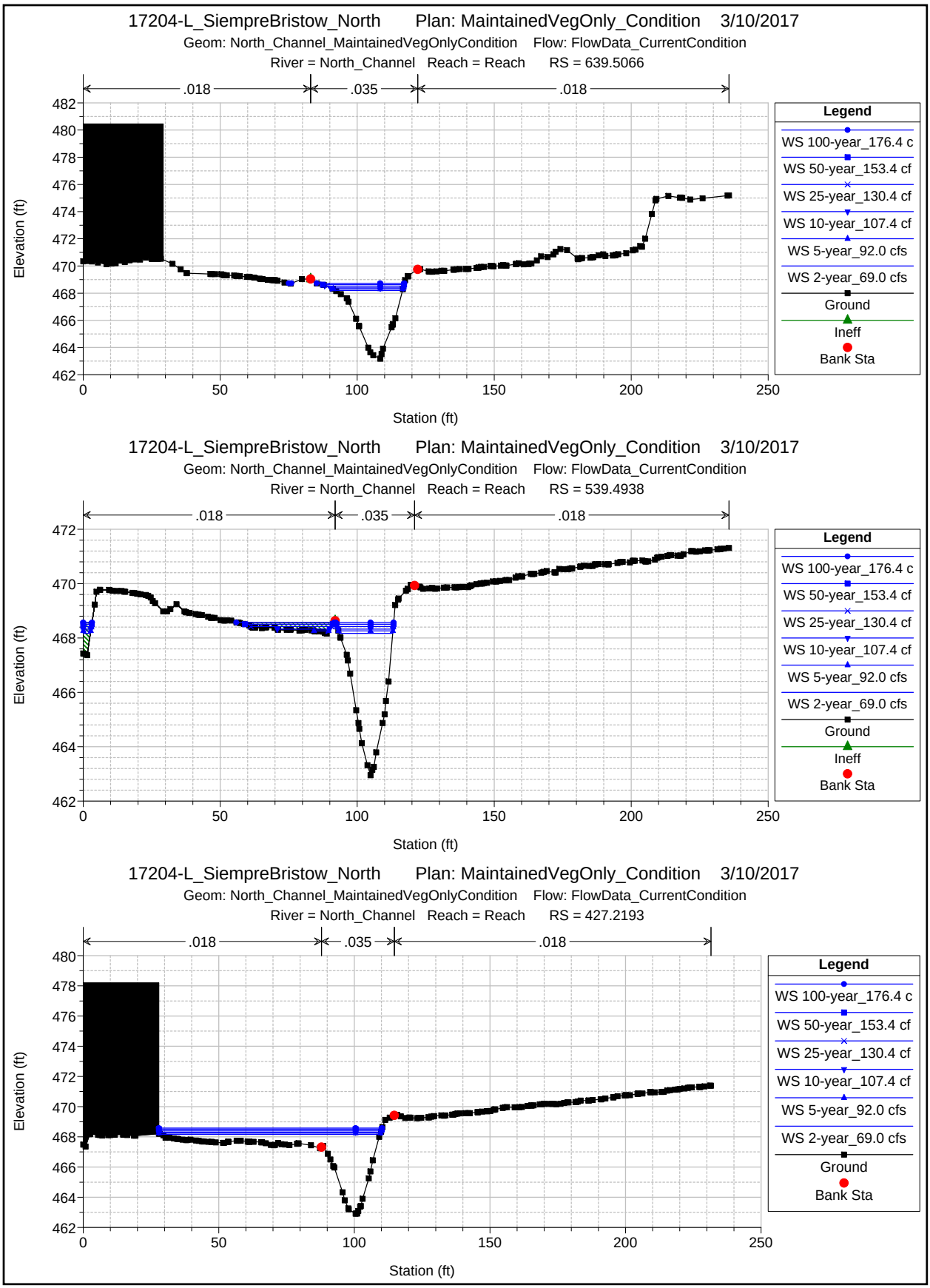
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	427.2193	50-year_153.4 cf	153.40	462.91	468.51		468.53	0.000229	1.32	124.21	82.20	0.13
Reach	427.2193	100-year_176.4 c	176.40	462.91	468.58		468.61	0.000262	1.42	130.11	82.31	0.14
Reach	301.9247	2-year_69.0 cfs	69.00	462.57	468.14		468.15	0.000248	1.08	64.39	41.34	0.13
Reach	301.9247	5-year_92.0 cfs	92.00	462.57	468.21		468.24	0.000400	1.39	67.60	46.09	0.16
Reach	301.9247	10-year_107.4 cf	107.40	462.57	468.26		468.30	0.000506	1.58	70.25	54.36	0.18
Reach	301.9247	25-year_130.4 cf	130.40	462.57	468.35		468.40	0.000659	1.82	75.71	75.44	0.21
Reach	301.9247	50-year_153.4 cf	153.40	462.57	468.42		468.48	0.000797	2.03	81.73	84.88	0.23
Reach	301.9247	100-year_176.4 c	176.40	462.57	468.48		468.55	0.000937	2.23	86.74	93.91	0.25
Reach	174.488	2-year_69.0 cfs	69.00	461.90	468.13		468.14	0.000040	0.52	132.19	115.82	0.05
Reach	174.488	5-year_92.0 cfs	92.00	461.90	468.21		468.21	0.000065	0.67	140.82	119.57	0.07
Reach	174.488	10-year_107.4 cf	107.40	461.90	468.26		468.27	0.000082	0.77	147.15	121.56	0.08
Reach	174.488	25-year_130.4 cf	130.40	461.90	468.34		468.36	0.000107	0.89	157.49	124.14	0.09
Reach	174.488	50-year_153.4 cf	153.40	461.90	468.42		468.43	0.000132	1.00	166.88	126.39	0.10
Reach	174.488	100-year_176.4 c	176.40	461.90	468.47		468.49	0.000159	1.11	173.91	127.22	0.11
Reach	72.67111	2-year_69.0 cfs	69.00	461.08	468.13	462.77	468.13	0.000038	0.56	125.43	46.08	0.05
Reach	72.67111	5-year_92.0 cfs	92.00	461.08	468.20	463.04	468.21	0.000064	0.72	128.90	51.67	0.07
Reach	72.67111	10-year_107.4 cf	107.40	461.08	468.25	463.20	468.26	0.000084	0.83	131.58	55.46	0.08
Reach	72.67111	25-year_130.4 cf	130.40	461.08	468.33	463.42	468.34	0.000115	0.98	136.23	60.06	0.09
Reach	72.67111	50-year_153.4 cf	153.40	461.08	468.40	463.63	468.42	0.000149	1.12	140.49	61.77	0.11
Reach	72.67111	100-year_176.4 c	176.40	461.08	468.45	463.82	468.47	0.000187	1.27	143.64	63.69	0.12

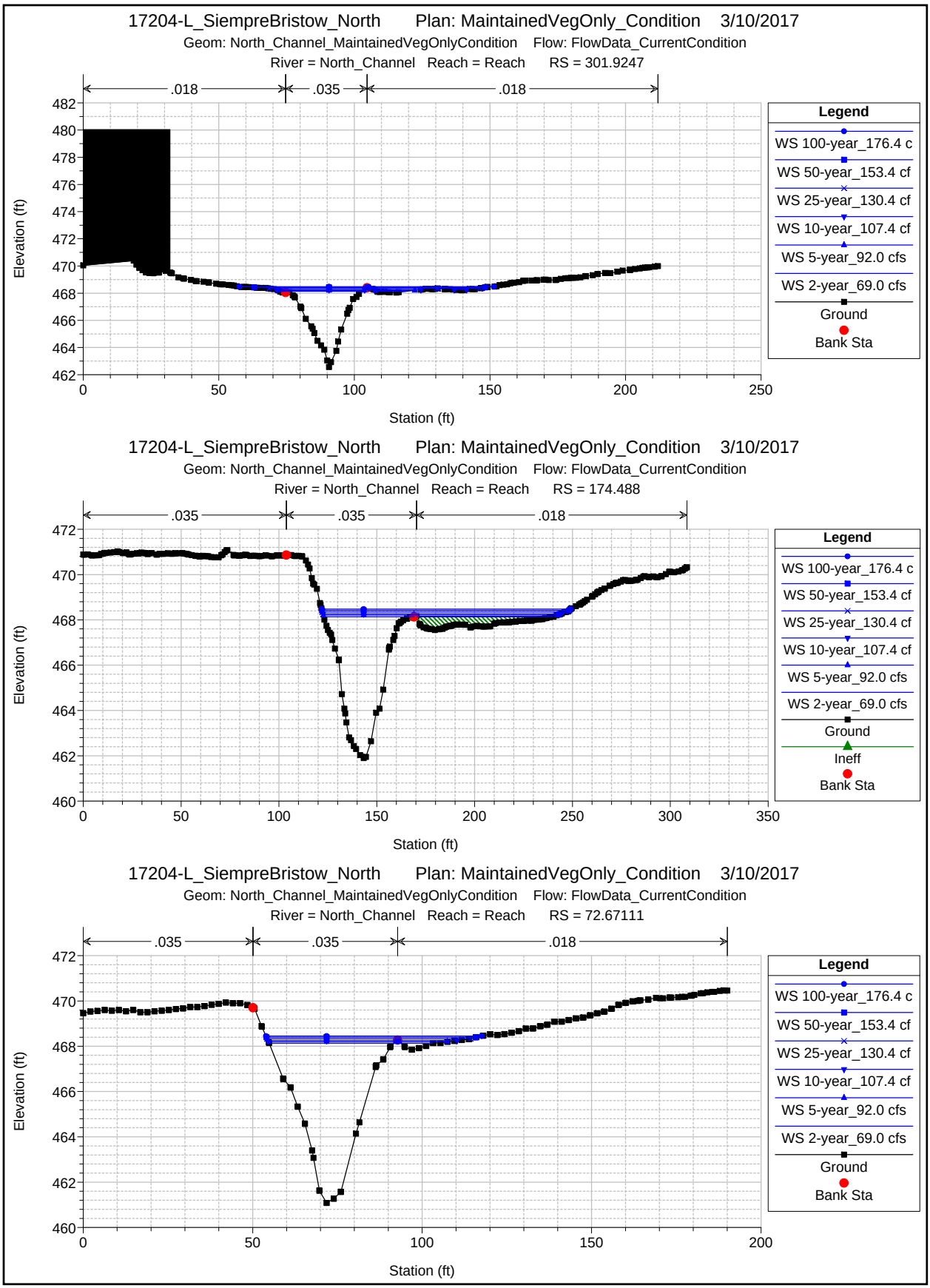

17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1459.614
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1370.583
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1270.58
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1170.577
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.04
.035
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1112.573
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1012.57
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 877.6657
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.04
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.11
.03
Elevation (ft)
Station (ft)
Legend
WS 25-year_130.4 cf
WS 50-year_153.4 cf
WS 100-year_176.4 c
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 735.8522
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 639.5066
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 539.4938
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 427.2193
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 301.9247
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 174.488
.035
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: North_Channel_MaintainedVegOnlyCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 72.67111
.035
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: 17204-L_SiempreBristow_North
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 2:11:06 PM

Project in English units

Project Description:
78

PLAN DATA

Plan Title: MaintainedVegOnly_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.p03

Geometry Title: North_Channel_MaintainedVegOnlyCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g05

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Plan Summary Information:
Number of: Cross Sections = 14 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Flow Data (cfs)

River	Reach	RS	2-year_69.0 cfs	5-year_92.0 cfs	10-year_107.4 cfs	25-year_130.4 cfs	50-year_153.4 cfs	100-year_176.4 cfs	PF 7	PF 8
North_Channel	Reach	1459.614	69	92	107.4	130.4	153.4	176.4	10	15

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
North_Channel	Reach	1459.614	20	25	30	35	40	45

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
North_Channel	Reach	2-year_69.0 cfs	Normal S = 0.004	Known WS = 468.13
North_Channel	Reach	5-year_92.0 cfs	Normal S = 0.004	Known WS = 468.2
North_Channel	Reach	10-year_107.4 cfs	Normal S = 0.004	Known WS = 468.25
North_Channel	Reach	25-year_130.4 cfs	Normal S = 0.004	Known WS = 468.33
North_Channel	Reach	50-year_153.4 cfs	Normal S = 0.004	Known WS = 468.4
North_Channel	Reach	100-year_176.4 cfs	Normal S = 0.004	Known WS = 468.45
North_Channel	Reach	PF 7	Normal S = 0.004	Known WS = 467.35
North_Channel	Reach	PF 8	Normal S = 0.004	Known WS = 467.53
North_Channel	Reach	PF 9	Normal S = 0.004	Known WS = 467.68
North_Channel	Reach	PF 10	Normal S = 0.004	Known WS = 467.83
North_Channel	Reach	PF 11	Normal S = 0.004	Known WS = 467.95
North_Channel	Reach	PF 12	Normal S = 0.004	Known WS = 467.98
North_Channel	Reach	PF 13	Normal S = 0.004	Known WS = 468.03
North_Channel	Reach	PF 14	Normal S = 0.004	Known WS = 468.05

GEOMETRY DATA

Geometry Title: North_Channel_MaintainedVegOnlyCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g05

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1459.614

INPUT
Description:
Station Elevation Data num= 177

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.81	.31	471.8	1.07	471.78	1.25	471.78	2.19	471.74
2.61	471.74	2.89	471.74	3.11	471.74	3.17	471.74	4.87	471.71
5.63	471.72	5.9	471.72	6.45	471.73	6.69	471.73	7.1	471.72
7.42	471.72	9.27	471.67	10.25	471.67	11.22	471.65	12.06	471.64
13.89	471.59	14.96	471.59	15.78	471.57	17.27	471.55	18.34	471.53
19.24	471.53	20.24	471.5	21.4	471.51	22.89	471.49	24.25	471.54
24.83	471.54	25.49	471.53	27.3	471.47	27.99	471.48	29.08	471.48
30.47	471.46	31.66	471.45	32.69	471.44	33.5	471.44	34.94	471.46
35.9	471.49	37.3	471.51	37.6	471.51	38.06	471.52	40.07	471.58
40.79	471.59	41.8	471.61	43.47	471.66	44.16	471.67	44.98	471.68
45.86	471.68	48.1	471.75	48.13	471.75	48.16	471.75	49.86	471.75
50.57	471.76	52.19	471.77	53.57	471.83	53.76	471.82	54.01	471.84
56.05	471.89	56.63	471.88	57.76	471.88	58.66	471.93	59.99	472.01
60.9	472.05	61.59	472.07	63.2	471.98	63.78	471.95	64.71	472.05
65.42	472.18	67.25	471.83	67.72	471.74	67.83	471.73	69.34	471.41
72.61	470.78	73.12	470.68	73.62	470.62	74.94	470.46	75.43	470.39
76.07	470.02	77.11	469.35	78.21	468.59	79.37	467.79	80.01	467.5
80.98	467.06	81.66	466.96	83.49	467.06	84.66	467.07	85.03	467.17
86.15	467.24	87.34	467.28	88.79	467.5	89	467.51	89.17	467.6
91.33	468.56	93.06	469.34	93.1	469.35	93.14	469.37	95.54	470.63
96.02	470.94	97.27	471.8	99.28	472.5	99.96	472.78	101.43	472.85
101.49	472.86	101.5	472.86	101.52	472.86	101.63	472.85	103.46	472.8
103.66	472.8	103.99	472.76	104.23	472.73	108.1	472.13	108.17	472.12
109.82	471.9	109.91	471.89	110.07	471.87	112.43	471.69	112.77	471.69
114.24	471.62	115.84	471.65	116.62	471.67	117.38	471.71	118.37	471.74
119.5	471.81	120.89	471.85	122.56	471.9	122.7	471.9	122.83	471.91
125.12	471.95	126.09	471.91	126.81	471.9	128.32	471.93	129.29	471.95
129.6	471.97	131.08	472.04	133.1	472.01	133.58	471.99	133.91	472
135.35	472.04	136.77	472.04	137.76	472.04	139.16	472.04	139.58	472.02
140.73	472.03	142.03	472.03	142.48	472.03	143.81	471.99	145.92	471.99
146.25	472	146.33	472	148.09	472.01	148.92	472	150.57	471.97
152.07	471.93	152.3	471.93	152.57	471.92	154.71	471.86	155.98	471.81
156.51	471.8	156.95	471.78	158.95	471.72	160.69	471.75	160.76	471.75
160.83	471.75	163.17	471.92	164.16	471.98	164.89	472.02	165.16	472.04
167.36	472.08	167.57	472.09	169.14	472.15	170.34	472.15	171.53	472.12
172.33	472.17	172.53	472.18						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	65.42	.035	101.43	.018

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

65.42	101.43	89.03	89.03	89.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	74.66	473	T
88.66	172.53	473	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1370.583

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.69	28.36	472.55	29.33	472.52	30.37	472.48	44.41	471.87
45.08	471.89	51.64	471.48	52.77	471.53	62.65	471.25	63.17	471.19
63.72	471.24	64.33	471.16	65	471.13	66.56	471.05	68.56	471.02
69.77	471.06	71.18	470.92	72.49	470.84	72.89	470.85	72.94	470.85
74.04	470.84	74.25	470.84	78.77	470.91	80.19	470.53	80.66	470.45
81.34	470.14	82.75	469.46	84.42	468.46	84.89	468.16	85.47	467.93
86.9	467.3	88.08	467.6	89.1	467.84	90.04	468.36	91.05	469.08
94.08	470.62	95.26	471.18	96.04	471.34	97.5	471.76	98.73	472.03
99.46	472.36	100.19	472.71	101.64	473.45	102.85	473.77	102.87	473.77
103.6	473.87	104.63	473.72	105.91	473.59	107.12	473.49	107.92	473.42
108.63	473.37	110.09	473.29	111.79	473.14	112.06	473.12	112.31	473.13
114.35	473.16	115.05	473.21	116.33	473.28	118.34	473.41	118.56	473.43
118.82	473.43	120.43	473.49	121.99	473.53	122.72	473.56	124.33	473.6
124.71	473.62	125.2	473.63	126.98	473.66	128.62	473.71	128.94	473.72
129.08	473.72	131.15	473.78	132	473.78	133.15	473.79	135.13	473.84
135.4	473.84	137.21	473.8	137.37	473.79	137.63	473.79	139.58	473.79
140.45	473.79	141.61	473.77	143.46	473.75	143.87	473.75	144.55	473.73
145.83	473.68	147.97	473.65	148.03	473.65	148.11	473.65	150.04	473.65
151.37	473.62	152.24	473.59	153.22	473.57	154.25	473.53	155.11	473.53
156.44	473.52	157.81	473.5	158.33	473.49	160.05	473.48	160.61	473.49
161.68	473.57	162.56	473.63	163.03	473.66	164.77	473.73	165.07	473.71
166.67	473.64	167.03	473.61	168.92	473.41	170.65	473.24	170.84	473.22
170.95	473.22	173.13	473.12	173.44	473.11				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	74.04	.035	103.6	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
74.04	102.87	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	73.08	482.688

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1270.58

INPUT
Description:
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.89	14.05	469.83	20.59	469.8	21.46	469.84	22.35	469.8
23.3	469.84	24.31	469.88	25.37	469.89	26.54	469.87	33.53	469.83
39.21	469.81	47.48	470.09	48.73	470.07	50.05	470.12	51.49	470.19
53.05	470.25	54.69	470.16	56.53	470.22	60.63	470.58	63.03	470.57
64.52	471.14	70.83	470.74	71.07	470.69	71.77	470.66	72.61	470.53
73.04	470.47	79.31	469.63	79.83	469.5	80.66	469.03	81.85	468.25
82.02	468.15	84.98	466.57	87.85	466.61	88.25	466.71	89.1	467.21
90.24	467.85	91.45	468.79	92.42	469.49	93.15	470.03	94.38	470.84
95.72	471.28	96.56	471.56	97.49	471.8	98.62	472.08	99.52	472.41

100.84	472.99	102.21	473.07	102.6	473.11	102.76	473.12	104.67	472.75
104.95	472.72	106.97	472.54	107.01	472.54	107.15	472.53	109.22	472.35
110.87	472.21	111.2	472.18	111.68	472.2	113.29	472.25	114.63	472.32
115.36	472.36	117.05	472.5	117.57	472.55	118.09	472.59	119.63	472.67
121.38	472.71	121.77	472.72	121.93	472.73	123.73	472.84	124.65	472.86
125.96	472.93	127.54	472.96	127.97	472.98	130.08	473.03	130.15	473.03
130.26	473.03	132.13	473.06	133.33	473.07	134.4	473.07	136.2	473.09
136.41	473.09	136.93	473.09	138.59	473.08	140.3	473.02	140.54	473.02
140.93	473.02	142.76	473.06	144.03	473.04	144.74	473.02	145.69	472.99
146.95	472.93	147.78	472.92	148.9	472.9	150.45	472.84	151.02	472.83
151.42	472.81	153.05	472.76	154.28	472.72	155.22	472.67	156.91	472.58
157.18	472.58	157.45	472.57	159.3	472.57	159.64	472.59	161.3	472.7
163.25	472.84	163.46	472.85	163.55	472.85	165.48	472.8	166.96	472.66
167.61	472.6	168.19	472.55	169.59	472.46	171.64	472.39	171.8	472.38
171.9	472.38	173.44	472.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	73.04	.035	102.21	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
73.04	102.6	100.01	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	72.51	480.547

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1170.577

INPUT
Description:
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	465.92	78.33	464.97	78.6	464.98
78.7	464.99	79.31	464.78	81.24	464.77	82.55	464.67	83	464.61
83.61	464.66	85.41	464.63	86.51	464.38	87.15	464.4	87.94	464.33
89.55	464.46	90.92	464.65	91.36	464.66	91.81	464.73	93.8	465.25
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92
124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59

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  173.44  471.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.83    .035   99.68    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.83  101.86           58.01      58      58             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   77.71     472       T
   97.21  173.44     472       T

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 1143.195

INPUT
Description:
Distance from Upstream XS =       2
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=     168
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23             .16  468.23            2.54  468.17
    2.79  468.16            2.98  468.17             4.5  468.22
    6.21  468.24            6.97  468.26            7.94  468.27
    8.82  468.29             9.9  468.34           11.34  468.39
      12  468.39           12.99  468.36           14.99  468.44
   15.37  468.46           15.65  468.45           17.09  468.46
   18.45  468.52           19.47  468.57           20.94  468.63
   21.11  468.64           21.44  468.65           23.48  468.71
   24.42  468.77           25.02  468.81           26.96  468.87
   27.38  468.88           27.52  468.88           29.01  468.94
   30.78  468.97           31.27  469.01           31.66     469
   32.83  469.05           35.12  469.11           35.18  469.11
   36.61  469.22            36.7  469.22           37.92   469.2
   38.94  469.18           39.12  469.19           40.46  469.24
   41.46  469.28           42.75  469.29           43.49  469.32
   44.31  469.29            46.4   469.4           46.56  469.41
   46.63  469.41           48.09  469.45           48.58  469.46
   50.31  469.54            51.3  469.54           51.94  469.56
   53.42  469.63           54.27  469.66           55.36  469.73
    55.8  469.75           57.99  469.83           58.03  469.83
   58.04  469.83           59.68  469.87           61.35   469.9
   62.05  469.91           62.82  469.94           63.68  469.98
   64.55     470           65.98  470.03            67.6  470.16
   67.61  470.16           67.61  470.16           70.07  470.19
   71.34  470.25           71.79  470.28           72.53  470.31
   74.23   470.4           74.97  470.44           75.85   470.5
    77.3  470.55           78.46  470.61           79.17  470.63
   80.15  470.66           81.51  470.76            82.6   470.8
   83.22  470.84           84.27  470.89           85.75  470.96
   86.75  471.02           87.56  471.08           88.51  471.16
   90.04  471.24           91.02  471.28           92.15   471.3
   92.66  471.34           94.81  471.51           95.13  471.52
   95.32  471.54           96.87  471.59           97.66  471.62
   99.35   471.7          100.89   471.7          101.04   471.7
  101.32  471.68            103.4  471.54          104.66  471.43
  105.16  471.39          107.13  471.27          107.65  471.23
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108	471.23	109.4	471.25	111.55	471.39
111.82	471.41	111.9	471.41	113.48	471.46
114.64	471.52	116.02	471.58	117.58	471.66
117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Upstream Bridge Cross Section Data

Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	464.33	78.33	464.33	78.6	464.33
78.7	464.33	79.31	464.33	81.24	464.33	82.55	464.33	83	464.33
83.61	464.33	85.41	464.33	86.51	464.33	87.15	464.33	87.94	464.33
89.55	464.33	90.92	464.33	91.36	464.33	91.81	464.33	93.8	464.33
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92
124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59
173.44	471.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.22	.04	99.68	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
47.83	101.86	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.71	472	T
97.21	173.44	472	T

Downstream Deck/Roadway Coordinates
num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	
46.63	469.41		48.09	469.45		48.58	469.46	
50.31	469.54		51.3	469.54		51.94	469.56	
53.42	469.63		54.27	469.66		55.36	469.73	
55.8	469.75		57.99	469.83		58.03	469.83	
58.04	469.83		59.68	469.87		61.35	469.9	
62.05	469.91		62.82	469.94		63.68	469.98	
64.55	470		65.98	470.03		67.6	470.16	
67.61	470.16		67.61	470.16		70.07	470.19	
71.34	470.25		71.79	470.28		72.53	470.31	
74.23	470.4		74.97	470.44		75.85	470.5	
77.3	470.55		78.46	470.61		79.17	470.63	
80.15	470.66		81.51	470.76		82.6	470.8	
83.22	470.84		84.27	470.89		85.75	470.96	
86.75	471.02		87.56	471.08		88.51	471.16	
90.04	471.24		91.02	471.28		92.15	471.3	
92.66	471.34		94.81	471.51		95.13	471.52	
95.32	471.54		96.87	471.59		97.66	471.62	
99.35	471.7		100.89	471.7		101.04	471.7	
101.32	471.68		103.4	471.54		104.66	471.43	
105.16	471.39		107.13	471.27		107.65	471.23	
108	471.23		109.4	471.25		111.55	471.39	
111.82	471.41		111.9	471.41		113.48	471.46	
114.64	471.52		116.02	471.58		117.58	471.66	
117.7	471.66		120.03	471.75		120.14	471.75	
120.23	471.75		121.83	471.74		122.84	471.76	
124.34	471.76		125.63	471.79		126.07	471.8	
127.19	471.78		128.53	471.75		130.05	471.8	
130.19	471.8		130.47	471.8		132.67	471.82	
133.55	471.82		134.34	471.8		135.72	471.83	
136.82	471.84		137.4	471.82		138.48	471.77	
140.33	471.75		140.86	471.74		142.27	471.78	
142.58	471.78		143.65	471.73		145.02	471.66	
145.42	471.64		146.7	471.59		147.27	471.56	
149.04	471.44		155.4	471.42		157.58	471.42	
157.96	471.46		159	471.53		161.45	471.56	
161.51	471.56		161.54	471.56		163.22	471.5	
164.48	471.42		165.65	471.35		166.31	471.32	
167.26	471.29		169.68	471.3		169.75	471.3	
169.82	471.3		171.47	471.33		173.84	471.43	
173.92	471.43		173.96	471.43		175	471.47	

Downstream Bridge Cross Section Data
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.26	.04	468.26	1.57	468.27	2.65	468.29	3.18	468.31
4.93	468.38	5.76	468.42	6.03	468.42	7.5	468.42	9.86	468.47
10.08	468.48	10.29	468.47	11.67	468.4	12.62	468.38	14.08	468.37
15.08	468.38	15.73	468.39	17.81	468.32	18.23	468.31	18.34	468.31
19.79	468.3	21.97	468.28	22.19	468.28	23.39	468.35	23.65	468.36
23.75	468.37	26.12	468.63	26.83	468.69	27.64	468.78	28.71	468.81
29.98	468.87	30.59	468.9	31.47	468.95	32.71	469.02	33.89	469.09
34.79	469.18	35.33	469.2	36.86	469.26	37.62	469.3	38.33	469.34
39.09	469.38	41.09	469.48	41.43	469.5	41.61	469.51	42.92	469.65
43.73	469.7	45.24	469.77	46.4	469.83	46.72	469.85	47.83	469.89
64.38	470.1	66.2	470.17	72.08	468.16	72.58	464.08	80.71	464.08
81.31	464.08	82.82	464.08	82.89	464.08	82.99	464.08	85.45	464.08
85.89	464.08	87.14	464.08	87.31	464.08	89.7	464.08	90.97	464.08
91.27	464.08	91.81	464.08	93.79	468.6	95.94	470.39	97.97	471.5
101.43	471.23	101.48	471.22	102.02	471.16	102.28	471.14	103.7	471.16
105.16	471.12	106.3	471.06	107.04	471.04	107.95	471.01	109.31	470.98
110.47	470.97	111.75	471.03	112.03	471.05	112.25	471.06	114.63	471.17
114.78	471.17	116.25	471.21	117.66	471.3	118.75	471.32	119.72	471.36
120.37	471.38	122.7	471.4	122.96	471.41	123.46	471.41	124.59	471.41
125.4	471.42	127.12	471.43	127.84	471.41	128.7	471.4	130.71	471.43
131.27	471.45	132.83	471.49	132.85	471.49	132.9	471.49	135.41	471.49
135.8	471.48	136.99	471.41	137.64	471.41	139.46	471.43	140.14	471.43
141.09	471.4	142.83	471.36	143.6	471.35	145.06	471.34	145.22	471.34
145.49	471.33	147.62	471.24	149.22	471.21	149.28	471.21	149.4	471.21
151.77	471.15	152.79	471.13	153.43	471.11	154.91	471.02	155.87	470.96
156.61	470.96	157.48	470.96	158.23	471.02	160.05	471.16	160.92	471.2
161.7	471.24	163.22	471.2	164.19	471.17	164.83	471.15	165.74	471.1
166.87	471.05	168.31	471	169.56	471.02	169.93	471.02	170.51	471.05
172.45	471.13	173.41	471.16	173.44	471.16				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	66.2	.04	80.71	.035	87.14	.04	97.97	.018

Bank Sta: Left Right Coeff Contr. Expan.
66.2 97.97 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	73.82	471.2	T
91.82	173.44	472	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 469.71
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 2

Culvert Name Shape Rise Span
Culvert #1 Ellipse 5 6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
2	52	.018	.018	.17		.2	1

Upstream Elevation = 464.25
Centerline Station = 81.085

```
Downstream Elevation =  464.08
           Centerline Station =  78.345

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                  2      52     .018     .018      .17                    .2
1
Upstream   Elevation =  464.25
           Centerline Station =  89.085
Downstream Elevation =  464.08
           Centerline Station =  86.345

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1112.573

INPUT
Description:
Station Elevation Data    num=     156
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.26     .04  468.26    1.57  468.27    2.65  468.29    3.18  468.31
    4.93  468.38    5.76  468.42    6.03  468.42     7.5  468.42    9.86  468.47
   10.08  468.48   10.29  468.47   11.67   468.4   12.62  468.38   14.08  468.37
   15.08  468.38   15.73  468.39   17.81  468.32   18.23  468.31   18.34  468.31
   19.79   468.3   21.97  468.28   22.19  468.28   23.39  468.35   23.65  468.36
   23.75  468.37   26.12  468.63   26.83  468.69   27.64  468.78   28.71  468.81
   29.98  468.87   30.59   468.9   31.47  468.95   32.71  469.02   33.89  469.09
   34.79  469.18   35.33   469.2   36.86  469.26   37.62   469.3   38.33  469.34
   39.09  469.38   41.09  469.48   41.43   469.5   41.61  469.51   42.92  469.65
   43.73   469.7   45.24  469.77    46.4  469.83   46.72  469.85   47.83  469.89
      49  469.93   49.36  469.94   50.54     470   52.26   470.1   52.93  470.14
   53.38  470.18    54.4  470.24   55.65  470.32    56.7   470.4   58.08  470.44
   58.28  470.45    58.4  470.45   62.75  470.76   64.38  470.97    66.2  471.19
   72.08  468.16    77.5  466.04   80.71  464.38   81.31  464.41   82.82  464.46
   82.89  464.45   82.99  464.46   85.45  464.41   85.89  464.41   87.14  464.41
   87.31  464.43    89.7  465.01   90.97  465.74   91.27  465.86   91.81  466.57
   93.79   468.6   95.94  470.39   97.97  471.99  101.43  471.23  101.48  471.22
  102.02  471.16  102.28  471.14   103.7  471.16  105.16  471.12   106.3  471.06
  107.04  471.04  107.95  471.01  109.31  470.98  110.47  470.97  111.75  471.03
  112.03  471.05  112.25  471.06  114.63  471.17  114.78  471.17  116.25  471.21
  117.66   471.3  118.75  471.32  119.72  471.36  120.37  471.38   122.7   471.4
  122.96  471.41  123.46  471.41  124.59  471.41   125.4  471.42  127.12  471.43
  127.84  471.41   128.7   471.4  130.71  471.43  131.27  471.45  132.83  471.49
  132.85  471.49   132.9  471.49  135.41  471.49   135.8  471.48  136.99  471.41
  137.64  471.41  139.46  471.43  140.14  471.43  141.09   471.4  142.83  471.36
   143.6  471.35  145.06  471.34  145.22  471.34  145.49  471.33  147.62  471.24
  149.22  471.21  149.28  471.21   149.4  471.21  151.77  471.15  152.79  471.13
  153.43  471.11  154.91  471.02  155.87  470.96  156.61  470.96  157.48  470.96
  158.23  471.02  160.05  471.16  160.92   471.2   161.7  471.24  163.22   471.2
  164.19  471.17  164.83  471.15  165.74   471.1  166.87  471.05  168.31     471
  169.56  471.02  169.93  471.02  170.51  471.05  172.45  471.13  173.41  471.16
  173.44  471.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018    66.2    .035   97.97    .018
```

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Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          66.2   97.97           100.02     100     100             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 1012.57

INPUT
Description:
Station Elevation Data    num=     106
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   470.3     4.1  470.27   13.31  470.33   28.44  470.53   58.63   471.1
   58.84  471.11   60.31  471.67   61.88  471.63   63.52  471.34   65.02   471.4
   67.18   471.5   70.31  471.12   75.58  470.35   79.73  468.18   79.77  468.15
    79.8   468.1   80.12  467.91    82.6  466.18   83.25  465.87   83.97  465.58
   86.65  465.48   86.72  465.48   86.73  465.49   86.93  465.64   90.89  468.65
    91.3  468.75   92.28  469.05   93.69  469.38   94.89  469.85   95.63  470.06
   97.29  470.36   99.13  470.54  100.09  470.47  100.58  470.38  100.69  470.37
  102.73  470.25  103.27  470.23  104.59  470.13  104.64  470.13  104.85  470.11
  107.44  469.84  108.19  469.83  108.83  469.82  111.22  470.02  111.56  470.05
  111.66  470.05  112.94  470.12  113.91  470.17  115.72  470.24  116.72  470.28
  117.13  470.29  119.49  470.33  119.86  470.34  120.33  470.35  121.22  470.36
  122.32  470.39     124  470.43  125.32  470.43  125.36  470.43  125.43  470.43
  128.11  470.44  128.89  470.42  129.45  470.42  131.32  470.44  132.12  470.45
  132.34  470.44  133.52  470.38  134.51  470.38  136.25  470.39   137.2  470.38
  137.62  470.39  138.58   470.4  140.24  470.42  141.29  470.37  141.64  470.36
   143.2  470.35  144.38  470.34  144.48  470.34  145.79  470.33  146.48  470.33
  148.46  470.26  149.51  470.24  149.82  470.22  152.54  470.17  152.63  470.17
  152.69  470.16  154.04  470.08  156.03  470.11  156.73  470.12  157.06  470.14
  158.05  470.21  160.69  470.33  160.83  470.34  160.88  470.34   162.2  470.27
  164.89   470.1  164.94   470.1  164.98   470.1  166.33  470.04  167.89  470.09
  168.95  470.13  169.77  470.18  170.36  470.21  170.97  470.24  173.15  470.31
  173.44  470.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   70.31    .035   99.13    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.02   99.13           127.93   134.9  144.08             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   99.13  173.44  470.54       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   70.55 481.086

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 877.6657

INPUT
Description:
Station Elevation Data    num=     255
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	96.32	465.07	96.86	464.55	97.35	463.85	97.61	463.8
98.6	463.67	98.77	463.67	100.78	463.66	102.05	463.65	102.16	463.65
103.31	463.71	103.62	463.72	105.43	463.9	106.62	463.79	107.07	463.88
107.79	463.81	108.93	464.69	110.09	465.66	110.39	465.95	112.51	467.46
115.52	469.4	119.54	469.09	119.76	469.09	119.96	469.05	120.03	469.03
121.08	468.76	121.25	468.77	123.57	468.84	124.46	468.78	125.36	468.74
125.62	468.72	127.91	468.47	128.91	468.38	129.02	468.37	130.06	468.53
131.27	468.57	132.57	468.56	133.41	468.62	134.17	468.68	134.56	468.69
136.17	468.76	137.87	468.84	138.89	468.85	139	468.86	139.18	468.86
139.52	468.89	141.37	469.01	142.32	469.03	142.87	469.02	143.42	469.04
144.85	469.09	146.75	469.17	147.49	469.13	147.83	469.13	148.68	469.12
151.09	469.14	152.21	469.19	155.52	469.18	155.61	469.18	156.62	469.18
157.83	469.16	159.83	469.12	160.11	469.14	160.94	469.15	162.42	469.08
164.26	469.07	165.17	469.02	165.41	469.02	165.94	469.01	168.66	469
168.87	468.99	169.72	468.99	170.85	469	172.75	469.02	173.1	469.03
173.53	469	174.13	468.97	175.58	468.97	177.18	468.99	177.62	468.98
178.15	468.98	180.01	468.99	181.25	469	182.02	468.98	182.26	468.97
182.99	468.97	185.34	468.92	185.66	468.91	186.34	468.88	189.28	468.79
189.36	468.79	189.38	468.79	190.39	468.81	191.4	468.79	193.5	468.72
194.4	468.69	194.52	468.69	195.03	468.69	197.64	468.64	198.37	468.58
198.76	468.54	199.71	468.52	202.06	468.49	202.98	468.45	203.13	468.45
203.5	468.44	206.37	468.33	207.37	468.35	207.5	468.35	208.21	468.38
211	468.5	211.41	468.51	212.17	468.53	214.54	468.61	215.49	468.65
215.74	468.66	216.59	468.69	219.59	468.79	220.03	468.79	221.09	468.82
221.18	468.82	221.5	468.83	224.57	468.94	225.64	469	225.67	469
225.9	469.02	229.13	469.21	229.54	469.24	230.27	469.27	232.52	469.41
233.65	469.47	234.25	469.49	234.75	469.51	235.67	469.57	238.08	469.76
239.21	469.79	239.22	469.79	239.34	469.8	242.48	470.05	242.92	470.08
243.56	470.11	246.31	470.35	246.62	470.37	246.76	470.38	247.72	470.42
249.02	470.5	250.87	470.65	251.5	470.69	251.89	470.7	254.08	470.82
254.71	470.85	254.9	470.87	255.72	470.87	256.51	470.91	258.65	471.04

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	88.65	.035	115.52	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
88.65	115.52	174.52	141.81	121.21	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

CULVERT

RIVER: North_Channel
REACH: Reach RS: 800

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 131
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		82.88	472.01		115.52	469.4	

Upstream Bridge Cross Section Data
Station Elevation Data num= 238

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.64	472.01	83.99	471.96
84.43	471.9	85.19	471.82	85.82	471.75	87.73	471.54	88.29	471.49
88.48	471.46	88.65	471.44	88.85	471.42	89.64	471.3	90.04	471.16
91.52	470.66	94.05	463.65	110.05	463.65	115.52	469.4	119.54	469.09
119.76	469.09	119.96	469.05	120.03	469.03	121.08	468.76	121.25	468.77
123.57	468.84	124.46	468.78	125.36	468.74	125.62	468.72	127.91	468.47
128.91	468.38	129.02	468.37	130.06	468.53	131.27	468.57	132.57	468.56
133.41	468.62	134.17	468.68	134.56	468.69	136.17	468.76	137.87	468.84
138.89	468.85	139	468.86	139.18	468.86	139.52	468.89	141.37	469.01
142.32	469.03	142.87	469.02	143.42	469.04	144.85	469.09	146.75	469.17
147.49	469.13	147.83	469.13	148.68	469.12	151.09	469.14	152.21	469.19
155.52	469.18	155.61	469.18	156.62	469.18	157.83	469.16	159.83	469.12
160.11	469.14	160.94	469.15	162.42	469.08	164.26	469.07	165.17	469.02
165.41	469.02	165.94	469.01	168.66	469	168.87	468.99	169.72	468.99
170.85	469	172.75	469.02	173.1	469.03	173.53	469	174.13	468.97
175.58	468.97	177.18	468.99	177.62	468.98	178.15	468.98	180.01	468.99
181.25	469	182.02	468.98	182.26	468.97	182.99	468.97	185.34	468.92
185.66	468.91	186.34	468.88	189.28	468.79	189.36	468.79	189.38	468.79
190.39	468.81	191.4	468.79	193.5	468.72	194.4	468.69	194.52	468.69
195.03	468.69	197.64	468.64	198.37	468.58	198.76	468.54	199.71	468.52
202.06	468.49	202.98	468.45	203.13	468.45	203.5	468.44	206.37	468.33
207.37	468.35	207.5	468.35	208.21	468.38	211	468.5	211.41	468.51
212.17	468.53	214.54	468.61	215.49	468.65	215.74	468.66	216.59	468.69
219.59	468.79	220.03	468.79	221.09	468.82	221.18	468.82	221.5	468.83
224.57	468.94	225.64	469	225.67	469	225.9	469.02	229.13	469.21
229.54	469.24	230.27	469.27	232.52	469.41	233.65	469.47	234.25	469.49
234.75	469.51	235.67	469.57	238.08	469.76	239.21	469.79	239.22	469.79

239.34	469.8	242.48	470.05	242.92	470.08	243.56	470.11	246.31	470.35
246.62	470.37	246.76	470.38	247.72	470.42	249.02	470.5	250.87	470.65
251.5	470.69	251.89	470.7	254.08	470.82	254.71	470.85	254.9	470.87
255.72	470.87	256.51	470.91	258.65	471.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.04	115.52	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
88.65	115.52	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

Downstream Deck/Roadway Coordinates num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		126.34	469.36		163.13	468.58	

Downstream Bridge Cross Section Data

Station Elevation Data num= 269

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	463.15
152.43	463.15	156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01
165.76	467.96	167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79
169.98	467.44	170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55
175.25	467.6	176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83
179.69	467.85	180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94
183.7	467.97	185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18
189.39	468.2	190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26
193.02	468.28	194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48
198.8	468.51	200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65
204.53	468.7	204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75
208.93	468.79	210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89
213.77	468.89	214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87
218.06	468.9	218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9
223.96	468.92	224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97
227.06	468.97	227.28	468.97	227.55	468.97	227.74	468.97	229.89	469
230.56	469.01	230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98
234.7	468.93	235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89
239.6	468.88	239.77	468.86	240.06	468.87	242.8	468.86	243.45	468.83

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  243.78  468.83  246.86  468.85  246.94  468.85  246.97  468.85  247.93  468.82
  250.05   468.7  251.09  468.67  251.54  468.66  252.15  468.67   254.8  468.64
  255.52  468.62  255.65  468.63  256.54   468.6  258.95  468.52  259.81  468.49
  260.13  468.47  260.91  468.42  264.32  468.35  264.43  468.35  264.76  468.35
  265.57  468.34  265.73  468.35  268.95  468.37  269.01  468.37     270  468.43
  270.63  468.45  273.49   468.6  273.66   468.6  274.61  468.65  277.36  468.71
  278.03  468.73  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23
  283.66  469.18  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45
  287.09  469.46  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89
  292.07  469.91  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13
  296.95  470.17  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37
  301.48  470.37  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68
  308.18  470.85  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08
  313.15  471.05  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .03  132.79     .11  156.85     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        126.34  163.13             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  115.52
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     5.5     7.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  98.3
Downstream Elevation =  462.98
           Centerline Station =  137.04

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     5.5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018      .17                   .2
1
Upstream   Elevation =  463.48
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           Centerline Station =  106.3
Downstream Elevation =  462.98
           Centerline Station =  148.68

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 735.8522

INPUT
Description:
Station Elevation Data    num=     278
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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	467.91
138.13	466.14	139.52	465.74	140.11	465.54	141.99	464.35	142.8	464.14
144.43	463.95	144.45	463.95	144.46	463.95	145.1	463.9	151.06	465.47
156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01	165.76	467.96
167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79	169.98	467.44
170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55	175.25	467.6
176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83	179.69	467.85
180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94	183.7	467.97
185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18	189.39	468.2
190.42	468.23	191.24	468.25	192.41	468.25	192.77	468.26	193.02	468.28
194.7	468.41	195.19	468.42	196.73	468.46	197.84	468.48	198.8	468.51
200.56	468.55	200.92	468.55	202.16	468.61	202.96	468.65	204.53	468.7
204.81	468.71	204.94	468.71	206.84	468.74	207.45	468.75	208.93	468.79
210.22	468.82	211.07	468.81	213.05	468.88	213.22	468.89	213.77	468.89
214.8	468.85	215.89	468.87	216.14	468.86	216.4	468.87	218.06	468.9
218.54	468.89	220.12	468.91	221.24	468.91	222.21	468.9	223.96	468.92
224.34	468.92	225.6	468.95	226.23	468.96	226.9	468.97	227.06	468.97
227.28	468.97	227.55	468.97	227.74	468.97	229.89	469	230.56	469.01
230.62	469.01	230.7	469.01	231.56	469.02	232.86	468.98	234.7	468.93
235.54	468.91	235.65	468.9	236.05	468.9	238.78	468.89	239.6	468.88
239.77	468.86	240.06	468.87	242.8	468.86	243.45	468.83	243.78	468.83
246.86	468.85	246.94	468.85	246.97	468.85	247.93	468.82	250.05	468.7
251.09	468.67	251.54	468.66	252.15	468.67	254.8	468.64	255.52	468.62
255.65	468.63	256.54	468.6	258.95	468.52	259.81	468.49	260.13	468.47
260.91	468.42	264.32	468.35	264.43	468.35	264.76	468.35	265.57	468.34
265.73	468.35	268.95	468.37	269.01	468.37	270	468.43	270.63	468.45
273.49	468.6	273.66	468.6	274.61	468.65	277.36	468.71	278.03	468.73
278.21	468.74	279.07	468.86	280.64	469.06	282.57	469.23	283.66	469.18

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  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45  287.09  469.46
  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89  292.07  469.91
  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13  296.95  470.17
  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37  301.48  470.37
  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68  308.18  470.85
  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08  313.15  471.05
  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34    .035  163.13    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        126.34  163.13             67.5   96.35  120.06             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 639.5066

INPUT
Description:
Station Elevation Data    num=     159
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.34    1.51  470.37     3.1  470.33    5.36  470.25    8.48  470.13
   10.32  470.17   11.85   470.2   13.49  470.39   15.15  470.29   16.94  470.42
   18.82  470.48   20.76  470.47   22.86  470.62   24.98  470.52   25.36  470.51
    27.2  470.51   27.23  470.51   28.25  470.54   28.32  470.54   32.57  470.16
   35.55  469.76   37.67  469.48   37.87  469.47   46.39  469.41   46.86  469.41
   48.13   469.4   50.44  469.39   51.16  469.34   51.49  469.32    52.4  469.31
    55.1  469.29   55.86  469.27   56.15  469.27   57.22  469.25   59.76   469.2
   60.35  469.21   60.78  469.19    62.4  469.15   64.39  469.07   64.88  469.04
   65.47  469.03   67.36  468.98   69.02  468.95   69.46  468.95      70  468.96
    70.9  468.91   73.45  468.78   75.71   468.7   79.84  469.03   83.01  469.04
   85.24  468.72    87.8  468.61   91.06  468.33   91.07  468.33   91.08  468.33
   91.12  468.33   92.35  468.15      94  467.93   96.18  467.63   96.33  467.61
   96.84  467.37   99.61  466.11  100.61  465.59  100.62  465.58  100.68  465.56
  104.04  463.99   104.8  463.65  105.84  463.44  108.41  463.18  108.87  463.52
  109.39  463.92  112.56  465.49  112.93  465.68  113.01  465.72  113.96  466.15
  116.67  468.29   117.5  468.95  118.46  469.24  118.48  469.24  118.58  469.26
   121.9  469.76  122.09  469.75  122.52  469.74  122.98  469.77   126.1   469.6
  126.37  469.58  126.52  469.58  127.35  469.57  128.89   469.6  130.76  469.64
  131.55  469.64  131.78  469.64  135.11  469.73  135.22  469.73  135.36  469.73
  136.28  469.76  137.42  469.77  139.66  469.77  140.38  469.78  140.64  469.79
  143.52  469.85  144.15  469.87  144.35  469.88  145.23  469.93  146.28  469.93
  148.69  469.99  149.24     470  149.74  469.97  152.42  470.03  153.31  470.06
  154.26  470.03  154.36  470.03  154.46  470.03   157.9  470.14  158.13  470.15
  158.99   470.2  160.79  470.12  162.57  470.14   162.9  470.18   163.6  470.18
  165.58  470.41  167.13  470.71  169.49  470.65   171.6  470.85  172.39  471.05
  174.19  471.25  176.59  471.17  180.43  470.55  180.58   470.5  181.18  470.54
  181.64  470.57  182.08  470.58   185.1  470.61  185.81  470.64  186.17  470.65
  188.19  470.78  189.82  470.85   190.6  470.73  193.31  470.77  194.18  470.78
  194.36  470.82  195.26  470.86   198.2  470.93  200.62  471.15  201.62   471.2
   203.3  471.46  203.94  471.41  205.11     472  207.54  473.83  208.86  474.83
  209.23  474.93  213.58  475.15  217.78  475.03   218.1  475.04  218.63  475.01
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  221.58  474.89  226.05  474.98  235.18  475.18  235.68  475.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   83.01    .035  122.09    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         83.01  122.09              100  100.01     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   83.01  469.04       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.23 480.456

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 539.4938

INPUT
Description:
Station Elevation Data    num=     210
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.43     .16  467.42     .85  467.41    1.44  467.37     4.2  469.23
    4.85   469.7    6.07  469.77     6.1  469.77    6.19  469.77    9.41  469.77
    9.63  469.76   10.73  469.74   12.09  469.73   14.01  469.73   14.94  469.71
   15.33   469.7   17.94  469.66   18.67  469.65   19.67  469.63   19.92  469.63
   20.86  469.61   22.87  469.58   23.72  469.55   24.61  469.49   25.35  469.36
   26.23  469.28   29.18  468.98   30.59  468.98   31.78  469.06   34.04  469.24
   36.93  468.98   37.42  468.95   37.58  468.94   38.76  468.92   41.01  468.88
   41.95  468.86   42.37  468.85   43.29  468.84   45.57  468.78   46.64  468.74
   47.01  468.74   47.95  468.74   50.13  468.66   51.27  468.64   51.74  468.64
   52.58  468.65   54.03  468.64   55.93  468.57   56.68  468.57   57.21  468.55
   58.58  468.52   60.59  468.46   61.48   468.4   61.84  468.38   62.73  468.38
   65.18  468.36   66.47  468.39   66.57  468.39   66.81  468.39   69.84  468.38
   71.06  468.31   71.07  468.31   71.09  468.31   74.28   468.3   75.61  468.31
   75.63  468.31   75.67  468.31   78.88  468.27   79.75  468.28   80.12  468.29
   81.05   468.3   83.24  468.28   83.99  468.28   84.49  468.24   85.88  468.24
   87.64  468.23   88.19  468.18   88.89  468.16   91.32  468.53   91.93  468.63
    92.1   468.6   93.12  468.27    93.8  468.03   93.87  468.01    96.2  467.38
   96.57  467.17   97.42  466.69   99.64  465.34  100.44  464.87  100.78  464.66
  101.68  464.13  103.76  463.32  104.86  462.95  105.51  463.15  106.08  463.26
  106.94  463.79  109.27  464.87  109.99  465.19   110.5  465.68  111.42   466.4
  113.86  469.21  114.93  469.41  115.11  469.45   117.8  469.74  118.37  469.79
  118.49  469.81  119.57  469.95  120.95  469.93  121.07  469.93  122.76  469.89
  123.08  469.86  124.07  469.81  126.21  469.82  127.22  469.83   127.4  469.84
  128.43  469.81  129.24  469.82  131.59  469.85  132.38  469.85  132.87  469.86
   135.5  469.86  136.08  469.86   136.2  469.86  137.37  469.87  138.45  469.88
  140.51  469.87  141.22  469.91  141.72  469.94  143.53  469.98  145.01     470
  145.63     470  146.32  470.02   147.4  470.03  149.54  470.08  150.58  470.08
  150.82  470.08  152.14   470.1  154.16  470.12  154.46  470.13  155.45  470.13
   157.8  470.22  158.73  470.27  159.81  470.26  160.04  470.26  160.25  470.27
  163.39  470.36  163.99  470.35  164.67  470.36  167.15   470.4  167.95  470.42
  168.15  470.43  169.16  470.46  172.02  470.41  172.42  470.41  172.46  470.41
  173.73  470.54  175.53  470.53  177.01  470.53   177.7  470.55  178.26  470.56
  178.47  470.56   181.4  470.62   181.6  470.63  182.72  470.66  184.68  470.65
   185.9  470.65  186.76   470.7  187.22  470.71  188.12  470.72  190.42  470.71
  191.65  470.71  191.68  470.71  191.74  470.71     195  470.76  196.04  470.79
  196.31   470.8  196.91   470.8  199.53  470.78  200.59  470.83   200.8  470.84
   201.3  470.84   204.1  470.85  205.06  470.82  205.38  470.81  206.24  470.82
  208.68  470.88  209.53  470.95  209.96  470.97  211.11  470.99  213.28  471.02
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  214.05  471.04  214.56  471.05  216.85  471.03  217.81  471.03  218.17  471.03
  219.12  471.08  221.91  471.19  222.34   471.2  222.67  471.19  223.68  471.17
  225.05  471.19  226.99  471.22  227.88  471.22  228.21  471.22  228.65  471.23
  231.47  471.26   232.5  471.27  232.78  471.28  233.82  471.29  235.68  471.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   91.93    .035  120.95    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         91.93  120.95            112.3  112.27  112.24             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   91.93  468.63       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 427.2193

INPUT
Description:
Station Elevation Data    num=     196
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.48     .89  467.36    2.41  468.18    2.42  468.18    2.49  468.18
    5.46  468.13    6.22  468.12    7.02  468.09    9.27  468.11   10.04  468.12
   11.57  468.15   11.61  468.15   11.63  468.15    14.7  468.15   14.81  468.14
   16.21  468.12    18.7  468.08   19.26  468.08   27.91   468.2   28.26  468.21
   29.55   468.1   30.33  467.94   31.79  467.94   33.41   467.9   34.52  467.87
   35.06  467.85   36.64  467.81   37.94  467.78   38.48  467.79   39.55  467.81
    41.6  467.76   42.63  467.73   43.75   467.7   44.21  467.69   46.13  467.67
   47.23  467.66    47.5  467.66   48.84  467.63   51.56   467.6   51.93   467.6
   53.42  467.67   53.46  467.67   53.55  467.67   56.59  467.74   57.11  467.74
   58.13  467.74   60.65  467.68   61.18  467.67    61.3  467.67   62.82  467.67
   65.62  467.64   65.84  467.64   65.95  467.64   67.32  467.58    69.2  467.47
   70.24  467.44   70.75  467.47   71.88  467.59   73.12  467.51   74.39  467.49
   76.07  467.45   78.83  467.54   79.27  467.56    79.4  467.57      84  467.44
   87.31  467.25   87.87  467.32   88.49   467.4   90.21  466.88   91.16   466.5
    92.2  466.06   92.62  465.97   95.66  464.33   96.43   463.8   97.78  463.26
   97.92   463.2  100.48  462.91  101.02  462.92  101.43  463.08  102.12  463.37
  102.37  463.42  103.05   463.9  105.29  465.25  105.93  465.71  106.81  466.45
  109.16     468  109.85  468.34  110.31  468.64  111.37  469.12  113.04  469.27
  114.39   469.4  114.74  469.42   115.4  469.44  115.84  469.45  117.13  469.36
  118.75  469.25   120.2  469.27  120.33  469.27  120.78  469.27  123.22  469.23
  123.84  469.26  124.69  469.26  127.29  469.29  127.58  469.29  128.38  469.33
  129.12  469.36  129.43  469.37  132.06  469.42  133.03   469.4  133.62  469.42
  136.09  469.47  136.52  469.47  137.26  469.51  137.99  469.54  138.85  469.55
  140.98  469.57  142.04  469.57  142.58  469.57  145.44  469.63   145.5  469.63
  145.56  469.63  147.08  469.67  148.98  469.69  150.13  469.71  151.42  469.79
  151.71  469.81  151.98  469.82  154.73  469.91   155.5  469.95  156.31  469.97
  159.12  469.95  159.35  469.95   159.8  469.95   160.9  469.96  161.81  469.98
  163.95  470.05  165.17  470.07  165.43  470.07  166.13  470.09  168.38  470.15
  169.22  470.16  169.99  470.19  171.64  470.18  172.98  470.18  173.63  470.18
  174.49  470.16  176.06  470.19  177.38  470.24  178.65  470.28  178.96  470.28
  181.55   470.3   181.9   470.3  182.47  470.34  183.47   470.4  186.33   470.4
   186.4   470.4  186.45   470.4  187.92  470.44  190.84  470.49     191  470.49
  191.11  470.49  192.57  470.54  195.48  470.62  195.52  470.62  195.55  470.62
  197.07  470.69  199.65  470.74  200.09  470.75  200.29  470.76  201.67  470.76
  204.41  470.85  204.65  470.86  204.77  470.86  206.24  470.87  209.07  470.96
  209.28  470.96  209.39  470.96  210.83  470.95   213.3  470.97  213.81  470.98
   214.1  470.98  215.39  471.06  216.39  471.09  218.32  471.12  219.22  471.14
  219.98  471.17  221.67   471.2     223  471.24   223.6  471.27  224.51  471.28
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  227.22   471.3   227.5   471.3  227.62   471.3  229.11  471.34  231.18  471.39
  231.51  471.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   87.87    .035  114.74    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         87.87  114.74           125.23  125.29   125.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   27.91   478.2

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 301.9247

INPUT
Description:
Station Elevation Data    num=     168
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.04   18.59  470.39    19.6   470.1   20.67  469.86   21.83  469.69
   23.08  469.52   24.39  469.48   25.85  469.47    25.9  469.47   27.75  469.52
   27.83  469.52   27.97  469.52   30.43  469.63   32.08  469.52   32.34  469.49
   32.71  469.46   35.09  469.16   36.84  469.09   36.99  469.08   37.17  469.07
   39.72  468.97   41.46  468.89   41.59  468.88   41.85  468.88   44.38  468.84
   46.18  468.79   46.25  468.79   46.35  468.78   49.04  468.69   50.47  468.66
   50.88  468.65   51.51  468.64   53.61  468.61   54.77  468.58   55.58  468.56
   56.69  468.51    58.3  468.45   59.34  468.46   60.07  468.46   60.94  468.45
   62.73  468.43   63.98   468.4   64.65  468.39   65.64  468.39   67.29  468.39
   68.16  468.36   69.13  468.32   70.31   468.3   71.69  468.24   72.62  468.12
   73.49  468.05   74.64  468.05   76.05  468.07   77.27  467.85   77.86  467.76
   78.07  467.69   80.09  467.01   80.34  466.94   80.42   466.9   82.09  466.11
   84.07  465.56   84.61  465.39   85.22  465.07   86.39  464.49    87.7  464.16
   88.88  463.84      90  463.05   90.65  462.57   91.38  462.92   93.34  463.75
      94  464.44   95.15  465.32   97.35  466.49   97.78  466.76   98.26  466.92
   99.55  467.57  100.75  467.72  101.69  467.94  104.71   468.4   104.9  468.43
  106.81  468.31  107.24  468.27  108.55   468.1  109.37  468.08  111.17  468.09
  112.58  468.07  113.04  468.06  115.43  468.05  115.63  468.05  116.37  468.07
  124.47  468.26  125.12  468.28  126.33  468.32  128.35   468.3  128.93  468.29
  129.74  468.31  130.71  468.35  133.36   468.3  133.39   468.3  133.41   468.3
   135.3  468.29  136.39  468.27  137.92  468.24  139.46  468.21  139.79  468.21
  140.48  468.23  142.52   468.3  143.58   468.3  144.42  468.29  146.67  468.36
  147.11  468.38  148.98  468.45  149.01  468.45  149.17  468.45  151.74  468.48
  152.36   468.5  153.61  468.59  154.94  468.62  156.34  468.65  157.51  468.72
  158.11  468.76  158.84  468.77  160.77  468.81  162.28   468.9   162.7  468.92
  163.16  468.93  165.37  468.93  167.01  468.94  167.17  468.94  167.53  468.95
   169.8  468.99  170.53     469  171.67  468.96  174.17  468.97  174.29  468.97
  174.48  468.98  176.17  469.05  177.89  469.09  178.79   469.1  179.82  469.12
  180.63  469.13  181.81  469.13  183.39  469.16  185.19  469.25  185.29  469.25
  185.43  469.26  187.91  469.32  189.64  469.41  189.75  469.42  192.46  469.48
  192.51  469.48  192.81  469.48  194.38  469.48  196.99  469.58  197.07  469.58
  197.14  469.58  198.94  469.66  201.62  469.71  201.67  469.71  201.71  469.71
  203.54  469.77  205.26  469.82  206.26  469.86  207.19  469.88   208.1  469.89
  208.68   469.9  210.73  469.95  211.98  469.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   74.64    .035  104.71    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
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         74.64  104.71           150.72  127.44  115.85             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   31.99 480.035

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 174.488

INPUT
Description:
Station Elevation Data    num=     304
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.88     .43  470.88     .77  470.88    2.37  470.89    4.12  470.86
    4.32  470.85    4.65  470.84    6.23  470.85    7.23  470.85    8.13  470.86
    9.12  470.91   10.02  470.92   10.83  470.95   11.99  470.96      14  470.97
   15.85  470.99   17.49  471.02   17.75  471.02   18.55  470.99   20.19  470.95
   20.74  470.95   22.05  470.98   23.25  470.91   23.73  470.88   24.26  470.89
   26.04  470.92   27.47  470.94    28.2  470.93   28.86  470.95   29.85  470.97
   30.92  470.96    31.4  470.95   31.92  470.94   32.96   470.9   33.96  470.94
   34.95  470.95   37.39  470.89   37.58  470.88   37.77  470.88   39.17  470.92
   40.64  470.92    40.8  470.92   41.25  470.92   43.33  470.94   44.08  470.93
   45.27  470.91   46.71  470.93   46.99  470.94   47.24  470.94   49.43  470.94
   50.62  470.95   51.55  470.93   52.67  470.91   53.35   470.9   53.92  470.88
   55.44  470.86   57.31  470.83    57.6  470.83   57.94  470.82   59.44  470.79
   60.69  470.81   61.34  470.83   62.43  470.82   63.38  470.81   63.93  470.81
   65.36  470.77   67.19  470.76   67.33  470.76    67.5  470.76   69.22  470.76
   70.58  470.85   71.19  470.89    72.3  470.99   73.15  471.06   73.67  471.08
   76.77  470.87   77.07  470.85   77.14  470.85   77.37  470.85   79.59  470.83
   80.29  470.84   81.49  470.85   82.67  470.87   83.15  470.87   83.61  470.86
   85.38  470.82   86.86  470.83   87.48  470.83   88.07  470.83   89.02  470.82
   90.01  470.81   90.97  470.82   93.16  470.85   93.78  470.84   96.26  470.81
   96.52  470.81    98.9  470.84   99.41  470.85   99.46  470.85  101.85  470.84
  102.57  470.84  103.79  470.86  104.11  470.86  105.64  470.86  106.27  470.86
  107.81  470.83  108.39  470.82  108.64  470.82  110.12  470.83  111.75  470.81
   111.8  470.81  111.85   470.8  113.77  470.62  114.86  470.44  115.68  470.27
  116.81  469.84   117.5   469.6     118  469.56  119.38  469.37  120.99  468.74
  121.28  468.66  121.69  468.52  123.21  468.01  124.31  467.74  125.02  467.55
  125.92  467.43  126.69  467.35  127.26  467.11  128.58  466.73  130.57  466.25
   130.6  466.24  130.63  466.22  132.18  464.72  133.46  464.08  133.85  463.87
  134.45  463.47  135.88  462.81  136.83  462.69  138.26  462.43  139.44   462.3
  141.47  462.03  143.33   461.9  144.47  461.95  147.04  462.64  149.63   463.9
  151.42  464.08  153.29  464.92  156.18  466.69  156.29  466.74  156.33  466.76
  156.65  466.82  158.45  467.11   159.1  467.29  160.18  467.63  161.16  467.84
  161.76  467.86  162.44  467.92  163.52  467.98  165.41  468.06  165.44  468.06
  165.46  468.06  167.04   468.1  168.44  468.12  168.65  468.12  168.89  468.12
  169.02  468.13  170.37  468.16  171.86  467.82  172.12  467.79  172.42  467.75
  173.91  467.67  175.24  467.65  175.69  467.62  176.37  467.61  177.45  467.59
  178.14  467.59  179.65  467.55  181.68  467.58  182.01  467.59  182.38   467.6
  183.63   467.6  184.71  467.66   185.4  467.69  186.47  467.71  187.52  467.73
  188.19  467.74  189.23  467.78  190.36  467.79  190.76  467.79  191.14  467.79
  192.88  467.79  194.76  467.79   195.2  467.78  197.78  467.67  197.91  467.67
  198.15  467.68  200.26  467.72  201.35  467.74  202.73  467.71  204.32   467.7
  205.27   467.7  207.19  467.71  207.73  467.71  207.99  467.72  210.01  467.83
   210.9  467.86  212.67  467.88  214.58  467.89  215.38  467.88  217.36  467.89
  217.61  467.89  217.82   467.9  219.26  467.91  220.94  467.92  220.96  467.92
     221  467.92  222.98  467.96   223.9  467.95  225.04  467.95  226.63  467.97
  227.15  467.98  227.52  467.97  229.11  467.96  230.35     468  231.02  468.01
   231.8  468.01  232.91  468.01  233.87  468.03   234.7  468.03  235.94  468.07
  236.43  468.08  236.75  468.08  238.34  468.11  240.26  468.14  240.29  468.14
  240.32  468.14  241.95   468.2  243.19  468.24  243.73  468.25  244.59  468.28
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  245.96  468.34  246.82  468.35  247.79  468.37  249.11  468.48  249.39   468.5
   249.6  468.51  251.77   468.6  253.41  468.67  253.92  468.68  254.47  468.72
  255.42  468.77  256.28  468.82  257.47  468.89   259.9  469.02  260.12  469.03
  260.36  469.05   261.6  469.13  262.68   469.2  263.12  469.23  263.45  469.25
  264.77  469.32  266.42  469.38  266.45  469.38  266.49  469.38  268.92   469.5
  269.32  469.51  270.79  469.58  272.05  469.62  272.53  469.63  273.09  469.63
  274.77  469.69  275.86  469.75  276.86  469.76  277.73  469.74  278.64  469.71
  279.68  469.72  280.65  469.73  282.45  469.76  282.85  469.76  283.28  469.78
  284.83  469.85  286.26  469.91  286.89  469.93     289  469.89  289.13  469.89
  289.33   469.9  291.34  469.92  292.72  469.89   293.5  469.88  295.43  469.93
  295.51  469.93  295.54  469.93  297.74  470.02  299.45  470.12  299.88  470.13
  300.88  470.11  301.67   470.1  302.01   470.1  304.13  470.14  305.92  470.18
  306.44   470.2  307.39  470.26   308.2  470.31  308.51  470.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .035  103.79    .035  170.37    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        103.79  169.02           126.48  101.82   81.84             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  169.02  308.51 468.134       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 72.67111

INPUT
Description:
Station Elevation Data    num=     181
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.46     .01  469.46     2.1  469.53    2.13  469.53     4.2  469.56
    4.23  469.56    6.32   469.6    6.36   469.6    8.42  469.57    8.46  469.57
   10.52   469.6   10.56   469.6   12.62  469.54   12.66  469.54   14.72   469.6
   14.76   469.6   16.82   469.5   16.86   469.5   18.92   469.5   18.97   469.5
   21.02  469.54   21.06  469.54   23.11  469.57   23.19  469.57   25.22   469.6
    25.3   469.6   27.33  469.64   27.39  469.64   29.43  469.67   29.49  469.67
   31.52  469.73    31.6  469.73   33.65  469.73   33.72  469.73   35.74  469.77
   35.82  469.77   37.85  469.83   37.92  469.83   39.94  469.87   40.02  469.87
   42.04  469.93   42.12  469.93   44.13   469.9   44.24   469.9   46.23   469.9
   46.35   469.9   48.37  469.82   48.48  469.82   50.07   469.7   50.47  469.67
   50.59  469.65   52.61  468.89    52.7  468.86   54.75  468.17   54.83  468.14
   58.95  466.58   59.02  466.56   59.08  466.54   61.16  466.19   61.21  466.17
   63.26  465.34    63.3  465.33   65.39  464.59   65.43  464.57   67.53   463.4
   67.54   463.4   67.94  463.07   69.67  461.63   69.69  461.62    71.8  461.08
   71.82  461.08    73.9  461.27   73.92  461.27      76  461.57   76.02  461.57
   76.03  461.58   80.46  464.14   81.48  464.64   86.27  467.08   86.37  467.13
   86.47  467.16   88.47  467.41   88.57  467.43   90.55  467.96   90.69  467.99
   92.66  468.26   92.77  468.27   92.79  468.27   94.75     468   94.89  467.96
   96.88  467.85   97.02  467.85   98.98  467.91   99.12  467.92  101.08  468.01
  101.22  468.01  103.18  468.14  103.32  468.14  105.32  468.14  105.45  468.14
  107.41   468.2  107.57   468.2  109.51  468.23  109.67  468.24  111.61  468.27
  111.78  468.28  113.74  468.31   113.9  468.31  115.84   468.4     116   468.4
  117.93  468.46  118.09  468.47  120.03  468.53   120.2  468.53  122.14  468.49
  122.31   468.5   124.2  468.53  124.37  468.54   126.3  468.59  126.47   468.6
  128.43  468.66  128.62  468.67  130.52  468.78  130.73  468.78  132.63  468.78
  132.83  468.79  134.75  468.88  134.96  468.89  136.83  468.94  137.03  468.96
  138.92  469.08  139.14  469.08  141.06  469.08  141.26  469.09  143.16  469.15
  143.36  469.16  145.25  469.23  145.46  469.23  147.35  469.26  147.59  469.27
  149.46  469.36  149.69  469.37  151.51  469.45  151.75  469.46  153.61  469.52
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153.85	469.53	155.75	469.65	155.99	469.66	157.85	469.82	158.09	469.83
159.95	469.91	160.19	469.92	162.05	469.98	162.28	469.98	163.63	470
164.09	470.02	164.41	470.03	166.7	470.06	166.71	470.06	166.72	470.06
168.98	470.14	170.22	470.12	171.13	470.12	173.01	470.15	173.21	470.15
173.54	470.15	175.5	470.16	176.66	470.18	177.58	470.18	179.23	470.23
179.55	470.24	180.35	470.27	182.17	470.33	182.88	470.34	184.17	470.38
185.56	470.4	186.17	470.4	187.8	470.44	188.91	470.47	189.33	470.46
190.03	470.46								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	50.07	.035	92.77	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50.07	92.77	149.26	72.67	167.63	.1	.3

SUMMARY OF REACH LENGTHS

River: North_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1459.614	89.03	89.03	89.04
Reach	1370.583	100.01	100	100
Reach	1270.58	100.01	100	100
Reach	1170.577	58.01	58	58
Reach	1143.195	Culvert		
Reach	1112.573	100.02	100	100
Reach	1012.57	127.93	134.9	144.08
Reach	877.6657	174.52	141.81	121.21
Reach	800	Culvert		
Reach	735.8522	67.5	96.35	120.06
Reach	639.5066	100	100.01	100
Reach	539.4938	112.3	112.27	112.24
Reach	427.2193	125.23	125.29	125.4
Reach	301.9247	150.72	127.44	115.85
Reach	174.488	126.48	101.82	81.84
Reach	72.67111	149.26	72.67	167.63

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: North_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1459.614	.1	.3
Reach	1370.583	.1	.3
Reach	1270.58	.1	.3
Reach	1170.577	.1	.3
Reach	1143.195	Culvert	
Reach	1112.573	.1	.3
Reach	1012.57	.1	.3
Reach	877.6657	.1	.3
Reach	800	Culvert	
Reach	735.8522	.1	.3
Reach	639.5066	.1	.3
Reach	539.4938	.1	.3
Reach	427.2193	.1	.3

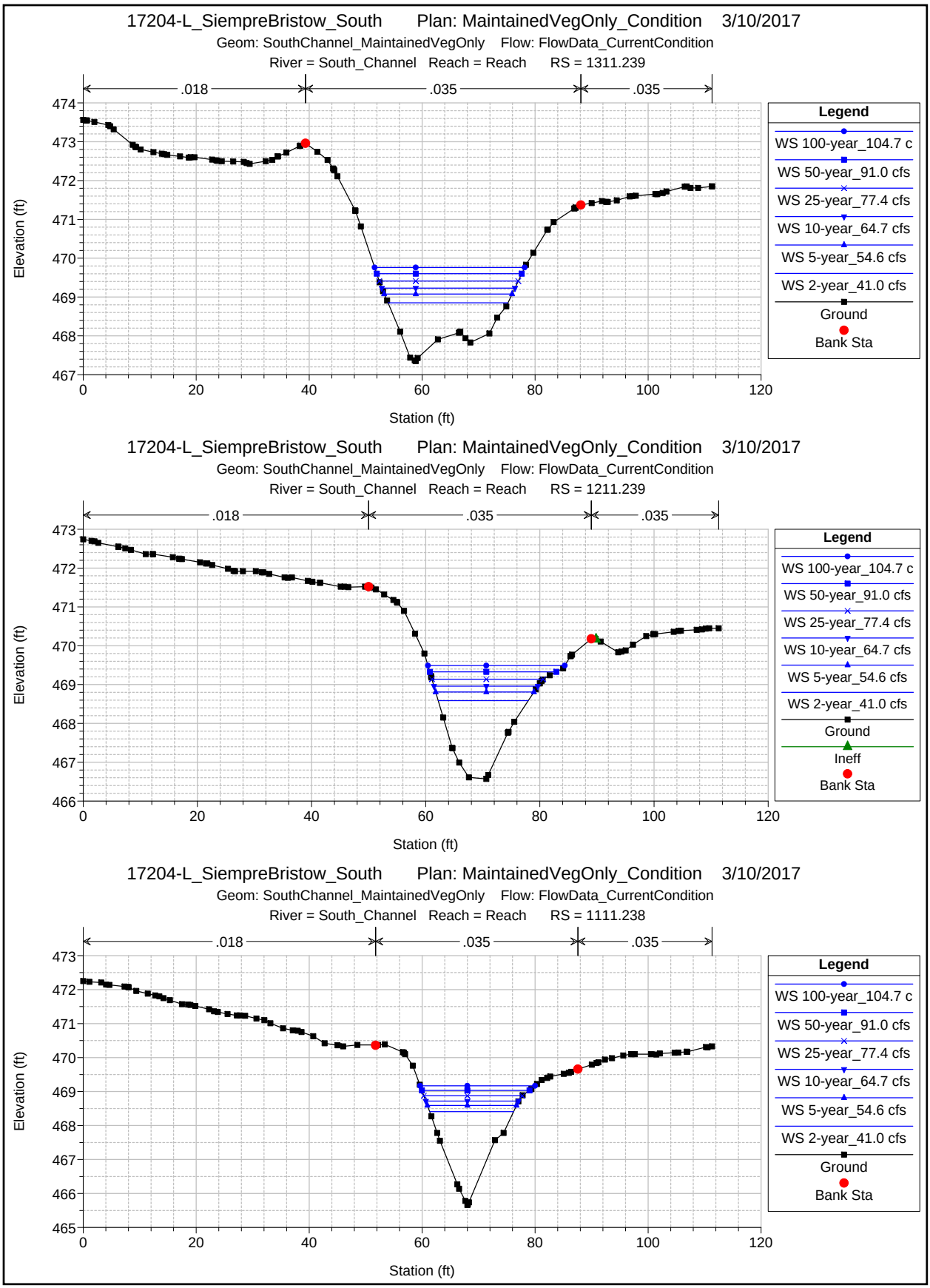
Reach	301.9247	.1	.3
Reach	174.488	.1	.3
Reach	72.67111	.1	.3

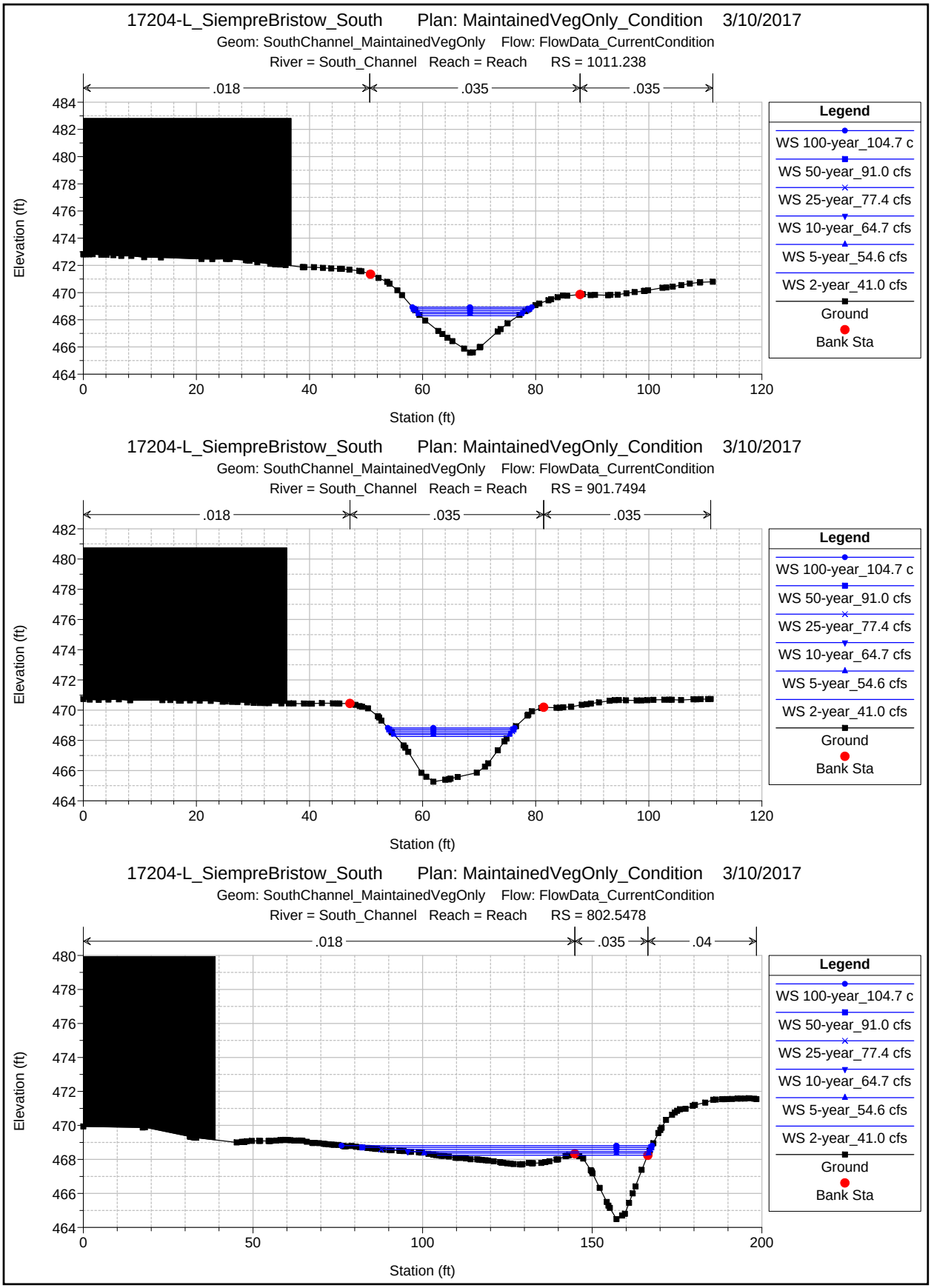
HEC-RAS Plan: VegOnly River: South_Channel Reach: Reach

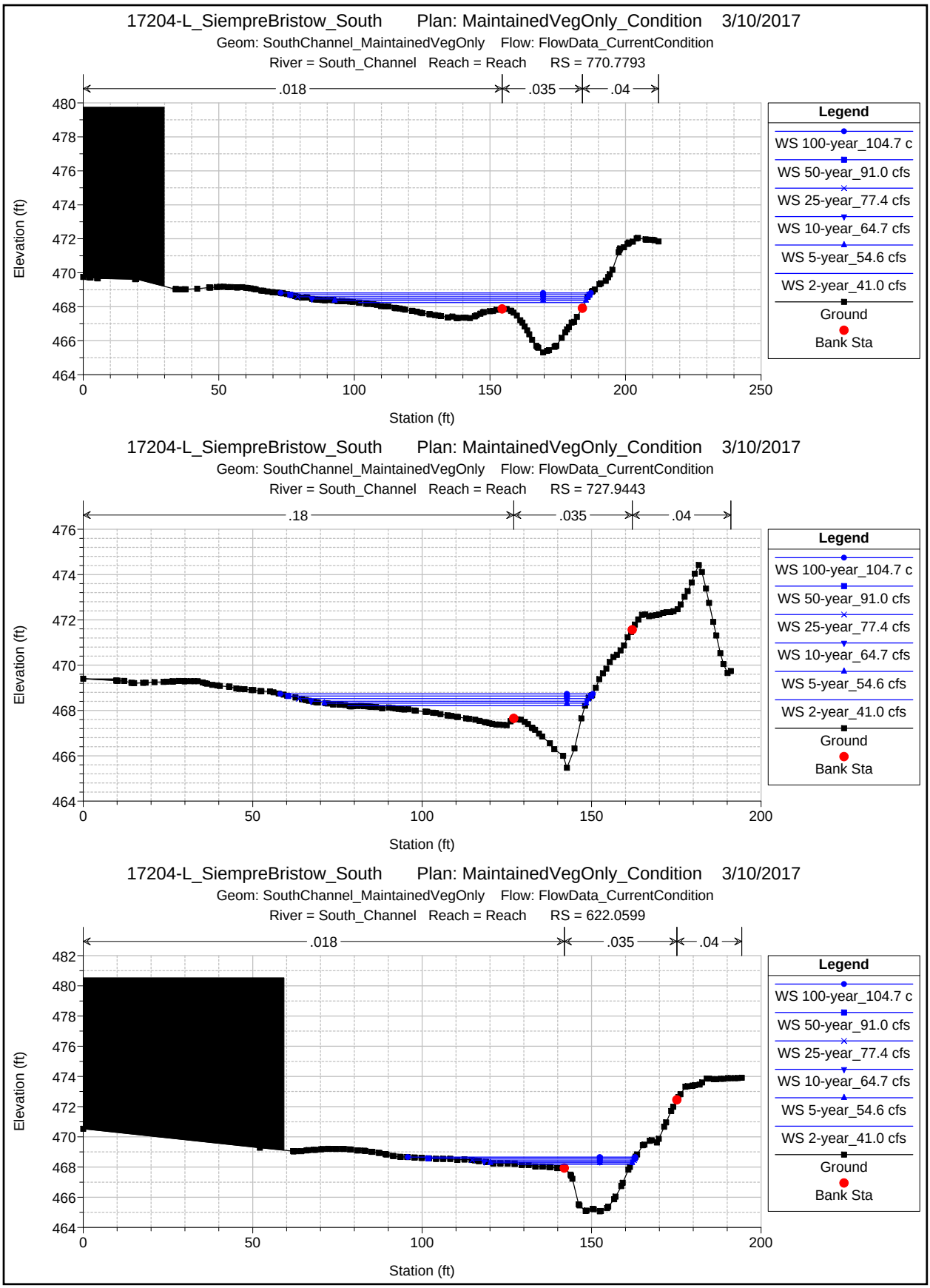
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1311.239	2-year_41.0 cfs	41.00	467.35	468.85	468.42	468.93	0.003637	2.27	18.07	21.22	0.43
Reach	1311.239	5-year_54.6 cfs	54.60	467.35	469.08	468.54	469.17	0.003122	2.37	23.07	22.65	0.41
Reach	1311.239	10-year_64.7 cfs	64.70	467.35	469.23	468.63	469.32	0.002880	2.43	26.60	23.57	0.40
Reach	1311.239	25-year_77.4 cfs	77.40	467.35	469.41	468.72	469.51	0.002640	2.50	30.95	24.60	0.39
Reach	1311.239	50-year_91.0 cfs	91.00	467.35	469.60	468.82	469.70	0.002401	2.55	35.71	25.66	0.38
Reach	1311.239	100-year_104.7 c	104.70	467.35	469.76	468.91	469.87	0.002301	2.62	39.90	26.55	0.38
Reach	1211.239	2-year_41.0 cfs	41.00	466.57	468.59		468.66	0.002064	2.14	19.18	15.78	0.34
Reach	1211.239	5-year_54.6 cfs	54.60	466.57	468.81		468.90	0.002308	2.39	22.81	17.21	0.37
Reach	1211.239	10-year_64.7 cfs	64.70	466.57	468.96		469.06	0.002427	2.54	25.45	18.20	0.38
Reach	1211.239	25-year_77.4 cfs	77.40	466.57	469.14		469.25	0.002507	2.68	28.85	19.50	0.39
Reach	1211.239	50-year_91.0 cfs	91.00	466.57	469.33		469.45	0.002674	2.78	32.78	22.15	0.40
Reach	1211.239	100-year_104.7 c	104.70	466.57	469.49		469.62	0.002736	2.87	36.53	23.96	0.41
Reach	1111.238	2-year_41.0 cfs	41.00	465.66	468.41		468.47	0.001648	2.03	20.24	14.86	0.31
Reach	1111.238	5-year_54.6 cfs	54.60	465.66	468.59		468.68	0.002057	2.37	23.04	15.78	0.35
Reach	1111.238	10-year_64.7 cfs	64.70	465.66	468.72		468.82	0.002297	2.58	25.09	16.43	0.37
Reach	1111.238	25-year_77.4 cfs	77.40	465.66	468.88		469.00	0.002538	2.79	27.76	17.44	0.39
Reach	1111.238	50-year_91.0 cfs	91.00	465.66	469.03		469.17	0.002839	2.97	30.61	19.06	0.41
Reach	1111.238	100-year_104.7 c	104.70	465.66	469.17		469.32	0.003078	3.14	33.33	20.35	0.43
Reach	1011.238	2-year_41.0 cfs	41.00	465.58	468.29		468.34	0.001023	1.66	24.65	17.33	0.25
Reach	1011.238	5-year_54.6 cfs	54.60	465.58	468.44		468.50	0.001386	2.00	27.26	18.20	0.29
Reach	1011.238	10-year_64.7 cfs	64.70	465.58	468.55		468.62	0.001620	2.22	29.19	18.81	0.31
Reach	1011.238	25-year_77.4 cfs	77.40	465.58	468.68		468.77	0.001846	2.43	31.79	19.62	0.34
Reach	1011.238	50-year_91.0 cfs	91.00	465.58	468.81		468.92	0.002069	2.65	34.40	20.42	0.36
Reach	1011.238	100-year_104.7 c	104.70	465.58	468.92		469.05	0.002300	2.85	36.75	21.12	0.38
Reach	901.7494	2-year_41.0 cfs	41.00	465.26	468.26		468.28	0.000269	1.05	39.10	19.93	0.13
Reach	901.7494	5-year_54.6 cfs	54.60	465.26	468.39		468.42	0.000399	1.31	41.75	20.51	0.16
Reach	901.7494	10-year_64.7 cfs	64.70	465.26	468.49		468.52	0.000496	1.48	43.67	20.93	0.18
Reach	901.7494	25-year_77.4 cfs	77.40	465.26	468.61		468.65	0.000606	1.67	46.27	21.47	0.20
Reach	901.7494	50-year_91.0 cfs	91.00	465.26	468.72		468.78	0.000725	1.86	48.81	21.99	0.22
Reach	901.7494	100-year_104.7 c	104.70	465.26	468.82		468.89	0.000852	2.05	50.99	22.43	0.24
Reach	802.5478	2-year_41.0 cfs	41.00	464.49	468.24		468.25	0.000201	0.88	51.13	59.45	0.11
Reach	802.5478	5-year_54.6 cfs	54.60	464.49	468.37		468.38	0.000254	1.02	59.19	66.17	0.13
Reach	802.5478	10-year_64.7 cfs	64.70	464.49	468.46		468.48	0.000275	1.09	65.46	71.20	0.13
Reach	802.5478	25-year_77.4 cfs	77.40	464.49	468.59		468.60	0.000281	1.14	74.79	79.34	0.14
Reach	802.5478	50-year_91.0 cfs	91.00	464.49	468.71		468.73	0.000277	1.18	84.73	85.19	0.14
Reach	802.5478	100-year_104.7 c	104.70	464.49	468.81		468.83	0.000282	1.22	93.72	91.54	0.14
Reach	770.7793	2-year_41.0 cfs	41.00	465.31	468.24		468.25	0.000092	0.56	76.08	83.52	0.08
Reach	770.7793	5-year_54.6 cfs	54.60	465.31	468.37		468.38	0.000112	0.65	87.29	92.72	0.09
Reach	770.7793	10-year_64.7 cfs	64.70	465.31	468.46		468.47	0.000122	0.70	96.37	101.37	0.09
Reach	770.7793	25-year_77.4 cfs	77.40	465.31	468.59		468.60	0.000121	0.73	109.32	107.03	0.09
Reach	770.7793	50-year_91.0 cfs	91.00	465.31	468.71		468.72	0.000118	0.75	122.50	110.35	0.09
Reach	770.7793	100-year_104.7 c	104.70	465.31	468.81		468.82	0.000120	0.78	134.00	114.44	0.09
Reach	727.9443	2-year_41.0 cfs	41.00	465.47	468.21		468.24	0.000684	1.34	46.69	70.02	0.20
Reach	727.9443	5-year_54.6 cfs	54.60	465.47	468.32		468.36	0.000923	1.62	55.11	77.26	0.24
Reach	727.9443	10-year_64.7 cfs	64.70	465.47	468.41		468.45	0.001069	1.80	61.76	81.47	0.26
Reach	727.9443	25-year_77.4 cfs	77.40	465.47	468.53		468.58	0.001179	1.96	71.51	85.35	0.27
Reach	727.9443	50-year_91.0 cfs	91.00	465.47	468.64		468.70	0.001312	2.12	81.44	89.37	0.29
Reach	727.9443	100-year_104.7 c	104.70	465.47	468.73		468.80	0.001445	2.27	89.95	92.20	0.30
Reach	622.0599	2-year_41.0 cfs	41.00	465.07	468.18		468.20	0.000220	0.98	43.10	33.54	0.12
Reach	622.0599	5-year_54.6 cfs	54.60	465.07	468.28		468.30	0.000329	1.23	46.86	41.86	0.15
Reach	622.0599	10-year_64.7 cfs	64.70	465.07	468.36		468.38	0.000400	1.37	50.06	43.87	0.16
Reach	622.0599	25-year_77.4 cfs	77.40	465.07	468.47		468.50	0.000461	1.51	55.11	47.70	0.18
Reach	622.0599	50-year_91.0 cfs	91.00	465.07	468.57		468.61	0.000529	1.65	60.83	60.88	0.19
Reach	622.0599	100-year_104.7 c	104.70	465.07	468.66		468.70	0.000580	1.76	66.49	67.13	0.20
Reach	522.0566	2-year_41.0 cfs	41.00	464.62	468.16		468.18	0.000168	0.85	48.40	23.71	0.10
Reach	522.0566	5-year_54.6 cfs	54.60	464.62	468.26		468.27	0.000265	1.08	50.57	24.24	0.13
Reach	522.0566	10-year_64.7 cfs	64.70	464.62	468.32		468.35	0.000341	1.24	52.21	24.63	0.15
Reach	522.0566	25-year_77.4 cfs	77.40	464.62	468.42		468.45	0.000441	1.41	54.73	25.72	0.17
Reach	522.0566	50-year_91.0 cfs	91.00	464.62	468.52		468.56	0.000565	1.59	57.44	32.78	0.19
Reach	522.0566	100-year_104.7 c	104.70	464.62	468.59		468.64	0.000667	1.76	60.00	34.70	0.21
Reach	422.0532	2-year_41.0 cfs	41.00	463.91	468.15		468.16	0.000121	0.76	54.09	24.34	0.09
Reach	422.0532	5-year_54.6 cfs	54.60	463.91	468.23		468.25	0.000194	0.97	56.16	26.26	0.11
Reach	422.0532	10-year_64.7 cfs	64.70	463.91	468.30		468.32	0.000254	1.12	57.88	30.97	0.13
Reach	422.0532	25-year_77.4 cfs	77.40	463.91	468.39		468.41	0.000320	1.28	60.94	34.42	0.15
Reach	422.0532	50-year_91.0 cfs	91.00	463.91	468.47		468.51	0.000393	1.45	64.01	37.98	0.16
Reach	422.0532	100-year_104.7 c	104.70	463.91	468.54		468.58	0.000474	1.61	66.69	40.67	0.18
Reach	322.0501	2-year_41.0 cfs	41.00	463.86	468.15		468.15	0.000067	0.62	69.76	51.48	0.07

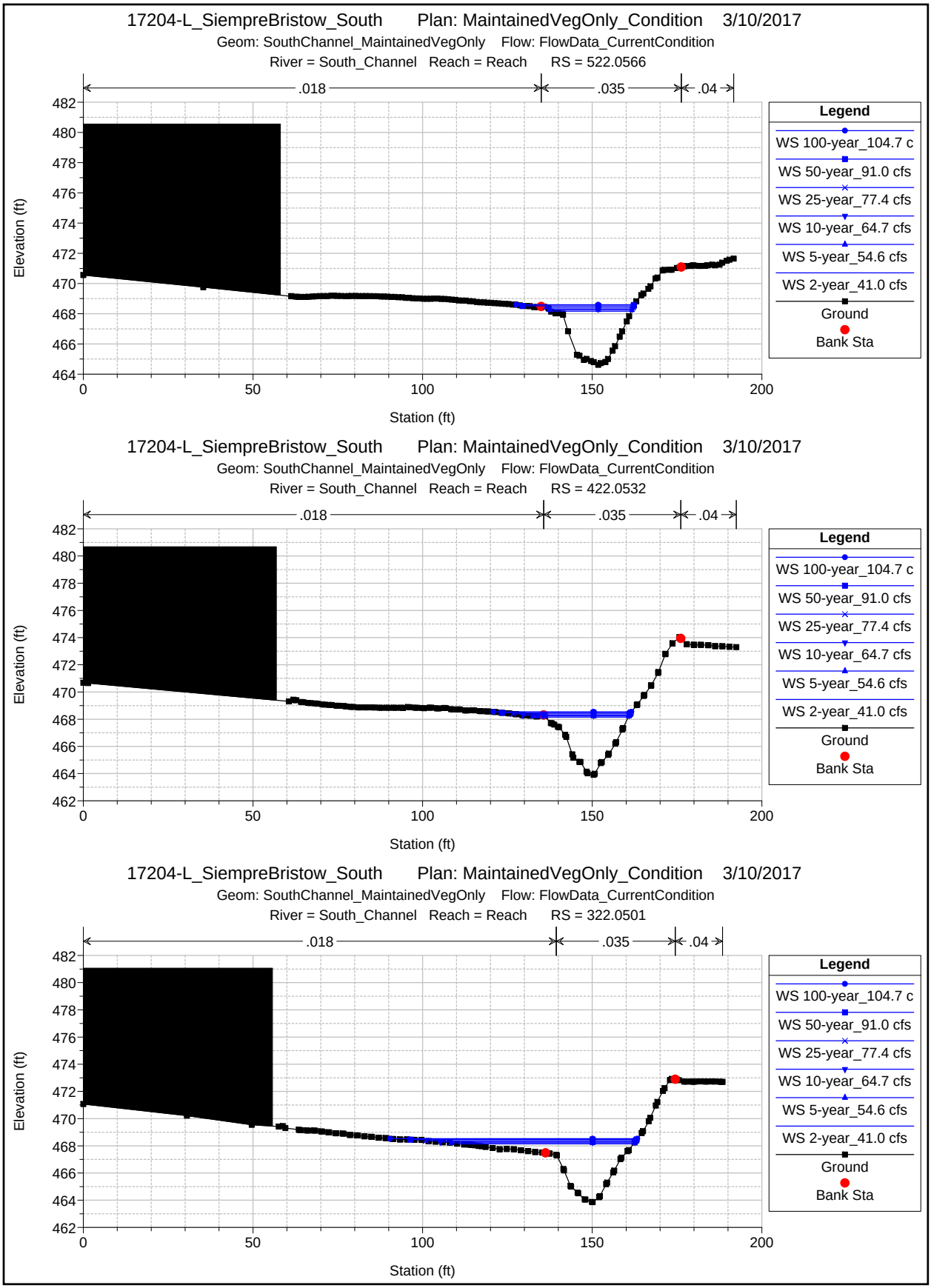
HEC-RAS Plan: VegOnly River: South_Channel Reach: Reach (Continued)

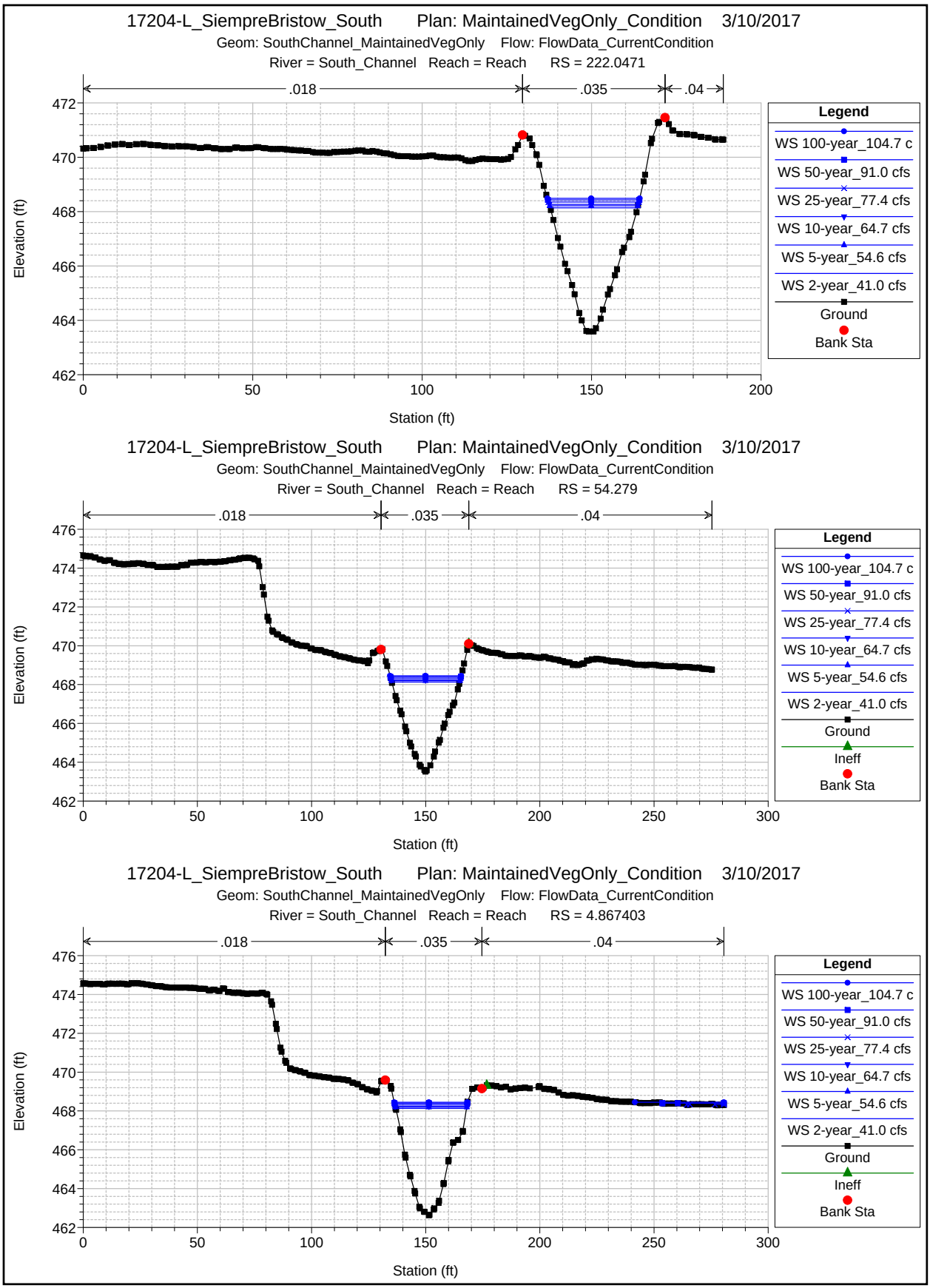
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	322.0501	5-year_54.6 cfs	54.60	463.86	468.22		468.23	0.000104	0.79	73.97	53.94	0.09
Reach	322.0501	10-year_64.7 cfs	64.70	463.86	468.28		468.30	0.000133	0.90	77.22	57.37	0.10
Reach	322.0501	25-year_77.4 cfs	77.40	463.86	468.37		468.39	0.000162	1.01	82.68	61.88	0.11
Reach	322.0501	50-year_91.0 cfs	91.00	463.86	468.46		468.48	0.000195	1.13	87.96	66.74	0.12
Reach	322.0501	100-year_104.7 c	104.70	463.86	468.52		468.54	0.000232	1.24	92.58	72.85	0.14
Reach	222.0471	2-year_41.0 cfs	41.00	463.59	468.14		468.14	0.000065	0.62	66.42	25.76	0.07
Reach	222.0471	5-year_54.6 cfs	54.60	463.59	468.21		468.22	0.000107	0.80	68.38	26.09	0.09
Reach	222.0471	10-year_64.7 cfs	64.70	463.59	468.27		468.28	0.000142	0.93	69.80	26.32	0.10
Reach	222.0471	25-year_77.4 cfs	77.40	463.59	468.35		468.37	0.000186	1.07	72.07	26.68	0.12
Reach	222.0471	50-year_91.0 cfs	91.00	463.59	468.43		468.45	0.000238	1.23	74.13	27.00	0.13
Reach	222.0471	100-year_104.7 c	104.70	463.59	468.49		468.52	0.000298	1.38	75.70	27.25	0.15
Reach	54.279	2-year_41.0 cfs	41.00	463.52	468.13		468.13	0.000046	0.53	77.68	29.73	0.06
Reach	54.279	5-year_54.6 cfs	54.60	463.52	468.20		468.21	0.000076	0.68	79.78	30.03	0.07
Reach	54.279	10-year_64.7 cfs	64.70	463.52	468.25		468.26	0.000101	0.80	81.29	30.25	0.09
Reach	54.279	25-year_77.4 cfs	77.40	463.52	468.33		468.34	0.000133	0.92	83.73	30.59	0.10
Reach	54.279	50-year_91.0 cfs	91.00	463.52	468.40		468.42	0.000171	1.06	85.89	30.91	0.11
Reach	54.279	100-year_104.7 c	104.70	463.52	468.45		468.47	0.000215	1.20	87.44	31.14	0.13
Reach	4.867403	2-year_41.0 cfs	41.00	462.63	468.13	463.76	468.13	0.000021	0.40	101.51	31.08	0.04
Reach	4.867403	5-year_54.6 cfs	54.60	462.63	468.20	463.93	468.20	0.000034	0.53	103.70	31.31	0.05
Reach	4.867403	10-year_64.7 cfs	64.70	462.63	468.25	464.04	468.26	0.000046	0.61	105.26	31.47	0.06
Reach	4.867403	25-year_77.4 cfs	77.40	462.63	468.33	464.17	468.34	0.000062	0.72	107.79	37.18	0.07
Reach	4.867403	50-year_91.0 cfs	91.00	462.63	468.40	464.30	468.41	0.000081	0.83	110.02	58.38	0.08
Reach	4.867403	100-year_104.7 c	104.70	462.63	468.45	464.42	468.46	0.000103	0.94	111.62	70.67	0.09


17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1311.239
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1211.239
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1111.238
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1011.238
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 901.7494
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 802.5478
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 770.7793
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 727.9443
.18
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 622.0599
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 522.0566
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 422.0532
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 322.0501
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 222.0471
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 54.279
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: MaintainedVegOnly_Condition 3/10/2017
Geom: SouthChannel_MaintainedVegOnly Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 4.867403
.018
.035
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_South
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 1:56:38 PM

Project in English units

PLAN DATA

Plan Title: MaintainedVegOnly_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.p03

Geometry Title: SouthChannel_MaintainedVegOnly
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g05

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Plan Summary Information:

Number of:	Cross Sections	= 15	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Flow Data (cfs)

River	Reach	RS	2-year_41.0 cfs	5-year_54.6 cfs	10-year_64.7 cfs	25-year_77.4 cfs	50-year_91.0 cfs	100-year_104.7 cfs	PF 7	PF 8
South_Channel	Reach	1311.239	41	54.6	64.7	77.4	91	104.7	5	10

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
South_Channel	Reach	1311.239	15	20	25	30	35	40

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
South_Channel	Reach	2-year_41.0 cfs	Critical	Known WS = 468.13
South_Channel	Reach	5-year_54.6 cfs	Critical	Known WS = 468.2
South_Channel	Reach	10-year_64.7 cfs	Critical	Known WS = 468.25
South_Channel	Reach	25-year_77.4 cfs	Critical	Known WS = 468.33
South_Channel	Reach	50-year_91.0 cfs	Critical	Known WS = 468.4
South_Channel	Reach	100-year_104.7 cfs	Critical	Known WS = 468.45
South_Channel	Reach	PF 7	Critical	Known WS = 467.35
South_Channel	Reach	PF 8	Critical	Known WS = 467.53
South_Channel	Reach	PF 9	Critical	Known WS = 467.68
South_Channel	Reach	PF 10	Critical	Known WS = 467.83
South_Channel	Reach	PF 11	Critical	Known WS = 467.95
South_Channel	Reach	PF 12	Critical	Known WS = 467.98
South_Channel	Reach	PF 13	Critical	Known WS = 468.03
South_Channel	Reach	PF 14	Critical	Known WS = 468.05

GEOMETRY DATA

Geometry Title: SouthChannel_MaintainedVegOnly
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g05

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1311.239

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.56	.52	473.55	.67	473.55	1.96	473.51	4.44	473.43
4.75	473.4	5.38	473.32	8.75	472.92	9.21	472.87	9.36	472.86
10.16	472.8	12.43	472.73	13.91	472.69	14.32	472.68	14.87	472.66
17.15	472.62	18.7	472.59	19	472.6	19.69	472.6	22.83	472.54
23.55	472.52	23.72	472.51	24.52	472.5	26.56	472.49	28.42	472.48
28.93	472.45	29.47	472.43	32.32	472.5	33.46	472.53	34.42	472.62
34.48	472.62	35.97	472.72	38.32	472.89	38.43	472.9	39.35	472.96
41.46	472.74	43.25	472.53	44.23	472.31	44.32	472.29	44.46	472.26
44.99	472.11	48.14	471.23	48.16	471.22	48.17	471.22	49.14	470.82
52.48	469.38	53.06	469.15	53.79	468.91	56.1	468.11	57.88	467.44
58.67	467.37	58.87	467.35	59.21	467.43	62.78	467.91	66.51	468.08
66.75	468.11	67.66	467.94	68.52	467.83	71.9	468.06	73.29	468.47
74.89	468.76	78.37	469.83	79.68	470.14	82.16	470.73	82.21	470.74
82.23	470.74	83.29	470.93	86.94	471.28	87.13	471.3	87.19	471.3
88.1	471.37	90.01	471.42	91.84	471.47	92.57	471.45	92.87	471.45
94.46	471.49	96.76	471.59	97.2	471.6	97.82	471.61	101.29	471.65
101.57	471.65	101.63	471.65	102.59	471.68	103.25	471.72	106.49	471.84
106.83	471.85	107.51	471.81	108.86	471.81	111.32	471.85	111.33	471.85

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	39.35	.035	88.1	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.35	88.1	102.88	100	100	.1	.3

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1211.239

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.74	1.46	472.7	1.98	472.69	2.65	472.65	6.13	472.55
6.15	472.55	6.18	472.55	7.37	472.51	8.36	472.47	10.96	472.36
12.19	472.36	12.22	472.36	15.69	472.28	16.8	472.24	16.92	472.24
17.28	472.23	20.48	472.15	21.5	472.12	21.74	472.12	22.58	472.08
25.37	471.98	26.34	471.93	26.58	471.92	27.97	471.92	30.24	471.92
31.32	471.89	31.56	471.89	32.59	471.85	35.27	471.76	35.83	471.75
36.57	471.76	39.35	471.67	40.16	471.65	41.47	471.62	41.49	471.62
45.11	471.52	45.77	471.52	46.43	471.51	49.38	471.52	50.01	471.52
50.5	471.5	51.26	471.45	52.72	471.32	54.33	471.18	54.94	471.13
55.03	471.11	56.21	470.9	58.13	470.31	59.78	469.8	60.93	469.22
61	469.18	63.07	468.15	64.65	467.37	64.69	467.36	65.87	466.99
67.58	466.61	70.61	466.57	70.95	466.67	74.4	467.76	74.52	467.78
75.52	468.04	79.28	468.88	80	469.03	80.3	469.09	80.5	469.13
81.74	469.24	84.08	469.42	85.36	469.73	85.42	469.74	85.64	469.77
89.01	470.18	89.76	470.18	90.65	470.11	93.73	469.83	94.31	469.85
95.02	469.88	96.31	470.03	98.63	470.25	99.86	470.29	99.93	470.3

```
  100.19   470.3  103.46  470.36  104.31  470.38  104.72  470.39  107.47  470.41
  108.38  470.42  109.06  470.44  109.67  470.45  111.33  470.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.01    .035   89.01    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.01   89.01              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   89.85  111.33  470.17       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1111.238

INPUT
Description:
Station Elevation Data    num=      89
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.25     1.1  472.23    3.18  472.21    4.04  472.15    4.64  472.14
    7.31  472.09     7.9  472.08    8.05  472.07    9.38  471.96   11.42  471.88
   12.74  471.83   13.47   471.8   14.21  471.75   15.34  471.69   17.49  471.57
   18.57  471.56   18.97  471.55   19.85  471.52   22.28  471.42   23.15  471.36
   23.82  471.34   25.55  471.28    27.2  471.24   27.76  471.24   28.66  471.23
   30.65  471.15   32.06   471.1   33.14  471.01   35.38  470.86   37.09   470.8
   37.97  470.79   38.65  470.75   40.71  470.63   42.74  470.42   45.01  470.36
   46.02  470.33   48.53  470.37   51.67  470.37   51.77  470.36   51.85  470.36
   52.18  470.37   53.38  470.39   56.59  470.16    56.8  470.14   56.99   470.1
   58.35  469.76   59.58   469.2   61.64  468.27   62.67  467.78   63.14  467.55
   66.22  466.27   66.53  466.14   67.65  465.78   68.01  465.66   68.08  465.68
   68.27  465.74   72.88  467.57   74.42  467.78   77.04  468.71    77.8  468.89
   79.34  469.07   80.32  469.22   81.17  469.34   82.14   469.4   82.67  469.44
   85.06  469.52   85.97  469.55   86.39  469.58   87.57  469.66   90.04  469.79
   90.89  469.84    91.2  469.86   92.35  469.94   93.61  469.98   95.61  470.06
   97.02   470.1   97.19   470.1   97.65   470.1  100.52   470.1  101.45  470.09
  102.08  470.12   104.7  470.14  105.36  470.15  106.85  470.17  106.87  470.17
  106.92  470.17  110.25  470.31  110.53   470.3  111.33  470.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   51.77    .035   87.57    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         51.77   87.57              100     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1011.238

INPUT
Description:
Station Elevation Data    num=      90
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.82     .05  472.81     .52  472.82    1.05  472.81    1.66  472.82
    3.17  472.78    4.13  472.78     5.3  472.75    6.71   472.7    8.49   472.7
   10.76   472.6   13.73  472.58   20.89  472.47   22.81  472.46   25.22  472.48
    25.4  472.48    25.9  472.47   28.74  472.38   29.05  472.37   29.41  472.35
```

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   30.77  472.23   33.05  472.11   33.91  472.08   34.78  472.06   35.77  472.03
   38.81  471.87   38.93  471.87   39.08  471.87   40.78  471.87   42.37  471.82
   43.85  471.77    45.4  471.75   45.72  471.75   47.05  471.69   48.81   471.6
   49.18  471.56   50.66  471.38   50.81  471.35    52.2  471.08   53.73  470.79
   54.15  470.66   55.53  470.17   56.35  469.81   58.67   468.7   59.43  468.36
   60.47  467.95   62.77  467.18    63.5  466.95   64.39  466.68   65.26  466.43
   67.34  465.88   68.39  465.58   68.89   465.6   70.11  465.97   70.15  465.98
    70.2     466   73.28  467.14   73.78  467.31   75.03  467.74   77.15  468.36
   78.17  468.64   78.69  468.77   79.96  469.08   80.64  469.19   82.26  469.43
   82.73  469.51   83.88  469.66   84.82  469.79   85.56  469.77   87.85  469.86
   88.31  469.88   89.72  469.81   90.49  469.83   92.79   469.8   93.22  469.84
   94.49  469.85   96.05  469.94    97.5  470.04   99.15  470.12   99.32  470.13
   99.86  470.17  102.42  470.35  103.11  470.38  104.24  470.44  105.75  470.55
  107.25  470.67  109.03  470.75  109.04  470.75  109.08  470.75  111.33   470.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.66    .035   87.85    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.81   87.85           109.55  109.49   109.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.76 482.816

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 901.7494

INPUT
Description:
Station Elevation Data    num=      88
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.74    1.14   470.7    2.72  470.68    4.45   470.7    6.29  470.71
    8.27  470.65   13.97  470.66   15.39  470.67   16.92  470.63   17.25  470.63
   18.87  470.64   20.59  470.63   22.53  470.61   24.65  470.56   25.17  470.57
   26.28  470.55   27.26  470.54   28.96  470.51   30.12  470.48   31.16  470.47
   32.15  470.46   32.84  470.46   35.01  470.45   36.33  470.45   37.18  470.45
   39.02  470.44   40.04  470.43   40.43  470.43   42.18  470.46   44.13  470.45
   44.99  470.44   45.29  470.44   47.15  470.44   48.11  470.35   48.88  470.27
    49.3  470.23   50.33  470.12   52.09  469.59    52.3  469.51   52.71  469.31
   54.55  468.53   56.64  467.66   56.95  467.51   57.46  467.24    59.8  465.85
   60.66  465.59    61.9  465.26      64   465.4   64.66  465.41   64.94  465.47
    66.2  465.58   69.57  465.86   71.02  466.26   71.62  466.48   73.31  467.34
   74.48  467.93   74.83  468.12   76.51  468.93   78.54  469.64    78.7   469.7
   79.34  469.92   80.98  470.14   81.41  470.19   83.69  470.16   84.27  470.16
   84.88  470.19   86.28  470.22   88.14  470.35   89.02  470.39   89.75  470.44
   91.19  470.51   93.07  470.62   93.97  470.66    94.7  470.67   95.96  470.65
   97.84  470.64    98.7  470.64   99.75  470.66  100.82  470.68  102.74  470.69
  103.63  470.69  104.06  470.69  105.71  470.67   107.9  470.71  108.45  470.71
  109.16  470.73  110.51  470.73  110.94  470.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.15    .035   81.41    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.15   81.41             99.3    99.2   99.08             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.01 480.742
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CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 802.5478

INPUT
Description:
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	17.5	469.88	17.83	469.9	18.17	469.89	31.38	469.35
31.53	469.34	31.68	469.34	31.83	469.33	31.99	469.33	32.16	469.32
32.32	469.32	32.5	469.31	32.68	469.3	32.87	469.3	33.07	469.29
33.27	469.28	45.18	469	46.75	469.03	46.88	469.03	47.35	469.03
47.46	469.03	48.12	469.07	49.68	469.09	51.79	469.09	52.11	469.09
54.6	469.08	54.89	469.08	55.26	469.09	56.85	469.11	58.1	469.13
58.71	469.14	59.45	469.15	60.33	469.14	61.06	469.13	62.13	469.11
63.49	469.11	64.1	469.11	64.58	469.1	65.89	469.04	67.48	468.97
67.65	468.97	67.86	468.97	69.48	468.96	70.85	468.92	71.33	468.91
72.23	468.89	73.26	468.87	73.82	468.86	75.15	468.85	76.58	468.79
76.99	468.77	77.36	468.77	79.05	468.79	80.35	468.75	81.51	468.72
83.72	468.68	84.22	468.67	85.04	468.65	86.01	468.62	86.59	468.62
88.35	468.57	90.14	468.55	90.86	468.54	93.14	468.51	93.4	468.51
94.41	468.49	96.15	468.45	96.6	468.45	98.88	468.42	99.55	468.4
101.71	468.33	103.11	468.28	103.93	468.25	104.85	468.23	105.55	468.21
106.18	468.21	107.77	468.17	109.65	468.1	110.14	468.09	110.79	468.09
111.89	468.09	112.71	468.06	114.15	468.01	116.11	468	116.64	467.99
117.49	467.97	118.59	467.95	119.29	467.93	120.97	467.89	122.83	467.84
123.27	467.81	123.75	467.81	124.88	467.77	125.94	467.75	126.78	467.73
128.59	467.71	129.16	467.7	129.43	467.72	131.33	467.79	132.1	467.78
132.38	467.77	132.52	467.78	134.97	467.79	136.17	467.84	137.39	467.89
139.46	467.99	139.93	468	142.14	468.19	142.36	468.21	142.79	468.23
143.18	468.25	144.9	468.33	146.16	468.19	147.33	468.05	149.56	467.37
149.84	467.3	150.1	467.18	152.18	466.33	154.27	465.5	154.77	465.28
155.19	465.15	157.13	464.49	158.79	464.7	159.63	464.8	160.83	465.44
161.94	466	162.75	466.41	164.56	467.39	166.39	468.24	166.9	468.49
168	468.95	169.47	469.55	170.06	469.73	170.44	469.86	171.76	470.32
173.53	470.62	174.33	470.76	175.02	470.86	175.86	470.95	177.5	470.98
179.65	471.15	180.25	471.21	183.31	471.34	185.66	471.51	186.46	471.52
188.29	471.54	188.96	471.54	189.65	471.55	191.21	471.56	192.84	471.58
193.7	471.58	194.96	471.58	196.11	471.6	197.74	471.57	198.39	471.55

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	144.9	.035	166.39	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
144.9	166.39	22.62	31.77	46.56	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	38.89	479.938

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 770.7793

INPUT
Description:
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

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      0  469.75    2.14  469.73    2.71  469.72    5.13  469.68    5.39  469.67
  19.12  469.62   19.31  469.63   19.51  469.63   34.16  469.03   34.17  469.03
  34.18  469.03   34.19  469.03    34.2  469.03   34.21  469.03   34.22  469.03
  34.23  469.03   34.65  469.02    34.7  469.02    36.6  469.02   37.23  469.02
  37.42  469.03   37.75  469.03   42.04  469.06   46.44  469.13    46.8  469.13
  46.89  469.13    49.3  469.16    50.5  469.17   51.88  469.18   53.41  469.15
  54.39  469.16   56.48  469.14   56.83  469.14      57  469.14   58.69  469.15
  59.98  469.12   60.64   469.1   61.79  469.08   62.96  469.05   63.62  469.03
  65.67  468.95   66.43  468.94   67.93   468.9   69.88  468.85   69.92  468.85
  69.96  468.85   71.55  468.84    72.9  468.81   73.24   468.8   73.69  468.79
  75.19  468.75   76.34  468.71   77.06  468.68    78.1  468.63   78.81   468.6
   79.3  468.57   80.63  468.54   82.26  468.55   82.47  468.55   82.63  468.55
  84.38  468.46   85.63  468.43   86.29  468.42   87.03  468.41   88.14  468.39
  89.11  468.38    90.1  468.39   92.14  468.39   92.17  468.39   92.21  468.39
  93.79  468.33   95.38  468.33   95.42  468.33   95.46  468.33   97.26  468.33
  98.38   468.3    99.4  468.29   101.7  468.24  101.84  468.24   101.9  468.24
 104.32  468.18  104.89  468.17  107.02  468.15  108.29  468.11  109.79  468.04
 111.32  468.02  112.58  468.02  114.81  467.94  115.13  467.92  115.48  467.92
 116.76   467.9  117.92  467.86   118.7  467.83  121.35  467.76  121.36  467.76
 121.37  467.76  123.08  467.71   124.4  467.65  125.11  467.62  127.71  467.56
 127.77  467.56  127.78  467.56  129.75  467.51  130.99  467.48  131.96  467.45
 134.49  467.37  134.52  467.37  134.56  467.37  136.16  467.42  137.65  467.34
 137.87  467.33  138.35  467.34  140.27  467.36  141.08  467.35  142.66  467.33
 144.42  467.43  145.08  467.49  146.47  467.59   147.4  467.66  147.84  467.69
 150.03  467.74  151.16  467.75   152.4  467.82  154.53  467.87  154.55  467.87
 154.58  467.87  156.19  467.87  157.75  467.77  157.86  467.75  158.69  467.65
 159.95  467.48  161.19  467.21  161.96  467.07  162.82  466.84  163.74  466.61
 164.52  466.38  165.58  466.06   167.1   465.7  167.51  465.62  167.81  465.59
 169.61  465.31  171.09   465.4  171.82  465.44  173.87  465.64  174.31  465.68
 174.46  465.71  176.46  466.17  177.79  466.49  178.42  466.66  179.12   466.8
 180.15  467.07  181.03  467.11  182.05   467.4  184.13  467.91  184.23  467.94
 184.28  467.95  186.05  468.59  187.65  468.88  187.89  468.93  188.65  469.02
  190.4  469.32  190.93  469.38  192.73  469.52  193.57  469.74  194.22  469.91
 195.18  470.18  197.49  471.21  197.78  471.34  198.06  471.43  199.42   471.5
 200.74   471.7  201.04  471.72  201.34  471.78  202.71  471.83  204.11  472.02
 204.61  472.05   207.4  471.96   207.6  471.95  208.21  471.95  210.03  471.94
 210.65  471.91   212.2  471.84

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  154.53    .035  184.13     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.53  184.13            32.88   42.84   62.72             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.88 479.748

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 727.9443

INPUT
Description:
Station Elevation Data    num=     167
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   469.4    9.74  469.32    9.81  469.32   10.15  469.31   10.18  469.31
   12.07   469.3    12.1   469.3   12.13   469.3   14.21  469.22   14.52  469.22
   15.03  469.21   17.67  469.22   18.39  469.23   21.02  469.25    23.7  469.26
   24.63  469.27   26.31  469.28   26.44  469.28   26.57  469.28   28.17   469.3
   29.85  469.29   29.91  469.29   30.01  469.29   31.74  469.29   32.75  469.29
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   33.77  469.29   35.26  469.24   36.02   469.2   36.53  469.18   38.07  469.13
   39.54  469.11   40.31  469.08   43.04  469.05   43.08  469.05   43.18  469.05
   45.16  468.97   46.02  468.95   47.59  468.94   49.65   468.9    50.2   468.9
   52.25  468.85   52.51  468.85   52.57  468.85   55.12  468.84   56.12   468.8
   57.67  468.75   59.12   468.7   60.17  468.65   62.63  468.57   64.51  468.49
   65.68  468.46   66.57  468.43   68.03  468.38   68.79  468.36   69.24  468.35
   71.53  468.32   72.12  468.31   73.71  468.26   75.53  468.26   75.69  468.26
   75.87  468.26    77.3  468.24   78.58  468.19   78.99  468.18   79.57  468.19
   80.97   468.2   81.96  468.21   82.84  468.19   84.08  468.18   84.61  468.17
   84.99  468.16    86.4  468.15    88.2   468.1   88.21   468.1   88.22   468.1
   90.17  468.13    91.3  468.11   92.09  468.09      93  468.07   93.94  468.05
   94.72  468.04   95.91  468.05   97.78     468   98.11  467.99  101.02  467.94
  101.16  467.94   101.5  467.94  103.23   467.9  104.01  467.89  105.41  467.84
  107.48  467.78   107.7  467.78  108.64  467.76   110.2  467.72  110.56  467.71
  112.97  467.65  113.89  467.63  115.69  467.59  116.95  467.54  118.47  467.49
  118.92  467.47  119.79  467.44  120.69  467.41  121.91  467.38  122.81  467.38
  123.98  467.36  124.93  467.35   126.1  467.52  127.02  467.65  128.18  467.61
  129.12  467.59  130.28   467.5  131.22   467.4  132.38  467.24  132.56  467.22
  133.32  467.15  134.47  466.98  135.43  466.85   137.7  466.55  138.98  466.29
   141.6     466  142.72  465.47  144.95  466.32  146.98  467.65  148.07  468.21
  149.14  468.56  150.17  468.67  151.23     469  152.27  469.38  153.32  469.64
  154.36  469.84  155.37  470.14  156.45  470.36  157.47  470.45  158.55  470.65
  159.56  470.87  160.65  471.23  161.65  471.46  161.99  471.56  162.75  471.79
  163.73  472.02  164.86  472.22  165.83  472.24  166.97  472.16  167.91  472.19
  169.06  472.21  170.01  472.24  171.16  472.31   172.1  472.34  173.26  472.34
  174.19  472.38  175.36  472.47  176.27  472.68  177.44  473.02  178.35  473.27
  179.54  473.65  180.43  474.04  181.64  474.42  182.52  474.11  183.76  473.38
  184.66  472.75   185.9  471.91  186.78  471.31     188  470.53  188.88  470.05
   190.1  469.65  191.08  469.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .18  127.02    .035  161.99     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        127.02  161.99           105.78  105.88  106.14             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0    9.54469.3978

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 622.0599

INPUT
Description:
Station Elevation Data    num=     135
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.53    52.1  469.28   61.95  469.05   61.99  469.05   62.02  469.04
   62.12  469.05   62.86  469.05   64.37  469.05   65.92   469.1   66.45  469.12
   68.03  469.14   68.54  469.14   70.14  469.17   70.63  469.19   72.27  469.21
   72.73   469.2   74.37   469.2   74.82   469.2   76.49   469.2    76.9   469.2
   78.62  469.17   79.02  469.16   80.78   469.1   81.13   469.1   82.89  469.08
   83.22  469.07   84.99  469.01   85.32     469   87.13  468.94   87.42  468.93
   89.24  468.84   89.51  468.83   91.35  468.74   91.59  468.73   93.46  468.68
   93.68  468.67   95.57  468.67   95.77  468.66   97.67  468.63   97.85  468.63
   99.79   468.6   99.95   468.6   101.9  468.57  102.04  468.57  104.05  468.54
  104.15  468.54  106.15  468.54  106.25  468.54  108.27  468.54  108.33  468.54
  110.37  468.47  110.42  468.47  112.48   468.5  112.51   468.5  114.59  468.47
   114.6  468.47  115.54  468.44  116.72   468.4  116.74   468.4  116.75   468.4
  118.84  468.34  118.87  468.34  120.97  468.24  121.03  468.24  123.07  468.24
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  123.14  468.24  125.17  468.24  125.26  468.24  127.24  468.21  127.35  468.21
  129.34  468.14  129.47  468.14  131.42  468.13  133.35  468.04  133.52  468.03
  135.44  468.03  135.62  468.03  137.51     468  137.72     468  137.93     468
  139.86  467.93  140.08  467.93  141.96  467.93  143.79   467.5  143.94  467.42
  144.31  467.22  146.16  465.53  146.42  465.46  148.23  465.09  148.51  465.11
  150.33  465.23  150.63  465.21  152.43  465.07  152.75  465.09  154.55  465.28
   154.9  465.37  156.65  465.87  157.05  466.04  158.76  466.74  159.17  466.96
  160.86  467.83  161.29  468.01  162.96  468.68  163.44  468.83  165.09  469.44
  165.59  469.48  167.18  469.73  167.71  469.77  169.28  469.62  169.83  469.87
  171.38  470.67  171.98  470.96  173.48  471.71  174.09  471.99  175.16  472.45
  175.58  472.63  176.23  472.82  177.68  473.32  178.36  473.35  179.76  473.38
  179.78  473.38  180.48  473.42  181.87  473.46  182.59   473.6  183.97  473.86
  184.71  473.86  186.05  473.82   186.8  473.82  188.15  473.84  188.91  473.84
  190.25  473.88  191.02  473.88  192.35  473.88  193.15  473.89  194.31  473.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  141.96    .035  175.16     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        141.96  175.16           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   59.24 480.533

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 522.0566

INPUT
Description:
Station Elevation Data    num=     129
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.56   35.34  469.76    61.3  469.15   61.33  469.17   62.65  469.13
   63.43  469.11   64.21  469.11   65.56  469.11   66.36  469.12   67.66  469.14
   68.47  469.15   69.77  469.17   71.03  469.17   71.87  469.17   73.15  469.19
   73.98   469.2   74.84  469.18   76.07  469.18   77.29  469.16   78.17  469.17
   79.04  469.18   80.29  469.18   81.19  469.17   82.39  469.17    83.3  469.17
   84.46  469.17   85.64  469.16    86.6  469.16   87.76  469.14    88.7  469.14
   89.66  469.13    90.8  469.11   91.77  469.11    92.9  469.09      94  469.09
      95  469.05      96  469.05    97.1  469.03   98.18  469.01    99.2  469.01
  100.26  468.99  101.32  468.99  102.37  468.99  103.42     469  104.43     469
   105.5  468.98  106.51  468.98  107.59  468.96   108.6  468.93  109.69  468.92
  110.67  468.88  111.77  468.87  112.76  468.87  113.87  468.83  114.84  468.82
     116  468.78  116.96  468.75  118.11  468.75  119.06  468.73  120.23  468.72
  121.16   468.7  122.34  468.69  123.26  468.67  124.44  468.65  125.36  468.64
  126.56   468.6  127.44   468.6  128.66  468.56  129.53  468.51  130.76  468.51
  131.62   468.5  132.86  468.44   133.7  468.44  134.96  468.48  135.78  468.47
  137.08  468.35  137.89  468.14  139.17  468.02  139.98  468.03  141.27  468.01
  141.38  467.93  142.85  466.84  145.46  465.29  146.26  465.22  147.54  464.94
  148.34  465.01  149.65  464.87  150.42  464.79  151.76  464.62  152.52  464.73
  153.88   464.8  154.63     465  155.98  465.55  156.71  465.85  158.08  466.48
   158.8  466.83  160.19  467.49  160.88  467.84   162.3  468.57  162.98  468.82
  164.44  469.22  165.08  469.33  166.53  469.65  167.16  469.81  168.63  470.33
  169.23  470.39  170.72  470.86  171.32   470.9  172.83  470.91   173.4  470.91
  174.95  471.03   175.5  471.03  176.26  471.09  177.04  471.14   177.6  471.15
  179.15  471.16  179.68   471.2   179.9   471.2  181.24  471.17  181.83  471.16
  183.33  471.17  183.98  471.21  185.43  471.25  186.15  471.21  187.53  471.25
  188.29  471.38  189.63   471.5  190.44  471.58  191.67  471.65

Manning's n Values        num=       3
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     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  134.96    .035  176.26     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        134.96  176.26           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   58.08 480.557

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 422.0532

INPUT
Description:
Station Elevation Data    num=     132
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.68    1.41  470.65   60.58  469.31   61.94  469.43   62.05   469.4
   62.77   469.4   64.15  469.27   64.87  469.25   66.25   469.2   66.94  469.18
   68.35  469.16   69.03  469.14   70.45  469.09   71.12  469.07   72.56  469.05
   73.21  469.04   74.65  468.99    75.3  468.99   76.78  468.97   77.43  468.94
   78.88   468.9   79.52   468.9   80.99  468.87   81.63  468.87    83.1  468.87
   83.72  468.87   85.21  468.87   85.81  468.86   87.31  468.84   87.91  468.84
   89.42  468.84      90  468.84   91.52  468.84   92.08  468.84   93.63  468.84
   94.18  468.84   95.72  468.89   96.27  468.88   97.82  468.84   98.36  468.84
   99.92  468.82  100.46  468.81  102.06  468.84  102.59  468.85  104.17   468.8
  104.68  468.79  106.28  468.82  106.77  468.82  108.38  468.74  108.87  468.72
  110.49  468.72  110.95  468.72  112.59  468.64  113.05  468.64  114.72  468.66
  115.18  468.65  116.82   468.6  117.27  468.59  118.93  468.57  119.36  468.57
  121.03  468.54  121.46  468.53  123.14  468.48  123.54  468.47  125.22  468.44
  125.61  468.42  127.32  468.37   127.7  468.36  129.39   468.3  129.77  468.29
  131.47  468.27  131.84  468.26  133.57   468.2  133.93  468.23  135.68  468.31
  136.04  468.22   137.8  467.72  138.13  467.69  138.82   467.6   139.9  467.45
  140.22  467.41  142.01  466.85  142.33   466.7   144.1  465.42  144.43  465.16
   146.2  464.86  146.52  464.86   148.3  464.14  148.63  464.02   150.4  463.91
  150.71  463.99  152.54  464.77  152.82  464.85  154.65  465.37  154.91  465.47
  156.79   466.2  157.03  466.31   158.9  467.25   159.1  467.35  161.01  468.36
   161.2  468.43  163.11  469.03  163.28  469.09  165.18  469.71  165.34  469.78
   167.3  470.45  167.42   470.5  169.41   471.4   169.5  471.46  171.54  472.78
  171.61  472.81  173.63  473.56  173.67  473.58  175.73  474.03  175.77  474.02
  176.12  473.94  177.84  473.51  177.85  473.51  179.93  473.47  179.96  473.47
  180.04  473.47  182.04  473.47  182.05  473.47  184.14  473.44  184.25  473.44
  186.24  473.37  186.25  473.37  188.34  473.36  188.36  473.36  190.43  473.33
  190.47  473.33  192.44   473.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.68    .035  176.12     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        135.68  176.12           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   56.91  480.68

CROSS SECTION


RIVER: South_Channel
REACH: Reach             RS: 322.0501
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INPUT
Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.07	30.54	470.22	49.62	469.55	57.58	469.42	58.78	469.45
59.56	469.31	63.51	469.18	63.76	469.16	64.13	469.15	65.86	469.13
66.21	469.12	67.97	469.12	68.31	469.12	70.07	469.06	70.39	469.05
72.18	469	72.48	468.99	74.28	468.93	74.57	468.92	76.41	468.9
76.69	468.89	78.52	468.8	78.78	468.8	80.62	468.77	80.87	468.76
82.73	468.7	82.96	468.7	84.83	468.67	85.05	468.66	86.95	468.6
87.15	468.6	89.05	468.57	89.23	468.56	91.18	468.5	91.35	468.5
93.28	468.47	93.44	468.47	95.39	468.47	95.53	468.47	97.5	468.44
97.62	468.44	99.6	468.44	99.71	468.43	101.71	468.34	101.8	468.34
103.78	468.31	103.86	468.31	105.89	468.27	105.95	468.27	108.02	468.24
108.07	468.24	110.14	468.16	110.16	468.16	112.24	468.1	112.26	468.1
113.8	468.08	114.34	468.07	114.35	468.07	115.35	468.04	116.44	468
116.45	468	117.4	467.97	118.54	467.93	118.55	467.93	120.63	467.84
120.66	467.84	122.69	467.74	122.73	467.74	124.78	467.77	124.84	467.77
126.87	467.74	126.95	467.74	128.96	467.67	129.06	467.67	131.06	467.61
131.17	467.61	133.15	467.54	133.28	467.54	135.22	467.51	135.36	467.51
136.25	467.48	137.31	467.44	137.47	467.43	139.4	467.34	139.58	467.29
141.5	466.3	141.67	466.19	143.59	465.05	143.78	465	145.7	464.55
145.87	464.51	147.79	464.06	147.98	464.05	149.91	463.87	150.12	463.86
152.01	464.22	152.24	464.3	154.09	465.18	154.38	465.29	156.18	466.04
156.48	466.17	158.29	467.02	158.62	467.13	160.39	467.6	160.74	467.68
162.48	468.25	162.87	468.39	164.57	468.94	164.98	469.08	166.65	469.81
167.1	470.06	168.74	470.96	169.21	471.23	170.82	472.04	171.32	472.24
172.89	472.83	173.44	472.92	174.46	472.89	175.02	472.87	175.56	472.82
177.12	472.72	177.67	472.72	179.21	472.72	179.78	472.71	180.19	472.72
181.31	472.74	181.87	472.74	183.42	472.72	183.95	472.73	185.53	472.73
186.06	472.73	187.65	472.71	188.14	472.7	188.39	472.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	139.4	.035	174.46	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
136.25 174.46 100.01 100 100 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	55.74	481.067

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 222.0471

INPUT
Description:
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.32	.86	470.33	1.04	470.33	2.95	470.34	3.15	470.34
5.07	470.38	5.29	470.38	7.17	470.43	7.39	470.43	9.28	470.46
9.52	470.47	11.37	470.48	11.63	470.49	13.45	470.45	13.73	470.45
15.54	470.48	15.84	470.48	17.63	470.49	17.94	470.49	19.72	470.46
20.04	470.45	21.81	470.44	22.14	470.44	23.89	470.41	24.25	470.41
25.98	470.4	26.36	470.39	28.1	470.41	28.49	470.4	30.18	470.4
30.59	470.4	32.27	470.38	32.7	470.38	34.35	470.34	34.79	470.34
36.44	470.37	36.9	470.37	38.51	470.33	38.98	470.33	40.6	470.3
41.09	470.3	42.71	470.3	43.21	470.3	44.8	470.35	45.32	470.36
46.88	470.33	47.42	470.33	49	470.33	49.55	470.34	51.08	470.37
51.67	470.37	53.18	470.34	53.77	470.33	55.26	470.31	55.87	470.3

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   57.35   470.3   57.97  470.31   59.43   470.3   60.08  470.28   61.52  470.27
   62.18  470.26   63.61  470.25   64.29  470.25   65.69  470.23   66.39  470.23
   67.77  470.19   68.49  470.17   69.85  470.17    70.6  470.17   71.96  470.16
   72.71  470.16   74.05  470.19   74.84  470.19   76.14   470.2   76.94  470.21
   78.21  470.21   79.06  470.22   80.32  470.24   81.17  470.25   82.42  470.25
   83.27  470.21   84.49   470.2   85.37  470.23   86.58  470.21   87.48  470.18
   88.66  470.15   89.59  470.14   90.75  470.11   91.69  470.08   92.84  470.05
   93.79  470.04   94.92  470.04    95.9  470.04   96.99  470.02   97.99  470.02
   99.07  470.02   100.1  470.03  101.16  470.04   102.2  470.06  103.26  470.07
  104.32  470.02  105.35     470  106.42     470  107.44  469.99  108.55  469.98
  109.53  469.99  110.63  469.99   111.6  469.96  112.74  469.89  113.68  469.86
  114.82  469.86  115.77   469.9  116.93  469.93  117.84  469.95  119.02  469.94
   119.9  469.93  121.12  469.93  122.01  469.93  123.26  469.91  124.12  469.92
  125.37  469.94   126.2  470.01   127.5  470.29   128.3  470.45  129.62  470.82
  130.38  470.79  131.72  470.69  132.47  470.45  133.69  470.11  133.81  470.08
  134.54  469.72  135.87  468.95  136.63  468.62  137.97  468.06  138.72  467.69
  140.07  467.03  140.81  466.71  142.17  466.08   142.9  465.81  144.27   465.3
  144.99  464.96  146.35  464.27  147.07     464  148.45  463.61  149.16  463.59
  150.57  463.59  151.27  463.71  152.68  464.06  153.33  464.39  154.79  464.95
  155.43  465.15   156.9  465.66  157.48  465.88     159  466.51  159.54  466.67
  161.11  467.06  161.61  467.26  163.25  467.98  163.72  468.23  165.34  469.11
  165.77  469.36  167.49  470.52  167.84  470.68  169.59  471.26  169.93   471.3
  171.69  471.46  171.99   471.4   172.8  471.22  173.79  470.99  174.07  470.98
  175.89  470.86  176.16  470.85  177.99  470.85  178.23  470.84  180.09  470.82
  180.32  470.81  180.33  470.81  182.19  470.75  182.41  470.75  184.29  470.72
  184.51  470.72  186.39  470.66  186.61  470.65  188.46  470.65  188.65  470.65
  188.87  470.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  129.62    .035  171.69     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        129.62  171.69             167.9  167.77  167.53             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 54.279

INPUT
Description:
Station Elevation Data    num=     265
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.65     .84  474.62     1.2  474.61    2.94  474.61    3.29   474.6
    5.06  474.55    5.41  474.54    7.16  474.45    7.53  474.44    9.26  474.38
    9.65  474.38   11.37  474.41   11.74   474.4   13.47  474.28   13.87  474.26
   15.57  474.21   15.97  474.22   17.67  474.19   18.07   474.2   19.77   474.2
   20.18  474.21   21.85  474.23   22.27  474.22   23.96  474.25   24.39  474.25
   26.07  474.22   26.48  474.22   28.19  474.16    28.6  474.17   30.28  474.17
   30.72  474.14   32.38  474.06   32.82  474.06   34.48  474.06   34.92  474.06
   36.58  474.06   37.05  474.07   38.71  474.07   39.17  474.07   40.82  474.07
   41.28  474.07   42.91  474.15    43.4  474.15   45.02  474.15    45.5  474.18
   47.14  474.28   47.62  474.28   49.24  474.28   49.72  474.29   51.34  474.31
   51.84  474.32   53.44  474.29   53.94   474.3   55.55  474.32   56.04  474.32
   57.65   474.3   58.18  474.32   59.76  474.33   60.28  474.33   61.86  474.35
   62.38  474.35   63.96   474.4    64.5   474.4   66.03  474.43   66.57  474.43
   68.16  474.46   68.69   474.5   70.26  474.52   70.81  474.53   72.36  474.53
   72.91  474.53   74.46   474.5   75.02  474.45   76.56  474.38    77.1  474.09
   78.61  473.02   79.13  472.63   80.68  471.49   81.18  471.29   82.75  470.79
   83.24  470.72   84.85   470.6   85.35  470.57   86.95  470.44   87.45   470.4
   89.03  470.33   89.52   470.3   91.13  470.18   91.64  470.16   93.26  470.08
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93.78	470.06	95.34	470.01	95.85	470	97.44	470	97.96	469.97
99.57	469.87	100.09	469.86	101.65	469.79	102.18	469.78	103.75	469.78
104.28	469.76	105.85	469.69	106.37	469.66	107.94	469.63	108.5	469.62
110.05	469.54	110.6	469.53	112.18	469.46	112.73	469.45	114.25	469.42
114.79	469.4	116.35	469.36	116.91	469.34	118.43	469.29	118.99	469.27
120.51	469.24	121.07	469.25	122.59	469.23	123.14	469.2	124.69	469.1
125.28	469.24	126.8	469.62	127.39	469.65	128.93	469.72	129.63	469.76
130.44	469.81	131.04	469.81	132.55	469.19	133.14	468.96	134.68	468.34
135.24	468.09	136.76	467.41	137.32	467.19	138.87	466.66	139.42	466.47
140.96	465.84	141.51	465.6	143.1	465	143.6	464.81	145.2	464.43
145.7	464.3	147.3	463.87	147.8	463.78	149.41	463.6	149.9	463.52
150.4	463.58	152.01	463.84	153.57	464.29	154.12	464.55	155.68	465.01
156.22	465.15	157.78	465.78	158.35	465.99	159.86	466.43	160.45	466.6
161.94	466.92	162.55	467.07	164.03	467.75	164.69	468.04	166.12	468.73
166.79	469.08	168.2	469.79	168.89	470.1	170.29	470.03	170.99	469.99
172.41	469.88	173.1	469.83	174.51	469.78	175.21	469.76	176.6	469.71
177.31	469.68	178.7	469.64	179.41	469.64	180.8	469.64	181.5	469.62
182.87	469.57	183.58	469.56	184.95	469.49	185.68	469.47	187.05	469.47
187.78	469.47	189.15	469.47	189.88	469.47	191.26	469.5	191.99	469.5
193.37	469.45	194.11	469.45	195.47	469.47	196.21	469.45	197.59	469.41
198.3	469.4	199.65	469.38	200.4	469.39	201.75	469.43	202.51	469.42
203.86	469.35	204.61	469.35	205.96	469.31	206.72	469.29	208.05	469.28
208.81	469.23	210.17	469.21	210.94	469.15	212.27	469.15	213.02	469.14
214.39	469.01	215.14	469.06	216.46	469	217.23	469.03	218.55	469.07
219.33	469.09	220.62	469.23	221.41	469.25	222.72	469.3	223.51	469.29
224.82	469.33	225.63	469.31	226.92	469.3	227.73	469.29	229.04	469.25
229.85	469.24	231.14	469.2	231.95	469.19	233.25	469.19	234.05	469.19
235.33	469.17	236.16	469.12	237.44	469.12	238.26	469.13	239.53	469.09
240.35	469.07	241.64	469.03	242.46	469.02	243.74	469.02	244.56	469.02
245.84	469	246.68	469	247.96	469.02	248.79	469.02	250.05	469.02
250.88	469.01	252.12	468.98	252.96	468.97	254.23	468.95	255.06	468.95
256.32	468.95	257.16	468.95	258.4	468.95	259.27	468.96	260.52	468.92
261.39	468.89	262.62	468.91	263.49	468.91	264.71	468.91	265.6	468.9
266.83	468.88	267.7	468.86	268.93	468.86	269.8	468.88	271.03	468.82
271.9	468.81	273.12	468.81	274.02	468.79	275.24	468.77	275.36	468.77

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	130.44	.035	168.89	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

130.44	168.89		49.37	49.41	49.5	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
168.89	275.36	470.1	T

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 4.867403

INPUT
Description:
Station Elevation Data num= 271

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.56	.19	474.57	1	474.57	2.3	474.55	3.09	474.53
4.4	474.55	5.18	474.55	6.49	474.55	7.27	474.55	8.6	474.52
9.37	474.52	10.7	474.54	11.45	474.56	12.83	474.56	13.57	474.55
14.93	474.55	15.66	474.56	17.03	474.56	17.76	474.55	19.13	474.52
19.85	474.53	21.26	474.58	21.96	474.58	23.36	474.58	24.05	474.58
25.46	474.56	26.15	474.54	27.56	474.52	28.23	474.51	29.67	474.48
30.33	474.47	31.78	474.43	32.43	474.43	33.88	474.43	34.53	474.41

```
      36  474.38   36.63  474.37    38.1  474.35   38.74  474.36   40.21  474.36
   40.84  474.35   42.31  474.35   42.94  474.35   44.41  474.35   45.01  474.36
   46.49  474.34   47.08  474.34   48.59  474.34   49.18  474.33    50.7   474.3
   51.27  474.29    52.8  474.29   53.36  474.29   54.93  474.22   55.47   474.2
   57.03  474.25   57.57  474.24   59.13  474.19   59.68  474.18   61.25  474.31
   61.76   474.3   63.35  474.13   63.85  474.12   65.44   474.1   65.95  474.08
   67.56  474.08   68.07   474.1   69.67  474.07   70.14  474.05   71.77  474.03
   72.24  474.04   73.87  474.06   74.34  474.05   75.98  474.05   76.43  474.04
   78.07  474.07   78.51  474.09   80.17  474.03    80.6  473.99   82.28  473.65
    82.7  473.47   84.35  472.49   84.79  472.22   86.39  471.26   86.84  471.05
   88.46  470.58    88.9  470.48   90.56  470.19      91  470.17   92.66  470.11
   93.09   470.1   94.76  470.05   95.19  470.03   96.86  469.97   97.28  469.96
   98.98  469.86    99.4  469.84  101.09  469.82  101.48  469.81   103.2  469.79
  103.57  469.78   105.3  469.74  105.67  469.74  107.43  469.72   107.8  469.71
  109.54  469.66  109.89  469.65  111.63  469.65  111.98  469.65  113.74  469.62
  114.07  469.62  115.81  469.59  116.14  469.57  117.92  469.46  118.22  469.45
  120.03  469.39  120.32  469.37  122.09  469.23  122.38  469.22  124.23  469.12
  124.51  469.11  126.33  469.05   126.6  469.04   128.4  468.95  128.68  469.02
  130.51  469.53  130.76  469.56  132.34  469.59  132.58  469.59  132.82  469.56
  134.68  469.29  134.92  469.15  136.79  468.13  137.02  468.06  138.85  467.05
   139.1  466.91  140.95  465.75   141.2   465.6  143.05  464.71  143.32  464.63
  145.11  463.88  145.38  463.75  147.21  463.06  147.47  462.98  149.28  462.81
  149.55   462.8  151.41  462.63  151.67  462.65  153.53  462.92  153.76  462.98
  155.66  463.26  155.88  463.37  157.76  464.23  157.95  464.29   159.9   465.4
  160.06  465.48     162  466.36  162.13  466.38   164.1   466.5  164.22  466.51
  166.21  466.92  166.29  466.97  168.31  468.45  168.37  468.47  170.42  469.14
  170.44  469.14  172.56  469.21  172.57  469.21  174.62  469.15  174.69  469.15
   174.7  469.15  175.35   469.2  176.77  469.31  176.79  469.31  178.84  469.31
  178.88  469.31  180.94  469.28  180.98  469.28     183  469.21  183.05  469.21
  185.08  469.25  185.16  469.25  187.17  469.11  187.26  469.11  189.31  469.15
   189.4  469.15   191.4  469.18   191.5  469.18  193.47   469.2  193.61   469.2
  195.63  469.16  199.41  469.23  199.84  469.26  199.95  469.28  201.86  469.15
  202.05  469.13  203.93  469.13  204.13  469.11  206.02  469.08  206.23  469.08
  208.12  468.96  208.33  468.94   210.2  468.83  210.44  468.82  212.28  468.79
  212.53  468.79  214.38  468.81  214.63  468.81  216.51  468.78  216.77  468.78
  218.59  468.74  218.88  468.73  220.69  468.71  220.98  468.71  222.78  468.68
  223.08  468.68  224.88  468.62  225.18  468.61  226.97  468.59  227.29  468.58
  229.06  468.58  229.39  468.57  231.12  468.51  231.47   468.5  233.22   468.5
  233.58   468.5  235.34  468.48   235.7  468.48  237.42  468.48  237.81  468.47
  239.54  468.47  239.93  468.48  241.64  468.45  242.04  468.45  243.72  468.42
  244.15   468.4  245.82   468.4  246.25  468.41  247.92  468.41  248.36   468.4
  250.02  468.43  250.46  468.43   252.1  468.43  252.57  468.44  254.19  468.38
  254.67  468.37  256.29  468.38  256.77  468.38  258.39  468.38  258.88  468.38
  260.46   468.4  260.98   468.4  262.55  468.38  263.08  468.39  264.64  468.31
  265.18  468.32  266.74  468.35  267.28  468.34  268.82  468.34   269.4  468.35
  270.93  468.35   271.5  468.34  273.02  468.34   273.6  468.34  275.12  468.36
   275.7  468.36  277.19  468.31  277.81  468.29  279.29  468.32  279.91  468.31
   280.6  468.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  132.34    .035  174.62     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        132.34  174.62            37.89    4.87   40.87             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  176.77   280.6  469.31       T



SUMMARY OF REACH LENGTHS
```

River: South_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1311.239	102.88	100	100
Reach	1211.239	100	100	100
Reach	1111.238	100	100	100
Reach	1011.238	109.55	109.49	109.4
Reach	901.7494	99.3	99.2	99.08
Reach	802.5478	22.62	31.77	46.56
Reach	770.7793	32.88	42.84	62.72
Reach	727.9443	105.78	105.88	106.14
Reach	622.0599	100.01	100	100
Reach	522.0566	100.01	100	100
Reach	422.0532	100.01	100	100
Reach	322.0501	100.01	100	100
Reach	222.0471	167.9	167.77	167.53
Reach	54.279	49.37	49.41	49.5
Reach	4.867403	37.89	4.87	40.87

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: South_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1311.239	.1	.3
Reach	1211.239	.1	.3
Reach	1111.238	.1	.3
Reach	1011.238	.1	.3
Reach	901.7494	.1	.3
Reach	802.5478	.1	.3
Reach	770.7793	.1	.3
Reach	727.9443	.1	.3
Reach	622.0599	.1	.3
Reach	522.0566	.1	.3
Reach	422.0532	.1	.3
Reach	322.0501	.1	.3
Reach	222.0471	.1	.3
Reach	54.279	.1	.3
Reach	4.867403	.1	.3

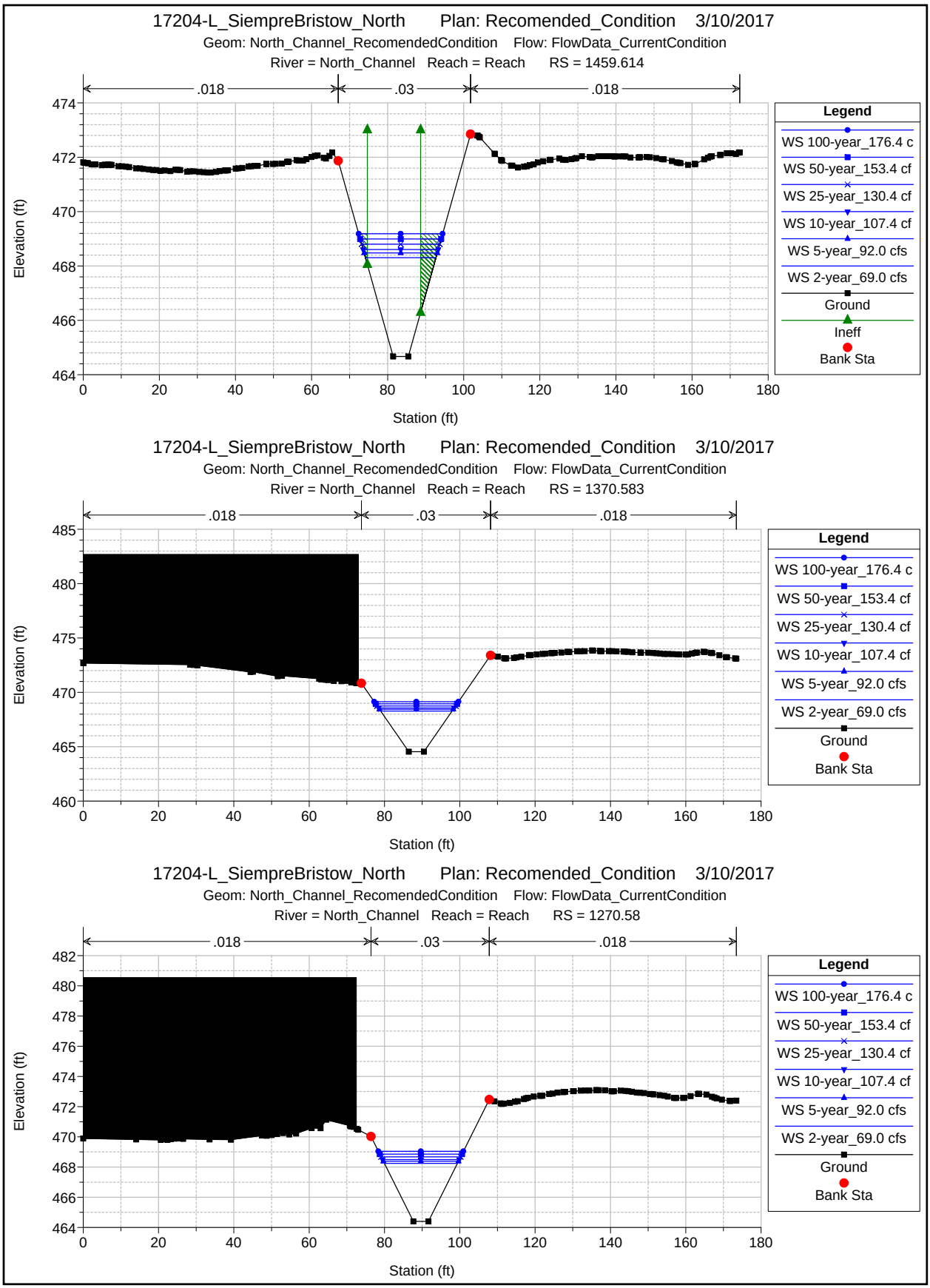
Attachment 16 - DETAILED HEC-RAS HYDRAULIC RESULTS FOR MAINTAINED CONDITION MODEL – SEDIMENT AND VEGETATION ONLY

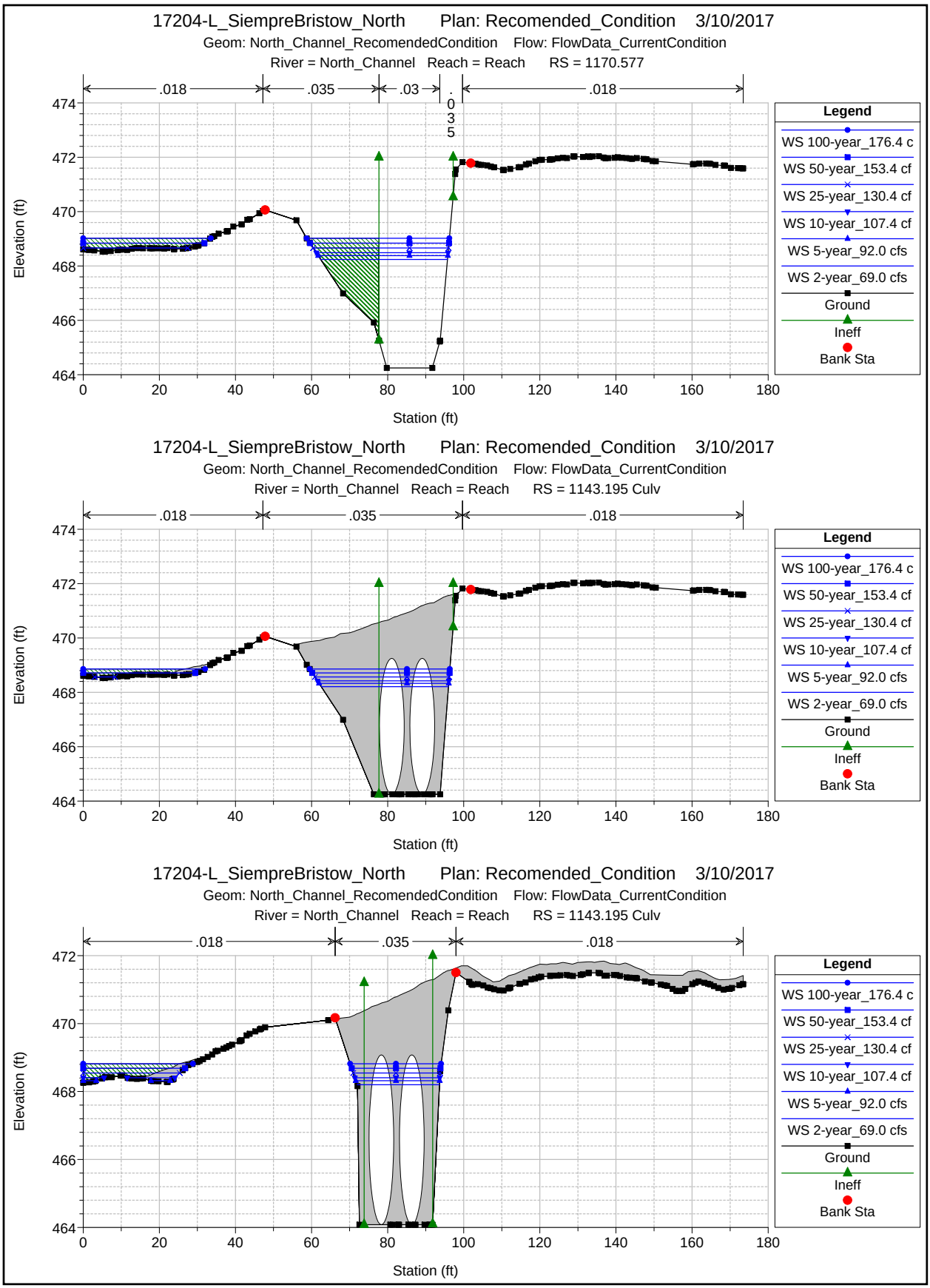
HEC-RAS Plan: Recomended River: North_Channel Reach: Reach

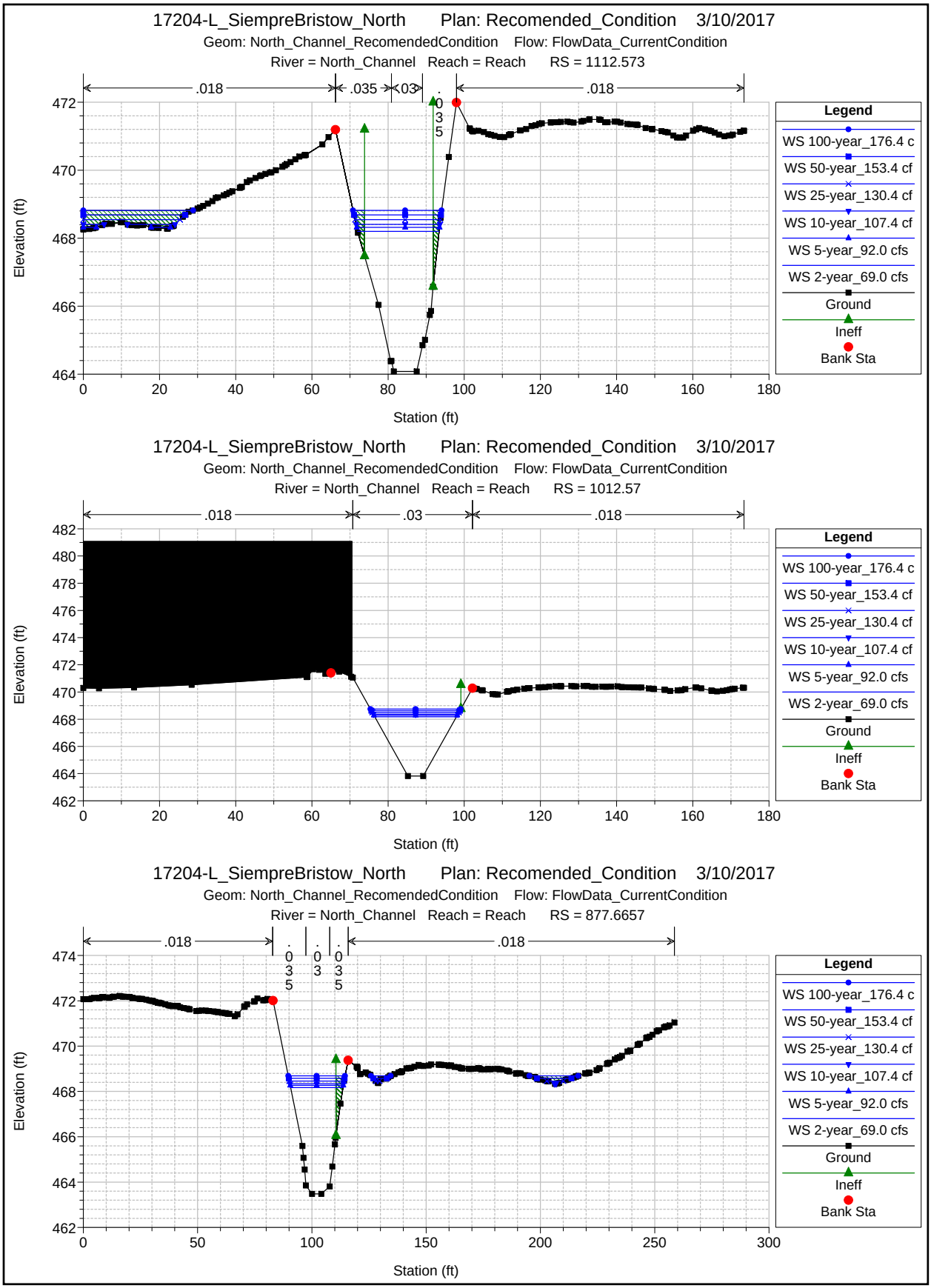
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1459.614	2-year_69.0 cfs	69.00	464.67	468.30	466.27	468.36	0.000439	1.87	36.81	18.54	0.20
Reach	1459.614	5-year_92.0 cfs	92.00	464.67	468.48	466.51	468.56	0.000631	2.34	39.26	19.23	0.25
Reach	1459.614	10-year_107.4 cf	107.40	464.67	468.60	466.67	468.71	0.000743	2.62	41.01	19.74	0.27
Reach	1459.614	25-year_130.4 cf	130.40	464.67	468.80	466.88	468.94	0.000882	2.98	43.76	20.52	0.30
Reach	1459.614	50-year_153.4 cf	153.40	464.67	469.00	467.07	469.16	0.000997	3.30	46.50	21.30	0.32
Reach	1459.614	100-year_176.4 c	176.40	464.67	469.19	467.25	469.39	0.001094	3.59	49.18	22.07	0.34
Reach	1370.583	2-year_69.0 cfs	69.00	464.54	468.28		468.32	0.000400	1.61	42.87	18.95	0.19
Reach	1370.583	5-year_92.0 cfs	92.00	464.54	468.44		468.50	0.000588	2.00	46.03	19.60	0.23
Reach	1370.583	10-year_107.4 cf	107.40	464.54	468.56		468.64	0.000700	2.22	48.41	20.08	0.25
Reach	1370.583	25-year_130.4 cf	130.40	464.54	468.75		468.85	0.000837	2.49	52.34	20.85	0.28
Reach	1370.583	50-year_153.4 cf	153.40	464.54	468.95		469.06	0.000946	2.72	56.47	21.63	0.30
Reach	1370.583	100-year_176.4 c	176.40	464.54	469.14		469.27	0.001029	2.90	60.73	22.40	0.31
Reach	1270.58	2-year_69.0 cfs	69.00	464.40	468.24		468.28	0.000354	1.54	44.87	19.36	0.18
Reach	1270.58	5-year_92.0 cfs	92.00	464.40	468.39		468.45	0.000533	1.93	47.75	19.95	0.22
Reach	1270.58	10-year_107.4 cf	107.40	464.40	468.50		468.57	0.000644	2.15	49.95	20.38	0.24
Reach	1270.58	25-year_130.4 cf	130.40	464.40	468.67		468.77	0.000784	2.43	53.64	21.10	0.27
Reach	1270.58	50-year_153.4 cf	153.40	464.40	468.86		468.97	0.000898	2.66	57.57	21.83	0.29
Reach	1270.58	100-year_176.4 c	176.40	464.40	469.04		469.17	0.000988	2.86	61.67	22.57	0.30
Reach	1170.577	2-year_69.0 cfs	69.00	464.25	468.24	465.20	468.26	0.000103	1.06	64.95	33.31	0.10
Reach	1170.577	5-year_92.0 cfs	92.00	464.25	468.38	465.39	468.41	0.000162	1.36	67.54	34.07	0.12
Reach	1170.577	10-year_107.4 cf	107.40	464.25	468.49	465.49	468.52	0.000203	1.55	69.48	34.64	0.14
Reach	1170.577	25-year_130.4 cf	130.40	464.25	468.66	465.65	468.71	0.000262	1.79	72.66	63.04	0.16
Reach	1170.577	50-year_153.4 cf	153.40	464.25	468.84	465.79	468.90	0.000319	2.02	75.93	68.39	0.18
Reach	1170.577	100-year_176.4 c	176.40	464.25	469.02	465.93	469.10	0.000371	2.23	79.25	71.05	0.19
Reach	1143.195		Culvert									
Reach	1112.573	2-year_69.0 cfs	69.00	464.08	468.20		468.23	0.000182	1.23	56.07	21.40	0.12
Reach	1112.573	5-year_92.0 cfs	92.00	464.08	468.32		468.36	0.000286	1.58	58.19	30.25	0.15
Reach	1112.573	10-year_107.4 cf	107.40	464.08	468.41		468.46	0.000356	1.80	59.75	40.03	0.17
Reach	1112.573	25-year_130.4 cf	130.40	464.08	468.55		468.61	0.000458	2.09	62.27	47.77	0.20
Reach	1112.573	50-year_153.4 cf	153.40	464.08	468.68		468.77	0.000556	2.37	64.76	49.60	0.22
Reach	1112.573	100-year_176.4 c	176.40	464.08	468.82		468.92	0.000652	2.63	67.13	52.09	0.24
Reach	1012.57	2-year_69.0 cfs	69.00	463.82	468.18		468.21	0.000200	1.24	55.51	21.45	0.14
Reach	1012.57	5-year_92.0 cfs	92.00	463.82	468.29		468.33	0.000319	1.59	57.83	21.88	0.17
Reach	1012.57	10-year_107.4 cf	107.40	463.82	468.37		468.42	0.000402	1.80	59.58	22.20	0.19
Reach	1012.57	25-year_130.4 cf	130.40	463.82	468.50		468.57	0.000521	2.09	62.49	22.71	0.22
Reach	1012.57	50-year_153.4 cf	153.40	463.82	468.63		468.71	0.000638	2.34	65.43	23.23	0.25
Reach	1012.57	100-year_176.4 c	176.40	463.82	468.75		468.85	0.000751	2.58	68.31	23.72	0.27
Reach	877.6657	2-year_69.0 cfs	69.00	463.48	468.17	464.68	468.18	0.000109	1.01	68.45	22.89	0.10
Reach	877.6657	5-year_92.0 cfs	92.00	463.48	468.27	464.91	468.29	0.000179	1.31	70.40	23.23	0.12
Reach	877.6657	10-year_107.4 cf	107.40	463.48	468.34	465.04	468.37	0.000230	1.49	71.86	24.22	0.14
Reach	877.6657	25-year_130.4 cf	130.40	463.48	468.46	465.23	468.51	0.000308	1.76	74.28	32.75	0.16
Reach	877.6657	50-year_153.4 cf	153.40	463.48	468.58	465.40	468.64	0.000390	2.00	76.69	45.38	0.18
Reach	877.6657	100-year_176.4 c	176.40	463.48	468.69	465.57	468.77	0.000475	2.23	79.00	54.77	0.20
Reach	800		Culvert									
Reach	735.8522	2-year_69.0 cfs	69.00	462.98	468.15		468.16	0.000078	1.00	69.80	52.56	0.09
Reach	735.8522	5-year_92.0 cfs	92.00	462.98	468.23		468.25	0.000129	1.30	71.32	55.56	0.12
Reach	735.8522	10-year_107.4 cf	107.40	462.98	468.28		468.32	0.000168	1.49	72.41	58.91	0.13
Reach	735.8522	25-year_130.4 cf	130.40	462.98	468.37		468.42	0.000228	1.77	74.14	66.99	0.16
Reach	735.8522	50-year_153.4 cf	153.40	462.98	468.46		468.52	0.000295	2.04	75.70	74.70	0.18
Reach	735.8522	100-year_176.4 c	176.40	462.98	468.52		468.60	0.000370	2.31	76.90	80.65	0.20
Reach	639.5066	2-year_69.0 cfs	69.00	462.66	468.14		468.15	0.000069	0.84	82.11	26.98	0.08
Reach	639.5066	5-year_92.0 cfs	92.00	462.66	468.22		468.24	0.000114	1.09	84.24	27.67	0.11
Reach	639.5066	10-year_107.4 cf	107.40	462.66	468.28		468.30	0.000148	1.25	85.79	28.16	0.13
Reach	639.5066	25-year_130.4 cf	130.40	462.66	468.36		468.40	0.000202	1.48	88.34	29.17	0.15
Reach	639.5066	50-year_153.4 cf	153.40	462.66	468.44		468.49	0.000260	1.69	90.70	30.26	0.17
Reach	639.5066	100-year_176.4 c	176.40	462.66	468.50		468.56	0.000326	1.91	92.56	31.09	0.19
Reach	539.4938	2-year_69.0 cfs	69.00	462.33	468.14		468.15	0.000054	0.76	90.68	29.81	0.07
Reach	539.4938	5-year_92.0 cfs	92.00	462.33	468.21		468.23	0.000090	0.99	92.72	31.61	0.10
Reach	539.4938	10-year_107.4 cf	107.40	462.33	468.27		468.29	0.000118	1.14	94.19	35.92	0.11
Reach	539.4938	25-year_130.4 cf	130.40	462.33	468.35		468.38	0.000163	1.35	96.57	50.75	0.13
Reach	539.4938	50-year_153.4 cf	153.40	462.33	468.43		468.46	0.000213	1.55	98.69	60.92	0.15
Reach	539.4938	100-year_176.4 c	176.40	462.33	468.48		468.53	0.000269	1.76	100.27	62.80	0.17
Reach	427.2193	2-year_69.0 cfs	69.00	461.95	468.14		468.14	0.000030	0.60	130.03	86.55	0.06
Reach	427.2193	5-year_92.0 cfs	92.00	461.95	468.21		468.22	0.000047	0.77	136.48	87.90	0.07
Reach	427.2193	10-year_107.4 cf	107.40	461.95	468.26		468.27	0.000059	0.87	141.17	88.03	0.08
Reach	427.2193	25-year_130.4 cf	130.40	461.95	468.35		468.36	0.000077	1.00	148.70	88.20	0.09

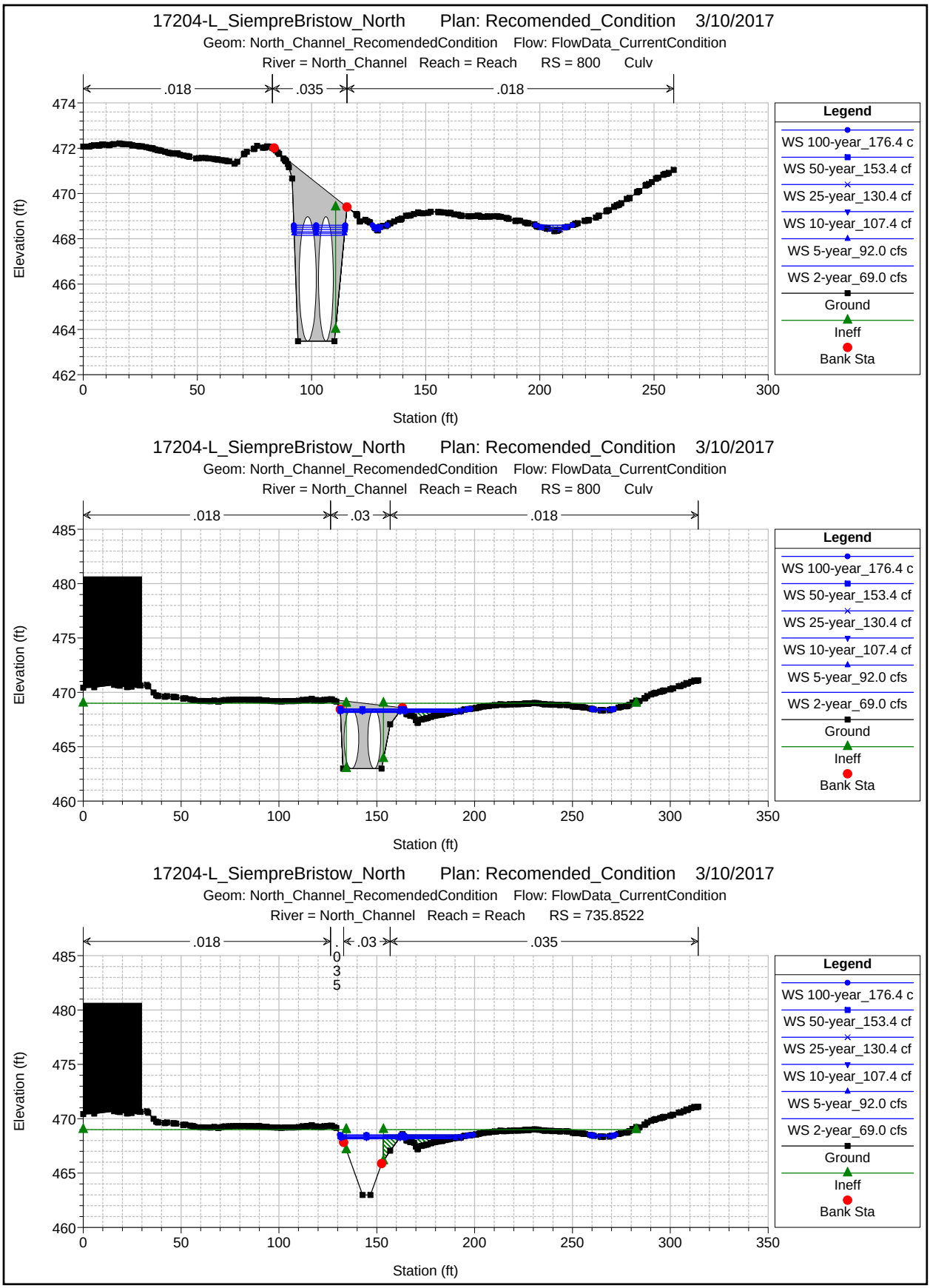
HEC-RAS Plan: Recomended River: North_Channel Reach: Reach (Continued)

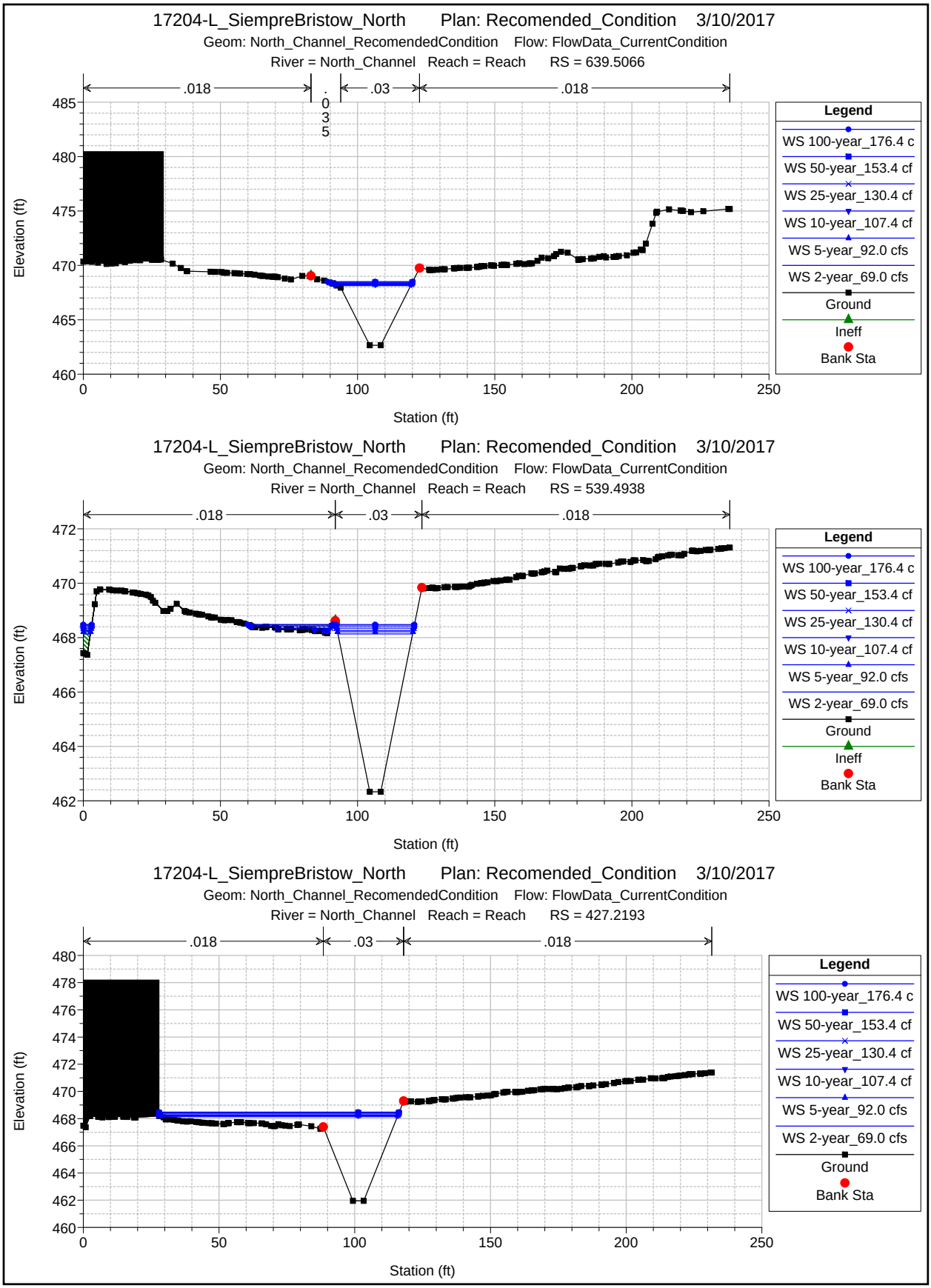
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	427.2193	50-year_153.4 cf	153.40	461.95	468.42		468.44	0.000095	1.12	155.41	88.35	0.10
Reach	427.2193	100-year_176.4 c	176.40	461.95	468.48		468.50	0.000115	1.25	160.42	88.46	0.11
Reach	301.9247	2-year_69.0 cfs	69.00	461.53	468.13		468.14	0.000029	0.61	114.24	43.02	0.06
Reach	301.9247	5-year_92.0 cfs	92.00	461.53	468.20		468.21	0.000049	0.79	117.43	47.27	0.07
Reach	301.9247	10-year_107.4 cf	107.40	461.53	468.25		468.27	0.000064	0.91	119.99	54.35	0.08
Reach	301.9247	25-year_130.4 cf	130.40	461.53	468.33		468.35	0.000088	1.08	125.12	74.54	0.10
Reach	301.9247	50-year_153.4 cf	153.40	461.53	468.40		468.43	0.000114	1.24	130.71	83.95	0.11
Reach	301.9247	100-year_176.4 c	176.40	461.53	468.46		468.49	0.000142	1.40	135.12	89.86	0.12
Reach	174.488	2-year_69.0 cfs	69.00	461.11	468.13		468.13	0.000012	0.37	187.35	119.94	0.03
Reach	174.488	5-year_92.0 cfs	92.00	461.11	468.20		468.21	0.000019	0.48	195.86	123.81	0.04
Reach	174.488	10-year_107.4 cf	107.40	461.11	468.25		468.26	0.000025	0.55	202.19	125.71	0.05
Reach	174.488	25-year_130.4 cf	130.40	461.11	468.33		468.34	0.000034	0.65	212.52	127.88	0.06
Reach	174.488	50-year_153.4 cf	153.40	461.11	468.41		468.41	0.000043	0.74	221.80	130.41	0.07
Reach	174.488	100-year_176.4 c	176.40	461.11	468.46		468.47	0.000054	0.83	228.60	131.14	0.07
Reach	72.67111	2-year_69.0 cfs	69.00	460.77	468.13	461.93	468.13	0.000011	0.39	172.01	49.01	0.03
Reach	72.67111	5-year_92.0 cfs	92.00	460.77	468.20	462.16	468.20	0.000018	0.52	175.69	54.55	0.04
Reach	72.67111	10-year_107.4 cf	107.40	460.77	468.25	462.29	468.26	0.000024	0.60	178.52	58.29	0.05
Reach	72.67111	25-year_130.4 cf	130.40	460.77	468.33	462.47	468.34	0.000034	0.71	183.38	62.81	0.06
Reach	72.67111	50-year_153.4 cf	153.40	460.77	468.40	462.64	468.41	0.000044	0.82	187.84	64.46	0.07
Reach	72.67111	100-year_176.4 c	176.40	460.77	468.45	462.79	468.46	0.000056	0.93	191.11	66.33	0.08

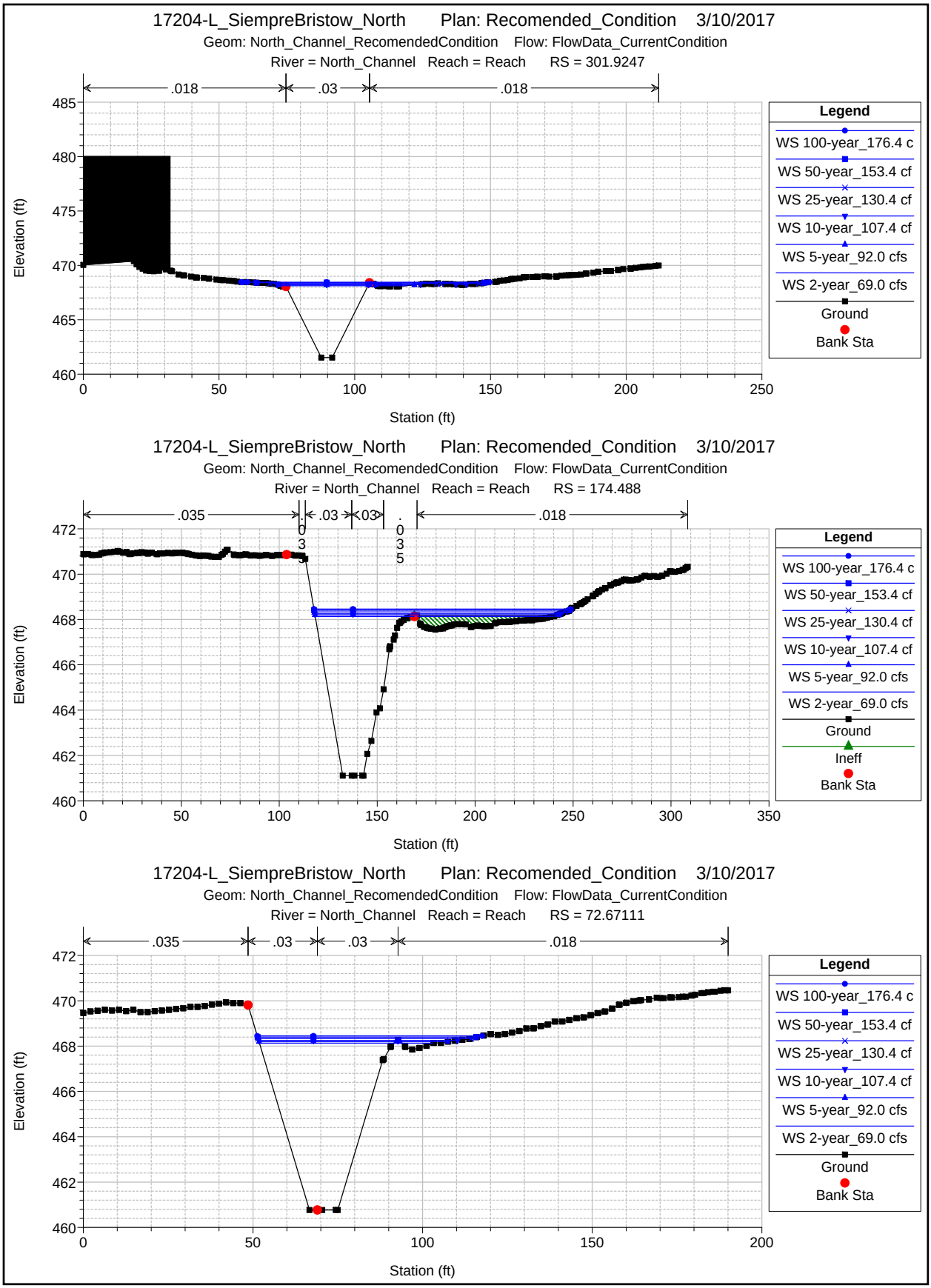

17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1459.614
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1370.583
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1270.58
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1170.577
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1112.573
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 1012.57
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 877.6657
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 735.8522
.018
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 639.5066
.018
.035
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 539.4938
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 427.2193
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 301.9247
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 174.488
.035
.03
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: Recomended_Condition 3/10/2017
Geom: North_Channel_RecomendedCondition Flow: FlowData_CurrentCondition
River = North_Channel Reach = Reach RS = 72.67111
.035
.03
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: 17204-L_SiempreBristow_North
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 2:13:23 PM

Project in English units

Project Description:
78

PLAN DATA

Plan Title: Recomended_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.p06

Geometry Title: North_Channel_RecomendedCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g01

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Plan Summary Information:
Number of: Cross Sections = 14 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f05

Flow Data (cfs)

River	Reach	RS	2-year_69.0 cfs	5-year_92.0 cfs	10-year_107.4 cfs	25-year_130.4 cfs	50-year_153.4 cfs	100-year_176.4 cfs	PF 7	PF 8
North_Channel	Reach	1459.614	69	92	107.4	130.4	153.4	176.4	10	15

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
North_Channel	Reach	1459.614	20	25	30	35	40	45

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
North_Channel	Reach	2-year_69.0 cfs	Normal S = 0.004	Known WS = 468.13
North_Channel	Reach	5-year_92.0 cfs	Normal S = 0.004	Known WS = 468.2
North_Channel	Reach	10-year_107.4 cfs	Normal S = 0.004	Known WS = 468.25
North_Channel	Reach	25-year_130.4 cfs	Normal S = 0.004	Known WS = 468.33
North_Channel	Reach	50-year_153.4 cfs	Normal S = 0.004	Known WS = 468.4
North_Channel	Reach	100-year_176.4 cfs	Normal S = 0.004	Known WS = 468.45
North_Channel	Reach	PF 7	Normal S = 0.004	Known WS = 467.35
North_Channel	Reach	PF 8	Normal S = 0.004	Known WS = 467.53
North_Channel	Reach	PF 9	Normal S = 0.004	Known WS = 467.68
North_Channel	Reach	PF 10	Normal S = 0.004	Known WS = 467.83
North_Channel	Reach	PF 11	Normal S = 0.004	Known WS = 467.95
North_Channel	Reach	PF 12	Normal S = 0.004	Known WS = 467.98
North_Channel	Reach	PF 13	Normal S = 0.004	Known WS = 468.03
North_Channel	Reach	PF 14	Normal S = 0.004	Known WS = 468.05

GEOMETRY DATA

Geometry Title: North_Channel_RecomendedCondition
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g01

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1459.614

INPUT
Description:
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.81	.31	471.8	1.07	471.78	1.25	471.78	2.19	471.74
2.61	471.74	2.89	471.74	3.11	471.74	3.17	471.74	4.87	471.71
5.63	471.72	5.9	471.72	6.45	471.73	6.69	471.73	7.1	471.72
7.42	471.72	9.27	471.67	10.25	471.67	11.22	471.65	12.06	471.64
13.89	471.59	14.96	471.59	15.78	471.57	17.27	471.55	18.34	471.53
19.24	471.53	20.24	471.5	21.4	471.51	22.89	471.49	24.25	471.54
24.83	471.54	25.49	471.53	27.3	471.47	27.99	471.48	29.08	471.48
30.47	471.46	31.66	471.45	32.69	471.44	33.5	471.44	34.94	471.46
35.9	471.49	37.3	471.51	37.6	471.51	38.06	471.52	40.07	471.58
40.79	471.59	41.8	471.61	43.47	471.66	44.16	471.67	44.98	471.68
45.86	471.68	48.1	471.75	48.13	471.75	48.16	471.75	49.86	471.75
50.57	471.76	52.19	471.77	53.57	471.83	53.76	471.82	54.01	471.84
56.05	471.89	56.63	471.88	57.76	471.88	58.66	471.93	59.99	472.01
60.9	472.05	61.59	472.07	63.2	471.98	63.78	471.95	64.71	472.05
65.42	472.18	67.02	471.87	81.43	464.67	85.43	464.67	101.78	472.85
103.46	472.8	103.66	472.8	103.99	472.76	104.23	472.73	108.1	472.13
108.17	472.12	109.82	471.9	109.91	471.89	110.07	471.87	112.43	471.69
112.77	471.69	114.24	471.62	115.84	471.65	116.62	471.67	117.38	471.71
118.37	471.74	119.5	471.81	120.89	471.85	122.56	471.9	122.7	471.9
122.83	471.91	125.12	471.95	126.09	471.91	126.81	471.9	128.32	471.93
129.29	471.95	129.6	471.97	131.08	472.04	133.1	472.01	133.58	471.99
133.91	472	135.35	472.04	136.77	472.04	137.76	472.04	139.16	472.04
139.58	472.02	140.73	472.03	142.03	472.03	142.48	472.03	143.81	471.99
145.92	471.99	146.25	472	146.33	472	148.09	472.01	148.92	472
150.57	471.97	152.07	471.93	152.3	471.93	152.57	471.92	154.71	471.86
155.98	471.81	156.51	471.8	156.95	471.78	158.95	471.72	160.69	471.75
160.76	471.75	160.83	471.75	163.17	471.92	164.16	471.98	164.89	472.02
165.16	472.04	167.36	472.08	167.57	472.09	169.14	472.15	170.34	472.15
171.53	472.12	172.33	472.17	172.53	472.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	67.02	.03	101.78	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
67.02	101.78	89.03	89.03	89.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	74.66	473	T
88.66	172.53	473	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1370.583

INPUT

Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.69	28.36	472.55	29.33	472.52	30.37	472.48	44.41	471.87
45.08	471.89	51.64	471.48	52.77	471.53	62.65	471.25	63.17	471.19
63.72	471.24	64.33	471.16	65	471.13	66.56	471.05	68.56	471.02
69.77	471.06	71.18	470.92	72.49	470.84	72.89	470.85	72.94	470.85
73.86	470.84	86.46	464.54	90.46	464.54	108.18	473.4	108.63	473.37
110.09	473.29	111.79	473.14	112.06	473.12	112.31	473.13	114.35	473.16
115.05	473.21	116.33	473.28	118.34	473.41	118.56	473.43	118.82	473.43
120.43	473.49	121.99	473.53	122.72	473.56	124.33	473.6	124.71	473.62
125.2	473.63	126.98	473.66	128.62	473.71	128.94	473.72	129.08	473.72
131.15	473.78	132	473.78	133.15	473.79	135.13	473.84	135.4	473.84
137.21	473.8	137.37	473.79	137.63	473.79	139.58	473.79	140.45	473.79
141.61	473.77	143.46	473.75	143.87	473.75	144.55	473.73	145.83	473.68
147.97	473.65	148.03	473.65	148.11	473.65	150.04	473.65	151.37	473.62
152.24	473.59	153.22	473.57	154.25	473.53	155.11	473.53	156.44	473.52
157.81	473.5	158.33	473.49	160.05	473.48	160.61	473.49	161.68	473.57
162.56	473.63	163.03	473.66	164.77	473.73	165.07	473.71	166.67	473.64
167.03	473.61	168.92	473.41	170.65	473.24	170.84	473.22	170.95	473.22
173.13	473.12	173.44	473.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	73.86	.03	108.18	.018

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

73.86	108.18	100.01	100	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	73.08	482.688

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1270.58

INPUT
Description:
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.89	14.05	469.83	20.59	469.8	21.46	469.84	22.35	469.8
23.3	469.84	24.31	469.88	25.37	469.89	26.54	469.87	33.53	469.83
39.21	469.81	47.48	470.09	48.73	470.07	50.05	470.12	51.49	470.19
53.05	470.25	54.69	470.16	56.53	470.22	60.63	470.58	63.03	470.57
64.52	471.14	70.83	470.74	71.07	470.69	71.77	470.66	72.61	470.53
73.04	470.47	76.43	470.02	87.66	464.4	91.66	464.4	107.81	472.47
109.22	472.35	110.87	472.21	111.2	472.18	111.68	472.2	113.29	472.25
114.63	472.32	115.36	472.36	117.05	472.5	117.57	472.55	118.09	472.59
119.63	472.67	121.38	472.71	121.77	472.72	121.93	472.73	123.73	472.84
124.65	472.86	125.96	472.93	127.54	472.96	127.97	472.98	130.08	473.03
130.15	473.03	130.26	473.03	132.13	473.06	133.33	473.07	134.4	473.07
136.2	473.09	136.41	473.09	136.93	473.09	138.59	473.08	140.3	473.02
140.54	473.02	140.93	473.02	142.76	473.06	144.03	473.04	144.74	473.02
145.69	472.99	146.95	472.93	147.78	472.92	148.9	472.9	150.45	472.84
151.02	472.83	151.42	472.81	153.05	472.76	154.28	472.72	155.22	472.67
156.91	472.58	157.18	472.58	157.45	472.57	159.3	472.57	159.64	472.59
161.3	472.7	163.25	472.84	163.46	472.85	163.55	472.85	165.48	472.8
166.96	472.66	167.61	472.6	168.19	472.55	169.59	472.46	171.64	472.39
171.8	472.38	171.9	472.38	173.44	472.4				

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   76.43     .03  107.81    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         76.43  107.81           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   72.51 480.547

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 1170.577

INPUT
Description:
Station Elevation Data    num=     124
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.61     .07  468.61     .98   468.6    1.48  468.59    2.88  468.57
    5.08  468.53    5.45  468.53    5.77  468.53    7.23  468.55    9.05  468.58
    9.64   468.6   10.43   468.6   11.55  468.59   12.75  468.63   13.99  468.66
   14.59  468.66   15.72  468.65   17.51  468.65   18.03  468.65   18.42  468.65
   19.81  468.65   21.29  468.64   22.16  468.66   23.82  468.62   23.85  468.62
   23.92  468.62   26.16  468.63   27.07  468.65   27.74  468.67   29.36  468.71
   30.07  468.75   30.31  468.76   31.77  468.83   33.35     469   33.96  469.07
   34.45   469.1   35.58  469.19   37.72  469.27    37.9  469.28   37.99  469.28
   39.45  469.45   41.61  469.53   41.63  469.53   43.12   469.7   43.77  469.72
   46.28  469.94   47.22  470.02   47.83  470.06   56.04  469.68   58.75  469.01
    59.5  468.86   68.27  466.99   76.37  465.92   77.75  465.25   79.75  464.25
   91.75  464.25    93.7  465.22    93.8  465.25   97.75  471.38   97.89  471.55
   99.68  471.82  101.86  471.78  103.13  471.76  103.86  471.73  104.63  471.72
  106.16   471.7  107.14  471.66  107.99  471.63  110.31  471.53  110.43  471.53
  110.53  471.53  112.22  471.57  114.43  471.63  114.61  471.63  114.86  471.64
  116.32  471.73  117.14  471.77   118.8  471.85  119.97   471.9  120.54  471.91
  122.57  471.91  122.93  471.92   123.3  471.92  124.69  471.96  126.07  471.98
  127.16  471.97  128.86  472.03  128.93  472.03  129.12  472.03  131.33  472.01
  132.65  472.03  133.05  472.01  133.82  472.03   135.5  472.04  136.73  471.99
  137.21  471.96  138.01  471.97  139.64  471.98  140.52     472  141.35  471.98
  142.75  471.97  143.69  471.95  144.23  471.94  145.48  471.97  147.27  471.94
  147.86  471.93  148.06  471.92   149.6  471.86  150.49  471.85   160.2  471.74
  160.53  471.75  161.92  471.77   163.7  471.77  164.37  471.77  164.71  471.76
  166.16  471.72  168.38  471.69  168.54  471.69  168.63  471.69   170.2  471.61
  172.08   471.6  172.67   471.6  173.27  471.59  173.44  471.59

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.22    .035   77.75     .03    93.7    .035   99.68    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.83  101.86            58.01      58      58             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   77.71     472       T
   97.21  173.44     472       T

CULVERT


RIVER: North_Channel
REACH: Reach             RS: 1143.195

INPUT
```

Description:
Distance from Upstream XS = 2
Deck/Roadway Width = 52
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	
46.63	469.41		48.09	469.45		48.58	469.46	
50.31	469.54		51.3	469.54		51.94	469.56	
53.42	469.63		54.27	469.66		55.36	469.73	
55.8	469.75		57.99	469.83		58.03	469.83	
58.04	469.83		59.68	469.87		61.35	469.9	
62.05	469.91		62.82	469.94		63.68	469.98	
64.55	470		65.98	470.03		67.6	470.16	
67.61	470.16		67.61	470.16		70.07	470.19	
71.34	470.25		71.79	470.28		72.53	470.31	
74.23	470.4		74.97	470.44		75.85	470.5	
77.3	470.55		78.46	470.61		79.17	470.63	
80.15	470.66		81.51	470.76		82.6	470.8	
83.22	470.84		84.27	470.89		85.75	470.96	
86.75	471.02		87.56	471.08		88.51	471.16	
90.04	471.24		91.02	471.28		92.15	471.3	
92.66	471.34		94.81	471.51		95.13	471.52	
95.32	471.54		96.87	471.59		97.66	471.62	
99.35	471.7		100.89	471.7		101.04	471.7	
101.32	471.68		103.4	471.54		104.66	471.43	
105.16	471.39		107.13	471.27		107.65	471.23	
108	471.23		109.4	471.25		111.55	471.39	
111.82	471.41		111.9	471.41		113.48	471.46	
114.64	471.52		116.02	471.58		117.58	471.66	
117.7	471.66		120.03	471.75		120.14	471.75	
120.23	471.75		121.83	471.74		122.84	471.76	
124.34	471.76		125.63	471.79		126.07	471.8	
127.19	471.78		128.53	471.75		130.05	471.8	
130.19	471.8		130.47	471.8		132.67	471.82	
133.55	471.82		134.34	471.8		135.72	471.83	
136.82	471.84		137.4	471.82		138.48	471.77	
140.33	471.75		140.86	471.74		142.27	471.78	
142.58	471.78		143.65	471.73		145.02	471.66	
145.42	471.64		146.7	471.59		147.27	471.56	
149.04	471.44		155.4	471.42		157.58	471.42	
157.96	471.46		159	471.53		161.45	471.56	
161.51	471.56		161.54	471.56		163.22	471.5	
164.48	471.42		165.65	471.35		166.31	471.32	
167.26	471.29		169.68	471.3		169.75	471.3	
169.82	471.3		171.47	471.33		173.84	471.43	
173.92	471.43		173.96	471.43		175	471.47	

Upstream Bridge Cross Section Data
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	464.25	78.33	464.25	78.6	464.25
78.7	464.25	79.31	464.25	81.24	464.25	82.55	464.25	83	464.25
83.61	464.25	85.41	464.25	86.51	464.25	87.15	464.25	87.94	464.25
89.55	464.25	90.92	464.25	91.36	464.25	91.81	464.25	93.8	464.25
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92
124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59
173.44	471.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.22	.035	99.68	.018

Bank Sta: Left Right Coeff Contr. Expan.
47.83 101.86 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.71	472	T
97.21	173.44	472	T

Downstream Deck/Roadway Coordinates
num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	

46.63	469.41	48.09	469.45	48.58	469.46
50.31	469.54	51.3	469.54	51.94	469.56
53.42	469.63	54.27	469.66	55.36	469.73
55.8	469.75	57.99	469.83	58.03	469.83
58.04	469.83	59.68	469.87	61.35	469.9
62.05	469.91	62.82	469.94	63.68	469.98
64.55	470	65.98	470.03	67.6	470.16
67.61	470.16	67.61	470.16	70.07	470.19
71.34	470.25	71.79	470.28	72.53	470.31
74.23	470.4	74.97	470.44	75.85	470.5
77.3	470.55	78.46	470.61	79.17	470.63
80.15	470.66	81.51	470.76	82.6	470.8
83.22	470.84	84.27	470.89	85.75	470.96
86.75	471.02	87.56	471.08	88.51	471.16
90.04	471.24	91.02	471.28	92.15	471.3
92.66	471.34	94.81	471.51	95.13	471.52
95.32	471.54	96.87	471.59	97.66	471.62
99.35	471.7	100.89	471.7	101.04	471.7
101.32	471.68	103.4	471.54	104.66	471.43
105.16	471.39	107.13	471.27	107.65	471.23
108	471.23	109.4	471.25	111.55	471.39
111.82	471.41	111.9	471.41	113.48	471.46
114.64	471.52	116.02	471.58	117.58	471.66
117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.26	.04	468.26	1.57	468.27	2.65	468.29	3.18	468.31
4.93	468.38	5.76	468.42	6.03	468.42	7.5	468.42	9.86	468.47
10.08	468.48	10.29	468.47	11.67	468.4	12.62	468.38	14.08	468.37
15.08	468.38	15.73	468.39	17.81	468.32	18.23	468.31	18.34	468.31
19.79	468.3	21.97	468.28	22.19	468.28	23.39	468.35	23.65	468.36
23.75	468.37	26.12	468.63	26.83	468.69	27.64	468.78	28.71	468.81
29.98	468.87	30.59	468.9	31.47	468.95	32.71	469.02	33.89	469.09
34.79	469.18	35.33	469.2	36.86	469.26	37.62	469.3	38.33	469.34
39.09	469.38	41.09	469.48	41.43	469.5	41.61	469.51	42.92	469.65
43.73	469.7	45.24	469.77	46.4	469.83	46.72	469.85	47.83	469.89
64.38	470.1	66.2	470.17	72.08	468.16	72.58	464.08	80.71	464.08
81.31	464.08	82.82	464.08	82.89	464.08	82.99	464.08	85.45	464.08
85.89	464.08	87.14	464.08	87.31	464.08	89.7	464.08	90.97	464.08
91.27	464.08	91.81	464.08	93.79	468.6	95.94	470.39	97.97	471.5
101.43	471.23	101.48	471.22	102.02	471.16	102.28	471.14	103.7	471.16
105.16	471.12	106.3	471.06	107.04	471.04	107.95	471.01	109.31	470.98
110.47	470.97	111.75	471.03	112.03	471.05	112.25	471.06	114.63	471.17
114.78	471.17	116.25	471.21	117.66	471.3	118.75	471.32	119.72	471.36
120.37	471.38	122.7	471.4	122.96	471.41	123.46	471.41	124.59	471.41

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   125.4  471.42  127.12  471.43  127.84  471.41   128.7   471.4  130.71  471.43
  131.27  471.45  132.83  471.49  132.85  471.49   132.9  471.49  135.41  471.49
   135.8  471.48  136.99  471.41  137.64  471.41  139.46  471.43  140.14  471.43
  141.09   471.4  142.83  471.36   143.6  471.35  145.06  471.34  145.22  471.34
  145.49  471.33  147.62  471.24  149.22  471.21  149.28  471.21   149.4  471.21
  151.77  471.15  152.79  471.13  153.43  471.11  154.91  471.02  155.87  470.96
  156.61  470.96  157.48  470.96  158.23  471.02  160.05  471.16  160.92   471.2
   161.7  471.24  163.22   471.2  164.19  471.17  164.83  471.15  165.74   471.1
  166.87  471.05  168.31     471  169.56  471.02  169.93  471.02  170.51  471.05
  172.45  471.13  173.41  471.16  173.44  471.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018    66.2    .035   97.97    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
          66.2   97.97            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =  469.71
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018        0                   .2
1
Upstream   Elevation =  464.25
           Centerline Station =  81.085
Downstream Elevation =  464.08
           Centerline Station =  78.345

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018        0                   .2
1
Upstream   Elevation =  464.25
           Centerline Station =  89.085
Downstream Elevation =  464.08
           Centerline Station =  86.345

CROSS SECTION
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RIVER: North_Channel
REACH: Reach RS: 1112.573

INPUT
Description:
Station Elevation Data num= 152

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.26	.04	468.26	1.57	468.27	2.65	468.29	3.18	468.31
4.93	468.38	5.76	468.42	6.03	468.42	7.5	468.42	9.86	468.47
10.08	468.48	10.29	468.47	11.67	468.4	12.62	468.38	14.08	468.37
15.08	468.38	15.73	468.39	17.81	468.32	18.23	468.31	18.34	468.31
19.79	468.3	21.97	468.28	22.19	468.28	23.39	468.35	23.65	468.36
23.75	468.37	26.12	468.63	26.83	468.69	27.64	468.78	28.71	468.81
29.98	468.87	30.59	468.9	31.47	468.95	32.71	469.02	33.89	469.09
34.79	469.18	35.33	469.2	36.86	469.26	37.62	469.3	38.33	469.34
39.09	469.38	41.09	469.48	41.43	469.5	41.61	469.51	42.92	469.65
43.73	469.7	45.24	469.77	46.4	469.83	46.72	469.85	47.83	469.89
49	469.93	49.36	469.94	50.54	470	52.26	470.1	52.93	470.14
53.38	470.18	54.4	470.24	55.65	470.32	56.7	470.4	58.08	470.44
58.28	470.45	58.4	470.45	62.75	470.76	64.38	470.97	66.2	471.19
72.08	468.16	77.5	466.04	80.71	464.38	80.88	464.39	81.5	464.08
87.5	464.08	89.04	464.85	89.7	465.01	90.97	465.74	91.27	465.86
91.81	466.57	93.79	468.6	95.94	470.39	97.97	471.99	101.43	471.23
101.48	471.22	102.02	471.16	102.28	471.14	103.7	471.16	105.16	471.12
106.3	471.06	107.04	471.04	107.95	471.01	109.31	470.98	110.47	470.97
111.75	471.03	112.03	471.05	112.25	471.06	114.63	471.17	114.78	471.17
116.25	471.21	117.66	471.3	118.75	471.32	119.72	471.36	120.37	471.38
122.7	471.4	122.96	471.41	123.46	471.41	124.59	471.41	125.4	471.42
127.12	471.43	127.84	471.41	128.7	471.4	130.71	471.43	131.27	471.45
132.83	471.49	132.85	471.49	132.9	471.49	135.41	471.49	135.8	471.48
136.99	471.41	137.64	471.41	139.46	471.43	140.14	471.43	141.09	471.4
142.83	471.36	143.6	471.35	145.06	471.34	145.22	471.34	145.49	471.33
147.62	471.24	149.22	471.21	149.28	471.21	149.4	471.21	151.77	471.15
152.79	471.13	153.43	471.11	154.91	471.02	155.87	470.96	156.61	470.96
157.48	470.96	158.23	471.02	160.05	471.16	160.92	471.2	161.7	471.24
163.22	471.2	164.19	471.17	164.83	471.15	165.74	471.1	166.87	471.05
168.31	471	169.56	471.02	169.93	471.02	170.51	471.05	172.45	471.13
173.41	471.16	173.44	471.16						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	66.2	.035	80.88	.03	89.04	.035	97.97	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
66.2	97.97	100.02	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	73.82	471.2	T
91.82	173.44	472	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1012.57

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.3	4.1	470.27	13.31	470.33	28.44	470.53	58.63	471.1
58.84	471.11	60.31	471.67	61.88	471.63	63.52	471.34	65.02	471.4
67.18	471.5	70.31	471.12	70.75	471.06	85.22	463.82	89.22	463.82

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  102.15  470.28  102.73  470.25  103.27  470.23  104.59  470.13  104.64  470.13
  104.85  470.11  107.44  469.84  108.19  469.83  108.83  469.82  111.22  470.02
  111.56  470.05  111.66  470.05  112.94  470.12  113.91  470.17  115.72  470.24
  116.72  470.28  117.13  470.29  119.49  470.33  119.86  470.34  120.33  470.35
  121.22  470.36  122.32  470.39     124  470.43  125.32  470.43  125.36  470.43
  125.43  470.43  128.11  470.44  128.89  470.42  129.45  470.42  131.32  470.44
  132.12  470.45  132.34  470.44  133.52  470.38  134.51  470.38  136.25  470.39
   137.2  470.38  137.62  470.39  138.58   470.4  140.24  470.42  141.29  470.37
  141.64  470.36   143.2  470.35  144.38  470.34  144.48  470.34  145.79  470.33
  146.48  470.33  148.46  470.26  149.51  470.24  149.82  470.22  152.54  470.17
  152.63  470.17  152.69  470.16  154.04  470.08  156.03  470.11  156.73  470.12
  157.06  470.14  158.05  470.21  160.69  470.33  160.83  470.34  160.88  470.34
   162.2  470.27  164.89   470.1  164.94   470.1  164.98   470.1  166.33  470.04
  167.89  470.09  168.95  470.13  169.77  470.18  170.36  470.21  170.97  470.24
  173.15  470.31  173.44  470.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   70.75     .03  102.15    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.02  102.15           127.93   134.9  144.08             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   99.13  173.44  470.54       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   70.55 481.086

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 877.6657

INPUT
Description:
Station Elevation Data    num=     236
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.07     .19  472.07    2.36  472.07    2.76  472.07    3.65   472.1
    4.71  472.13    6.58  472.12    6.77  472.12    6.89  472.12    7.26  472.13
    8.31  472.16    8.68  472.17    9.95  472.15   11.18  472.13   11.56  472.14
   12.74  472.17   12.84  472.17   13.45  472.18   15.89  472.21   16.28   472.2
   17.19  472.18   17.91  472.18   19.99  472.17   20.24  472.17   20.33  472.17
   21.39  472.12   21.57  472.13   23.86   472.1    24.6  472.08   25.43  472.08
   25.75  472.08   27.55  472.05   28.84  472.02   29.67     472   30.06     472
   30.51  471.99   31.46  471.95   32.54  471.91   33.06  471.92   33.48   471.9
   34.21  471.89   35.87  471.84   37.23   471.8   37.88  471.79   38.35  471.78
   38.89  471.76   40.37  471.77   41.02  471.78   41.26  471.77   41.43  471.76
   42.41  471.71   43.97  471.68   45.42  471.66   46.24  471.63   46.54  471.62
   49.44  471.55   49.51  471.55   50.64  471.56   51.87  471.57    53.6  471.57
   54.52  471.55   54.76  471.55   57.04  471.53   57.86  471.51   58.77   471.5
   58.97   471.5   60.61  471.47   61.89  471.46   62.32  471.45   63.09  471.43
   63.93  471.42   66.25  471.32   66.39  471.32   67.44   471.4   70.36  471.73
   70.53  471.75   70.62  471.75   71.67  471.84   74.66  471.96   74.91  471.97
   75.04  471.98   76.15   472.1   78.69  472.02   79.41  472.03   79.79  472.03
   80.58  472.08   81.29  472.07   82.88  472.01   83.03  472.01   95.88  465.59
   96.32  465.07   96.86  464.55   97.35  463.85  100.09  463.48  104.09  463.48
  107.79  463.81  108.93  464.69  110.09  465.66  110.39  465.95  112.51  467.46
   114.1  468.49  115.88  469.37  119.54  469.09  119.76  469.09  119.96  469.05
  120.03  469.03  121.08  468.76  121.25  468.77  123.57  468.84  124.46  468.78
  125.36  468.74  125.62  468.72  127.91  468.47  128.91  468.38  129.02  468.37
  130.06  468.53  131.27  468.57  132.57  468.56  133.41  468.62  134.17  468.68
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  134.56  468.69  136.17  468.76  137.87  468.84  138.89  468.85     139  468.86
  139.18  468.86  139.52  468.89  141.37  469.01  142.32  469.03  142.87  469.02
  143.42  469.04  144.85  469.09  146.75  469.17  147.49  469.13  147.83  469.13
  148.68  469.12  151.09  469.14  152.21  469.19  155.52  469.18  155.61  469.18
  156.62  469.18  157.83  469.16  159.83  469.12  160.11  469.14  160.94  469.15
  162.42  469.08  164.26  469.07  165.17  469.02  165.41  469.02  165.94  469.01
  168.66     469  168.87  468.99  169.72  468.99  170.85     469  172.75  469.02
   173.1  469.03  173.53     469  174.13  468.97  175.58  468.97  177.18  468.99
  177.62  468.98  178.15  468.98  180.01  468.99  181.25     469  182.02  468.98
  182.26  468.97  182.99  468.97  185.34  468.92  185.66  468.91  186.34  468.88
  189.28  468.79  189.36  468.79  189.38  468.79  190.39  468.81   191.4  468.79
   193.5  468.72   194.4  468.69  194.52  468.69  195.03  468.69  197.64  468.64
  198.37  468.58  198.76  468.54  199.71  468.52  202.06  468.49  202.98  468.45
  203.13  468.45   203.5  468.44  206.37  468.33  207.37  468.35   207.5  468.35
  208.21  468.38     211   468.5  211.41  468.51  212.17  468.53  214.54  468.61
  215.49  468.65  215.74  468.66  216.59  468.69  219.59  468.79  220.03  468.79
  221.09  468.82  221.18  468.82   221.5  468.83  224.57  468.94  225.64     469
  225.67     469   225.9  469.02  229.13  469.21  229.54  469.24  230.27  469.27
  232.52  469.41  233.65  469.47  234.25  469.49  234.75  469.51  235.67  469.57
  238.08  469.76  239.21  469.79  239.22  469.79  239.34   469.8  242.48  470.05
  242.92  470.08  243.56  470.11  246.31  470.35  246.62  470.37  246.76  470.38
  247.72  470.42  249.02   470.5  250.87  470.65   251.5  470.69  251.89   470.7
  254.08  470.82  254.71  470.85   254.9  470.87  255.72  470.87  256.51  470.91
  258.65  471.04

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   82.88    .035   97.35     .03  107.79    .035  115.88    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         83.03  115.88           174.52  141.81  121.21             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  110.53  258.65   469.4       F

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 800

INPUT
Description:
Distance from Upstream XS =       5
Deck/Roadway Width        =     131
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23           82.88  472.01          115.52   469.4

Upstream Bridge Cross Section Data
Station Elevation Data    num=     238
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.07     .19  472.07    2.36  472.07    2.76  472.07    3.65   472.1
    4.71  472.13    6.58  472.12    6.77  472.12    6.89  472.12    7.26  472.13
    8.31  472.16    8.68  472.17    9.95  472.15   11.18  472.13   11.56  472.14
   12.74  472.17   12.84  472.17   13.45  472.18   15.89  472.21   16.28   472.2
   17.19  472.18   17.91  472.18   19.99  472.17   20.24  472.17   20.33  472.17
   21.39  472.12   21.57  472.13   23.86   472.1    24.6  472.08   25.43  472.08
   25.75  472.08   27.55  472.05   28.84  472.02   29.67     472   30.06     472
   30.51  471.99   31.46  471.95   32.54  471.91   33.06  471.92   33.48   471.9
   34.21  471.89   35.87  471.84   37.23   471.8   37.88  471.79   38.35  471.78
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   38.89  471.76   40.37  471.77   41.02  471.78   41.26  471.77   41.43  471.76
   42.41  471.71   43.97  471.68   45.42  471.66   46.24  471.63   46.54  471.62
   49.44  471.55   49.51  471.55   50.64  471.56   51.87  471.57    53.6  471.57
   54.52  471.55   54.76  471.55   57.04  471.53   57.86  471.51   58.77   471.5
   58.97   471.5   60.61  471.47   61.89  471.46   62.32  471.45   63.09  471.43
   63.93  471.42   66.25  471.32   66.39  471.32   67.44   471.4   70.36  471.73
   70.53  471.75   70.62  471.75   71.67  471.84   74.66  471.96   74.91  471.97
   75.04  471.98   76.15   472.1   78.69  472.02   79.41  472.03   79.79  472.03
   80.58  472.08   81.29  472.07   82.88  472.01   83.64  472.01   83.99  471.96
   84.43   471.9   85.19  471.82   85.82  471.75   87.73  471.54   88.29  471.49
   88.48  471.46   88.65  471.44   88.85  471.42   89.64   471.3   90.04  471.16
   91.52  470.66   94.05  463.48  110.05  463.48  115.52   469.4  119.54  469.09
  119.76  469.09  119.96  469.05  120.03  469.03  121.08  468.76  121.25  468.77
  123.57  468.84  124.46  468.78  125.36  468.74  125.62  468.72  127.91  468.47
  128.91  468.38  129.02  468.37  130.06  468.53  131.27  468.57  132.57  468.56
  133.41  468.62  134.17  468.68  134.56  468.69  136.17  468.76  137.87  468.84
  138.89  468.85     139  468.86  139.18  468.86  139.52  468.89  141.37  469.01
  142.32  469.03  142.87  469.02  143.42  469.04  144.85  469.09  146.75  469.17
  147.49  469.13  147.83  469.13  148.68  469.12  151.09  469.14  152.21  469.19
  155.52  469.18  155.61  469.18  156.62  469.18  157.83  469.16  159.83  469.12
  160.11  469.14  160.94  469.15  162.42  469.08  164.26  469.07  165.17  469.02
  165.41  469.02  165.94  469.01  168.66     469  168.87  468.99  169.72  468.99
  170.85     469  172.75  469.02   173.1  469.03  173.53     469  174.13  468.97
  175.58  468.97  177.18  468.99  177.62  468.98  178.15  468.98  180.01  468.99
  181.25     469  182.02  468.98  182.26  468.97  182.99  468.97  185.34  468.92
  185.66  468.91  186.34  468.88  189.28  468.79  189.36  468.79  189.38  468.79
  190.39  468.81   191.4  468.79   193.5  468.72   194.4  468.69  194.52  468.69
  195.03  468.69  197.64  468.64  198.37  468.58  198.76  468.54  199.71  468.52
  202.06  468.49  202.98  468.45  203.13  468.45   203.5  468.44  206.37  468.33
  207.37  468.35   207.5  468.35  208.21  468.38     211   468.5  211.41  468.51
  212.17  468.53  214.54  468.61  215.49  468.65  215.74  468.66  216.59  468.69
  219.59  468.79  220.03  468.79  221.09  468.82  221.18  468.82   221.5  468.83
  224.57  468.94  225.64     469  225.67     469   225.9  469.02  229.13  469.21
  229.54  469.24  230.27  469.27  232.52  469.41  233.65  469.47  234.25  469.49
  234.75  469.51  235.67  469.57  238.08  469.76  239.21  469.79  239.22  469.79
  239.34   469.8  242.48  470.05  242.92  470.08  243.56  470.11  246.31  470.35
  246.62  470.37  246.76  470.38  247.72  470.42  249.02   470.5  250.87  470.65
   251.5  470.69  251.89   470.7  254.08  470.82  254.71  470.85   254.9  470.87
  255.72  470.87  256.51  470.91  258.65  471.04

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   82.88    .035  115.52    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
         83.64  115.52            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  110.53  258.65   469.4       F

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23          126.34  469.36          163.13  468.58

Downstream Bridge Cross Section Data
Station Elevation Data    num=     269
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.43    5.63  470.47   15.79  470.69   17.68  470.65   18.64  470.61
   22.33  470.48   22.88  470.49   24.69  470.52   26.63  470.74   27.89  470.67
   28.73  470.66   28.93  470.63   29.23  470.63   32.55  470.67   33.18  470.55
   35.91  469.99   37.27  469.73   38.07  469.66   38.32  469.66   41.54  469.61
   41.84   469.6   41.92  469.61   42.85  469.65   46.12  469.57    46.5  469.57
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   46.61  469.57   47.54  469.55    51.1  469.42   51.13  469.42   52.17  469.45
   54.66  469.37   55.82  469.33   56.13  469.31   56.83  469.28   59.71  469.21
   60.48   469.2   60.62   469.2   61.43  469.21   62.06   469.2   62.98   469.2
    63.7  469.19   65.02  469.18   66.34  469.21   67.02  469.25   68.93  469.16
   69.01  469.16   69.27  469.16   70.61  469.22   71.74  469.27   72.39  469.28
   72.59  469.29   74.44  469.29   75.26   469.3   76.44  469.31   77.85  469.32
   78.41  469.33   80.21  469.32   80.33  469.32   80.74  469.32      82  469.34
   82.38  469.34   83.99  469.31   84.49  469.31   86.01  469.31   87.11  469.31
   87.99  469.29   89.66  469.32   89.92  469.32   90.76  469.28   91.76  469.25
   93.08  469.27   93.62  469.27   93.77  469.26   95.55   469.2   96.23   469.2
   97.42  469.19    98.6  469.19   99.27  469.18  100.95  469.16  101.63  469.17
  102.99  469.19  103.79  469.19  104.97  469.19  105.31   469.2  106.85  469.19
  107.73  469.19   108.7  469.21  110.09  469.23  111.94  469.28  112.31   469.3
  114.03  469.29  114.51  469.32  114.69  469.32  116.78  469.41  117.81  469.25
  119.04   469.3  120.16  469.25  121.39   469.2  121.55  469.21  122.02  469.23
  122.88  469.28  123.35   469.3  124.51  469.34   124.8  469.34  126.34  469.36
  127.11  469.36  128.37  469.23  129.32  469.15  131.38  468.43  132.79  462.98
  152.43  462.98  156.85  467.06  163.13  468.58  164.06  468.36  165.11  468.01
  165.76  467.96   167.1  467.85  167.19  467.85  167.49  467.84  169.02  467.79
  169.98  467.44   170.8  467.19  171.06  467.22  173.02  467.49  174.01  467.55
  175.25   467.6  176.02  467.64  177.57  467.74  177.88  467.76  179.17  467.83
  179.69  467.85  180.66  467.89  181.31  467.92  181.63  467.91  183.21  467.94
   183.7  467.97  185.24  468.04  186.36  468.08  187.31  468.12  189.07  468.18
  189.39   468.2  190.42  468.23  191.24  468.25  192.41  468.25  192.77  468.26
  193.02  468.28   194.7  468.41  195.19  468.42  196.73  468.46  197.84  468.48
   198.8  468.51  200.56  468.55  200.92  468.55  202.16  468.61  202.96  468.65
  204.53   468.7  204.81  468.71  204.94  468.71  206.84  468.74  207.45  468.75
  208.93  468.79  210.22  468.82  211.07  468.81  213.05  468.88  213.22  468.89
  213.77  468.89   214.8  468.85  215.89  468.87  216.14  468.86   216.4  468.87
  218.06   468.9  218.54  468.89  220.12  468.91  221.24  468.91  222.21   468.9
  223.96  468.92  224.34  468.92   225.6  468.95  226.23  468.96   226.9  468.97
  227.06  468.97  227.28  468.97  227.55  468.97  227.74  468.97  229.89     469
  230.56  469.01  230.62  469.01   230.7  469.01  231.56  469.02  232.86  468.98
   234.7  468.93  235.54  468.91  235.65   468.9  236.05   468.9  238.78  468.89
   239.6  468.88  239.77  468.86  240.06  468.87   242.8  468.86  243.45  468.83
  243.78  468.83  246.86  468.85  246.94  468.85  246.97  468.85  247.93  468.82
  250.05   468.7  251.09  468.67  251.54  468.66  252.15  468.67   254.8  468.64
  255.52  468.62  255.65  468.63  256.54   468.6  258.95  468.52  259.81  468.49
  260.13  468.47  260.91  468.42  264.32  468.35  264.43  468.35  264.76  468.35
  265.57  468.34  265.73  468.35  268.95  468.37  269.01  468.37     270  468.43
  270.63  468.45  273.49   468.6  273.66   468.6  274.61  468.65  277.36  468.71
  278.03  468.73  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23
  283.66  469.18  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45
  287.09  469.46  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89
  292.07  469.91  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13
  296.95  470.17  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37
  301.48  470.37  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68
  308.18  470.85  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08
  313.15  471.05  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .03  156.85    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
        131.38  163.13             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636
```

```
Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =  115.52
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     5.5     7.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018        0                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  98.3
Downstream Elevation =  462.98
           Centerline Station =  137.04

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     5.5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018        0                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  106.3
Downstream Elevation =  462.98
           Centerline Station =  148.68

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 735.8522

INPUT
Description:
Station Elevation Data    num=     272
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.43    5.63  470.47   15.79  470.69   17.68  470.65   18.64  470.61
   22.33  470.48   22.88  470.49   24.69  470.52   26.63  470.74   27.89  470.67
   28.73  470.66   28.93  470.63   29.23  470.63   32.55  470.67   33.18  470.55
   35.91  469.99   37.27  469.73   38.07  469.66   38.32  469.66   41.54  469.61
   41.84   469.6   41.92  469.61   42.85  469.65   46.12  469.57    46.5  469.57
   46.61  469.57   47.54  469.55    51.1  469.42   51.13  469.42   52.17  469.45
   54.66  469.37   55.82  469.33   56.13  469.31   56.83  469.28   59.71  469.21
   60.48   469.2   60.62   469.2   61.43  469.21   62.06   469.2   62.98   469.2
    63.7  469.19   65.02  469.18   66.34  469.21   67.02  469.25   68.93  469.16
   69.01  469.16   69.27  469.16   70.61  469.22   71.74  469.27   72.39  469.28
   72.59  469.29   74.44  469.29   75.26   469.3   76.44  469.31   77.85  469.32
   78.41  469.33   80.21  469.32   80.33  469.32   80.74  469.32      82  469.34
   82.38  469.34   83.99  469.31   84.49  469.31   86.01  469.31   87.11  469.31
   87.99  469.29   89.66  469.32   89.92  469.32   90.76  469.28   91.76  469.25
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   93.08  469.27   93.62  469.27   93.77  469.26   95.55   469.2   96.23   469.2
   97.42  469.19    98.6  469.19   99.27  469.18  100.95  469.16  101.63  469.17
  102.99  469.19  103.79  469.19  104.97  469.19  105.31   469.2  106.85  469.19
  107.73  469.19   108.7  469.21  110.09  469.23  111.94  469.28  112.31   469.3
  114.03  469.29  114.51  469.32  114.69  469.32  116.78  469.41  117.81  469.25
  119.04   469.3  120.16  469.25  121.39   469.2  121.55  469.21  122.02  469.23
  122.88  469.28  123.35   469.3  124.51  469.34   124.8  469.34  126.34  469.36
  127.11  469.36  128.37  469.23  129.32  469.15  131.38  468.43  132.79  467.91
  133.06  467.82  142.74  462.98  146.74  462.98  152.52  465.87  156.85  467.06
  163.13  468.58  164.06  468.36  165.11  468.01  165.76  467.96   167.1  467.85
  167.19  467.85  167.49  467.84  169.02  467.79  169.98  467.44   170.8  467.19
  171.06  467.22  173.02  467.49  174.01  467.55  175.25   467.6  176.02  467.64
  177.57  467.74  177.88  467.76  179.17  467.83  179.69  467.85  180.66  467.89
  181.31  467.92  181.63  467.91  183.21  467.94   183.7  467.97  185.24  468.04
  186.36  468.08  187.31  468.12  189.07  468.18  189.39   468.2  190.42  468.23
  191.24  468.25  192.41  468.25  192.77  468.26  193.02  468.28   194.7  468.41
  195.19  468.42  196.73  468.46  197.84  468.48   198.8  468.51  200.56  468.55
  200.92  468.55  202.16  468.61  202.96  468.65  204.53   468.7  204.81  468.71
  204.94  468.71  206.84  468.74  207.45  468.75  208.93  468.79  210.22  468.82
  211.07  468.81  213.05  468.88  213.22  468.89  213.77  468.89   214.8  468.85
  215.89  468.87  216.14  468.86   216.4  468.87  218.06   468.9  218.54  468.89
  220.12  468.91  221.24  468.91  222.21   468.9  223.96  468.92  224.34  468.92
   225.6  468.95  226.23  468.96   226.9  468.97  227.06  468.97  227.28  468.97
  227.55  468.97  227.74  468.97  229.89     469  230.56  469.01  230.62  469.01
   230.7  469.01  231.56  469.02  232.86  468.98   234.7  468.93  235.54  468.91
  235.65   468.9  236.05   468.9  238.78  468.89   239.6  468.88  239.77  468.86
  240.06  468.87   242.8  468.86  243.45  468.83  243.78  468.83  246.86  468.85
  246.94  468.85  246.97  468.85  247.93  468.82  250.05   468.7  251.09  468.67
  251.54  468.66  252.15  468.67   254.8  468.64  255.52  468.62  255.65  468.63
  256.54   468.6  258.95  468.52  259.81  468.49  260.13  468.47  260.91  468.42
  264.32  468.35  264.43  468.35  264.76  468.35  265.57  468.34  265.73  468.35
  268.95  468.37  269.01  468.37     270  468.43  270.63  468.45  273.49   468.6
  273.66   468.6  274.61  468.65  277.36  468.71  278.03  468.73  278.21  468.74
  279.07  468.86  280.64  469.06  282.57  469.23  283.66  469.18  283.69  469.18
  283.75  469.18   284.3  469.22  286.83  469.45  287.09  469.46  287.21  469.47
  288.15  469.65   290.3   469.8  291.53  469.89  292.07  469.91  292.65  469.97
  294.86  470.04  295.95   470.1  296.22  470.13  296.95  470.17  299.97  470.28
  300.07  470.28  300.09  470.28  301.15  470.37  301.48  470.37  304.33  470.57
  304.97  470.56  305.31  470.59  306.82  470.68  308.18  470.85  308.55   470.8
  309.12  470.84  310.73  470.97  312.26  471.08  313.15  471.05  313.29  471.06
   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34    .035  133.06     .03  156.85    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        133.06  152.52             67.5   96.35  120.06             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 639.5066

INPUT
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Description:
Station Elevation Data num= 137

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.34	1.51	470.37	3.1	470.33	5.36	470.25	8.48	470.13
10.32	470.17	11.85	470.2	13.49	470.39	15.15	470.29	16.94	470.42
18.82	470.48	20.76	470.47	22.86	470.62	24.98	470.52	25.36	470.51
27.2	470.51	27.23	470.51	28.25	470.54	28.32	470.54	32.57	470.16
35.55	469.76	37.67	469.48	37.87	469.47	46.39	469.41	46.86	469.41
48.13	469.4	50.44	469.39	51.16	469.34	51.49	469.32	52.4	469.31
55.1	469.29	55.86	469.27	56.15	469.27	57.22	469.25	59.76	469.2
60.35	469.21	60.78	469.19	62.4	469.15	64.39	469.07	64.88	469.04
65.47	469.03	67.36	468.98	69.02	468.95	69.46	468.95	70	468.96
70.9	468.91	73.45	468.78	75.71	468.7	79.84	469.03	83.01	469.04
85.24	468.72	87.8	468.61	91.06	468.33	91.07	468.33	91.08	468.33
91.12	468.33	92.35	468.15	93.85	467.95	104.43	462.66	108.43	462.66
122.6	469.75	122.98	469.77	126.1	469.6	126.37	469.58	126.52	469.58
127.35	469.57	128.89	469.6	130.76	469.64	131.55	469.64	131.78	469.64
135.11	469.73	135.22	469.73	135.36	469.73	136.28	469.76	137.42	469.77
139.66	469.77	140.38	469.78	140.64	469.79	143.52	469.85	144.15	469.87
144.35	469.88	145.23	469.93	146.28	469.93	148.69	469.99	149.24	470
149.74	469.97	152.42	470.03	153.31	470.06	154.26	470.03	154.36	470.03
154.46	470.03	157.9	470.14	158.13	470.15	158.99	470.2	160.79	470.12
162.57	470.14	162.9	470.18	163.6	470.18	165.58	470.41	167.13	470.71
169.49	470.65	171.6	470.85	172.39	471.05	174.19	471.25	176.59	471.17
180.43	470.55	180.58	470.5	181.18	470.54	181.64	470.57	182.08	470.58
185.1	470.61	185.81	470.64	186.17	470.65	188.19	470.78	189.82	470.85
190.6	470.73	193.31	470.77	194.18	470.78	194.36	470.82	195.26	470.86
198.2	470.93	200.62	471.15	201.62	471.2	203.3	471.46	203.94	471.41
205.11	472	207.54	473.83	208.86	474.83	209.23	474.93	213.58	475.15
217.78	475.03	218.1	475.04	218.63	475.01	221.58	474.89	226.05	474.98
235.18	475.18	235.68	475.19						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	83.01	.035	93.85	.03	122.6	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
83.01	122.6	100 100.01	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	83.01	469.04	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	29.23	480.456

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 539.4938

INPUT
Description:
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	467.43	.16	467.42	.85	467.41	1.44	467.37	4.2	469.23
4.85	469.7	6.07	469.77	6.1	469.77	6.19	469.77	9.41	469.77
9.63	469.76	10.73	469.74	12.09	469.73	14.01	469.73	14.94	469.71
15.33	469.7	17.94	469.66	18.67	469.65	19.67	469.63	19.92	469.63
20.86	469.61	22.87	469.58	23.72	469.55	24.61	469.49	25.35	469.36
26.23	469.28	29.18	468.98	30.59	468.98	31.78	469.06	34.04	469.24
36.93	468.98	37.42	468.95	37.58	468.94	38.76	468.92	41.01	468.88
41.95	468.86	42.37	468.85	43.29	468.84	45.57	468.78	46.64	468.74

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   47.01  468.74   47.95  468.74   50.13  468.66   51.27  468.64   51.74  468.64
   52.58  468.65   54.03  468.64   55.93  468.57   56.68  468.57   57.21  468.55
   58.58  468.52   60.59  468.46   61.48   468.4   61.84  468.38   62.73  468.38
   65.18  468.36   66.47  468.39   66.57  468.39   66.81  468.39   69.84  468.38
   71.06  468.31   71.07  468.31   71.09  468.31   74.28   468.3   75.61  468.31
   75.63  468.31   75.67  468.31   78.88  468.27   79.75  468.28   80.12  468.29
   81.05   468.3   83.24  468.28   83.99  468.28   84.49  468.24   85.88  468.24
   87.64  468.23   88.19  468.18   88.89  468.16   91.32  468.53   91.86  468.62
  104.44  462.33  108.44  462.33  123.46  469.84  124.07  469.81  126.21  469.82
  127.22  469.83   127.4  469.84  128.43  469.81  129.24  469.82  131.59  469.85
  132.38  469.85  132.87  469.86   135.5  469.86  136.08  469.86   136.2  469.86
  137.37  469.87  138.45  469.88  140.51  469.87  141.22  469.91  141.72  469.94
  143.53  469.98  145.01     470  145.63     470  146.32  470.02   147.4  470.03
  149.54  470.08  150.58  470.08  150.82  470.08  152.14   470.1  154.16  470.12
  154.46  470.13  155.45  470.13   157.8  470.22  158.73  470.27  159.81  470.26
  160.04  470.26  160.25  470.27  163.39  470.36  163.99  470.35  164.67  470.36
  167.15   470.4  167.95  470.42  168.15  470.43  169.16  470.46  172.02  470.41
  172.42  470.41  172.46  470.41  173.73  470.54  175.53  470.53  177.01  470.53
   177.7  470.55  178.26  470.56  178.47  470.56   181.4  470.62   181.6  470.63
  182.72  470.66  184.68  470.65   185.9  470.65  186.76   470.7  187.22  470.71
  188.12  470.72  190.42  470.71  191.65  470.71  191.68  470.71  191.74  470.71
     195  470.76  196.04  470.79  196.31   470.8  196.91   470.8  199.53  470.78
  200.59  470.83   200.8  470.84   201.3  470.84   204.1  470.85  205.06  470.82
  205.38  470.81  206.24  470.82  208.68  470.88  209.53  470.95  209.96  470.97
  211.11  470.99  213.28  471.02  214.05  471.04  214.56  471.05  216.85  471.03
  217.81  471.03  218.17  471.03  219.12  471.08  221.91  471.19  222.34   471.2
  222.67  471.19  223.68  471.17  225.05  471.19  226.99  471.22  227.88  471.22
  228.21  471.22  228.65  471.23  231.47  471.26   232.5  471.27  232.78  471.28
  233.82  471.29  235.68  471.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   91.86     .03  123.46    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         91.86  123.46           112.3  112.27  112.24             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   91.93  468.63       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 427.2193

INPUT
Description:
Station Elevation Data    num=     172
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.48     .89  467.36    2.41  468.18    2.42  468.18    2.49  468.18
    5.46  468.13    6.22  468.12    7.02  468.09    9.27  468.11   10.04  468.12
   11.57  468.15   11.61  468.15   11.63  468.15    14.7  468.15   14.81  468.14
   16.21  468.12    18.7  468.08   19.26  468.08   27.91   468.2   28.26  468.21
   29.55   468.1   30.33  467.94   31.79  467.94   33.41   467.9   34.52  467.87
   35.06  467.85   36.64  467.81   37.94  467.78   38.48  467.79   39.55  467.81
    41.6  467.76   42.63  467.73   43.75   467.7   44.21  467.69   46.13  467.67
   47.23  467.66    47.5  467.66   48.84  467.63   51.56   467.6   51.93   467.6
   53.42  467.67   53.46  467.67   53.55  467.67   56.59  467.74   57.11  467.74
   58.13  467.74   60.65  467.68   61.18  467.67    61.3  467.67   62.82  467.67
   65.62  467.64   65.84  467.64   65.95  467.64   67.32  467.58    69.2  467.47
   70.24  467.44   70.75  467.47   71.88  467.59   73.12  467.51   74.39  467.49
   76.07  467.45   78.83  467.54   79.27  467.56    79.4  467.57      84  467.44
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   87.31  467.25   87.87  467.32   88.43  467.39   99.31  461.95  103.31  461.95
  118.01   469.3  118.75  469.25   120.2  469.27  120.33  469.27  120.78  469.27
  123.22  469.23  123.84  469.26  124.69  469.26  127.29  469.29  127.58  469.29
  128.38  469.33  129.12  469.36  129.43  469.37  132.06  469.42  133.03   469.4
  133.62  469.42  136.09  469.47  136.52  469.47  137.26  469.51  137.99  469.54
  138.85  469.55  140.98  469.57  142.04  469.57  142.58  469.57  145.44  469.63
   145.5  469.63  145.56  469.63  147.08  469.67  148.98  469.69  150.13  469.71
  151.42  469.79  151.71  469.81  151.98  469.82  154.73  469.91   155.5  469.95
  156.31  469.97  159.12  469.95  159.35  469.95   159.8  469.95   160.9  469.96
  161.81  469.98  163.95  470.05  165.17  470.07  165.43  470.07  166.13  470.09
  168.38  470.15  169.22  470.16  169.99  470.19  171.64  470.18  172.98  470.18
  173.63  470.18  174.49  470.16  176.06  470.19  177.38  470.24  178.65  470.28
  178.96  470.28  181.55   470.3   181.9   470.3  182.47  470.34  183.47   470.4
  186.33   470.4   186.4   470.4  186.45   470.4  187.92  470.44  190.84  470.49
     191  470.49  191.11  470.49  192.57  470.54  195.48  470.62  195.52  470.62
  195.55  470.62  197.07  470.69  199.65  470.74  200.09  470.75  200.29  470.76
  201.67  470.76  204.41  470.85  204.65  470.86  204.77  470.86  206.24  470.87
  209.07  470.96  209.28  470.96  209.39  470.96  210.83  470.95   213.3  470.97
  213.81  470.98   214.1  470.98  215.39  471.06  216.39  471.09  218.32  471.12
  219.22  471.14  219.98  471.17  221.67   471.2     223  471.24   223.6  471.27
  224.51  471.28  227.22   471.3   227.5   471.3  227.62   471.3  229.11  471.34
  231.18  471.39  231.51  471.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   88.43     .03  118.01    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         88.43  118.01           125.23  125.29   125.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   27.91   478.2

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 301.9247

INPUT
Description:
Station Elevation Data    num=     143
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.04   18.59  470.39    19.6   470.1   20.67  469.86   21.83  469.69
   23.08  469.52   24.39  469.48   25.85  469.47    25.9  469.47   27.75  469.52
   27.83  469.52   27.97  469.52   30.43  469.63   32.08  469.52   32.34  469.49
   32.71  469.46   35.09  469.16   36.84  469.09   36.99  469.08   37.17  469.07
   39.72  468.97   41.46  468.89   41.59  468.88   41.85  468.88   44.38  468.84
   46.18  468.79   46.25  468.79   46.35  468.78   49.04  468.69   50.47  468.66
   50.88  468.65   51.51  468.64   53.61  468.61   54.77  468.58   55.58  468.56
   56.69  468.51    58.3  468.45   59.34  468.46   60.07  468.46   60.94  468.45
   62.73  468.43   63.98   468.4   64.65  468.39   65.64  468.39   67.29  468.39
   68.16  468.36   69.13  468.32   70.31   468.3   71.69  468.24   72.62  468.12
   73.49  468.05   74.64  468.05   87.68  461.53   91.68  461.53  105.42   468.4
  106.81  468.31  107.24  468.27  108.55   468.1  109.37  468.08  111.17  468.09
  112.58  468.07  113.04  468.06  115.43  468.05  115.63  468.05  116.37  468.07
  124.47  468.26  125.12  468.28  126.33  468.32  128.35   468.3  128.93  468.29
  129.74  468.31  130.71  468.35  133.36   468.3  133.39   468.3  133.41   468.3
   135.3  468.29  136.39  468.27  137.92  468.24  139.46  468.21  139.79  468.21
  140.48  468.23  142.52   468.3  143.58   468.3  144.42  468.29  146.67  468.36
  147.11  468.38  148.98  468.45  149.01  468.45  149.17  468.45  151.74  468.48
  152.36   468.5  153.61  468.59  154.94  468.62  156.34  468.65  157.51  468.72
  158.11  468.76  158.84  468.77  160.77  468.81  162.28   468.9   162.7  468.92
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  163.16  468.93  165.37  468.93  167.01  468.94  167.17  468.94  167.53  468.95
   169.8  468.99  170.53     469  171.67  468.96  174.17  468.97  174.29  468.97
  174.48  468.98  176.17  469.05  177.89  469.09  178.79   469.1  179.82  469.12
  180.63  469.13  181.81  469.13  183.39  469.16  185.19  469.25  185.29  469.25
  185.43  469.26  187.91  469.32  189.64  469.41  189.75  469.42  192.46  469.48
  192.51  469.48  192.81  469.48  194.38  469.48  196.99  469.58  197.07  469.58
  197.14  469.58  198.94  469.66  201.62  469.71  201.67  469.71  201.71  469.71
  203.54  469.77  205.26  469.82  206.26  469.86  207.19  469.88   208.1  469.89
  208.68   469.9  210.73  469.95  211.98  469.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   74.64     .03  105.42    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         74.64  105.42           150.72  127.44  115.85             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   31.99 480.035

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 174.488

INPUT
Description:
Station Elevation Data    num=     280
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.88     .43  470.88     .77  470.88    2.37  470.89    4.12  470.86
    4.32  470.85    4.65  470.84    6.23  470.85    7.23  470.85    8.13  470.86
    9.12  470.91   10.02  470.92   10.83  470.95   11.99  470.96      14  470.97
   15.85  470.99   17.49  471.02   17.75  471.02   18.55  470.99   20.19  470.95
   20.74  470.95   22.05  470.98   23.25  470.91   23.73  470.88   24.26  470.89
   26.04  470.92   27.47  470.94    28.2  470.93   28.86  470.95   29.85  470.97
   30.92  470.96    31.4  470.95   31.92  470.94   32.96   470.9   33.96  470.94
   34.95  470.95   37.39  470.89   37.58  470.88   37.77  470.88   39.17  470.92
   40.64  470.92    40.8  470.92   41.25  470.92   43.33  470.94   44.08  470.93
   45.27  470.91   46.71  470.93   46.99  470.94   47.24  470.94   49.43  470.94
   50.62  470.95   51.55  470.93   52.67  470.91   53.35   470.9   53.92  470.88
   55.44  470.86   57.31  470.83    57.6  470.83   57.94  470.82   59.44  470.79
   60.69  470.81   61.34  470.83   62.43  470.82   63.38  470.81   63.93  470.81
   65.36  470.77   67.19  470.76   67.33  470.76    67.5  470.76   69.22  470.76
   70.58  470.85   71.19  470.89    72.3  470.99   73.15  471.06   73.67  471.08
   76.77  470.87   77.07  470.85   77.14  470.85   77.37  470.85   79.59  470.83
   80.29  470.84   81.49  470.85   82.67  470.87   83.15  470.87   83.61  470.86
   85.38  470.82   86.86  470.83   87.48  470.83   88.07  470.83   89.02  470.82
   90.01  470.81   90.97  470.82   93.16  470.85   93.78  470.84   96.26  470.81
   96.52  470.81    98.9  470.84   99.41  470.85   99.46  470.85  101.85  470.84
  102.57  470.84  103.79  470.86  104.11  470.86  105.64  470.86  106.27  470.86
  107.81  470.83  108.39  470.82  108.64  470.82  110.12  470.83  111.75  470.81
   111.8  470.81  111.85   470.8  113.29  470.67   132.4  461.11     137  461.11
  138.39  461.11  142.39  461.11     143  461.11  144.92  462.07  147.04  462.64
  149.63   463.9  151.42  464.08  153.29  464.92  156.18  466.69  156.29  466.74
  156.33  466.76  156.65  466.82  158.45  467.11   159.1  467.29  160.18  467.63
  161.16  467.84  161.76  467.86  162.44  467.92  163.52  467.98  165.41  468.06
  165.44  468.06  165.46  468.06  167.04   468.1  168.44  468.12  168.65  468.12
  168.89  468.12  169.02  468.13  170.37  468.16  171.86  467.82  172.12  467.79
  172.42  467.75  173.91  467.67  175.24  467.65  175.69  467.62  176.37  467.61
  177.45  467.59  178.14  467.59  179.65  467.55  181.68  467.58  182.01  467.59
  182.38   467.6  183.63   467.6  184.71  467.66   185.4  467.69  186.47  467.71
  187.52  467.73  188.19  467.74  189.23  467.78  190.36  467.79  190.76  467.79
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  191.14  467.79  192.88  467.79  194.76  467.79   195.2  467.78  197.78  467.67
  197.91  467.67  198.15  467.68  200.26  467.72  201.35  467.74  202.73  467.71
  204.32   467.7  205.27   467.7  207.19  467.71  207.73  467.71  207.99  467.72
  210.01  467.83   210.9  467.86  212.67  467.88  214.58  467.89  215.38  467.88
  217.36  467.89  217.61  467.89  217.82   467.9  219.26  467.91  220.94  467.92
  220.96  467.92     221  467.92  222.98  467.96   223.9  467.95  225.04  467.95
  226.63  467.97  227.15  467.98  227.52  467.97  229.11  467.96  230.35     468
  231.02  468.01   231.8  468.01  232.91  468.01  233.87  468.03   234.7  468.03
  235.94  468.07  236.43  468.08  236.75  468.08  238.34  468.11  240.26  468.14
  240.29  468.14  240.32  468.14  241.95   468.2  243.19  468.24  243.73  468.25
  244.59  468.28  245.96  468.34  246.82  468.35  247.79  468.37  249.11  468.48
  249.39   468.5   249.6  468.51  251.77   468.6  253.41  468.67  253.92  468.68
  254.47  468.72  255.42  468.77  256.28  468.82  257.47  468.89   259.9  469.02
  260.12  469.03  260.36  469.05   261.6  469.13  262.68   469.2  263.12  469.23
  263.45  469.25  264.77  469.32  266.42  469.38  266.45  469.38  266.49  469.38
  268.92   469.5  269.32  469.51  270.79  469.58  272.05  469.62  272.53  469.63
  273.09  469.63  274.77  469.69  275.86  469.75  276.86  469.76  277.73  469.74
  278.64  469.71  279.68  469.72  280.65  469.73  282.45  469.76  282.85  469.76
  283.28  469.78  284.83  469.85  286.26  469.91  286.89  469.93     289  469.89
  289.13  469.89  289.33   469.9  291.34  469.92  292.72  469.89   293.5  469.88
  295.43  469.93  295.51  469.93  295.54  469.93  297.74  470.02  299.45  470.12
  299.88  470.13  300.88  470.11  301.67   470.1  302.01   470.1  304.13  470.14
  305.92  470.18  306.44   470.2  307.39  470.26   308.2  470.31  308.51  470.32

Manning's n Values         num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .035  110.12    .035  113.29     .03     137     .03  153.29    .035
  170.37    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        103.79  169.02           126.48  101.82   81.84             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  169.02  308.51 468.134       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 72.67111

INPUT
Description:
Station Elevation Data    num=     155
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.46     .01  469.46     2.1  469.53    2.13  469.53     4.2  469.56
    4.23  469.56    6.32   469.6    6.36   469.6    8.42  469.57    8.46  469.57
   10.52   469.6   10.56   469.6   12.62  469.54   12.66  469.54   14.72   469.6
   14.76   469.6   16.82   469.5   16.86   469.5   18.92   469.5   18.97   469.5
   21.02  469.54   21.06  469.54   23.11  469.57   23.19  469.57   25.22   469.6
    25.3   469.6   27.33  469.64   27.39  469.64   29.43  469.67   29.49  469.67
   31.52  469.73    31.6  469.73   33.65  469.73   33.72  469.73   35.74  469.77
   35.82  469.77   37.85  469.83   37.92  469.83   39.94  469.87   40.02  469.87
   42.04  469.93   42.12  469.93   44.13   469.9   44.24   469.9   46.23   469.9
   46.35   469.9   48.37  469.82   48.48  469.82   48.56  469.81   66.65  460.77
      69  460.77   70.41  460.77   74.41  460.77      75  460.77   88.22  467.38
   88.47  467.41   88.57  467.43   90.55  467.96   90.69  467.99   92.66  468.26
   92.77  468.27   92.79  468.27   94.75     468   94.89  467.96   96.88  467.85
   97.02  467.85   98.98  467.91   99.12  467.92  101.08  468.01  101.22  468.01
  103.18  468.14  103.32  468.14  105.32  468.14  105.45  468.14  107.41   468.2
  107.57   468.2  109.51  468.23  109.67  468.24  111.61  468.27  111.78  468.28
  113.74  468.31   113.9  468.31  115.84   468.4     116   468.4  117.93  468.46
  118.09  468.47  120.03  468.53   120.2  468.53  122.14  468.49  122.31   468.5
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124.2	468.53	124.37	468.54	126.3	468.59	126.47	468.6	128.43	468.66
128.62	468.67	130.52	468.78	130.73	468.78	132.63	468.78	132.83	468.79
134.75	468.88	134.96	468.89	136.83	468.94	137.03	468.96	138.92	469.08
139.14	469.08	141.06	469.08	141.26	469.09	143.16	469.15	143.36	469.16
145.25	469.23	145.46	469.23	147.35	469.26	147.59	469.27	149.46	469.36
149.69	469.37	151.51	469.45	151.75	469.46	153.61	469.52	153.85	469.53
155.75	469.65	155.99	469.66	157.85	469.82	158.09	469.83	159.95	469.91
160.19	469.92	162.05	469.98	162.28	469.98	163.63	470	164.09	470.02
164.41	470.03	166.7	470.06	166.71	470.06	166.72	470.06	168.98	470.14
170.22	470.12	171.13	470.12	173.01	470.15	173.21	470.15	173.54	470.15
175.5	470.16	176.66	470.18	177.58	470.18	179.23	470.23	179.55	470.24
180.35	470.27	182.17	470.33	182.88	470.34	184.17	470.38	185.56	470.4
186.17	470.4	187.8	470.44	188.91	470.47	189.33	470.46	190.03	470.46

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	48.56	.03	69	.03	92.77	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
48.56	69	149.26	72.67	167.63	.1	.3

SUMMARY OF REACH LENGTHS

River: North_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1459.614	89.03	89.03	89.04
Reach	1370.583	100.01	100	100
Reach	1270.58	100.01	100	100
Reach	1170.577	58.01	58	58
Reach	1143.195	Culvert		
Reach	1112.573	100.02	100	100
Reach	1012.57	127.93	134.9	144.08
Reach	877.6657	174.52	141.81	121.21
Reach	800	Culvert		
Reach	735.8522	67.5	96.35	120.06
Reach	639.5066	100	100.01	100
Reach	539.4938	112.3	112.27	112.24
Reach	427.2193	125.23	125.29	125.4
Reach	301.9247	150.72	127.44	115.85
Reach	174.488	126.48	101.82	81.84
Reach	72.67111	149.26	72.67	167.63

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: North_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1459.614	.1	.3
Reach	1370.583	.1	.3
Reach	1270.58	.1	.3
Reach	1170.577	.1	.3
Reach	1143.195	Culvert	
Reach	1112.573	.1	.3
Reach	1012.57	.1	.3
Reach	877.6657	.1	.3

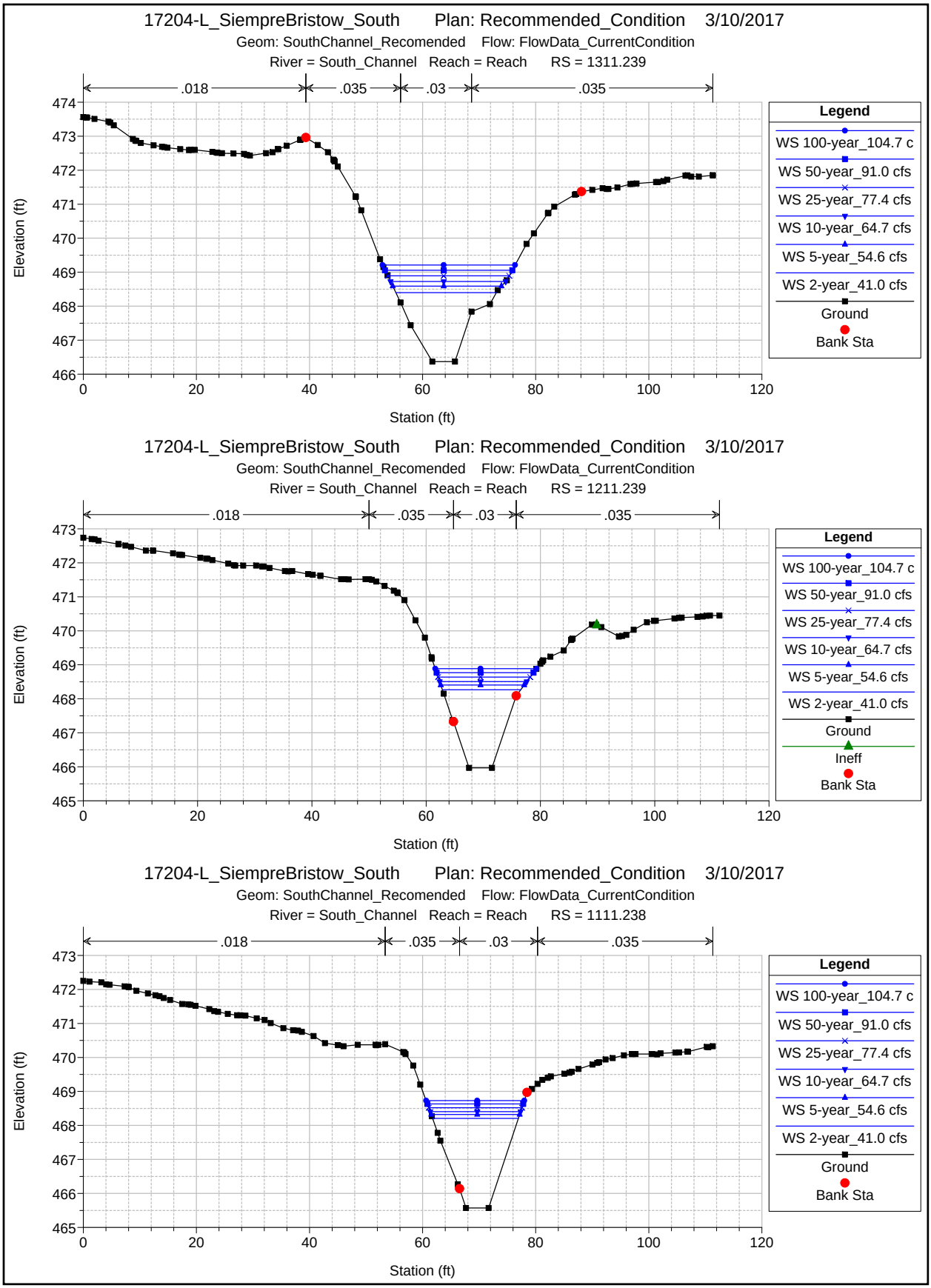
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Reach               800      Culvert
Reach               735.8522        .1        .3
Reach               639.5066        .1        .3
Reach               539.4938        .1        .3
Reach               427.2193        .1        .3
Reach               301.9247        .1        .3
Reach               174.488         .1        .3
Reach               72.67111        .1        .3
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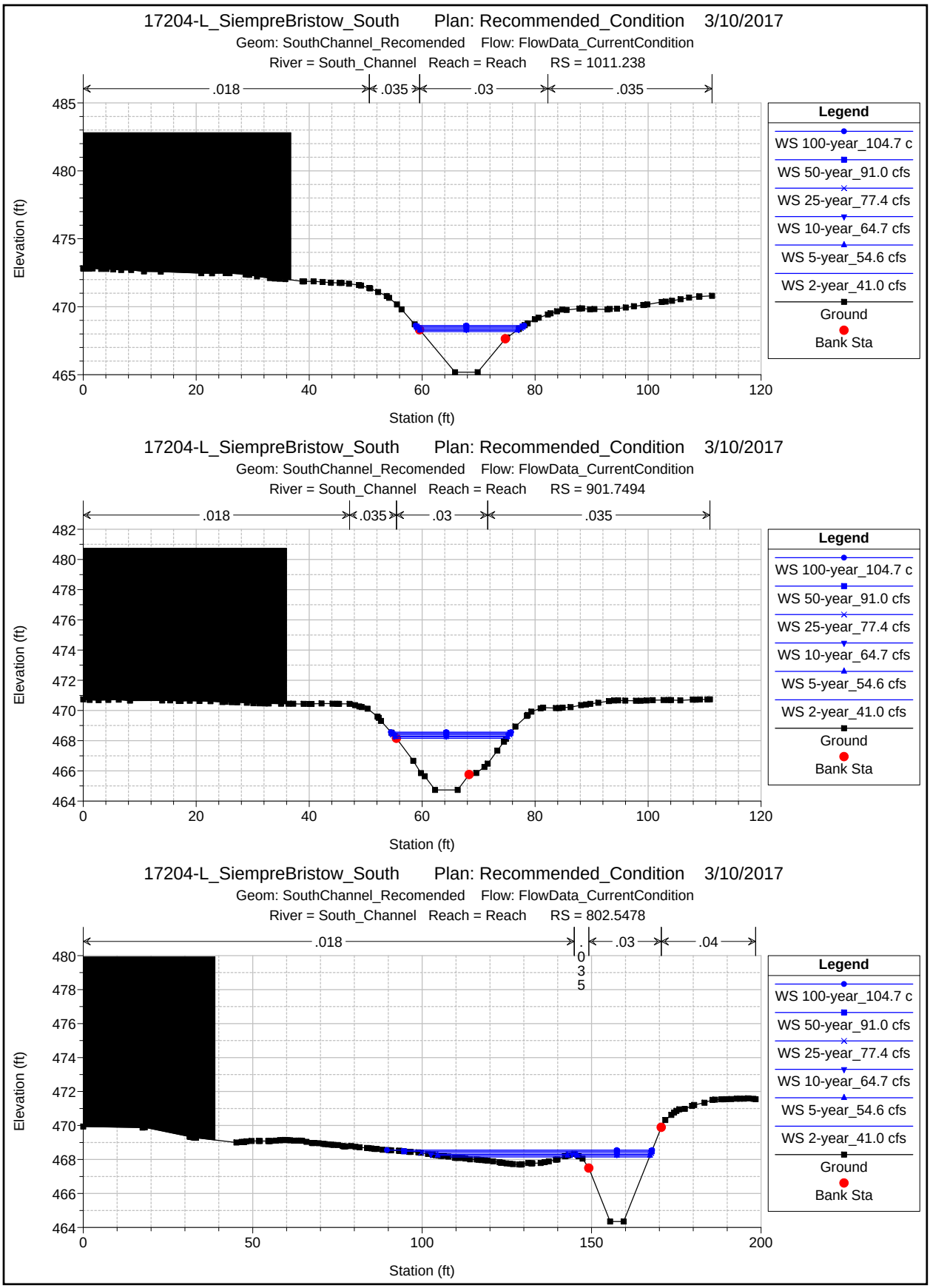
HEC-RAS Plan: Recomended River: South_Channel Reach: Reach

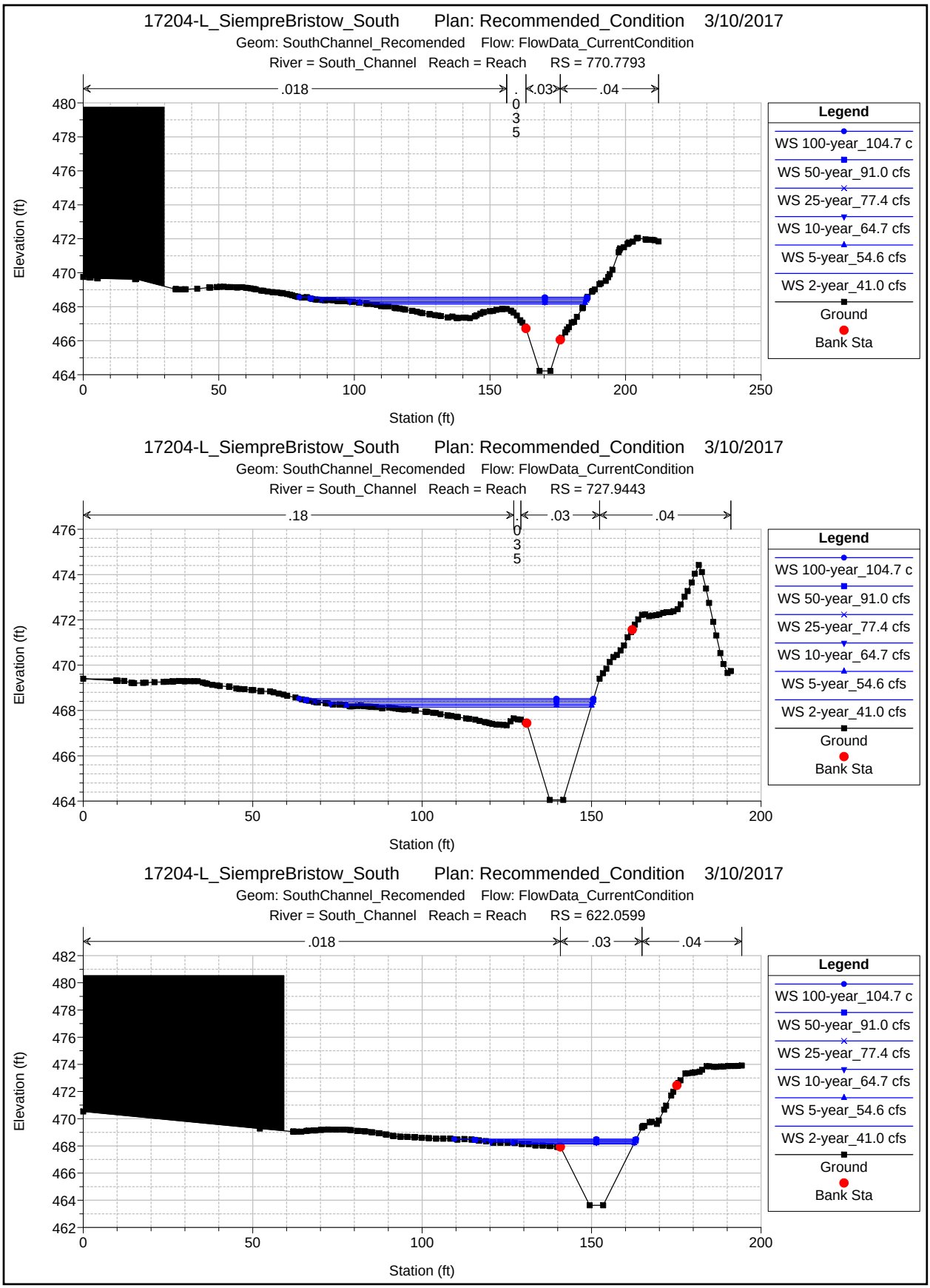
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1311.239	2-year_41.0 cfs	41.00	466.37	468.40	467.50	468.46	0.001560	2.00	20.52	17.78	0.33
Reach	1311.239	5-year_54.6 cfs	54.60	466.37	468.59	467.69	468.67	0.001844	2.27	24.03	19.22	0.36
Reach	1311.239	10-year_64.7 cfs	64.70	466.37	468.72	467.80	468.82	0.001984	2.42	26.73	20.37	0.37
Reach	1311.239	25-year_77.4 cfs	77.40	466.37	468.89	468.00	468.99	0.002036	2.56	30.27	21.49	0.38
Reach	1311.239	50-year_91.0 cfs	91.00	466.37	469.06	468.13	469.17	0.002073	2.68	33.90	22.52	0.39
Reach	1311.239	100-year_104.7 c	104.70	466.37	469.21	468.24	469.33	0.002106	2.80	37.38	23.44	0.39
Reach	1211.239	2-year_41.0 cfs	41.00	465.97	468.27		468.34	0.000999	2.14	19.83	13.71	0.29
Reach	1211.239	5-year_54.6 cfs	54.60	465.97	468.40		468.51	0.001351	2.62	21.80	14.60	0.34
Reach	1211.239	10-year_64.7 cfs	64.70	465.97	468.51		468.64	0.001574	2.93	23.31	15.26	0.37
Reach	1211.239	25-year_77.4 cfs	77.40	465.97	468.64		468.80	0.001778	3.25	25.41	16.12	0.40
Reach	1211.239	50-year_91.0 cfs	91.00	465.97	468.77		468.96	0.001977	3.57	27.56	16.96	0.42
Reach	1211.239	100-year_104.7 c	104.70	465.97	468.89		469.11	0.002174	3.87	29.56	17.71	0.45
Reach	1111.238	2-year_41.0 cfs	41.00	465.57	468.21		468.25	0.000584	1.78	25.26	15.18	0.22
Reach	1111.238	5-year_54.6 cfs	54.60	465.57	468.32		468.39	0.000868	2.22	27.02	15.65	0.28
Reach	1111.238	10-year_64.7 cfs	64.70	465.57	468.41		468.49	0.001075	2.51	28.34	16.00	0.31
Reach	1111.238	25-year_77.4 cfs	77.40	465.57	468.52		468.63	0.001298	2.82	30.23	16.49	0.34
Reach	1111.238	50-year_91.0 cfs	91.00	465.57	468.63		468.77	0.001533	3.13	32.09	16.96	0.37
Reach	1111.238	100-year_104.7 c	104.70	465.57	468.73		468.89	0.001778	3.42	33.75	17.37	0.40
Reach	1011.238	2-year_41.0 cfs	41.00	465.18	468.18		468.20	0.000346	1.38	30.11	16.70	0.17
Reach	1011.238	5-year_54.6 cfs	54.60	465.18	468.27		468.32	0.000530	1.75	31.74	17.22	0.21
Reach	1011.238	10-year_64.7 cfs	64.70	465.18	468.34		468.40	0.000667	2.00	32.96	17.61	0.24
Reach	1011.238	25-year_77.4 cfs	77.40	465.18	468.44		468.52	0.000812	2.27	34.79	18.21	0.27
Reach	1011.238	50-year_91.0 cfs	91.00	465.18	468.54		468.64	0.000970	2.56	36.56	18.77	0.30
Reach	1011.238	100-year_104.7 c	104.70	465.18	468.62		468.74	0.001142	2.84	38.06	19.23	0.32
Reach	901.7494	2-year_41.0 cfs	41.00	464.74	468.16		468.18	0.000150	1.04	41.28	19.47	0.12
Reach	901.7494	5-year_54.6 cfs	54.60	464.74	468.25		468.27	0.000235	1.34	43.01	19.86	0.15
Reach	901.7494	10-year_64.7 cfs	64.70	464.74	468.31		468.35	0.000302	1.54	44.30	20.15	0.17
Reach	901.7494	25-year_77.4 cfs	77.40	464.74	468.41		468.45	0.000380	1.77	46.25	20.59	0.19
Reach	901.7494	50-year_91.0 cfs	91.00	464.74	468.50		468.55	0.000468	2.01	48.09	20.98	0.21
Reach	901.7494	100-year_104.7 c	104.70	464.74	468.57		468.64	0.000566	2.25	49.59	21.30	0.23
Reach	802.5478	2-year_41.0 cfs	41.00	464.35	468.15		468.16	0.000106	0.87	52.75	54.00	0.10
Reach	802.5478	5-year_54.6 cfs	54.60	464.35	468.24		468.25	0.000159	1.09	57.53	59.81	0.12
Reach	802.5478	10-year_64.7 cfs	64.70	464.35	468.30		468.32	0.000197	1.22	61.39	63.79	0.14
Reach	802.5478	25-year_77.4 cfs	77.40	464.35	468.39		468.42	0.000230	1.34	67.75	67.83	0.15
Reach	802.5478	50-year_91.0 cfs	91.00	464.35	468.48		468.51	0.000264	1.46	74.01	73.03	0.16
Reach	802.5478	100-year_104.7 c	104.70	464.35	468.56		468.59	0.000302	1.59	79.44	78.23	0.17
Reach	770.7793	2-year_41.0 cfs	41.00	464.22	468.15		468.16	0.000050	0.72	78.53	78.12	0.07
Reach	770.7793	5-year_54.6 cfs	54.60	464.22	468.24		468.25	0.000073	0.88	85.45	83.10	0.09
Reach	770.7793	10-year_64.7 cfs	64.70	464.22	468.30		468.31	0.000090	0.99	90.80	86.92	0.10
Reach	770.7793	25-year_77.4 cfs	77.40	464.22	468.40		468.41	0.000107	1.10	99.63	97.81	0.11
Reach	770.7793	50-year_91.0 cfs	91.00	464.22	468.49		468.50	0.000120	1.19	108.65	101.93	0.11
Reach	770.7793	100-year_104.7 c	104.70	464.22	468.56		468.58	0.000135	1.28	116.18	106.25	0.12
Reach	727.9443	2-year_41.0 cfs	41.00	464.05	468.15		468.16	0.000083	0.81	66.35	63.30	0.09
Reach	727.9443	5-year_54.6 cfs	54.60	464.05	468.23		468.24	0.000133	1.03	71.80	72.36	0.11
Reach	727.9443	10-year_64.7 cfs	64.70	464.05	468.29		468.31	0.000173	1.19	76.18	77.21	0.13
Reach	727.9443	25-year_77.4 cfs	77.40	464.05	468.38		468.40	0.000221	1.37	83.40	82.11	0.14
Reach	727.9443	50-year_91.0 cfs	91.00	464.05	468.46		468.49	0.000275	1.55	90.30	84.74	0.16
Reach	727.9443	100-year_104.7 c	104.70	464.05	468.52		468.57	0.000336	1.73	95.88	86.87	0.18
Reach	622.0599	2-year_41.0 cfs	41.00	463.63	468.14		468.15	0.000059	0.70	59.90	33.11	0.07
Reach	622.0599	5-year_54.6 cfs	54.60	463.63	468.22		468.23	0.000095	0.90	62.54	35.83	0.09
Reach	622.0599	10-year_64.7 cfs	64.70	463.63	468.27		468.29	0.000125	1.04	64.76	42.43	0.11
Reach	622.0599	25-year_77.4 cfs	77.40	463.63	468.36		468.38	0.000159	1.19	68.56	44.75	0.12
Reach	622.0599	50-year_91.0 cfs	91.00	463.63	468.44		468.47	0.000197	1.34	72.22	47.49	0.14
Reach	622.0599	100-year_104.7 c	104.70	463.63	468.50		468.53	0.000242	1.50	75.23	53.67	0.15
Reach	522.0566	2-year_41.0 cfs	41.00	463.23	468.14		468.14	0.000040	0.60	68.26	25.89	0.06
Reach	522.0566	5-year_54.6 cfs	54.60	463.23	468.21		468.22	0.000066	0.78	70.21	26.35	0.08
Reach	522.0566	10-year_64.7 cfs	64.70	463.23	468.27		468.28	0.000088	0.91	71.64	26.66	0.09
Reach	522.0566	25-year_77.4 cfs	77.40	463.23	468.35		468.37	0.000116	1.06	73.92	27.16	0.11
Reach	522.0566	50-year_91.0 cfs	91.00	463.23	468.43		468.45	0.000149	1.21	76.01	28.13	0.12
Reach	522.0566	100-year_104.7 c	104.70	463.23	468.48		468.51	0.000187	1.37	77.72	32.52	0.14
Reach	422.0532	2-year_41.0 cfs	41.00	462.83	468.13		468.14	0.000028	0.53	77.57	25.75	0.05
Reach	422.0532	5-year_54.6 cfs	54.60	462.83	468.21		468.21	0.000046	0.69	79.47	26.45	0.07
Reach	422.0532	10-year_64.7 cfs	64.70	462.83	468.26		468.27	0.000062	0.80	80.92	29.20	0.08
Reach	422.0532	25-year_77.4 cfs	77.40	462.83	468.34		468.36	0.000082	0.94	83.61	34.33	0.09
Reach	422.0532	50-year_91.0 cfs	91.00	462.83	468.42		468.43	0.000106	1.07	86.24	36.93	0.10
Reach	422.0532	100-year_104.7 c	104.70	462.83	468.47		468.49	0.000133	1.21	88.31	39.28	0.12
Reach	322.0501	2-year_41.0 cfs	41.00	462.43	468.13		468.14	0.000018	0.45	96.70	51.87	0.04

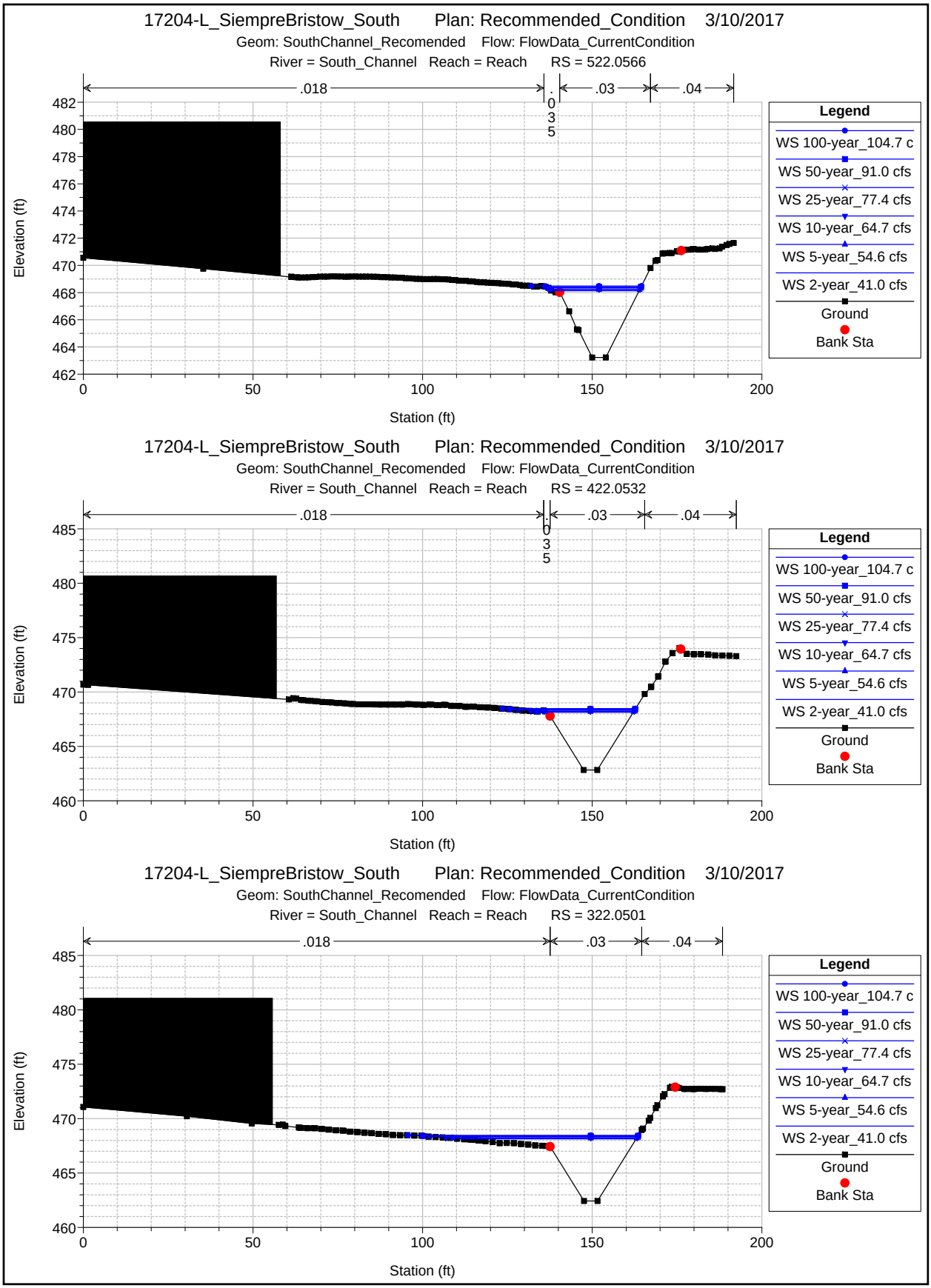
HEC-RAS Plan: Recomended River: South_Channel Reach: Reach (Continued)

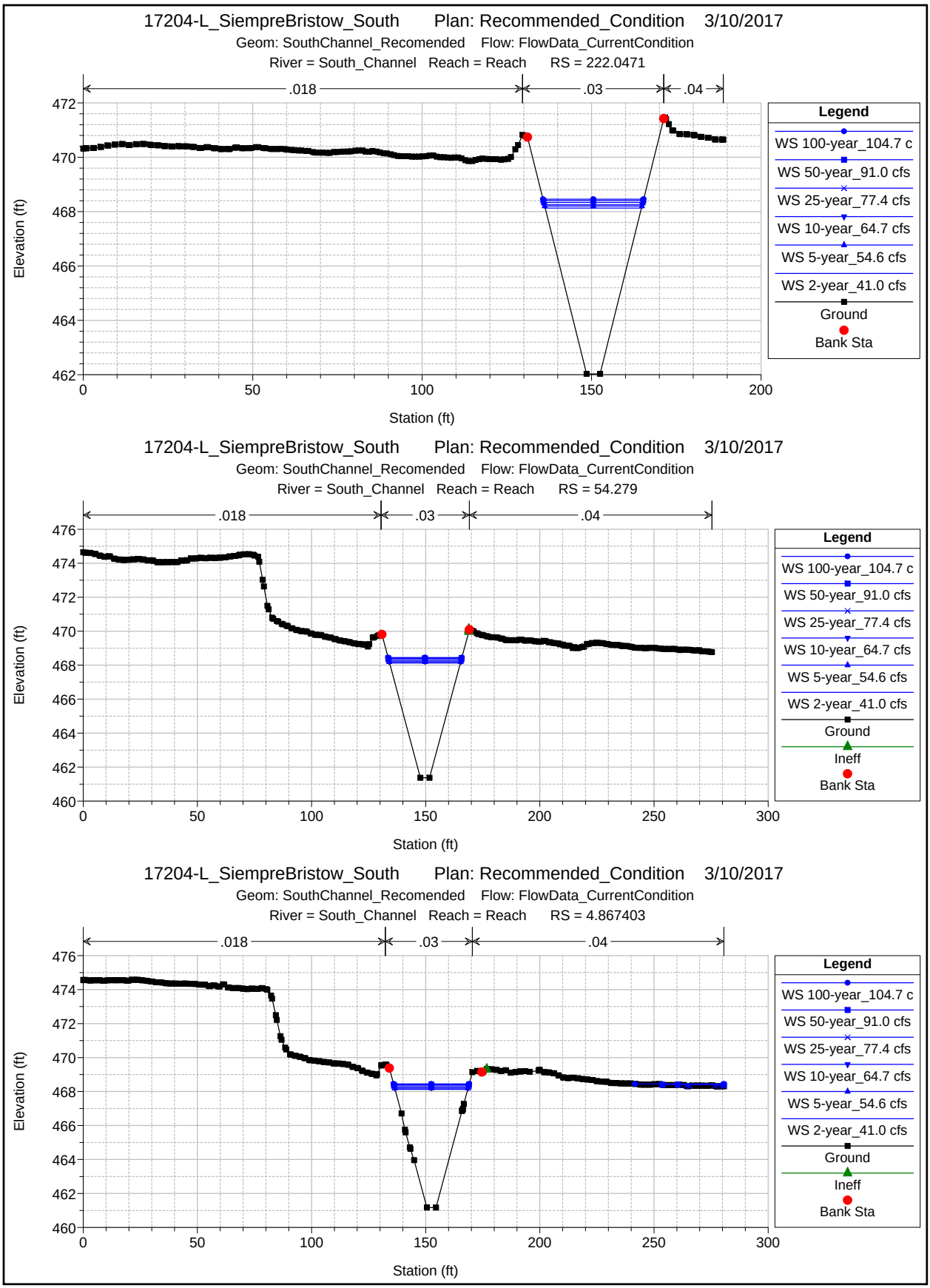
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	322.0501	5-year_54.6 cfs	54.60	462.43	468.21		468.21	0.000030	0.58	100.53	54.14	0.05
Reach	322.0501	10-year_64.7 cfs	64.70	462.43	468.26		468.26	0.000039	0.67	103.39	56.38	0.06
Reach	322.0501	25-year_77.4 cfs	77.40	462.43	468.34		468.35	0.000051	0.78	108.26	61.56	0.07
Reach	322.0501	50-year_91.0 cfs	91.00	462.43	468.41		468.42	0.000064	0.88	112.84	63.44	0.08
Reach	322.0501	100-year_104.7 c	104.70	462.43	468.47		468.48	0.000080	0.99	116.36	67.90	0.09
Reach	222.0471	2-year_41.0 cfs	41.00	462.03	468.13		468.13	0.000015	0.41	98.87	28.41	0.04
Reach	222.0471	5-year_54.6 cfs	54.60	462.03	468.20		468.21	0.000025	0.54	100.90	28.69	0.05
Reach	222.0471	10-year_64.7 cfs	64.70	462.03	468.25		468.26	0.000034	0.63	102.37	28.89	0.06
Reach	222.0471	25-year_77.4 cfs	77.40	462.03	468.34		468.34	0.000046	0.74	104.73	29.22	0.07
Reach	222.0471	50-year_91.0 cfs	91.00	462.03	468.41		468.42	0.000061	0.85	106.83	29.51	0.08
Reach	222.0471	100-year_104.7 c	104.70	462.03	468.46		468.47	0.000077	0.97	108.37	29.71	0.09
Reach	54.279	2-year_41.0 cfs	41.00	461.37	468.13		468.13	0.000009	0.35	118.44	31.04	0.03
Reach	54.279	5-year_54.6 cfs	54.60	461.37	468.20		468.20	0.000016	0.45	120.63	31.32	0.04
Reach	54.279	10-year_64.7 cfs	64.70	461.37	468.25		468.26	0.000021	0.53	122.21	31.52	0.05
Reach	54.279	25-year_77.4 cfs	77.40	461.37	468.33		468.34	0.000029	0.62	124.75	31.84	0.06
Reach	54.279	50-year_91.0 cfs	91.00	461.37	468.40		468.41	0.000038	0.72	127.00	32.12	0.06
Reach	54.279	100-year_104.7 c	104.70	461.37	468.45		468.46	0.000049	0.81	128.62	32.33	0.07
Reach	4.867403	2-year_41.0 cfs	41.00	461.17	468.13	462.37	468.13	0.000008	0.33	125.47	31.84	0.03
Reach	4.867403	5-year_54.6 cfs	54.60	461.17	468.20	462.58	468.20	0.000014	0.43	127.71	32.12	0.04
Reach	4.867403	10-year_64.7 cfs	64.70	461.17	468.25	462.71	468.25	0.000018	0.50	129.32	32.32	0.04
Reach	4.867403	25-year_77.4 cfs	77.40	461.17	468.33	462.87	468.34	0.000025	0.59	131.92	38.09	0.05
Reach	4.867403	50-year_91.0 cfs	91.00	461.17	468.40	463.02	468.41	0.000033	0.68	134.22	59.35	0.06
Reach	4.867403	100-year_104.7 c	104.70	461.17	468.45	463.17	468.46	0.000042	0.77	135.87	71.68	0.07


17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1311.239
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1211.239
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1111.238
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 1011.238
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 901.7494
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 802.5478
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 770.7793
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 727.9443
.18
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 622.0599
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 522.0566
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 422.0532
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 322.0501
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 222.0471
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 54.279
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: Recommended_Condition 3/10/2017
Geom: SouthChannel_Recomended Flow: FlowData_CurrentCondition
River = South_Channel Reach = Reach RS = 4.867403
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_South
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 1:59:25 PM

Project in English units

PLAN DATA

Plan Title: Recommended_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.p05

Geometry Title: SouthChannel_Recomended
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g08

Flow Title : FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Plan Summary Information:
Number of: Cross Sections = 15 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_CurrentCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f01

Flow Data (cfs)

River	Reach	RS	2-year_41.0 cfs	5-year_54.6 cfs	10-year_64.7 cfs	25-year_77.4 cfs	50-year_91.0 cfs	100-year_104.7 cfs	PF 7	PF 8
South_Channel	Reach	1311.239	41	54.6	64.7	77.4	91	104.7	5	10

River	Reach	RS	PF 9	PF 10	PF 11	PF 12	PF 13	PF 14
South_Channel	Reach	1311.239	15	20	25	30	35	40

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
South_Channel	Reach	2-year_41.0 cfs	Critical	Known WS = 468.13
South_Channel	Reach	5-year_54.6 cfs	Critical	Known WS = 468.2
South_Channel	Reach	10-year_64.7 cfs	Critical	Known WS = 468.25
South_Channel	Reach	25-year_77.4 cfs	Critical	Known WS = 468.33
South_Channel	Reach	50-year_91.0 cfs	Critical	Known WS = 468.4
South_Channel	Reach	100-year_104.7 cfs	Critical	Known WS = 468.45
South_Channel	Reach	PF 7	Critical	Known WS = 467.35
South_Channel	Reach	PF 8	Critical	Known WS = 467.53
South_Channel	Reach	PF 9	Critical	Known WS = 467.68
South_Channel	Reach	PF 10	Critical	Known WS = 467.83
South_Channel	Reach	PF 11	Critical	Known WS = 467.95
South_Channel	Reach	PF 12	Critical	Known WS = 467.98
South_Channel	Reach	PF 13	Critical	Known WS = 468.03
South_Channel	Reach	PF 14	Critical	Known WS = 468.05

GEOMETRY DATA

Geometry Title: SouthChannel_Recomended
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g08

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1311.239

INPUT
Description:
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.56	.52	473.55	.67	473.55	1.96	473.51	4.44	473.43
4.75	473.4	5.38	473.32	8.75	472.92	9.21	472.87	9.36	472.86
10.16	472.8	12.43	472.73	13.91	472.69	14.32	472.68	14.87	472.66
17.15	472.62	18.7	472.59	19	472.6	19.69	472.6	22.83	472.54
23.55	472.52	23.72	472.51	24.52	472.5	26.56	472.49	28.42	472.48
28.93	472.45	29.47	472.43	32.32	472.5	33.46	472.53	34.42	472.62
34.48	472.62	35.97	472.72	38.32	472.89	38.43	472.9	39.35	472.96
41.46	472.74	43.25	472.53	44.23	472.31	44.32	472.29	44.46	472.26
44.99	472.11	48.14	471.23	48.16	471.22	48.17	471.22	49.14	470.82
52.48	469.38	53.06	469.15	53.79	468.91	56.1	468.11	57.88	467.44
61.72	466.37	65.72	466.37	68.66	467.84	71.9	468.06	73.29	468.47
74.89	468.76	78.37	469.83	79.68	470.14	82.16	470.73	82.21	470.74
82.23	470.74	83.29	470.93	86.94	471.28	87.13	471.3	87.19	471.3
88.1	471.37	90.01	471.42	91.84	471.47	92.57	471.45	92.87	471.45
94.46	471.49	96.76	471.59	97.2	471.6	97.82	471.61	101.29	471.65
101.57	471.65	101.63	471.65	102.59	471.68	103.25	471.72	106.49	471.84
106.83	471.85	107.51	471.81	108.86	471.81	111.32	471.85	111.33	471.85

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	39.35	.035	56.1	.03	68.66	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.35	88.1	102.88	100	100	.1	.3

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1211.239

INPUT
Description:
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.74	1.46	472.7	1.98	472.69	2.65	472.65	6.13	472.55
6.15	472.55	6.18	472.55	7.37	472.51	8.36	472.47	10.96	472.36
12.19	472.36	12.22	472.36	15.69	472.28	16.8	472.24	16.92	472.24
17.28	472.23	20.48	472.15	21.5	472.12	21.74	472.12	22.58	472.08
25.37	471.98	26.34	471.93	26.58	471.92	27.97	471.92	30.24	471.92
31.32	471.89	31.56	471.89	32.59	471.85	35.27	471.76	35.83	471.75
36.57	471.76	39.35	471.67	40.16	471.65	41.47	471.62	41.49	471.62
45.11	471.52	45.77	471.52	46.43	471.51	49.38	471.52	50.01	471.52
50.5	471.5	51.26	471.45	52.72	471.32	54.33	471.18	54.94	471.13
55.03	471.11	56.21	470.9	58.13	470.31	59.78	469.8	60.93	469.22
61	469.18	63.07	468.15	64.65	467.37	64.69	467.36	64.8	467.33
67.51	465.97	71.51	465.97	75.76	468.09	79.28	468.88	80	469.03
80.3	469.09	80.5	469.13	81.74	469.24	84.08	469.42	85.36	469.73
85.42	469.74	85.64	469.77	89.01	470.18	89.76	470.18	90.65	470.11
93.73	469.83	94.31	469.85	95.02	469.88	96.31	470.03	98.63	470.25
99.86	470.29	99.93	470.3	100.19	470.3	103.46	470.36	104.31	470.38
104.72	470.39	107.47	470.41	108.38	470.42	109.06	470.44	109.67	470.45

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  111.33  470.45

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.01    .035    64.8     .03   75.76    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          64.8   75.76              100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   89.85  111.33  470.17       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1111.238

INPUT
Description:
Station Elevation Data    num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.25     1.1  472.23    3.18  472.21    4.04  472.15    4.64  472.14
    7.31  472.09     7.9  472.08    8.05  472.07    9.38  471.96   11.42  471.88
   12.74  471.83   13.47   471.8   14.21  471.75   15.34  471.69   17.49  471.57
   18.57  471.56   18.97  471.55   19.85  471.52   22.28  471.42   23.15  471.36
   23.82  471.34   25.55  471.28    27.2  471.24   27.76  471.24   28.66  471.23
   30.65  471.15   32.06   471.1   33.14  471.01   35.38  470.86   37.09   470.8
   37.97  470.79   38.65  470.75   40.71  470.63   42.74  470.42   45.01  470.36
   46.02  470.33   48.53  470.37   51.67  470.37   51.77  470.36   51.85  470.36
   52.18  470.37   53.38  470.39   56.59  470.16    56.8  470.14   56.99   470.1
   58.35  469.76   59.58   469.2   61.64  468.27   62.67  467.78   63.14  467.55
   66.22  466.27   66.53  466.14   67.67  465.57   71.67  465.57   78.47  468.97
   79.34  469.07   80.32  469.22   81.17  469.34   82.14   469.4   82.67  469.44
   85.06  469.52   85.97  469.55   86.39  469.58   87.57  469.66   90.04  469.79
   90.89  469.84    91.2  469.86   92.35  469.94   93.61  469.98   95.61  470.06
   97.02   470.1   97.19   470.1   97.65   470.1  100.52   470.1  101.45  470.09
  102.08  470.12   104.7  470.14  105.36  470.15  106.85  470.17  106.87  470.17
  106.92  470.17  110.25  470.31  110.53   470.3  111.33  470.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   53.38    .035   66.53     .03   80.32    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         66.53   78.47              100     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1011.238

INPUT
Description:
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.82     .05  472.81     .52  472.82    1.05  472.81    1.66  472.82
    3.17  472.78    4.13  472.78     5.3  472.75    6.71   472.7    8.49   472.7
   10.76   472.6   13.73  472.58   20.89  472.47   22.81  472.46   25.22  472.48
    25.4  472.48    25.9  472.47   28.74  472.38   29.05  472.37   29.41  472.35
   30.77  472.23   33.05  472.11   33.91  472.08   34.78  472.06   35.77  472.03
   38.81  471.87   38.93  471.87   39.08  471.87   40.78  471.87   42.37  471.82
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   43.85  471.77    45.4  471.75   45.72  471.75   47.05  471.69   48.81   471.6
   49.18  471.56   50.66  471.38   50.81  471.35    52.2  471.08   53.73  470.79
   54.15  470.66   55.53  470.17   56.35  469.81   58.67   468.7   59.43  468.36
   59.57   468.3   65.82  465.18   69.82  465.18   74.74  467.64   75.03  467.74
   77.15  468.36   78.17  468.64   78.69  468.77   79.96  469.08   80.64  469.19
   82.26  469.43   82.73  469.51   83.88  469.66   84.82  469.79   85.56  469.77
   87.85  469.86   88.31  469.88   89.72  469.81   90.49  469.83   92.79   469.8
   93.22  469.84   94.49  469.85   96.05  469.94    97.5  470.04   99.15  470.12
   99.32  470.13   99.86  470.17  102.42  470.35  103.11  470.38  104.24  470.44
  105.75  470.55  107.25  470.67  109.03  470.75  109.04  470.75  109.08  470.75
  111.33   470.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.66    .035   59.57     .03   82.26    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         59.57   74.74           109.55  109.49   109.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.76 482.816

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 901.7494

INPUT
Description:
Station Elevation Data    num=      85
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.74    1.14   470.7    2.72  470.68    4.45   470.7    6.29  470.71
    8.27  470.65   13.97  470.66   15.39  470.67   16.92  470.63   17.25  470.63
   18.87  470.64   20.59  470.63   22.53  470.61   24.65  470.56   25.17  470.57
   26.28  470.55   27.26  470.54   28.96  470.51   30.12  470.48   31.16  470.47
   32.15  470.46   32.84  470.46   35.01  470.45   36.33  470.45   37.18  470.45
   39.02  470.44   40.04  470.43   40.43  470.43   42.18  470.46   44.13  470.45
   44.99  470.44   45.29  470.44   47.15  470.44   48.11  470.35   48.88  470.27
    49.3  470.23   50.33  470.12   52.09  469.59    52.3  469.51   52.71  469.31
   54.55  468.53   55.45  468.16   58.42  466.67    59.8  465.85   60.46  465.65
   62.28  464.74   66.28  464.74   68.31  465.76   69.57  465.86   71.02  466.26
   71.62  466.48   73.31  467.34   74.48  467.93   74.83  468.12   76.51  468.93
   78.54  469.64    78.7   469.7   79.34  469.92   80.98  470.14   81.41  470.19
   83.69  470.16   84.27  470.16   84.88  470.19   86.28  470.22   88.14  470.35
   89.02  470.39   89.75  470.44   91.19  470.51   93.07  470.62   93.97  470.66
    94.7  470.67   95.96  470.65   97.84  470.64    98.7  470.64   99.75  470.66
  100.82  470.68  102.74  470.69  103.63  470.69  104.06  470.69  105.71  470.67
   107.9  470.71  108.45  470.71  109.16  470.73  110.51  470.73  110.94  470.74

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.15    .035   55.45     .03   71.62    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         55.45   68.31             99.3    99.2   99.08             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.01 480.742

CROSS SECTION
```

RIVER: South_Channel
REACH: Reach RS: 802.5478

INPUT
Description:
Station Elevation Data num= 139

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	17.5	469.88	17.83	469.9	18.17	469.89	31.38	469.35
31.53	469.34	31.68	469.34	31.83	469.33	31.99	469.33	32.16	469.32
32.32	469.32	32.5	469.31	32.68	469.3	32.87	469.3	33.07	469.29
33.27	469.28	45.18	469	46.75	469.03	46.88	469.03	47.35	469.03
47.46	469.03	48.12	469.07	49.68	469.09	51.79	469.09	52.11	469.09
54.6	469.08	54.89	469.08	55.26	469.09	56.85	469.11	58.1	469.13
58.71	469.14	59.45	469.15	60.33	469.14	61.06	469.13	62.13	469.11
63.49	469.11	64.1	469.11	64.58	469.1	65.89	469.04	67.48	468.97
67.65	468.97	67.86	468.97	69.48	468.96	70.85	468.92	71.33	468.91
72.23	468.89	73.26	468.87	73.82	468.86	75.15	468.85	76.58	468.79
76.99	468.77	77.36	468.77	79.05	468.79	80.35	468.75	81.51	468.72
83.72	468.68	84.22	468.67	85.04	468.65	86.01	468.62	86.59	468.62
88.35	468.57	90.14	468.55	90.86	468.54	93.14	468.51	93.4	468.51
94.41	468.49	96.15	468.45	96.6	468.45	98.88	468.42	99.55	468.4
101.71	468.33	103.11	468.28	103.93	468.25	104.85	468.23	105.55	468.21
106.18	468.21	107.77	468.17	109.65	468.1	110.14	468.09	110.79	468.09
111.89	468.09	112.71	468.06	114.15	468.01	116.11	468	116.64	467.99
117.49	467.97	118.59	467.95	119.29	467.93	120.97	467.89	122.83	467.84
123.27	467.81	123.75	467.81	124.88	467.77	125.94	467.75	126.78	467.73
128.59	467.71	129.16	467.7	129.43	467.72	131.33	467.79	132.1	467.78
132.38	467.77	132.52	467.78	134.97	467.79	136.17	467.84	137.39	467.89
139.46	467.99	139.93	468	142.14	468.19	142.36	468.21	142.79	468.23
143.18	468.25	144.9	468.33	146.16	468.19	147.33	468.05	149.18	467.49
155.45	464.35	159.45	464.35	170.54	469.89	171.76	470.32	173.53	470.62
174.33	470.76	175.02	470.86	175.86	470.95	177.5	470.98	179.65	471.15
180.25	471.21	183.31	471.34	185.66	471.51	186.46	471.52	188.29	471.54
188.96	471.54	189.65	471.55	191.21	471.56	192.84	471.58	193.7	471.58
194.96	471.58	196.11	471.6	197.74	471.57	198.39	471.55		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	144.9	.035	149.18	.03	170.54	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
149.18	170.54	22.62	31.77	46.56	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	38.89	479.938

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 770.7793

INPUT
Description:
Station Elevation Data num= 174

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.75	2.14	469.73	2.71	469.72	5.13	469.68	5.39	469.67
19.12	469.62	19.31	469.63	19.51	469.63	34.16	469.03	34.17	469.03
34.18	469.03	34.19	469.03	34.2	469.03	34.21	469.03	34.22	469.03
34.23	469.03	34.65	469.02	34.7	469.02	36.6	469.02	37.23	469.02
37.42	469.03	37.75	469.03	42.04	469.06	46.44	469.13	46.8	469.13
46.89	469.13	49.3	469.16	50.5	469.17	51.88	469.18	53.41	469.15
54.39	469.16	56.48	469.14	56.83	469.14	57	469.14	58.69	469.15

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   59.98  469.12   60.64   469.1   61.79  469.08   62.96  469.05   63.62  469.03
   65.67  468.95   66.43  468.94   67.93   468.9   69.88  468.85   69.92  468.85
   69.96  468.85   71.55  468.84    72.9  468.81   73.24   468.8   73.69  468.79
   75.19  468.75   76.34  468.71   77.06  468.68    78.1  468.63   78.81   468.6
    79.3  468.57   80.63  468.54   82.26  468.55   82.47  468.55   82.63  468.55
   84.38  468.46   85.63  468.43   86.29  468.42   87.03  468.41   88.14  468.39
   89.11  468.38    90.1  468.39   92.14  468.39   92.17  468.39   92.21  468.39
   93.79  468.33   95.38  468.33   95.42  468.33   95.46  468.33   97.26  468.33
   98.38   468.3    99.4  468.29   101.7  468.24  101.84  468.24   101.9  468.24
  104.32  468.18  104.89  468.17  107.02  468.15  108.29  468.11  109.79  468.04
  111.32  468.02  112.58  468.02  114.81  467.94  115.13  467.92  115.48  467.92
  116.76   467.9  117.92  467.86   118.7  467.83  121.35  467.76  121.36  467.76
  121.37  467.76  123.08  467.71   124.4  467.65  125.11  467.62  127.71  467.56
  127.77  467.56  127.78  467.56  129.75  467.51  130.99  467.48  131.96  467.45
  134.49  467.37  134.52  467.37  134.56  467.37  136.16  467.42  137.65  467.34
  137.87  467.33  138.35  467.34  140.27  467.36  141.08  467.35  142.66  467.33
  144.42  467.43  145.08  467.49  146.47  467.59   147.4  467.66  147.84  467.69
  150.03  467.74  151.16  467.75   152.4  467.82  154.53  467.87  154.55  467.87
  154.58  467.87  156.19  467.87  157.75  467.77  157.86  467.75  158.69  467.65
  159.95  467.48  161.19  467.21  161.96  467.07  162.82  466.84  163.28  466.72
  168.29  464.22  172.29  464.22  175.96  466.05  176.46  466.17  177.79  466.49
  178.42  466.66  179.12   466.8  180.15  467.07  181.03  467.11  182.05   467.4
  184.13  467.91  184.23  467.94  184.28  467.95  186.05  468.59  187.65  468.88
  187.89  468.93  188.65  469.02   190.4  469.32  190.93  469.38  192.73  469.52
  193.57  469.74  194.22  469.91  195.18  470.18  197.49  471.21  197.78  471.34
  198.06  471.43  199.42   471.5  200.74   471.7  201.04  471.72  201.34  471.78
  202.71  471.83  204.11  472.02  204.61  472.05   207.4  471.96   207.6  471.95
  208.21  471.95  210.03  471.94  210.65  471.91   212.2  471.84

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  156.19    .035  163.28     .03  175.96     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        163.28  175.96            32.88   42.84   62.72             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.88 479.748

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 727.9443

INPUT
Description:
Station Elevation Data    num=     154
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   469.4    9.74  469.32    9.81  469.32   10.15  469.31   10.18  469.31
   12.07   469.3    12.1   469.3   12.13   469.3   14.21  469.22   14.52  469.22
   15.03  469.21   17.67  469.22   18.39  469.23   21.02  469.25    23.7  469.26
   24.63  469.27   26.31  469.28   26.44  469.28   26.57  469.28   28.17   469.3
   29.85  469.29   29.91  469.29   30.01  469.29   31.74  469.29   32.75  469.29
   33.77  469.29   35.26  469.24   36.02   469.2   36.53  469.18   38.07  469.13
   39.54  469.11   40.31  469.08   43.04  469.05   43.08  469.05   43.18  469.05
   45.16  468.97   46.02  468.95   47.59  468.94   49.65   468.9    50.2   468.9
   52.25  468.85   52.51  468.85   52.57  468.85   55.12  468.84   56.12   468.8
   57.67  468.75   59.12   468.7   60.17  468.65   62.63  468.57   64.51  468.49
   65.68  468.46   66.57  468.43   68.03  468.38   68.79  468.36   69.24  468.35
   71.53  468.32   72.12  468.31   73.71  468.26   75.53  468.26   75.69  468.26
   75.87  468.26    77.3  468.24   78.58  468.19   78.99  468.18   79.57  468.19
   80.97   468.2   81.96  468.21   82.84  468.19   84.08  468.18   84.61  468.17
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   84.99  468.16    86.4  468.15    88.2   468.1   88.21   468.1   88.22   468.1
   90.17  468.13    91.3  468.11   92.09  468.09      93  468.07   93.94  468.05
   94.72  468.04   95.91  468.05   97.78     468   98.11  467.99  101.02  467.94
  101.16  467.94   101.5  467.94  103.23   467.9  104.01  467.89  105.41  467.84
  107.48  467.78   107.7  467.78  108.64  467.76   110.2  467.72  110.56  467.71
  112.97  467.65  113.89  467.63  115.69  467.59  116.95  467.54  118.47  467.49
  118.92  467.47  119.79  467.44  120.69  467.41  121.91  467.38  122.81  467.38
  123.98  467.36  124.93  467.35   126.1  467.52  127.02  467.65  128.18  467.61
  129.12  467.59  130.28   467.5  130.88  467.44  137.65  464.05  141.65  464.05
  152.35   469.4  153.32  469.64  154.36  469.84  155.37  470.14  156.45  470.36
  157.47  470.45  158.55  470.65  159.56  470.87  160.65  471.23  161.65  471.46
  161.99  471.56  162.75  471.79  163.73  472.02  164.86  472.22  165.83  472.24
  166.97  472.16  167.91  472.19  169.06  472.21  170.01  472.24  171.16  472.31
   172.1  472.34  173.26  472.34  174.19  472.38  175.36  472.47  176.27  472.68
  177.44  473.02  178.35  473.27  179.54  473.65  180.43  474.04  181.64  474.42
  182.52  474.11  183.76  473.38  184.66  472.75   185.9  471.91  186.78  471.31
     188  470.53  188.88  470.05   190.1  469.65  191.08  469.74

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .18  127.02    .035  129.12     .03  152.35     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.88  161.99           105.78  105.88  106.14             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0    9.54469.3978

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 622.0599

INPUT
Description:
Station Elevation Data    num=     117
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.53    52.1  469.28   61.95  469.05   61.99  469.05   62.02  469.04
   62.12  469.05   62.86  469.05   64.37  469.05   65.92   469.1   66.45  469.12
   68.03  469.14   68.54  469.14   70.14  469.17   70.63  469.19   72.27  469.21
   72.73   469.2   74.37   469.2   74.82   469.2   76.49   469.2    76.9   469.2
   78.62  469.17   79.02  469.16   80.78   469.1   81.13   469.1   82.89  469.08
   83.22  469.07   84.99  469.01   85.32     469   87.13  468.94   87.42  468.93
   89.24  468.84   89.51  468.83   91.35  468.74   91.59  468.73   93.46  468.68
   93.68  468.67   95.57  468.67   95.77  468.66   97.67  468.63   97.85  468.63
   99.79   468.6   99.95   468.6   101.9  468.57  102.04  468.57  104.05  468.54
  104.15  468.54  106.15  468.54  106.25  468.54  108.27  468.54  108.33  468.54
  110.37  468.47  110.42  468.47  112.48   468.5  112.51   468.5  114.59  468.47
   114.6  468.47  115.54  468.44  116.72   468.4  116.74   468.4  116.75   468.4
  118.84  468.34  118.87  468.34  120.97  468.24  121.03  468.24  123.07  468.24
  123.14  468.24  125.17  468.24  125.26  468.24  127.24  468.21  127.35  468.21
  129.34  468.14  129.47  468.14  131.42  468.13  133.35  468.04  133.52  468.03
  135.44  468.03  135.62  468.03  137.51     468  137.72     468  137.93     468
  139.86  467.93  140.08  467.93  140.81  467.93  149.41  463.63  153.41  463.63
  164.86  469.35  165.09  469.44  165.59  469.48  167.18  469.73  167.71  469.77
  169.28  469.62  169.83  469.87  171.38  470.67  171.98  470.96  173.48  471.71
  174.09  471.99  175.16  472.45  175.58  472.63  176.23  472.82  177.68  473.32
  178.36  473.35  179.76  473.38  179.78  473.38  180.48  473.42  181.87  473.46
  182.59   473.6  183.97  473.86  184.71  473.86  186.05  473.82   186.8  473.82
  188.15  473.84  188.91  473.84  190.25  473.88  191.02  473.88  192.35  473.88
  193.15  473.89  194.31  473.91
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Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  140.81     .03  140.81     .03  164.86     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        140.81  175.16           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   59.24 480.533

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 522.0566

INPUT
Description:
Station Elevation Data    num=     111
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.56   35.34  469.76    61.3  469.15   61.33  469.17   62.65  469.13
   63.43  469.11   64.21  469.11   65.56  469.11   66.36  469.12   67.66  469.14
   68.47  469.15   69.77  469.17   71.03  469.17   71.87  469.17   73.15  469.19
   73.98   469.2   74.84  469.18   76.07  469.18   77.29  469.16   78.17  469.17
   79.04  469.18   80.29  469.18   81.19  469.17   82.39  469.17    83.3  469.17
   84.46  469.17   85.64  469.16    86.6  469.16   87.76  469.14    88.7  469.14
   89.66  469.13    90.8  469.11   91.77  469.11    92.9  469.09      94  469.09
      95  469.05      96  469.05    97.1  469.03   98.18  469.01    99.2  469.01
  100.26  468.99  101.32  468.99  102.37  468.99  103.42     469  104.43     469
   105.5  468.98  106.51  468.98  107.59  468.96   108.6  468.93  109.69  468.92
  110.67  468.88  111.77  468.87  112.76  468.87  113.87  468.83  114.84  468.82
     116  468.78  116.96  468.75  118.11  468.75  119.06  468.73  120.23  468.72
  121.16   468.7  122.34  468.69  123.26  468.67  124.44  468.65  125.36  468.64
  126.56   468.6  127.44   468.6  128.66  468.56  129.53  468.51  130.76  468.51
  131.62   468.5  132.86  468.44   133.7  468.44  134.96  468.48  135.78  468.47
  137.08  468.35  137.89  468.14  139.17  468.02  139.98  468.03  140.41  468.02
  143.22  466.62  145.46  465.29  145.97  465.25     150  463.23     154  463.23
  167.16  469.81  168.63  470.33  169.23  470.39  170.72  470.86  171.32   470.9
  172.83  470.91   173.4  470.91  174.95  471.03   175.5  471.03  176.26  471.09
  177.04  471.14   177.6  471.15  179.15  471.16  179.68   471.2   179.9   471.2
  181.24  471.17  181.83  471.16  183.33  471.17  183.98  471.21  185.43  471.25
  186.15  471.21  187.53  471.25  188.29  471.38  189.63   471.5  190.44  471.58
  191.67  471.65

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.78    .035  140.41     .03  167.16     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        140.41  176.26           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   58.08 480.557

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 422.0532

INPUT
Description:
Station Elevation Data    num=     107
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.68	1.41	470.65	60.58	469.31	61.94	469.43	62.05	469.4
62.77	469.4	64.15	469.27	64.87	469.25	66.25	469.2	66.94	469.18
68.35	469.16	69.03	469.14	70.45	469.09	71.12	469.07	72.56	469.05
73.21	469.04	74.65	468.99	75.3	468.99	76.78	468.97	77.43	468.94
78.88	468.9	79.52	468.9	80.99	468.87	81.63	468.87	83.1	468.87
83.72	468.87	85.21	468.87	85.81	468.86	87.31	468.84	87.91	468.84
89.42	468.84	90	468.84	91.52	468.84	92.08	468.84	93.63	468.84
94.18	468.84	95.72	468.89	96.27	468.88	97.82	468.84	98.36	468.84
99.92	468.82	100.46	468.81	102.06	468.84	102.59	468.85	104.17	468.8
104.68	468.79	106.28	468.82	106.77	468.82	108.38	468.74	108.87	468.72
110.49	468.72	110.95	468.72	112.59	468.64	113.05	468.64	114.72	468.66
115.18	468.65	116.82	468.6	117.27	468.59	118.93	468.57	119.36	468.57
121.03	468.54	121.46	468.53	123.14	468.48	123.54	468.47	125.22	468.44
125.61	468.42	127.32	468.37	127.7	468.36	129.39	468.3	129.77	468.29
131.47	468.27	131.84	468.26	133.57	468.2	133.93	468.23	135.68	468.31
136.04	468.22	137.57	467.79	147.48	462.83	151.48	462.83	165.47	469.82
167.3	470.45	167.42	470.5	169.41	471.4	169.5	471.46	171.54	472.78
171.61	472.81	173.63	473.56	173.67	473.58	175.73	474.03	175.77	474.02
176.12	473.94	177.84	473.51	177.85	473.51	179.93	473.47	179.96	473.47
180.04	473.47	182.04	473.47	182.05	473.47	184.14	473.44	184.25	473.44
186.24	473.37	186.25	473.37	188.34	473.36	188.36	473.36	190.43	473.33
190.47	473.33	192.44	473.3						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	135.68	.035	137.57	.03	137.57	.03	165.47	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
137.57	176.12	100.01	100	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	56.91	480.68

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 322.0501

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.07	30.54	470.22	49.62	469.55	57.58	469.42	58.78	469.45
59.56	469.31	63.51	469.18	63.76	469.16	64.13	469.15	65.86	469.13
66.21	469.12	67.97	469.12	68.31	469.12	70.07	469.06	70.39	469.05
72.18	469	72.48	468.99	74.28	468.93	74.57	468.92	76.41	468.9
76.69	468.89	78.52	468.8	78.78	468.8	80.62	468.77	80.87	468.76
82.73	468.7	82.96	468.7	84.83	468.67	85.05	468.66	86.95	468.6
87.15	468.6	89.05	468.57	89.23	468.56	91.18	468.5	91.35	468.5
93.28	468.47	93.44	468.47	95.39	468.47	95.53	468.47	97.5	468.44
97.62	468.44	99.6	468.44	99.71	468.43	101.71	468.34	101.8	468.34
103.78	468.31	103.86	468.31	105.89	468.27	105.95	468.27	108.02	468.24
108.07	468.24	110.14	468.16	110.16	468.16	112.24	468.1	112.26	468.1
113.8	468.08	114.34	468.07	114.35	468.07	115.35	468.04	116.44	468
116.45	468	117.4	467.97	118.54	467.93	118.55	467.93	120.63	467.84
120.66	467.84	122.69	467.74	122.73	467.74	124.78	467.77	124.84	467.77
126.87	467.74	126.95	467.74	128.96	467.67	129.06	467.67	131.06	467.61
131.17	467.61	133.15	467.54	133.28	467.54	135.22	467.51	135.36	467.51
136.25	467.48	137.31	467.44	137.47	467.43	137.57	467.43	147.56	462.43
151.56	462.43	164.6	468.95	164.98	469.08	166.65	469.81	167.1	470.06
168.74	470.96	169.21	471.23	170.82	472.04	171.32	472.24	172.89	472.83

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  173.44  472.92  174.46  472.89  175.02  472.87  175.56  472.82  177.12  472.72
  177.67  472.72  179.21  472.72  179.78  472.71  180.19  472.72  181.31  472.74
  181.87  472.74  183.42  472.72  183.95  472.73  185.53  472.73  186.06  472.73
  187.65  472.71  188.14   472.7  188.39   472.7

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  137.57     .03  137.57     .03  164.57     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        137.57  174.46           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   55.74 481.067

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 222.0471

INPUT
Description:
Station Elevation Data    num=     151
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.32     .86  470.33    1.04  470.33    2.95  470.34    3.15  470.34
    5.07  470.38    5.29  470.38    7.17  470.43    7.39  470.43    9.28  470.46
    9.52  470.47   11.37  470.48   11.63  470.49   13.45  470.45   13.73  470.45
   15.54  470.48   15.84  470.48   17.63  470.49   17.94  470.49   19.72  470.46
   20.04  470.45   21.81  470.44   22.14  470.44   23.89  470.41   24.25  470.41
   25.98   470.4   26.36  470.39    28.1  470.41   28.49   470.4   30.18   470.4
   30.59   470.4   32.27  470.38    32.7  470.38   34.35  470.34   34.79  470.34
   36.44  470.37    36.9  470.37   38.51  470.33   38.98  470.33    40.6   470.3
   41.09   470.3   42.71   470.3   43.21   470.3    44.8  470.35   45.32  470.36
   46.88  470.33   47.42  470.33      49  470.33   49.55  470.34   51.08  470.37
   51.67  470.37   53.18  470.34   53.77  470.33   55.26  470.31   55.87   470.3
   57.35   470.3   57.97  470.31   59.43   470.3   60.08  470.28   61.52  470.27
   62.18  470.26   63.61  470.25   64.29  470.25   65.69  470.23   66.39  470.23
   67.77  470.19   68.49  470.17   69.85  470.17    70.6  470.17   71.96  470.16
   72.71  470.16   74.05  470.19   74.84  470.19   76.14   470.2   76.94  470.21
   78.21  470.21   79.06  470.22   80.32  470.24   81.17  470.25   82.42  470.25
   83.27  470.21   84.49   470.2   85.37  470.23   86.58  470.21   87.48  470.18
   88.66  470.15   89.59  470.14   90.75  470.11   91.69  470.08   92.84  470.05
   93.79  470.04   94.92  470.04    95.9  470.04   96.99  470.02   97.99  470.02
   99.07  470.02   100.1  470.03  101.16  470.04   102.2  470.06  103.26  470.07
  104.32  470.02  105.35     470  106.42     470  107.44  469.99  108.55  469.98
  109.53  469.99  110.63  469.99   111.6  469.96  112.74  469.89  113.68  469.86
  114.82  469.86  115.77   469.9  116.93  469.93  117.84  469.95  119.02  469.94
   119.9  469.93  121.12  469.93  122.01  469.93  123.26  469.91  124.12  469.92
  125.37  469.94   126.2  470.01   127.5  470.29   128.3  470.45  129.62  470.82
  130.38  470.79  131.09  470.74   148.5  462.03   152.5  462.03  171.29  471.42
  171.69  471.46  171.99   471.4   172.8  471.22  173.79  470.99  174.07  470.98
  175.89  470.86  176.16  470.85  177.99  470.85  178.23  470.84  180.09  470.82
  180.32  470.81  180.33  470.81  182.19  470.75  182.41  470.75  184.29  470.72
  184.51  470.72  186.39  470.66  186.61  470.65  188.46  470.65  188.65  470.65
  188.87  470.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  129.62     .03  171.29     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        131.09  171.29            167.9  167.77  167.53             .1       .3
```

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 54.279

INPUT
Description:
Station Elevation Data num= 232

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.65	.84	474.62	1.2	474.61	2.94	474.61	3.29	474.6
5.06	474.55	5.41	474.54	7.16	474.45	7.53	474.44	9.26	474.38
9.65	474.38	11.37	474.41	11.74	474.4	13.47	474.28	13.87	474.26
15.57	474.21	15.97	474.22	17.67	474.19	18.07	474.2	19.77	474.2
20.18	474.21	21.85	474.23	22.27	474.22	23.96	474.25	24.39	474.25
26.07	474.22	26.48	474.22	28.19	474.16	28.6	474.17	30.28	474.17
30.72	474.14	32.38	474.06	32.82	474.06	34.48	474.06	34.92	474.06
36.58	474.06	37.05	474.07	38.71	474.07	39.17	474.07	40.82	474.07
41.28	474.07	42.91	474.15	43.4	474.15	45.02	474.15	45.5	474.18
47.14	474.28	47.62	474.28	49.24	474.28	49.72	474.29	51.34	474.31
51.84	474.32	53.44	474.29	53.94	474.3	55.55	474.32	56.04	474.32
57.65	474.3	58.18	474.32	59.76	474.33	60.28	474.33	61.86	474.35
62.38	474.35	63.96	474.4	64.5	474.4	66.03	474.43	66.57	474.43
68.16	474.46	68.69	474.5	70.26	474.52	70.81	474.53	72.36	474.53
72.91	474.53	74.46	474.5	75.02	474.45	76.56	474.38	77.1	474.09
78.61	473.02	79.13	472.63	80.68	471.49	81.18	471.29	82.75	470.79
83.24	470.72	84.85	470.6	85.35	470.57	86.95	470.44	87.45	470.4
89.03	470.33	89.52	470.3	91.13	470.18	91.64	470.16	93.26	470.08
93.78	470.06	95.34	470.01	95.85	470	97.44	470	97.96	469.97
99.57	469.87	100.09	469.86	101.65	469.79	102.18	469.78	103.75	469.78
104.28	469.76	105.85	469.69	106.37	469.66	107.94	469.63	108.5	469.62
110.05	469.54	110.6	469.53	112.18	469.46	112.73	469.45	114.25	469.42
114.79	469.4	116.35	469.36	116.91	469.34	118.43	469.29	118.99	469.27
120.51	469.24	121.07	469.25	122.59	469.23	123.14	469.2	124.69	469.1
125.28	469.24	126.8	469.62	127.39	469.65	128.93	469.72	129.63	469.76
130.44	469.81	130.79	469.81	147.67	461.37	151.67	461.37	169.11	470.09
170.29	470.03	170.99	469.99	172.41	469.88	173.1	469.83	174.51	469.78
175.21	469.76	176.6	469.71	177.31	469.68	178.7	469.64	179.41	469.64
180.8	469.64	181.5	469.62	182.87	469.57	183.58	469.56	184.95	469.49
185.68	469.47	187.05	469.47	187.78	469.47	189.15	469.47	189.88	469.47
191.26	469.5	191.99	469.5	193.37	469.45	194.11	469.45	195.47	469.47
196.21	469.45	197.59	469.41	198.3	469.4	199.65	469.38	200.4	469.39
201.75	469.43	202.51	469.42	203.86	469.35	204.61	469.35	205.96	469.31
206.72	469.29	208.05	469.28	208.81	469.23	210.17	469.21	210.94	469.15
212.27	469.15	213.02	469.14	214.39	469.01	215.14	469.06	216.46	469
217.23	469.03	218.55	469.07	219.33	469.09	220.62	469.23	221.41	469.25
222.72	469.3	223.51	469.29	224.82	469.33	225.63	469.31	226.92	469.3
227.73	469.29	229.04	469.25	229.85	469.24	231.14	469.2	231.95	469.19
233.25	469.19	234.05	469.19	235.33	469.17	236.16	469.12	237.44	469.12
238.26	469.13	239.53	469.09	240.35	469.07	241.64	469.03	242.46	469.02
243.74	469.02	244.56	469.02	245.84	469	246.68	469	247.96	469.02
248.79	469.02	250.05	469.02	250.88	469.01	252.12	468.98	252.96	468.97
254.23	468.95	255.06	468.95	256.32	468.95	257.16	468.95	258.4	468.95
259.27	468.96	260.52	468.92	261.39	468.89	262.62	468.91	263.49	468.91
264.71	468.91	265.6	468.9	266.83	468.88	267.7	468.86	268.93	468.86
269.8	468.88	271.03	468.82	271.9	468.81	273.12	468.81	274.02	468.79
275.24	468.77	275.36	468.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	130.44	.03	169.11	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
130.79 169.11 49.37 49.41 49.5 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
168.89 275.36 470.1 T

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 4.867403

INPUT
Description:
Station Elevation Data num= 249

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.56	.19	474.57	1	474.57	2.3	474.55	3.09	474.53
4.4	474.55	5.18	474.55	6.49	474.55	7.27	474.55	8.6	474.52
9.37	474.52	10.7	474.54	11.45	474.56	12.83	474.56	13.57	474.55
14.93	474.55	15.66	474.56	17.03	474.56	17.76	474.55	19.13	474.52
19.85	474.53	21.26	474.58	21.96	474.58	23.36	474.58	24.05	474.58
25.46	474.56	26.15	474.54	27.56	474.52	28.23	474.51	29.67	474.48
30.33	474.47	31.78	474.43	32.43	474.43	33.88	474.43	34.53	474.41
36	474.38	36.63	474.37	38.1	474.35	38.74	474.36	40.21	474.36
40.84	474.35	42.31	474.35	42.94	474.35	44.41	474.35	45.01	474.36
46.49	474.34	47.08	474.34	48.59	474.34	49.18	474.33	50.7	474.3
51.27	474.29	52.8	474.29	53.36	474.29	54.93	474.22	55.47	474.2
57.03	474.25	57.57	474.24	59.13	474.19	59.68	474.18	61.25	474.31
61.76	474.3	63.35	474.13	63.85	474.12	65.44	474.1	65.95	474.08
67.56	474.08	68.07	474.1	69.67	474.07	70.14	474.05	71.77	474.03
72.24	474.04	73.87	474.06	74.34	474.05	75.98	474.05	76.43	474.04
78.07	474.07	78.51	474.09	80.17	474.03	80.6	473.99	82.28	473.65
82.7	473.47	84.35	472.49	84.79	472.22	86.39	471.26	86.84	471.05
88.46	470.58	88.9	470.48	90.56	470.19	91	470.17	92.66	470.11
93.09	470.1	94.76	470.05	95.19	470.03	96.86	469.97	97.28	469.96
98.98	469.86	99.4	469.84	101.09	469.82	101.48	469.81	103.2	469.79
103.57	469.78	105.3	469.74	105.67	469.74	107.43	469.72	107.8	469.71
109.54	469.66	109.89	469.65	111.63	469.65	111.98	469.65	113.74	469.62
114.07	469.62	115.81	469.59	116.14	469.57	117.92	469.46	118.22	469.45
120.03	469.39	120.32	469.37	122.09	469.23	122.38	469.22	124.23	469.12
124.51	469.11	126.33	469.05	126.6	469.04	128.4	468.95	128.68	469.02
130.51	469.53	130.76	469.56	132.34	469.59	132.58	469.59	132.82	469.56
134.09	469.38	139.41	466.71	140.95	465.75	141.2	465.6	143.05	464.71
143.32	464.63	144.92	463.96	150.5	461.17	154.5	461.17	165.85	466.85
166.21	466.92	166.29	466.97	166.7	467.27	170.44	469.14	172.56	469.21
172.57	469.21	174.62	469.15	174.69	469.15	174.7	469.15	175.35	469.2
176.77	469.31	176.79	469.31	178.84	469.31	178.88	469.31	180.94	469.28
180.98	469.28	183	469.21	183.05	469.21	185.08	469.25	185.16	469.25
187.17	469.11	187.26	469.11	189.31	469.15	189.4	469.15	191.4	469.18
191.5	469.18	193.47	469.2	193.61	469.2	195.63	469.16	199.41	469.23
199.84	469.26	199.95	469.28	201.86	469.15	202.05	469.13	203.93	469.13
204.13	469.11	206.02	469.08	206.23	469.08	208.12	468.96	208.33	468.94
210.2	468.83	210.44	468.82	212.28	468.79	212.53	468.79	214.38	468.81
214.63	468.81	216.51	468.78	216.77	468.78	218.59	468.74	218.88	468.73
220.69	468.71	220.98	468.71	222.78	468.68	223.08	468.68	224.88	468.62
225.18	468.61	226.97	468.59	227.29	468.58	229.06	468.58	229.39	468.57
231.12	468.51	231.47	468.5	233.22	468.5	233.58	468.5	235.34	468.48
235.7	468.48	237.42	468.48	237.81	468.47	239.54	468.47	239.93	468.48
241.64	468.45	242.04	468.45	243.72	468.42	244.15	468.4	245.82	468.4
246.25	468.41	247.92	468.41	248.36	468.4	250.02	468.43	250.46	468.43
252.1	468.43	252.57	468.44	254.19	468.38	254.67	468.37	256.29	468.38
256.77	468.38	258.39	468.38	258.88	468.38	260.46	468.4	260.98	468.4
262.55	468.38	263.08	468.39	264.64	468.31	265.18	468.32	266.74	468.35

267.28	468.34	268.82	468.34	269.4	468.35	270.93	468.35	271.5	468.34
273.02	468.34	273.6	468.34	275.12	468.36	275.7	468.36	277.19	468.31
277.81	468.29	279.29	468.32	279.91	468.31	280.6	468.31		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	132.34	.03	170.44	.04

Bank Sta: Left	Right	Lengths: Left Channel		Right	Coeff Contr.	Expan.
134.09	174.62	37.89	4.87	40.87	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
176.77	280.6	469.31	T

SUMMARY OF REACH LENGTHS

River: South_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1311.239	102.88	100	100
Reach	1211.239	100	100	100
Reach	1111.238	100	100	100
Reach	1011.238	109.55	109.49	109.4
Reach	901.7494	99.3	99.2	99.08
Reach	802.5478	22.62	31.77	46.56
Reach	770.7793	32.88	42.84	62.72
Reach	727.9443	105.78	105.88	106.14
Reach	622.0599	100.01	100	100
Reach	522.0566	100.01	100	100
Reach	422.0532	100.01	100	100
Reach	322.0501	100.01	100	100
Reach	222.0471	167.9	167.77	167.53
Reach	54.279	49.37	49.41	49.5
Reach	4.867403	37.89	4.87	40.87

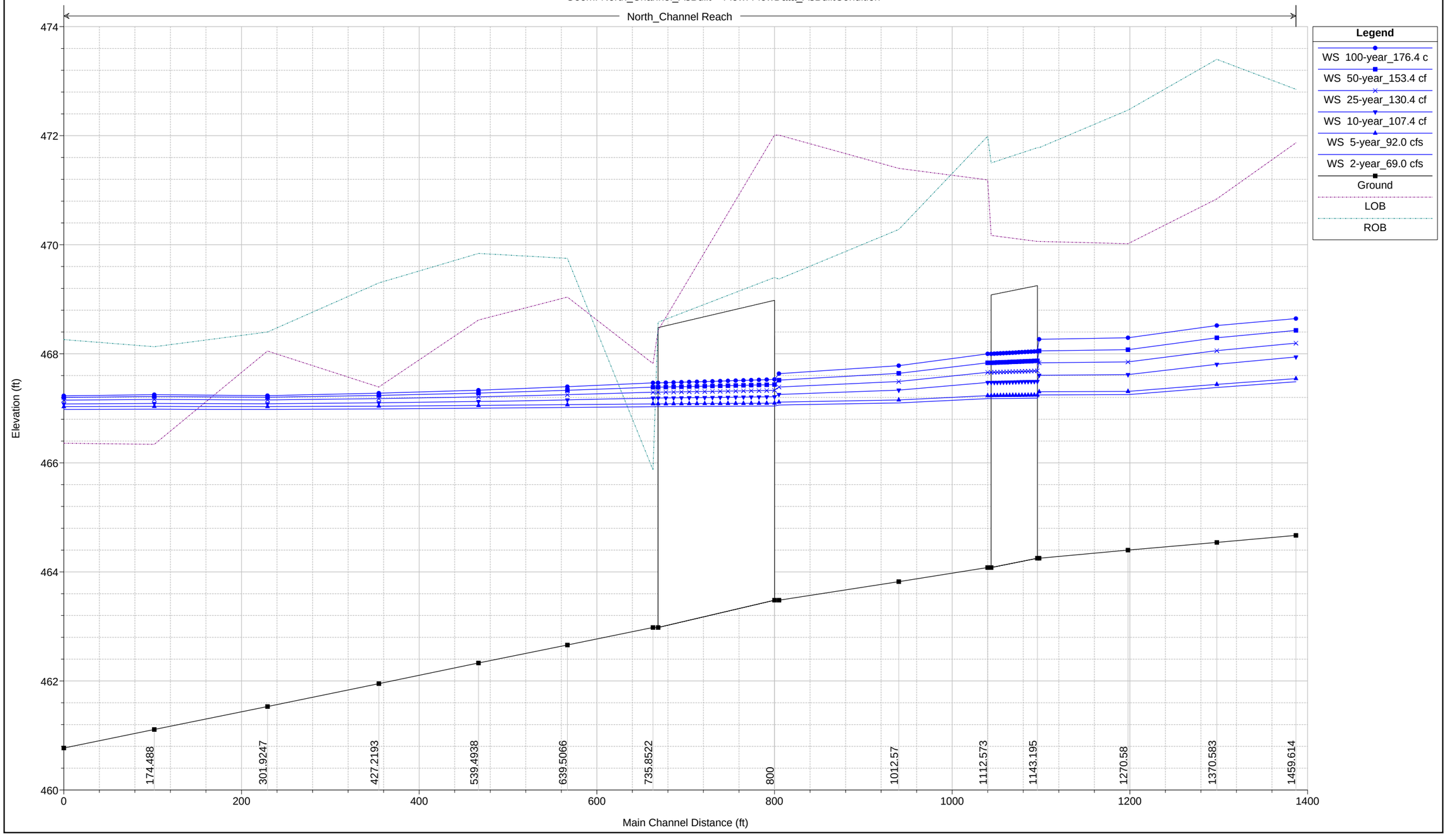
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: South_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1311.239	.1	.3
Reach	1211.239	.1	.3
Reach	1111.238	.1	.3
Reach	1011.238	.1	.3
Reach	901.7494	.1	.3
Reach	802.5478	.1	.3
Reach	770.7793	.1	.3
Reach	727.9443	.1	.3
Reach	622.0599	.1	.3
Reach	522.0566	.1	.3
Reach	422.0532	.1	.3
Reach	322.0501	.1	.3
Reach	222.0471	.1	.3
Reach	54.279	.1	.3
Reach	4.867403	.1	.3

Attachment 17 – HYDRAULIC PROFILES AND DETAILED HEC-RAS HYDRAULIC RESULTS FOR AS-BUILT CONDITION

17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017

Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition

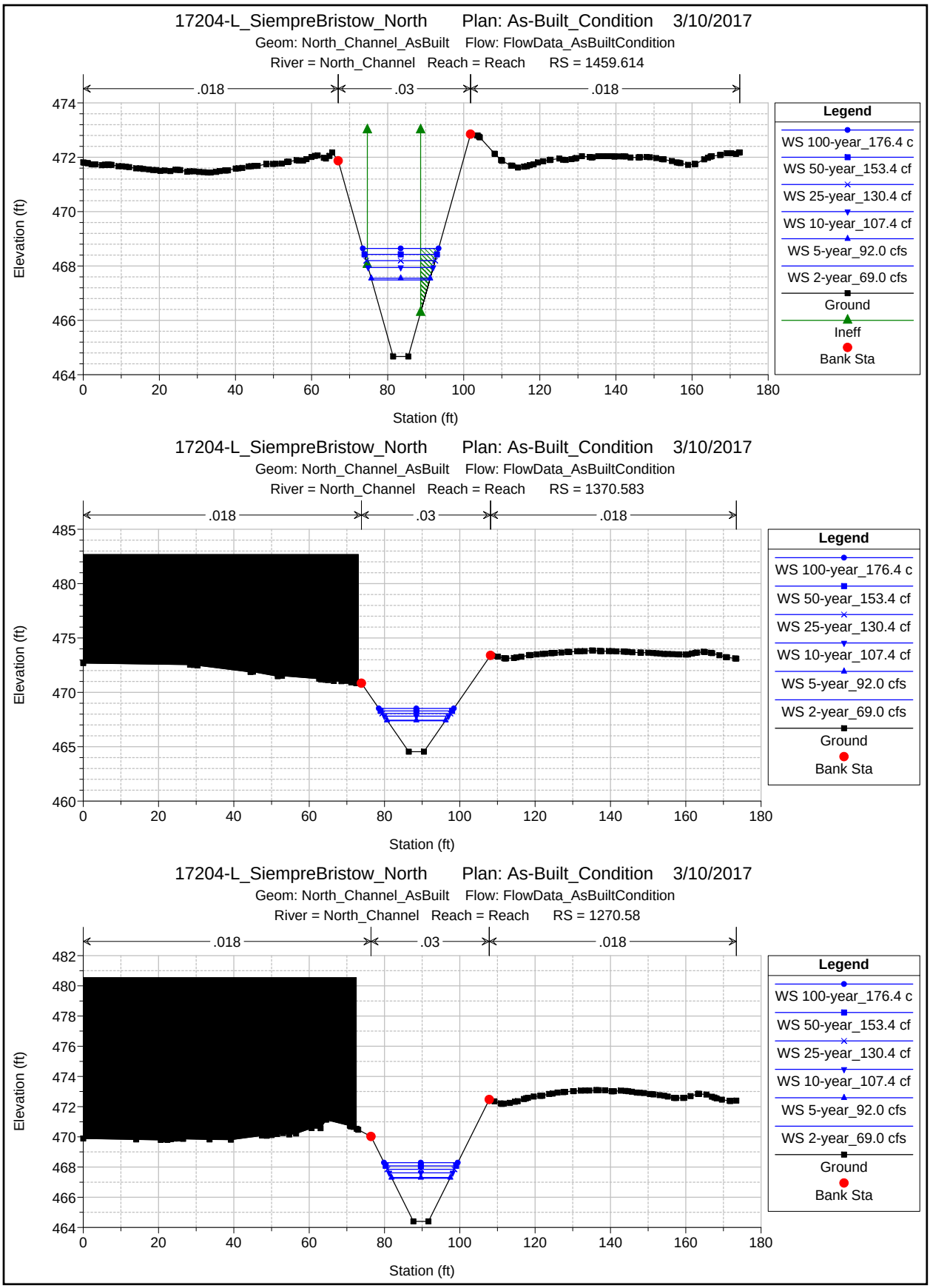


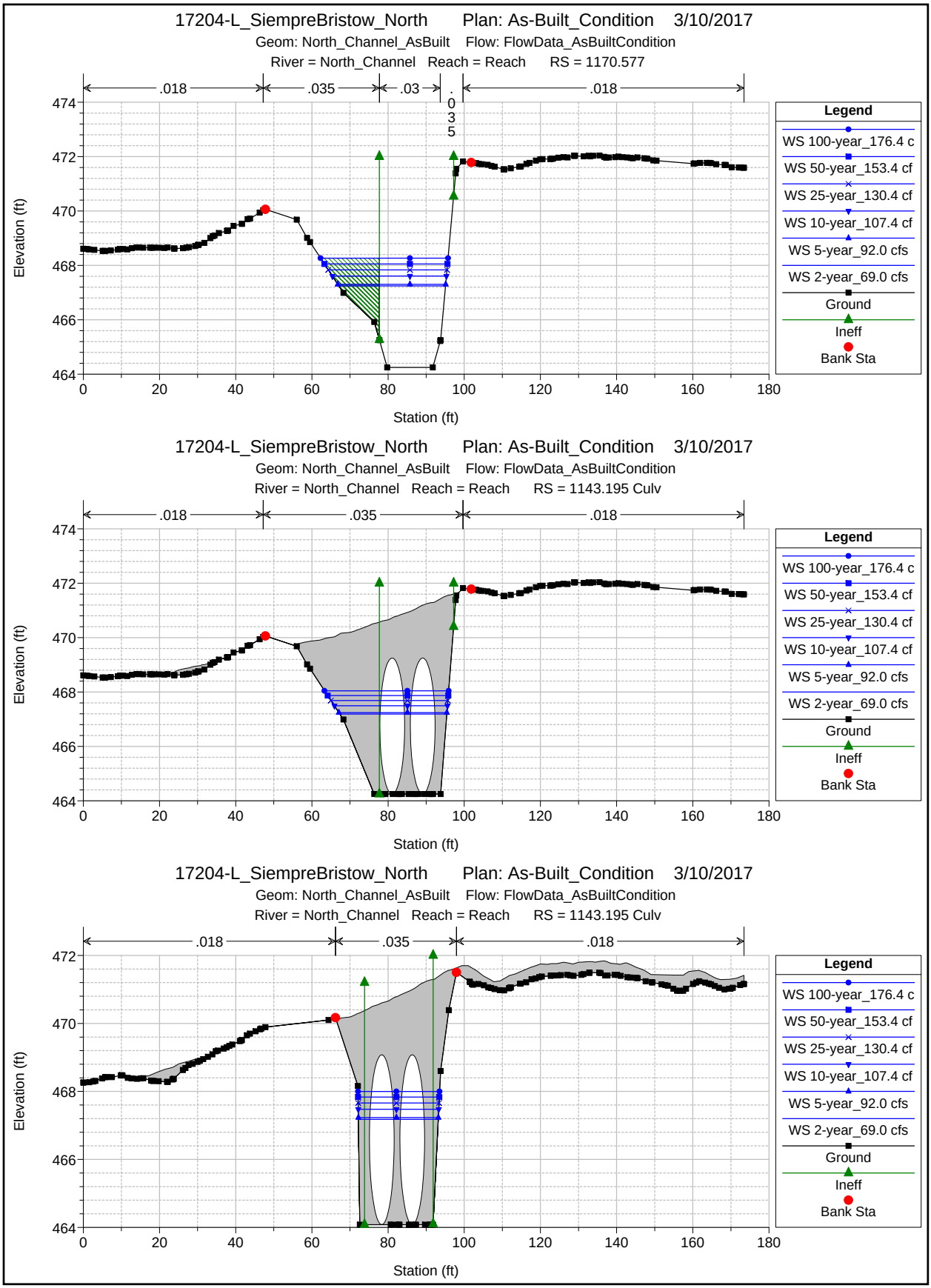
HEC-RAS Plan: As_Built River: North_Channel Reach: Reach

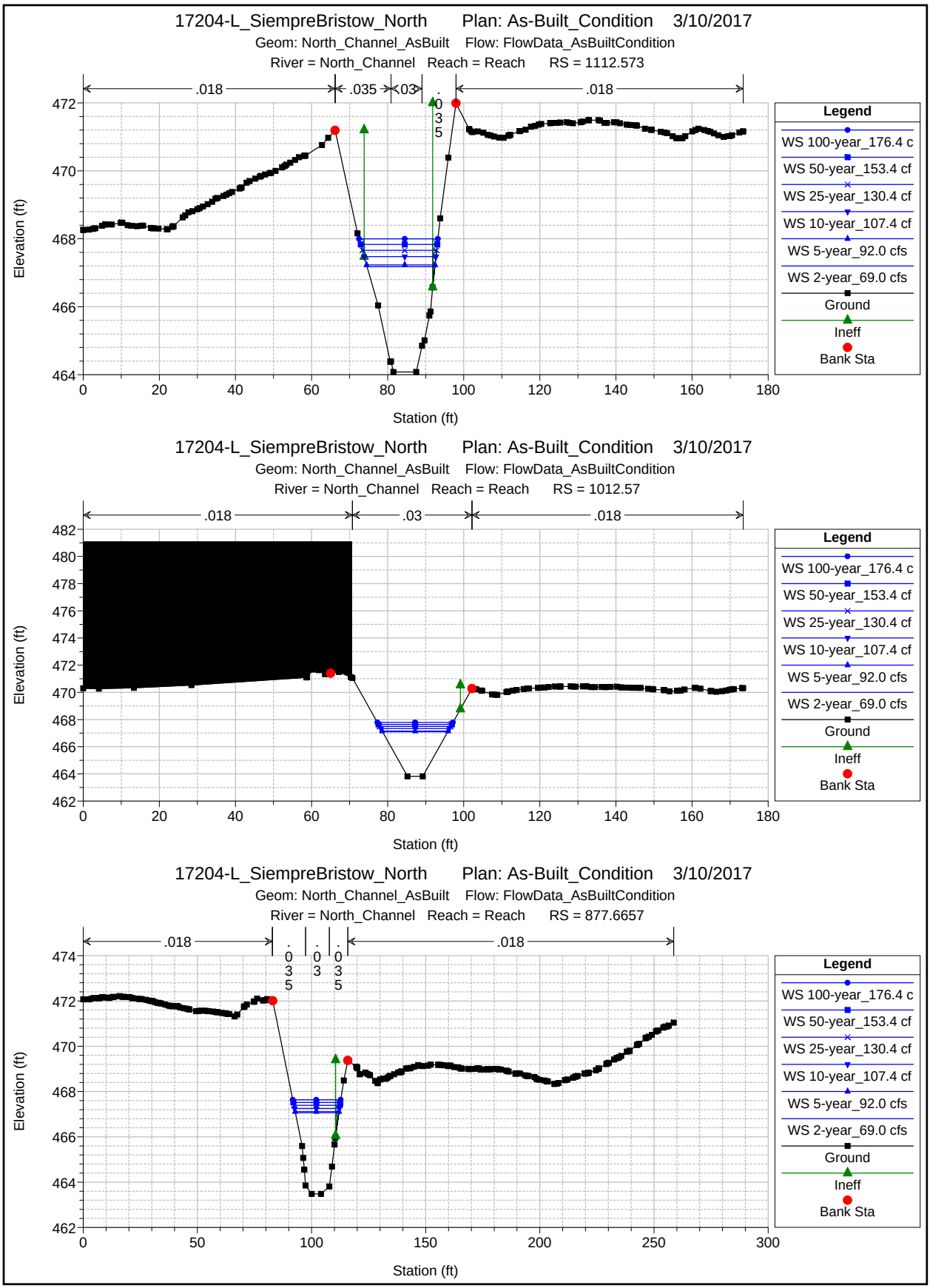
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1459.614	2-year_69.0 cfs	69.00	464.67	467.49	466.27	467.60	0.001295	2.68	25.71	15.27	0.33
Reach	1459.614	5-year_92.0 cfs	72.00	464.67	467.55	466.30	467.66	0.001298	2.72	26.45	15.50	0.34
Reach	1459.614	10-year_107.4 cf	107.40	464.67	467.94	466.67	468.12	0.001703	3.38	31.77	17.09	0.39
Reach	1459.614	25-year_130.4 cf	130.40	464.67	468.20	466.88	468.41	0.001805	3.69	35.30	18.10	0.41
Reach	1459.614	50-year_153.4 cf	153.40	464.67	468.43	467.07	468.67	0.001863	3.98	38.55	19.03	0.42
Reach	1459.614	100-year_176.4 c	176.40	464.67	468.65	467.25	468.92	0.001911	4.24	41.60	19.90	0.43
Reach	1370.583	2-year_69.0 cfs	69.00	464.54	467.38		467.48	0.001318	2.51	27.51	15.37	0.33
Reach	1370.583	5-year_92.0 cfs	72.00	464.54	467.44		467.54	0.001316	2.53	28.42	15.60	0.33
Reach	1370.583	10-year_107.4 cf	107.40	464.54	467.81		467.96	0.001748	3.12	34.42	17.07	0.39
Reach	1370.583	25-year_130.4 cf	130.40	464.54	468.06		468.23	0.001865	3.36	38.83	18.07	0.40
Reach	1370.583	50-year_153.4 cf	153.40	464.54	468.29		468.49	0.001938	3.55	43.20	19.02	0.42
Reach	1370.583	100-year_176.4 c	176.40	464.54	468.52		468.73	0.001979	3.71	47.57	19.91	0.42
Reach	1270.58	2-year_69.0 cfs	69.00	464.40	467.25		467.35	0.001299	2.49	27.66	15.40	0.33
Reach	1270.58	5-year_92.0 cfs	72.00	464.40	467.31		467.41	0.001297	2.52	28.57	15.64	0.33
Reach	1270.58	10-year_107.4 cf	107.40	464.40	467.62		467.78	0.001867	3.20	33.59	16.87	0.40
Reach	1270.58	25-year_130.4 cf	130.40	464.40	467.85		468.04	0.002030	3.47	37.62	17.80	0.42
Reach	1270.58	50-year_153.4 cf	153.40	464.40	468.08		468.29	0.002129	3.68	41.71	18.70	0.43
Reach	1270.58	100-year_176.4 c	176.40	464.40	468.29		468.52	0.002180	3.84	45.88	19.57	0.44
Reach	1170.577	2-year_69.0 cfs	69.00	464.25	467.25	465.20	467.28	0.000266	1.46	47.40	28.01	0.16
Reach	1170.577	5-year_92.0 cfs	72.00	464.25	467.30	465.23	467.34	0.000272	1.49	48.41	28.32	0.16
Reach	1170.577	10-year_107.4 cf	107.40	464.25	467.61	465.49	467.67	0.000441	2.00	53.71	29.94	0.20
Reach	1170.577	25-year_130.4 cf	130.40	464.25	467.83	465.65	467.91	0.000522	2.26	57.74	31.15	0.22
Reach	1170.577	50-year_153.4 cf	153.40	464.25	468.05	465.79	468.15	0.000593	2.49	61.64	32.32	0.24
Reach	1170.577	100-year_176.4 c	176.40	464.25	468.27	465.93	468.38	0.000655	2.69	65.46	33.46	0.25
Reach	1143.195		Culvert									
Reach	1112.573	2-year_69.0 cfs	69.00	464.08	467.18		467.23	0.000638	1.83	37.74	17.81	0.22
Reach	1112.573	5-year_92.0 cfs	72.00	464.08	467.23		467.29	0.000647	1.86	38.70	18.01	0.22
Reach	1112.573	10-year_107.4 cf	107.40	464.08	467.47		467.57	0.001069	2.50	42.96	18.86	0.29
Reach	1112.573	25-year_130.4 cf	130.40	464.08	467.66		467.78	0.001226	2.81	46.33	19.52	0.31
Reach	1112.573	50-year_153.4 cf	153.40	464.08	467.84		467.98	0.001364	3.10	49.47	20.13	0.33
Reach	1112.573	100-year_176.4 c	176.40	464.08	468.00		468.18	0.001487	3.37	52.42	20.71	0.35
Reach	1012.57	2-year_69.0 cfs	69.00	463.82	467.10		467.16	0.000710	1.99	34.63	17.12	0.25
Reach	1012.57	5-year_92.0 cfs	72.00	463.82	467.15		467.22	0.000720	2.02	35.57	17.34	0.25
Reach	1012.57	10-year_107.4 cf	107.40	463.82	467.33		467.45	0.001273	2.77	38.73	18.05	0.33
Reach	1012.57	25-year_130.4 cf	130.40	463.82	467.49		467.64	0.001545	3.13	41.65	18.69	0.37
Reach	1012.57	50-year_153.4 cf	153.40	463.82	467.64		467.83	0.001791	3.45	44.49	19.29	0.40
Reach	1012.57	100-year_176.4 c	176.40	463.82	467.78		468.00	0.002014	3.73	47.26	19.85	0.43
Reach	877.6657	2-year_69.0 cfs	69.00	463.48	467.06	464.68	467.09	0.000303	1.45	47.71	19.01	0.15
Reach	877.6657	5-year_92.0 cfs	72.00	463.48	467.11	464.71	467.15	0.000312	1.48	48.66	19.19	0.16
Reach	877.6657	10-year_107.4 cf	107.40	463.48	467.25	465.04	467.32	0.000601	2.10	51.18	19.67	0.22
Reach	877.6657	25-year_130.4 cf	130.40	463.48	467.39	465.23	467.48	0.000774	2.43	53.64	20.14	0.25
Reach	877.6657	50-year_153.4 cf	153.40	463.48	467.52	465.40	467.63	0.000950	2.74	55.96	20.58	0.28
Reach	877.6657	100-year_176.4 c	176.40	463.48	467.64	465.57	467.78	0.001125	3.03	58.17	20.99	0.30
Reach	800		Culvert									
Reach	735.8522	2-year_69.0 cfs	69.00	462.98	467.03		467.06	0.000254	1.43	48.62	22.11	0.15
Reach	735.8522	5-year_92.0 cfs	72.00	462.98	467.08		467.12	0.000261	1.46	49.59	22.41	0.16
Reach	735.8522	10-year_107.4 cf	107.40	462.98	467.19		467.26	0.000514	2.10	51.60	23.06	0.22
Reach	735.8522	25-year_130.4 cf	130.40	462.98	467.30		467.39	0.000667	2.45	53.64	24.87	0.25
Reach	735.8522	50-year_153.4 cf	153.40	462.98	467.39		467.51	0.000830	2.79	55.39	26.41	0.28
Reach	735.8522	100-year_176.4 c	176.40	462.98	467.47		467.62	0.001005	3.13	56.88	27.70	0.31
Reach	639.5066	2-year_69.0 cfs	69.00	462.66	467.01		467.04	0.000202	1.25	55.33	21.41	0.14
Reach	639.5066	5-year_92.0 cfs	72.00	462.66	467.07		467.09	0.000209	1.28	56.42	21.62	0.14
Reach	639.5066	10-year_107.4 cf	107.40	462.66	467.15		467.21	0.000424	1.84	58.35	21.97	0.20
Reach	639.5066	25-year_130.4 cf	130.40	462.66	467.25		467.32	0.000568	2.16	60.49	22.36	0.23
Reach	639.5066	50-year_153.4 cf	153.40	462.66	467.33		467.43	0.000727	2.46	62.31	22.68	0.26
Reach	639.5066	100-year_176.4 c	176.40	462.66	467.40		467.52	0.000902	2.76	63.81	22.94	0.29
Reach	539.4938	2-year_69.0 cfs	69.00	462.33	467.00		467.02	0.000147	1.11	62.32	22.68	0.12
Reach	539.4938	5-year_92.0 cfs	72.00	462.33	467.05		467.07	0.000152	1.13	63.47	22.89	0.12
Reach	539.4938	10-year_107.4 cf	107.40	462.33	467.12		467.17	0.000316	1.65	65.16	23.18	0.17
Reach	539.4938	25-year_130.4 cf	130.40	462.33	467.21		467.27	0.000430	1.94	67.17	23.52	0.20
Reach	539.4938	50-year_153.4 cf	153.40	462.33	467.28		467.36	0.000558	2.23	68.80	23.80	0.23
Reach	539.4938	100-year_176.4 c	176.40	462.33	467.33		467.43	0.000703	2.52	70.04	24.01	0.26
Reach	427.2193	2-year_69.0 cfs	69.00	461.95	466.99		467.00	0.000104	0.97	70.97	24.16	0.10
Reach	427.2193	5-year_92.0 cfs	72.00	461.95	467.04		467.06	0.000108	1.00	72.18	24.36	0.10
Reach	427.2193	10-year_107.4 cf	107.40	461.95	467.10		467.13	0.000228	1.46	73.68	24.61	0.15
Reach	427.2193	25-year_130.4 cf	130.40	461.95	467.18		467.22	0.000313	1.73	75.59	24.91	0.17

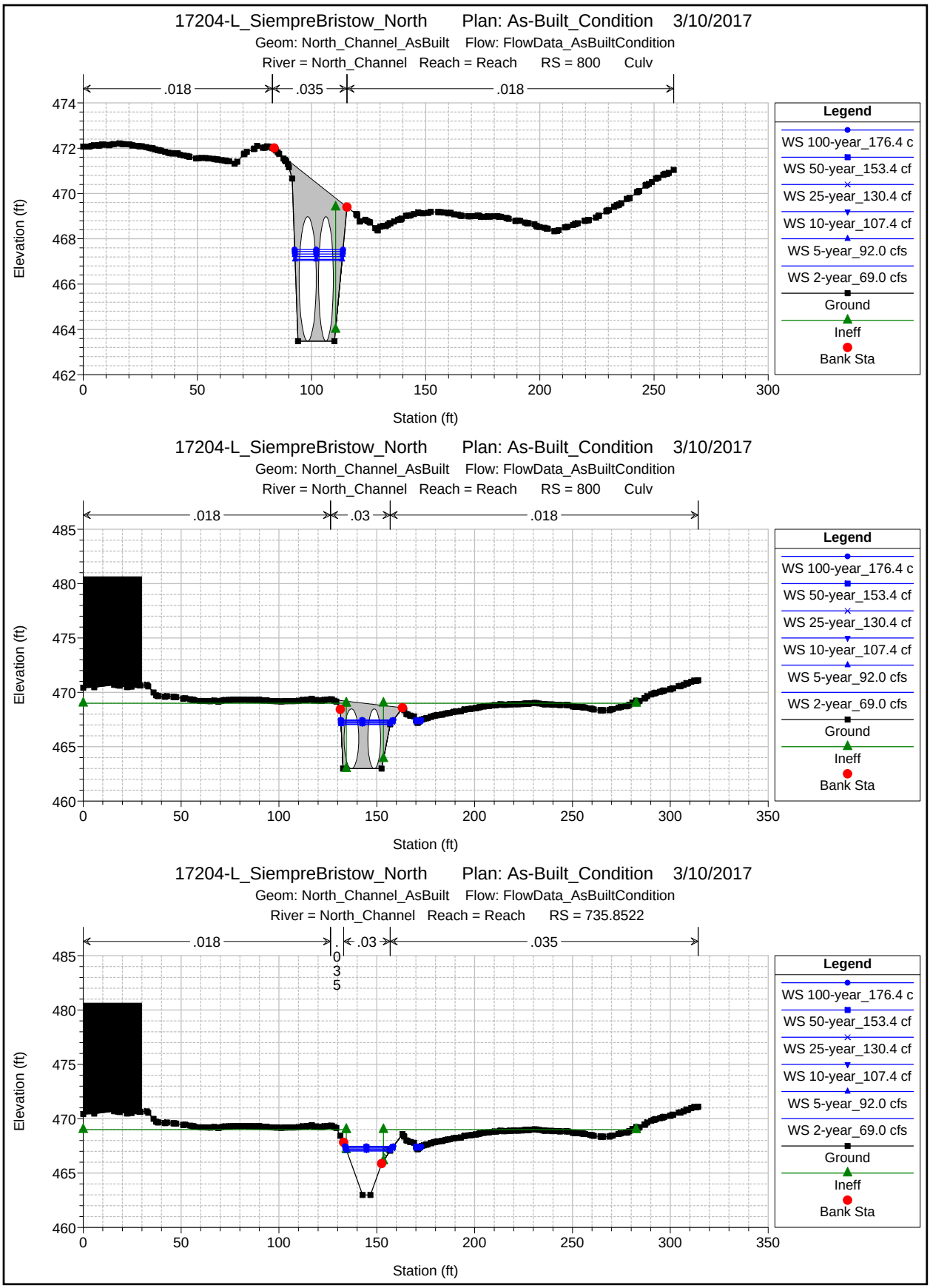
HEC-RAS Plan: As_Built River: North_Channel Reach: Reach (Continued)

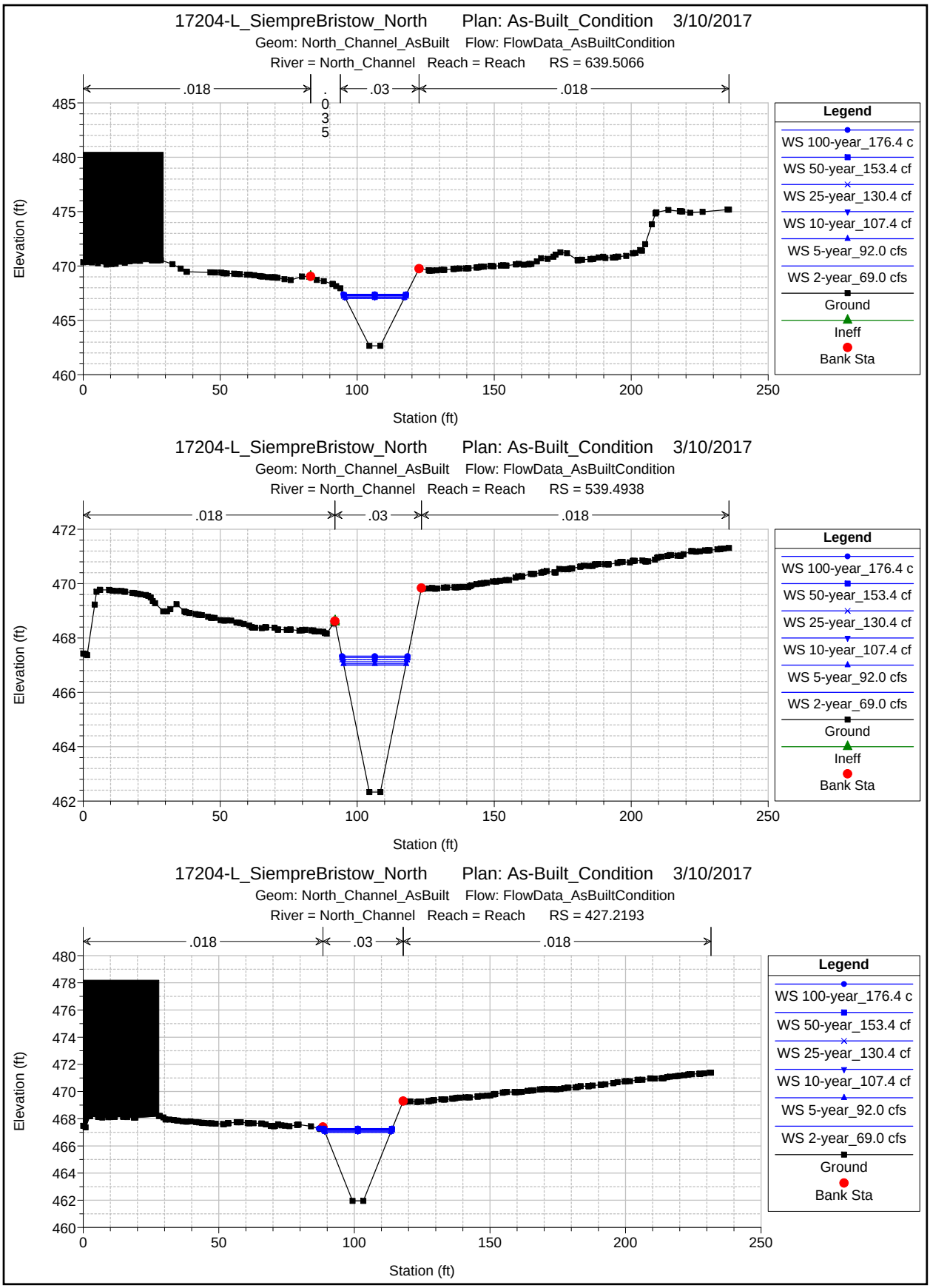
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	427.2193	50-year_153.4 cf	153.40	461.95	467.24		467.30	0.000412	1.99	77.06	25.15	0.20
Reach	427.2193	100-year_176.4 c	176.40	461.95	467.28		467.36	0.000526	2.26	78.07	26.00	0.23
Reach	301.9247	2-year_69.0 cfs	69.00	461.53	466.98		466.99	0.000072	0.85	81.25	25.81	0.08
Reach	301.9247	5-year_92.0 cfs	72.00	461.53	467.03		467.04	0.000075	0.87	82.54	26.01	0.09
Reach	301.9247	10-year_107.4 cf	107.40	461.53	467.08		467.11	0.000161	1.28	83.88	26.21	0.13
Reach	301.9247	25-year_130.4 cf	130.40	461.53	467.15		467.19	0.000224	1.52	85.73	26.49	0.15
Reach	301.9247	50-year_153.4 cf	153.40	461.53	467.20		467.25	0.000297	1.76	87.06	26.69	0.17
Reach	301.9247	100-year_176.4 c	176.40	461.53	467.23		467.30	0.000384	2.01	87.86	26.81	0.20
Reach	174.488	2-year_69.0 cfs	69.00	461.11	466.98		466.99	0.000019	0.39	224.93	157.67	0.04
Reach	174.488	5-year_92.0 cfs	72.00	461.11	467.03		467.04	0.000019	0.39	232.85	157.98	0.04
Reach	174.488	10-year_107.4 cf	107.40	461.11	467.09		467.09	0.000039	0.56	241.48	158.32	0.06
Reach	174.488	25-year_130.4 cf	130.40	461.11	467.16		467.17	0.000051	0.65	253.11	158.64	0.07
Reach	174.488	50-year_153.4 cf	153.40	461.11	467.22		467.22	0.000065	0.74	261.67	158.83	0.08
Reach	174.488	100-year_176.4 c	176.40	461.11	467.25		467.26	0.000082	0.84	267.16	158.96	0.09
Reach	72.67111	2-year_69.0 cfs	69.00	460.77	466.98	461.96	466.98	0.000020	0.51	159.59	87.42	0.05
Reach	72.67111	5-year_92.0 cfs	72.00	460.77	467.03	461.99	467.03	0.000020	0.52	163.96	87.52	0.05
Reach	72.67111	10-year_107.4 cf	107.40	460.77	467.08	462.32	467.09	0.000043	0.75	168.34	87.62	0.07
Reach	72.67111	25-year_130.4 cf	130.40	460.77	467.15	462.51	467.16	0.000058	0.89	174.47	87.76	0.08
Reach	72.67111	50-year_153.4 cf	153.40	460.77	467.20	462.69	467.21	0.000077	1.02	178.87	87.86	0.10
Reach	72.67111	100-year_176.4 c	176.40	460.77	467.23	462.85	467.25	0.000098	1.16	181.50	87.92	0.11

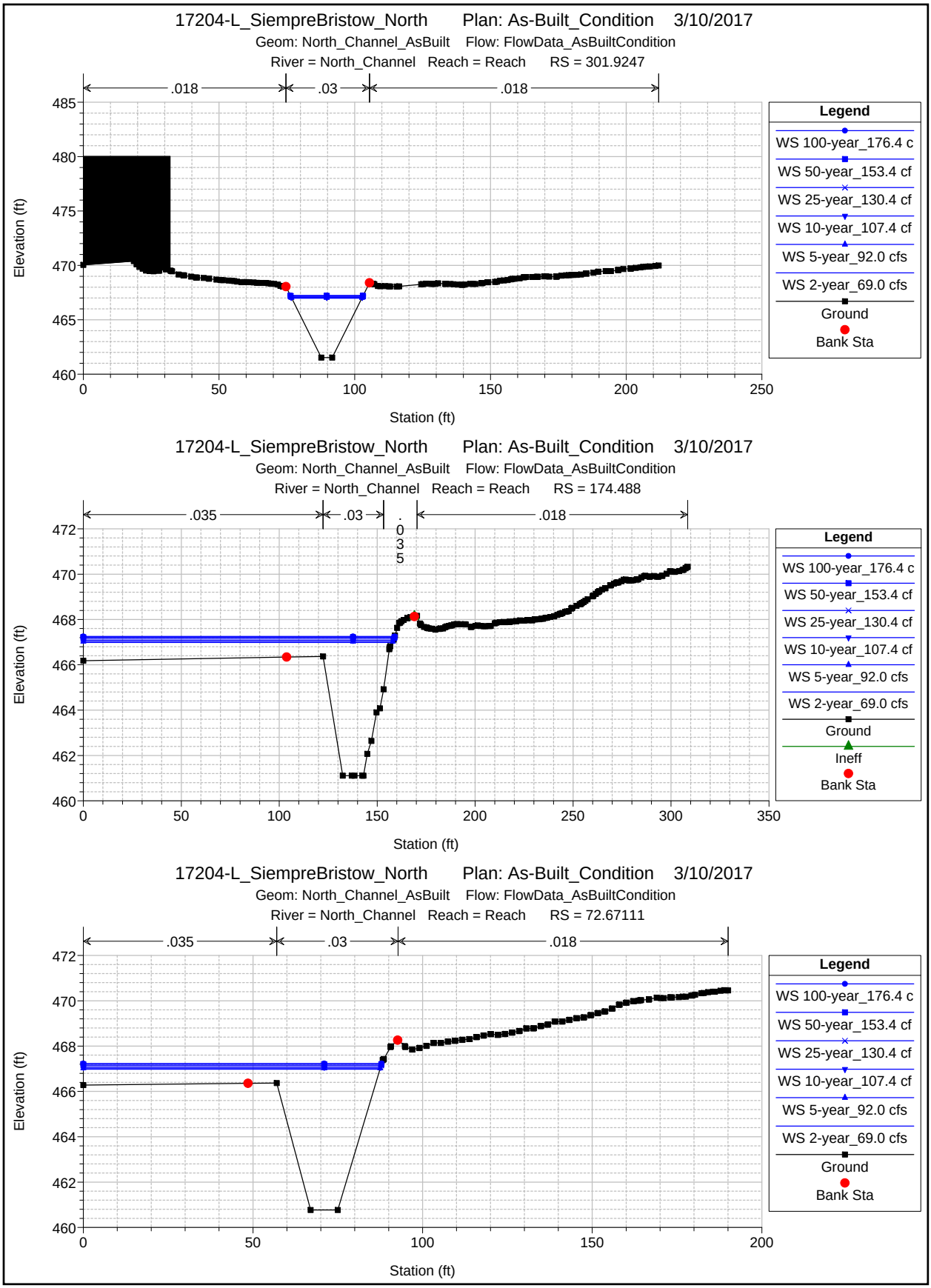

17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1459.614
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1370.583
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1270.58
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1170.577
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1143.195 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1112.573
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 1012.57
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 877.6657
.018
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 800 Culv
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 735.8522
.018
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 639.5066
.018
.035
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 539.4938
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 427.2193
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 301.9247
.018
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 174.488
.035
.03
.035
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_North Plan: As-Built_Condition 3/10/2017
Geom: North_Channel_AsBuilt Flow: FlowData_AsBuiltCondition
River = North_Channel Reach = Reach RS = 72.67111
.035
.03
.018
Elevation (ft)
Station (ft)
Legend
WS 100-year_176.4 c
WS 50-year_153.4 cf
WS 25-year_130.4 cf
WS 10-year_107.4 cf
WS 5-year_92.0 cfs
WS 2-year_69.0 cfs
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
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PROJECT DATA
Project Title: 17204-L_SiempreBristow_North
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 2:18:39 PM

Project in English units

Project Description:
78

PLAN DATA

Plan Title: As-Built_Condition
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.p05

Geometry Title: North_Channel_AsBuilt
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g08

Flow Title : FlowData_AsBuiltCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f01

Plan Summary Information:
Number of: Cross Sections = 14 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_AsBuiltCondition
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.f01

Flow Data (cfs)

River	Reach	RS	2-year_69.0 cfs	5-year_92.0 cfs	10-year_107.4 cfs	25-year_130.4 cfs	50-year_153.4 cfs	100-year_176.4 cfs
North_Channel	Reach	1459.614	69	72	107.4	130.4	153.4	176.4

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
North_Channel	Reach	2-year_69.0 cfs	Normal S = 0.004	Known WS = 466.98
North_Channel	Reach	5-year_92.0 cfs	Normal S = 0.004	Known WS = 467.03
North_Channel	Reach	10-year_107.4 cfs	Normal S = 0.004	Known WS = 467.08
North_Channel	Reach	25-year_130.4 cfs	Normal S = 0.004	Known WS = 467.15
North_Channel	Reach	50-year_153.4 cfs	Normal S = 0.004	Known WS = 467.2
North_Channel	Reach	100-year_176.4 cfs	Normal S = 0.004	Known WS = 467.23

GEOMETRY DATA

Geometry Title: North_Channel_AsBuilt
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\North_Channel\17204-L_SiempreBris.g08

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 1459.614

INPUT
Description:
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.81	.31	471.8	1.07	471.78	1.25	471.78	2.19	471.74
2.61	471.74	2.89	471.74	3.11	471.74	3.17	471.74	4.87	471.71
5.63	471.72	5.9	471.72	6.45	471.73	6.69	471.73	7.1	471.72
7.42	471.72	9.27	471.67	10.25	471.67	11.22	471.65	12.06	471.64
13.89	471.59	14.96	471.59	15.78	471.57	17.27	471.55	18.34	471.53
19.24	471.53	20.24	471.5	21.4	471.51	22.89	471.49	24.25	471.54
24.83	471.54	25.49	471.53	27.3	471.47	27.99	471.48	29.08	471.48
30.47	471.46	31.66	471.45	32.69	471.44	33.5	471.44	34.94	471.46

```
    35.9  471.49    37.3  471.51    37.6  471.51   38.06  471.52   40.07  471.58
   40.79  471.59    41.8  471.61   43.47  471.66   44.16  471.67   44.98  471.68
   45.86  471.68    48.1  471.75   48.13  471.75   48.16  471.75   49.86  471.75
   50.57  471.76   52.19  471.77   53.57  471.83   53.76  471.82   54.01  471.84
   56.05  471.89   56.63  471.88   57.76  471.88   58.66  471.93   59.99  472.01
    60.9  472.05   61.59  472.07    63.2  471.98   63.78  471.95   64.71  472.05
   65.42  472.18   67.02  471.87   81.43  464.67   85.43  464.67  101.78  472.85
  103.46   472.8  103.66   472.8  103.99  472.76  104.23  472.73   108.1  472.13
  108.17  472.12  109.82   471.9  109.91  471.89  110.07  471.87  112.43  471.69
  112.77  471.69  114.24  471.62  115.84  471.65  116.62  471.67  117.38  471.71
  118.37  471.74   119.5  471.81  120.89  471.85  122.56   471.9   122.7   471.9
  122.83  471.91  125.12  471.95  126.09  471.91  126.81   471.9  128.32  471.93
  129.29  471.95   129.6  471.97  131.08  472.04   133.1  472.01  133.58  471.99
  133.91     472  135.35  472.04  136.77  472.04  137.76  472.04  139.16  472.04
  139.58  472.02  140.73  472.03  142.03  472.03  142.48  472.03  143.81  471.99
  145.92  471.99  146.25     472  146.33     472  148.09  472.01  148.92     472
  150.57  471.97  152.07  471.93   152.3  471.93  152.57  471.92  154.71  471.86
  155.98  471.81  156.51   471.8  156.95  471.78  158.95  471.72  160.69  471.75
  160.76  471.75  160.83  471.75  163.17  471.92  164.16  471.98  164.89  472.02
  165.16  472.04  167.36  472.08  167.57  472.09  169.14  472.15  170.34  472.15
  171.53  472.12  172.33  472.17  172.53  472.18

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   67.02     .03  101.78    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         67.02  101.78             89.03   89.03   89.04             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   74.66     473       T
   88.66  172.53     473       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1370.583

INPUT
Description:
Station Elevation Data    num=      87
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.69   28.36  472.55   29.33  472.52   30.37  472.48   44.41  471.87
   45.08  471.89   51.64  471.48   52.77  471.53   62.65  471.25   63.17  471.19
   63.72  471.24   64.33  471.16      65  471.13   66.56  471.05   68.56  471.02
   69.77  471.06   71.18  470.92   72.49  470.84   72.89  470.85   72.94  470.85
   73.86  470.84   86.46  464.54   90.46  464.54  108.18   473.4  108.63  473.37
  110.09  473.29  111.79  473.14  112.06  473.12  112.31  473.13  114.35  473.16
  115.05  473.21  116.33  473.28  118.34  473.41  118.56  473.43  118.82  473.43
  120.43  473.49  121.99  473.53  122.72  473.56  124.33   473.6  124.71  473.62
   125.2  473.63  126.98  473.66  128.62  473.71  128.94  473.72  129.08  473.72
  131.15  473.78     132  473.78  133.15  473.79  135.13  473.84   135.4  473.84
  137.21   473.8  137.37  473.79  137.63  473.79  139.58  473.79  140.45  473.79
  141.61  473.77  143.46  473.75  143.87  473.75  144.55  473.73  145.83  473.68
  147.97  473.65  148.03  473.65  148.11  473.65  150.04  473.65  151.37  473.62
  152.24  473.59  153.22  473.57  154.25  473.53  155.11  473.53  156.44  473.52
  157.81   473.5  158.33  473.49  160.05  473.48  160.61  473.49  161.68  473.57
  162.56  473.63  163.03  473.66  164.77  473.73  165.07  473.71  166.67  473.64
  167.03  473.61  168.92  473.41  170.65  473.24  170.84  473.22  170.95  473.22
  173.13  473.12  173.44  473.11

Manning's n Values        num=       3
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     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   73.86     .03  108.18    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         73.86  108.18           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   73.08 482.688

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1270.58

INPUT
Description:
Station Elevation Data    num=      93
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.89   14.05  469.83   20.59   469.8   21.46  469.84   22.35   469.8
    23.3  469.84   24.31  469.88   25.37  469.89   26.54  469.87   33.53  469.83
   39.21  469.81   47.48  470.09   48.73  470.07   50.05  470.12   51.49  470.19
   53.05  470.25   54.69  470.16   56.53  470.22   60.63  470.58   63.03  470.57
   64.52  471.14   70.83  470.74   71.07  470.69   71.77  470.66   72.61  470.53
   73.04  470.47   76.43  470.02   87.66   464.4   91.66   464.4  107.81  472.47
  109.22  472.35  110.87  472.21   111.2  472.18  111.68   472.2  113.29  472.25
  114.63  472.32  115.36  472.36  117.05   472.5  117.57  472.55  118.09  472.59
  119.63  472.67  121.38  472.71  121.77  472.72  121.93  472.73  123.73  472.84
  124.65  472.86  125.96  472.93  127.54  472.96  127.97  472.98  130.08  473.03
  130.15  473.03  130.26  473.03  132.13  473.06  133.33  473.07   134.4  473.07
   136.2  473.09  136.41  473.09  136.93  473.09  138.59  473.08   140.3  473.02
  140.54  473.02  140.93  473.02  142.76  473.06  144.03  473.04  144.74  473.02
  145.69  472.99  146.95  472.93  147.78  472.92   148.9   472.9  150.45  472.84
  151.02  472.83  151.42  472.81  153.05  472.76  154.28  472.72  155.22  472.67
  156.91  472.58  157.18  472.58  157.45  472.57   159.3  472.57  159.64  472.59
   161.3   472.7  163.25  472.84  163.46  472.85  163.55  472.85  165.48   472.8
  166.96  472.66  167.61   472.6  168.19  472.55  169.59  472.46  171.64  472.39
   171.8  472.38   171.9  472.38  173.44   472.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   76.43     .03  107.81    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         76.43  107.81           100.01     100     100             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   72.51 480.547

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1170.577

INPUT
Description:
Station Elevation Data    num=     124
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.61     .07  468.61     .98   468.6    1.48  468.59    2.88  468.57
    5.08  468.53    5.45  468.53    5.77  468.53    7.23  468.55    9.05  468.58
    9.64   468.6   10.43   468.6   11.55  468.59   12.75  468.63   13.99  468.66
   14.59  468.66   15.72  468.65   17.51  468.65   18.03  468.65   18.42  468.65
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   19.81  468.65   21.29  468.64   22.16  468.66   23.82  468.62   23.85  468.62
   23.92  468.62   26.16  468.63   27.07  468.65   27.74  468.67   29.36  468.71
   30.07  468.75   30.31  468.76   31.77  468.83   33.35     469   33.96  469.07
   34.45   469.1   35.58  469.19   37.72  469.27    37.9  469.28   37.99  469.28
   39.45  469.45   41.61  469.53   41.63  469.53   43.12   469.7   43.77  469.72
   46.28  469.94   47.22  470.02   47.83  470.06   56.04  469.68   58.75  469.01
    59.5  468.86   68.27  466.99   76.37  465.92   77.75  465.25   79.75  464.25
   91.75  464.25    93.7  465.22    93.8  465.25   97.75  471.38   97.89  471.55
   99.68  471.82  101.86  471.78  103.13  471.76  103.86  471.73  104.63  471.72
  106.16   471.7  107.14  471.66  107.99  471.63  110.31  471.53  110.43  471.53
  110.53  471.53  112.22  471.57  114.43  471.63  114.61  471.63  114.86  471.64
  116.32  471.73  117.14  471.77   118.8  471.85  119.97   471.9  120.54  471.91
  122.57  471.91  122.93  471.92   123.3  471.92  124.69  471.96  126.07  471.98
  127.16  471.97  128.86  472.03  128.93  472.03  129.12  472.03  131.33  472.01
  132.65  472.03  133.05  472.01  133.82  472.03   135.5  472.04  136.73  471.99
  137.21  471.96  138.01  471.97  139.64  471.98  140.52     472  141.35  471.98
  142.75  471.97  143.69  471.95  144.23  471.94  145.48  471.97  147.27  471.94
  147.86  471.93  148.06  471.92   149.6  471.86  150.49  471.85   160.2  471.74
  160.53  471.75  161.92  471.77   163.7  471.77  164.37  471.77  164.71  471.76
  166.16  471.72  168.38  471.69  168.54  471.69  168.63  471.69   170.2  471.61
  172.08   471.6  172.67   471.6  173.27  471.59  173.44  471.59

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   47.22    .035   77.75     .03    93.7    .035   99.68    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.83  101.86             58.01      58      58             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   77.71     472       T
   97.21  173.44     472       T

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 1143.195

INPUT
Description:
Distance from Upstream XS =       2
Deck/Roadway Width        =      52
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=     168
      Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
        0  468.23             .16  468.23            2.54  468.17
     2.79  468.16            2.98  468.17             4.5  468.22
     6.21  468.24            6.97  468.26            7.94  468.27
     8.82  468.29             9.9  468.34           11.34  468.39
       12  468.39           12.99  468.36           14.99  468.44
   15.37  468.46           15.65  468.45           17.09  468.46
   18.45  468.52           19.47  468.57           20.94  468.63
   21.11  468.64           21.44  468.65           23.48  468.71
   24.42  468.77           25.02  468.81           26.96  468.87
   27.38  468.88           27.52  468.88           29.01  468.94
   30.78  468.97           31.27  469.01           31.66     469
   32.83  469.05           35.12  469.11           35.18  469.11
   36.61  469.22            36.7  469.22           37.92   469.2
   38.94  469.18           39.12  469.19           40.46  469.24
   41.46  469.28           42.75  469.29           43.49  469.32
   44.31  469.29            46.4   469.4           46.56  469.41
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46.63	469.41	48.09	469.45	48.58	469.46
50.31	469.54	51.3	469.54	51.94	469.56
53.42	469.63	54.27	469.66	55.36	469.73
55.8	469.75	57.99	469.83	58.03	469.83
58.04	469.83	59.68	469.87	61.35	469.9
62.05	469.91	62.82	469.94	63.68	469.98
64.55	470	65.98	470.03	67.6	470.16
67.61	470.16	67.61	470.16	70.07	470.19
71.34	470.25	71.79	470.28	72.53	470.31
74.23	470.4	74.97	470.44	75.85	470.5
77.3	470.55	78.46	470.61	79.17	470.63
80.15	470.66	81.51	470.76	82.6	470.8
83.22	470.84	84.27	470.89	85.75	470.96
86.75	471.02	87.56	471.08	88.51	471.16
90.04	471.24	91.02	471.28	92.15	471.3
92.66	471.34	94.81	471.51	95.13	471.52
95.32	471.54	96.87	471.59	97.66	471.62
99.35	471.7	100.89	471.7	101.04	471.7
101.32	471.68	103.4	471.54	104.66	471.43
105.16	471.39	107.13	471.27	107.65	471.23
108	471.23	109.4	471.25	111.55	471.39
111.82	471.41	111.9	471.41	113.48	471.46
114.64	471.52	116.02	471.58	117.58	471.66
117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.61	.07	468.61	.98	468.6	1.48	468.59	2.88	468.57
5.08	468.53	5.45	468.53	5.77	468.53	7.23	468.55	9.05	468.58
9.64	468.6	10.43	468.6	11.55	468.59	12.75	468.63	13.99	468.66
14.59	468.66	15.72	468.65	17.51	468.65	18.03	468.65	18.42	468.65
19.81	468.65	21.29	468.64	22.16	468.66	23.82	468.62	23.85	468.62
23.92	468.62	26.16	468.63	27.07	468.65	27.74	468.67	29.36	468.71
30.07	468.75	30.31	468.76	31.77	468.83	33.35	469	33.96	469.07
34.45	469.1	35.58	469.19	37.72	469.27	37.9	469.28	37.99	469.28
39.45	469.45	41.61	469.53	41.63	469.53	43.12	469.7	43.77	469.72
46.28	469.94	47.22	470.02	47.83	470.06	56.04	469.68	58.75	469.01
59.5	468.86	68.27	466.99	76.37	464.25	78.33	464.25	78.6	464.25
78.7	464.25	79.31	464.25	81.24	464.25	82.55	464.25	83	464.25
83.61	464.25	85.41	464.25	86.51	464.25	87.15	464.25	87.94	464.25
89.55	464.25	90.92	464.25	91.36	464.25	91.81	464.25	93.8	464.25
97.75	471.38	97.89	471.55	99.68	471.82	101.86	471.78	103.13	471.76
103.86	471.73	104.63	471.72	106.16	471.7	107.14	471.66	107.99	471.63
110.31	471.53	110.43	471.53	110.53	471.53	112.22	471.57	114.43	471.63
114.61	471.63	114.86	471.64	116.32	471.73	117.14	471.77	118.8	471.85
119.97	471.9	120.54	471.91	122.57	471.91	122.93	471.92	123.3	471.92

124.69	471.96	126.07	471.98	127.16	471.97	128.86	472.03	128.93	472.03
129.12	472.03	131.33	472.01	132.65	472.03	133.05	472.01	133.82	472.03
135.5	472.04	136.73	471.99	137.21	471.96	138.01	471.97	139.64	471.98
140.52	472	141.35	471.98	142.75	471.97	143.69	471.95	144.23	471.94
145.48	471.97	147.27	471.94	147.86	471.93	148.06	471.92	149.6	471.86
150.49	471.85	160.2	471.74	160.53	471.75	161.92	471.77	163.7	471.77
164.37	471.77	164.71	471.76	166.16	471.72	168.38	471.69	168.54	471.69
168.63	471.69	170.2	471.61	172.08	471.6	172.67	471.6	173.27	471.59
173.44	471.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.22	.035	99.68	.018

Bank Sta: Left	Right	Coeff	Contr.	Expan.
47.83	101.86		.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.71	472	T
97.21	173.44	472	T

Downstream Deck/Roadway Coordinates

num= 168

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		.16	468.23		2.54	468.17	
2.79	468.16		2.98	468.17		4.5	468.22	
6.21	468.24		6.97	468.26		7.94	468.27	
8.82	468.29		9.9	468.34		11.34	468.39	
12	468.39		12.99	468.36		14.99	468.44	
15.37	468.46		15.65	468.45		17.09	468.46	
18.45	468.52		19.47	468.57		20.94	468.63	
21.11	468.64		21.44	468.65		23.48	468.71	
24.42	468.77		25.02	468.81		26.96	468.87	
27.38	468.88		27.52	468.88		29.01	468.94	
30.78	468.97		31.27	469.01		31.66	469	
32.83	469.05		35.12	469.11		35.18	469.11	
36.61	469.22		36.7	469.22		37.92	469.2	
38.94	469.18		39.12	469.19		40.46	469.24	
41.46	469.28		42.75	469.29		43.49	469.32	
44.31	469.29		46.4	469.4		46.56	469.41	
46.63	469.41		48.09	469.45		48.58	469.46	
50.31	469.54		51.3	469.54		51.94	469.56	
53.42	469.63		54.27	469.66		55.36	469.73	
55.8	469.75		57.99	469.83		58.03	469.83	
58.04	469.83		59.68	469.87		61.35	469.9	
62.05	469.91		62.82	469.94		63.68	469.98	
64.55	470		65.98	470.03		67.6	470.16	
67.61	470.16		67.61	470.16		70.07	470.19	
71.34	470.25		71.79	470.28		72.53	470.31	
74.23	470.4		74.97	470.44		75.85	470.5	
77.3	470.55		78.46	470.61		79.17	470.63	
80.15	470.66		81.51	470.76		82.6	470.8	
83.22	470.84		84.27	470.89		85.75	470.96	
86.75	471.02		87.56	471.08		88.51	471.16	
90.04	471.24		91.02	471.28		92.15	471.3	
92.66	471.34		94.81	471.51		95.13	471.52	
95.32	471.54		96.87	471.59		97.66	471.62	
99.35	471.7		100.89	471.7		101.04	471.7	
101.32	471.68		103.4	471.54		104.66	471.43	
105.16	471.39		107.13	471.27		107.65	471.23	
108	471.23		109.4	471.25		111.55	471.39	
111.82	471.41		111.9	471.41		113.48	471.46	
114.64	471.52		116.02	471.58		117.58	471.66	

117.7	471.66	120.03	471.75	120.14	471.75
120.23	471.75	121.83	471.74	122.84	471.76
124.34	471.76	125.63	471.79	126.07	471.8
127.19	471.78	128.53	471.75	130.05	471.8
130.19	471.8	130.47	471.8	132.67	471.82
133.55	471.82	134.34	471.8	135.72	471.83
136.82	471.84	137.4	471.82	138.48	471.77
140.33	471.75	140.86	471.74	142.27	471.78
142.58	471.78	143.65	471.73	145.02	471.66
145.42	471.64	146.7	471.59	147.27	471.56
149.04	471.44	155.4	471.42	157.58	471.42
157.96	471.46	159	471.53	161.45	471.56
161.51	471.56	161.54	471.56	163.22	471.5
164.48	471.42	165.65	471.35	166.31	471.32
167.26	471.29	169.68	471.3	169.75	471.3
169.82	471.3	171.47	471.33	173.84	471.43
173.92	471.43	173.96	471.43	175	471.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.26	.04	468.26	1.57	468.27	2.65	468.29	3.18	468.31
4.93	468.38	5.76	468.42	6.03	468.42	7.5	468.42	9.86	468.47
10.08	468.48	10.29	468.47	11.67	468.4	12.62	468.38	14.08	468.37
15.08	468.38	15.73	468.39	17.81	468.32	18.23	468.31	18.34	468.31
19.79	468.3	21.97	468.28	22.19	468.28	23.39	468.35	23.65	468.36
23.75	468.37	26.12	468.63	26.83	468.69	27.64	468.78	28.71	468.81
29.98	468.87	30.59	468.9	31.47	468.95	32.71	469.02	33.89	469.09
34.79	469.18	35.33	469.2	36.86	469.26	37.62	469.3	38.33	469.34
39.09	469.38	41.09	469.48	41.43	469.5	41.61	469.51	42.92	469.65
43.73	469.7	45.24	469.77	46.4	469.83	46.72	469.85	47.83	469.89
64.38	470.1	66.2	470.17	72.08	468.16	72.58	464.08	80.71	464.08
81.31	464.08	82.82	464.08	82.89	464.08	82.99	464.08	85.45	464.08
85.89	464.08	87.14	464.08	87.31	464.08	89.7	464.08	90.97	464.08
91.27	464.08	91.81	464.08	93.79	468.6	95.94	470.39	97.97	471.5
101.43	471.23	101.48	471.22	102.02	471.16	102.28	471.14	103.7	471.16
105.16	471.12	106.3	471.06	107.04	471.04	107.95	471.01	109.31	470.98
110.47	470.97	111.75	471.03	112.03	471.05	112.25	471.06	114.63	471.17
114.78	471.17	116.25	471.21	117.66	471.3	118.75	471.32	119.72	471.36
120.37	471.38	122.7	471.4	122.96	471.41	123.46	471.41	124.59	471.41
125.4	471.42	127.12	471.43	127.84	471.41	128.7	471.4	130.71	471.43
131.27	471.45	132.83	471.49	132.85	471.49	132.9	471.49	135.41	471.49
135.8	471.48	136.99	471.41	137.64	471.41	139.46	471.43	140.14	471.43
141.09	471.4	142.83	471.36	143.6	471.35	145.06	471.34	145.22	471.34
145.49	471.33	147.62	471.24	149.22	471.21	149.28	471.21	149.4	471.21
151.77	471.15	152.79	471.13	153.43	471.11	154.91	471.02	155.87	470.96
156.61	470.96	157.48	470.96	158.23	471.02	160.05	471.16	160.92	471.2
161.7	471.24	163.22	471.2	164.19	471.17	164.83	471.15	165.74	471.1
166.87	471.05	168.31	471	169.56	471.02	169.93	471.02	170.51	471.05
172.45	471.13	173.41	471.16	173.44	471.16				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	66.2	.035	97.97	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
66.2	97.97	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	73.82	471.2	T
91.82	173.44	472	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

```
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =  469.71
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018        0                   .2
1
Upstream   Elevation =  464.25
           Centerline Station =  81.085
Downstream Elevation =  464.08
           Centerline Station =  78.345

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse       5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 2 - Grooved end with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 2      52     .018     .018        0                   .2
1
Upstream   Elevation =  464.25
           Centerline Station =  89.085
Downstream Elevation =  464.08
           Centerline Station =  86.345

CROSS SECTION


RIVER: North_Channel
REACH: Reach             RS: 1112.573

INPUT
Description:
Station Elevation Data    num=     152
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  468.26     .04  468.26    1.57  468.27    2.65  468.29    3.18  468.31
    4.93  468.38    5.76  468.42    6.03  468.42     7.5  468.42    9.86  468.47
   10.08  468.48   10.29  468.47   11.67   468.4   12.62  468.38   14.08  468.37
   15.08  468.38   15.73  468.39   17.81  468.32   18.23  468.31   18.34  468.31
   19.79   468.3   21.97  468.28   22.19  468.28   23.39  468.35   23.65  468.36
   23.75  468.37   26.12  468.63   26.83  468.69   27.64  468.78   28.71  468.81
   29.98  468.87   30.59   468.9   31.47  468.95   32.71  469.02   33.89  469.09
   34.79  469.18   35.33   469.2   36.86  469.26   37.62   469.3   38.33  469.34
   39.09  469.38   41.09  469.48   41.43   469.5   41.61  469.51   42.92  469.65
   43.73   469.7   45.24  469.77    46.4  469.83   46.72  469.85   47.83  469.89
      49  469.93   49.36  469.94   50.54     470   52.26   470.1   52.93  470.14
   53.38  470.18    54.4  470.24   55.65  470.32    56.7   470.4   58.08  470.44
   58.28  470.45    58.4  470.45   62.75  470.76   64.38  470.97    66.2  471.19
   72.08  468.16    77.5  466.04   80.71  464.38   80.88  464.39    81.5  464.08
    87.5  464.08   89.04  464.85    89.7  465.01   90.97  465.74   91.27  465.86
   91.81  466.57   93.79   468.6   95.94  470.39   97.97  471.99  101.43  471.23
```

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  101.48  471.22  102.02  471.16  102.28  471.14   103.7  471.16  105.16  471.12
   106.3  471.06  107.04  471.04  107.95  471.01  109.31  470.98  110.47  470.97
  111.75  471.03  112.03  471.05  112.25  471.06  114.63  471.17  114.78  471.17
  116.25  471.21  117.66   471.3  118.75  471.32  119.72  471.36  120.37  471.38
   122.7   471.4  122.96  471.41  123.46  471.41  124.59  471.41   125.4  471.42
  127.12  471.43  127.84  471.41   128.7   471.4  130.71  471.43  131.27  471.45
  132.83  471.49  132.85  471.49   132.9  471.49  135.41  471.49   135.8  471.48
  136.99  471.41  137.64  471.41  139.46  471.43  140.14  471.43  141.09   471.4
  142.83  471.36   143.6  471.35  145.06  471.34  145.22  471.34  145.49  471.33
  147.62  471.24  149.22  471.21  149.28  471.21   149.4  471.21  151.77  471.15
  152.79  471.13  153.43  471.11  154.91  471.02  155.87  470.96  156.61  470.96
  157.48  470.96  158.23  471.02  160.05  471.16  160.92   471.2   161.7  471.24
  163.22   471.2  164.19  471.17  164.83  471.15  165.74   471.1  166.87  471.05
  168.31     471  169.56  471.02  169.93  471.02  170.51  471.05  172.45  471.13
  173.41  471.16  173.44  471.16

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018    66.2    .035   80.88     .03   89.04    .035   97.97    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          66.2   97.97           100.02     100     100             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   73.82   471.2       T
   91.82  173.44     472       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 1012.57

INPUT
Description:
Station Elevation Data    num=      87
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   470.3     4.1  470.27   13.31  470.33   28.44  470.53   58.63   471.1
   58.84  471.11   60.31  471.67   61.88  471.63   63.52  471.34   65.02   471.4
   67.18   471.5   70.31  471.12   70.75  471.06   85.22  463.82   89.22  463.82
  102.15  470.28  102.73  470.25  103.27  470.23  104.59  470.13  104.64  470.13
  104.85  470.11  107.44  469.84  108.19  469.83  108.83  469.82  111.22  470.02
  111.56  470.05  111.66  470.05  112.94  470.12  113.91  470.17  115.72  470.24
  116.72  470.28  117.13  470.29  119.49  470.33  119.86  470.34  120.33  470.35
  121.22  470.36  122.32  470.39     124  470.43  125.32  470.43  125.36  470.43
  125.43  470.43  128.11  470.44  128.89  470.42  129.45  470.42  131.32  470.44
  132.12  470.45  132.34  470.44  133.52  470.38  134.51  470.38  136.25  470.39
   137.2  470.38  137.62  470.39  138.58   470.4  140.24  470.42  141.29  470.37
  141.64  470.36   143.2  470.35  144.38  470.34  144.48  470.34  145.79  470.33
  146.48  470.33  148.46  470.26  149.51  470.24  149.82  470.22  152.54  470.17
  152.63  470.17  152.69  470.16  154.04  470.08  156.03  470.11  156.73  470.12
  157.06  470.14  158.05  470.21  160.69  470.33  160.83  470.34  160.88  470.34
   162.2  470.27  164.89   470.1  164.94   470.1  164.98   470.1  166.33  470.04
  167.89  470.09  168.95  470.13  169.77  470.18  170.36  470.21  170.97  470.24
  173.15  470.31  173.44  470.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   70.75     .03  102.15    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         65.02  102.15           127.93   134.9  144.08             .1       .3
Ineffective Flow     num=       1
```

Sta L	Sta R	Elev	Permanent
99.13	173.44	470.54	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	70.55	481.086

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 877.6657

INPUT
Description:
Station Elevation Data num= 236

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	472.07	.19	472.07	2.36	472.07	2.76	472.07	3.65	472.1
4.71	472.13	6.58	472.12	6.77	472.12	6.89	472.12	7.26	472.13
8.31	472.16	8.68	472.17	9.95	472.15	11.18	472.13	11.56	472.14
12.74	472.17	12.84	472.17	13.45	472.18	15.89	472.21	16.28	472.2
17.19	472.18	17.91	472.18	19.99	472.17	20.24	472.17	20.33	472.17
21.39	472.12	21.57	472.13	23.86	472.1	24.6	472.08	25.43	472.08
25.75	472.08	27.55	472.05	28.84	472.02	29.67	472	30.06	472
30.51	471.99	31.46	471.95	32.54	471.91	33.06	471.92	33.48	471.9
34.21	471.89	35.87	471.84	37.23	471.8	37.88	471.79	38.35	471.78
38.89	471.76	40.37	471.77	41.02	471.78	41.26	471.77	41.43	471.76
42.41	471.71	43.97	471.68	45.42	471.66	46.24	471.63	46.54	471.62
49.44	471.55	49.51	471.55	50.64	471.56	51.87	471.57	53.6	471.57
54.52	471.55	54.76	471.55	57.04	471.53	57.86	471.51	58.77	471.5
58.97	471.5	60.61	471.47	61.89	471.46	62.32	471.45	63.09	471.43
63.93	471.42	66.25	471.32	66.39	471.32	67.44	471.4	70.36	471.73
70.53	471.75	70.62	471.75	71.67	471.84	74.66	471.96	74.91	471.97
75.04	471.98	76.15	472.1	78.69	472.02	79.41	472.03	79.79	472.03
80.58	472.08	81.29	472.07	82.88	472.01	83.03	472.01	95.88	465.59
96.32	465.07	96.86	464.55	97.35	463.85	100.09	463.48	104.09	463.48
107.79	463.81	108.93	464.69	110.09	465.66	110.39	465.95	112.51	467.46
114.1	468.49	115.88	469.37	119.54	469.09	119.76	469.09	119.96	469.05
120.03	469.03	121.08	468.76	121.25	468.77	123.57	468.84	124.46	468.78
125.36	468.74	125.62	468.72	127.91	468.47	128.91	468.38	129.02	468.37
130.06	468.53	131.27	468.57	132.57	468.56	133.41	468.62	134.17	468.68
134.56	468.69	136.17	468.76	137.87	468.84	138.89	468.85	139	468.86
139.18	468.86	139.52	468.89	141.37	469.01	142.32	469.03	142.87	469.02
143.42	469.04	144.85	469.09	146.75	469.17	147.49	469.13	147.83	469.13
148.68	469.12	151.09	469.14	152.21	469.19	155.52	469.18	155.61	469.18
156.62	469.18	157.83	469.16	159.83	469.12	160.11	469.14	160.94	469.15
162.42	469.08	164.26	469.07	165.17	469.02	165.41	469.02	165.94	469.01
168.66	469	168.87	468.99	169.72	468.99	170.85	469	172.75	469.02
173.1	469.03	173.53	469	174.13	468.97	175.58	468.97	177.18	468.99
177.62	468.98	178.15	468.98	180.01	468.99	181.25	469	182.02	468.98
182.26	468.97	182.99	468.97	185.34	468.92	185.66	468.91	186.34	468.88
189.28	468.79	189.36	468.79	189.38	468.79	190.39	468.81	191.4	468.79
193.5	468.72	194.4	468.69	194.52	468.69	195.03	468.69	197.64	468.64
198.37	468.58	198.76	468.54	199.71	468.52	202.06	468.49	202.98	468.45
203.13	468.45	203.5	468.44	206.37	468.33	207.37	468.35	207.5	468.35
208.21	468.38	211	468.5	211.41	468.51	212.17	468.53	214.54	468.61
215.49	468.65	215.74	468.66	216.59	468.69	219.59	468.79	220.03	468.79
221.09	468.82	221.18	468.82	221.5	468.83	224.57	468.94	225.64	469
225.67	469	225.9	469.02	229.13	469.21	229.54	469.24	230.27	469.27
232.52	469.41	233.65	469.47	234.25	469.49	234.75	469.51	235.67	469.57
238.08	469.76	239.21	469.79	239.22	469.79	239.34	469.8	242.48	470.05
242.92	470.08	243.56	470.11	246.31	470.35	246.62	470.37	246.76	470.38
247.72	470.42	249.02	470.5	250.87	470.65	251.5	470.69	251.89	470.7
254.08	470.82	254.71	470.85	254.9	470.87	255.72	470.87	256.51	470.91

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  258.65  471.04

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   82.88    .035   97.35     .03  107.79    .035  115.88    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         83.03  115.88           174.52  141.81  121.21             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  110.53  258.65   469.4       F

CULVERT


RIVER: North_Channel
REACH: Reach              RS: 800

INPUT
Description:
Distance from Upstream XS =       5
Deck/Roadway Width        =     131
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  468.23           82.88  472.01          115.52   469.4

Upstream Bridge Cross Section Data
Station Elevation Data    num=     238
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.07     .19  472.07    2.36  472.07    2.76  472.07    3.65   472.1
    4.71  472.13    6.58  472.12    6.77  472.12    6.89  472.12    7.26  472.13
    8.31  472.16    8.68  472.17    9.95  472.15   11.18  472.13   11.56  472.14
   12.74  472.17   12.84  472.17   13.45  472.18   15.89  472.21   16.28   472.2
   17.19  472.18   17.91  472.18   19.99  472.17   20.24  472.17   20.33  472.17
   21.39  472.12   21.57  472.13   23.86   472.1    24.6  472.08   25.43  472.08
   25.75  472.08   27.55  472.05   28.84  472.02   29.67     472   30.06     472
   30.51  471.99   31.46  471.95   32.54  471.91   33.06  471.92   33.48   471.9
   34.21  471.89   35.87  471.84   37.23   471.8   37.88  471.79   38.35  471.78
   38.89  471.76   40.37  471.77   41.02  471.78   41.26  471.77   41.43  471.76
   42.41  471.71   43.97  471.68   45.42  471.66   46.24  471.63   46.54  471.62
   49.44  471.55   49.51  471.55   50.64  471.56   51.87  471.57    53.6  471.57
   54.52  471.55   54.76  471.55   57.04  471.53   57.86  471.51   58.77   471.5
   58.97   471.5   60.61  471.47   61.89  471.46   62.32  471.45   63.09  471.43
   63.93  471.42   66.25  471.32   66.39  471.32   67.44   471.4   70.36  471.73
   70.53  471.75   70.62  471.75   71.67  471.84   74.66  471.96   74.91  471.97
   75.04  471.98   76.15   472.1   78.69  472.02   79.41  472.03   79.79  472.03
   80.58  472.08   81.29  472.07   82.88  472.01   83.64  472.01   83.99  471.96
   84.43   471.9   85.19  471.82   85.82  471.75   87.73  471.54   88.29  471.49
   88.48  471.46   88.65  471.44   88.85  471.42   89.64   471.3   90.04  471.16
   91.52  470.66   94.05  463.48  110.05  463.48  115.52   469.4  119.54  469.09
  119.76  469.09  119.96  469.05  120.03  469.03  121.08  468.76  121.25  468.77
  123.57  468.84  124.46  468.78  125.36  468.74  125.62  468.72  127.91  468.47
  128.91  468.38  129.02  468.37  130.06  468.53  131.27  468.57  132.57  468.56
  133.41  468.62  134.17  468.68  134.56  468.69  136.17  468.76  137.87  468.84
  138.89  468.85     139  468.86  139.18  468.86  139.52  468.89  141.37  469.01
  142.32  469.03  142.87  469.02  143.42  469.04  144.85  469.09  146.75  469.17
  147.49  469.13  147.83  469.13  148.68  469.12  151.09  469.14  152.21  469.19
  155.52  469.18  155.61  469.18  156.62  469.18  157.83  469.16  159.83  469.12
  160.11  469.14  160.94  469.15  162.42  469.08  164.26  469.07  165.17  469.02
  165.41  469.02  165.94  469.01  168.66     469  168.87  468.99  169.72  468.99
  170.85     469  172.75  469.02   173.1  469.03  173.53     469  174.13  468.97
```

175.58	468.97	177.18	468.99	177.62	468.98	178.15	468.98	180.01	468.99
181.25	469	182.02	468.98	182.26	468.97	182.99	468.97	185.34	468.92
185.66	468.91	186.34	468.88	189.28	468.79	189.36	468.79	189.38	468.79
190.39	468.81	191.4	468.79	193.5	468.72	194.4	468.69	194.52	468.69
195.03	468.69	197.64	468.64	198.37	468.58	198.76	468.54	199.71	468.52
202.06	468.49	202.98	468.45	203.13	468.45	203.5	468.44	206.37	468.33
207.37	468.35	207.5	468.35	208.21	468.38	211	468.5	211.41	468.51
212.17	468.53	214.54	468.61	215.49	468.65	215.74	468.66	216.59	468.69
219.59	468.79	220.03	468.79	221.09	468.82	221.18	468.82	221.5	468.83
224.57	468.94	225.64	469	225.67	469	225.9	469.02	229.13	469.21
229.54	469.24	230.27	469.27	232.52	469.41	233.65	469.47	234.25	469.49
234.75	469.51	235.67	469.57	238.08	469.76	239.21	469.79	239.22	469.79
239.34	469.8	242.48	470.05	242.92	470.08	243.56	470.11	246.31	470.35
246.62	470.37	246.76	470.38	247.72	470.42	249.02	470.5	250.87	470.65
251.5	470.69	251.89	470.7	254.08	470.82	254.71	470.85	254.9	470.87
255.72	470.87	256.51	470.91	258.65	471.04				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	82.88	.035	115.52	.018

Bank Sta: Left	Right	Coeff Contr.	Expan.
83.64	115.52	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
110.53	258.65	469.4	F

Downstream Deck/Roadway Coordinates

num= 3

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	468.23		126.34	469.36		163.13	468.58	

Downstream Bridge Cross Section Data

Station Elevation Data num= 269

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.43	5.63	470.47	15.79	470.69	17.68	470.65	18.64	470.61
22.33	470.48	22.88	470.49	24.69	470.52	26.63	470.74	27.89	470.67
28.73	470.66	28.93	470.63	29.23	470.63	32.55	470.67	33.18	470.55
35.91	469.99	37.27	469.73	38.07	469.66	38.32	469.66	41.54	469.61
41.84	469.6	41.92	469.61	42.85	469.65	46.12	469.57	46.5	469.57
46.61	469.57	47.54	469.55	51.1	469.42	51.13	469.42	52.17	469.45
54.66	469.37	55.82	469.33	56.13	469.31	56.83	469.28	59.71	469.21
60.48	469.2	60.62	469.2	61.43	469.21	62.06	469.2	62.98	469.2
63.7	469.19	65.02	469.18	66.34	469.21	67.02	469.25	68.93	469.16
69.01	469.16	69.27	469.16	70.61	469.22	71.74	469.27	72.39	469.28
72.59	469.29	74.44	469.29	75.26	469.3	76.44	469.31	77.85	469.32
78.41	469.33	80.21	469.32	80.33	469.32	80.74	469.32	82	469.34
82.38	469.34	83.99	469.31	84.49	469.31	86.01	469.31	87.11	469.31
87.99	469.29	89.66	469.32	89.92	469.32	90.76	469.28	91.76	469.25
93.08	469.27	93.62	469.27	93.77	469.26	95.55	469.2	96.23	469.2
97.42	469.19	98.6	469.19	99.27	469.18	100.95	469.16	101.63	469.17
102.99	469.19	103.79	469.19	104.97	469.19	105.31	469.2	106.85	469.19
107.73	469.19	108.7	469.21	110.09	469.23	111.94	469.28	112.31	469.3
114.03	469.29	114.51	469.32	114.69	469.32	116.78	469.41	117.81	469.25
119.04	469.3	120.16	469.25	121.39	469.2	121.55	469.21	122.02	469.23
122.88	469.28	123.35	469.3	124.51	469.34	124.8	469.34	126.34	469.36
127.11	469.36	128.37	469.23	129.32	469.15	131.38	468.43	132.79	462.98
152.43	462.98	156.85	467.06	163.13	468.58	164.06	468.36	165.11	468.01
165.76	467.96	167.1	467.85	167.19	467.85	167.49	467.84	169.02	467.79
169.98	467.44	170.8	467.19	171.06	467.22	173.02	467.49	174.01	467.55
175.25	467.6	176.02	467.64	177.57	467.74	177.88	467.76	179.17	467.83
179.69	467.85	180.66	467.89	181.31	467.92	181.63	467.91	183.21	467.94
183.7	467.97	185.24	468.04	186.36	468.08	187.31	468.12	189.07	468.18

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  189.39   468.2  190.42  468.23  191.24  468.25  192.41  468.25  192.77  468.26
  193.02  468.28   194.7  468.41  195.19  468.42  196.73  468.46  197.84  468.48
   198.8  468.51  200.56  468.55  200.92  468.55  202.16  468.61  202.96  468.65
  204.53   468.7  204.81  468.71  204.94  468.71  206.84  468.74  207.45  468.75
  208.93  468.79  210.22  468.82  211.07  468.81  213.05  468.88  213.22  468.89
  213.77  468.89   214.8  468.85  215.89  468.87  216.14  468.86   216.4  468.87
  218.06   468.9  218.54  468.89  220.12  468.91  221.24  468.91  222.21   468.9
  223.96  468.92  224.34  468.92   225.6  468.95  226.23  468.96   226.9  468.97
  227.06  468.97  227.28  468.97  227.55  468.97  227.74  468.97  229.89     469
  230.56  469.01  230.62  469.01   230.7  469.01  231.56  469.02  232.86  468.98
   234.7  468.93  235.54  468.91  235.65   468.9  236.05   468.9  238.78  468.89
   239.6  468.88  239.77  468.86  240.06  468.87   242.8  468.86  243.45  468.83
  243.78  468.83  246.86  468.85  246.94  468.85  246.97  468.85  247.93  468.82
  250.05   468.7  251.09  468.67  251.54  468.66  252.15  468.67   254.8  468.64
  255.52  468.62  255.65  468.63  256.54   468.6  258.95  468.52  259.81  468.49
  260.13  468.47  260.91  468.42  264.32  468.35  264.43  468.35  264.76  468.35
  265.57  468.34  265.73  468.35  268.95  468.37  269.01  468.37     270  468.43
  270.63  468.45  273.49   468.6  273.66   468.6  274.61  468.65  277.36  468.71
  278.03  468.73  278.21  468.74  279.07  468.86  280.64  469.06  282.57  469.23
  283.66  469.18  283.69  469.18  283.75  469.18   284.3  469.22  286.83  469.45
  287.09  469.46  287.21  469.47  288.15  469.65   290.3   469.8  291.53  469.89
  292.07  469.91  292.65  469.97  294.86  470.04  295.95   470.1  296.22  470.13
  296.95  470.17  299.97  470.28  300.07  470.28  300.09  470.28  301.15  470.37
  301.48  470.37  304.33  470.57  304.97  470.56  305.31  470.59  306.82  470.68
  308.18  470.85  308.55   470.8  309.12  470.84  310.73  470.97  312.26  471.08
  313.15  471.05  313.29  471.06   314.1  471.09  314.27  471.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34     .03  156.85    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
        131.38  163.13            .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =  115.52
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1       Ellipse     5.5     7.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                  5     131     .018     .018        0                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  98.3
Downstream Elevation =  462.98
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           Centerline Station =  137.04

Culvert Name     Shape      Rise    Span
Culvert #2       Ellipse     5.5     6.5
FHWA Chart # 29- Horizontal Ellipse; Concrete
FHWA Scale # 1 - Square edge with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                 5     131     .018     .018        0                   .2
1
Upstream   Elevation =  463.48
           Centerline Station =  106.3
Downstream Elevation =  462.98
           Centerline Station =  148.68

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 735.8522

INPUT
Description:
Station Elevation Data    num=     272
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.43    5.63  470.47   15.79  470.69   17.68  470.65   18.64  470.61
   22.33  470.48   22.88  470.49   24.69  470.52   26.63  470.74   27.89  470.67
   28.73  470.66   28.93  470.63   29.23  470.63   32.55  470.67   33.18  470.55
   35.91  469.99   37.27  469.73   38.07  469.66   38.32  469.66   41.54  469.61
   41.84   469.6   41.92  469.61   42.85  469.65   46.12  469.57    46.5  469.57
   46.61  469.57   47.54  469.55    51.1  469.42   51.13  469.42   52.17  469.45
   54.66  469.37   55.82  469.33   56.13  469.31   56.83  469.28   59.71  469.21
   60.48   469.2   60.62   469.2   61.43  469.21   62.06   469.2   62.98   469.2
    63.7  469.19   65.02  469.18   66.34  469.21   67.02  469.25   68.93  469.16
   69.01  469.16   69.27  469.16   70.61  469.22   71.74  469.27   72.39  469.28
   72.59  469.29   74.44  469.29   75.26   469.3   76.44  469.31   77.85  469.32
   78.41  469.33   80.21  469.32   80.33  469.32   80.74  469.32      82  469.34
   82.38  469.34   83.99  469.31   84.49  469.31   86.01  469.31   87.11  469.31
   87.99  469.29   89.66  469.32   89.92  469.32   90.76  469.28   91.76  469.25
   93.08  469.27   93.62  469.27   93.77  469.26   95.55   469.2   96.23   469.2
   97.42  469.19    98.6  469.19   99.27  469.18  100.95  469.16  101.63  469.17
  102.99  469.19  103.79  469.19  104.97  469.19  105.31   469.2  106.85  469.19
  107.73  469.19   108.7  469.21  110.09  469.23  111.94  469.28  112.31   469.3
  114.03  469.29  114.51  469.32  114.69  469.32  116.78  469.41  117.81  469.25
  119.04   469.3  120.16  469.25  121.39   469.2  121.55  469.21  122.02  469.23
  122.88  469.28  123.35   469.3  124.51  469.34   124.8  469.34  126.34  469.36
  127.11  469.36  128.37  469.23  129.32  469.15  131.38  468.43  132.79  467.91
  133.06  467.82  142.74  462.98  146.74  462.98  152.52  465.87  156.85  467.06
  163.13  468.58  164.06  468.36  165.11  468.01  165.76  467.96   167.1  467.85
  167.19  467.85  167.49  467.84  169.02  467.79  169.98  467.44   170.8  467.19
  171.06  467.22  173.02  467.49  174.01  467.55  175.25   467.6  176.02  467.64
  177.57  467.74  177.88  467.76  179.17  467.83  179.69  467.85  180.66  467.89
  181.31  467.92  181.63  467.91  183.21  467.94   183.7  467.97  185.24  468.04
  186.36  468.08  187.31  468.12  189.07  468.18  189.39   468.2  190.42  468.23
  191.24  468.25  192.41  468.25  192.77  468.26  193.02  468.28   194.7  468.41
  195.19  468.42  196.73  468.46  197.84  468.48   198.8  468.51  200.56  468.55
  200.92  468.55  202.16  468.61  202.96  468.65  204.53   468.7  204.81  468.71
  204.94  468.71  206.84  468.74  207.45  468.75  208.93  468.79  210.22  468.82
  211.07  468.81  213.05  468.88  213.22  468.89  213.77  468.89   214.8  468.85
  215.89  468.87  216.14  468.86   216.4  468.87  218.06   468.9  218.54  468.89
  220.12  468.91  221.24  468.91  222.21   468.9  223.96  468.92  224.34  468.92
   225.6  468.95  226.23  468.96   226.9  468.97  227.06  468.97  227.28  468.97
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  227.55  468.97  227.74  468.97  229.89     469  230.56  469.01  230.62  469.01
   230.7  469.01  231.56  469.02  232.86  468.98   234.7  468.93  235.54  468.91
  235.65   468.9  236.05   468.9  238.78  468.89   239.6  468.88  239.77  468.86
  240.06  468.87   242.8  468.86  243.45  468.83  243.78  468.83  246.86  468.85
  246.94  468.85  246.97  468.85  247.93  468.82  250.05   468.7  251.09  468.67
  251.54  468.66  252.15  468.67   254.8  468.64  255.52  468.62  255.65  468.63
  256.54   468.6  258.95  468.52  259.81  468.49  260.13  468.47  260.91  468.42
  264.32  468.35  264.43  468.35  264.76  468.35  265.57  468.34  265.73  468.35
  268.95  468.37  269.01  468.37     270  468.43  270.63  468.45  273.49   468.6
  273.66   468.6  274.61  468.65  277.36  468.71  278.03  468.73  278.21  468.74
  279.07  468.86  280.64  469.06  282.57  469.23  283.66  469.18  283.69  469.18
  283.75  469.18   284.3  469.22  286.83  469.45  287.09  469.46  287.21  469.47
  288.15  469.65   290.3   469.8  291.53  469.89  292.07  469.91  292.65  469.97
  294.86  470.04  295.95   470.1  296.22  470.13  296.95  470.17  299.97  470.28
  300.07  470.28  300.09  470.28  301.15  470.37  301.48  470.37  304.33  470.57
  304.97  470.56  305.31  470.59  306.82  470.68  308.18  470.85  308.55   470.8
  309.12  470.84  310.73  470.97  312.26  471.08  313.15  471.05  313.29  471.06
   314.1  471.09  314.27  471.11

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  126.34    .035  133.06     .03  156.85    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        133.06  152.52             67.5   96.35  120.06             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  134.43     469       T
  153.43  282.57     469       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.84 480.636

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 639.5066

INPUT
Description:
Station Elevation Data    num=     137
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.34    1.51  470.37     3.1  470.33    5.36  470.25    8.48  470.13
   10.32  470.17   11.85   470.2   13.49  470.39   15.15  470.29   16.94  470.42
   18.82  470.48   20.76  470.47   22.86  470.62   24.98  470.52   25.36  470.51
    27.2  470.51   27.23  470.51   28.25  470.54   28.32  470.54   32.57  470.16
   35.55  469.76   37.67  469.48   37.87  469.47   46.39  469.41   46.86  469.41
   48.13   469.4   50.44  469.39   51.16  469.34   51.49  469.32    52.4  469.31
    55.1  469.29   55.86  469.27   56.15  469.27   57.22  469.25   59.76   469.2
   60.35  469.21   60.78  469.19    62.4  469.15   64.39  469.07   64.88  469.04
   65.47  469.03   67.36  468.98   69.02  468.95   69.46  468.95      70  468.96
    70.9  468.91   73.45  468.78   75.71   468.7   79.84  469.03   83.01  469.04
   85.24  468.72    87.8  468.61   91.06  468.33   91.07  468.33   91.08  468.33
   91.12  468.33   92.35  468.15   93.85  467.95  104.43  462.66  108.43  462.66
   122.6  469.75  122.98  469.77   126.1   469.6  126.37  469.58  126.52  469.58
  127.35  469.57  128.89   469.6  130.76  469.64  131.55  469.64  131.78  469.64
  135.11  469.73  135.22  469.73  135.36  469.73  136.28  469.76  137.42  469.77
  139.66  469.77  140.38  469.78  140.64  469.79  143.52  469.85  144.15  469.87
  144.35  469.88  145.23  469.93  146.28  469.93  148.69  469.99  149.24     470
  149.74  469.97  152.42  470.03  153.31  470.06  154.26  470.03  154.36  470.03
  154.46  470.03   157.9  470.14  158.13  470.15  158.99   470.2  160.79  470.12
  162.57  470.14   162.9  470.18   163.6  470.18  165.58  470.41  167.13  470.71
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169.49	470.65	171.6	470.85	172.39	471.05	174.19	471.25	176.59	471.17
180.43	470.55	180.58	470.5	181.18	470.54	181.64	470.57	182.08	470.58
185.1	470.61	185.81	470.64	186.17	470.65	188.19	470.78	189.82	470.85
190.6	470.73	193.31	470.77	194.18	470.78	194.36	470.82	195.26	470.86
198.2	470.93	200.62	471.15	201.62	471.2	203.3	471.46	203.94	471.41
205.11	472	207.54	473.83	208.86	474.83	209.23	474.93	213.58	475.15
217.78	475.03	218.1	475.04	218.63	475.01	221.58	474.89	226.05	474.98
235.18	475.18	235.68	475.19						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	83.01	.035	93.85	.03	122.6	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
83.01	122.6	100	100.01	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	83.01	469.04	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	29.23	480.456

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 539.4938

INPUT
Description:
Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	467.43	.16	467.42	.85	467.41	1.44	467.37	4.2	469.23
4.85	469.7	6.07	469.77	6.1	469.77	6.19	469.77	9.41	469.77
9.63	469.76	10.73	469.74	12.09	469.73	14.01	469.73	14.94	469.71
15.33	469.7	17.94	469.66	18.67	469.65	19.67	469.63	19.92	469.63
20.86	469.61	22.87	469.58	23.72	469.55	24.61	469.49	25.35	469.36
26.23	469.28	29.18	468.98	30.59	468.98	31.78	469.06	34.04	469.24
36.93	468.98	37.42	468.95	37.58	468.94	38.76	468.92	41.01	468.88
41.95	468.86	42.37	468.85	43.29	468.84	45.57	468.78	46.64	468.74
47.01	468.74	47.95	468.74	50.13	468.66	51.27	468.64	51.74	468.64
52.58	468.65	54.03	468.64	55.93	468.57	56.68	468.57	57.21	468.55
58.58	468.52	60.59	468.46	61.48	468.4	61.84	468.38	62.73	468.38
65.18	468.36	66.47	468.39	66.57	468.39	66.81	468.39	69.84	468.38
71.06	468.31	71.07	468.31	71.09	468.31	74.28	468.3	75.61	468.31
75.63	468.31	75.67	468.31	78.88	468.27	79.75	468.28	80.12	468.29
81.05	468.3	83.24	468.28	83.99	468.28	84.49	468.24	85.88	468.24
87.64	468.23	88.19	468.18	88.89	468.16	91.32	468.53	91.86	468.62
104.44	462.33	108.44	462.33	123.46	469.84	124.07	469.81	126.21	469.82
127.22	469.83	127.4	469.84	128.43	469.81	129.24	469.82	131.59	469.85
132.38	469.85	132.87	469.86	135.5	469.86	136.08	469.86	136.2	469.86
137.37	469.87	138.45	469.88	140.51	469.87	141.22	469.91	141.72	469.94
143.53	469.98	145.01	470	145.63	470	146.32	470.02	147.4	470.03
149.54	470.08	150.58	470.08	150.82	470.08	152.14	470.1	154.16	470.12
154.46	470.13	155.45	470.13	157.8	470.22	158.73	470.27	159.81	470.26
160.04	470.26	160.25	470.27	163.39	470.36	163.99	470.35	164.67	470.36
167.15	470.4	167.95	470.42	168.15	470.43	169.16	470.46	172.02	470.41
172.42	470.41	172.46	470.41	173.73	470.54	175.53	470.53	177.01	470.53
177.7	470.55	178.26	470.56	178.47	470.56	181.4	470.62	181.6	470.63
182.72	470.66	184.68	470.65	185.9	470.65	186.76	470.7	187.22	470.71
188.12	470.72	190.42	470.71	191.65	470.71	191.68	470.71	191.74	470.71
195	470.76	196.04	470.79	196.31	470.8	196.91	470.8	199.53	470.78
200.59	470.83	200.8	470.84	201.3	470.84	204.1	470.85	205.06	470.82

```
  205.38  470.81  206.24  470.82  208.68  470.88  209.53  470.95  209.96  470.97
  211.11  470.99  213.28  471.02  214.05  471.04  214.56  471.05  216.85  471.03
  217.81  471.03  218.17  471.03  219.12  471.08  221.91  471.19  222.34   471.2
  222.67  471.19  223.68  471.17  225.05  471.19  226.99  471.22  227.88  471.22
  228.21  471.22  228.65  471.23  231.47  471.26   232.5  471.27  232.78  471.28
  233.82  471.29  235.68  471.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   91.86     .03  123.46    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         91.86  123.46            112.3  112.27  112.24             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   91.93  468.63       T

CROSS SECTION


RIVER: North_Channel
REACH: Reach              RS: 427.2193

INPUT
Description:
Station Elevation Data    num=     172
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  467.48     .89  467.36    2.41  468.18    2.42  468.18    2.49  468.18
    5.46  468.13    6.22  468.12    7.02  468.09    9.27  468.11   10.04  468.12
   11.57  468.15   11.61  468.15   11.63  468.15    14.7  468.15   14.81  468.14
   16.21  468.12    18.7  468.08   19.26  468.08   27.91   468.2   28.26  468.21
   29.55   468.1   30.33  467.94   31.79  467.94   33.41   467.9   34.52  467.87
   35.06  467.85   36.64  467.81   37.94  467.78   38.48  467.79   39.55  467.81
    41.6  467.76   42.63  467.73   43.75   467.7   44.21  467.69   46.13  467.67
   47.23  467.66    47.5  467.66   48.84  467.63   51.56   467.6   51.93   467.6
   53.42  467.67   53.46  467.67   53.55  467.67   56.59  467.74   57.11  467.74
   58.13  467.74   60.65  467.68   61.18  467.67    61.3  467.67   62.82  467.67
   65.62  467.64   65.84  467.64   65.95  467.64   67.32  467.58    69.2  467.47
   70.24  467.44   70.75  467.47   71.88  467.59   73.12  467.51   74.39  467.49
   76.07  467.45   78.83  467.54   79.27  467.56    79.4  467.57      84  467.44
   87.31  467.25   87.87  467.32   88.43  467.39   99.31  461.95  103.31  461.95
  118.01   469.3  118.75  469.25   120.2  469.27  120.33  469.27  120.78  469.27
  123.22  469.23  123.84  469.26  124.69  469.26  127.29  469.29  127.58  469.29
  128.38  469.33  129.12  469.36  129.43  469.37  132.06  469.42  133.03   469.4
  133.62  469.42  136.09  469.47  136.52  469.47  137.26  469.51  137.99  469.54
  138.85  469.55  140.98  469.57  142.04  469.57  142.58  469.57  145.44  469.63
   145.5  469.63  145.56  469.63  147.08  469.67  148.98  469.69  150.13  469.71
  151.42  469.79  151.71  469.81  151.98  469.82  154.73  469.91   155.5  469.95
  156.31  469.97  159.12  469.95  159.35  469.95   159.8  469.95   160.9  469.96
  161.81  469.98  163.95  470.05  165.17  470.07  165.43  470.07  166.13  470.09
  168.38  470.15  169.22  470.16  169.99  470.19  171.64  470.18  172.98  470.18
  173.63  470.18  174.49  470.16  176.06  470.19  177.38  470.24  178.65  470.28
  178.96  470.28  181.55   470.3   181.9   470.3  182.47  470.34  183.47   470.4
  186.33   470.4   186.4   470.4  186.45   470.4  187.92  470.44  190.84  470.49
     191  470.49  191.11  470.49  192.57  470.54  195.48  470.62  195.52  470.62
  195.55  470.62  197.07  470.69  199.65  470.74  200.09  470.75  200.29  470.76
  201.67  470.76  204.41  470.85  204.65  470.86  204.77  470.86  206.24  470.87
  209.07  470.96  209.28  470.96  209.39  470.96  210.83  470.95   213.3  470.97
  213.81  470.98   214.1  470.98  215.39  471.06  216.39  471.09  218.32  471.12
  219.22  471.14  219.98  471.17  221.67   471.2     223  471.24   223.6  471.27
  224.51  471.28  227.22   471.3   227.5   471.3  227.62   471.3  229.11  471.34
  231.18  471.39  231.51  471.39
```

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	88.43	.03	118.01	.018

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

88.43	118.01	125.23	125.29	125.4	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	27.91	478.2

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 301.9247

INPUT
Description:
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.04	18.59	470.39	19.6	470.1	20.67	469.86	21.83	469.69
23.08	469.52	24.39	469.48	25.85	469.47	25.9	469.47	27.75	469.52
27.83	469.52	27.97	469.52	30.43	469.63	32.08	469.52	32.34	469.49
32.71	469.46	35.09	469.16	36.84	469.09	36.99	469.08	37.17	469.07
39.72	468.97	41.46	468.89	41.59	468.88	41.85	468.88	44.38	468.84
46.18	468.79	46.25	468.79	46.35	468.78	49.04	468.69	50.47	468.66
50.88	468.65	51.51	468.64	53.61	468.61	54.77	468.58	55.58	468.56
56.69	468.51	58.3	468.45	59.34	468.46	60.07	468.46	60.94	468.45
62.73	468.43	63.98	468.4	64.65	468.39	65.64	468.39	67.29	468.39
68.16	468.36	69.13	468.32	70.31	468.3	71.69	468.24	72.62	468.12
73.49	468.05	74.64	468.05	87.68	461.53	91.68	461.53	105.42	468.4
106.81	468.31	107.24	468.27	108.55	468.1	109.37	468.08	111.17	468.09
112.58	468.07	113.04	468.06	115.43	468.05	115.63	468.05	116.37	468.07
124.47	468.26	125.12	468.28	126.33	468.32	128.35	468.3	128.93	468.29
129.74	468.31	130.71	468.35	133.36	468.3	133.39	468.3	133.41	468.3
135.3	468.29	136.39	468.27	137.92	468.24	139.46	468.21	139.79	468.21
140.48	468.23	142.52	468.3	143.58	468.3	144.42	468.29	146.67	468.36
147.11	468.38	148.98	468.45	149.01	468.45	149.17	468.45	151.74	468.48
152.36	468.5	153.61	468.59	154.94	468.62	156.34	468.65	157.51	468.72
158.11	468.76	158.84	468.77	160.77	468.81	162.28	468.9	162.7	468.92
163.16	468.93	165.37	468.93	167.01	468.94	167.17	468.94	167.53	468.95
169.8	468.99	170.53	469	171.67	468.96	174.17	468.97	174.29	468.97
174.48	468.98	176.17	469.05	177.89	469.09	178.79	469.1	179.82	469.12
180.63	469.13	181.81	469.13	183.39	469.16	185.19	469.25	185.29	469.25
185.43	469.26	187.91	469.32	189.64	469.41	189.75	469.42	192.46	469.48
192.51	469.48	192.81	469.48	194.38	469.48	196.99	469.58	197.07	469.58
197.14	469.58	198.94	469.66	201.62	469.71	201.67	469.71	201.71	469.71
203.54	469.77	205.26	469.82	206.26	469.86	207.19	469.88	208.1	469.89
208.68	469.9	210.73	469.95	211.98	469.99				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	74.64	.03	105.42	.018

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

74.64	105.42	150.72	127.44	115.85	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	31.99	480.035

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 174.488

INPUT
Description:
Station Elevation Data num= 170

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	466.18	103.79	466.34	122.4	466.37	132.4	461.11	137	461.11
138.39	461.11	142.39	461.11	143	461.11	144.92	462.07	147.04	462.64
149.63	463.9	151.42	464.08	153.29	464.92	156.18	466.69	156.29	466.74
156.33	466.76	156.65	466.82	158.45	467.11	159.1	467.29	160.18	467.63
161.16	467.84	161.76	467.86	162.44	467.92	163.52	467.98	165.41	468.06
165.44	468.06	165.46	468.06	167.04	468.1	168.44	468.12	168.65	468.12
168.89	468.12	169.02	468.13	170.37	468.16	171.86	467.82	172.12	467.79
172.42	467.75	173.91	467.67	175.24	467.65	175.69	467.62	176.37	467.61
177.45	467.59	178.14	467.59	179.65	467.55	181.68	467.58	182.01	467.59
182.38	467.6	183.63	467.6	184.71	467.66	185.4	467.69	186.47	467.71
187.52	467.73	188.19	467.74	189.23	467.78	190.36	467.79	190.76	467.79
191.14	467.79	192.88	467.79	194.76	467.79	195.2	467.78	197.78	467.67
197.91	467.67	198.15	467.68	200.26	467.72	201.35	467.74	202.73	467.71
204.32	467.7	205.27	467.7	207.19	467.71	207.73	467.71	207.99	467.72
210.01	467.83	210.9	467.86	212.67	467.88	214.58	467.89	215.38	467.88
217.36	467.89	217.61	467.89	217.82	467.9	219.26	467.91	220.94	467.92
220.96	467.92	221	467.92	222.98	467.96	223.9	467.95	225.04	467.95
226.63	467.97	227.15	467.98	227.52	467.97	229.11	467.96	230.35	468
231.02	468.01	231.8	468.01	232.91	468.01	233.87	468.03	234.7	468.03
235.94	468.07	236.43	468.08	236.75	468.08	238.34	468.11	240.26	468.14
240.29	468.14	240.32	468.14	241.95	468.2	243.19	468.24	243.73	468.25
244.59	468.28	245.96	468.34	246.82	468.35	247.79	468.37	249.11	468.48
249.39	468.5	249.6	468.51	251.77	468.6	253.41	468.67	253.92	468.68
254.47	468.72	255.42	468.77	256.28	468.82	257.47	468.89	259.9	469.02
260.12	469.03	260.36	469.05	261.6	469.13	262.68	469.2	263.12	469.23
263.45	469.25	264.77	469.32	266.42	469.38	266.45	469.38	266.49	469.38
268.92	469.5	269.32	469.51	270.79	469.58	272.05	469.62	272.53	469.63
273.09	469.63	274.77	469.69	275.86	469.75	276.86	469.76	277.73	469.74
278.64	469.71	279.68	469.72	280.65	469.73	282.45	469.76	282.85	469.76
283.28	469.78	284.83	469.85	286.26	469.91	286.89	469.93	289	469.89
289.13	469.89	289.33	469.9	291.34	469.92	292.72	469.89	293.5	469.88
295.43	469.93	295.51	469.93	295.54	469.93	297.74	470.02	299.45	470.12
299.88	470.13	300.88	470.11	301.67	470.1	302.01	470.1	304.13	470.14
305.92	470.18	306.44	470.2	307.39	470.26	308.2	470.31	308.51	470.32

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	122.4	.03	153.29	.035	170.37	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
103.79	169.02	126.48	101.82	81.84	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
169.02	308.51	468.134	T

CROSS SECTION

RIVER: North_Channel
REACH: Reach RS: 72.67111

INPUT
Description:
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	466.28	48.56	466.36	57	466.37	67	460.77	75	460.77

88.22	467.38	88.47	467.41	88.57	467.43	90.55	467.96	90.69	467.99
92.66	468.26	92.77	468.27	92.79	468.27	94.75	468	94.89	467.96
96.88	467.85	97.02	467.85	98.98	467.91	99.12	467.92	101.08	468.01
101.22	468.01	103.18	468.14	103.32	468.14	105.32	468.14	105.45	468.14
107.41	468.2	107.57	468.2	109.51	468.23	109.67	468.24	111.61	468.27
111.78	468.28	113.74	468.31	113.9	468.31	115.84	468.4	116	468.4
117.93	468.46	118.09	468.47	120.03	468.53	120.2	468.53	122.14	468.49
122.31	468.5	124.2	468.53	124.37	468.54	126.3	468.59	126.47	468.6
128.43	468.66	128.62	468.67	130.52	468.78	130.73	468.78	132.63	468.78
132.83	468.79	134.75	468.88	134.96	468.89	136.83	468.94	137.03	468.96
138.92	469.08	139.14	469.08	141.06	469.08	141.26	469.09	143.16	469.15
143.36	469.16	145.25	469.23	145.46	469.23	147.35	469.26	147.59	469.27
149.46	469.36	149.69	469.37	151.51	469.45	151.75	469.46	153.61	469.52
153.85	469.53	155.75	469.65	155.99	469.66	157.85	469.82	158.09	469.83
159.95	469.91	160.19	469.92	162.05	469.98	162.28	469.98	163.63	470
164.09	470.02	164.41	470.03	166.7	470.06	166.71	470.06	166.72	470.06
168.98	470.14	170.22	470.12	171.13	470.12	173.01	470.15	173.21	470.15
173.54	470.15	175.5	470.16	176.66	470.18	177.58	470.18	179.23	470.23
179.55	470.24	180.35	470.27	182.17	470.33	182.88	470.34	184.17	470.38
185.56	470.4	186.17	470.4	187.8	470.44	188.91	470.47	189.33	470.46
190.03	470.46								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	57	.03	92.77	.018

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
48.56	92.66	149.26	72.67	167.63	.1	.3

SUMMARY OF REACH LENGTHS

River: North_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1459.614	89.03	89.03	89.04
Reach	1370.583	100.01	100	100
Reach	1270.58	100.01	100	100
Reach	1170.577	58.01	58	58
Reach	1143.195	Culvert		
Reach	1112.573	100.02	100	100
Reach	1012.57	127.93	134.9	144.08
Reach	877.6657	174.52	141.81	121.21
Reach	800	Culvert		
Reach	735.8522	67.5	96.35	120.06
Reach	639.5066	100	100.01	100
Reach	539.4938	112.3	112.27	112.24
Reach	427.2193	125.23	125.29	125.4
Reach	301.9247	150.72	127.44	115.85
Reach	174.488	126.48	101.82	81.84
Reach	72.67111	149.26	72.67	167.63

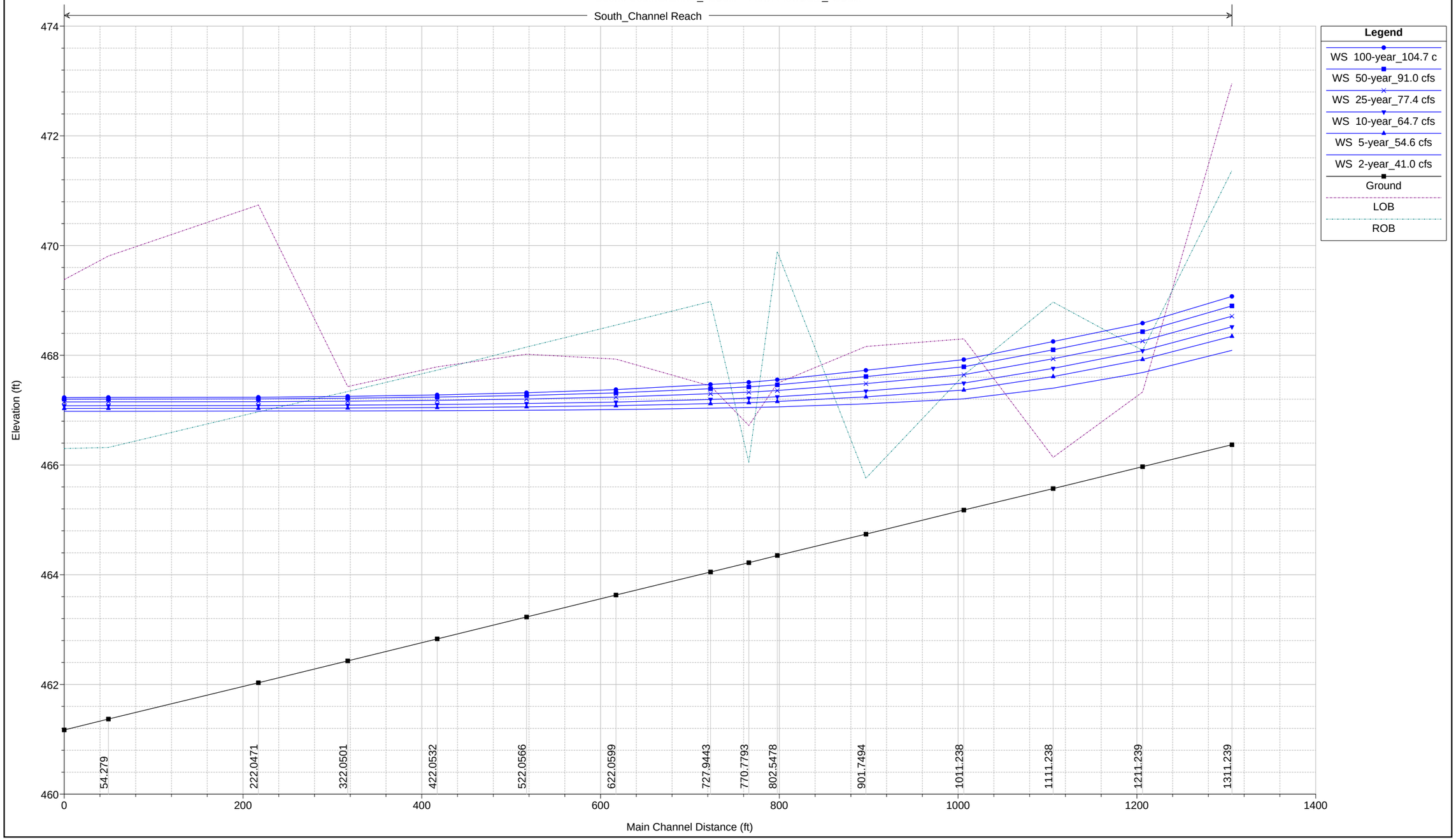
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: North_Channel

Reach	River Sta.	Contr.	Expan.

```
Reach               1459.614        .1        .3
Reach               1370.583        .1        .3
Reach               1270.58         .1        .3
Reach               1170.577        .1        .3
Reach               1143.195 Culvert
Reach               1112.573        .1        .3
Reach               1012.57         .1        .3
Reach               877.6657        .1        .3
Reach               800      Culvert
Reach               735.8522        .1        .3
Reach               639.5066        .1        .3
Reach               539.4938        .1        .3
Reach               427.2193        .1        .3
Reach               301.9247        .1        .3
Reach               174.488         .1        .3
Reach               72.67111        .1        .3
```

17204-L_SiempreBristow_South Plan: As-Built 3/10/2017

Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt

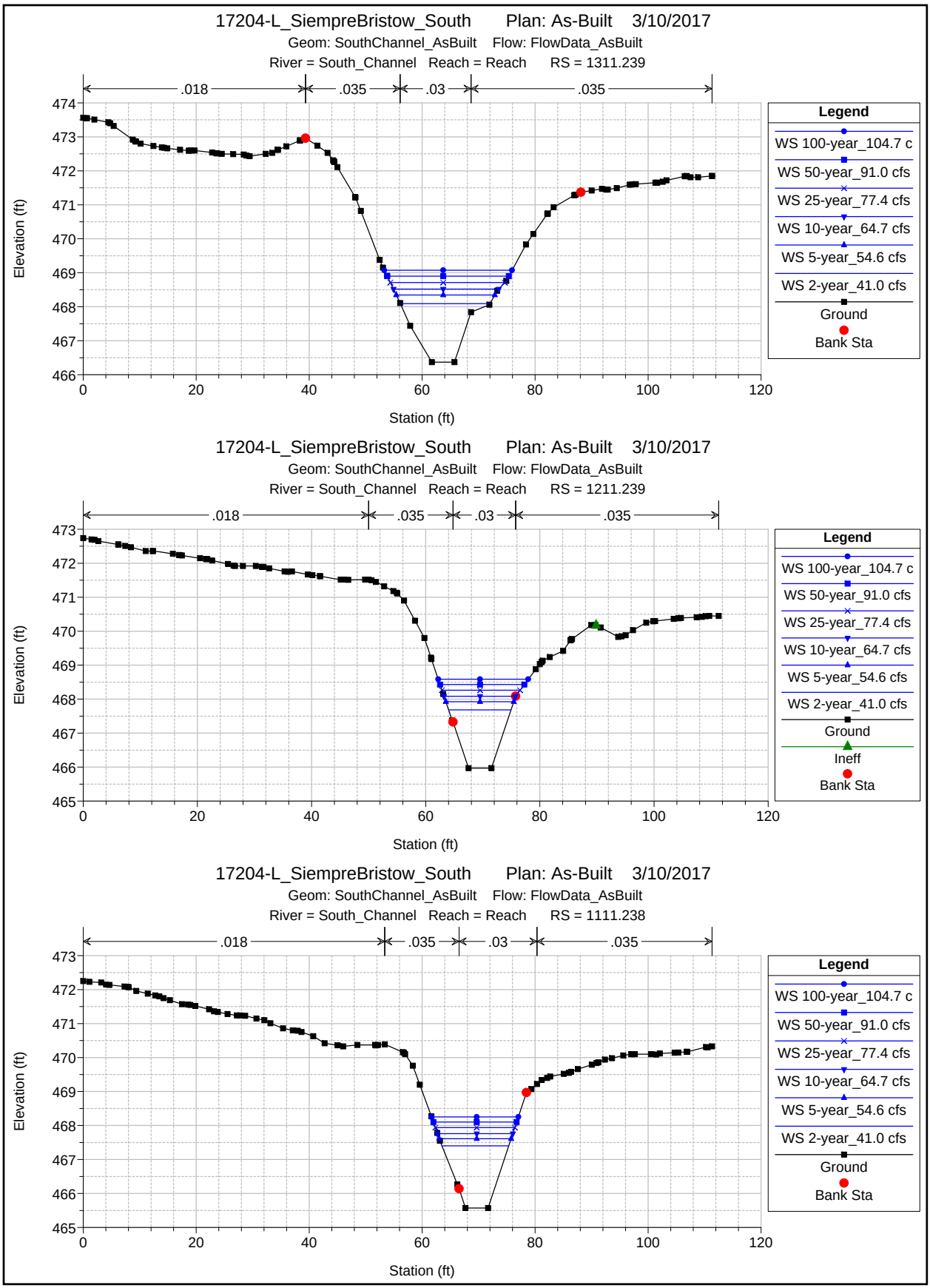


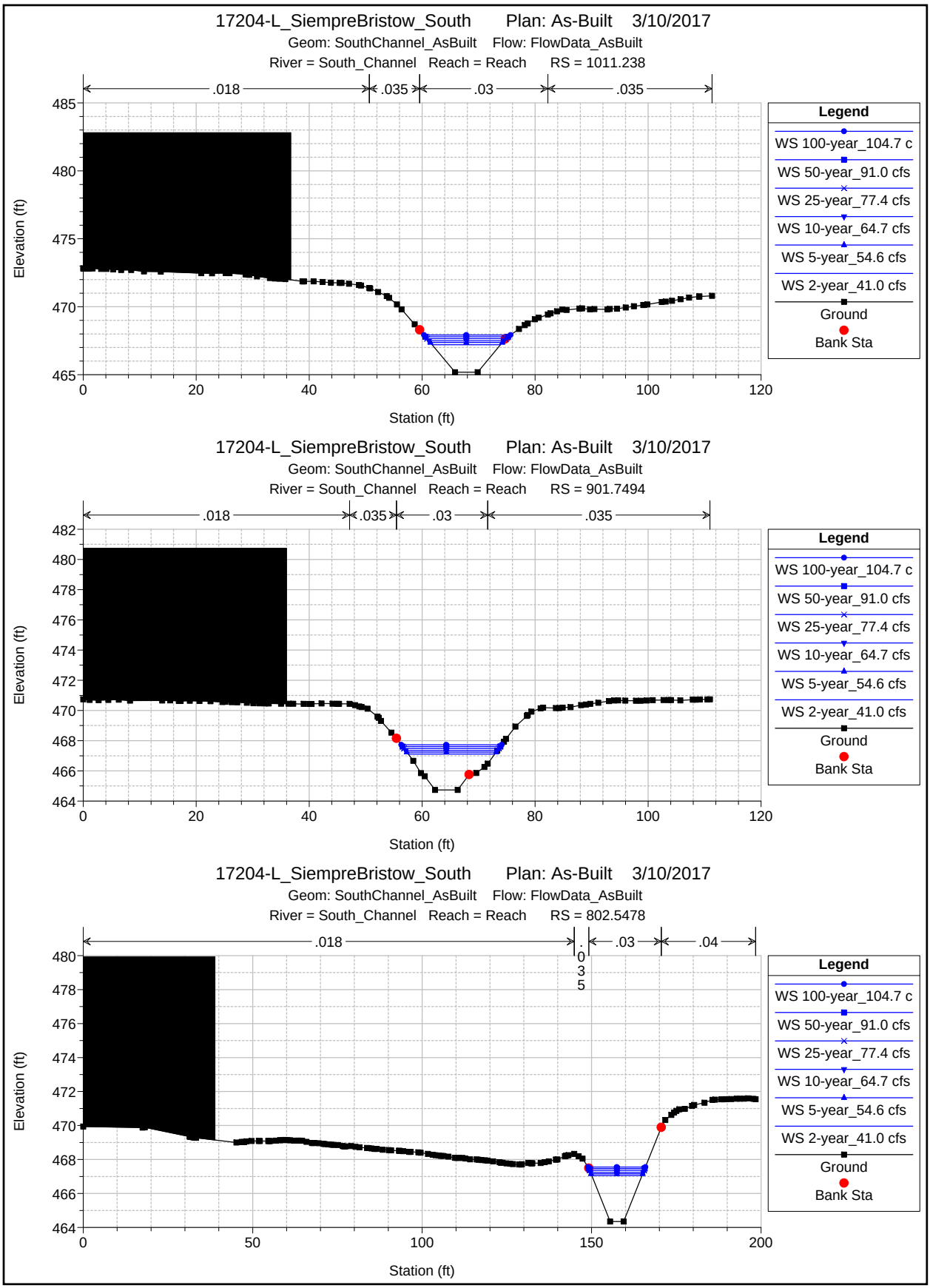
HEC-RAS Plan: As_Built River: South_Channel Reach: Reach

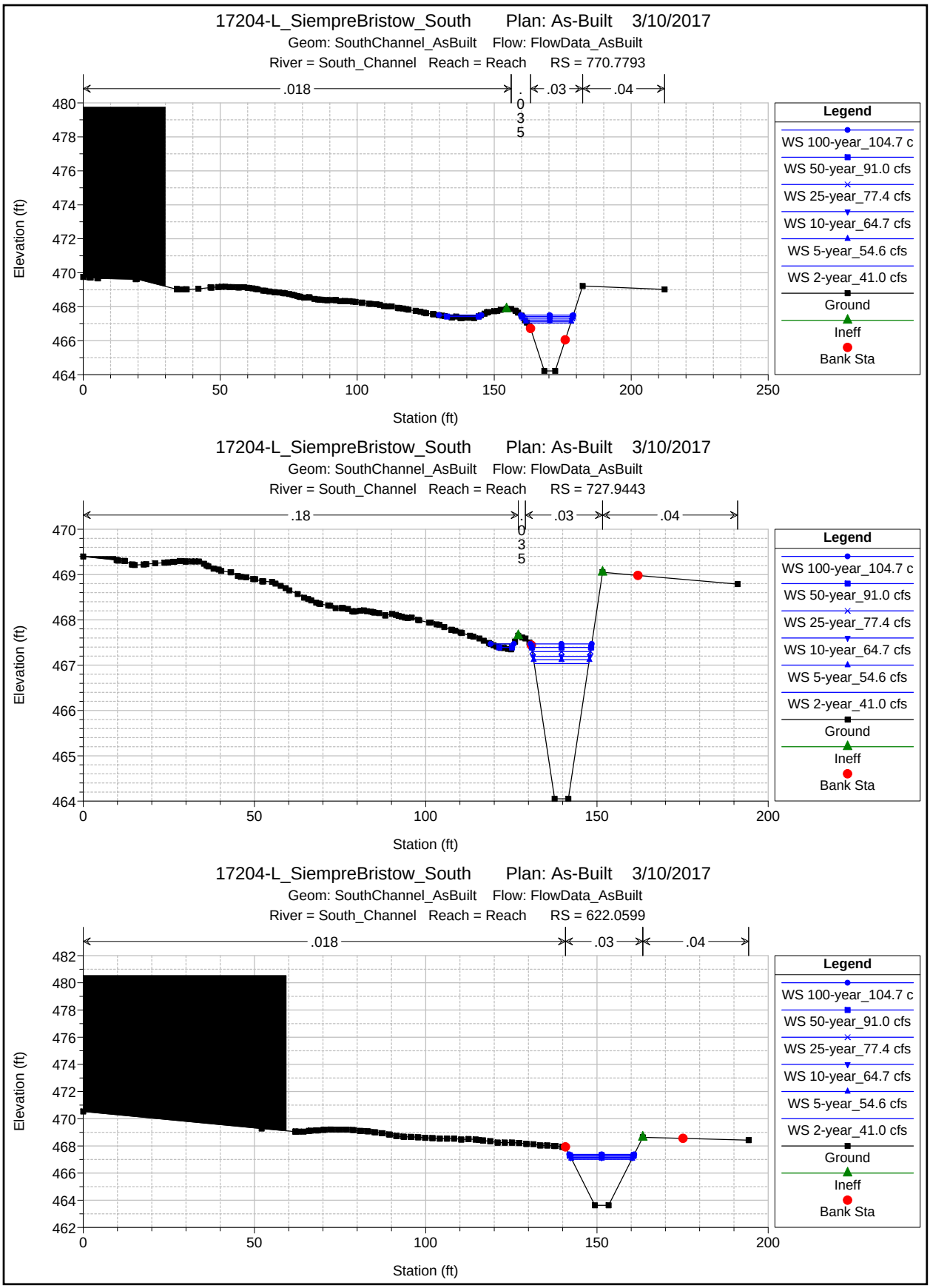
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1311.239	2-year_41.0 cfs	41.00	466.37	468.09	467.50	468.20	0.003425	2.67	15.35	15.85	0.48
Reach	1311.239	5-year_54.6 cfs	54.60	466.37	468.35	467.69	468.47	0.003125	2.78	19.61	17.45	0.46
Reach	1311.239	10-year_64.7 cfs	64.70	466.37	468.52	467.80	468.65	0.002977	2.85	22.73	18.64	0.45
Reach	1311.239	25-year_77.4 cfs	77.40	466.37	468.71	468.00	468.85	0.002900	2.92	26.50	20.28	0.45
Reach	1311.239	50-year_91.0 cfs	91.00	466.37	468.90	468.13	469.04	0.002776	2.99	30.42	21.53	0.44
Reach	1311.239	100-year_104.7 c	104.70	466.37	469.07	468.24	469.22	0.002668	3.06	34.26	22.62	0.44
Reach	1211.239	2-year_41.0 cfs	41.00	465.97	467.69		467.85	0.003512	3.24	12.77	10.94	0.51
Reach	1211.239	5-year_54.6 cfs	54.60	465.97	467.92		468.12	0.003610	3.59	15.50	11.90	0.53
Reach	1211.239	10-year_64.7 cfs	64.70	465.97	468.08		468.31	0.003651	3.80	17.45	12.55	0.54
Reach	1211.239	25-year_77.4 cfs	77.40	465.97	468.26		468.51	0.003591	4.05	19.78	13.68	0.55
Reach	1211.239	50-year_91.0 cfs	91.00	465.97	468.43		468.71	0.003576	4.30	22.18	14.77	0.55
Reach	1211.239	100-year_104.7 c	104.70	465.97	468.59		468.90	0.003575	4.53	24.55	15.77	0.56
Reach	1111.238	2-year_41.0 cfs	41.00	465.57	467.40		467.54	0.002626	3.07	14.34	11.83	0.45
Reach	1111.238	5-year_54.6 cfs	54.60	465.57	467.61		467.79	0.002990	3.48	16.94	12.74	0.49
Reach	1111.238	10-year_64.7 cfs	64.70	465.57	467.76		467.96	0.003142	3.71	18.89	13.35	0.51
Reach	1111.238	25-year_77.4 cfs	77.40	465.57	467.94		468.16	0.003271	3.96	21.30	14.07	0.52
Reach	1111.238	50-year_91.0 cfs	91.00	465.57	468.10		468.35	0.003426	4.20	23.66	14.74	0.54
Reach	1111.238	100-year_104.7 c	104.70	465.57	468.25		468.53	0.003564	4.43	25.91	15.35	0.56
Reach	1011.238	2-year_41.0 cfs	41.00	465.18	467.21		467.30	0.001914	2.51	16.31	12.11	0.38
Reach	1011.238	5-year_54.6 cfs	54.60	465.18	467.37		467.51	0.002475	2.98	18.33	12.76	0.44
Reach	1011.238	10-year_64.7 cfs	64.70	465.18	467.49		467.66	0.002760	3.24	19.96	13.26	0.47
Reach	1011.238	25-year_77.4 cfs	77.40	465.18	467.65		467.84	0.003012	3.51	22.05	13.88	0.49
Reach	1011.238	50-year_91.0 cfs	91.00	465.18	467.79		468.01	0.003197	3.78	24.10	14.62	0.51
Reach	1011.238	100-year_104.7 c	104.70	465.18	467.92		468.17	0.003377	4.03	26.06	15.33	0.53
Reach	901.7494	2-year_41.0 cfs	41.00	464.74	467.12		467.17	0.000738	1.87	23.08	15.34	0.25
Reach	901.7494	5-year_54.6 cfs	54.60	464.74	467.24		467.32	0.001042	2.30	25.06	15.84	0.30
Reach	901.7494	10-year_64.7 cfs	64.70	464.74	467.35		467.44	0.001222	2.55	26.76	16.26	0.32
Reach	901.7494	25-year_77.4 cfs	77.40	464.74	467.48		467.60	0.001402	2.81	29.00	16.80	0.35
Reach	901.7494	50-year_91.0 cfs	91.00	464.74	467.61		467.75	0.001589	3.07	31.18	17.31	0.37
Reach	901.7494	100-year_104.7 c	104.70	464.74	467.73		467.89	0.001773	3.32	33.19	17.76	0.40
Reach	802.5478	2-year_41.0 cfs	41.00	464.35	467.06		467.10	0.000571	1.61	25.51	14.83	0.22
Reach	802.5478	5-year_54.6 cfs	54.60	464.35	467.16		467.22	0.000870	2.02	26.99	15.23	0.27
Reach	802.5478	10-year_64.7 cfs	64.70	464.35	467.24		467.32	0.001073	2.28	28.32	15.57	0.30
Reach	802.5478	25-year_77.4 cfs	77.40	464.35	467.36		467.46	0.001299	2.57	30.13	16.03	0.33
Reach	802.5478	50-year_91.0 cfs	91.00	464.35	467.46		467.59	0.001551	2.86	31.82	16.45	0.36
Reach	802.5478	100-year_104.7 c	104.70	464.35	467.55		467.71	0.001793	3.14	33.33	16.89	0.39
Reach	770.7793	2-year_41.0 cfs	41.00	464.22	467.05		467.08	0.000407	1.54	27.41	15.90	0.19
Reach	770.7793	5-year_54.6 cfs	54.60	464.22	467.14		467.20	0.000621	1.96	28.89	16.54	0.23
Reach	770.7793	10-year_64.7 cfs	64.70	464.22	467.22		467.29	0.000765	2.23	30.26	17.14	0.26
Reach	770.7793	25-year_77.4 cfs	77.40	464.22	467.33		467.42	0.000925	2.53	32.16	17.86	0.29
Reach	770.7793	50-year_91.0 cfs	91.00	464.22	467.42		467.55	0.001106	2.84	33.93	30.06	0.32
Reach	770.7793	100-year_104.7 c	104.70	464.22	467.51		467.66	0.001296	3.14	35.50	34.65	0.35
Reach	727.9443	2-year_41.0 cfs	41.00	464.05	467.03		467.06	0.000377	1.38	29.74	15.93	0.18
Reach	727.9443	5-year_54.6 cfs	54.60	464.05	467.12		467.17	0.000593	1.76	31.10	16.27	0.22
Reach	727.9443	10-year_64.7 cfs	64.70	464.05	467.20		467.26	0.000749	2.00	32.36	16.57	0.25
Reach	727.9443	25-year_77.4 cfs	77.40	464.05	467.30		467.38	0.000931	2.27	34.10	16.99	0.28
Reach	727.9443	50-year_91.0 cfs	91.00	464.05	467.39		467.49	0.001140	2.55	35.67	21.09	0.31
Reach	727.9443	100-year_104.7 c	104.70	464.05	467.47		467.59	0.001359	2.83	37.03	24.67	0.34
Reach	622.0599	2-year_41.0 cfs	41.00	463.63	467.01		467.03	0.000219	1.13	36.39	17.53	0.14
Reach	622.0599	5-year_54.6 cfs	54.60	463.63	467.08		467.11	0.000355	1.45	37.64	17.81	0.18
Reach	622.0599	10-year_64.7 cfs	64.70	463.63	467.15		467.19	0.000459	1.67	38.82	18.07	0.20
Reach	622.0599	25-year_77.4 cfs	77.40	463.63	467.24		467.30	0.000588	1.91	40.47	18.43	0.23
Reach	622.0599	50-year_91.0 cfs	91.00	463.63	467.31		467.39	0.000741	2.17	41.88	18.74	0.26
Reach	622.0599	100-year_104.7 c	104.70	463.63	467.37		467.47	0.000913	2.43	43.01	18.98	0.28
Reach	522.0566	2-year_41.0 cfs	41.00	463.23	467.00		467.01	0.000134	0.94	43.76	19.08	0.11
Reach	522.0566	5-year_54.6 cfs	54.60	463.23	467.06		467.08	0.000220	1.21	44.96	19.33	0.14
Reach	522.0566	10-year_64.7 cfs	64.70	463.23	467.12		467.15	0.000289	1.40	46.12	19.57	0.16
Reach	522.0566	25-year_77.4 cfs	77.40	463.23	467.20		467.24	0.000377	1.62	47.74	19.90	0.18
Reach	522.0566	50-year_91.0 cfs	91.00	463.23	467.27		467.32	0.000485	1.86	49.05	20.16	0.21
Reach	522.0566	100-year_104.7 c	104.70	463.23	467.32		467.39	0.000609	2.09	50.04	20.35	0.24
Reach	422.0532	2-year_41.0 cfs	41.00	462.83	466.99		467.00	0.000088	0.80	51.25	20.63	0.09
Reach	422.0532	5-year_54.6 cfs	54.60	462.83	467.05		467.06	0.000146	1.04	52.43	20.86	0.12
Reach	422.0532	10-year_64.7 cfs	64.70	462.83	467.10		467.13	0.000194	1.21	53.59	21.08	0.13
Reach	422.0532	25-year_77.4 cfs	77.40	462.83	467.18		467.21	0.000256	1.40	55.22	21.39	0.15
Reach	422.0532	50-year_91.0 cfs	91.00	462.83	467.24		467.28	0.000333	1.61	56.47	21.62	0.18
Reach	422.0532	100-year_104.7 c	104.70	462.83	467.28		467.33	0.000423	1.83	57.34	21.78	0.20
Reach	322.0501	2-year_41.0 cfs	41.00	462.43	466.99		466.99	0.000058	0.69	59.70	22.21	0.07

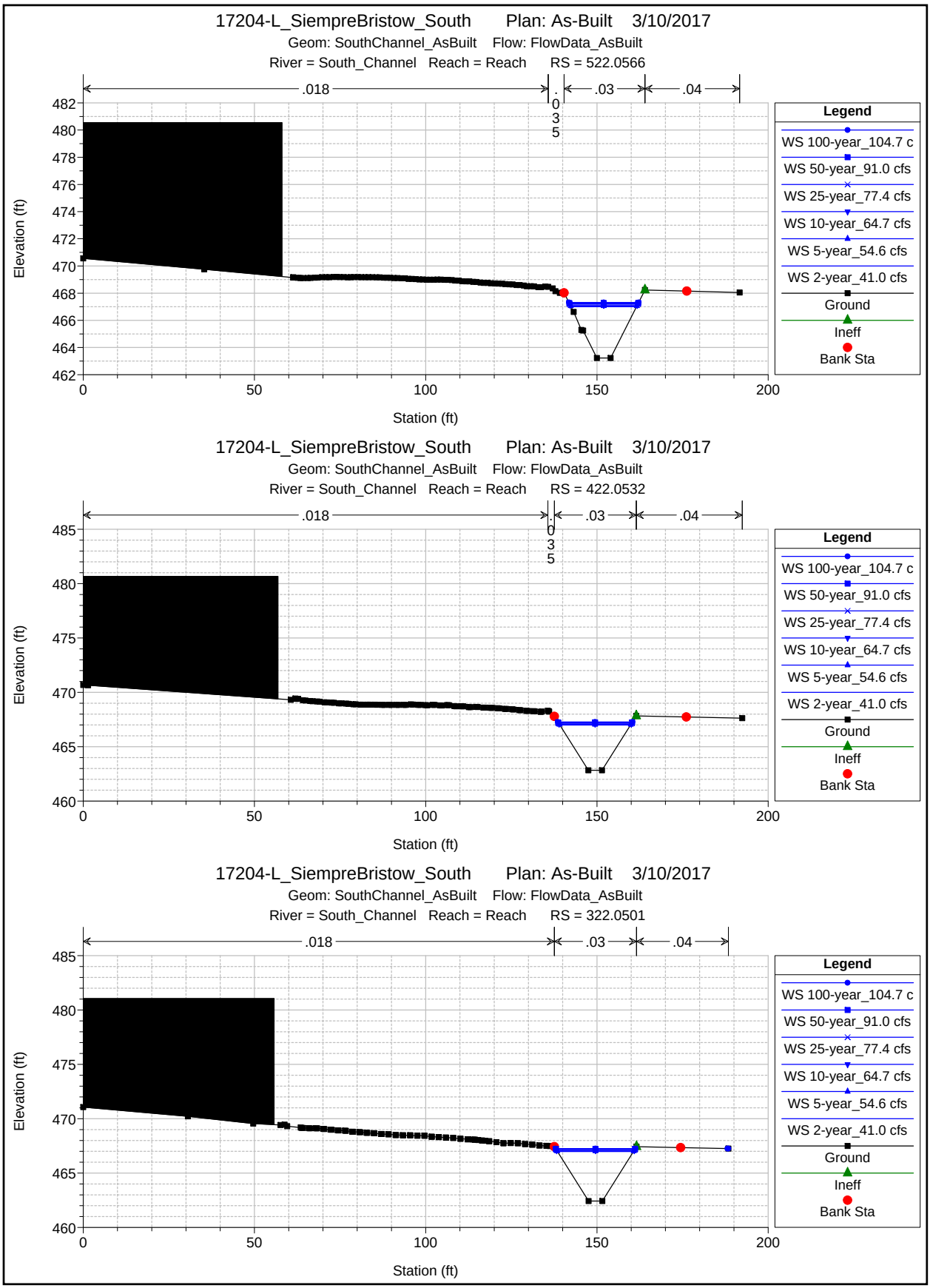
HEC-RAS Plan: As_Built River: South_Channel Reach: Reach (Continued)

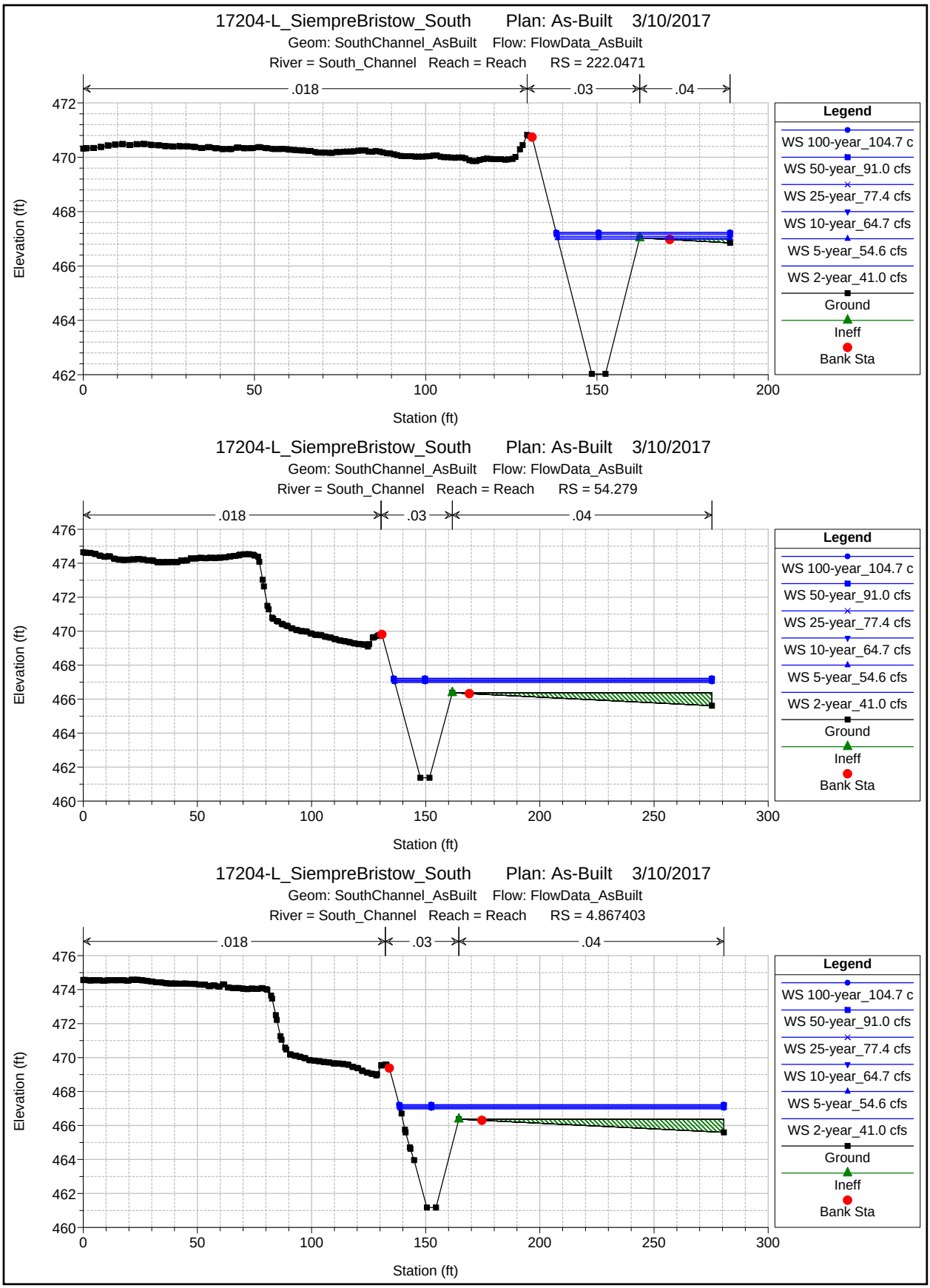
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	322.0501	5-year_54.6 cfs	54.60	462.43	467.04		467.05	0.000098	0.90	60.89	22.43	0.10
Reach	322.0501	10-year_64.7 cfs	64.70	462.43	467.09		467.11	0.000131	1.04	62.08	22.64	0.11
Reach	322.0501	25-year_77.4 cfs	77.40	462.43	467.16		467.19	0.000174	1.21	63.73	22.93	0.13
Reach	322.0501	50-year_91.0 cfs	91.00	462.43	467.22		467.25	0.000229	1.40	64.97	23.14	0.15
Reach	322.0501	100-year_104.7 c	104.70	462.43	467.25		467.29	0.000293	1.59	65.77	23.58	0.17
Reach	222.0471	2-year_41.0 cfs	41.00	462.03	466.98		466.99	0.000040	0.60	68.84	43.12	0.06
Reach	222.0471	5-year_54.6 cfs	54.60	462.03	467.03		467.04	0.000067	0.78	70.13	50.37	0.09
Reach	222.0471	10-year_64.7 cfs	64.70	462.03	467.08		467.10	0.000090	0.90	72.68	50.47	0.11
Reach	222.0471	25-year_77.4 cfs	77.40	462.03	467.15		467.17	0.000119	1.04	76.24	50.61	0.12
Reach	222.0471	50-year_91.0 cfs	91.00	462.03	467.20		467.23	0.000155	1.20	78.82	50.71	0.14
Reach	222.0471	100-year_104.7 c	104.70	462.03	467.24		467.26	0.000198	1.36	80.39	50.78	0.16
Reach	54.279	2-year_41.0 cfs	41.00	461.37	466.98		466.98	0.000015	0.38	154.44	138.91	0.04
Reach	54.279	5-year_54.6 cfs	54.60	461.37	467.03		467.03	0.000024	0.49	161.43	139.01	0.05
Reach	54.279	10-year_64.7 cfs	64.70	461.37	467.08		467.09	0.000031	0.56	168.42	139.11	0.06
Reach	54.279	25-year_77.4 cfs	77.40	461.37	467.15		467.16	0.000039	0.64	178.21	139.25	0.07
Reach	54.279	50-year_91.0 cfs	91.00	461.37	467.20		467.21	0.000050	0.73	185.25	139.35	0.08
Reach	54.279	100-year_104.7 c	104.70	461.37	467.23		467.24	0.000063	0.82	189.50	139.42	0.08
Reach	4.867403	2-year_41.0 cfs	41.00	461.17	466.98	462.37	466.98	0.000013	0.36	160.65	141.73	0.04
Reach	4.867403	5-year_54.6 cfs	54.60	461.17	467.03	462.58	467.03	0.000021	0.47	167.74	141.83	0.05
Reach	4.867403	10-year_64.7 cfs	64.70	461.17	467.08	462.72	467.08	0.000027	0.53	174.83	141.93	0.06
Reach	4.867403	25-year_77.4 cfs	77.40	461.17	467.15	462.87	467.15	0.000035	0.61	184.77	142.07	0.06
Reach	4.867403	50-year_91.0 cfs	91.00	461.17	467.20	463.03	467.21	0.000044	0.69	191.88	142.17	0.07
Reach	4.867403	100-year_104.7 c	104.70	461.17	467.23	463.17	467.24	0.000056	0.78	196.14	142.23	0.08


17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 1311.239
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 1211.239
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 1111.238
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 1011.238
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 901.7494
.018
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 802.5478
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Bank Sta


17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 770.7793
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 727.9443
.18
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 622.0599
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 522.0566
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 422.0532
.018
.035
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 322.0501
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta


17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 222.0471
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 54.279
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta
17204-L_SiempreBristow_South Plan: As-Built 3/10/2017
Geom: SouthChannel_AsBuilt Flow: FlowData_AsBuilt
River = South_Channel Reach = Reach RS = 4.867403
.018
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100-year_104.7 c
WS 50-year_91.0 cfs
WS 25-year_77.4 cfs
WS 10-year_64.7 cfs
WS 5-year_54.6 cfs
WS 2-year_41.0 cfs
Ground
Ineff
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 17204-L_SiempreBristow_South
Project File : 17204-L_SiempreBris.prj
Run Date and Time: 3/10/2017 1:46:38 PM

Project in English units

PLAN DATA

Plan Title: As-Built
Plan File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.p06

Geometry Title: SouthChannel_AsBuilt
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g01

Flow Title : FlowData_AsBuilt
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f02

Plan Summary Information:
Number of: Cross Sections = 15 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FlowData_AsBuilt
Flow File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.f02

Flow Data (cfs)

River	Reach	RS	2-year_41.0 cfs	5-year_54.6 cfs	10-year_64.7 cfs	25-year_77.4 cfs	50-year_91.0 cfs	100-year_104.7 cfs
South_Channel	Reach	1311.239	41	54.6	64.7	77.4	91	104.7

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
South_Channel	Reach	2-year_41.0 cfs	Critical	Known WS = 466.98
South_Channel	Reach	5-year_54.6 cfs	Critical	Known WS = 467.03
South_Channel	Reach	10-year_64.7 cfs	Critical	Known WS = 467.08
South_Channel	Reach	25-year_77.4 cfs	Critical	Known WS = 467.15
South_Channel	Reach	50-year_91.0 cfs	Critical	Known WS = 467.2
South_Channel	Reach	100-year_104.7 cfs	Critical	Known WS = 467.23

GEOMETRY DATA

Geometry Title: SouthChannel_AsBuilt
Geometry File : w:\17204-L_TO#39_IHHA_FY17\5_Siempre Viva & Bristow Map 126, 127\WaterResources\Hydraulics\HecRas\South_Channel\17204-L_SiempreBris.g01

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 1311.239

INPUT
Description:
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.56	.52	473.55	.67	473.55	1.96	473.51	4.44	473.43
4.75	473.4	5.38	473.32	8.75	472.92	9.21	472.87	9.36	472.86
10.16	472.8	12.43	472.73	13.91	472.69	14.32	472.68	14.87	472.66
17.15	472.62	18.7	472.59	19	472.6	19.69	472.6	22.83	472.54
23.55	472.52	23.72	472.51	24.52	472.5	26.56	472.49	28.42	472.48
28.93	472.45	29.47	472.43	32.32	472.5	33.46	472.53	34.42	472.62
34.48	472.62	35.97	472.72	38.32	472.89	38.43	472.9	39.35	472.96
41.46	472.74	43.25	472.53	44.23	472.31	44.32	472.29	44.46	472.26
44.99	472.11	48.14	471.23	48.16	471.22	48.17	471.22	49.14	470.82
52.48	469.38	53.06	469.15	53.79	468.91	56.1	468.11	57.88	467.44
61.72	466.37	65.72	466.37	68.66	467.84	71.9	468.06	73.29	468.47
74.89	468.76	78.37	469.83	79.68	470.14	82.16	470.73	82.21	470.74

```
   82.23  470.74   83.29  470.93   86.94  471.28   87.13   471.3   87.19   471.3
    88.1  471.37   90.01  471.42   91.84  471.47   92.57  471.45   92.87  471.45
   94.46  471.49   96.76  471.59    97.2   471.6   97.82  471.61  101.29  471.65
  101.57  471.65  101.63  471.65  102.59  471.68  103.25  471.72  106.49  471.84
  106.83  471.85  107.51  471.81  108.86  471.81  111.32  471.85  111.33  471.85

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   39.35    .035    56.1     .03   68.66    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         39.35    88.1           102.88     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1211.239

INPUT
Description:
Station Elevation Data    num=      86
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.74    1.46   472.7    1.98  472.69    2.65  472.65    6.13  472.55
    6.15  472.55    6.18  472.55    7.37  472.51    8.36  472.47   10.96  472.36
   12.19  472.36   12.22  472.36   15.69  472.28    16.8  472.24   16.92  472.24
   17.28  472.23   20.48  472.15    21.5  472.12   21.74  472.12   22.58  472.08
   25.37  471.98   26.34  471.93   26.58  471.92   27.97  471.92   30.24  471.92
   31.32  471.89   31.56  471.89   32.59  471.85   35.27  471.76   35.83  471.75
   36.57  471.76   39.35  471.67   40.16  471.65   41.47  471.62   41.49  471.62
   45.11  471.52   45.77  471.52   46.43  471.51   49.38  471.52   50.01  471.52
    50.5   471.5   51.26  471.45   52.72  471.32   54.33  471.18   54.94  471.13
   55.03  471.11   56.21   470.9   58.13  470.31   59.78   469.8   60.93  469.22
      61  469.18   63.07  468.15   64.65  467.37   64.69  467.36    64.8  467.33
   67.51  465.97   71.51  465.97   75.76  468.09   79.28  468.88      80  469.03
    80.3  469.09    80.5  469.13   81.74  469.24   84.08  469.42   85.36  469.73
   85.42  469.74   85.64  469.77   89.01  470.18   89.76  470.18   90.65  470.11
   93.73  469.83   94.31  469.85   95.02  469.88   96.31  470.03   98.63  470.25
   99.86  470.29   99.93   470.3  100.19   470.3  103.46  470.36  104.31  470.38
  104.72  470.39  107.47  470.41  108.38  470.42  109.06  470.44  109.67  470.45
  111.33  470.45

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.01    .035    64.8     .03   75.76    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          64.8   75.76             100     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   89.85  111.33  470.17       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1111.238

INPUT
Description:
Station Elevation Data    num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.25     1.1  472.23    3.18  472.21    4.04  472.15    4.64  472.14
```

```
    7.31  472.09     7.9  472.08    8.05  472.07    9.38  471.96   11.42  471.88
   12.74  471.83   13.47   471.8   14.21  471.75   15.34  471.69   17.49  471.57
   18.57  471.56   18.97  471.55   19.85  471.52   22.28  471.42   23.15  471.36
   23.82  471.34   25.55  471.28    27.2  471.24   27.76  471.24   28.66  471.23
   30.65  471.15   32.06   471.1   33.14  471.01   35.38  470.86   37.09   470.8
   37.97  470.79   38.65  470.75   40.71  470.63   42.74  470.42   45.01  470.36
   46.02  470.33   48.53  470.37   51.67  470.37   51.77  470.36   51.85  470.36
   52.18  470.37   53.38  470.39   56.59  470.16    56.8  470.14   56.99   470.1
   58.35  469.76   59.58   469.2   61.64  468.27   62.67  467.78   63.14  467.55
   66.22  466.27   66.53  466.14   67.67  465.57   71.67  465.57   78.47  468.97
   79.34  469.07   80.32  469.22   81.17  469.34   82.14   469.4   82.67  469.44
   85.06  469.52   85.97  469.55   86.39  469.58   87.57  469.66   90.04  469.79
   90.89  469.84    91.2  469.86   92.35  469.94   93.61  469.98   95.61  470.06
   97.02   470.1   97.19   470.1   97.65   470.1  100.52   470.1  101.45  470.09
  102.08  470.12   104.7  470.14  105.36  470.15  106.85  470.17  106.87  470.17
  106.92  470.17  110.25  470.31  110.53   470.3  111.33  470.33

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   53.38    .035   66.53     .03   80.32    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         66.53   78.47              100     100     100             .1       .3

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 1011.238

INPUT
Description:
Station Elevation Data    num=      81
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  472.82     .05  472.81     .52  472.82    1.05  472.81    1.66  472.82
    3.17  472.78    4.13  472.78     5.3  472.75    6.71   472.7    8.49   472.7
   10.76   472.6   13.73  472.58   20.89  472.47   22.81  472.46   25.22  472.48
    25.4  472.48    25.9  472.47   28.74  472.38   29.05  472.37   29.41  472.35
   30.77  472.23   33.05  472.11   33.91  472.08   34.78  472.06   35.77  472.03
   38.81  471.87   38.93  471.87   39.08  471.87   40.78  471.87   42.37  471.82
   43.85  471.77    45.4  471.75   45.72  471.75   47.05  471.69   48.81   471.6
   49.18  471.56   50.66  471.38   50.81  471.35    52.2  471.08   53.73  470.79
   54.15  470.66   55.53  470.17   56.35  469.81   58.67   468.7   59.43  468.36
   59.57   468.3   65.82  465.18   69.82  465.18   74.74  467.64   75.03  467.74
   77.15  468.36   78.17  468.64   78.69  468.77   79.96  469.08   80.64  469.19
   82.26  469.43   82.73  469.51   83.88  469.66   84.82  469.79   85.56  469.77
   87.85  469.86   88.31  469.88   89.72  469.81   90.49  469.83   92.79   469.8
   93.22  469.84   94.49  469.85   96.05  469.94    97.5  470.04   99.15  470.12
   99.32  470.13   99.86  470.17  102.42  470.35  103.11  470.38  104.24  470.44
  105.75  470.55  107.25  470.67  109.03  470.75  109.04  470.75  109.08  470.75
  111.33   470.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   50.66    .035   59.57     .03   82.26    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         59.57   74.74           109.55  109.49   109.4             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   36.76 482.816

CROSS SECTION
```

RIVER: South_Channel
REACH: Reach RS: 901.7494

INPUT
Description:
Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.74	1.14	470.7	2.72	470.68	4.45	470.7	6.29	470.71
8.27	470.65	13.97	470.66	15.39	470.67	16.92	470.63	17.25	470.63
18.87	470.64	20.59	470.63	22.53	470.61	24.65	470.56	25.17	470.57
26.28	470.55	27.26	470.54	28.96	470.51	30.12	470.48	31.16	470.47
32.15	470.46	32.84	470.46	35.01	470.45	36.33	470.45	37.18	470.45
39.02	470.44	40.04	470.43	40.43	470.43	42.18	470.46	44.13	470.45
44.99	470.44	45.29	470.44	47.15	470.44	48.11	470.35	48.88	470.27
49.3	470.23	50.33	470.12	52.09	469.59	52.3	469.51	52.71	469.31
54.55	468.53	55.45	468.16	58.42	466.67	59.8	465.85	60.46	465.65
62.28	464.74	66.28	464.74	68.31	465.76	69.57	465.86	71.02	466.26
71.62	466.48	73.31	467.34	74.48	467.93	74.83	468.12	76.51	468.93
78.54	469.64	78.7	469.7	79.34	469.92	80.98	470.14	81.41	470.19
83.69	470.16	84.27	470.16	84.88	470.19	86.28	470.22	88.14	470.35
89.02	470.39	89.75	470.44	91.19	470.51	93.07	470.62	93.97	470.66
94.7	470.67	95.96	470.65	97.84	470.64	98.7	470.64	99.75	470.66
100.82	470.68	102.74	470.69	103.63	470.69	104.06	470.69	105.71	470.67
107.9	470.71	108.45	470.71	109.16	470.73	110.51	470.73	110.94	470.74

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.018	47.15	.035	55.45	.03	71.62	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

55.45	68.31	99.3	99.2	99.08	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	36.01	480.742

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 802.5478

INPUT
Description:
Station Elevation Data num= 139

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.94	17.5	469.88	17.83	469.9	18.17	469.89	31.38	469.35
31.53	469.34	31.68	469.34	31.83	469.33	31.99	469.33	32.16	469.32
32.32	469.32	32.5	469.31	32.68	469.3	32.87	469.3	33.07	469.29
33.27	469.28	45.18	469	46.75	469.03	46.88	469.03	47.35	469.03
47.46	469.03	48.12	469.07	49.68	469.09	51.79	469.09	52.11	469.09
54.6	469.08	54.89	469.08	55.26	469.09	56.85	469.11	58.1	469.13
58.71	469.14	59.45	469.15	60.33	469.14	61.06	469.13	62.13	469.11
63.49	469.11	64.1	469.11	64.58	469.1	65.89	469.04	67.48	468.97
67.65	468.97	67.86	468.97	69.48	468.96	70.85	468.92	71.33	468.91
72.23	468.89	73.26	468.87	73.82	468.86	75.15	468.85	76.58	468.79
76.99	468.77	77.36	468.77	79.05	468.79	80.35	468.75	81.51	468.72
83.72	468.68	84.22	468.67	85.04	468.65	86.01	468.62	86.59	468.62
88.35	468.57	90.14	468.55	90.86	468.54	93.14	468.51	93.4	468.51
94.41	468.49	96.15	468.45	96.6	468.45	98.88	468.42	99.55	468.4
101.71	468.33	103.11	468.28	103.93	468.25	104.85	468.23	105.55	468.21
106.18	468.21	107.77	468.17	109.65	468.1	110.14	468.09	110.79	468.09

```
  111.89  468.09  112.71  468.06  114.15  468.01  116.11     468  116.64  467.99
  117.49  467.97  118.59  467.95  119.29  467.93  120.97  467.89  122.83  467.84
  123.27  467.81  123.75  467.81  124.88  467.77  125.94  467.75  126.78  467.73
  128.59  467.71  129.16   467.7  129.43  467.72  131.33  467.79   132.1  467.78
  132.38  467.77  132.52  467.78  134.97  467.79  136.17  467.84  137.39  467.89
  139.46  467.99  139.93     468  142.14  468.19  142.36  468.21  142.79  468.23
  143.18  468.25   144.9  468.33  146.16  468.19  147.33  468.05  149.18  467.49
  155.45  464.35  159.45  464.35  170.54  469.89  171.76  470.32  173.53  470.62
  174.33  470.76  175.02  470.86  175.86  470.95   177.5  470.98  179.65  471.15
  180.25  471.21  183.31  471.34  185.66  471.51  186.46  471.52  188.29  471.54
  188.96  471.54  189.65  471.55  191.21  471.56  192.84  471.58   193.7  471.58
  194.96  471.58  196.11   471.6  197.74  471.57  198.39  471.55

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018   144.9    .035  149.18     .03  170.54     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        149.18  170.54             22.62   31.77   46.56             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   38.89 479.938

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 770.7793

INPUT
Description:
Station Elevation Data    num=     140
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  469.75    2.14  469.73    2.71  469.72    5.13  469.68    5.39  469.67
   19.12  469.62   19.31  469.63   19.51  469.63   34.16  469.03   34.17  469.03
   34.18  469.03   34.19  469.03    34.2  469.03   34.21  469.03   34.22  469.03
   34.23  469.03   34.65  469.02    34.7  469.02    36.6  469.02   37.23  469.02
   37.42  469.03   37.75  469.03   42.04  469.06   46.44  469.13    46.8  469.13
   46.89  469.13    49.3  469.16    50.5  469.17   51.88  469.18   53.41  469.15
   54.39  469.16   56.48  469.14   56.83  469.14      57  469.14   58.69  469.15
   59.98  469.12   60.64   469.1   61.79  469.08   62.96  469.05   63.62  469.03
   65.67  468.95   66.43  468.94   67.93   468.9   69.88  468.85   69.92  468.85
   69.96  468.85   71.55  468.84    72.9  468.81   73.24   468.8   73.69  468.79
   75.19  468.75   76.34  468.71   77.06  468.68    78.1  468.63   78.81   468.6
    79.3  468.57   80.63  468.54   82.26  468.55   82.47  468.55   82.63  468.55
   84.38  468.46   85.63  468.43   86.29  468.42   87.03  468.41   88.14  468.39
   89.11  468.38    90.1  468.39   92.14  468.39   92.17  468.39   92.21  468.39
   93.79  468.33   95.38  468.33   95.42  468.33   95.46  468.33   97.26  468.33
   98.38   468.3    99.4  468.29   101.7  468.24  101.84  468.24   101.9  468.24
  104.32  468.18  104.89  468.17  107.02  468.15  108.29  468.11  109.79  468.04
  111.32  468.02  112.58  468.02  114.81  467.94  115.13  467.92  115.48  467.92
  116.76   467.9  117.92  467.86   118.7  467.83  121.35  467.76  121.36  467.76
  121.37  467.76  123.08  467.71   124.4  467.65  125.11  467.62  127.71  467.56
  127.77  467.56  127.78  467.56  129.75  467.51  130.99  467.48  131.96  467.45
  134.49  467.37  134.52  467.37  134.56  467.37  136.16  467.42  137.65  467.34
  137.87  467.33  138.35  467.34  140.27  467.36  141.08  467.35  142.66  467.33
  144.42  467.43  145.08  467.49  146.47  467.59   147.4  467.66  147.84  467.69
  150.03  467.74  151.16  467.75   152.4  467.82  154.53  467.87  154.55  467.87
  154.58  467.87  156.19  467.87  157.75  467.77  157.86  467.75  158.69  467.65
  159.95  467.48  161.19  467.21  161.96  467.07  162.82  466.84  163.28  466.72
  168.29  464.22  172.29  464.22  175.96  466.05  182.29  469.22   212.2  469.02

Manning's n Values        num=       4
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```
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  156.19    .035  163.28     .03  182.29     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        163.28  175.96           32.88   42.84   62.72             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0  154.53  467.87       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   29.88 479.748

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 727.9443

INPUT
Description:
Station Elevation Data    num=     118
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   469.4    9.74  469.32    9.81  469.32   10.15  469.31   10.18  469.31
   12.07   469.3    12.1   469.3   12.13   469.3   14.21  469.22   14.52  469.22
   15.03  469.21   17.67  469.22   18.39  469.23   21.02  469.25    23.7  469.26
   24.63  469.27   26.31  469.28   26.44  469.28   26.57  469.28   28.17   469.3
   29.85  469.29   29.91  469.29   30.01  469.29   31.74  469.29   32.75  469.29
   33.77  469.29   35.26  469.24   36.02   469.2   36.53  469.18   38.07  469.13
   39.54  469.11   40.31  469.08   43.04  469.05   43.08  469.05   43.18  469.05
   45.16  468.97   46.02  468.95   47.59  468.94   49.65   468.9    50.2   468.9
   52.25  468.85   52.51  468.85   52.57  468.85   55.12  468.84   56.12   468.8
   57.67  468.75   59.12   468.7   60.17  468.65   62.63  468.57   64.51  468.49
   65.68  468.46   66.57  468.43   68.03  468.38   68.79  468.36   69.24  468.35
   71.53  468.32   72.12  468.31   73.71  468.26   75.53  468.26   75.69  468.26
   75.87  468.26    77.3  468.24   78.58  468.19   78.99  468.18   79.57  468.19
   80.97   468.2   81.96  468.21   82.84  468.19   84.08  468.18   84.61  468.17
   84.99  468.16    86.4  468.15    88.2   468.1   88.21   468.1   88.22   468.1
   90.17  468.13    91.3  468.11   92.09  468.09      93  468.07   93.94  468.05
   94.72  468.04   95.91  468.05   97.78     468   98.11  467.99  101.02  467.94
  101.16  467.94   101.5  467.94  103.23   467.9  104.01  467.89  105.41  467.84
  107.48  467.78   107.7  467.78  108.64  467.76   110.2  467.72  110.56  467.71
  112.97  467.65  113.89  467.63  115.69  467.59  116.95  467.54  118.47  467.49
  118.92  467.47  119.79  467.44  120.69  467.41  121.91  467.38  122.81  467.38
  123.98  467.36  124.93  467.35   126.1  467.52  127.02  467.65  128.18  467.61
  129.12  467.59  130.28   467.5  130.88  467.44  137.65  464.05  141.65  464.05
  151.65  469.05  161.99  468.98  191.08  468.79

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .18  127.02    .035  129.12     .03  151.65     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.88  161.99          105.78  105.88  106.14             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  127.02  467.65       T
  151.65  191.08  469.05       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0    9.54469.3978

CROSS SECTION
```

RIVER: South_Channel
REACH: Reach RS: 622.0599

INPUT
Description:
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.53	52.1	469.28	61.95	469.05	61.99	469.05	62.02	469.04
62.12	469.05	62.86	469.05	64.37	469.05	65.92	469.1	66.45	469.12
68.03	469.14	68.54	469.14	70.14	469.17	70.63	469.19	72.27	469.21
72.73	469.2	74.37	469.2	74.82	469.2	76.49	469.2	76.9	469.2
78.62	469.17	79.02	469.16	80.78	469.1	81.13	469.1	82.89	469.08
83.22	469.07	84.99	469.01	85.32	469	87.13	468.94	87.42	468.93
89.24	468.84	89.51	468.83	91.35	468.74	91.59	468.73	93.46	468.68
93.68	468.67	95.57	468.67	95.77	468.66	97.67	468.63	97.85	468.63
99.79	468.6	99.95	468.6	101.9	468.57	102.04	468.57	104.05	468.54
104.15	468.54	106.15	468.54	106.25	468.54	108.27	468.54	108.33	468.54
110.37	468.47	110.42	468.47	112.48	468.5	112.51	468.5	114.59	468.47
114.6	468.47	115.54	468.44	116.72	468.4	116.74	468.4	116.75	468.4
118.84	468.34	118.87	468.34	120.97	468.24	121.03	468.24	123.07	468.24
123.14	468.24	125.17	468.24	125.26	468.24	127.24	468.21	127.35	468.21
129.34	468.14	129.47	468.14	131.42	468.13	133.35	468.04	133.52	468.03
135.44	468.03	135.62	468.03	137.51	468	137.72	468	137.93	468
139.86	467.93	140.08	467.93	140.81	467.93	149.41	463.63	153.41	463.63
163.41	468.63	175.16	468.55	194.31	468.42				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	140.81	.03	163.41	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
140.81	175.16	100.01	100	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
163.41	194.31	468.63	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	59.24	480.533

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 522.0566

INPUT
Description:
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.56	35.34	469.76	61.3	469.15	61.33	469.17	62.65	469.13
63.43	469.11	64.21	469.11	65.56	469.11	66.36	469.12	67.66	469.14
68.47	469.15	69.77	469.17	71.03	469.17	71.87	469.17	73.15	469.19
73.98	469.2	74.84	469.18	76.07	469.18	77.29	469.16	78.17	469.17
79.04	469.18	80.29	469.18	81.19	469.17	82.39	469.17	83.3	469.17
84.46	469.17	85.64	469.16	86.6	469.16	87.76	469.14	88.7	469.14
89.66	469.13	90.8	469.11	91.77	469.11	92.9	469.09	94	469.09
95	469.05	96	469.05	97.1	469.03	98.18	469.01	99.2	469.01
100.26	468.99	101.32	468.99	102.37	468.99	103.42	469	104.43	469
105.5	468.98	106.51	468.98	107.59	468.96	108.6	468.93	109.69	468.92
110.67	468.88	111.77	468.87	112.76	468.87	113.87	468.83	114.84	468.82
116	468.78	116.96	468.75	118.11	468.75	119.06	468.73	120.23	468.72
121.16	468.7	122.34	468.69	123.26	468.67	124.44	468.65	125.36	468.64

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  126.56   468.6  127.44   468.6  128.66  468.56  129.53  468.51  130.76  468.51
  131.62   468.5  132.86  468.44   133.7  468.44  134.96  468.48  135.78  468.47
  137.08  468.35  137.89  468.14  139.17  468.02  139.98  468.03  140.41  468.02
  143.22  466.62  145.46  465.29  145.97  465.25     150  463.23     154  463.23
     164  468.23  176.26  468.15  191.67  468.05

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.78    .035  140.41     .03     164     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        140.41  176.26           100.01     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     164  191.67  468.23       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   58.08 480.557

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 422.0532

INPUT
Description:
Station Elevation Data    num=      82
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  470.68    1.41  470.65   60.58  469.31   61.94  469.43   62.05   469.4
   62.77   469.4   64.15  469.27   64.87  469.25   66.25   469.2   66.94  469.18
   68.35  469.16   69.03  469.14   70.45  469.09   71.12  469.07   72.56  469.05
   73.21  469.04   74.65  468.99    75.3  468.99   76.78  468.97   77.43  468.94
   78.88   468.9   79.52   468.9   80.99  468.87   81.63  468.87    83.1  468.87
   83.72  468.87   85.21  468.87   85.81  468.86   87.31  468.84   87.91  468.84
   89.42  468.84      90  468.84   91.52  468.84   92.08  468.84   93.63  468.84
   94.18  468.84   95.72  468.89   96.27  468.88   97.82  468.84   98.36  468.84
   99.92  468.82  100.46  468.81  102.06  468.84  102.59  468.85  104.17   468.8
  104.68  468.79  106.28  468.82  106.77  468.82  108.38  468.74  108.87  468.72
  110.49  468.72  110.95  468.72  112.59  468.64  113.05  468.64  114.72  468.66
  115.18  468.65  116.82   468.6  117.27  468.59  118.93  468.57  119.36  468.57
  121.03  468.54  121.46  468.53  123.14  468.48  123.54  468.47  125.22  468.44
  125.61  468.42  127.32  468.37   127.7  468.36  129.39   468.3  129.77  468.29
  131.47  468.27  131.84  468.26  133.57   468.2  133.93  468.23  135.68  468.31
  136.04  468.22  137.57  467.79  147.48  462.83  151.48  462.83  161.48  467.83
  176.12  467.73  192.44  467.62

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  135.68    .035  137.57     .03  161.48     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        137.57  176.12           100.01     100     100             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  161.48  192.44  467.83       T
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0   56.91  480.68

CROSS SECTION
```

RIVER: South_Channel
REACH: Reach RS: 322.0501

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.07	30.54	470.22	49.62	469.55	57.58	469.42	58.78	469.45
59.56	469.31	63.51	469.18	63.76	469.16	64.13	469.15	65.86	469.13
66.21	469.12	67.97	469.12	68.31	469.12	70.07	469.06	70.39	469.05
72.18	469	72.48	468.99	74.28	468.93	74.57	468.92	76.41	468.9
76.69	468.89	78.52	468.8	78.78	468.8	80.62	468.77	80.87	468.76
82.73	468.7	82.96	468.7	84.83	468.67	85.05	468.66	86.95	468.6
87.15	468.6	89.05	468.57	89.23	468.56	91.18	468.5	91.35	468.5
93.28	468.47	93.44	468.47	95.39	468.47	95.53	468.47	97.5	468.44
97.62	468.44	99.6	468.44	99.71	468.43	101.71	468.34	101.8	468.34
103.78	468.31	103.86	468.31	105.89	468.27	105.95	468.27	108.02	468.24
108.07	468.24	110.14	468.16	110.16	468.16	112.24	468.1	112.26	468.1
113.8	468.08	114.34	468.07	114.35	468.07	115.35	468.04	116.44	468
116.45	468	117.4	467.97	118.54	467.93	118.55	467.93	120.63	467.84
120.66	467.84	122.69	467.74	122.73	467.74	124.78	467.77	124.84	467.77
126.87	467.74	126.95	467.74	128.96	467.67	129.06	467.67	131.06	467.61
131.17	467.61	133.15	467.54	133.28	467.54	135.22	467.51	135.36	467.51
136.25	467.48	137.31	467.44	137.47	467.43	137.57	467.43	147.56	462.43
151.56	462.43	161.56	467.43	174.46	467.34	188.39	467.25		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	137.57	.03	161.56	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
137.57 174.46 100.01 100 100 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
161.56	188.39	467.43	T

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	55.74	481.067

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 222.0471

INPUT
Description:
Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	470.32	.86	470.33	1.04	470.33	2.95	470.34	3.15	470.34
5.07	470.38	5.29	470.38	7.17	470.43	7.39	470.43	9.28	470.46
9.52	470.47	11.37	470.48	11.63	470.49	13.45	470.45	13.73	470.45
15.54	470.48	15.84	470.48	17.63	470.49	17.94	470.49	19.72	470.46
20.04	470.45	21.81	470.44	22.14	470.44	23.89	470.41	24.25	470.41
25.98	470.4	26.36	470.39	28.1	470.41	28.49	470.4	30.18	470.4
30.59	470.4	32.27	470.38	32.7	470.38	34.35	470.34	34.79	470.34
36.44	470.37	36.9	470.37	38.51	470.33	38.98	470.33	40.6	470.3
41.09	470.3	42.71	470.3	43.21	470.3	44.8	470.35	45.32	470.36
46.88	470.33	47.42	470.33	49	470.33	49.55	470.34	51.08	470.37
51.67	470.37	53.18	470.34	53.77	470.33	55.26	470.31	55.87	470.3
57.35	470.3	57.97	470.31	59.43	470.3	60.08	470.28	61.52	470.27
62.18	470.26	63.61	470.25	64.29	470.25	65.69	470.23	66.39	470.23
67.77	470.19	68.49	470.17	69.85	470.17	70.6	470.17	71.96	470.16

72.71	470.16	74.05	470.19	74.84	470.19	76.14	470.2	76.94	470.21
78.21	470.21	79.06	470.22	80.32	470.24	81.17	470.25	82.42	470.25
83.27	470.21	84.49	470.2	85.37	470.23	86.58	470.21	87.48	470.18
88.66	470.15	89.59	470.14	90.75	470.11	91.69	470.08	92.84	470.05
93.79	470.04	94.92	470.04	95.9	470.04	96.99	470.02	97.99	470.02
99.07	470.02	100.1	470.03	101.16	470.04	102.2	470.06	103.26	470.07
104.32	470.02	105.35	470	106.42	470	107.44	469.99	108.55	469.98
109.53	469.99	110.63	469.99	111.6	469.96	112.74	469.89	113.68	469.86
114.82	469.86	115.77	469.9	116.93	469.93	117.84	469.95	119.02	469.94
119.9	469.93	121.12	469.93	122.01	469.93	123.26	469.91	124.12	469.92
125.37	469.94	126.2	470.01	127.5	470.29	128.3	470.45	129.62	470.82
130.38	470.79	131.09	470.74	148.5	462.03	152.5	462.03	162.5	467.03
171.29	466.97	188.87	466.85						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.018	129.62	.03	162.5	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
131.09	171.29	167.9	167.77	167.53	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
162.5	188.87	467.03	T

CROSS SECTION

RIVER: South_Channel
REACH: Reach RS: 54.279

INPUT
Description:
Station Elevation Data num= 132

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.65	.84	474.62	1.2	474.61	2.94	474.61	3.29	474.6
5.06	474.55	5.41	474.54	7.16	474.45	7.53	474.44	9.26	474.38
9.65	474.38	11.37	474.41	11.74	474.4	13.47	474.28	13.87	474.26
15.57	474.21	15.97	474.22	17.67	474.19	18.07	474.2	19.77	474.2
20.18	474.21	21.85	474.23	22.27	474.22	23.96	474.25	24.39	474.25
26.07	474.22	26.48	474.22	28.19	474.16	28.6	474.17	30.28	474.17
30.72	474.14	32.38	474.06	32.82	474.06	34.48	474.06	34.92	474.06
36.58	474.06	37.05	474.07	38.71	474.07	39.17	474.07	40.82	474.07
41.28	474.07	42.91	474.15	43.4	474.15	45.02	474.15	45.5	474.18
47.14	474.28	47.62	474.28	49.24	474.28	49.72	474.29	51.34	474.31
51.84	474.32	53.44	474.29	53.94	474.3	55.55	474.32	56.04	474.32
57.65	474.3	58.18	474.32	59.76	474.33	60.28	474.33	61.86	474.35
62.38	474.35	63.96	474.4	64.5	474.4	66.03	474.43	66.57	474.43
68.16	474.46	68.69	474.5	70.26	474.52	70.81	474.53	72.36	474.53
72.91	474.53	74.46	474.5	75.02	474.45	76.56	474.38	77.1	474.09
78.61	473.02	79.13	472.63	80.68	471.49	81.18	471.29	82.75	470.79
83.24	470.72	84.85	470.6	85.35	470.57	86.95	470.44	87.45	470.4
89.03	470.33	89.52	470.3	91.13	470.18	91.64	470.16	93.26	470.08
93.78	470.06	95.34	470.01	95.85	470	97.44	470	97.96	469.97
99.57	469.87	100.09	469.86	101.65	469.79	102.18	469.78	103.75	469.78
104.28	469.76	105.85	469.69	106.37	469.66	107.94	469.63	108.5	469.62
110.05	469.54	110.6	469.53	112.18	469.46	112.73	469.45	114.25	469.42
114.79	469.4	116.35	469.36	116.91	469.34	118.43	469.29	118.99	469.27
120.51	469.24	121.07	469.25	122.59	469.23	123.14	469.2	124.69	469.1
125.28	469.24	126.8	469.62	127.39	469.65	128.93	469.72	129.63	469.76
130.44	469.81	130.79	469.81	147.67	461.37	151.67	461.37	161.67	466.37
169.11	466.32	275.36	465.61						

Manning's n Values num= 3

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     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  130.44     .03  161.67     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.79  169.11           49.37   49.41    49.5            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  161.67  275.36  466.37       T

CROSS SECTION


RIVER: South_Channel
REACH: Reach              RS: 4.867403

INPUT
Description:
Station Elevation Data    num=     142
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  474.56     .19  474.57       1  474.57     2.3  474.55    3.09  474.53
     4.4  474.55    5.18  474.55    6.49  474.55    7.27  474.55     8.6  474.52
    9.37  474.52    10.7  474.54   11.45  474.56   12.83  474.56   13.57  474.55
   14.93  474.55   15.66  474.56   17.03  474.56   17.76  474.55   19.13  474.52
   19.85  474.53   21.26  474.58   21.96  474.58   23.36  474.58   24.05  474.58
   25.46  474.56   26.15  474.54   27.56  474.52   28.23  474.51   29.67  474.48
   30.33  474.47   31.78  474.43   32.43  474.43   33.88  474.43   34.53  474.41
      36  474.38   36.63  474.37    38.1  474.35   38.74  474.36   40.21  474.36
   40.84  474.35   42.31  474.35   42.94  474.35   44.41  474.35   45.01  474.36
   46.49  474.34   47.08  474.34   48.59  474.34   49.18  474.33    50.7   474.3
   51.27  474.29    52.8  474.29   53.36  474.29   54.93  474.22   55.47   474.2
   57.03  474.25   57.57  474.24   59.13  474.19   59.68  474.18   61.25  474.31
   61.76   474.3   63.35  474.13   63.85  474.12   65.44   474.1   65.95  474.08
   67.56  474.08   68.07   474.1   69.67  474.07   70.14  474.05   71.77  474.03
   72.24  474.04   73.87  474.06   74.34  474.05   75.98  474.05   76.43  474.04
   78.07  474.07   78.51  474.09   80.17  474.03    80.6  473.99   82.28  473.65
    82.7  473.47   84.35  472.49   84.79  472.22   86.39  471.26   86.84  471.05
   88.46  470.58    88.9  470.48   90.56  470.19      91  470.17   92.66  470.11
   93.09   470.1   94.76  470.05   95.19  470.03   96.86  469.97   97.28  469.96
   98.98  469.86    99.4  469.84  101.09  469.82  101.48  469.81   103.2  469.79
  103.57  469.78   105.3  469.74  105.67  469.74  107.43  469.72   107.8  469.71
  109.54  469.66  109.89  469.65  111.63  469.65  111.98  469.65  113.74  469.62
  114.07  469.62  115.81  469.59  116.14  469.57  117.92  469.46  118.22  469.45
  120.03  469.39  120.32  469.37  122.09  469.23  122.38  469.22  124.23  469.12
  124.51  469.11  126.33  469.05   126.6  469.04   128.4  468.95  128.68  469.02
  130.51  469.53  130.76  469.56  132.34  469.59  132.58  469.59  132.82  469.56
  134.09  469.38  139.41  466.71  140.95  465.75   141.2   465.6  143.05  464.71
  143.32  464.63  144.92  463.96   150.5  461.17   154.5  461.17   164.5  466.37
  174.62   466.3   280.6   465.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .018  132.34     .03   164.5     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        134.09  174.62           37.89    4.87   40.87            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
   164.5   280.6  466.37       T



SUMMARY OF REACH LENGTHS
```

River: South_Channel

Reach	River Sta.	Left	Channel	Right
Reach	1311.239	102.88	100	100
Reach	1211.239	100	100	100
Reach	1111.238	100	100	100
Reach	1011.238	109.55	109.49	109.4
Reach	901.7494	99.3	99.2	99.08
Reach	802.5478	22.62	31.77	46.56
Reach	770.7793	32.88	42.84	62.72
Reach	727.9443	105.78	105.88	106.14
Reach	622.0599	100.01	100	100
Reach	522.0566	100.01	100	100
Reach	422.0532	100.01	100	100
Reach	322.0501	100.01	100	100
Reach	222.0471	167.9	167.77	167.53
Reach	54.279	49.37	49.41	49.5
Reach	4.867403	37.89	4.87	40.87

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: South_Channel

Reach	River Sta.	Contr.	Expan.
Reach	1311.239	.1	.3
Reach	1211.239	.1	.3
Reach	1111.238	.1	.3
Reach	1011.238	.1	.3
Reach	901.7494	.1	.3
Reach	802.5478	.1	.3
Reach	770.7793	.1	.3
Reach	727.9443	.1	.3
Reach	622.0599	.1	.3
Reach	522.0566	.1	.3
Reach	422.0532	.1	.3
Reach	322.0501	.1	.3
Reach	222.0471	.1	.3
Reach	54.279	.1	.3
Reach	4.867403	.1	.3

Attachment 18 – STORAGE VOLUME CALCULATIONS AND SUPPORT MATERIAL

Hydrologic Parameter Summary		
Basin	North - Bristow Channel	South - Siempre Viva Channel
Total Basin Area	74.7	45.6
Composite Runoff Coefficient	0.71	0.72

Runoff Coefficients			
Basin	Landuse Type - SANGIS Current Land Use Layer	Area (acres)	Runoff Coefficient
North - Bristow Channel	Spaced Rural Residential	1.81	0.4
North - Bristow Channel	Vacant and Undeveloped Land	14.74	0.4
North - Bristow Channel	Light Industry - General	13.66	0.9
North - Bristow Channel	Warehousing	8.28	0.9
North - Bristow Channel	Heavy Industry	7.05	0.9
North - Bristow Channel	Vacant and Undeveloped Land	6.92	0.4
North - Bristow Channel	Field Crops	4.35	0.4
North - Bristow Channel	Road Right of Way	4.19	0.95
North - Bristow Channel	Wholesale Trade	3.97	0.9
North - Bristow Channel	Road Right of Way	3.10	0.95
North - Bristow Channel	Warehousing	2.21	0.9
North - Bristow Channel	Road Right of Way	1.62	0.95
North - Bristow Channel	Road Right of Way	1.56	0.95
North - Bristow Channel	Industrial Park	0.62	0.4
North - Bristow Channel	Road Right of Way	0.32	0.95
North - Bristow Channel	Vacant and Undeveloped Land	0.26	0.4
North - Bristow Channel	Intensive Agriculture	0.08	0.4
North - Bristow Channel	Road Right of Way	0.01	0.95
South - Siempre Viva Channel	Industrial Park	22.53	0.9
South - Siempre Viva Channel	Vacant and Undeveloped Land	8.22	0.4
South - Siempre Viva Channel	Vacant and Undeveloped Land	7.98	0.4
South - Siempre Viva Channel	Wholesale Trade	4.25	0.9
South - Siempre Viva Channel	Road Right of Way	1.39	0.95
South - Siempre Viva Channel	Open Space Park or Preserve	0.40	0.4
South - Siempre Viva Channel	Road Right of Way	0.39	0.95
South - Siempre Viva Channel	Open Space Park or Preserve	0.22	0.4
South - Siempre Viva Channel	Vacant and Undeveloped Land	0.13	0.4
South - Siempre Viva Channel	Vacant and Undeveloped Land	0.06	0.4

Runoff Volume and Storage Capacity Calculations for Shared Detention Facility at Downstream Ends of Siempre Viva and Bristow Channels (MMP Map No. 126 and 127)
Prepared 02/24/17
RICK Engineering Company
J-17204-L

Total 6-hour Runoff Volumes						
	2-year	5-year	10-year	25-year	50-year	100-year
6 hour precip	0.9	1.2	1.4	1.7	2	2.3
North - Bristow Channel (ft^3)	174,509	232,679	271,458	329,628	387,798	445,967
South - Siempre Viva Channel (ft^3)	106,441	141,921	165,574	201,054	236,535	272,015

Channel/Detention Basin Storage Capcities			
Condition	Channel	North - Bristow Channel	South - Siempre Viva Channel
	Basin Invert (ft NAVD 88)	467.34	467.34
Current Vegetated Condition	Storage Volume (ft^3)	57,025	37,394
	Existing Storage Capacity	<2 year	<2 year
	Approximate 6-hour Precipitation Depth (in)	0.29	0.32
Maintained Condition - Sediment and Vegetation Removed	Storage Volume (ft^3)	100,328	58,556
	Storage Capacity	<2 year	<2 year
	Approximate 6-hour Precipitation Depth (in)	0.52	0.50
	% Increase	75.94%	56.59%

Runoff Volume and Storage Capacity Calculations for Shared Detention Facility at Downstream Ends of Siempre Viva and Bristow Channels (MMP Map No. 126 and 127)
Prepared 02/24/17
RICK Engineering Company
J-17204-L