# Hydraulics/Hydrology/Scour Report

Gardiner, Maine
Bridge Street Bridge (#2101) over Cobbossee Stream WIN 018735.00
Maine Avenue Bridge (#3098) over Cobbossee Stream WIN 018736.00
Multi-use Bridge over Cobbossee Stream WIN 018736.10

Stantec

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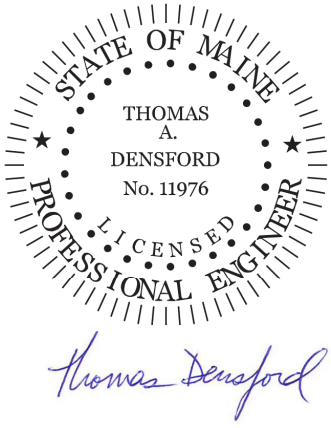


June 6, 2018

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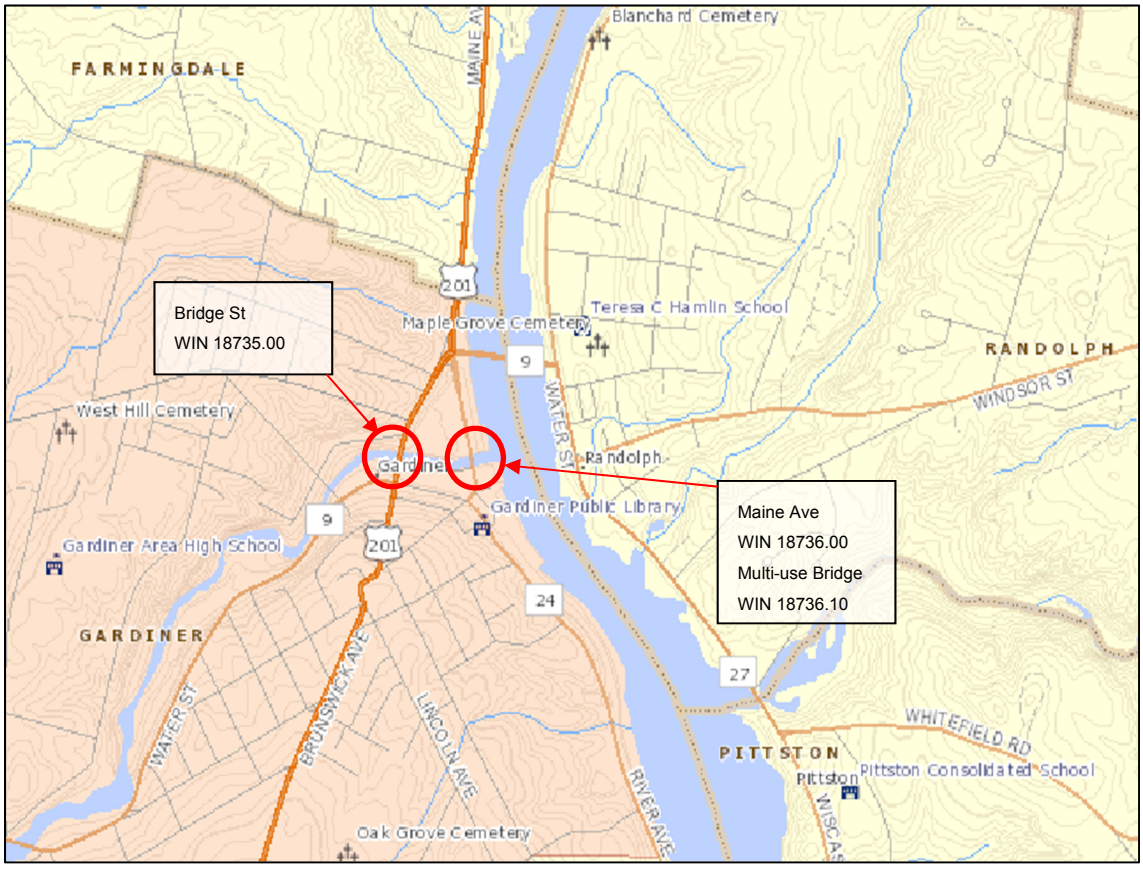
# 1.0 LOCATION AND PURPOSE

This report discusses two existing roadway bridge crossings, and a proposed new multi-use bridge crossing, of the Cobbosseecontee (Cobbossee) Stream, in Gardiner, Maine. The Cobbossee Stream is tributary to the Kennebec River, which lies immediately downstream of the project area.

The two existing roadway bridges are located at Bridge Street and Maine Avenue, and are scheduled for replacement. The proposed multi-use bridge is just upstream of the Maine Avenue Bridge. This report shows the study of the existing hydraulic conditions and compares the proposed conditions of the reconstructed bridges with the existing conditions. This report presents the setting and hydrologic data, as well as the hydraulic data for the existing and proposed bridges.




**LOCATION MAP**

# 2.0 BRIDGE DESCRIPTIONS & FLOOD HISTORY

## 2.1 BRIDGE STREET BRIDGE

The existing Bridge Street Bridge carries U.S. Route 201 over the Cobbossee Stream. The bridge consists of four 55-foot spans of concrete T-beams, with a total superstructure depth of about 6.0 feet. The superstructure is on mass piers and high cantilever abutments with shallow foundations founded on native fill material. The bridge crosses a FEMA Flood Zone and Regulatory Floodway, shown in Figure 1. The northern two bridge spans cross the Cobbossee Stream, the southern interior span crossing Arcade Street, and the southern exterior span crossing a fill slope. The vertical clearance over Arcade Street is 11.0'. The bridge supports several utilities, and overhead power exists above the bridge. An elevated concrete driveway structure abuts the bridge along its southwest edge.

An existing building, of about 23 feet in width, was on the south overbank of the Cobbossee Stream, blocking a portion of the overbank in higher flows. During the completion of this report, that building has been removed, but it remains in the existing conditions model, so the effect of its removal may be shown with other project modifications.

The existing channel upstream and downstream are lined with large stones, and appear to be stable. Small concrete walls surround each of the piers on the stream banks; these may have served as cofferdams and were left in place as scour protection. Remnants of a stacked granite block dam are just upstream of the bridge, and the bridge may have been located within the spillway area when the dam was functional. The dam remnants have been identified as a historical resource, and will remain.

The proposed Bridge Street Bridge consists of a single steel plate girder span of 135 feet, with a superstructure depth of about 5.5 feet, founded on high cantilever abutments on deep foundation piles. The proposed bank protection is riprap revetments at 1.75:1 to 2.0:1 slope.

## 2.2 MAINE AVENUE BRIDGE AND MULTI-USE BRIDGE

The existing Maine Avenue Bridge carries Maine Avenue over the Cobbossee Stream. The bridge consists of one concrete T-beam span of 50.0 feet, with a superstructure depth of about 4.5 feet. The superstructure is on stacked granite stone abutment walls that extend below stream grade and are founded on native fill materials. This bridge lies inundated beneath the FEMA Flood Zone water surface at the flood stage of the Kennebec River. Figure 1 shows the FEMA Flood Zone and Regulatory Floodway in the project area.

The existing channel upstream is lined with large stones and appears to be stable. The existing channel downstream has an unprotected earth slope on the south side, and a high retaining wall on the north side. While the invert of the stream is lined with large stones, the southern earth slope is prone to erosion, the northern retaining wall is prone to scour, and a known grout bag

scour repair exists at the downstream corner of the north abutment. Further downstream is a rail bridge which is founded on the retaining wall to the north and a failing stacked-stone abutment on the south. The rail bridge no longer carries rail traffic.

The proposed Maine Avenue Bridge is a single span of 78.0 feet, with a superstructure depth of about 3.7 feet, founded on integral abutments on deep foundation piles. The proposed bank protection is riprap revetments at 1.5:1 slope. Erosion and scour protection at the south earthen slope and north retaining wall should be considered for inclusion in project scoping. Similarly, the design should consider protection against high flows for the failing rail bridge south abutment.

A proposed separated Multi-use Bridge, approximately 50 feet upstream of the Maine Avenue Bridge, was modeled to determine its influence on flows. The Multi-use Bridge's proposed low chord elevation is about 8" above the proposed Maine Ave bridge's low chord elevation.

## 2.3 FLOOD HISTORY

According to the Kennebec County Flood Insurance Study:

> *In Kennebec County, flooding generally occurs in the winter or early spring as a result of heavy rainfall on snow covered or frozen ground. Ice jams in the rivers can compound flood problems.*
>
> *The most notable floods on the Kennebec River occurred in May 1832, December 1901, March 1936, and April 1987. The 1987 flood had a peak discharge of 232,000 cubic feet per second (cfs) at the USGS gaging station in Sidney (station No. 01049265) and a recurrence interval of over 100 years.*
>
> *Flooding in the Cities of Augusta and Gardiner occur principally in the commercial area along the banks of the Kennebec River. Gardiner has a downtown business district along Water Street, as well as a shopping center located along the bank of the Kennebec River near the mouth of Cobbosseecontee Stream, which would suffer extensive damage in a major flood.*
>
> *Three flooding events were identified within the Kennebec River Basin after 1987. The Kennebec River and Cobbosseecontee Stream flooded in March and December of 2003 as a result of ice jams. Both flooding events were estimated by the USGS to be below the 50-percent-annual-chance flood in the City of Gardiner, ME. Flooding of the Kennebec and Cobbosseecontee Rivers in April 2005 was estimated by USGS to be between the 20, and 10-percent-annual-chance flood. The April 2005 flooding event impacted the Cities of Augusta, Gardiner and Hallowell. Flooding along the Kennebec River in April 2008 (19.14 feet NAVD) reached similar gage heights in the City of Augusta as the April 2005 flooding event (19.49 feet NAVD).*

The recorded flood information indicates that FEMA FIRM flood elevations are mostly attributable to the behavior of the flows in the Kennebec River, and have less to do with the flows in the upper reaches of the Cobbossee Stream. As a result, the hydraulic openings of the bridges at Maine Avenue and Bridge Street are unlikely to affect the Kennebec-induced flooding of the greater area surrounding these bridges. However, as shown later in this Report, immediate areas

surrounding the Bridge Street Bridge and Arcade Street do experience some flooding from Cobbossee Stream flow alone. Therefore, the design of the subject bridges should only consider localized effects on the conveyance of upstream flows in the Cobbossee Stream.

# 3.0 HYDRAULIC MODELING

This Hydrology/Hydraulic/Scour Report, follows requirements contained in MaineDOT *Bridge Design Guide* (BDG) 2.1.9. The geometry of the Cobbossee Stream was generated from ground survey and contours provided by MaineDOT. Hydraulic modeling of the Cobbossee Stream was performed using HEC-RAS river modeling software obtained from the US Army Corps of Engineers, and follows MaineDOT and FEMA practices. Figure 1 shows the extent of flooding in the project area from the FEMA Flood Insurance Rate Map. Figure 2 shows the location of cross sections used in the HEC-RAS model. Cross sections A thru I, from Figure 1, were located in the HEC-RAS model (Figure 2) for comparison to FEMA FIS data. Figure 3 shows FEMA Floodway limits in the project area as obtained from the FEMA National Flood Hazard Layer of the Maine GIS website:

http://maine.maps.arcgis.com/apps/webappviewer/index.html?id=3c09351397764bd2aa9ba385d2e9efe7

Figures 4A, 4B, and 5 show the proposed bridge grading, plan, and profile at Bridge Street with the FEMA Floodway. The plan and profile figures for Bridge Street depict a bridge span of 135 feet. Earlier in the study process, an alternative design with a bridge span of 130 feet was modeled. Grading of the overbank near the north abutment to provide a smooth transition through the proposed bridge opening was conducted, and the bridge span set at 135 feet. Additionally, an old foundation of large granite blocks just northwest of the existing Bridge Street was modelled as remaining in place. The building just southeast of the Bridge Street bridge known as Dennis's Pizza was also removed from the proposed conditions (noted on Figure 4B).

Figures 6A, 6B, and 6C show the proposed Maine Avenue highway bridge in plan and profile views. Figure 7 depicts the proposed plan and profile views of the separated Multi-use bridge. FEMA's Regulatory Floodway is not shown on this plan, because the Floodway spills out beyond the adjacent parking areas to the north and south of the bridge project limits as can be seen in Figure 3. Table 1 shows the Hydrology flow rates as obtained from the FEMA Flood Insurance Study *Kennebec County FIS 23011CV001* (June 2011), and MaineDOT provided separate regression equation values shown in Table 2. Since the flow rates from the FEMA FIS marginally exceeded the flow rates provided by MaineDOT, the FEMA flow rates were accepted for use by MaineDOT. Manning's channel roughness "n" values were obtained from the FEMA FIS and compared to standard values. MaineDOT surveyors obtained tidal benchmarks, which Stantec compared to tidal gage data published by the US Department of Commerce. Tide data was obtained per MaineDOT BDG 2.3.6.

Figure 8 shows the FEMA FIS profile for the Cobbossee Stream, with the project area inundated by flooding of the Kennebec River. Figure 8 also shows cross section locations for the FEMA model used to set the Regulatory Floodway of the Cobbossee Stream in the vicinity of the Bridge Street Bridge. FEMA did not furnish a similar analysis for the lower reach of the Cobbossee Stream under non-flood conditions in the Kennebec River. Table 3 gives Floodway Data for the reach near the Bridge Street Bridge. Figure 9 shows the FEMA conceptual section of a Regulatory Floodway, which is the stream flow area needed to remain open to flows such that, if the floodplain were filled in to Floodway limits, the stream flow would be accommodated with no more than 1 foot of rise in water surface elevation. Floodway analyses were not conducted with this report.

Per MaineDOT BDG hydraulics section 2.3.3.2, BDG 2.3.10.2.C, and HEC-23, Stantec performed a Level 2 Basic Analysis, which is a qualitative plus steady flow analysis for bridge opening freeboard and foundation scour using tail waters for tidal mean high water and mean low water bounds. Stantec checked the backwater conditions of the bridge per BDG 2.3.10.4, using an existing conditions model (the FEMA Corrected Effective model developed for this project, further described below) for comparison with the proposed bridge layout model. Tidal information is shown in Appendix A.

Scour analysis was performed per HEC-18 as contained in HEC-RAS and as modified for current HEC-18 parameters. Slope protection scour countermeasures were evaluated per HEC-23 guidance, for the proposed bridge layouts. Scour and revetment calculations are shown in Appendix B and C.

# 4.0 RESULTS AND DISCUSSION

Using the HEC-RAS models described above, Stantec developed Cobbossee Stream water surface profiles for existing conditions and proposed conditions at Bridge Street and Maine Avenue for tail water conditions of Mean High Water and Mean Low Water at the confluence of Cobbossee Stream with the Kennebec River. The proposed models were also used to determine parameters for scour protection.

The hydraulic data summary Table 4 provides data typical to MaineDOT bridge plans. Figure 10 shows profile information for the FEMA FIS cross section points A thru I, as well as the remainder of the project limits downstream to the Kennebec River confluence. Representative stream profiles and sections showing bridge elevations are attached as Figures 11 thru 17.

BDG 2.3.11.1 scour requirements include evaluation of scour at the design flood (Q100) and the check flood (Q500). The procedures contained in HEC-18 have been used for scour estimation, and are contained in Appendix B. The Haley & Aldrich gradation analyses provided the soil particle sizes used for estimating scour (2.4mm Bridge St., 0.2mm Maine Ave.). Scour depths for

the unprotected channel are estimated as shown in Table 5 for Bridge Street Bridge and Maine Avenue Bridge, with the Multi-use Bridge scour similar to the nearby Maine Avenue Bridge.

| | Table 5, Scour Depth, ft. | | | |
|---|---|---|---|---|
| | @ Q100 | | @ Q500 | |
| | Clearwater | Live Bed | Clearwater | Live Bed |
| Bridge St. Bridge | 13.1 | 11.9 | 15.4 | 14.0 |
| Maine Ave. Bridge | 49.3 | 13.1 | 50.0 | 7.9 |

A review of the stream profile at Bridge Street indicates the bridge is located at a change in stream gradient. A scour hole is indicated thru and downstream of the bridge location. Field observations confirm the flow to be turbulent upstream, and calm downstream, of this location. Hydraulic analyses indicate a hydraulic jump develops upstream of the bridge location at Section B. Revetment described below is needed to protect the abutments of the Bridge Street Bridge.

While the scour estimates for Maine Avenue Bridge are in excess of field-observed conditions, all values indicate that revetment is needed to protect the abutments and retaining wall foundations downstream of the Maine Avenue Bridge.

The HEC-23 parameters for sizing riprap were selected based on the MaineDOT BDG 2.3.11.3 slope protection criteria for the design flood (Q100). Bank protection revetment calculations are shown in Appendix C. HEC-23 recommends that riprap be a minimum of 0.8 feet $D_{50}$ for Bridge Street, and 0.9 feet $D_{50}$ for Maine Avenue. According to BDG 2.3.11.3, a 4-foot minimum thickness of plain riprap should be used at Bridge Street Bridge, and a 4-foot thickness of heavy riprap should be used at Maine Avenue Bridge and Multi-use Bridge. A 4-foot thickness of heavy riprap is recommended at the subject bridge locations.

The analysis and results from HEC-RAS hydraulic simulations are contained in appendices D through F, for existing and proposed conditions, with Mean Low Water (MLW) and Mean High Water (MHW) tailwater conditions at the stream confluence with the Kennebec River. Appendix H contains the HEC-RAS electronic files.

# 5.0 FEMA SUMMARY

The FEMA FIS indicates that the 100-year Cobbossee Stream flow from upstream sources during normal tidal water (non-flood) levels in the Kennebec River is 5,910 cubic-feet/second at about 11.2 feet/second velocity, with a water surface elevation (WSEL) of 14.7 feet (NAVD 1988) upstream and 10.9 feet downstream of the Bridge Street Bridge. Since the Flood Zone inundates the Maine Avenue Bridge, the FIS does not report similar data for this bridge. The FEMA *Flood*

FEMA SUMMARY
June 6, 2018

*Insurance Rate Map 23011C0657D* (FIRM, June 2011) shows that the Flood Zone elevations for both bridges are in a backwater condition from the flood levels of the Kennebec River (100-year Water Surface Elevation (WSEL) 24.0 feet) with all vertical elevation values in datum NAVD 1988.

Based on the above information, neither bridge waterway opening controls the 100-year Flood Zone elevations set by FEMA. The FEMA FIRM Flood Zone elevations solely depend on the high flow elevations of the Kennebec River rather than the upland flows in Cobbossee Stream. Upland flows in the Cobbossee Stream result in 100-year flood water surface elevations that are about 10' lower than the Kennebec River backwater flows shown on the FIRM. However, the FEMA FIS and FIRM include a Regulatory Floodway along the Cobbossee Stream to prevent further filling of the floodplain near normal stream flows when the Kennebec River is at non-flood flow levels. The calculated Floodway of the Cobbossee Stream begins at Section A on the FEMA FIRM, just downstream of the Bridge Street Bridge. However, the Floodway is delineated to the Kennebec River, and appears to be a graphic connection between the calculated Floodways of the Cobbossee Stream and the Kennebec River.

Backwater of the Kennebec River floods the project area and sets the limits of the FEMA Flood Zone at both bridges and the Regulatory Floodway at Maine Avenue. However, upstream of the Maine Avenue Bridge, FEMA has determined a separate Regulatory Floodway within the Cobbossee Stream for times when the Kennebec River is not at flood stage. Near the Bridge Street Bridge, the Regulatory Floodway is located near the defined stream channel. Near the Maine Avenue Bridge, the Regulatory Floodway is much wider than the existing bridge since the Kennebec River flooding engulfs the existing bridge.

Stantec obtained the FEMA Current Effective hydraulic model for the Cobbossee Stream from FEMA's consultant Michael Baker Jr. Inc. This model is the basis of the Cobbossee Stream Regulatory Floodway data contained in the FIS and FIRM. The model was prepared using the USGS software program E431, *Step-Backwater and Floodway Analysis*, which shows flood channel cross sections similar to the existing cross sections obtained from current ground survey. The model does not include the existing building obstructions on the south overbank downstream of the Bridge Street Bridge.

Since the FEMA Current Effective model cross sections were found to reasonably compare to the cross sections obtained from current ground survey, a Duplicate Effective (see FEMA MT-2) model was not created. Instead, a Corrected Effective model of existing conditions using current ground survey was analyzed using HEC-RAS software. This Corrected Effective model was used to establish a baseline of actual existing conditions, including the existing building obstructions at Bridge Street, and for comparing the existing condition to the hydraulic parameters of the Cobbossee Stream for proposed conditions. In the proposed conditions model, the existing building at the Bridge Street Bridge middle pier (Dennis' Pizza) has been removed since the building has been demolished prior to beginning this bridge replacement project.

FEMA SUMMARY
June 6, 2018

The proposed Bridge Street Bridge includes a 135-foot bridge span with the proposed abutments located outside the Regulatory Floodway. The work also includes removal of the existing bridge piers, and an adjacent commercial building, regrading of the channel banks, construction of bank revetment, and minor earthwork grading within the floodplain and Regulatory Floodway.

The proposed Maine Avenue Bridge and separate Multi-use Bridge construction lies completely within the Regulatory Floodway and includes construction of minor earthwork filling and bank protection. Construction of these two bridges outside of the Regulatory Floodway is not possible due to site constraints and proximity to the Kennebec River confluence. Stantec's analysis shows that the Multi-use Bridge and its access path have very little effect on stream hydraulics in the context of the modeling described above.

A summary of the existing versus proposed Cobbossee Stream 100-year flood conditions is shown in Table 6 for MaineDOT's use in making a final decision on bridge layout and potential FEMA flood insurance map impacts. The proposed modeling illustrates that there is not any increase in the water surface elevation for the 100-year event with MHW tailwater compared to the existing modeled conditions within the FEMA study reach (Sections A to I).

While the proposed Maine Avenue bridge lies within the Regulatory Floodway of the Kennebec River and Cobbossee Stream, the bridge was an existing condition when the Floodway was established. The proposed replacement bridge does not affect the flow width, and does not affect the Floodway limits. The Maine Avenue proposed bridge is slightly longer than the existing bridge, which improves the hydraulics thru the bridge opening, but since the downstream channel is unimproved, the overall hydraulics remains consistent with existing conditions. Similarly, the addition of a Multi-use Bridge which spans the channel, will also lie inside the Regulatory Floodway, but will not affect it, since the Floodway is determined by backwater flooding of the Kennebec River, not by the presence of the subject bridge.

Bridge St. Bridge over Cobbossee Stream, Gardiner ME

Maine Ave. Bridge and Multi-use Bridge over Cobbossee Stream, Gardiner ME

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0657D

# FIRM

FLOOD INSURANCE RATE MAP

KENNEBEC COUNTY, MAINE

(ALL JURISDICTIONS)

PANEL 657 OF 775

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| CHELSEA, TOWN OF | 230234 | 0657 | D |
| FARMINGDALE, TOWN OF | 230164 | 0657 | D |
| GARDINER, CITY OF | 230068 | 0657 | D |
| PITTSTON, TOWN OF | 230243 | 0657 | D |
| RANDOLPH, TOWN OF | 230244 | 0657 | D |

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
23011C0657D

EFFECTIVE DATE
JUNE 16, 2011

Federal Emergency Management Agency

## LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

| | |
|---|---|
| ZONE A | No Base Flood Elevations determined. |
| ZONE AE | Base Flood Elevations determined. |
| ZONE AH | Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined. |
| ZONE AO | Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. |
| ZONE AR | Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. |
| ZONE A99 | Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined. |
| ZONE V | Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined. |
| ZONE VE | Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined. |

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

| | |
|---|---|
| ZONE X | Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. |

OTHER AREAS

| | |
|---|---|
| ZONE X | Areas determined to be outside the 0.2% annual chance floodplain. |
| ZONE D | Areas in which flood hazards are undetermined, but possible. |

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

Culvert

Bridge

45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

4989000 M — 1000-meter ticks: Maine State Plane West Zone (FIPS Zone 1802), Transverse Mercator projection

4989000 N — 1000-meter Universal Transverse Mercator grid values, zone 19N

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 16, 2011

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

**Figure 1, Detail from FEMA FIRM**

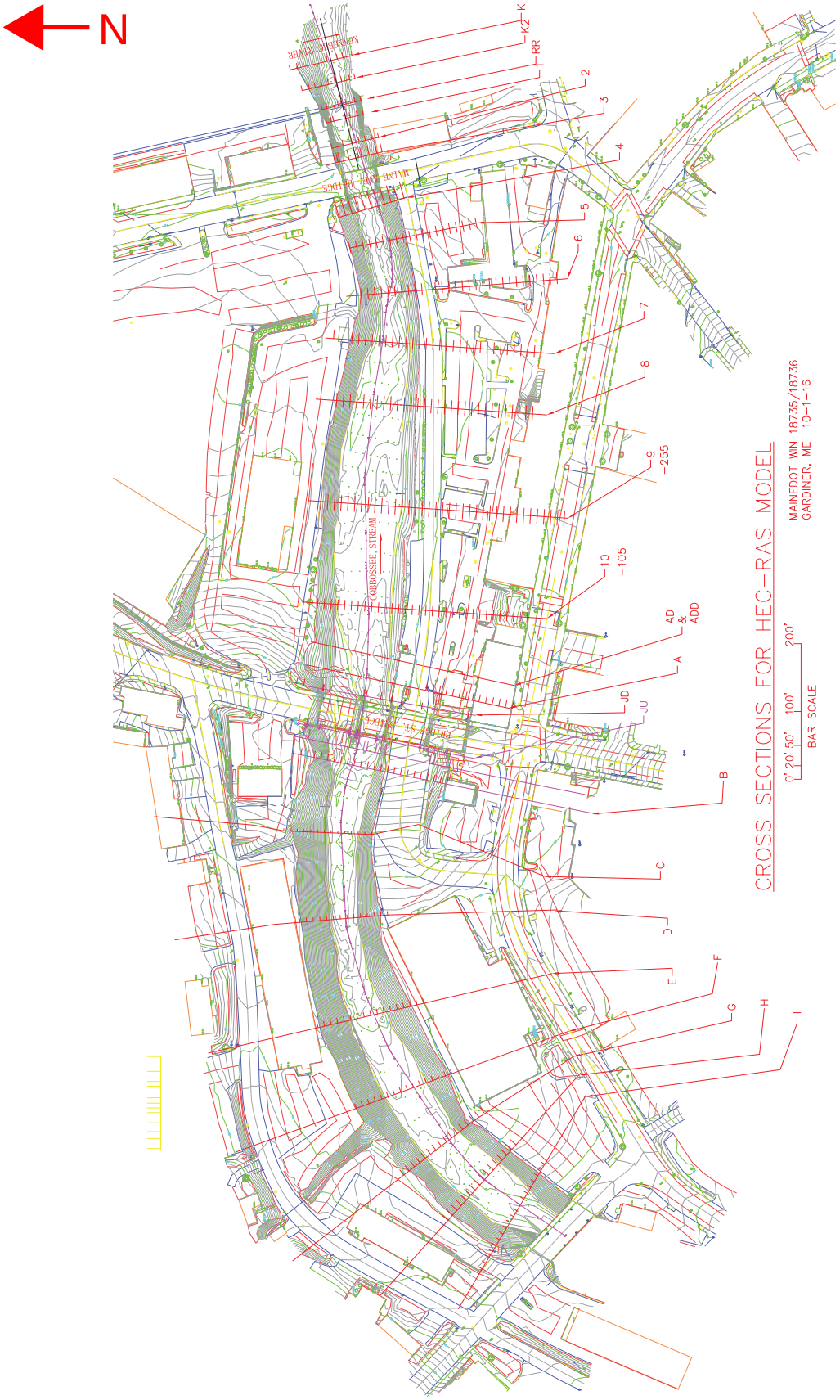



**Figure 2, Cross Section Locations for HEC-RAS Model**

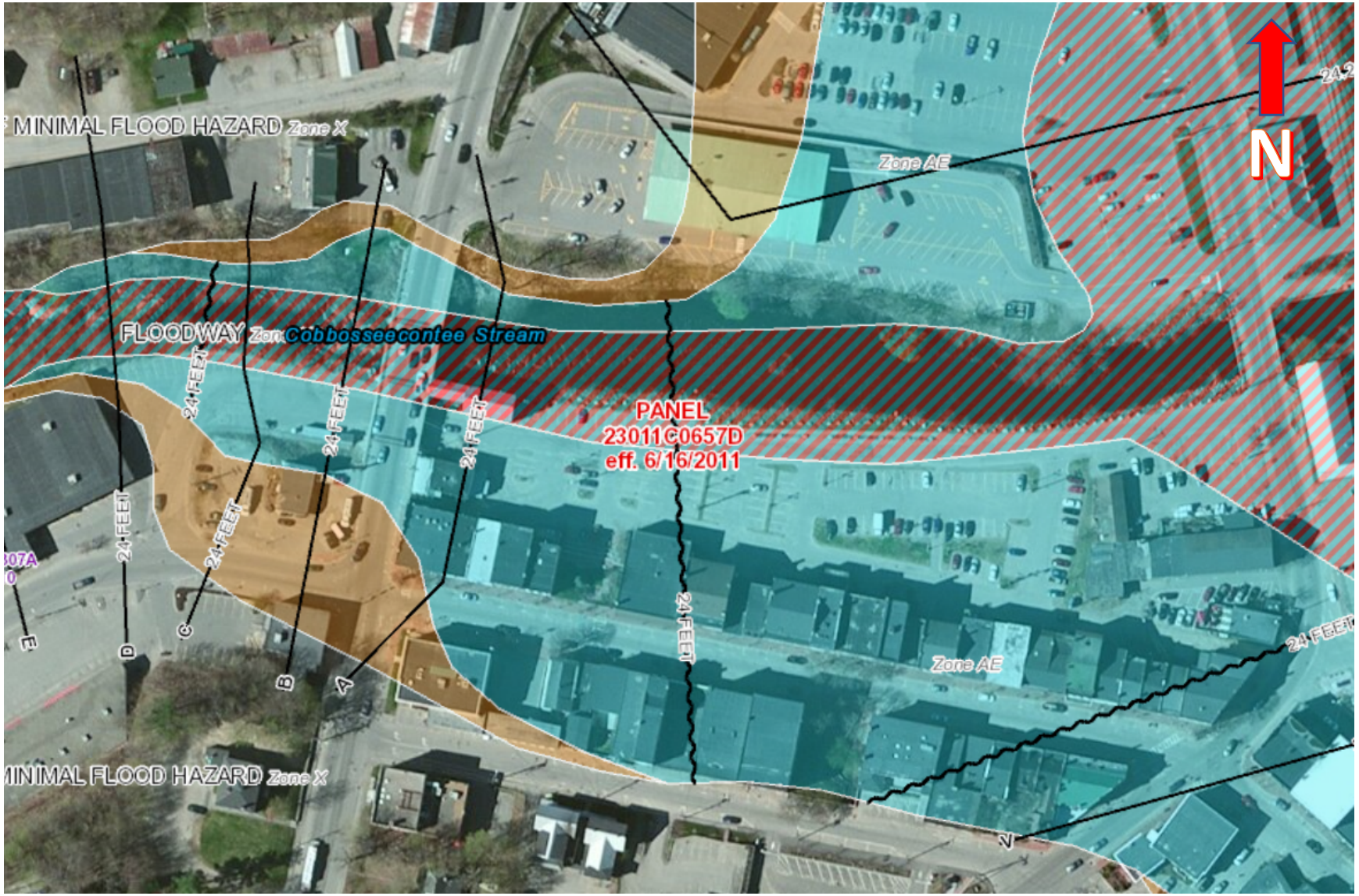



**Figure 3, FEMA Regulatory Floodway**

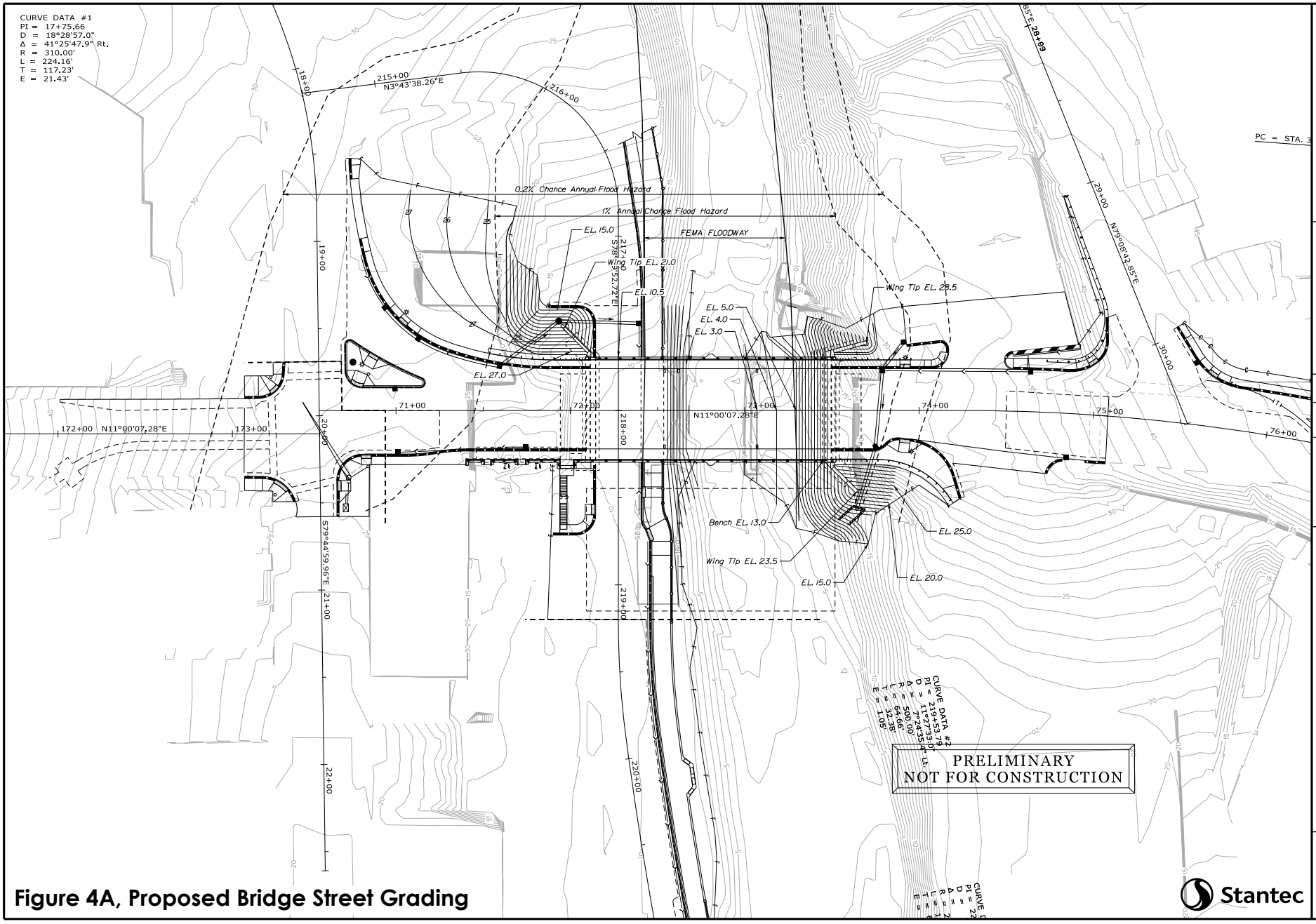
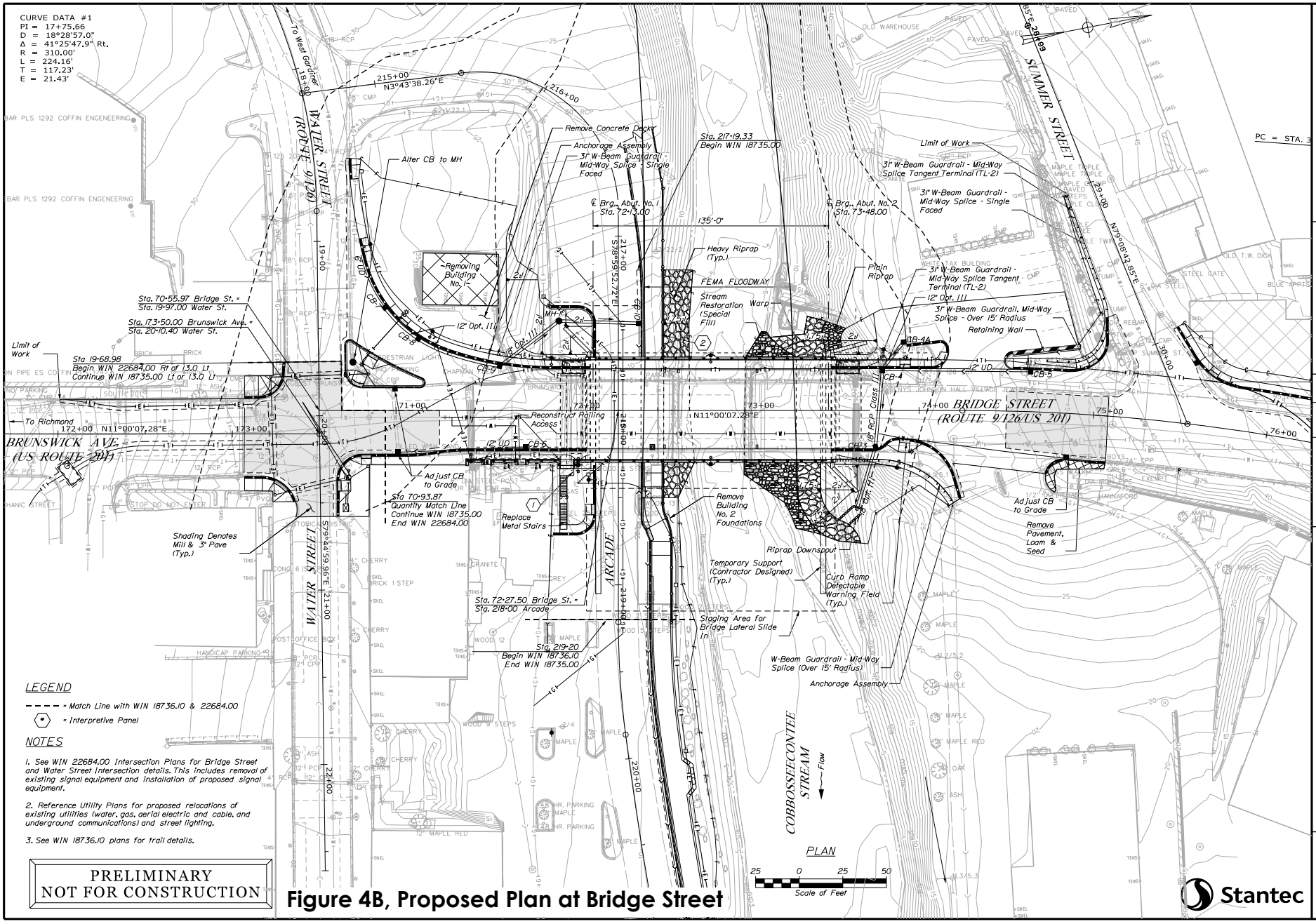



**Figure 4A, Proposed Bridge Street Grading**

Filename: ...\BRIDGE\MSTA\ddt_grading.dgn Division: BRIDGE Username: dotaylor Date:6/1/2018




## LEGEND

- - - - = Match Line with WIN 18736.10 & 22684.00

⊙ = Interpretive Panel

## NOTES

1. See WIN 22684.00 Intersection Plans for Bridge Street and Water Street Intersection details. This includes removal of existing signal equipment and installation of proposed signal equipment.

2. Reference Utility Plans for proposed relocations of existing utilities (water, gas, aerial electric and cable, and underground communications) and street lighting.

3. See WIN 18736.10 plans for trail details.

PRELIMINARY
NOT FOR CONSTRUCTION

**Figure 4B, Proposed Plan at Bridge Street**

Stantec

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1873(500)

WIN 18735.00

BRIDGE NO. 2101

BRIDGE PLANS

| | | BY | DATE |
|---|---|---|---|
| PROJ. MANAGER | L. TIMBERLAKE | | |
| DESIGN-DETAILED | LSF | DDT\LSF | JUN 2018 |
| CHECKED-REVIEWED | TEK | | JUN 2018 |
| DESIGN2-DETAILED2 | PLP | PLP | JUN 2018 |
| DESIGN3-DETAILED3 | TEK | JTB | |
| REVISIONS 1 | | | |
| REVISIONS 2 | | | |
| REVISIONS 3 | | | |
| REVISIONS 4 | | | |
| FIELD CHANGES | | | |

SIGNATURE

P.E. NUMBER

DATE

BRIDGE STREET BRIDGE
COBBOSSEECONTEE STREAM
GARDINER KENNEBEC COUNTY

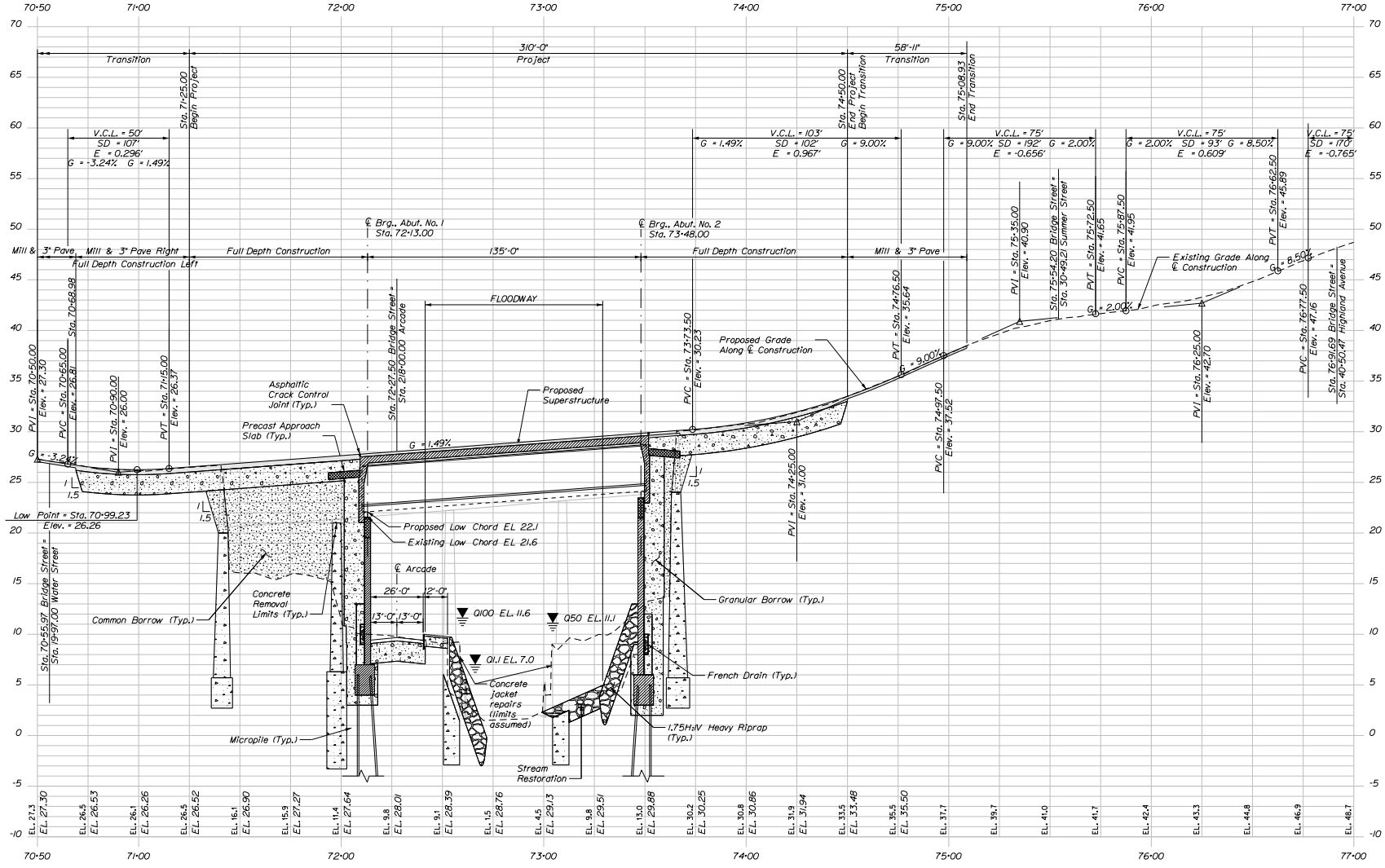
GENERAL PLAN

SHEET NUMBER

A2

OF A73

Filename: ...\00\BRIDGE\MSTA\0A2_Plan1.dgn Division: BRIDGE Username: kwight Date:6/2/2018




NOTE:

1. Existing substructure and foundation dimensions shown are based on a combination of existing plans and field observations. Actual conditions may differ from these Plans.

BRIDGE STREET PROFILE

Horiz. 25 0 25 50

Vert. 5 0 5 10

Scale of Feet

PRELIMINARY
NOT FOR CONSTRUCTION

# Figure 5, Proposed Profile at Bridge Street

Stantec

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1873(500)

WIN 18735.00

BRIDGE PLANS

BRIDGE NO. 2101

| | | | |
|---|---|---|---|
| PROJ. MANAGER | L. TIMBERLAKE | BY | DATE |
| DESIGN-DETAILED | LSF | DDT\LSF | JUN 2018 |
| CHECKED-REVIEWED | TEK | | JUN 2018 |
| DESIGN2-DETAILED2 | PLP | PLP | JUN 2018 |
| DESIGN3-DETAILED3 | TEK | JTB | |
| REVISIONS 1 | | | |
| REVISIONS 2 | | | |
| REVISIONS 3 | | | |
| REVISIONS 4 | | | |
| FIELD CHANGES | | | |

SIGNATURE

P.E. NUMBER

DATE

BRIDGE STREET BRIDGE
COBBOSSEECONTEE STREAM
GARDINER KENNEBEC COUNTY

PROFILE

SHEET NUMBER

A5

OF A73

Filename: ...\BRIDGE\MSTA\ldot_grading.dgn Division: BRIDGE Username: dataylor Date:6/2/2018

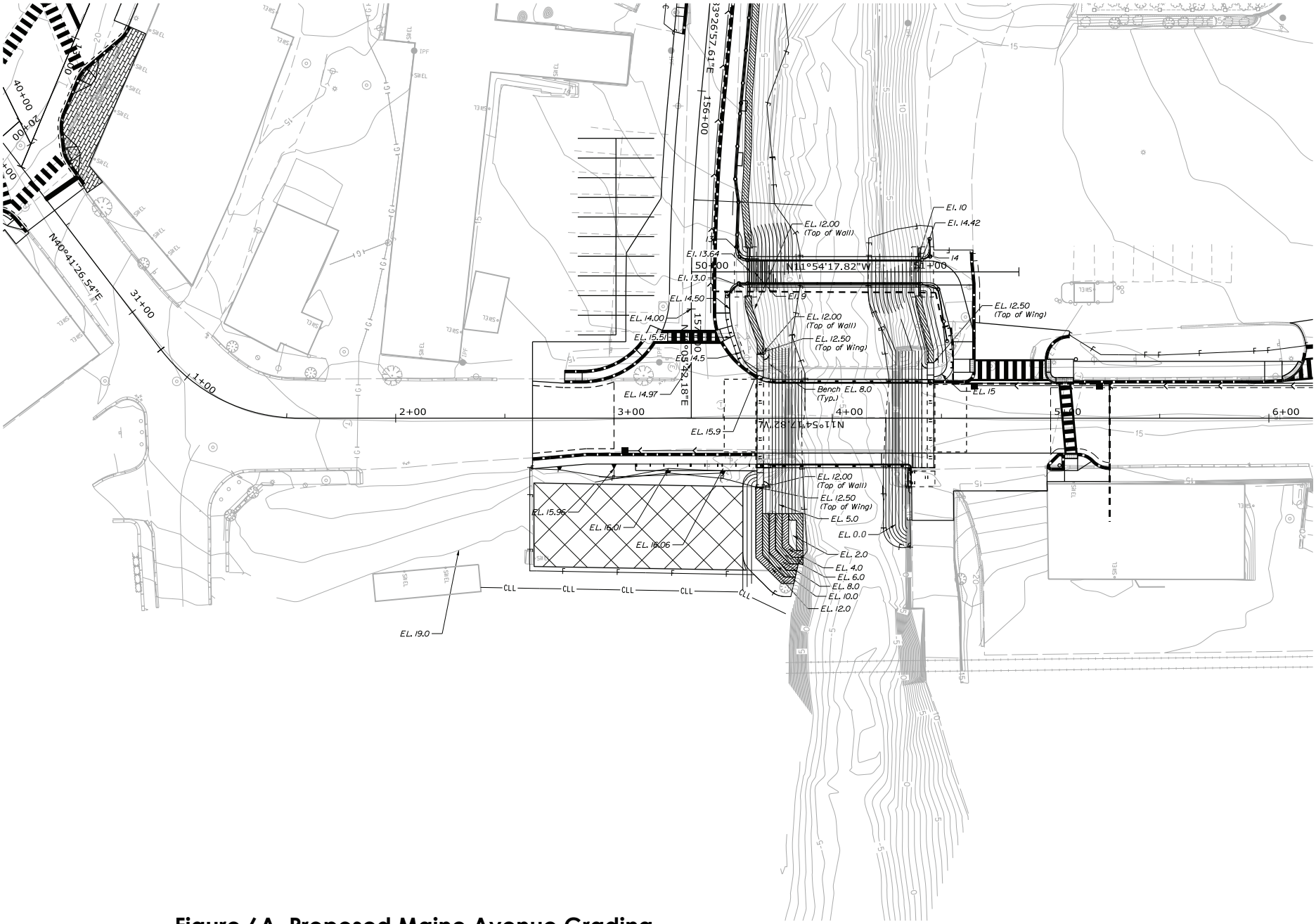



**Figure 6A, Proposed Maine Avenue Grading**

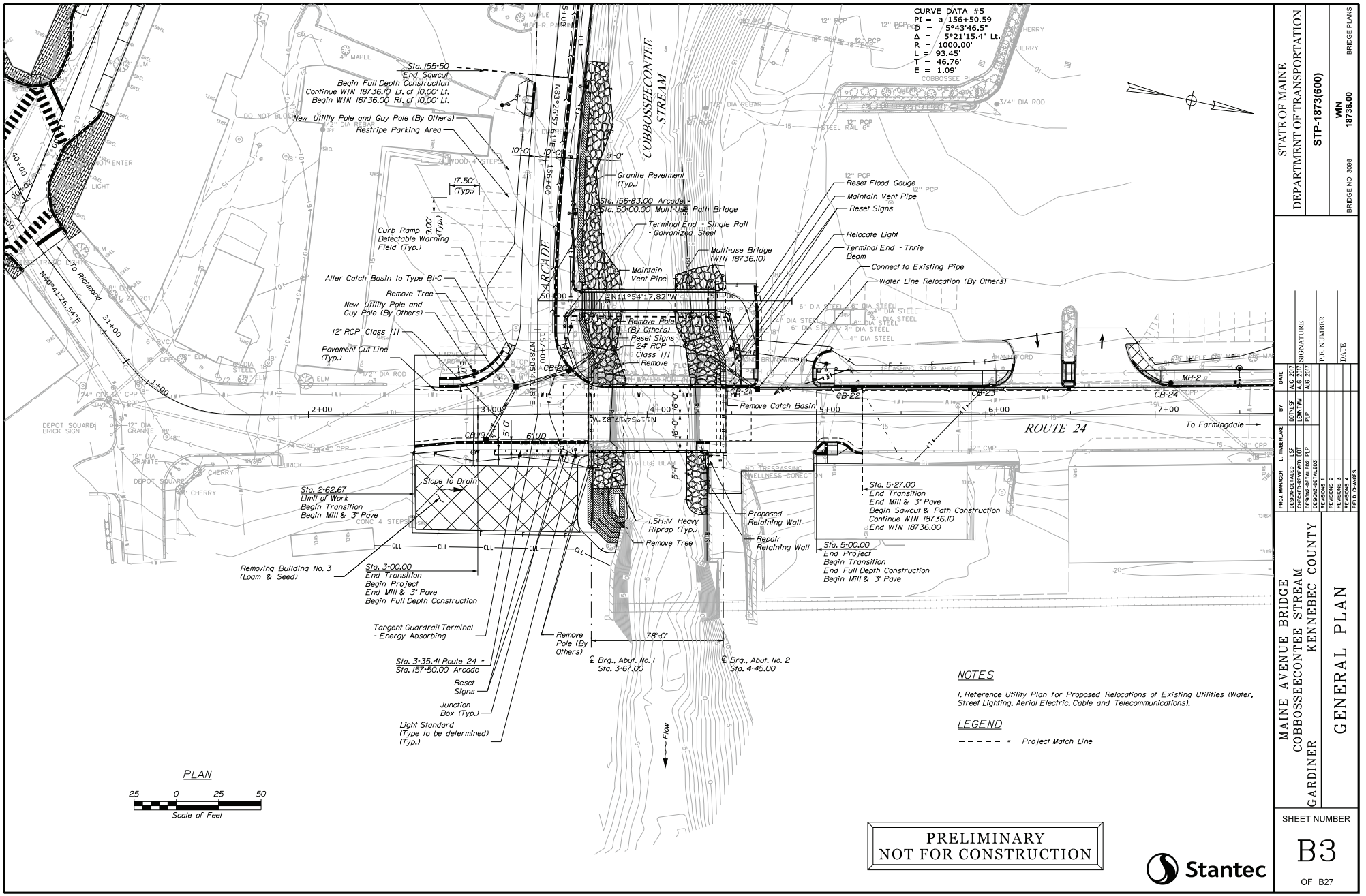
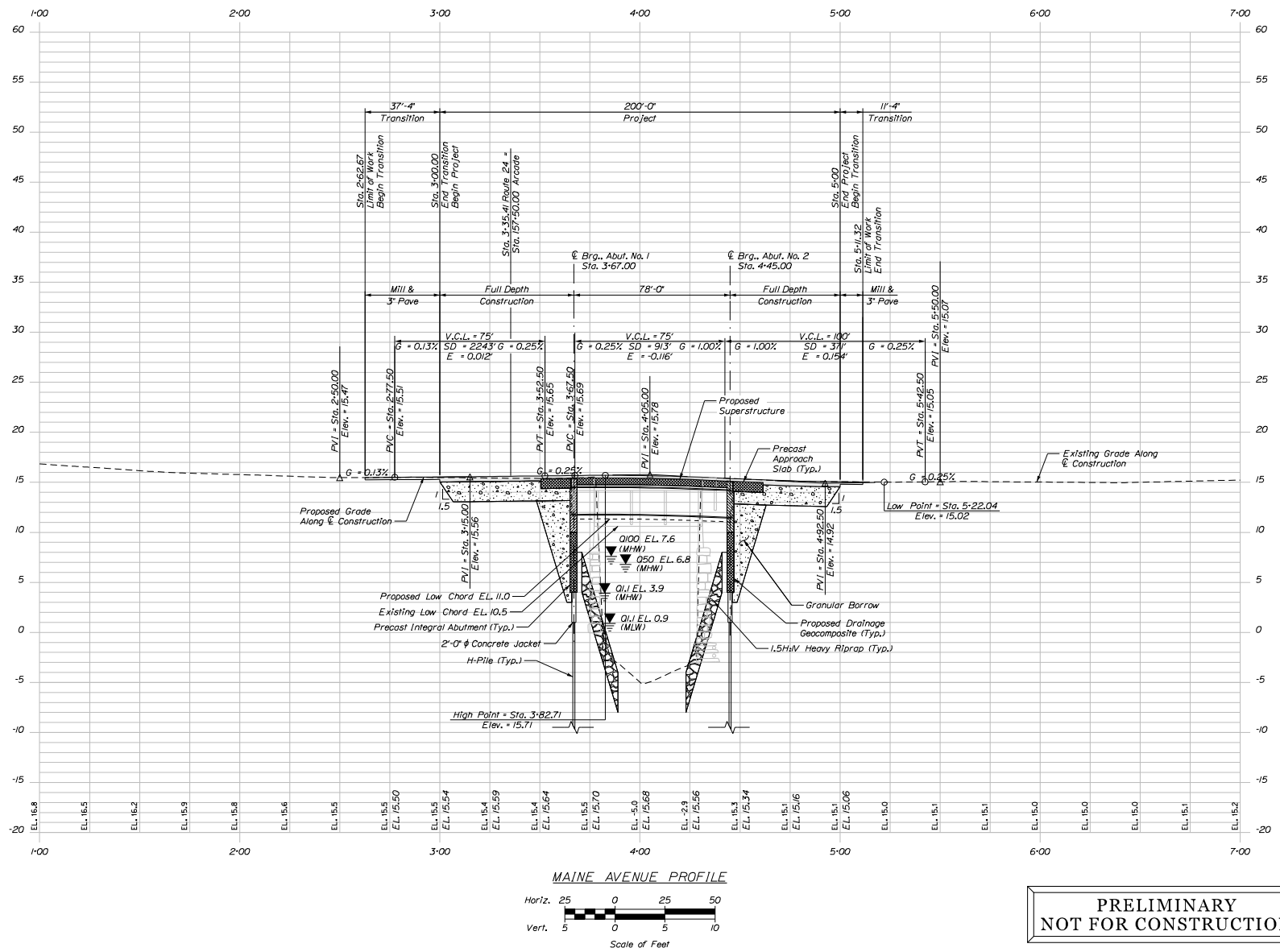



Figure 6B, Proposed Plan at Maine Avenue




MAINE AVENUE PROFILE

Horiz. 25 0 25 50

Vert. 5 0 5 10

Scale of Feet

PRELIMINARY
NOT FOR CONSTRUCTION

Stantec

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1873(600)

WIN 18736.00

BRIDGE NO. 3098

BRIDGE PLANS

| | | | |
|---|---|---|---|
| PROJ. MANAGER | L. TIMBERLAKE | BY | DATE |
| DESIGN-DETAILED | LST | QA/QC | MAY 2017 |
| QUALITY CHECKED | DDT | PM/PM | MAY 2017 |
| DESIGN2-DETAILED2 | PLP | | MAY 2017 |
| DESIGN3-DETAILED3 | | | |
| REVISIONS 1 | | | |
| REVISIONS 2 | | | |
| REVISIONS 3 | | | |
| REVISIONS 4 | | | |
| FIELD CHANGES | | | |

SIGNATURE

P.E. NUMBER

DATE

MAINE AVENUE BRIDGE
COBBOSSEECONTEE STREAM
GARDINER KENNEBEC COUNTY

PRELIMINARY PROFILE

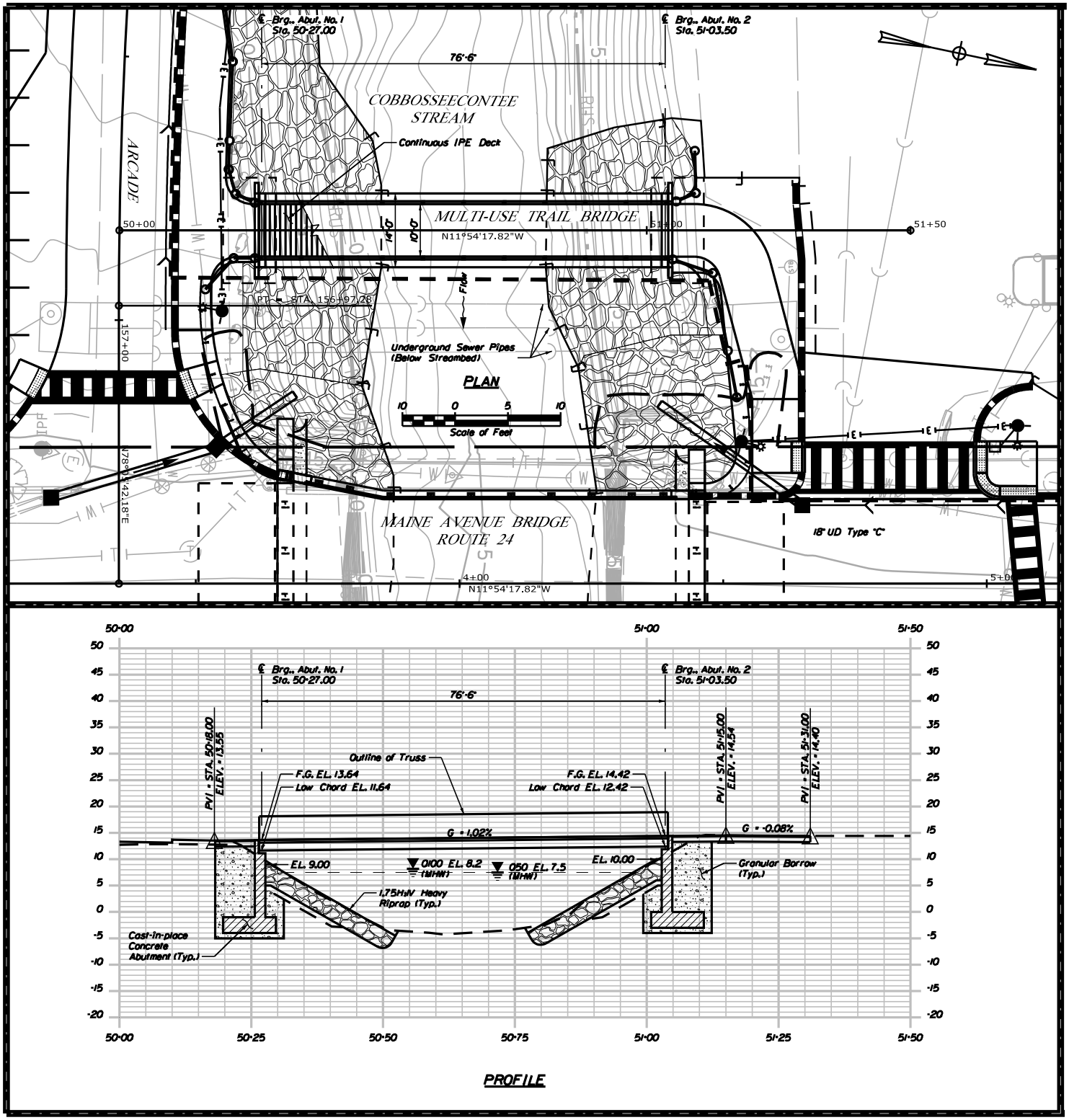
SHEET NUMBER

3

OF 11

Filename: ...\MSTA\003_Profile.dgn Division: BRIDGE Username: dataylor Date:5/15/2017

**Figure 6C, Proposed Profile at Maine Avenue**




Filename: ...\006_HOPlan_BikePedBridgePlan.dgn Division: BRIDGE Username: lflanders Date:7/28/2017

**Figure 7, Proposed Plan and Profile of Multi-use Bridge**

## Table 1, FEMA Cobbossee Stream Flow Data

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE | | |
|---|---|---|---|---|---|---|---|
| BOND BROOK | | | | | | | |
| At Confluence with Kennebec River | 21.3 | 1,390 | 2,310 | 2,800 | 4,210 | | |
| At first crossing of Bond Brook Road | 17.2 | 1,110 | 1,830 | 2,230 | 3,360 | | |
| Upstream of Confluence of Stone Brook | 13.7 | 898 | 1,500 | 1,820 | 2,760 | | |
| COBBOSSEECONTEE STREAM | | | | | | MDOT Q1.1 | MDOT Q25 |
| At Confluence with Kennebec River | 219 | 3,850 | 5,290 | 5,910 | 7,380 | 1,312 | 4,148 |
| At inlet to Pleasant Pond near the Sagadahoc-Kennebec County limits | 213 | 3,850 | 5,290 | 5,910 | 7,380 | | |
| Gardiner- West Gardiner corporate limits | 212 | 3,850 | 5,290 | 5,910 | 7,380 | | |
| At Pond Road | 186 | 3,400 | 4,660 | 5,180 | 6,500 | | |
| At the Litchfield-West Gardiner upstream corporate limits | 140 | * | * | 4,140 | * | | |
| At Collins Mill Road | 140 | 2,710 | 3,740 | 4,140 | 5,200 | | |
| At West Gardiner-Manchester corporate limits | 139 | 2,710 | 3,740 | 4,140 | 5,200 | | |
| At Confluence with Cobbosseecontee Lake | 131 | 2,570 | 3,540 | 3,920 | 4,930 | | |

Source: FEMA Flood Insurance Study 23011CV001A, Kennebec County, ME (June 16, 2011)

Environmental Office – Hydrology Section
16 State House Station
Augusta ME 04333-0016
207.557.1052
Charles.Hebson@maine.gov

**Maine Department of Transportation**

# Memo

**To:** Janet Damren, Leanne Timberlake

**From:** Charles Hebson

**CC:**

**Date:** 11 May 2015

**Re:** Gardiner - 18735 (Bridge St, 2101) & 18736 (Maine Ave, 3908) - Cobbesecontee Stream Hydrology

---

The final recommended design hydrology is summarized in Table 1 and Figure 1 below.

**Table 1. Design Hydrology Summary**

| Return Period T (yrs) | Exceedance Prob $P_{ex}$ | USGS gage<br><br>Bull. 17B Est. |
|---|---|---|
| 1.005 | 0.995 | |
| 1.01 | 0.990 | |
| 1.05 | 0.952 | 1122 |
| 1.1 | 0.900 | 1312 |
| 1.25 | 0.800 | 1576 |
| 1.5 | 0.667 | 1861 |
| 2 | 0.500 | 2204 |
| 2.33 | 0.429 | 2360 |
| 5 | 0.200 | 3020 |
| 10 | 0.100 | 3531 |
| 25 | 0.040 | 4148 |
| 50 | 0.020 | 4588 |
| 100 | 0.010 | 5012 |
| 200 | 0.005 | 5426 |
| 500 | 0.002 | 5959 |
| Max of Record (1936) | | 5020 |

**Note:** USGS Gage 01049500 on Cobbosseecontee Stream in Gardiner, just upstream of bridges

**Table 2, MaineDOT Cobbossee Stream Flow Data**

**Figure 8, FEMA Cobbossee Stream Profile**

Source: FEMA Flood Insurance Study 23011CV001A, Kennebec County, ME (June 16, 2011)

Table 3, FEMA Cobbossee Stream Floodway Data

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1000 | 100 | 530 | 11.2 | 24.0 | 10.7 [2] | 10.9 | 0.2 |
| B | 1140 | 80 | 657 | 9.0 | 24.0 | 14.3 [2] | 14.7 | 0.4 |
| C | 1250 | 60 | 400 | 14.8 | 24.0 | 14.6 [2] | 14.7 | 0.1 |
| D | 1370 | 60 | 449 | 13.2 | 24.0 | 17.1 [2] | 17.1 | 0.0 |
| E | 1520 | 100 | 783 | 7.6 | 24.0 | 20.9 [2] | 20.9 | 0.0 |
| F | 1640 | 90 | 630 | 9.4 | 24.0 | 21.1 [2] | 21.1 | 0.0 |
| G | 1740 | 90 | 497 | 11.9 | 24.0 | 21.5 [2] | 21.5 | 0.0 |
| H | 1820 | 85 | 464 | 12.8 | 24.0 | 22.3 [2] | 22.3 | 0.0 |
| I | 1880 | 60 | 399 | 14.8 | 24.0 | 23.7 [2] | 23.7 | 0.0 |
| J | 2010 | 85 | 810 | 7.3 | 27.9 | 27.9 | 27.9 | 0.0 |
| K | 2100 | 90 | 662 | 8.9 | 28.0 | 28.0 | 28.0 | 0.0 |
| L | 2180 | 85 | 664 | 8.9 | 28.5 | 28.5 | 28.5 | 0.0 |
| M | 2240 | 150 | 853 | 6.9 | 29.2 | 29.2 | 29.2 | 0.0 |
| N | 2350 | 120 | 700 | 8.5 | 29.6 | 29.6 | 29.6 | 0.0 |
| O | 2430 | 100 | 554 | 10.7 | 30.0 | 30.0 | 30.0 | 0.0 |
| P | 2540 | 90 | 546 | 10.8 | 31.1 | 31.1 | 31.1 | 0.0 |
| Q | 2660 | 80 | 571 | 10.3 | 33.0 | 33.0 | 33.0 | 0.0 |
| R | 2730 | 170 | 1320 | 4.5 | 33.9 | 33.9 | 34.2 | 0.3 |
| S | 2790 | 150 | 701 | 8.4 | 34.0 | 34.0 | 34.2 | 0.2 |
| T | 2830 | 140 | 645 | 9.2 | 34.2 | 34.2 | 34.5 | 0.3 |
| U | 2900 | 130 | 1150 | 5.1 | 39.2 | 39.2 | 39.5 | 0.3 |
| V | 3090 | 110 | 775 | 7.6 | 39.8 | 39.8 | 40.1 | 0.3 |
| W | 3320 | 130 | 568 | 10.4 | 43.5 | 43.5 | 43.6 | 0.1 |
| X | 3470 | 80 | 520 | 11.3 | 46.1 | 46.1 | 46.1 | 0.0 |
| Y | 3660 | 120 | 673 | 8.8 | 49.0 | 49.0 | 49.4 | 0.4 |
| Z | 3770 | 120 | 524 | 11.3 | 51.1 | 51.1 | 51.5 | 0.4 |
| AA | 3960 | 90 | 520 | 11.3 | 54.5 | 54.5 | 54.5 | 0.0 |

[1] FEET ABOVE CONFLUENCE WITH KENNEBEC RIVER

[2] ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM KENNEBEC RIVER

Source: FEMA Flood Insurance Study 23011CV001A, Kennebec County, ME (June 16, 2011)

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

KENNEBEC COUNTY, ME
(ALL JURISDICTIONS)

FLOODWAY DATA

COBBOSSEECONTEE STREAM

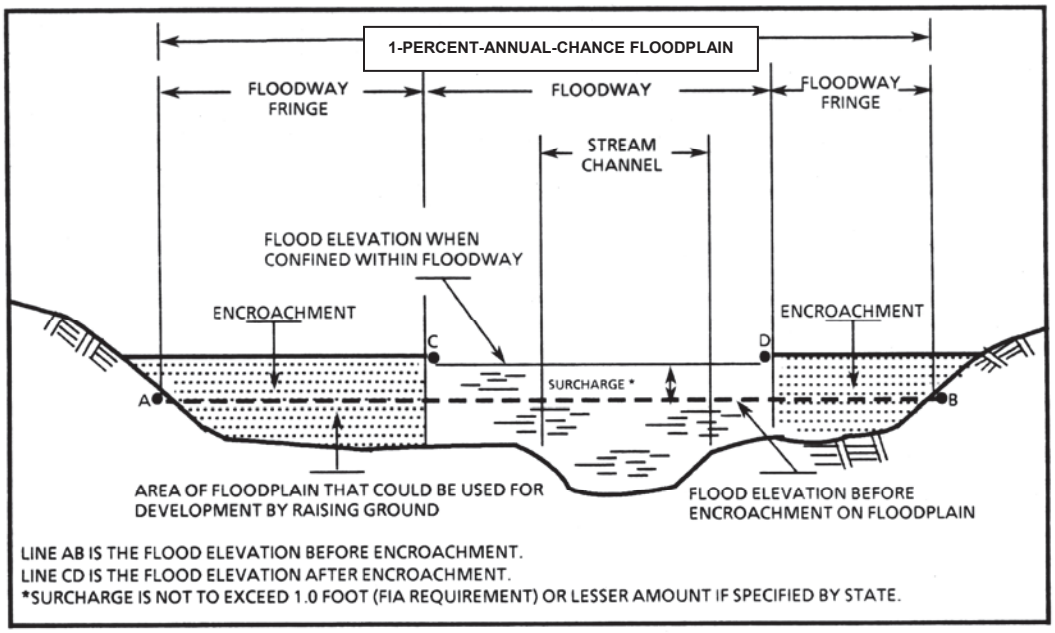



**Figure 9, FEMA Regulatory Floodway Section**

Source: FEMA Flood Insurance Study 23011CV001A, Kennebec County, ME (June 16, 2011)

## Table 4, Cobbossee Stream Flow Summary

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MAINEDOT GARDINER | | | | | | | | |
| WIN 18735, 18736 | | | | | | | | |
| HYDROLOGIC AND HYDRAULIC DATA | | | | | | | | |
| 4/11/2018 | | | | | | | | |
| | | | | | | | | |
| HYDROLOGY DATA: | | | | | | | | |
| | | | REF: | | | | | |
| DRAINAGE AREA | 219 | sq.mi. | FEMA FIS | | | | | |
| ORDINARY HIGH WATER DISCHARGE (Q1.1) | 1,312 | cfs | MaineDOT | | | | | |
| DISCHARGE (Q10) | 3,850 | cfs | FEMA FIS | | | | | |
| DISCHARGE (Q25) | 4,148 | cfs | MaineDOT | | | | | |
| DESIGN DISCHARGE (Q50) | 5,290 | cfs | FEMA FIS | | | | | |
| CHECK DISCHARGE (Q100) | 5,910 | cfs | FEMA FIS | | | | | |
| SCOUR CHECK DISCHARGE (Q500) | 7,380 | cfs | FEMA FIS | | | | | |
| | | | | | | | | |
| MEAN HIGHER HIGH WATER (MHHW) EL. | 4.2 | ft | MaineDOT benchmark survey | | | | | |
| MEAN HIGH WATER (MHW) EL. | 3.8 | ft | NOAA Tidal data | | | | | |
| MEAN TIDE LEVEL (MTL) EL. | 0.9 | ft | typical | | | | | |
| MEAN LOW WATER (MLW) EL. | -2.1 | ft | NAVD Datum | | | | | |
| MEAN LOW LOW WATER (MLLW) EL. | -2.3 | ft | | | | | | |
| FLOOD OF RECORD EL. | 24.9 | ft | Onsite pole | | | | | |
| 2018 PREDICTED HIGH TIDE EL. | 5.3 | ft | NOAA Tidal data | | | | | |
| | | | | | | | | |
| HYDRAULIC DATA SUMMARY: | | | | | | | | |
| | EXISTING MAINE AVE. BRIDGE (MLW) | EXISTING MAINE AVE. BRIDGE (MHW) | PROPOSED MAINE AVE. BRIDGE (MLW) | PROPOSED MAINE AVE. BRIDGE (MHW) | TRAIL BRIDGE (MLW) | TRAIL BRIDGE (MHW) | EXISTING BRIDGE ST. BRIDGE | PROPOSED BRIDGE ST. BRIDGE |
| HEC-RAS SECTION | 98.5 BR U | 98.5 BR U | 98.5 BR U | 98.5 BR U | 166 BRU | 166 BRU | 895 BR U | 895 BR U |
| ORDINARY HIGH WATER EL. @ Q1.1 | 0.9 | 3.8 | 0.6 | 3.8 | 1.9 | 3.9 | 7.1 | 7.0 |
| HEADWATER EL. @ Q10 | 4.7 | 4.7 | 4.7 | 4.8 | 5.7 | 5.7 | 9.9 | 9.7 |
| HEADWATER EL. @ Q25 | 5.0 | 5.0 | 5.1 | 5.1 | 6.1 | 6.1 | 10.2 | 10.0 |
| HEADWATER EL. @ Q50 | 6.4 | 6.4 | 6.7 | 6.7 | 7.5 | 7.5 | 11.1 | 11.1 |
| HEADWATER EL. @ Q100 | 7.2 | 7.2 | 7.6 | 7.6 | 8.2 | 8.2 | 11.7 | 11.6 |
| HEADWATER EL. @ Q500 | 8.8 | 8.8 | 9.4 | 9.4 | 9.9 | 9.9 | 13.1 | 12.8 |
| DISCHARGE VELOCITY @ Q1.1 | 9.0 | 4.6 | 9.8 | 4.5 | 7.0 | 4.5 | 7.1 | 5.7 |
| DISCHARGE VELOCITY @ Q10 | 11.9 | 11.8 | 11.5 | 11.3 | 9.9 | 9.8 | 10.4 | 8.7 |
| DISCHARGE VELOCITY @ Q25 | 12.2 | 12.2 | 11.6 | 11.6 | 10.1 | 10.1 | 10.5 | 8.9 |
| DISCHARGE VELOCITY @ Q50 | 13.0 | 13.0 | 11.6 | 11.6 | 10.6 | 10.6 | 10.9 | 9.1 |
| DISCHARGE VELOCITY @ Q100 | 13.3 | 13.3 | 11.6 | 11.6 | 10.8 | 10.8 | 10.8 | 9.3 |
| DISCHARGE VELOCITY @ Q500 | 14.1 | 14.1 | 11.5 | 11.5 | 11.1 | 11.1 | 10.0 | 9.3 |
| LOW CHORD EL. | 10.5 | 10.5 | 11.0 | 11.0 | 11.6 | 11.6 | 21.5 | 22.0 |
| VERTICAL CLEARANCE @ Q50 | 4.1 | 4.1 | 4.3 | 4.3 | 4.1 | 4.1 | 10.4 | 10.9 |
| VERTICAL CLEARANCE @ Q100 | 3.4 | 3.4 | 3.5 | 3.5 | 3.4 | 3.4 | 9.8 | 10.4 |

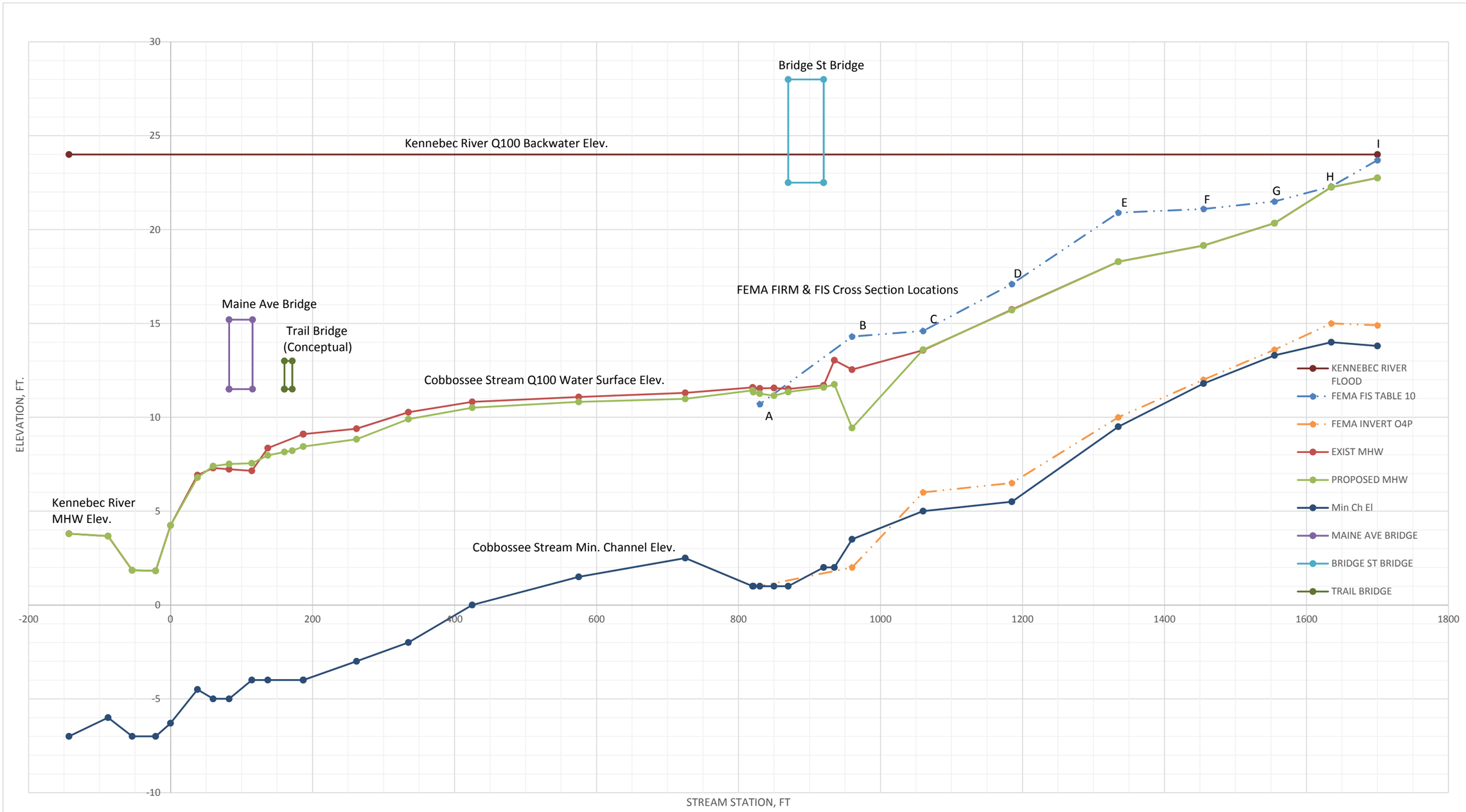



**Figure 10, Cobbossee Stream Profile**

## Table 6, Cobbossee Stream 100-year Flow Data

| Q100 DATA, HEC-RAS MODEL AND FEMA FIS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEMA FIS SECTION ---> | | | I | H | G | F | E | D | C | B | | | | | A | | (LOWER PORTION OF COBBOSSEE STREAM NOT MODELED BY FEMA IN FIS) | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | (Bridge St. Bridge) | | | | | | | | | | | | | | | | | | (Maine Ave Bridge) | | | | | | |
| EXIST MHW | River Sta | | 1700 | 1635 | 1555 | 1455 | 1335 | 1185 | 1060 | 960 | 935 | 920 | 870 | 850 | 830 | 821 | 820 | 725 | 575 | 425 | 335 | 262 | 187 | 187 | 187 | 137 | 114.5 | 82.5 | 60 | 38 | 0 | -21 | -54 | -88 | -143 |
| | Min Ch El | (ft) | 13.8 | 14.0 | 13.3 | 11.8 | 9.5 | 5.5 | 5.0 | 3.5 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.5 | 1.5 | 0.0 | -2.0 | -3.0 | -4.0 | -4.0 | -4.0 | -4.0 | -4.0 | -5.0 | -5.0 | -4.5 | -6.3 | -7.0 | -7.0 | -6.0 | -7.0 |
| | W.S. Elev | (ft) | 22.8 | 22.3 | 20.3 | 19.2 | 18.3 | 15.7 | 13.6 | 12.5 | 13.0 | 11.7 | 11.5 | 11.6 | 11.5 | 11.5 | 11.6 | 11.3 | 11.1 | 10.8 | 10.3 | 9.4 | 9.1 | 9.1 | 9.1 | 8.4 | 7.2 | 7.2 | 7.3 | 6.9 | 4.2 | 1.8 | 1.9 | 3.7 | 3.8 |
| | Top Width | (ft) | 85.0 | 91.6 | 80.1 | 85.0 | 80.4 | 64.2 | 66.8 | 82.8 | 158.2 | 121.5 | 133.3 | 144.2 | 147.3 | 157.7 | 193.2 | 188.2 | 220.8 | 244.7 | 169.0 | 73.2 | 71.1 | 71.1 | 71.1 | 69.0 | 48.5 | 48.5 | 59.0 | 58.5 | 44.3 | 45.7 | 61.4 | 75.5 | 73.6 |
| | Vel Chnl | (ft/s) | 10.6 | 10.5 | 13.0 | 12.4 | 10.8 | 13.2 | 14.2 | 12.2 | 8.3 | 11.3 | 9.6 | 8.8 | 8.2 | 8.1 | 7.5 | 7.4 | 6.2 | 6.2 | 7.8 | 9.9 | 9.7 | 9.7 | 9.7 | 11.1 | 13.3 | 11.8 | 11.0 | 11.6 | 16.5 | 19.8 | 17.7 | 12.7 | 10.6 |
| EXIST MLW | River Sta | | 1700 | 1635 | 1555 | 1455 | 1335 | 1185 | 1060 | 960 | 935 | 920 | 870 | 850 | 830 | 821 | 820 | 725 | 575 | 425 | 335 | 262 | 187 | 187 | 187 | 137 | 114.5 | 82.5 | 60 | 38 | 0 | -21 | -54 | -88 | -143 |
| | Min Ch El | (ft) | 13.8 | 14.0 | 13.3 | 11.8 | 9.5 | 5.5 | 5.0 | 3.5 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.5 | 1.5 | 0.0 | -2.0 | -3.0 | -4.0 | -4.0 | -4.0 | -4.0 | -4.0 | -5.0 | -5.0 | -4.5 | -6.3 | -7.0 | -7.0 | -6.0 | -7.0 |
| | W.S. Elev | (ft) | 22.8 | 22.3 | 20.3 | 19.2 | 18.3 | 15.7 | 13.6 | 12.5 | 13.0 | 11.7 | 11.5 | 11.6 | 11.5 | 11.5 | 11.6 | 11.3 | 11.1 | 10.8 | 10.3 | 9.4 | 9.1 | 8.4 | 9.1 | 8.4 | 7.2 | 7.2 | 7.3 | 6.9 | 4.2 | 1.8 | 1.9 | 3.2 | 0.9 |
| | Top Width | (ft) | 85.0 | 91.6 | 80.1 | 85.0 | 80.4 | 64.2 | 66.8 | 82.8 | 158.2 | 121.5 | 133.3 | 144.2 | 147.3 | 157.7 | 193.2 | 188.2 | 220.8 | 244.7 | 169.0 | 73.2 | 71.1 | 69.0 | 71.1 | 69.0 | 48.5 | 48.5 | 59.0 | 58.5 | 44.3 | 45.7 | 61.4 | 72.8 | 66.5 |
| | Vel Chnl | (ft/s) | 10.6 | 10.5 | 13.0 | 12.4 | 10.8 | 13.2 | 14.2 | 12.2 | 8.3 | 11.3 | 9.6 | 8.8 | 8.2 | 8.1 | 7.5 | 7.4 | 6.2 | 6.2 | 7.8 | 9.9 | 9.7 | 11.1 | 9.7 | 11.1 | 13.3 | 11.8 | 11.0 | 11.6 | 16.5 | 19.8 | 17.7 | 13.8 | 16.5 |
| PROPOSED MHW | River Sta | | 1700 | 1635 | 1555 | 1455 | 1335 | 1185 | 1060 | 960 | 935 | 920 | 870 | 850 | 830 | 821 | 820 | 725 | 575 | 425 | 335 | 262 | 187 | 171.5 | 160.5 | 137 | 114.5 | 82.5 | 60 | 38 | 0 | -21 | -54 | -88 | -143 |
| | Min Ch El | (ft) | 13.8 | 14.0 | 13.3 | 11.8 | 9.5 | 5.5 | 5.0 | 3.5 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.5 | 1.5 | 0.0 | -2.0 | -3.0 | -4.0 | -4.0 | -4.0 | -4.0 | -4.0 | -5.0 | -5.0 | -4.5 | -6.3 | -7.0 | -7.0 | -6.0 | -7.0 |
| | W.S. Elev | (ft) | 22.8 | 22.3 | 20.3 | 19.2 | 18.3 | 15.7 | 13.6 | 9.4 | 11.8 | 11.6 | 11.4 | 11.2 | 11.3 | 11.3 | 11.4 | 11.0 | 10.8 | 10.5 | 9.9 | 8.8 | 8.4 | 8.2 | 8.2 | 8.0 | 7.6 | 7.5 | 7.4 | 6.8 | 4.2 | 1.8 | 1.9 | 3.7 | 3.8 |
| | Top Width | (ft) | 85.0 | 91.6 | 80.1 | 85.0 | 80.4 | 64.1 | 66.9 | 76.5 | 132.9 | 126.6 | 125.6 | 137.1 | 159.1 | 173.1 | 172.4 | 173.8 | 205.8 | 227.4 | 116.9 | 71.1 | 68.8 | 68.1 | 68.3 | 67.7 | 66.3 | 63.1 | 62.8 | 58.8 | 44.3 | 45.7 | 61.4 | 75.5 | 73.6 |
| | Vel Chnl | (ft/s) | 10.6 | 10.5 | 13.0 | 12.4 | 10.8 | 13.2 | 14.2 | 18.6 | 10.4 | 10.7 | 10.4 | 10.8 | 9.2 | 8.3 | 7.7 | 8.2 | 6.5 | 6.5 | 8.1 | 10.6 | 10.5 | 10.8 | 10.7 | 11.0 | 11.6 | 10.8 | 10.9 | 12.0 | 16.5 | 19.8 | 17.7 | 12.7 | 10.6 |
| PROPOSED MLW | River Sta | | 1700 | 1635 | 1555 | 1455 | 1335 | 1185 | 1060 | 960 | 935 | 920 | 870 | 850 | 830 | 821 | 820 | 725 | 575 | 425 | 335 | 262 | 187 | 171.5 | 160.5 | 137 | 114.5 | 82.5 | 60 | 38 | 0 | -21 | -54 | -88 | -143 |
| | Min Ch El | (ft) | 13.8 | 14.0 | 13.3 | 11.8 | 9.5 | 5.5 | 5.0 | 3.5 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.5 | 1.5 | 0.0 | -2.0 | -3.0 | -4.0 | -4.0 | -4.0 | -4.0 | -4.0 | -5.0 | -5.0 | -4.5 | -6.3 | -7.0 | -7.0 | -6.0 | -7.0 |
| | W.S. Elev | (ft) | 22.8 | 22.3 | 20.3 | 19.2 | 18.3 | 15.7 | 13.6 | 9.4 | 11.8 | 11.6 | 11.4 | 11.2 | 11.3 | 11.3 | 11.4 | 11.0 | 10.8 | 10.5 | 9.9 | 8.8 | 8.4 | 8.2 | 8.2 | 8.0 | 7.6 | 7.5 | 7.4 | 6.8 | 4.2 | 1.8 | 1.9 | 3.2 | 0.9 |
| | Top Width | (ft) | 85.0 | 91.6 | 80.1 | 85.0 | 80.4 | 64.1 | 66.9 | 76.5 | 132.9 | 126.6 | 125.6 | 137.1 | 159.1 | 173.1 | 172.4 | 173.8 | 205.8 | 227.4 | 116.9 | 71.1 | 68.8 | 68.1 | 68.3 | 67.7 | 66.3 | 63.1 | 62.8 | 58.8 | 44.3 | 45.7 | 61.4 | 72.8 | 66.5 |
| | Vel Chnl | (ft/s) | 10.6 | 10.5 | 13.0 | 12.4 | 10.8 | 13.2 | 14.2 | 18.6 | 10.4 | 10.7 | 10.4 | 10.8 | 9.2 | 8.3 | 7.7 | 8.2 | 6.5 | 6.5 | 8.1 | 10.6 | 10.5 | 10.8 | 10.7 | 11.0 | 11.6 | 10.8 | 10.9 | 12.0 | 16.5 | 19.8 | 17.7 | 13.8 | 16.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | (Trail Bridge) | | | | | | | | | | |
| FEMA FIS TABLE 10 | | | I | H | G | F | E | D | C | B | A | | | | A | | | | | | | | | | | | | | | | | | | |
| | DIST | | 1880 | 1820 | 1740 | 1640 | 1520 | 1370 | 1250 | 1140 | 1000 | | | | 1000 | | | | | | | | | | | | | | | | | | | |
| | River Sta | | 1700 | 1635 | 1555 | 1455 | 1335 | 1185 | 1060 | 960 | 830 | | | | 830.0 | | | | | | | | | | | | | | | | | | | |
| | FEMA INVERT O4P | | 14.9 | 15.0 | 13.6 | 12.0 | 10.0 | 6.5 | 6.0 | 2.0 | 1.0 | | | | 1.0 | | | | | | | | | | | | | | | | | | | |
| | WSEL | | 23.7 | 22.3 | 21.5 | 21.1 | 20.9 | 17.1 | 14.6 | 14.3 | 10.7 | | | | 10.7 | | | | | | | | | | | | | | | | | | | |
| | VEL | | 14.8 | 12.8 | 11.9 | 9.4 | 7.6 | 13.2 | 14.8 | 9.0 | 11.2 | | | | 11.2 | | | | | | | | | | | | | | | | | | | |

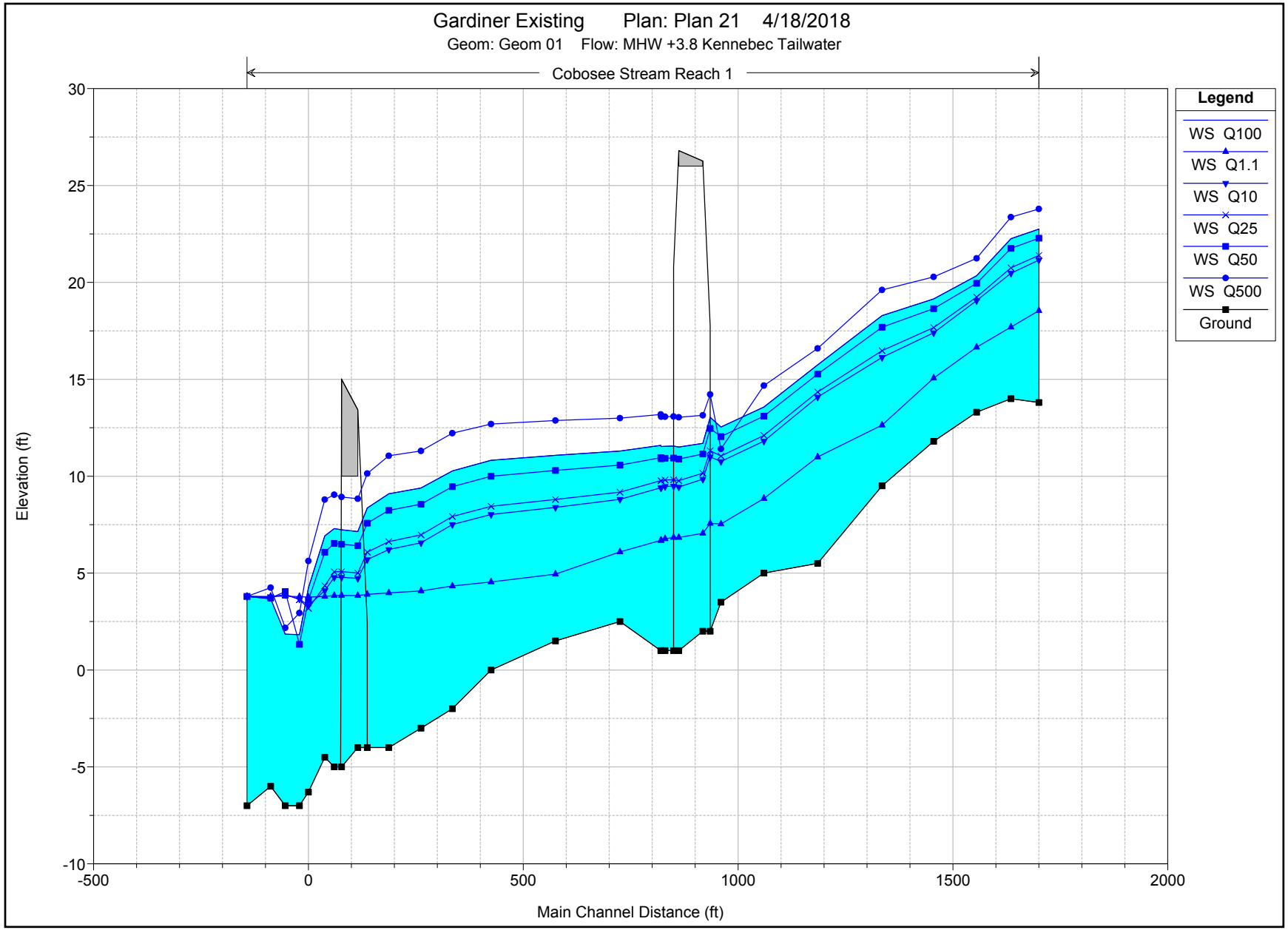



**Figure 11, Cobbossee Stream Profile - Existing Conditions**

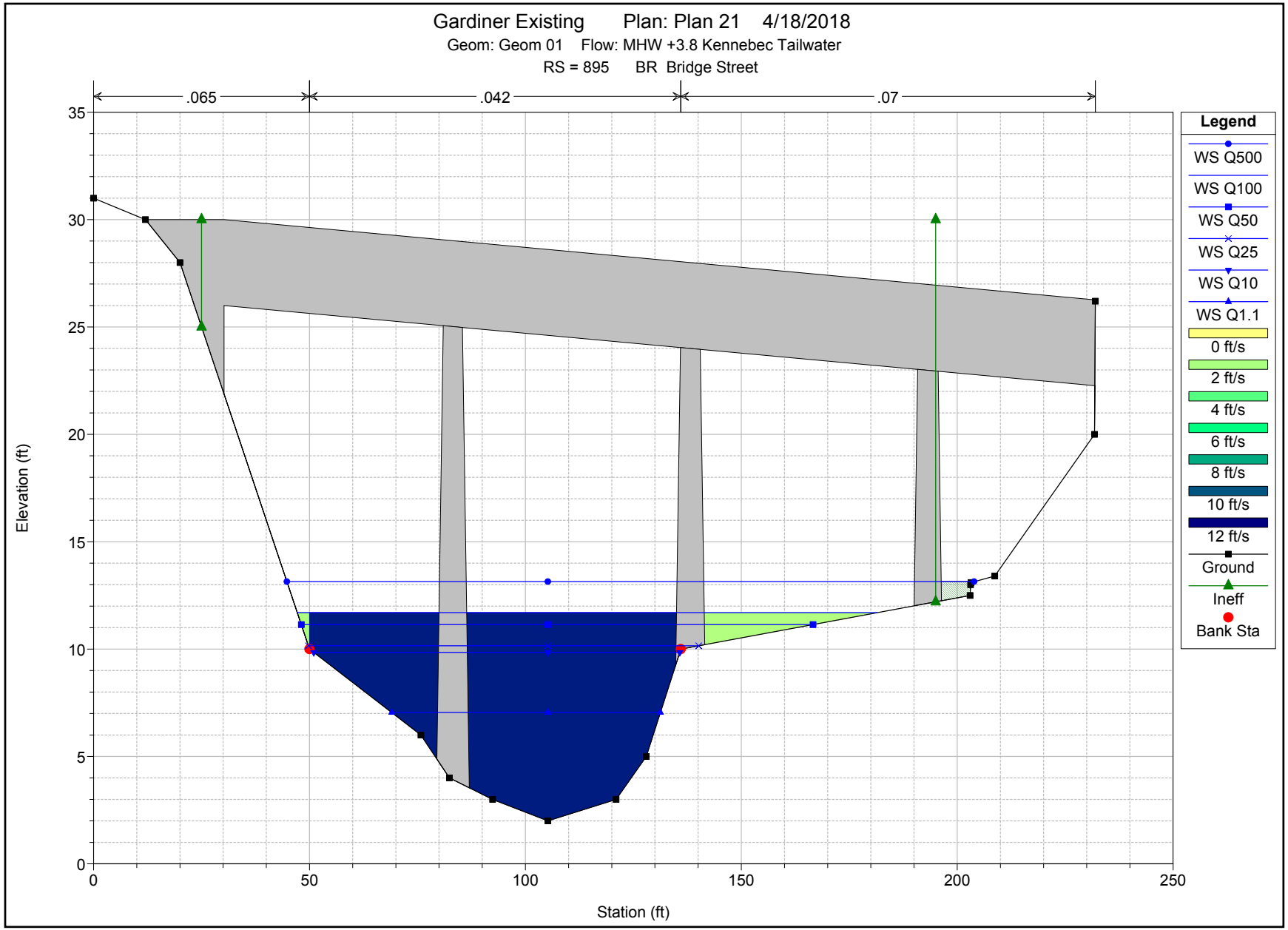



**Figure 12, Bridge Street Bridge Elevation- Existing Conditions**

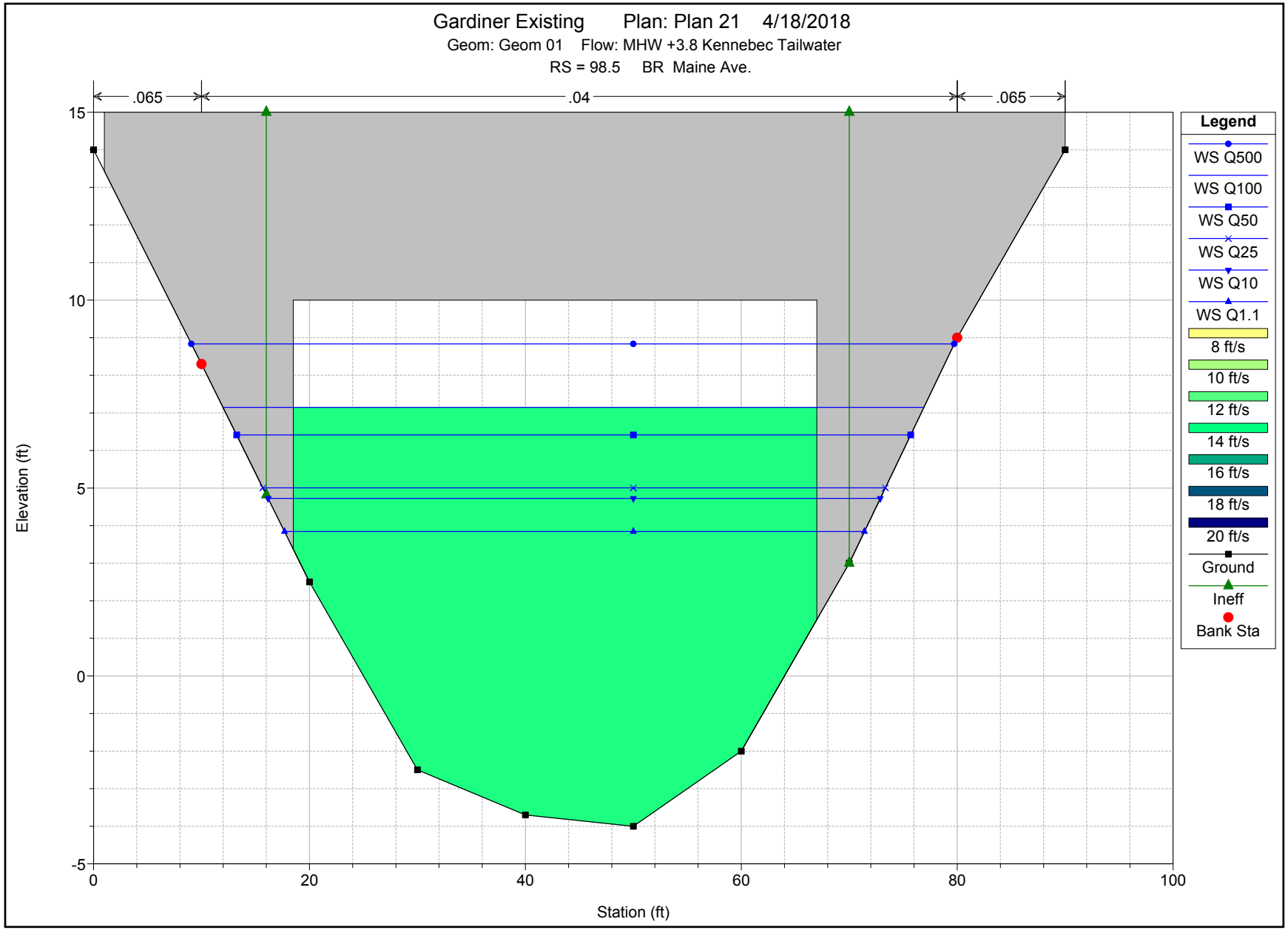



**Figure 13, Maine Avenue Bridge Elevation - Existing Conditions**

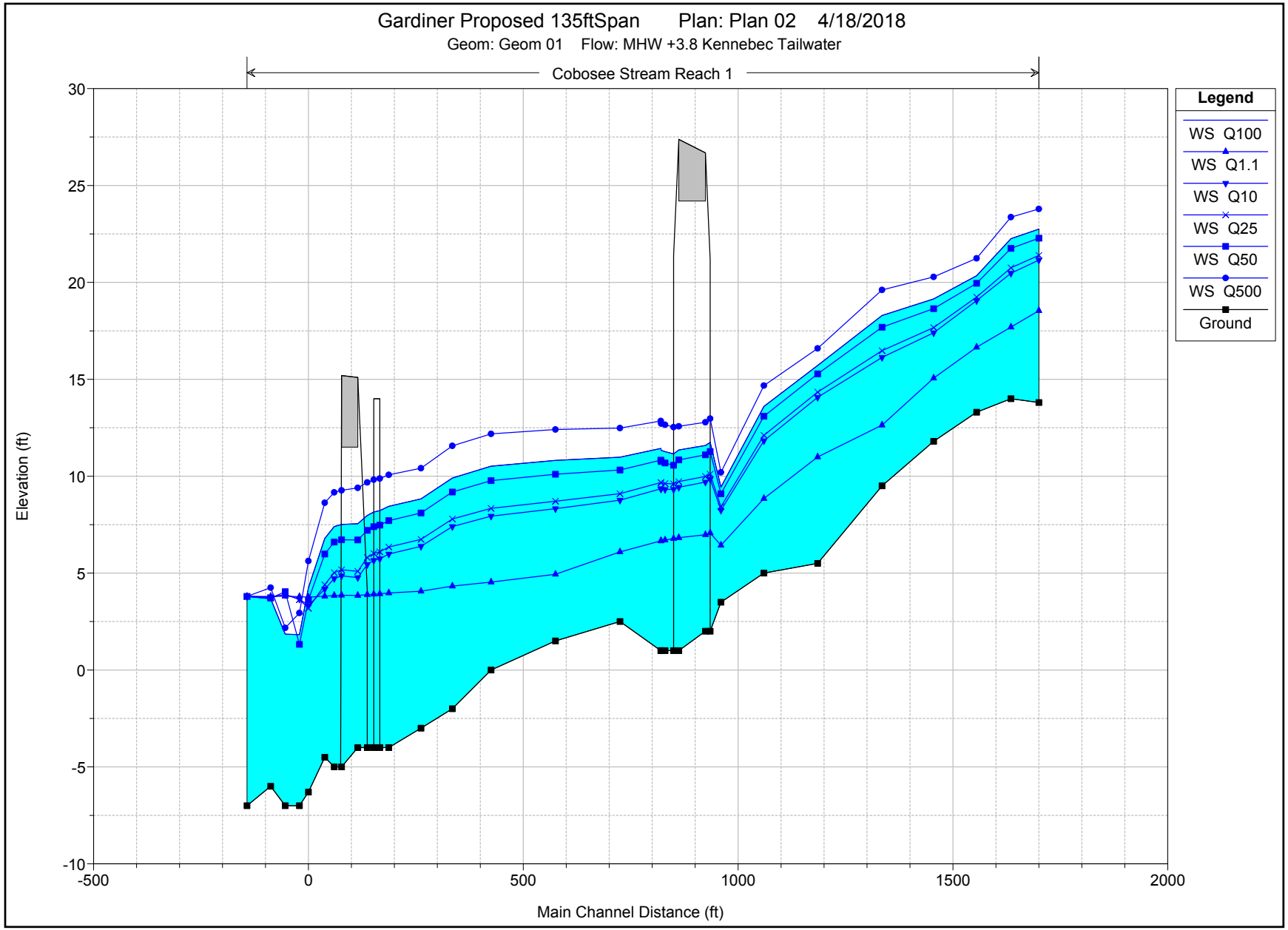



**Figure 14, Cobbossee Stream Profile - Proposed Conditions**

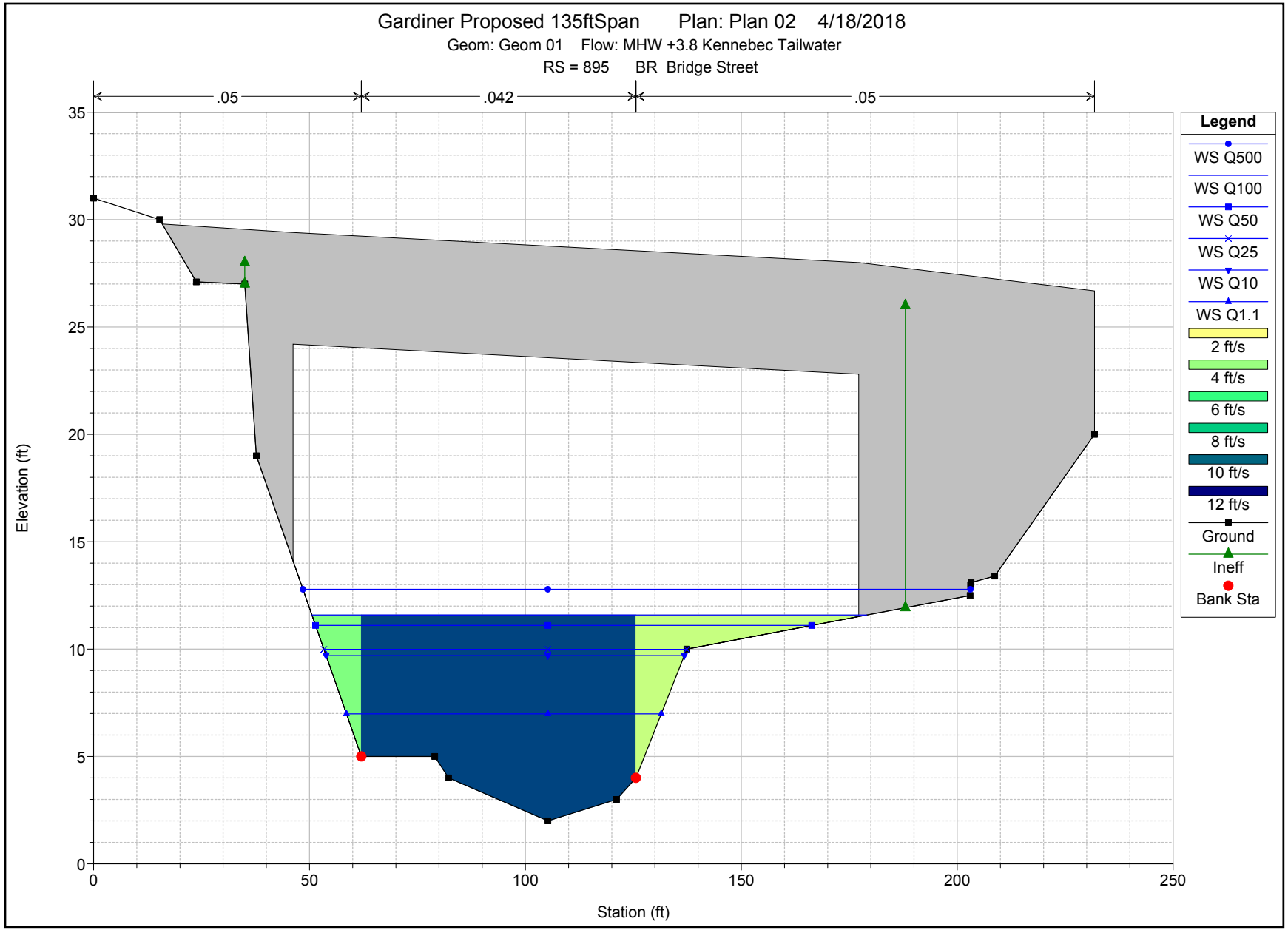



**Figure 15, Bridge Street Bridge Elevation - Proposed Conditions**

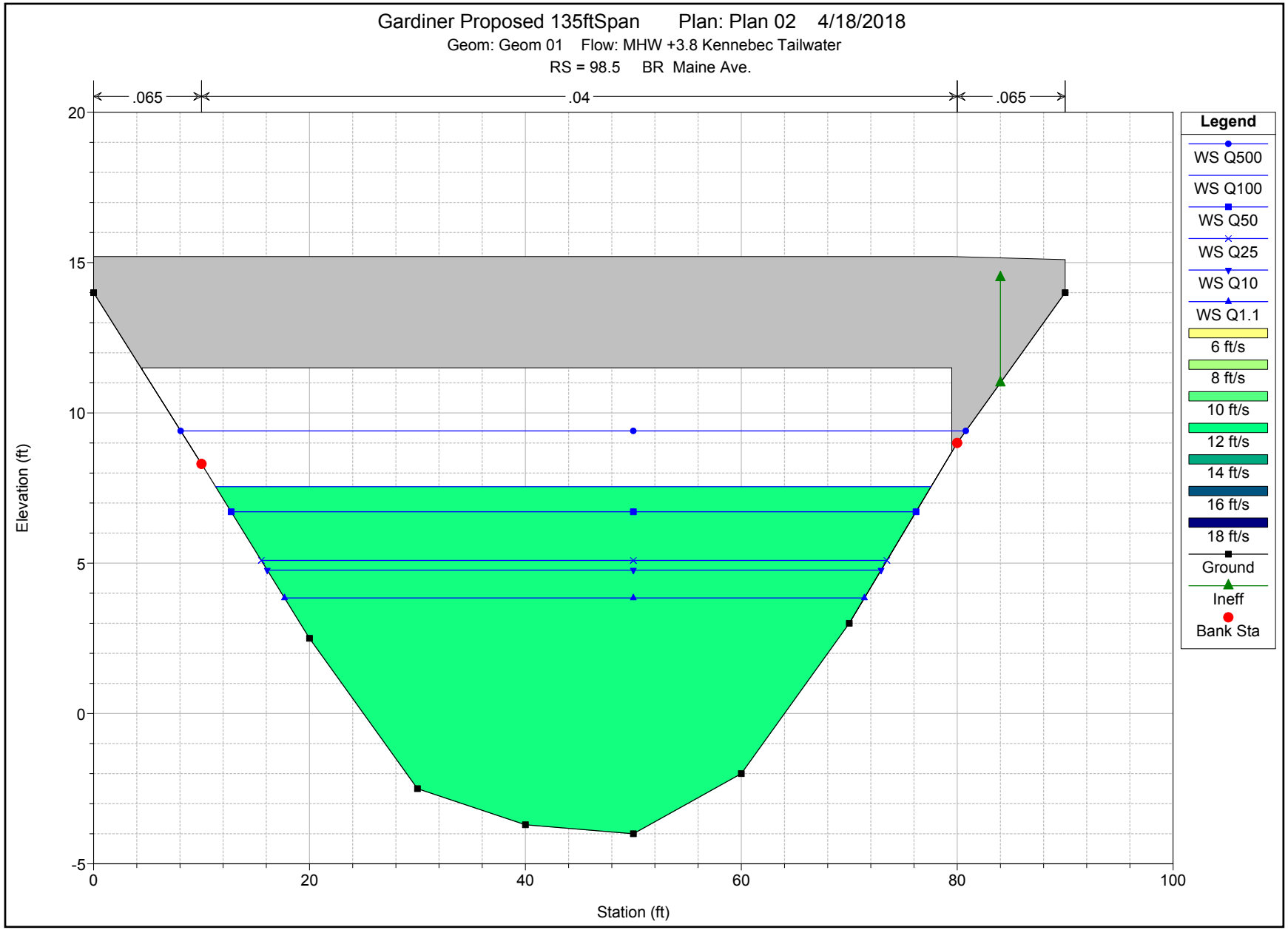



**Figure 16, Maine Avenue Bridge Elevation - Proposed Conditions**

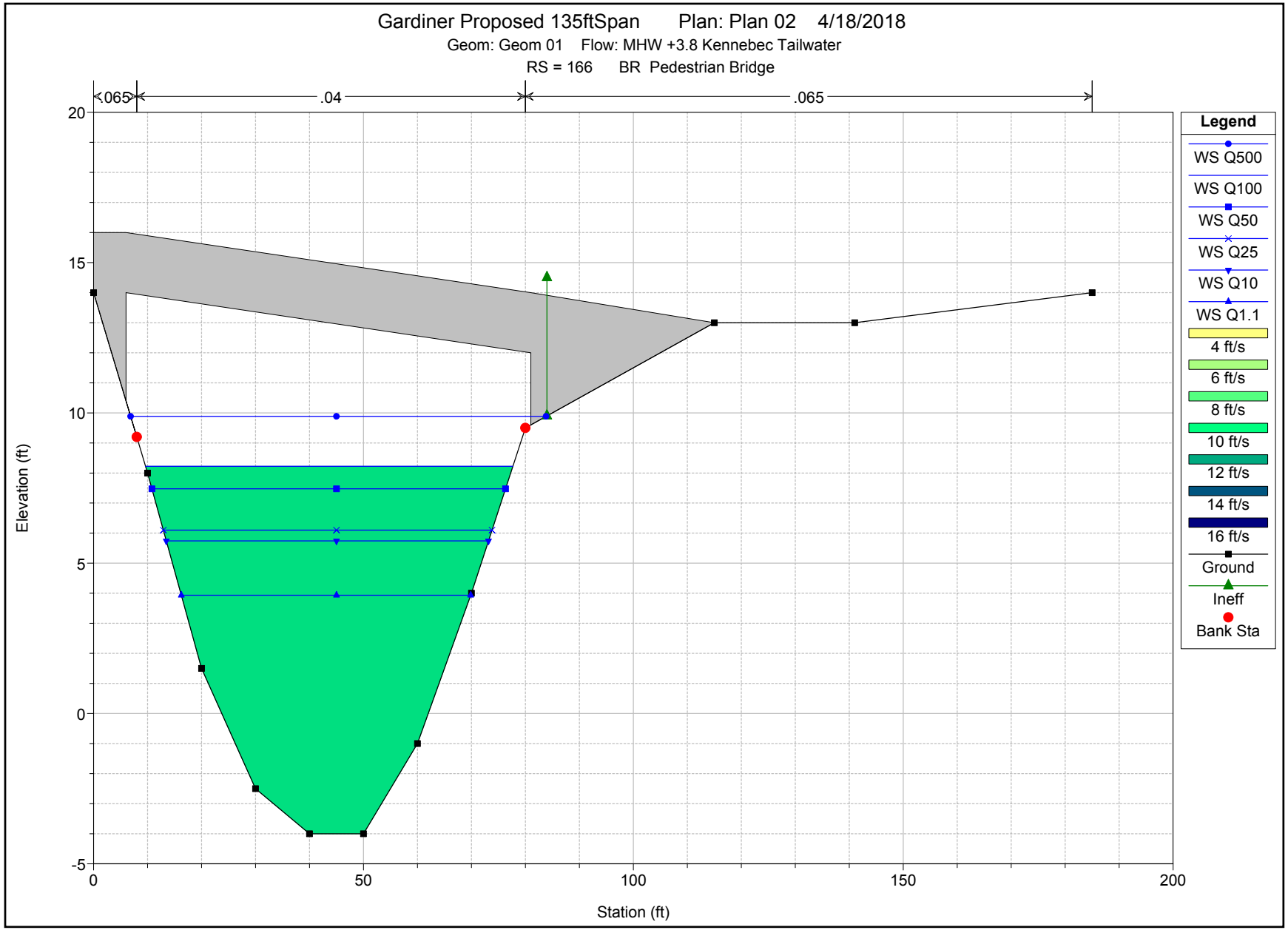



**Figure 17, Trail Bridge Elevation - Proposed Conditions**

# APPENDIX A / TIDAL DATA

MEAN LOW WATER AND MEAN HIGH WATER DATA FOR KENNEBEC RIVER AT GARDINER:

from US Dept Commerce Tidal Datums

| | Datum meters | Datum ft | computed NAVD ft |
|---|---|---|---|
| MHHW | 1.99 | 6.53 | 4.2 |
| MHW | 1.882 | 6.17 | 3.8 |
| MSL | 1.025 | 3.36 | 1.0 |
| MTL | 0.974 | 3.20 | 0.9 |
| MLW | 0.066 | 0.22 | -2.1 |
| MLLW | 0 | 0.00 | -2.3 |

from US Dept Commerce Tidal Datums
Benchmark Elevs in Meters

| 7134B | 7134C | 7134D | benchmark |
|---|---|---|---|
| 2.800 | 7.605 | 6.553 | meters above MHW |
| 4.682 | 9.487 | 8.435 | meters above MLLW |
| 1.882 | 1.882 | 1.882 | difference MHW to MLLW |

from US Dept Commerce Tidal Datums
Benchmark Elevs converted to feet

| 7134B | 7134C | 7134D | benchmark |
|---|---|---|---|
| 9.19 | 24.95 | 21.50 | feet above MHW |
| 15.36 | 31.12 | 27.67 | feet above MLLW |
| 6.174 | 6.174 | 6.174 | difference MHW to MLLW |

from MaineDOT Survey

| 7134B | 7134C | 7134D | benchmark | | |
|---|---|---|---|---|---|
| 12.98 | 28.84 | ~~9.07~~ | NAVD EL. | feet | NAVD |

computed values at benchmarks, and computed average

| 7134B | 7134C | 7134D | benchmark | AVERAGE: | |
|---|---|---|---|---|---|
| 3.79 | 3.89 | ~~-12.43~~ | MHW | **3.8** | feet NAVD |
| | | | MLW | **-2.1** | feet NAVD |
| -2.38 | -2.28 | ~~-18.60~~ | MLLW | -2.3 | feet NAVD |

**AVG, USE FOR GARDINER BRIDGE ANALYSIS**

**Station ID: 8417134** **PUBLICATION DATE: 02/27/2006**
**Name: GARDINER, KENNEBEC RIVER MAINE**
**NOAA Chart: 13298** **Latitude: 44° 14.0' N**
**USGS Quad: GARDINER** **Longitude: 69° 46.0' W**

FROM I-295, CONTINUE NORTH ON I-295 TO EXIT 49 STATE ROUTE 201 RICHMOND, PROCEED NORTH OF STATE ROUTE 201 FOR 9.0 KM (5.6 MI) TO THE INTERSECTION OF STATE ROUTE 201 AND MARINA WAY, TURN RIGHT AND CONTINUE PAST THE CENTRAL MAINE ELECTRIC COMPANY DOWN THE PRIVATE ROAD TO THE MARINA. THE BENCH MARKS ARE LOCATED AT THE ELECTRIC COMPANY, ALONG THE WALK PATH, AND IN THE FIRE STATION WINGWALL. THE TIDE GAGE IS LOCATED ON THE FOGGY BOTTOM MARINA BULKHEAD.

## T I D A L B E N C H M A R K S

**PRIMARY BENCH MARK STAMPING: 7134 A 2005**
DESIGNATION: 841 7134 A

MONUMENTATION: Tidal Station disk VM#: 17899
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Granite foundation

The bench mark is a disk set in the granite foundation of the Maine Central Power Company located on Water Street, 44.34 m (145.5 ft) SE of the east railroad track, 15.9 m (52.2 ft) east of the fire hydrant, 1.84 m (6.04 ft) NE of the power company door, and 0.03 m (0.1 ft) above the stoop.

**BENCH MARK STAMPING: 7134 B 2005**
DESIGNATION: 841 7134 B

MONUMENTATION: Tidal Station disk VM#: 17900
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Retaining wall

The bench mark is a disk set in a culvert located along the walk/bike path, 33.63 m (110.3 ft) south of the "5.75" mile marker, 26.00 m (85.3 ft) north of the SW corner of the home at 305 Maine Avenue, and 7.63 m (25.0 ft) west of the west railroad track.

**Station ID: 8417134** **PUBLICATION DATE: 02/27/2006**
**Name: GARDINER, KENNEBEC RIVER MAINE**
**NOAA Chart: 13298** **Latitude: 44° 14.0' N**
**USGS Quad: GARDINER** **Longitude: 69° 46.0' W**

## T I D A L  B E N C H  M A R K S

**BENCH MARK STAMPING: 7134 C 2005**
DESIGNATION: 841 7134 C

MONUMENTATION: Tidal Station disk VM#: 17901
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Concrete culvert

The bench mark is a disk set in a retaining wall located east of the Farmdale Fire Station, 10.98 m (36.0 ft) north of the NW corner of the building at 285 Maine Avenue, and 5.85 m (19.2 ft) SE of the centerline of the garage driveway.

**BENCH MARK STAMPING: 7134 D 2005**
DESIGNATION: 841 7134 D

MONUMENTATION: Tidal Station disk VM#: 17902
AGENCY: National Ocean Service (NOS) PID:
SETTING CLASSIFICATION: Concrete pad

The bench mark is a disk set in a concrete air conditioning unit foundation located along the east wall of the Home Care for Maine building at 357 Maine Avenue, 27.50 m (90.2 ft) north of the NE corner of the building, 7.80 m (25.6 ft) west of the fenceline, and 4.79 m (15.7 ft) south of the NE corner of the concrete pad.

**Station ID: 8417134** **PUBLICATION DATE: 02/27/2006**
**Name: GARDINER, KENNEBEC RIVER**
**MAINE**
**NOAA Chart: 13298** **Latitude: 44° 14.0' N**
**USGS Quad: GARDINER** **Longitude: 69° 46.0' W**

## T I D A L  D A T U M S

Tidal datums at GARDINER, KENNEBEC RIVER based on:

LENGTH OF SERIES: 1 MONTH
TIME PERIOD: September 2005
TIDAL EPOCH: 1983-2001
CONTROL TIDE STATION: 8418150 PORTLAND, CASCO BAY

Elevations of tidal datums referred to Mean Lower Low Water (MLLW), in METERS:

| | | | |
|---|---|---|---|
| MEAN HIGHER HIGH WATER | MHHW | = | 1.990 |
| MEAN HIGH WATER | MHW | = | 1.882 |
| MEAN SEA LEVEL | MSL | = | 1.025 |
| MEAN TIDE LEVEL | MTL | = | 0.974 |
| MEAN LOW WATER | MLW | = | 0.066 |
| MEAN LOWER LOW WATER | MLLW | = | 0.000 |

Bench Mark Elevation Information In METERS above:

| Stamping or Designation | MLLW | MHW |
|---|---|---|
| 7134 A 2005 | 8.381 | 6.499 |
| 7134 B 2005 | 4.682 | 2.800 |
| 7134 C 2005 | 9.487 | 7.605 |
| 7134 D 2005 | 8.435 | 6.553 |

**Station ID: 8417134** **PUBLICATION DATE: 02/27/2006**
**Name: GARDINER, KENNEBEC RIVER MAINE**
**NOAA Chart: 13298** **Latitude: 44° 14.0' N**
**USGS Quad: GARDINER** **Longitude: 69° 46.0' W**

## D E F I N I T I O N S

Mean Sea Level (MSL) is a tidal datum determined over a 19-year National Tidal Datum Epoch. It pertains to local mean sea level and should not be confused with the fixed datums of North American Vertical Datum of 1988 (NAVD88).

NAVD88 is a fixed datum derived from a simultaneous, least squares, minimum constraint adjustment of Canadian/Mexican/United States leveling observations. Local mean sea level observed at Father Point/Rimouski, Canada was held fixed as the single initial constraint. NAVD88 replaces NGVD29 as the national standard geodetic reference for heights. Bench mark elevations relative to NAVD88 are available from NGS through the World Wide Web at National Geodetic Survey.

NGVD29 is a fixed datum adopted as a national standard geodetic reference for heights but is now considered superseded. NGVD29 is sometimes referred to as Sea Level Datum of 1929 or as Mean Sea Level on some early issues of Geological Survey Topographic Quads. NGVD29 was originally derived from a general adjustment of the first-order leveling networks of the U.S. and Canada after holding mean sea level observed at 26 long term tide stations as fixed. Numerous local and wide-spread adjustments have been made since establishment in 1929. Bench mark elevations relative to NGVD29 are available from the National Geodetic Survey (NGS) data base via the World Wide Web at National Geodetic Survey.

NAVD88 and NGVD29 are fixed geodetic datums whose elevation relationships to local MSL and other tidal datums may not be consistent from one location to another.

The Vertical Mark Number (VM#) and PID# shown on the bench mark sheet are unique identifiers for bench marks in the tidal and geodetic databases, respectively. Each bench mark in either database has a single, unique VM# and/or PID# assigned. Where both VM# and PID# are indicated, both tidal and geodetic elevations are available for the bench mark listed.

The NAVD88 elevation is shown on the Elevations of Tidal Datums Table Referred to MLLW only when two or more of the bench marks listed have NAVD88 elevations. The NAVD88 elevation relationship shown in the table is derived from an average of several bench mark elevations relative to tide station datum. As a result of this averaging, NAVD88 bench mark elevations computed indirectly from the tidal datums elevation table may differ slightly from NAVD88 elevations listed for each bench mark in the NGS database.

| Project information | | Coordinate System | |
|---|---|---|---|
| Name: | C:\pin\FARMINGDALE111111\11\SURVEY\Orig-Data\GARDINER BRIDGES 018736 018735 17 DEC 15.vce | Name: | US State Plane 1983 |
| | | Datum: | NAD 1983 (Conus) |
| Size: | 100 KB | Zone: | Maine 2000 West |
| Modified: | 12/17/2015 7:43:16 AM (UTC:-5) | Geoid: | GEOID12A (Conus) |
| Time zone: | Eastern Standard Time | Vertical datum: | |
| Reference number: | | | |
| Description: | | | |

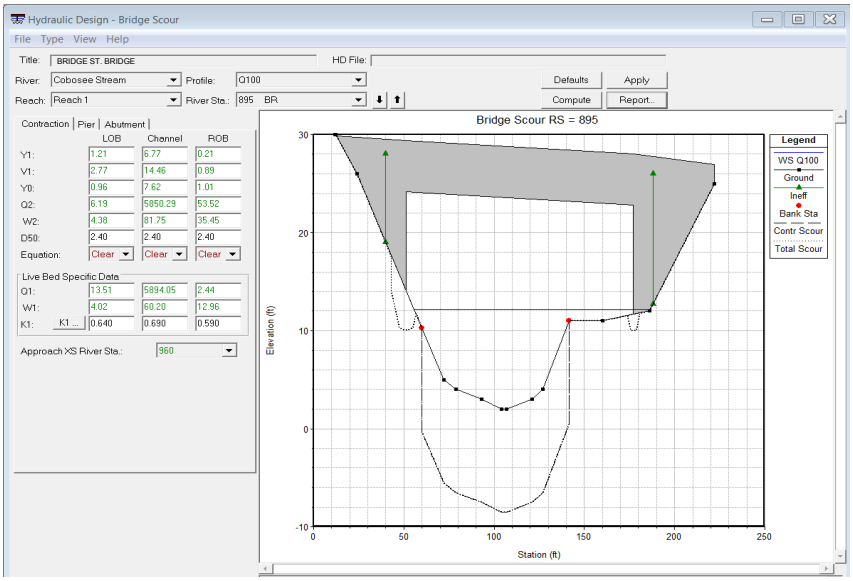
# Point List

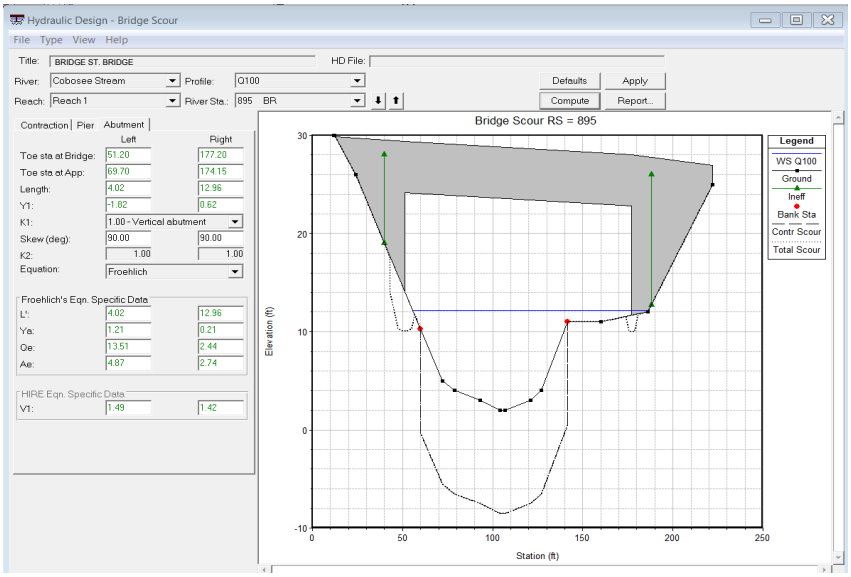
| ID | Northing (US survey foot) | Easting (US survey foot) | Elevation (US survey foot) | Feature Code | Combined Scale Factor |
|---|---|---|---|---|---|
| 7134B | 514174.5142 | 1142674.4558 | 12.98 | PTRA | 1.0000120936 |
| 7134C | 513649.5033 | 1142579.6096 | 28.84 | PTRA | 1.0000113024 |
| 7134D | 515182.0207 | 1142678.4539 | 9.07 | PTRA | 1.0000122816 |
| B31 | 515412.8733 | 1142704.2060 | 19.03 | PTRA | 1.0000118155 |
| MEOW | 533816.6886 | 1149086.1147 | 207.23 | PCTL | 1.0000051916 |

suspect

| | | |
|---|---|---|
| 12/17/2015 8:05:00 AM | C:\pin\FARMINGDALE111111\11\SURVEY\Orig-Data\GARDINER BRIDGES 018736 018735 17 DEC 15.vce | Trimble Business Center |

# APPENDIX B / SCOUR CALCULATIONS




Hydraulic Design Data
Contraction Scour

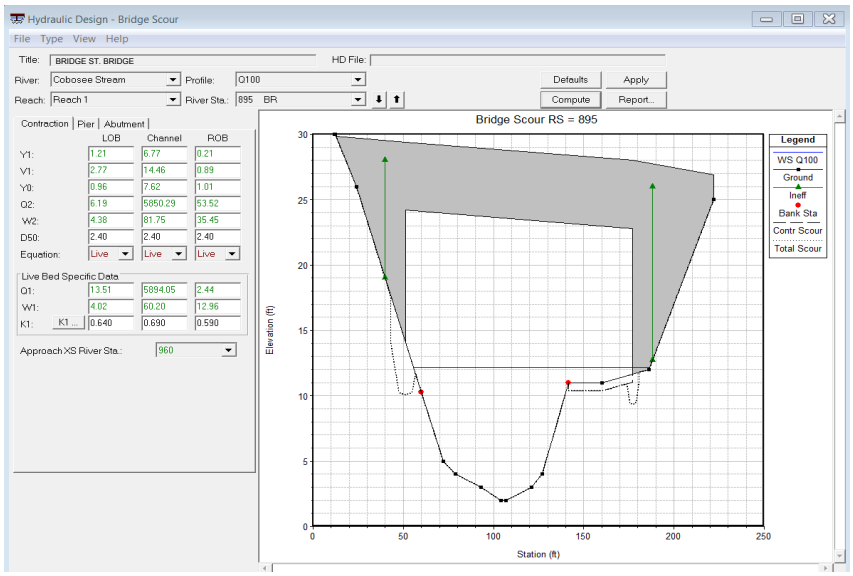
| | Left | Channel | Right |
|---|---|---|---|
| **Input Data** | | | |
| Average Depth (ft): | 1.21 | 6.77 | 0.21 |
| Approach Velocity (ft/s): | 2.77 | 14.46 | 0.89 |
| Br Average Depth (ft): | 0.96 | 7.62 | 1.01 |
| BR Opening Flow (cfs): | 6.19 | 5850.29 | 53.52 |
| BR Top WD (ft): | 4.38 | 81.75 | 35.45 |
| Grain Size D50 (mm): | 2.4 | 2.4 | 2.4 |
| Approach Flow (cfs): | 13.51 | 5894.05 | 2.44 |
| Approach Top WD (ft): | 4.02 | 60.2 | 12.96 |
| K1 Coefficient: | 0.64 | 0.69 | 0.59 |
| **Results** | | | |
| Scour Depth Ys (ft): | 0 | 10.52 | 0 |
| Critical Velocity (ft/s): | | | |
| Equation: | Clear | Clear | Clear |

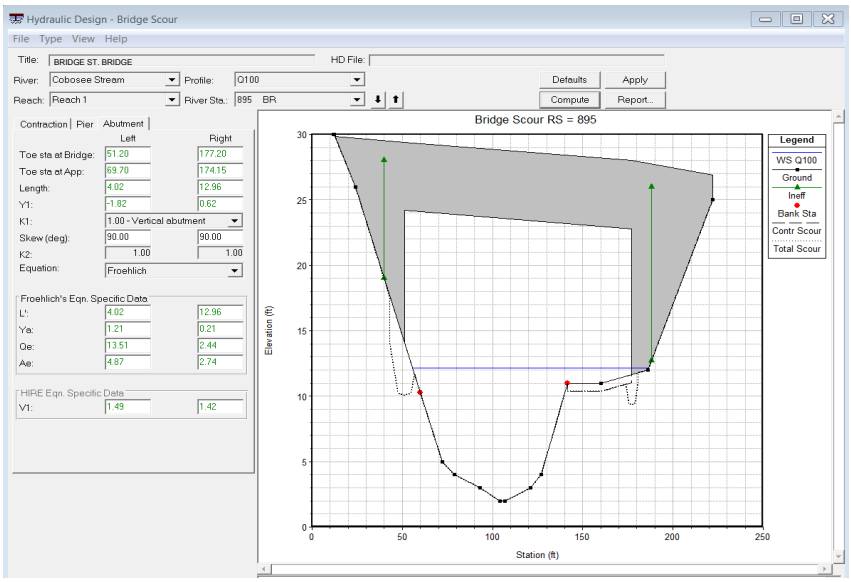
Abutment Scour

| | Left | Right |
|---|---|---|
| **Input Data** | | |
| Station at Toe (ft): | 51.2 | 177.2 |
| Toe Sta at appr (ft): | 69.7 | 174.15 |
| Abutment Length (ft): | 4.02 | 12.96 |
| Depth at Toe (ft): | -1.82 | 0.62 |
| K1 Shape Coef: | 1.00 - Vertical abutment | |
| Degree of Skew (degrees): | 90 | 90 |
| K2 Skew Coef: | 1 | 1 |
| Projected Length L' (ft): | 4.02 | 12.96 |
| Avg Depth Obstructed Ya (ft): | 1.21 | 0.21 |
| Flow Obstructed Qe (cfs): | 13.51 | 2.44 |
| Area Obstructed Ae (sq ft): | 4.87 | 2.74 |
| **Results** | | |
| Scour Depth Ys (ft): | 4.02 | 1.67 |
| Qe/Ae = Ve: | 2.77 | 0.89 |
| Froude #: | 0.44 | 0.34 |
| Equation: | Froehlich | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Left abutment scour + contraction scour (ft): | 4.02 |
| Right abutment scour + contraction scour (ft): | 1.67 |




Hydraulic Design Data
Contraction Scour

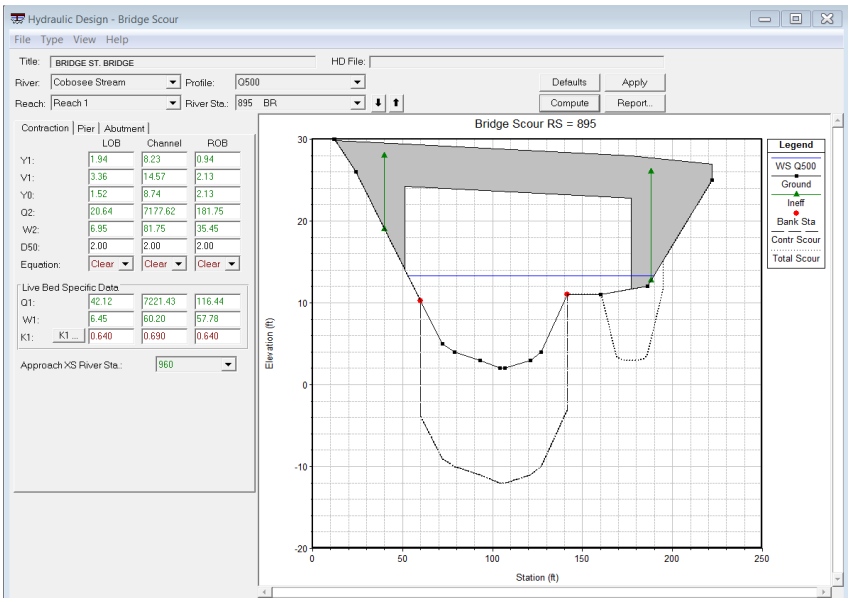
| | Left | Channel | Right |
|---|---|---|---|
| **Input Data** | | | |
| Average Depth (ft): | 1.21 | 6.77 | 0.21 |
| Approach Velocity (ft/s): | 2.77 | 14.46 | 0.89 |
| Br Average Depth (ft): | 0.96 | 7.62 | 1.01 |
| BR Opening Flow (cfs): | 6.19 | 5850.29 | 53.52 |
| BR Top WD (ft): | 4.38 | 81.75 | 35.45 |
| Grain Size D50 (mm): | 2.4 | 2.4 | 2.4 |
| Approach Flow (cfs): | 13.51 | 5894.05 | 2.44 |
| Approach Top WD (ft): | 4.02 | 60.2 | 12.96 |
| K1 Coefficient: | 0.64 | 0.69 | 0.59 |
| **Results** | | | |
| Scour Depth Ys (ft): | 0 | 0 | 0.63 |
| Critical Velocity (ft/s): | | | |
| Equation: | Live | Live | Live |

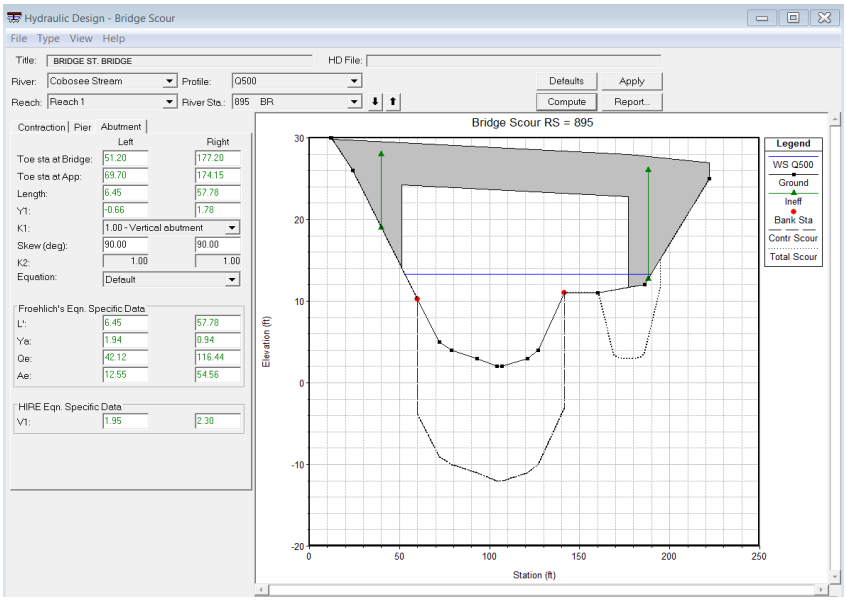
Abutment Scour

| | Left | Right |
|---|---|---|
| **Input Data** | | |
| Station at Toe (ft): | 51.2 | 177.2 |
| Toe Sta at appr (ft): | 69.7 | 174.15 |
| Abutment Length (ft): | 4.02 | 12.96 |
| Depth at Toe (ft): | -1.82 | 0.62 |
| K1 Shape Coef: | 1.00 - Vertical abutment | |
| Degree of Skew (degrees): | 90 | 90 |
| K2 Skew Coef: | 1 | 1 |
| Projected Length L' (ft): | 4.02 | 12.96 |
| Avg Depth Obstructed Ya (ft): | 1.21 | 0.21 |
| Flow Obstructed Qe (cfs): | 13.51 | 2.44 |
| Area Obstructed Ae (sq ft): | 4.87 | 2.74 |
| **Results** | | |
| Scour Depth Ys (ft): | 4.02 | 1.67 |
| Qe/Ae = Ve: | 2.77 | 0.89 |
| Froude #: | 0.44 | 0.34 |
| Equation: | Froehlich | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Left abutment scour + contraction scour (ft): | 4.02 |
| Right abutment scour + contraction scour (ft): | 2.3 |




Hydraulic Design Data

Contraction Scour

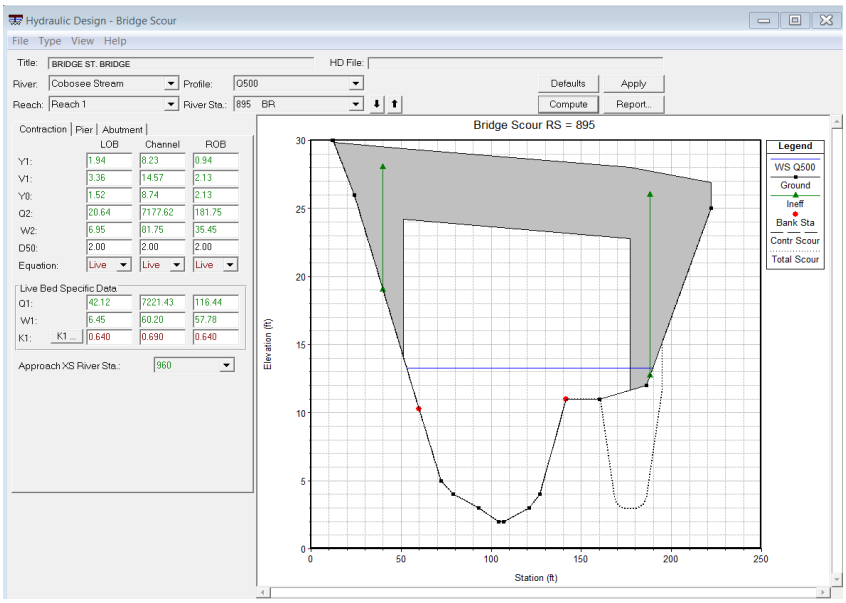
| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average D | 1.94 | 8.23 | 0.94 |
| Approach ' | 3.36 | 14.57 | 2.13 |
| Br Average | 1.52 | 8.74 | 2.13 |
| BR Openin | 20.64 | 7177.62 | 181.75 |
| BR Top Wi | 6.95 | 81.75 | 35.45 |
| Grain Size | 2 | 2 | 2 |
| Approach | 42.12 | 7221.43 | 116.44 |
| Approach ' | 6.45 | 60.2 | 57.78 |
| K1 Coeffici | 0.64 | 0.69 | 0.64 |
| Results | | | |
| Scour Dept | 0 | 14.04 | 0 |
| Critical Velocity (ft/s): | | | |
| Equation: | Clear | Clear | Clear |

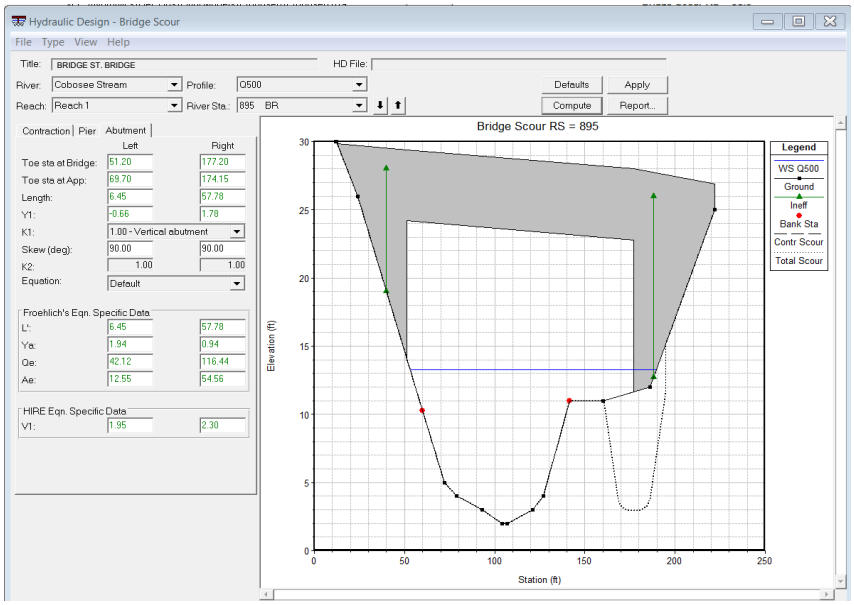
Abutment Scour

| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at ' | 51.2 | 177.2 |
| Toe Sta at | 69.7 | 174.15 |
| Abutment | 6.45 | 57.78 |
| Depth at T | -0.66 | 1.78 |
| K1 Shape ( | 1.00 - Vertical abutment | |
| Degree of | 90 | 90 |
| K2 Skew C | 1 | 1 |
| Projected I | 6.45 | 57.78 |
| Avg Depth | 1.94 | 0.94 |
| Flow Obstr | 42.12 | 116.44 |
| Area Obstr | 12.55 | 54.56 |
| Results | | |
| Scour Depth Ys (ft): | | 8.74 |
| Froude #: | | 0.3 |
| Equation: | Default | HIRE |

Combined Scour Depths

| | |
|---|---|
| Right abut | 8.74 |



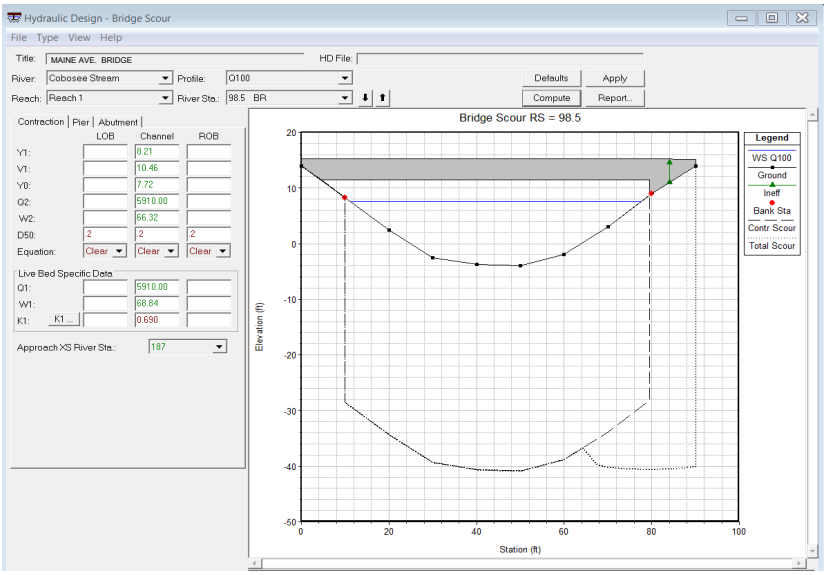

Hydraulic Design Data

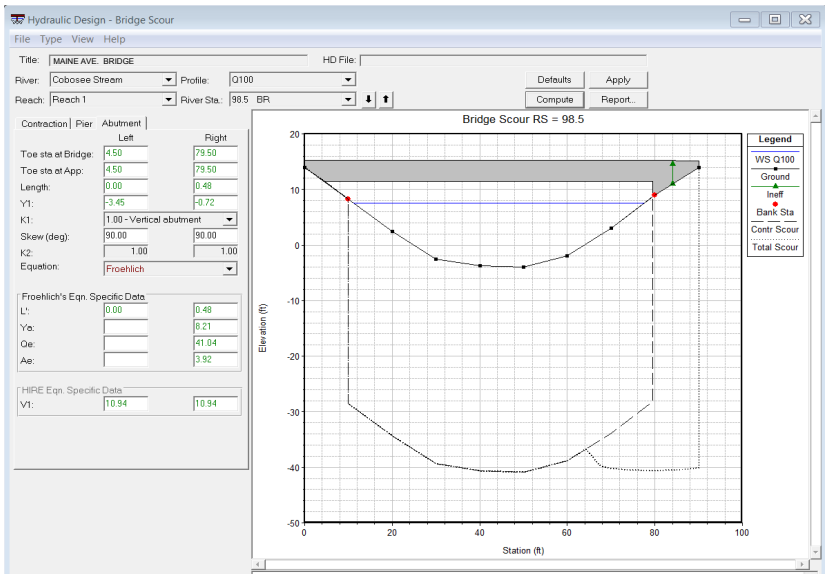
Contraction Scour

| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average D | 1.94 | 8.23 | 0.94 |
| Approach ' | 3.36 | 14.57 | 2.13 |
| Br Average | 1.52 | 8.74 | 2.13 |
| BR Openin | 20.64 | 7177.62 | 181.75 |
| BR Top WI | 6.95 | 81.75 | 35.45 |
| Grain Size | 2 | 2 | 2 |
| Approach | 42.12 | 7221.43 | 116.44 |
| Approach ' | 6.45 | 60.2 | 57.78 |
| K1 Coeffici | 0.64 | 0.69 | 0.64 |
| Results | | | |
| Scour Dept | 0 | 0 | 0 |
| Critical Velocity (ft/s): | | | |
| Equation: | Live | Live | Live |

Abutment Scour

| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at ' | 51.2 | 177.2 |
| Toe Sta at | 69.7 | 174.15 |
| Abutment | 6.45 | 57.78 |
| Depth at T | -0.66 | 1.78 |
| K1 Shape C | 1.00 - Vertical abutment | |
| Degree of | 90 | 90 |
| K2 Skew C | 1 | 1 |
| Projected I | 6.45 | 57.78 |
| Avg Depth | 1.94 | 0.94 |
| Flow Obstr | 42.12 | 116.44 |
| Area Obstr | 12.55 | 54.56 |
| Results | | |
| Scour Depth Ys (ft): | | 8.74 |
| Froude #: | | 0.3 |
| Equation: | Default | HIRE |




Hydraulic Design Data
Contraction Scour

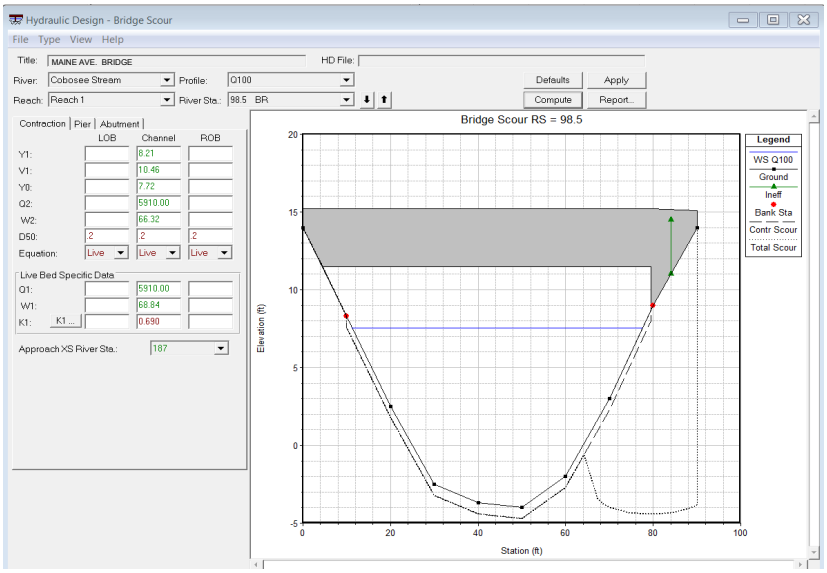
| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average Depth (ft): | | 8.21 | |
| Approach Velocity (ft/s): | | 10.46 | |
| Br Average Depth (ft): | | 7.72 | |
| BR Opening Flow (cfs): | | 5910 | |
| BR Top WD (ft): | | 66.32 | |
| Grain Size D50 (mm): | 0.2 | 0.2 | 0.2 |
| Approach Flow (cfs): | | 5910 | |
| Approach Top WD (ft): | | 68.84 | |
| K1 Coefficient: | | 0.69 | |
| Results | | | |
| Scour Depth Ys (ft): | | 36.87 | |
| Critical Velocity (ft/s): | | | |
| Equation: | | Clear | |

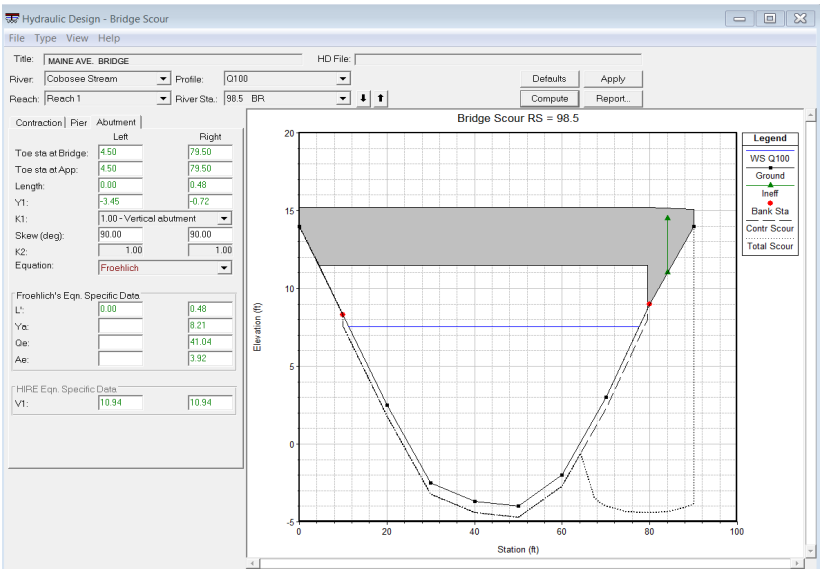
Abutment Scour

| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at Toe (ft): | 4.5 | 79.5 |
| Toe Sta at appr (ft): | 4.5 | 79.5 |
| Abutment Length (ft): | 0 | 0.48 |
| Depth at Toe (ft): | -3.45 | -0.72 |
| K1 Shape Coef: | 1.00 - Vertical abutment | |
| Degree of Skew (degrees): | 90 | 90 |
| K2 Skew Coef: | 1 | 1 |
| Projected Length L' (ft): | 0 | 0.48 |
| Avg Depth Obstructed Ya (ft): | | 8.21 |
| Flow Obstructed Qe (cfs): | | 41.04 |
| Area Obstructed Ae (sq ft): | | 3.92 |
| Results | | |
| Scour Depth Ys (ft): | | 12.41 |
| Qe/Ae = Ve: | | 10.47 |
| Froude #: | | 0.64 |
| Equation: | Default | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Right abutment scour + contraction scour (ft): | 49.28 |




Hydraulic Design Data
Contraction Scour

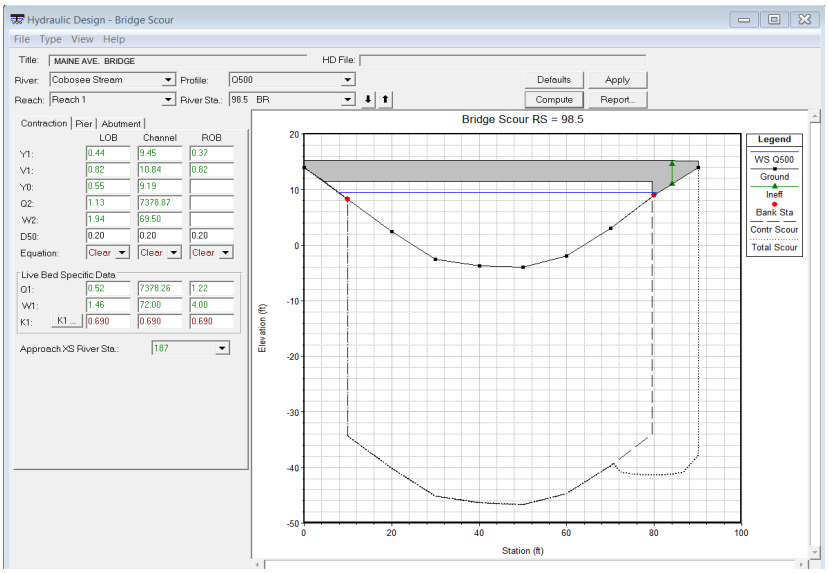
| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average Depth (ft): | | 8.21 | |
| Approach Velocity (ft/s): | | 10.46 | |
| Br Average Depth (ft): | | 7.72 | |
| BR Opening Flow (cfs): | | 5910 | |
| BR Top WD (ft): | | 66.32 | |
| Grain Size D50 (mm): | 0.2 | 0.2 | 0.2 |
| Approach Flow (cfs): | | 5910 | |
| Approach Top WD (ft): | | 68.84 | |
| K1 Coefficient: | | 0.69 | |
| Results | | | |
| Scour Depth Ys (ft): | | 0.7 | |
| Critical Velocity (ft/s): | | | |
| Equation: | | Live | |

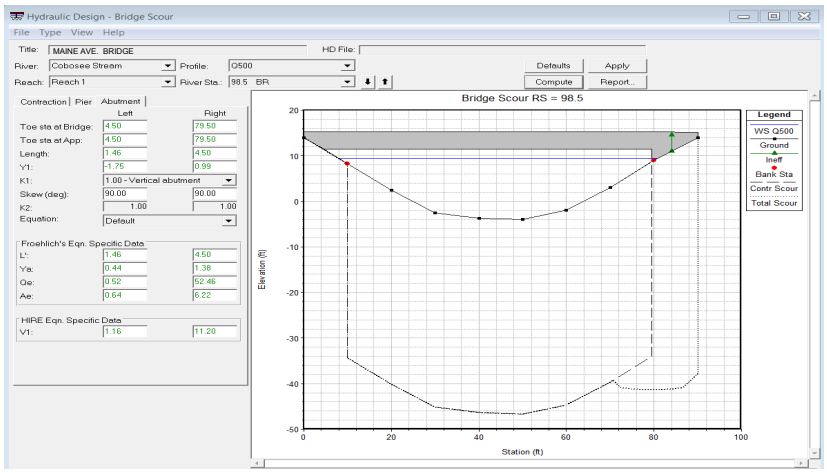
Abutment Scour

| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at Toe (ft): | 4.5 | 79.5 |
| Toe Sta at appr (ft): | 4.5 | 79.5 |
| Abutment Length (ft): | 0 | 0.48 |
| Depth at Toe (ft): | -3.45 | -0.72 |
| K1 Shape Coef: | 1.00 - Vertical abutment | |
| Degree of Skew (degrees): | 90 | 90 |
| K2 Skew Coef: | 1 | 1 |
| Projected Length L' (ft): | 0 | 0.48 |
| Avg Depth Obstructed Ya (ft): | | 8.21 |
| Flow Obstructed Qe (cfs): | | 41.04 |
| Area Obstructed Ae (sq ft): | | 3.92 |
| Results | | |
| Scour Depth Ys (ft): | | 12.41 |
| Qe/Ae = Ve: | | 10.47 |
| Froude #: | | 0.64 |
| Equation: | Default | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Right abutment scour + contraction scour (ft): | 13.12 |




Hydraulic Design Data

Contraction Scour

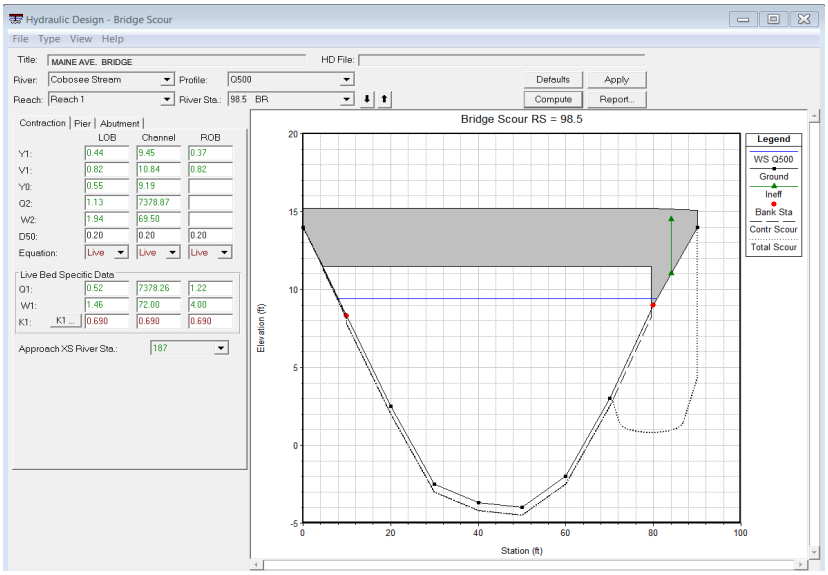
| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average De | 0.44 | 9.45 | 0.37 |
| Approach \ | 0.82 | 10.84 | 0.82 |
| Br Average | 0.55 | 9.19 | |
| BR Openin | 1.13 | 7378.87 | |
| BR Top WE | 1.94 | 69.5 | |
| Grain Size | 0.2 | 0.2 | 0.2 |
| Approach I | 0.52 | 7378.26 | 1.22 |
| Approach ' | 1.46 | 72 | 4 |
| K1 Coeffici | 0.69 | 0.69 | 0.69 |
| Results | | | |
| Scour Dept | 0.05 | 42.63 | |
| Critical Velocity (ft/s): | | | |
| Equation: | Clear | Clear | |

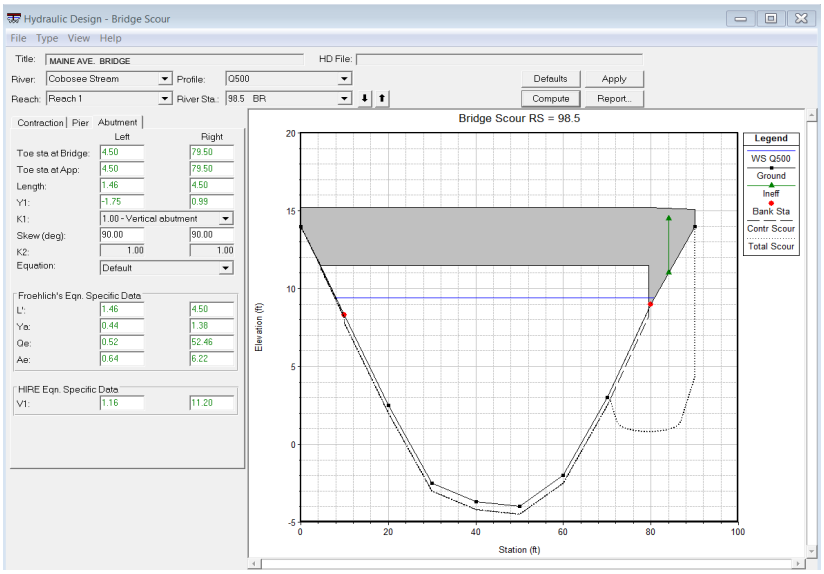
Abutment Scour

| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at ' | 4.5 | 79.5 |
| Toe Sta at | 4.5 | 79.5 |
| Abutment | 1.46 | 4.5 |
| Depth at Te | -1.75 | 0.99 |
| K1 Shape C | 1.00 - Vertical abutment | |
| Degree of S | 90 | 90 |
| K2 Skew Co | 1 | 1 |
| Projected L | 1.46 | 4.5 |
| Avg Depth | 0.44 | 1.38 |
| Flow Obstr | 0.52 | 52.46 |
| Area Obstr | 0.64 | 6.22 |
| Results | | |
| Scour Depth Ys (ft): | | 7.39 |
| Qe/Ae = Ve: | | 8.43 |
| Froude #: | | 1.27 |
| Equation: | Default | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Right abut | 50.02 |




Hydraulic Design Data

Contraction Scour

| | Left | Channel | Right |
|---|---|---|---|
| Input Data | | | |
| Average De | 0.44 | 9.45 | 0.37 |
| Approach \ | 0.82 | 10.84 | 0.82 |
| Br Average | 0.55 | 9.19 | |
| BR Openin | 1.13 | 7378.87 | |
| BR Top WE | 1.94 | 69.5 | |
| Grain Size | 0.2 | 0.2 | 0.2 |
| Approach I | 0.52 | 7378.26 | 1.22 |
| Approach \ | 1.46 | 72 | 4 |
| K1 Coeffici | 0.69 | 0.69 | 0.69 |
| Results | | | |
| Scour Dept | 0.15 | 0.49 | |
| Critical Velocity (ft/s): | | | |
| Equation: | Live | Live | |

Abutment Scour

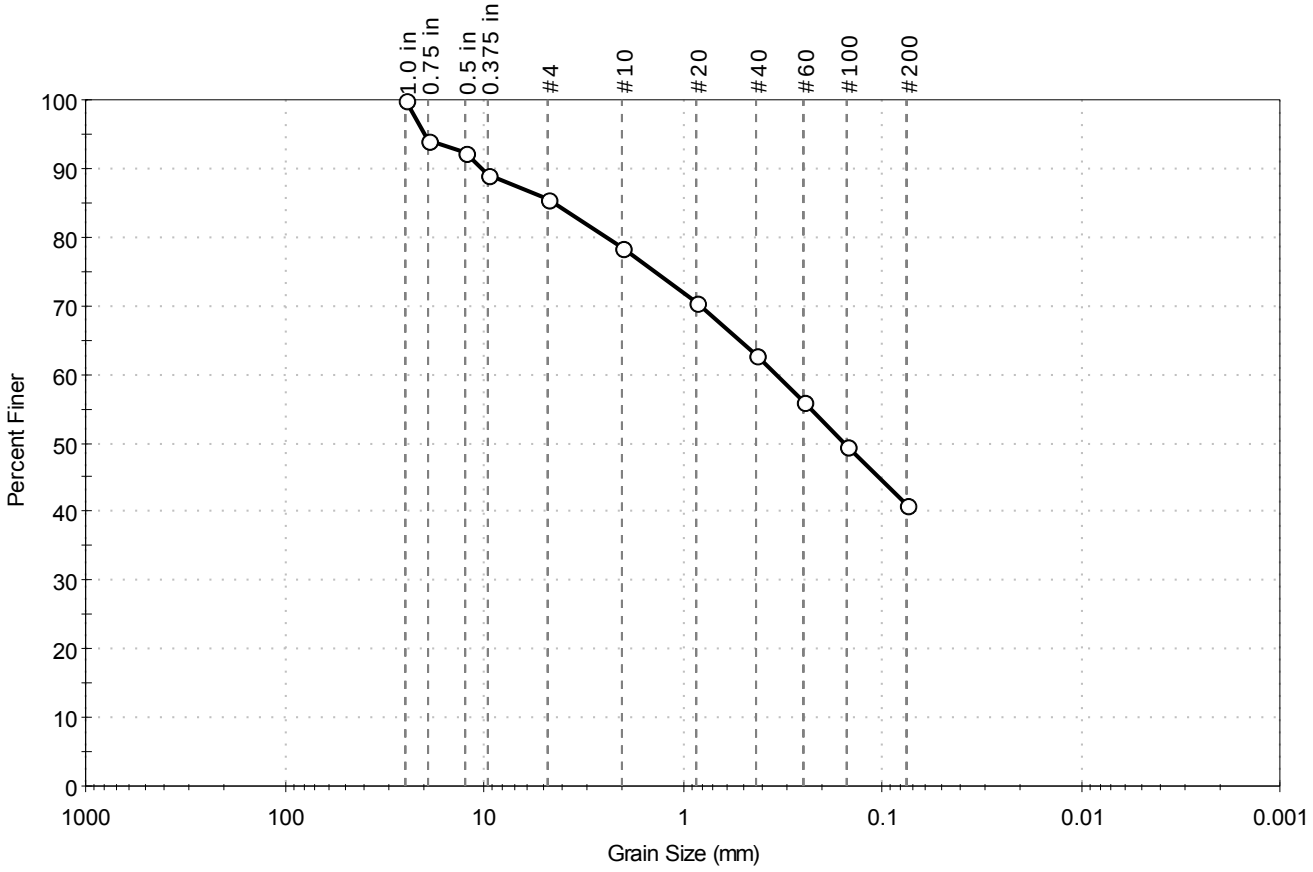
| | Left | Right |
|---|---|---|
| Input Data | | |
| Station at \ | 4.5 | 79.5 |
| Toe Sta at | 4.5 | 79.5 |
| Abutment | 1.46 | 4.5 |
| Depth at Tc | -1.75 | 0.99 |
| K1 Shape C | 1.00 - Vertical abutment | |
| Degree of S | 90 | 90 |
| K2 Skew Cc | 1 | 1 |
| Projected L | 1.46 | 4.5 |
| Avg Depth | 0.44 | 1.38 |
| Flow Obstr | 0.52 | 52.46 |
| Area Obstr | 0.64 | 6.22 |
| Results | | |
| Scour Depth Ys (ft): | | 7.39 |
| Qe/Ae = Ve: | | 8.43 |
| Froude #: | | 1.27 |
| Equation: | Default | Froehlich |

Combined Scour Depths

| | |
|---|---|
| Right abut | 7.89 |

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-104 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 2D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 2.0-4.0 | Test Id: | 365338 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark olive brown clayey sand | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 14.4 | 44.7 | 40.9 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 1.0 in | 25.00 | 100 | | |
| 0.75 in | 19.00 | 94 | | |
| 0.5 in | 12.50 | 92 | | |
| 0.375 in | 9.50 | 89 | | |
| #4 | 4.75 | 86 | | |
| #10 | 2.00 | 79 | | |
| #20 | 0.85 | 70 | | |
| #40 | 0.42 | 63 | | |
| #60 | 0.25 | 56 | | |
| #100 | 0.15 | 50 | | |
| #200 | 0.075 | 41 | | |
| | | | | |
| | | | | |

**Coefficients**

| | |
|---|---|
| $D_{85}$ = 4.4055 mm | $D_{30}$ = N/A |
| $D_{60}$ = 0.3440 mm | $D_{15}$ = N/A |
| $D_{50}$ = 0.1550 mm | $D_{10}$ = N/A |
| $C_u$ = N/A | $C_c$ = N/A |

**Classification**

ASTM N/A

AASHTO Silty Soils (A-4 (0))

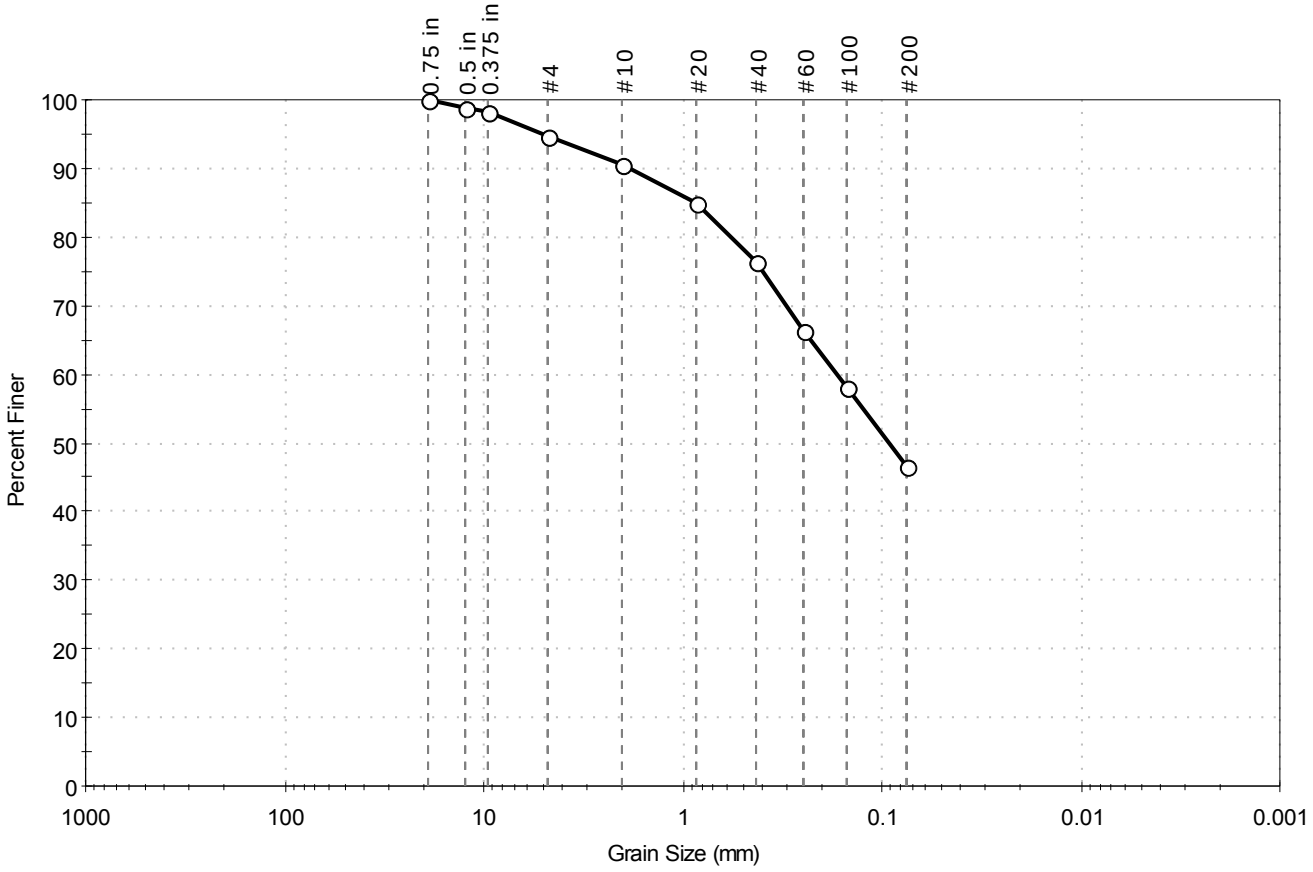
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-104 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 3D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 4.0-6.0 | Test Id: | 365339 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown clayey sand | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 5.2 | 48.2 | 46.6 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.75 in | 19.00 | 100 | | |
| 0.5 in | 12.50 | 99 | | |
| 0.375 in | 9.50 | 98 | | |
| #4 | 4.75 | 95 | | |
| #10 | 2.00 | 90 | | |
| #20 | 0.85 | 85 | | |
| #40 | 0.42 | 76 | | |
| #60 | 0.25 | 67 | | |
| #100 | 0.15 | 58 | | |
| #200 | 0.075 | 47 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 0.8564 mm  $D_{30}$ = N/A

$D_{60}$ = 0.1688 mm  $D_{15}$ = N/A

$D_{50}$ = 0.0921 mm  $D_{10}$ = N/A

$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Soils (A-4 (0))

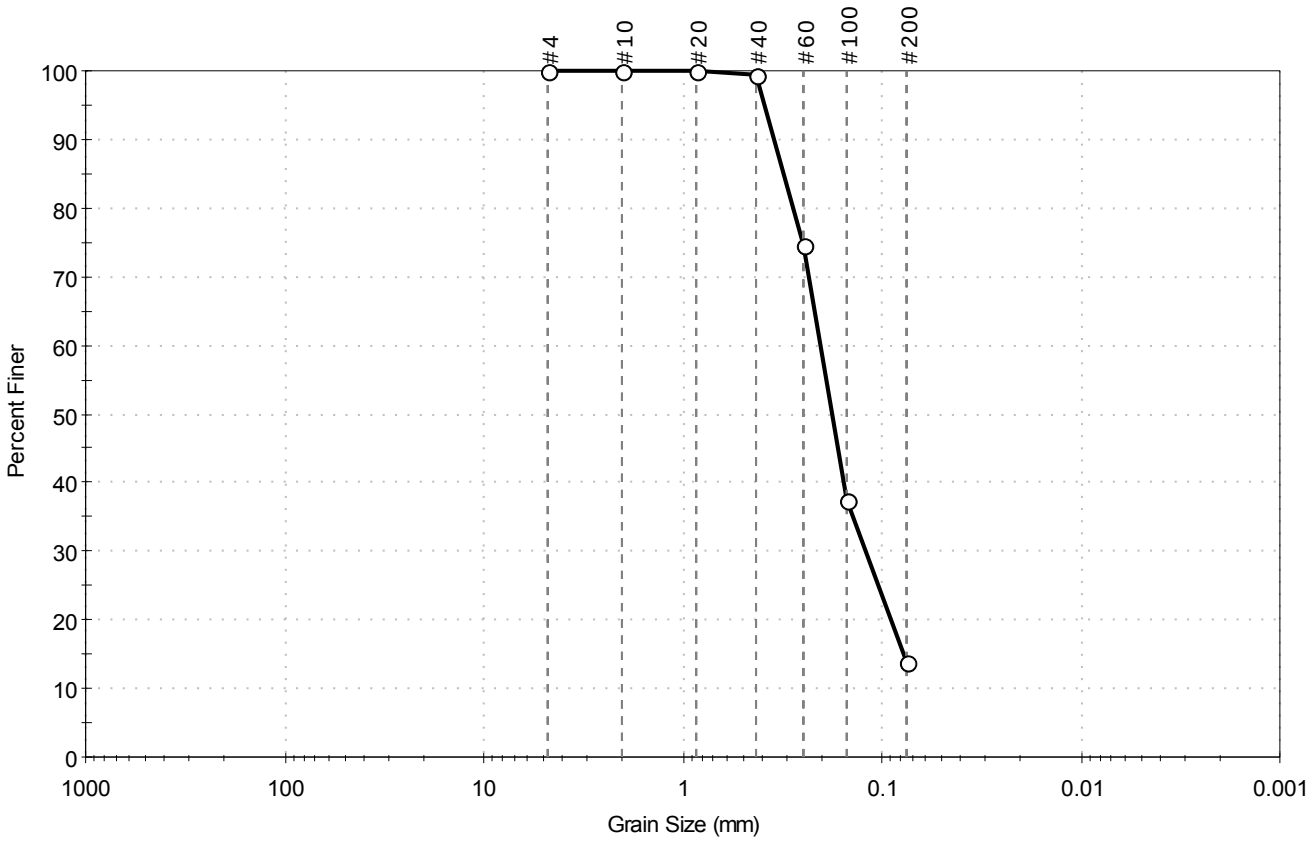
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-104 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 15D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 40.0-42.0 | Test Id: | 365340 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark gray silty sand | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 0.0 | 86.0 | 14.0 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| #4 | 4.75 | 100 | | |
| #10 | 2.00 | 100 | | |
| #20 | 0.85 | 100 | | |
| #40 | 0.42 | 99 | | |
| #60 | 0.25 | 75 | | |
| #100 | 0.15 | 38 | | |
| #200 | 0.075 | 14 | | |
| | | | | |
| | | | | |

**Coefficients**

| | |
|---|---|
| $D_{85}$ = 0.3116 mm | $D_{30}$ = 0.1202 mm |
| $D_{60}$ = 0.2042 mm | $D_{15}$ = 0.0773 mm |
| $D_{50}$ = 0.1780 mm | $D_{10}$ = N/A |
| $C_u$ = N/A | $C_c$ = N/A |

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

**Sample / Test Description**

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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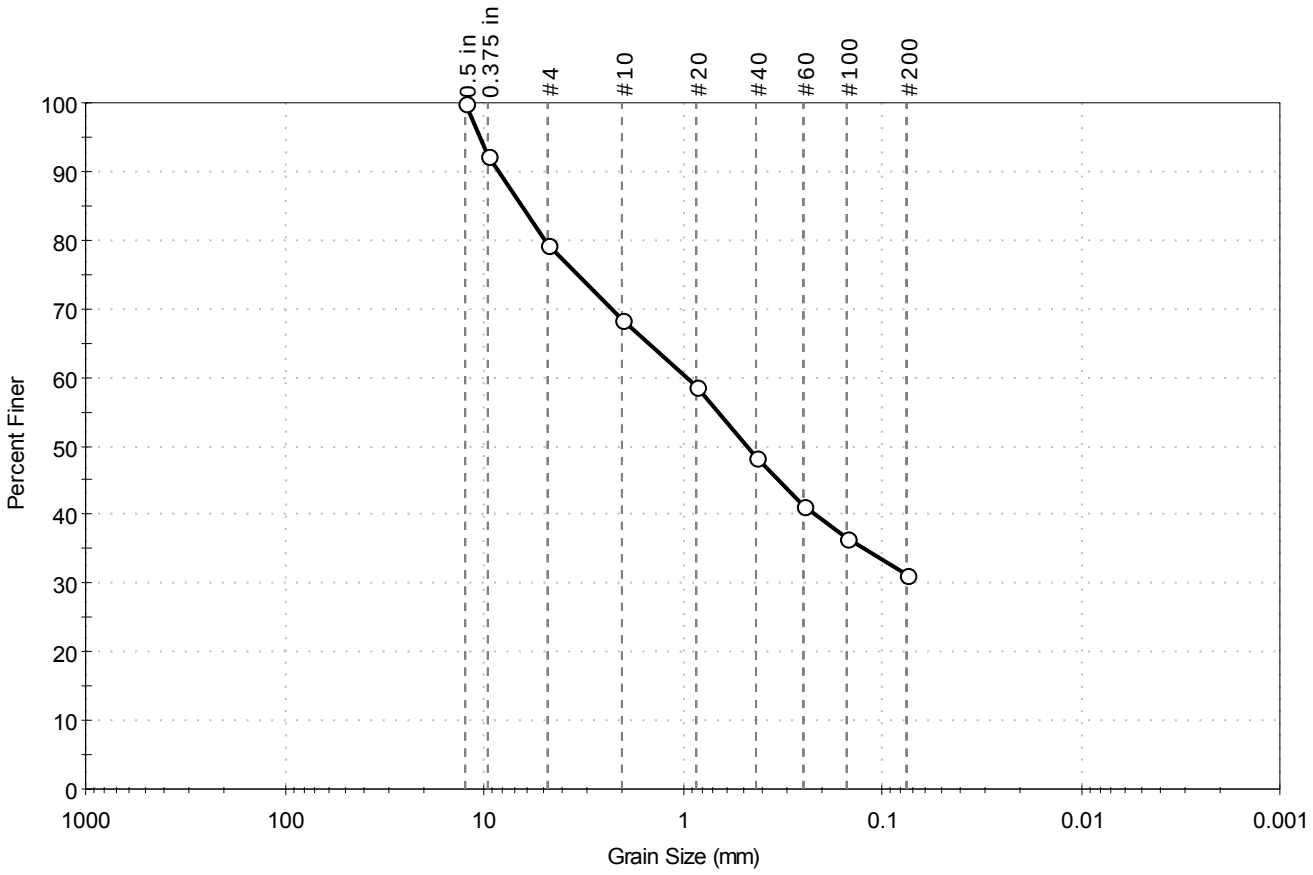
| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-105 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 2D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 2.5-4.5 | Test Id: | 365341 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, olive brown clayey sand with gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 20.7 | 48.1 | 31.2 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.5 in | 12.50 | 100 | | |
| 0.375 in | 9.50 | 92 | | |
| #4 | 4.75 | 79 | | |
| #10 | 2.00 | 68 | | |
| #20 | 0.85 | 59 | | |
| #40 | 0.42 | 48 | | |
| #60 | 0.25 | 41 | | |
| #100 | 0.15 | 37 | | |
| #200 | 0.075 | 31 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 6.4389 mm  $D_{30}$ = N/A

$D_{60}$ = 0.9551 mm  $D_{15}$ = N/A

$D_{50}$ = 0.4719 mm  $D_{10}$ = N/A

$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

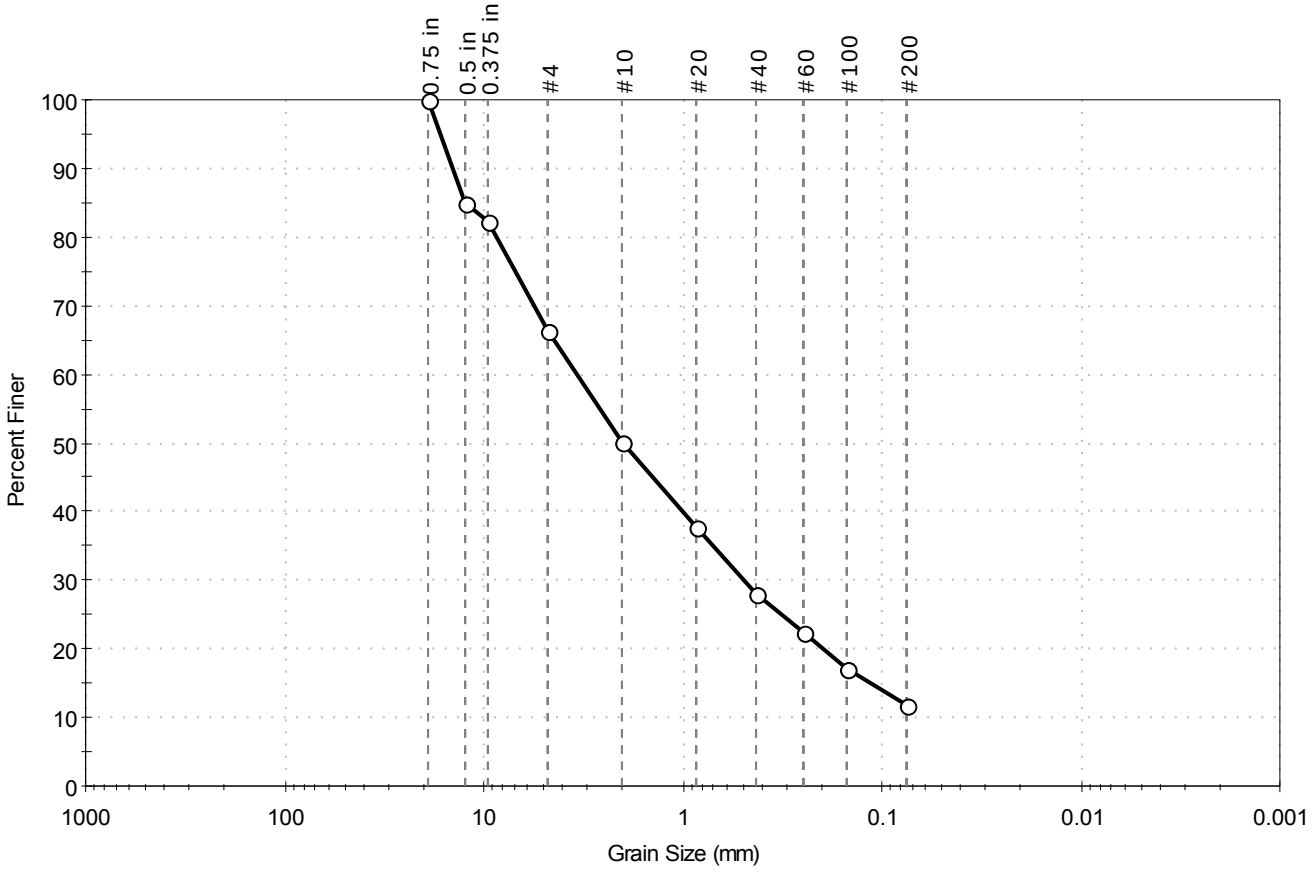
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-105 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 3D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 4.5-6.5 | Test Id: | 365342 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown sand with silt and gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 33.7 | 54.5 | 11.8 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.75 in | 19.00 | 100 | | |
| 0.5 in | 12.50 | 85 | | |
| 0.375 in | 9.50 | 82 | | |
| #4 | 4.75 | 66 | | |
| #10 | 2.00 | 50 | | |
| #20 | 0.85 | 38 | | |
| #40 | 0.42 | 28 | | |
| #60 | 0.25 | 22 | | |
| #100 | 0.15 | 17 | | |
| #200 | 0.075 | 12 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 12.5175 mm  $D_{30}$ = 0.4890 mm

$D_{60}$ = 3.3922 mm  $D_{15}$ = 0.1134 mm

$D_{50}$ = 1.9879 mm  $D_{10}$ = N/A

$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

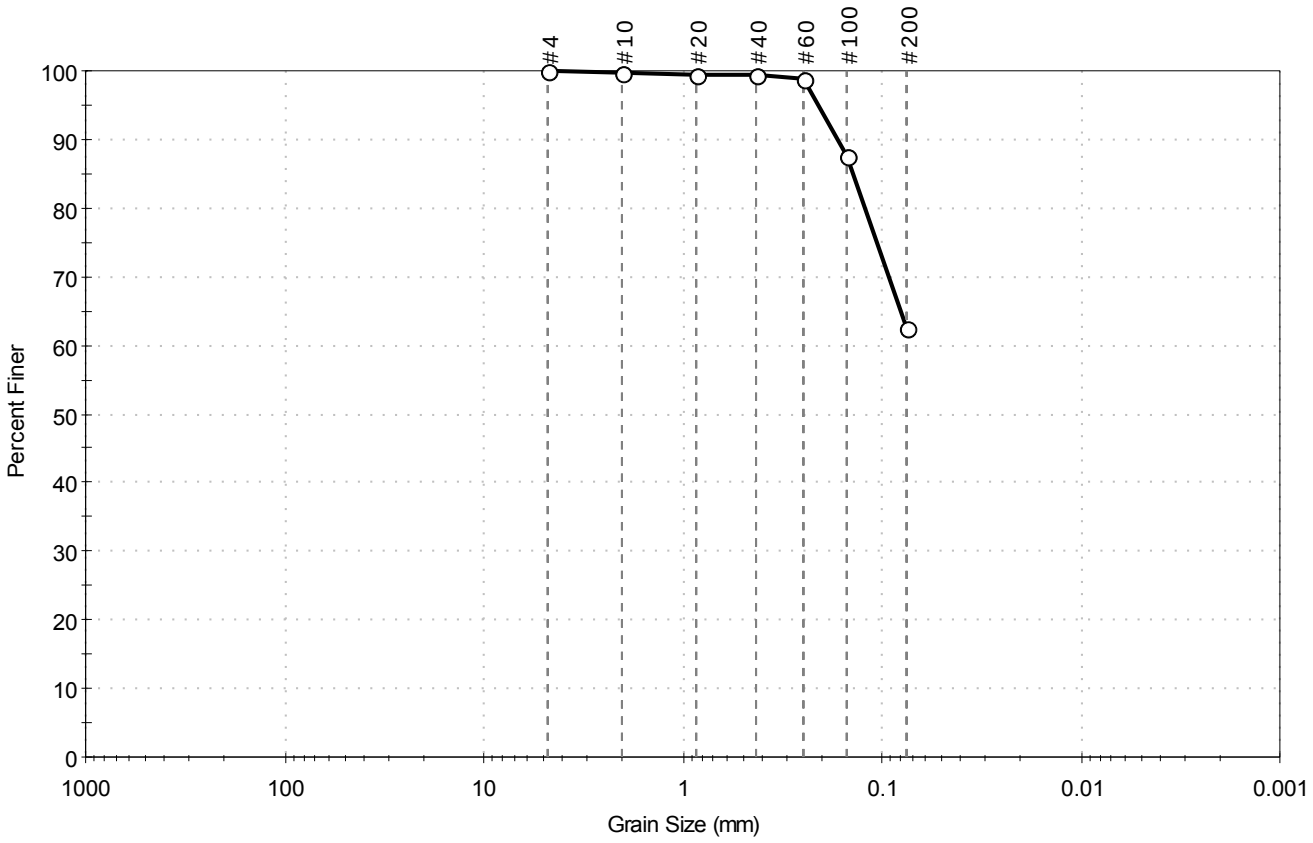
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-105 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 14D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 35.5-37.5 | Test Id: | 365343 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark gray sandy clay | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 0.0 | 37.5 | 62.5 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| #4 | 4.75 | 100 | | |
| #10 | 2.00 | 100 | | |
| #20 | 0.85 | 100 | | |
| #40 | 0.42 | 99 | | |
| #60 | 0.25 | 99 | | |
| #100 | 0.15 | 88 | | |
| #200 | 0.075 | 62 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 0.1396 mm  $D_{30}$ = N/A
$D_{60}$ = N/A  $D_{15}$ = N/A
$D_{50}$ = N/A  $D_{10}$ = N/A
$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Soils (A-4 (0))

**Sample / Test Description**

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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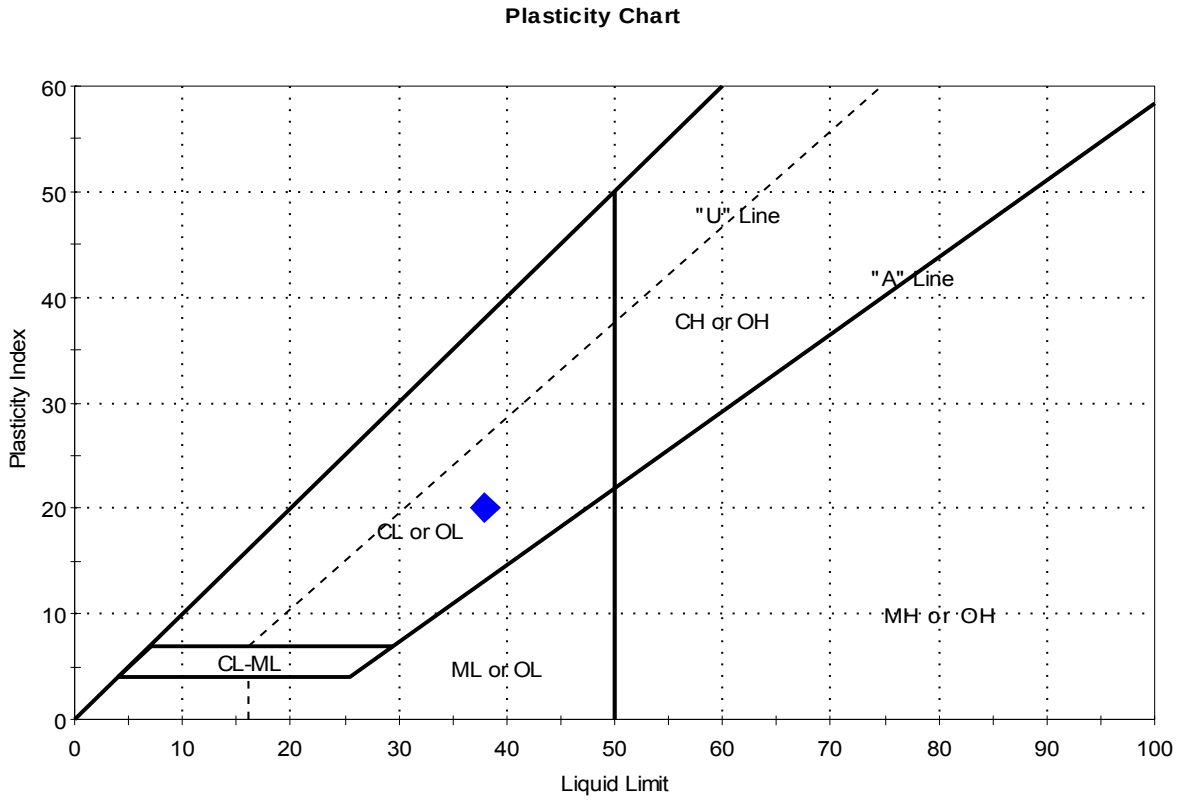
| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-104 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 11D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 28.0-30.0 | Test Id: | 365355 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark gray clay | | | | |
| Sample Comment: | --- | | | | |

# Atterberg Limits - ASTM D4318




| Symbol | Sample ID | Boring | Depth | Natural Moisture Content, % | Liquid Limit | Plastic Limit | Plasticity Index | Liquidity Index | Soil Classification |
|---|---|---|---|---|---|---|---|---|---|
| ◆ | 11D | B-GCS-10 | 28.0-30.0 | 33 | 38 | 18 | 20 | 0.7 | |

Sample Prepared using the WET method

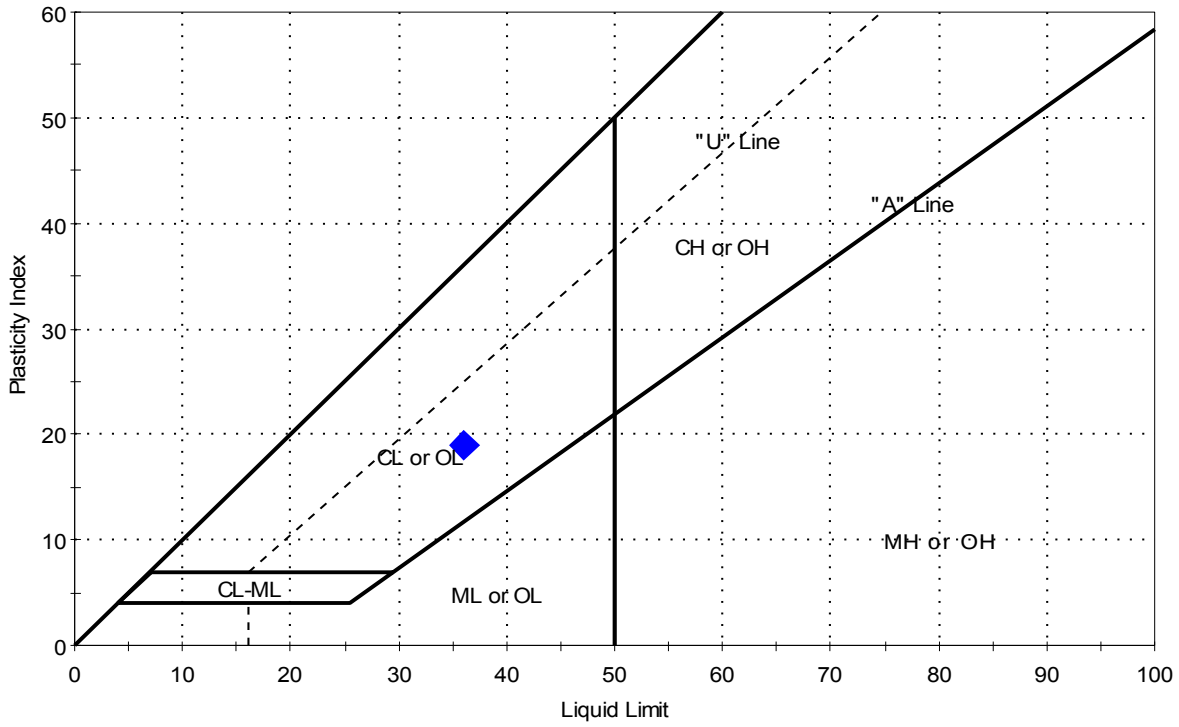
Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | U.S. 24 over the Cobbossee Stream | | | | |
| Location: | Gardiner, Maine | | | Project No: | GTX-304381 |
| Boring ID: | BB-GCS-104 | Sample Type: | bag | Tested By: | GA |
| Sample ID: | 13D | Test Date: | 02/18/16 | Checked By: | jdt |
| Depth : | 32.0-34.0 | Test Id: | 365356 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark gray clay | | | | |
| Sample Comment: | --- | | | | |

# Atterberg Limits - ASTM D4318




| Symbol | Sample ID | Boring | Depth | Natural Moisture Content, % | Liquid Limit | Plastic Limit | Plasticity Index | Liquidity Index | Soil Classification |
|---|---|---|---|---|---|---|---|---|---|
| ◆ | 13D | B-GCS-10 | 32.0-34.0 | 29 | 36 | 17 | 19 | 0.6 | |

Sample Prepared using the WET method

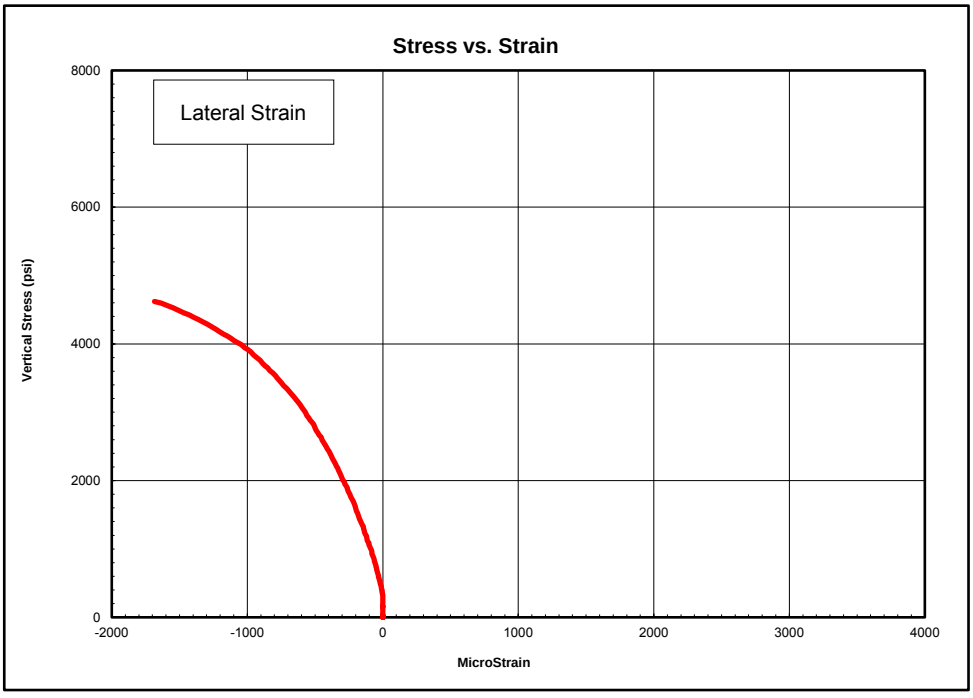
Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

| | |
|---|---|
| Client: | Haley & Aldrich, Inc. |
| Project Name: | U.S. 24 over the Cobbossee Stream |
| Project Location: | Gardiner, Maine |
| GTX #: | 304381 |
| Test Date: | 2/15/2016 |
| Tested By: | rlc |
| Checked By: | jsc |
| Boring ID: | BB-GCS-104 |
| Sample ID: | R6 |
| Depth, ft: | 80.25-80.62 |
| Sample Type: | rock core |
| Sample Description: | See photographs<br>Discontinuity failure |

# Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D




Peak Compressive Stress: 4,721 psi

Both axial strain devices failed to record meaningful data. Young's Modulus and Poisson's Ratio could not be determined.

| Stress Range, psi | Young's Modulus, psi | Poisson's Ratio |
|---|---|---|
| 500-1700 | --- | --- |
| 1700-3000 | --- | --- |
| 3000-4200 | --- | --- |

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

| | | | |
|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | Test Date: | 2/12/2016 |
| Project Name: | U.S. 24 over the Cobbossee Stream | Tested By: | daa/rlc |
| Project Location: | Gardiner, Maine | Checked By: | jsc |
| GTX #: | 304381 | | |
| Boring ID: | BB-GCS-104 | | |
| Sample ID: | R6 | | |
| Depth: | 80.25-80.62 ft | | |
| Visual Description: | See photographs | | |

# UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

**BULK DENSITY**

| | 1 | 2 | Average |
|---|---|---|---|
| Specimen Length, in: | 4.33 | 4.33 | 4.33 |
| Specimen Diameter, in: | 1.98 | 1.98 | 1.98 |
| Specimen Mass, g: | 572.99 | | |
| Bulk Density, lb/ft$^3$ | 163 | **Minimum Diameter Tolerence Met?** | YES |
| Length to Diameter Ratio: | 2.2 | **Length to Diameter Ratio Tolerance Met?** | YES |

**DEVIATION FROM STRAIGHTNESS (Procedure S1)**

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

*Maximum difference must be < 0.020 in.*
**Straightness Tolerance Met?** YES

**END FLATNESS AND PARALLELISM (Procedure FP1)**

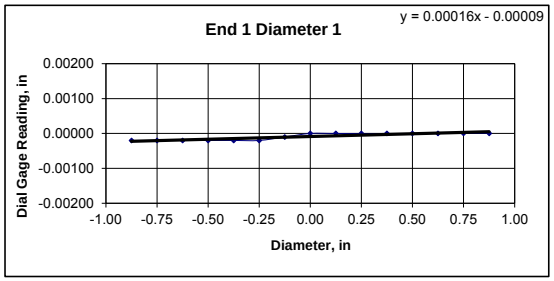
| END 1 | -0.875 | -0.750 | -0.625 | -0.500 | -0.375 | -0.250 | -0.125 | 0.000 | 0.125 | 0.250 | 0.375 | 0.500 | 0.625 | 0.750 | 0.875 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter 1, in | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00010 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |
| Diameter 2, in (rotated 90°) | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

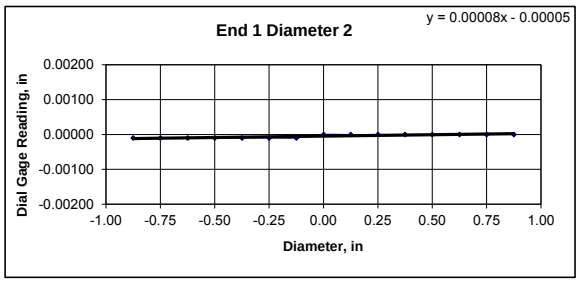
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00010

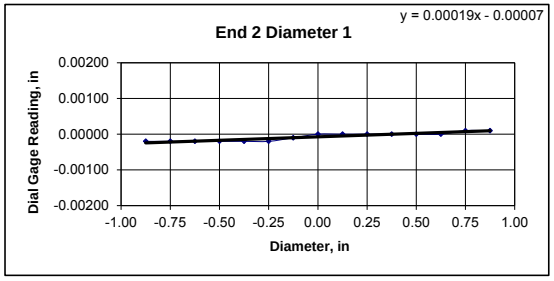
| END 2 | -0.875 | -0.750 | -0.625 | -0.500 | -0.375 | -0.250 | -0.125 | 0.000 | 0.125 | 0.250 | 0.375 | 0.500 | 0.625 | 0.750 | 0.875 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter 1, in | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00020 | -0.00010 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00010 | 0.00010 |
| Diameter 2, in (rotated 90°) | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | -0.00010 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.00000 |

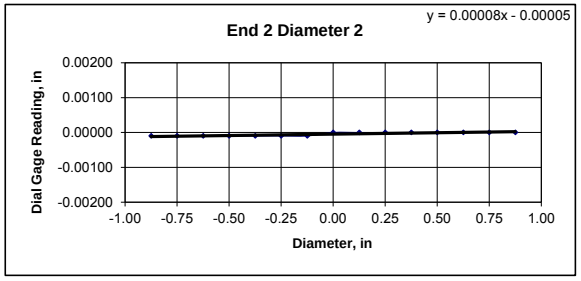
Difference between max and min readings, in:
0° = 0.0003 90° = 0.0001

*Maximum difference must be < 0.0020 in.* Difference = ± 0.00015
**Flatness Tolerance Met?** YES




DIAMETER 1

End 1:
Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00917

End 2:
Slope of Best Fit Line 0.00019
Angle of Best Fit Line: 0.01089

Maximum Angular Difference: 0.00172

**Parallelism Tolerance Met?** YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00458

End 2:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00458

Maximum Angular Difference: 0.00000

**Parallelism Tolerance Met?** YES
Spherically Seated

**PERPENDICULARITY (Procedure P1)** (Calculated from End Flatness and Parallelism measurements above)

| END 1 | Difference, Maximum and Minimum (in.) | Diameter (in.) | Slope | Angle° | Perpendicularity Tolerance Met? |
|---|---|---|---|---|---|
| Diameter 1, in | 0.00020 | 1.980 | 0.00010 | 0.006 | YES |
| Diameter 2, in (rotated 90°) | 0.00010 | 1.980 | 0.00005 | 0.003 | YES |
| END 2 | | | | | |
| Diameter 1, in | 0.00030 | 1.980 | 0.00015 | 0.009 | YES |
| Diameter 2, in (rotated 90°) | 0.00010 | 1.980 | 0.00005 | 0.003 | YES |

*Maximum angle of departure must be ≤ 0.25°*
**Perpendicularity Tolerance Met?** YES

| | |
|---|---|
| Client: | Haley & Aldrich, Inc. |
| Project Name: | U.S. 24 over the Cobbossee Stream |
| Project Location: | Gardiner, Maine |
| GTX #: | 304381 |
| Test Date: | 2/15/2016 |
| Tested By: | daa/rlc |
| Checked By: | jsc |
| Boring ID: | BB-GCS-104 |
| Sample ID: | R6 |
| Depth, ft: | 80.25-80.62 |

After cutting and grinding

After break

# APPENDIX C / BANK PROTECTION REVETMENT CALCULATIONS

Embankment Protection Revetment Stone Sizing per HEC-23 (2009)

The EM-1601 equation can be used with uniform or gradually varying flow. Coefficients are included to account for the desired safety factor for design, specific gravity of the riprap stone, bank slope, and bendway character. The EM-1601 equation is:

$$d_{30} = y(S_f C_S C_V C_T)\left[\frac{(V_{des})}{\sqrt{K_1(S_g - 1)gy}}\right]^{2.5} \quad (4.1)$$

where:

$d_{30}$ = Particle size for which 30% is finer by weight, ft (m)

$y$ = Local depth of flow, ft (m)

$S_f$ = Safety factor (must be > 1.0)

$C_S$ = Stability coefficient (for blanket thickness = $d_{100}$ or $1.5d_{50}$, whichever is greater, and uniformity ratio $d_{85}/d_{15}$ = 1.7 to 5.2)
- = 0.30 for angular rock
- = 0.375 for rounded rock

$C_V$ = Velocity distribution coefficient
- = 1.0 for straight channels or the inside of bends
- = 1.283 - 0.2log($R_c$/W) for the outside of bends (1.0 for $R_c$/W > 26)
- = 1.25 downstream from concrete channels
- = 1.25 at the end of dikes

$C_T$ = Blanket thickness coefficient given as a function of the uniformity ratio $d_{85}/d_{15}$. $C_T$ = 1.0 is recommended because it is based on very limited data.

$V_{des}$ = Characteristic velocity for design, defined as the depth-averaged velocity at a point 20% upslope from the toe of the revetment, ft/s (m/s)

For natural channels, $V_{des} = V_{avg}(1.74 - 0.52\log(R_c/W))$
$V_{des} = V_{avg}$ for $R_c/W > 26$

For trapezoidal channels, $V_{des} = V_{avg}(1.71 - 0.78\log(R_c/W))$
$V_{des} = V_{avg}$ for $R_c/W > 8$

$V_{avg}$ = Channel cross-sectional average velocity, ft/s (m/s)

$K_1$ = Side slope correction factor

$$K_1 = \sqrt{1 - \left(\frac{\sin(\theta - 14^\circ)}{\sin(32^\circ)}\right)^{1.6}}$$

where: $\theta$ is the bank angle in degrees

$R_c$ = Centerline radius of curvature of channel bend, ft (m)

$W$ = Width of water surface at upstream end of channel bend, ft (m)

$S_g$ = Specific gravity of riprap (usually taken as 2.65)

$g$ = Acceleration due to gravity, 32.2 ft/s$^2$ (9.81 m/s$^2$)

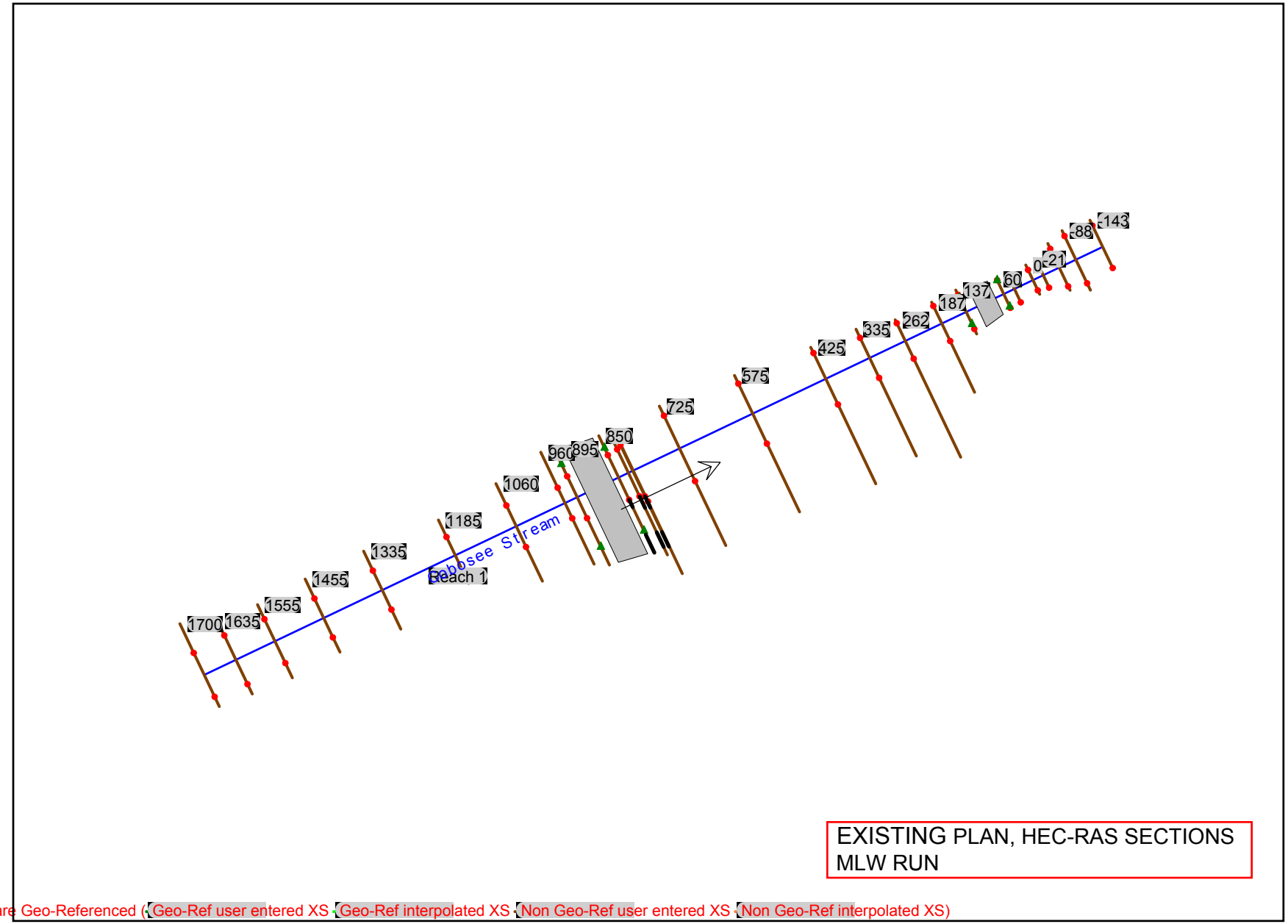


135' span

at Q100

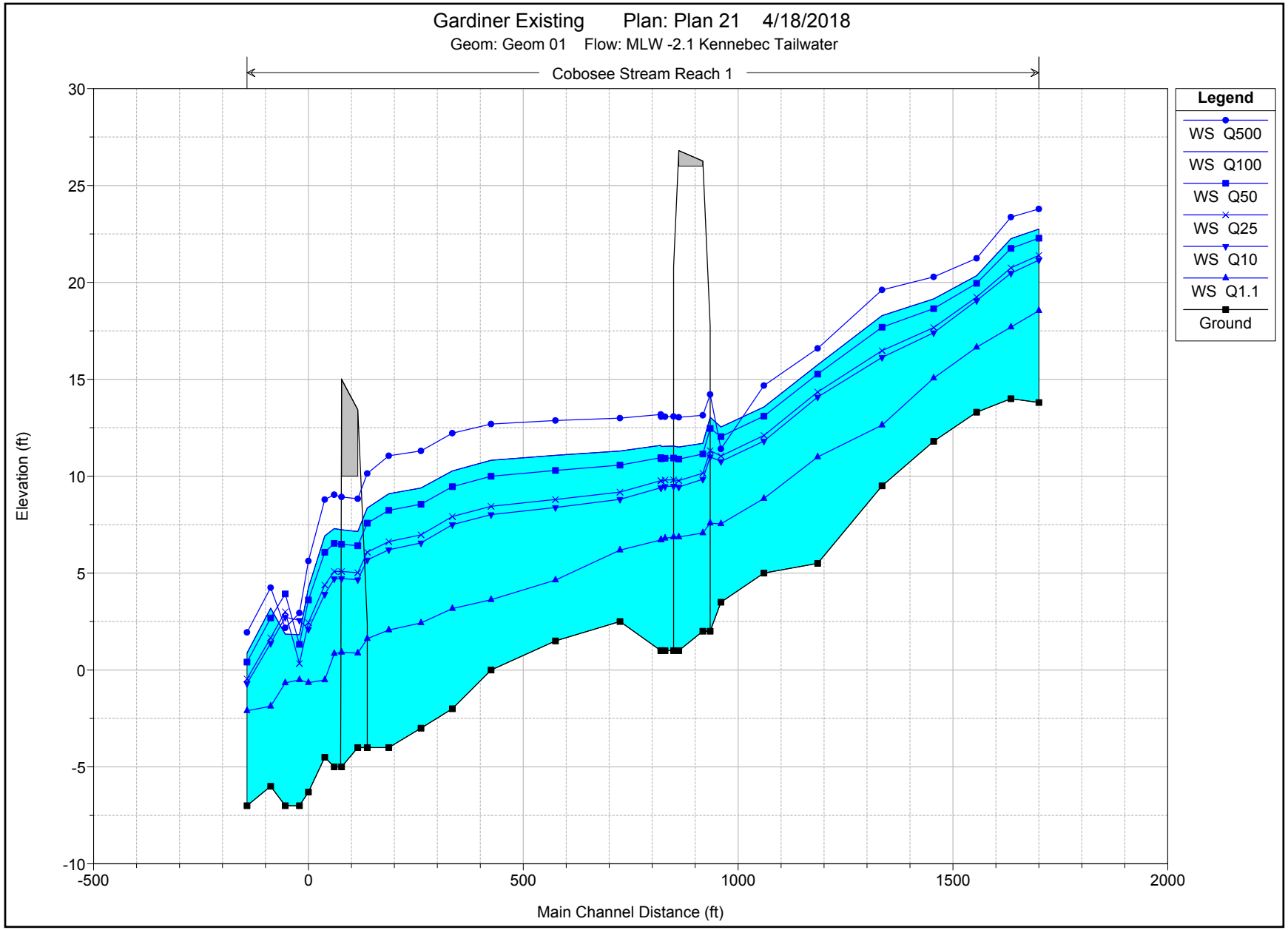
| | Bridge St. bridge at 895 BR U | Maine Ave. bridge at 98.5 BR U |
|---|---|---|
| WSEL | 11.6 | 7.56 |
| min ch elev | 2 | -5 |
| y | 9.6 | 12.56 |
| Sf | 1.2 | 1.2 |
| Cs | 0.3 | 0.3 |
| Cv | 1 | 1 |
| Ct | 1 | 1 |
| Vdes | 10.7 | 11.55 |
| Vavg | 10.7 | 11.55 |
| slope X:1 | 2 | 2 |
| theta, rad | 0.464 | 0.464 |
| K1 | 0.871 | 0.871 |
| Sg | 2.65 | 2.65 |
| g, ft/s2 | 32.2 | 32.2 |
| d30, ft | 0.63 | 0.72 |
| d50=1.2*d30, ft | **0.76** | **0.86** |

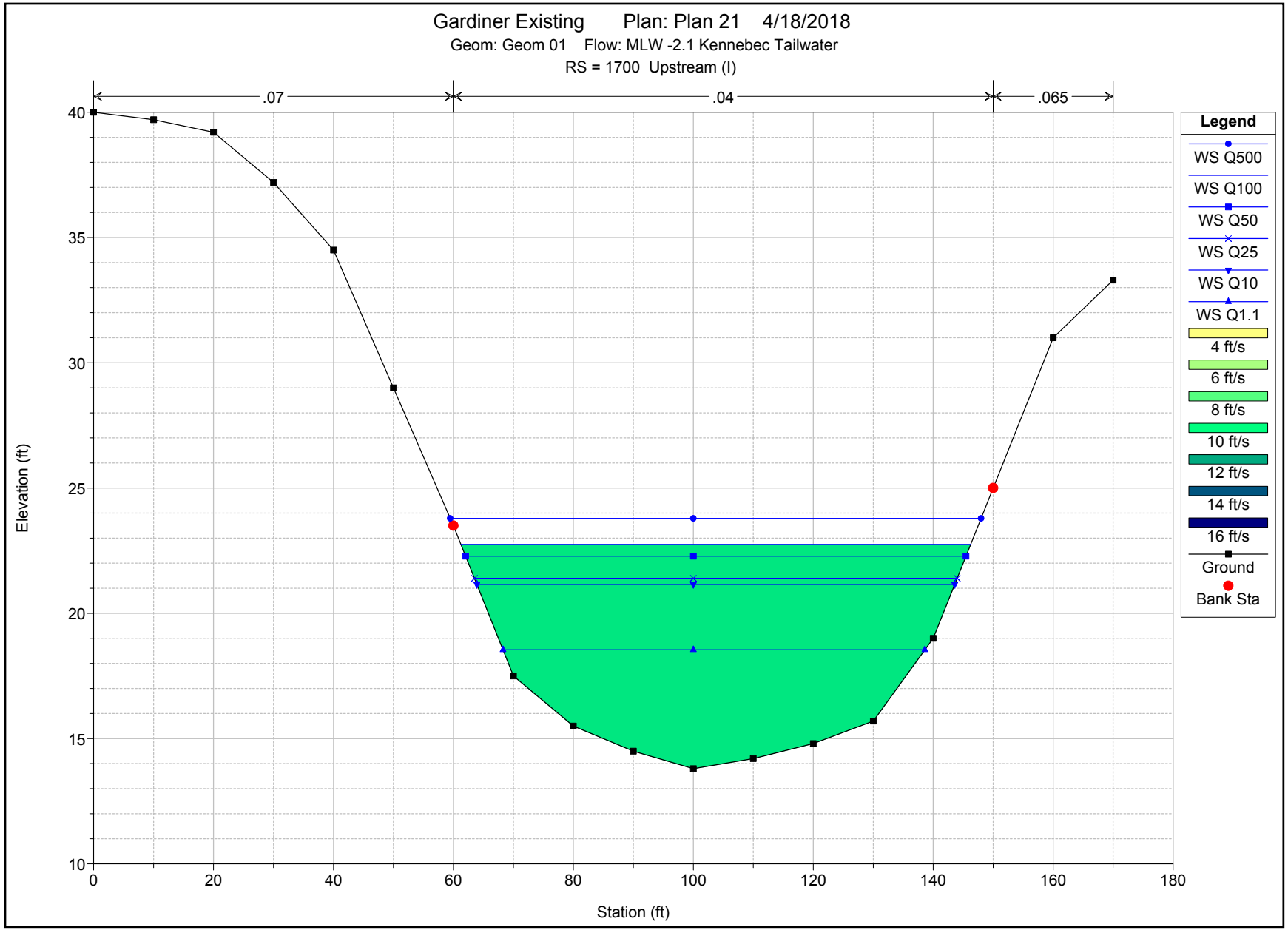
# APPENDIX D / HEC-RAS RESULTS FOR EXISTING CONDITIONS AT MLW

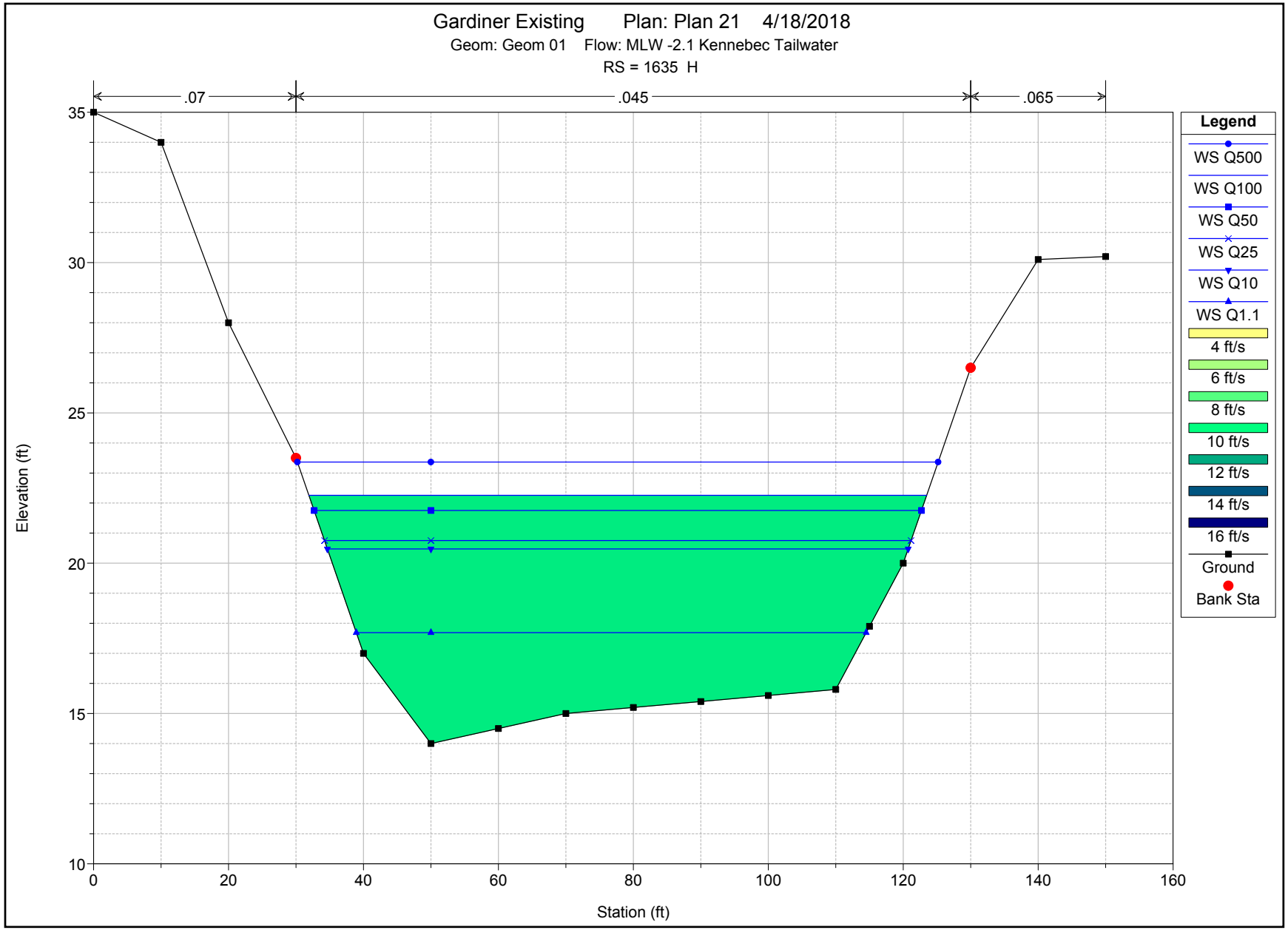


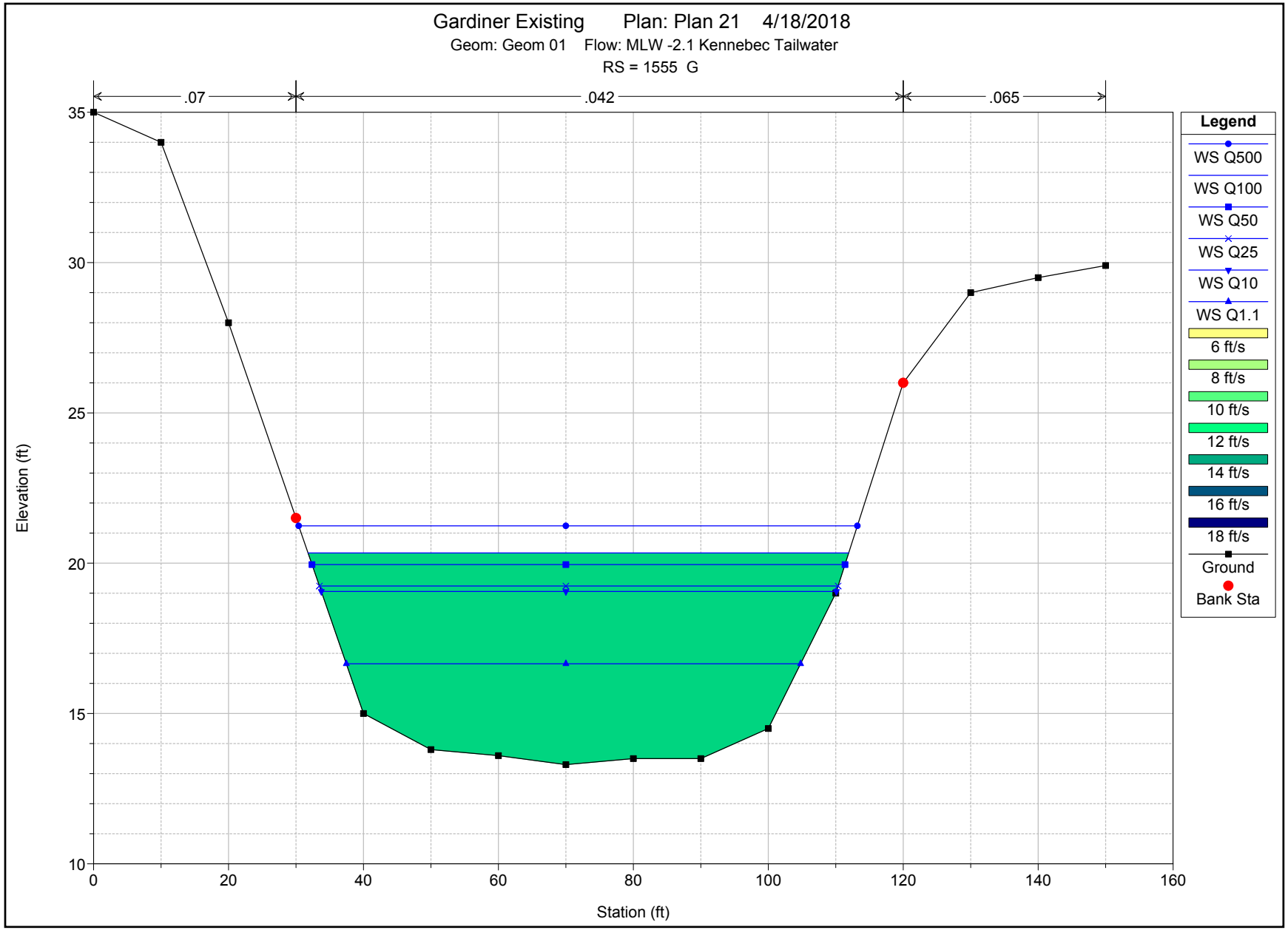

EXISTING PLAN, HEC-RAS SECTIONS
MLW RUN

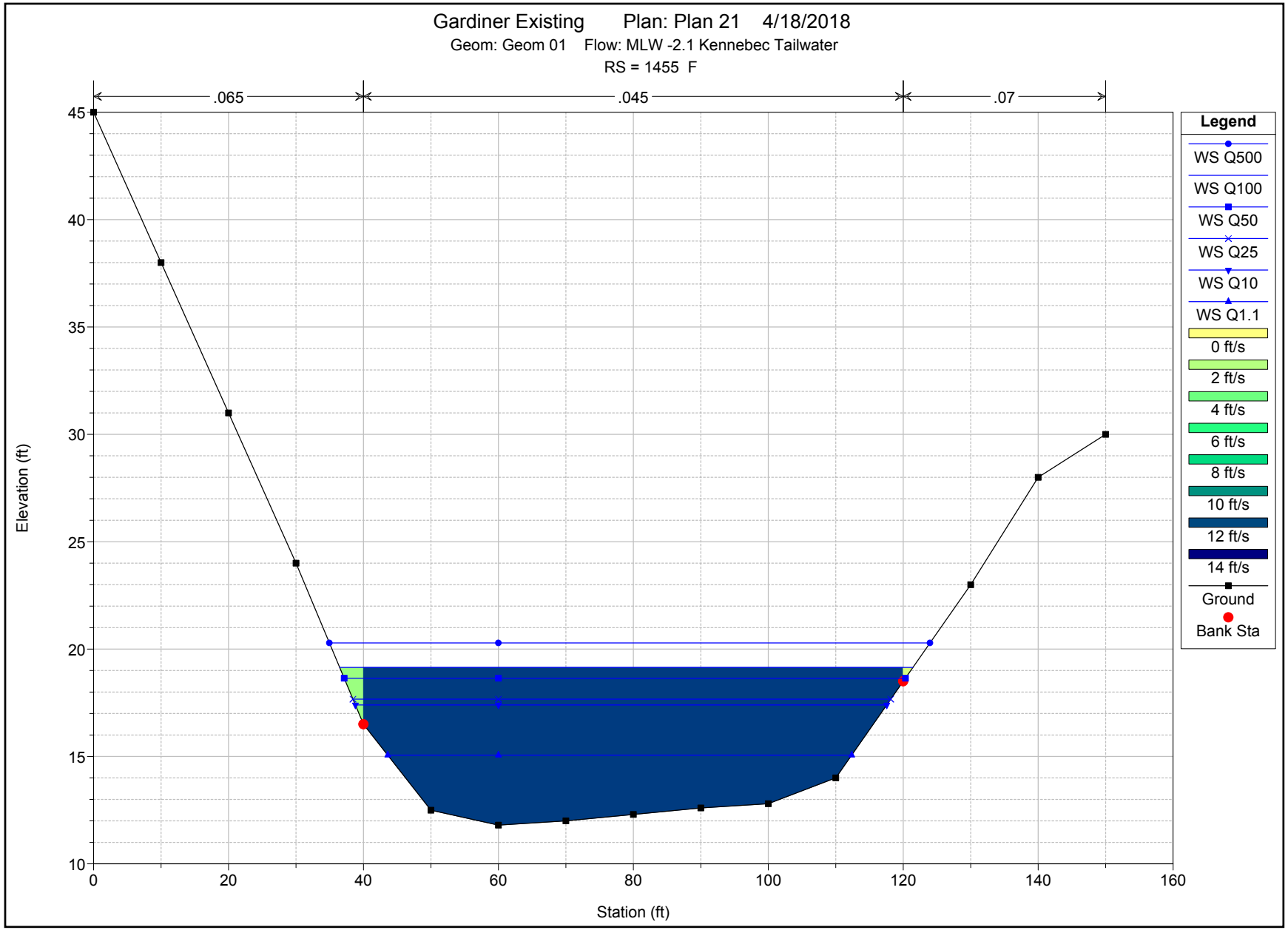
None of the XS's are Geo-Referenced (, Geo-Ref user entered XS , Geo-Ref interpolated XS , Non Geo-Ref user entered XS , Non Geo-Ref interpolated XS)

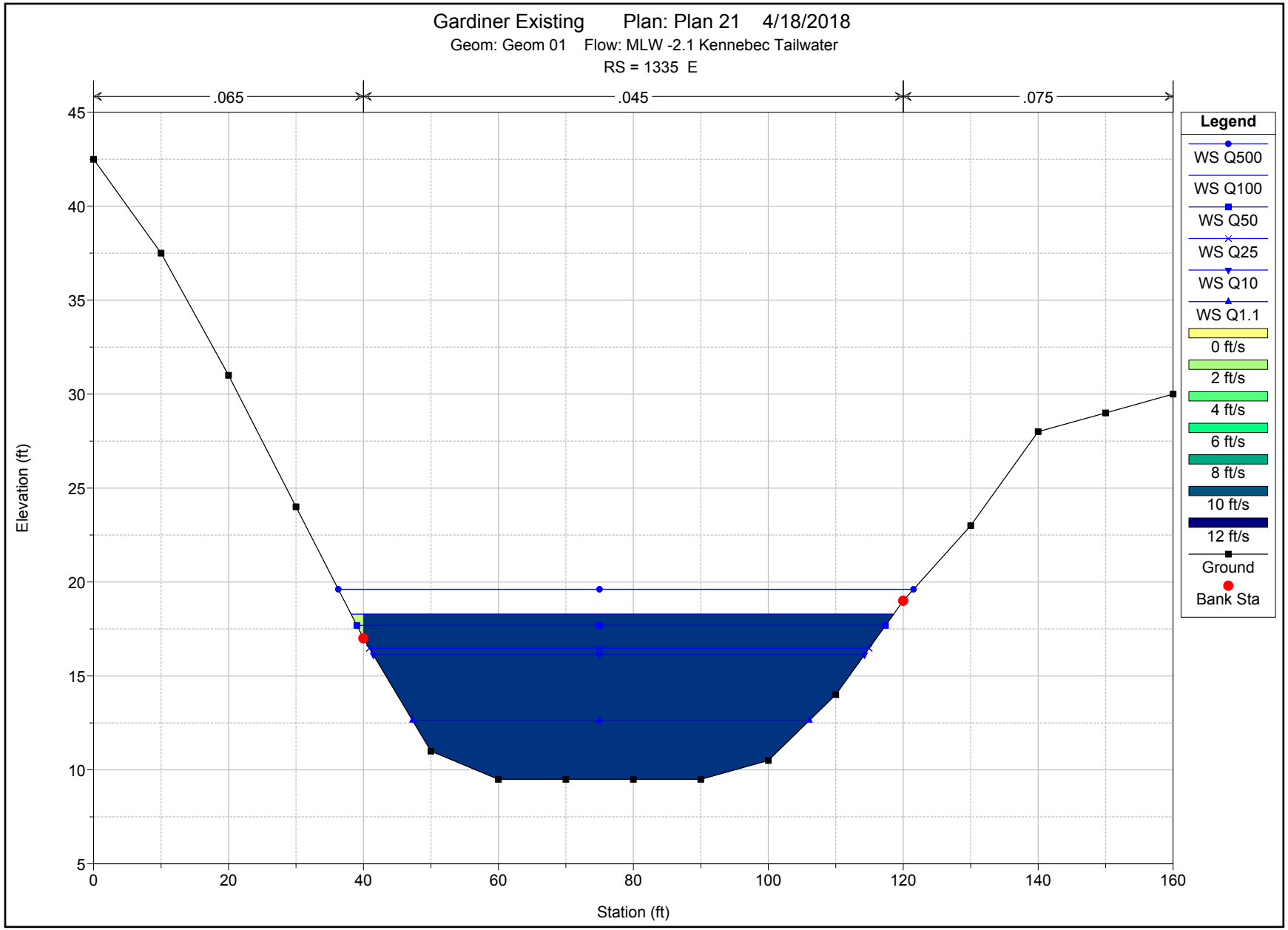

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
Cobosee Stream Reach 1
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
Ground
Elevation (ft)
Main Channel Distance (ft)
30
25
20
15
10
5
0
-5
-10
-500
0
500
1000
1500
2000

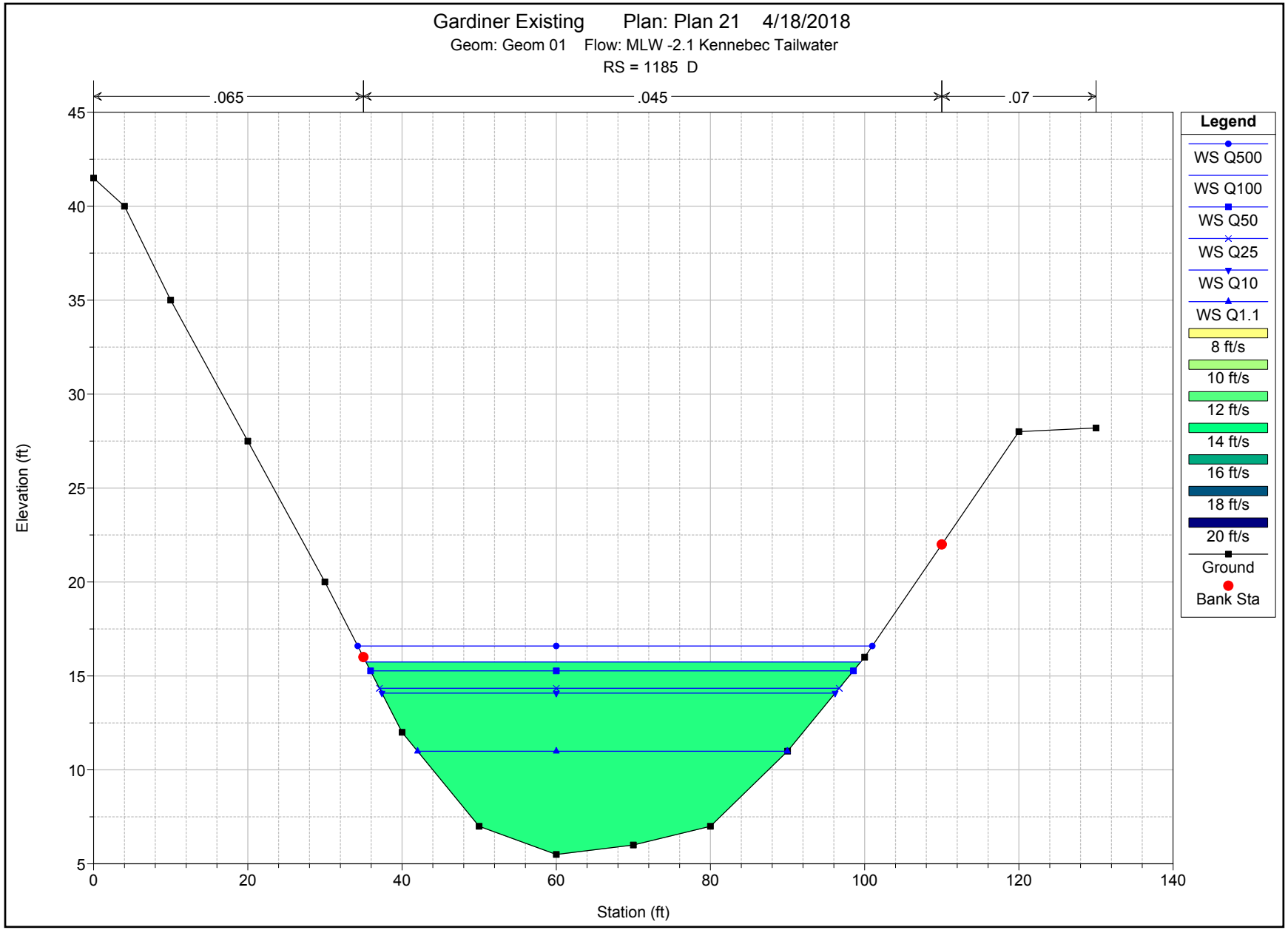

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1700 Upstream (I)
.07
.04
.065
Elevation (ft)
Station (ft)
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
180
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

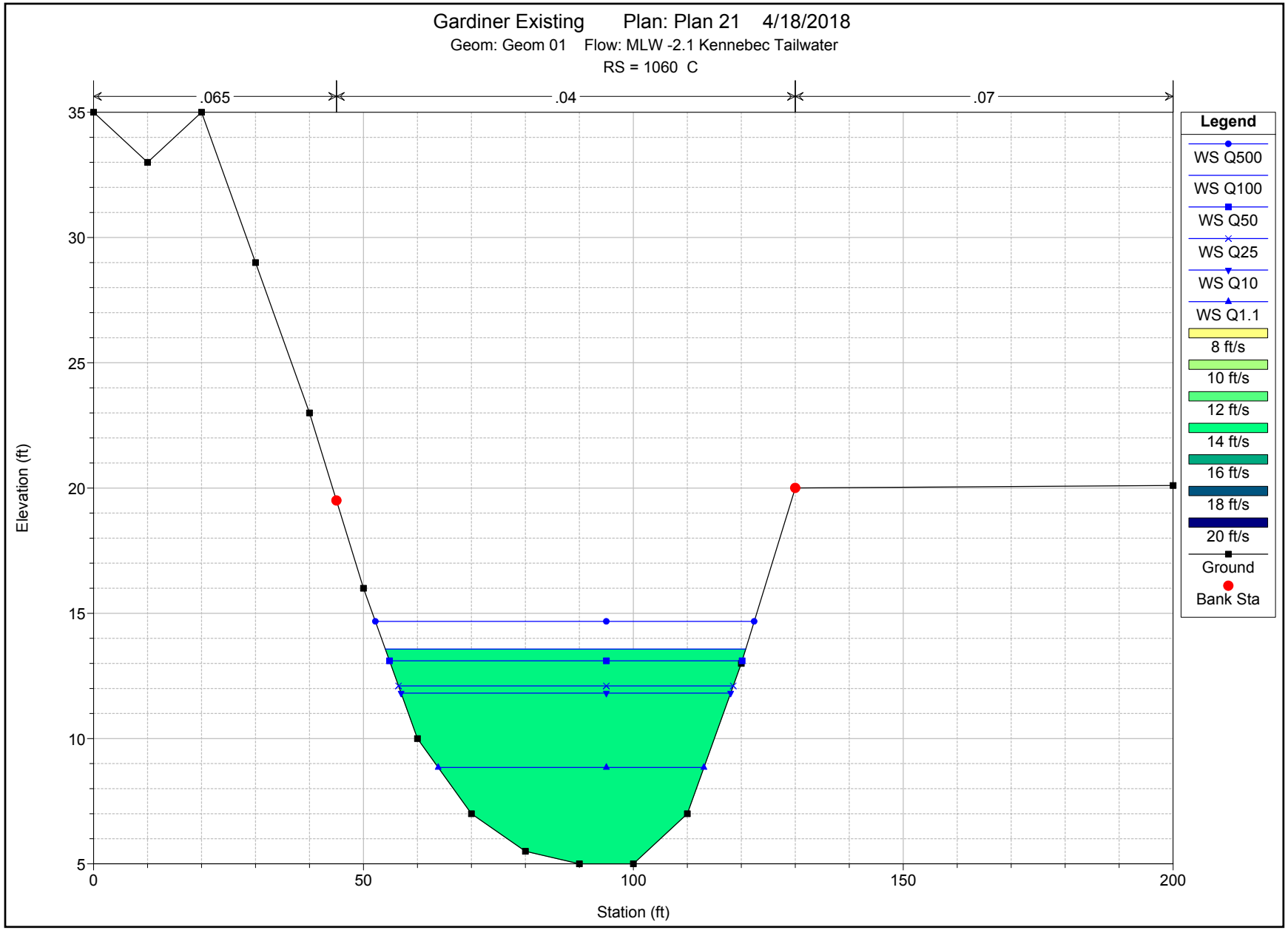

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1635 H
.07
.045
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

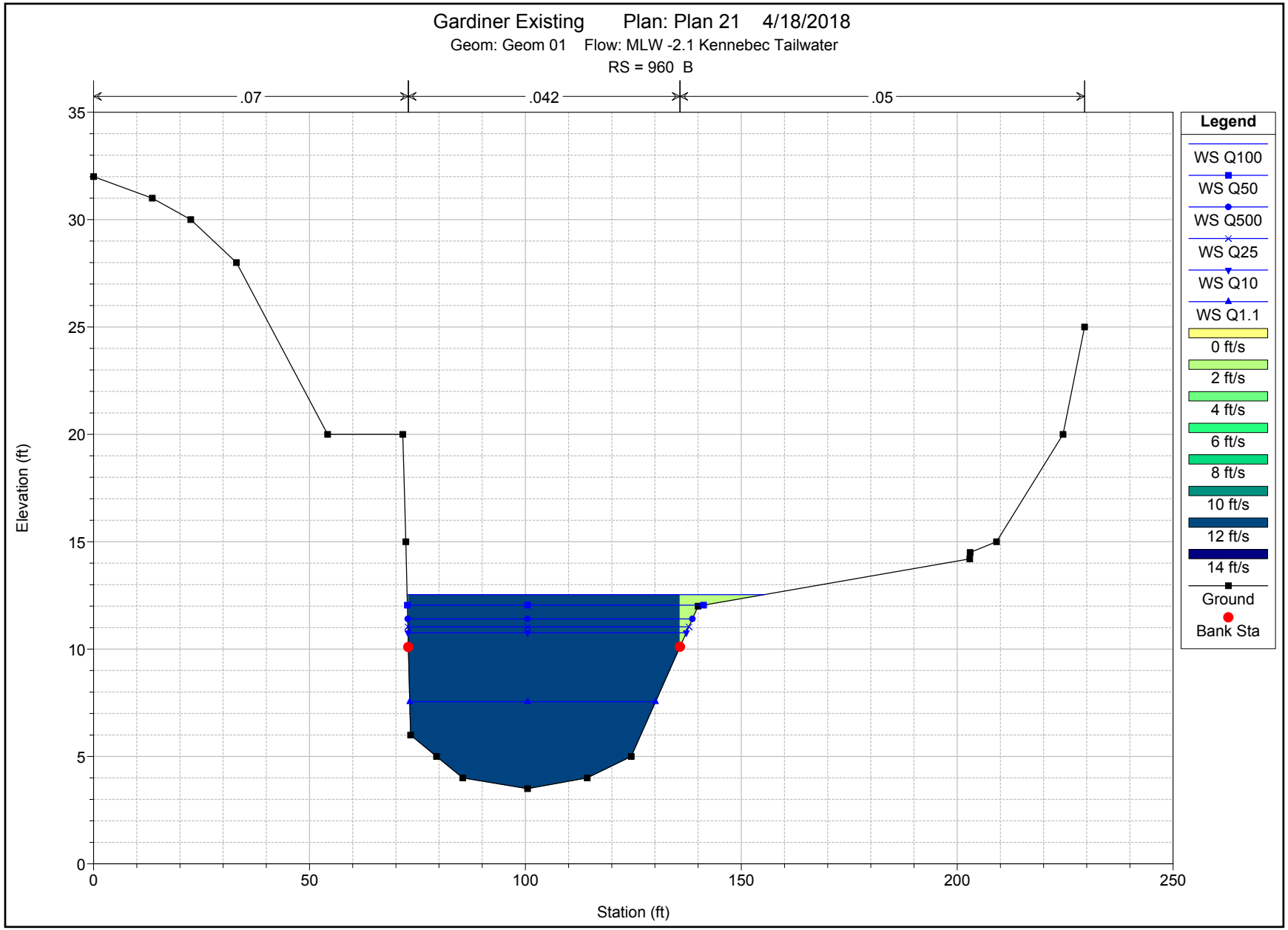

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1555 G
.07
.042
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta

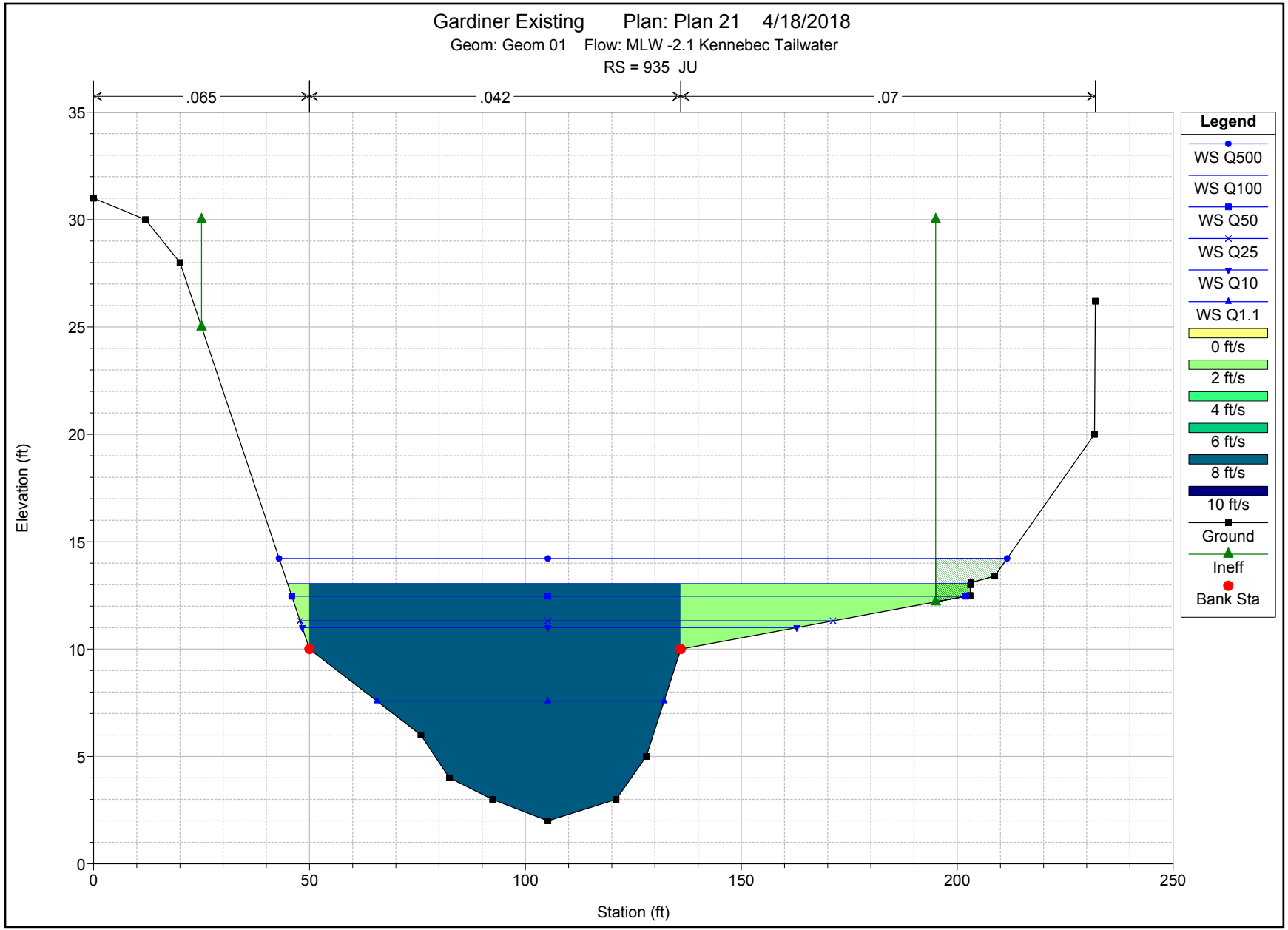

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1455 F
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

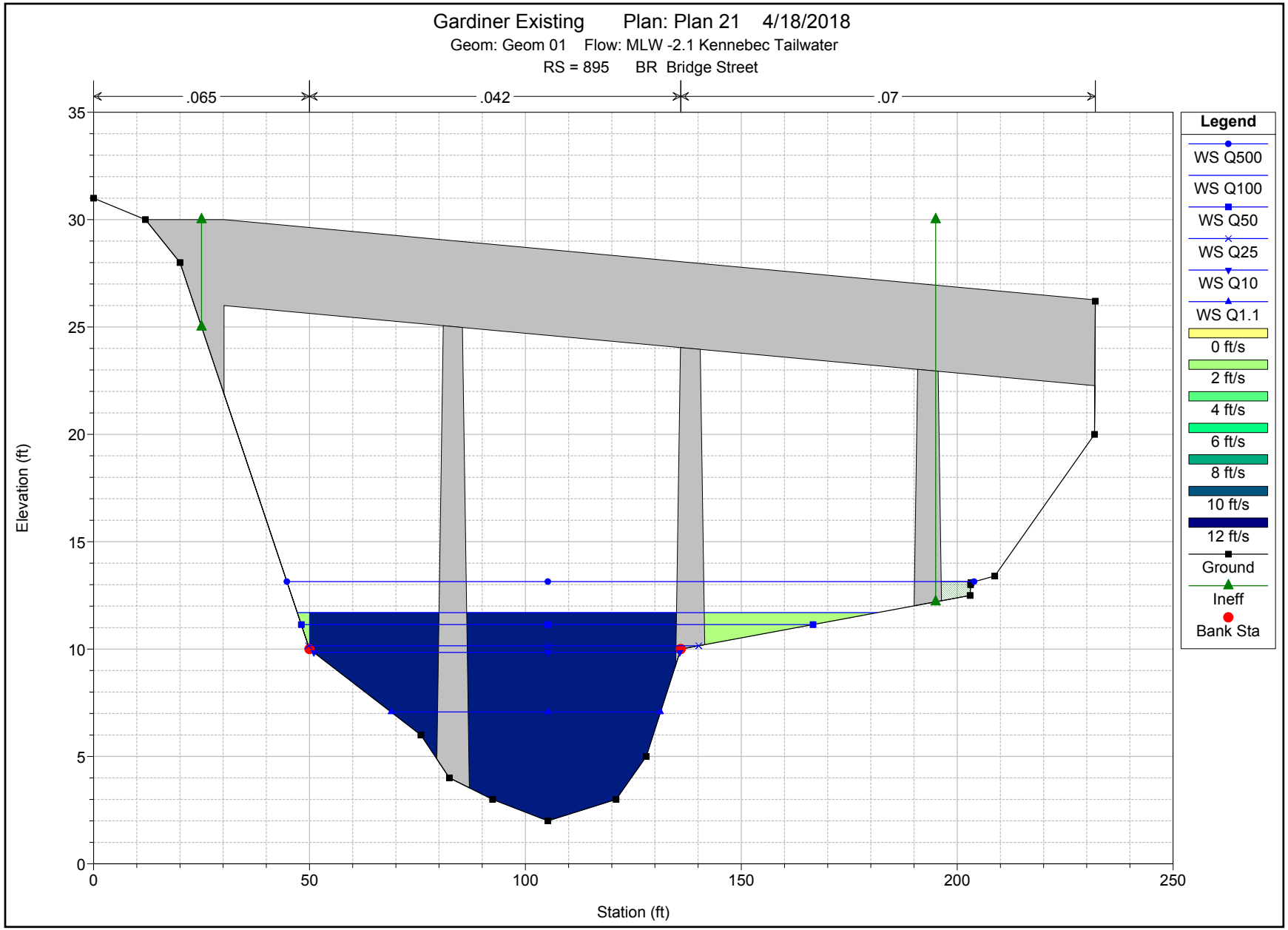

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1335 E
.065
.045
.075
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

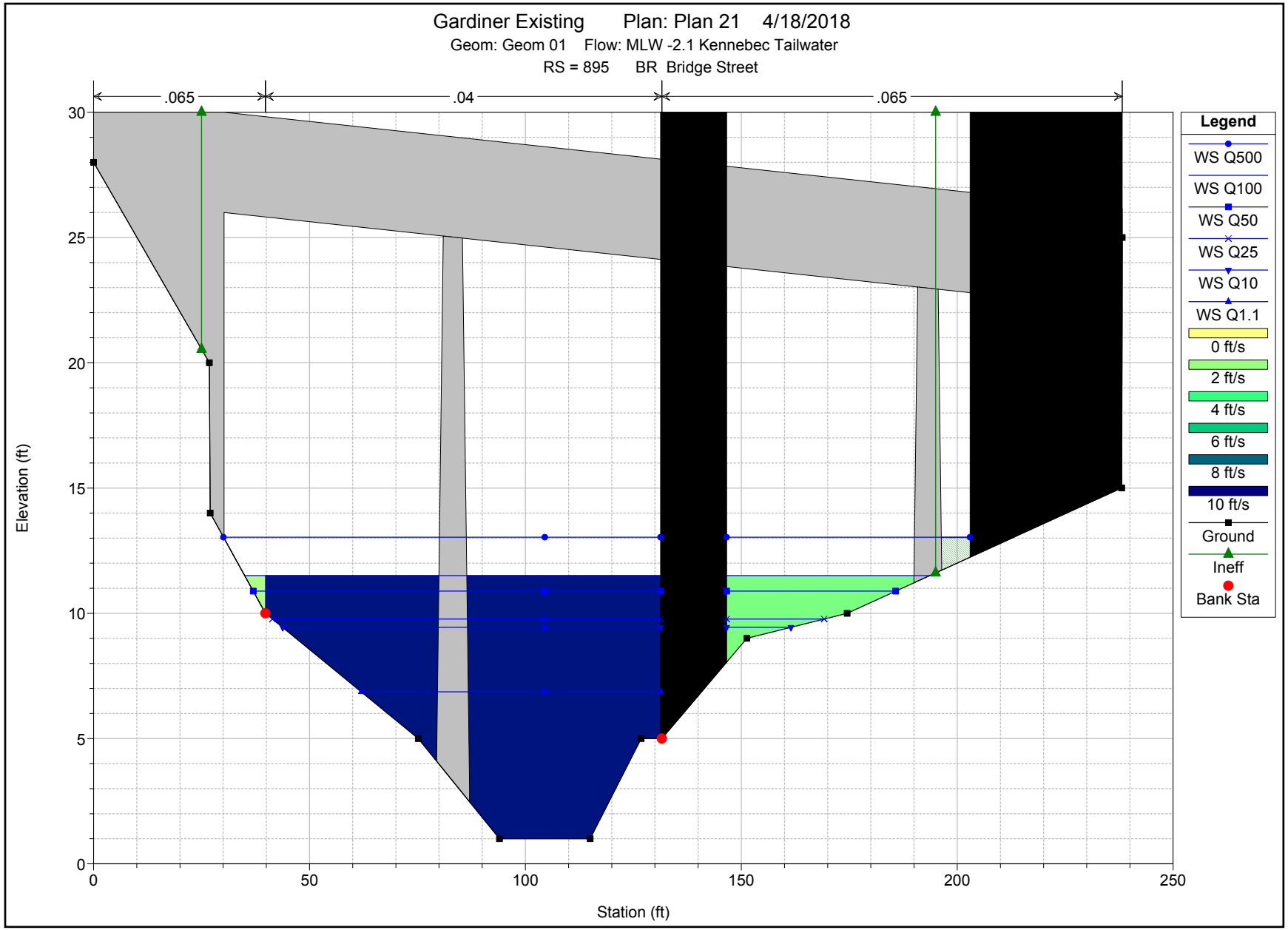

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1185 D
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

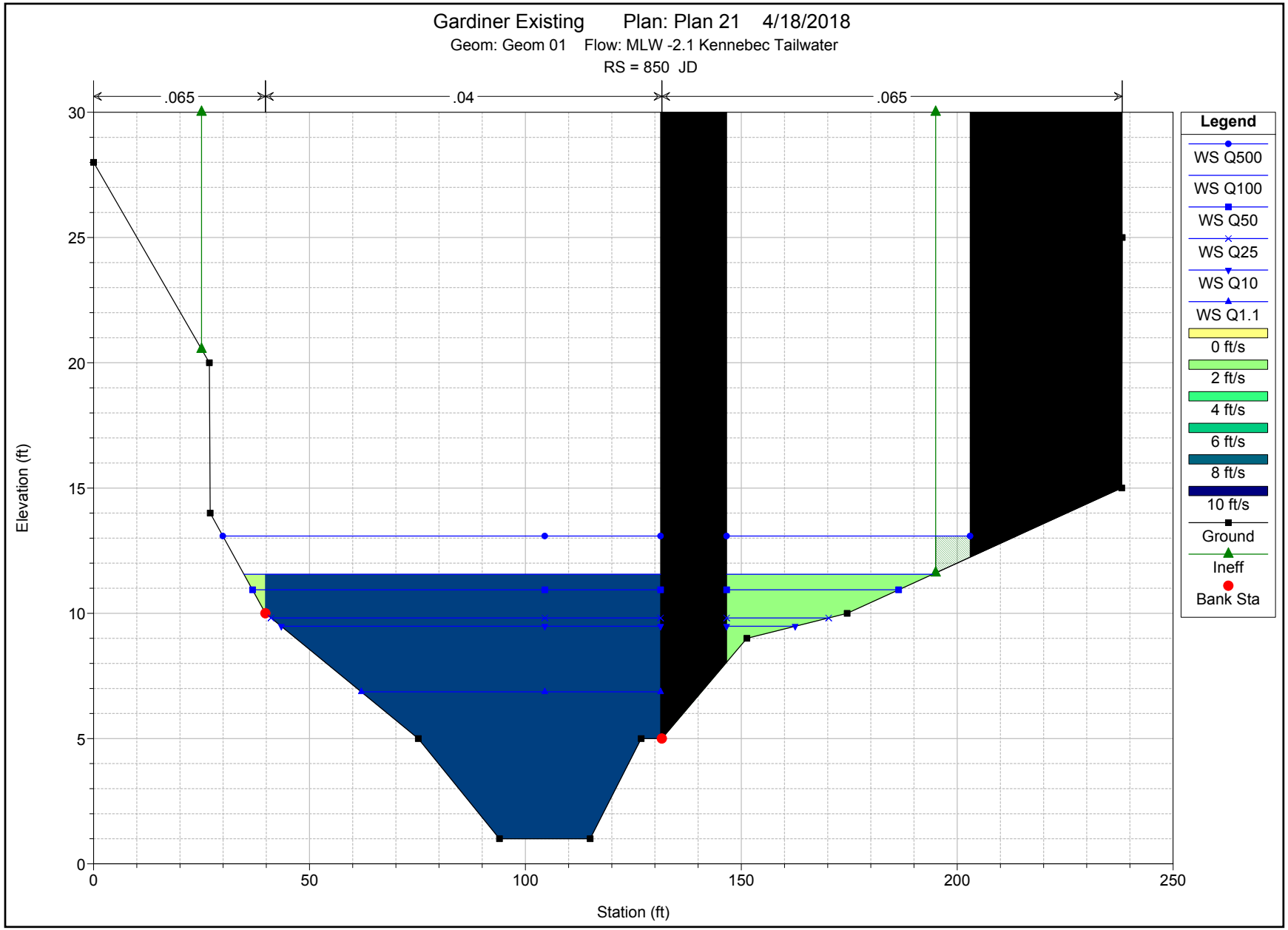

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1060 C
.065
.04
.07
Elevation (ft)
Station (ft)
35
30
25
20
15
10
5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

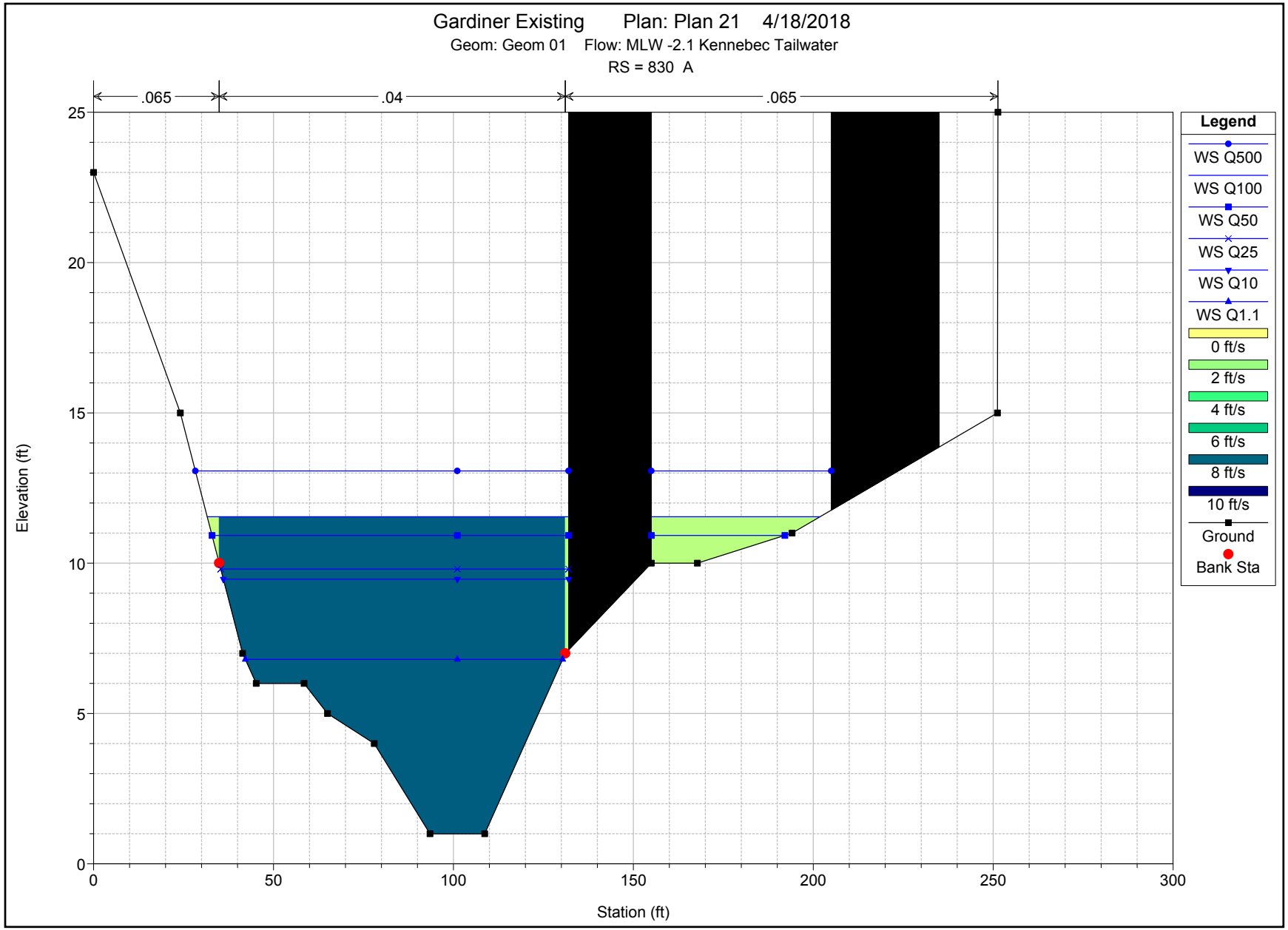

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 960 B
.07
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q100
WS Q50
WS Q500
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

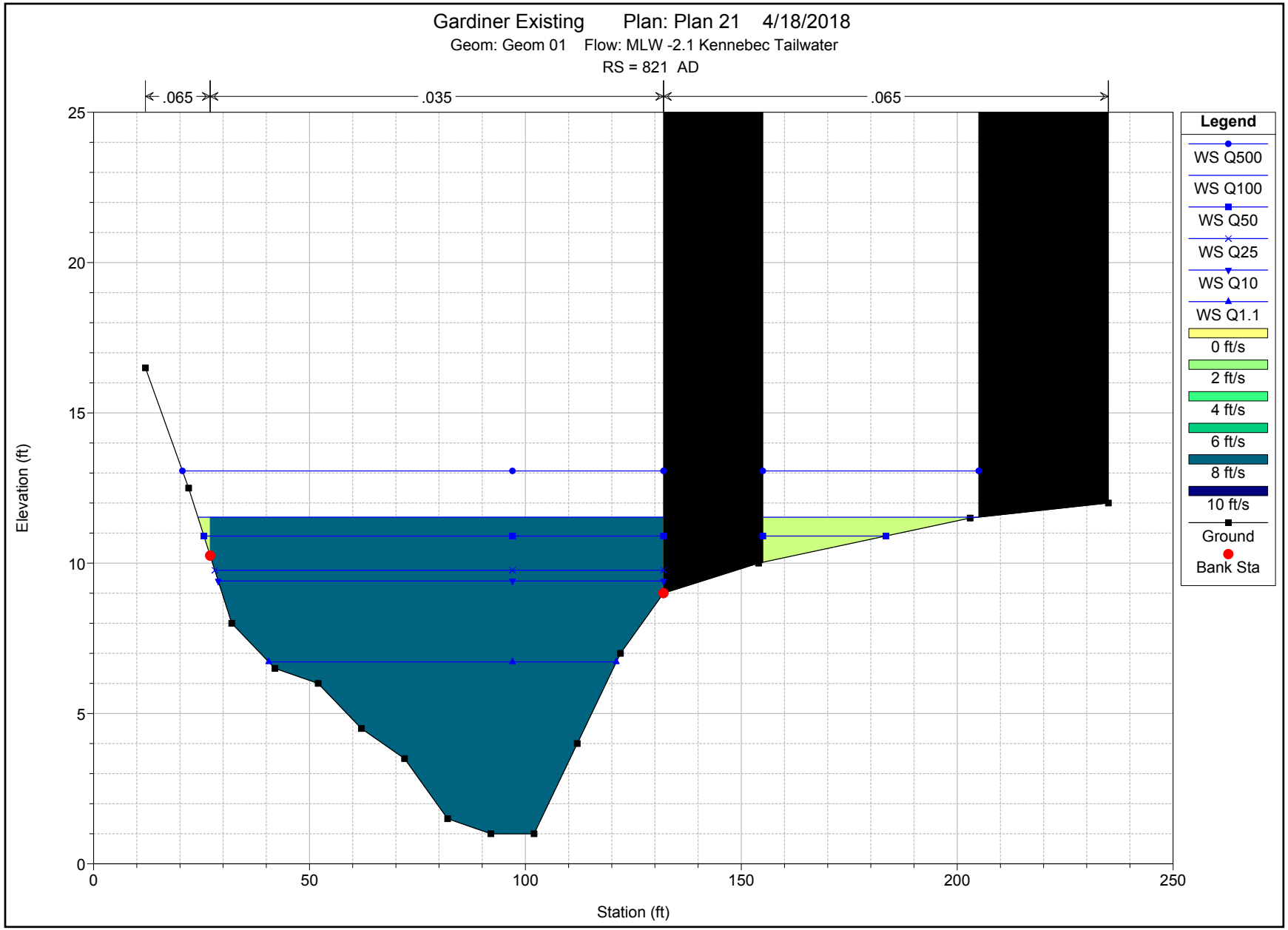

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 935 JU
.065
.042
.07
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

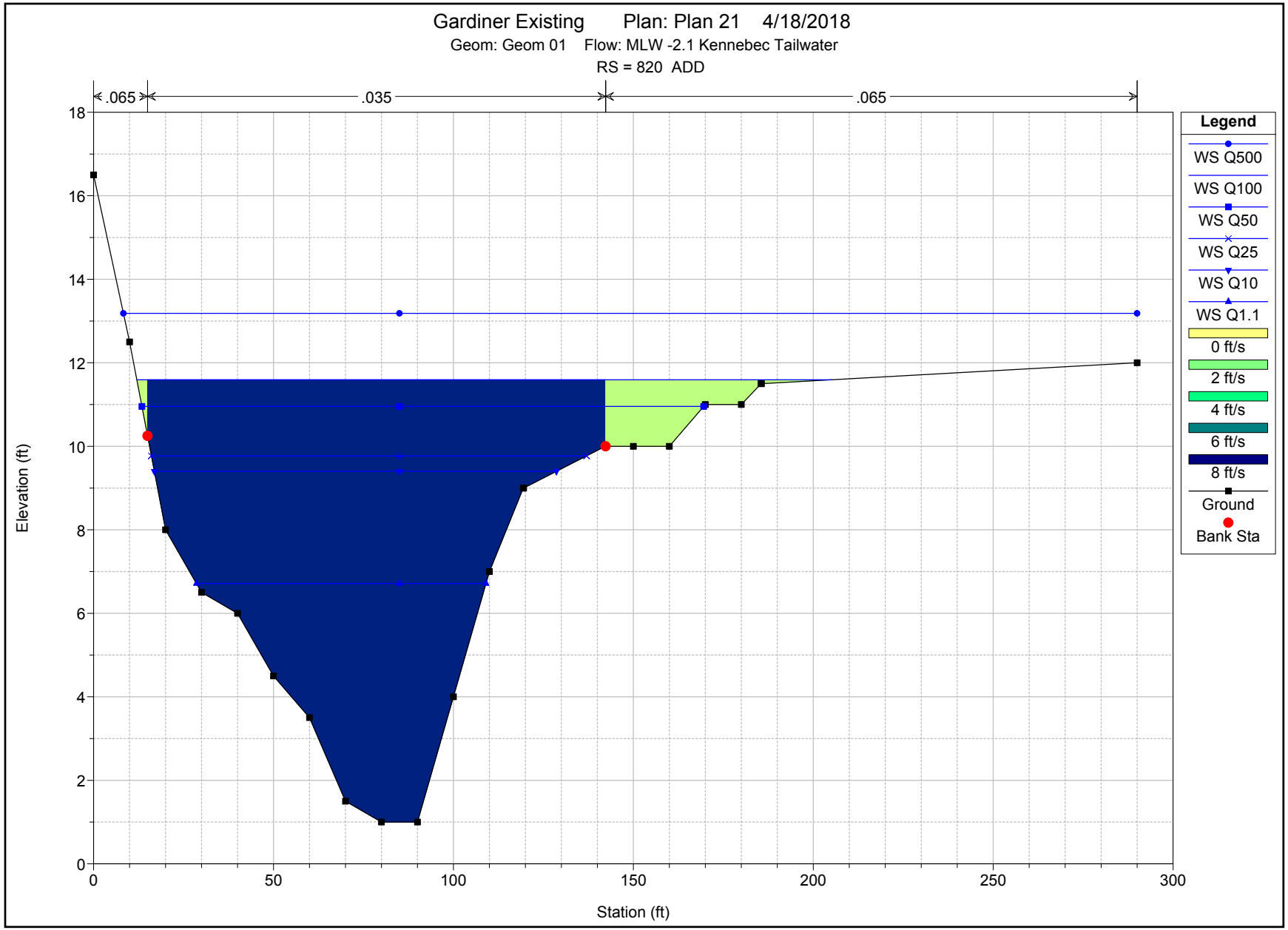

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 895 BR Bridge Street
.065
.042
.07
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

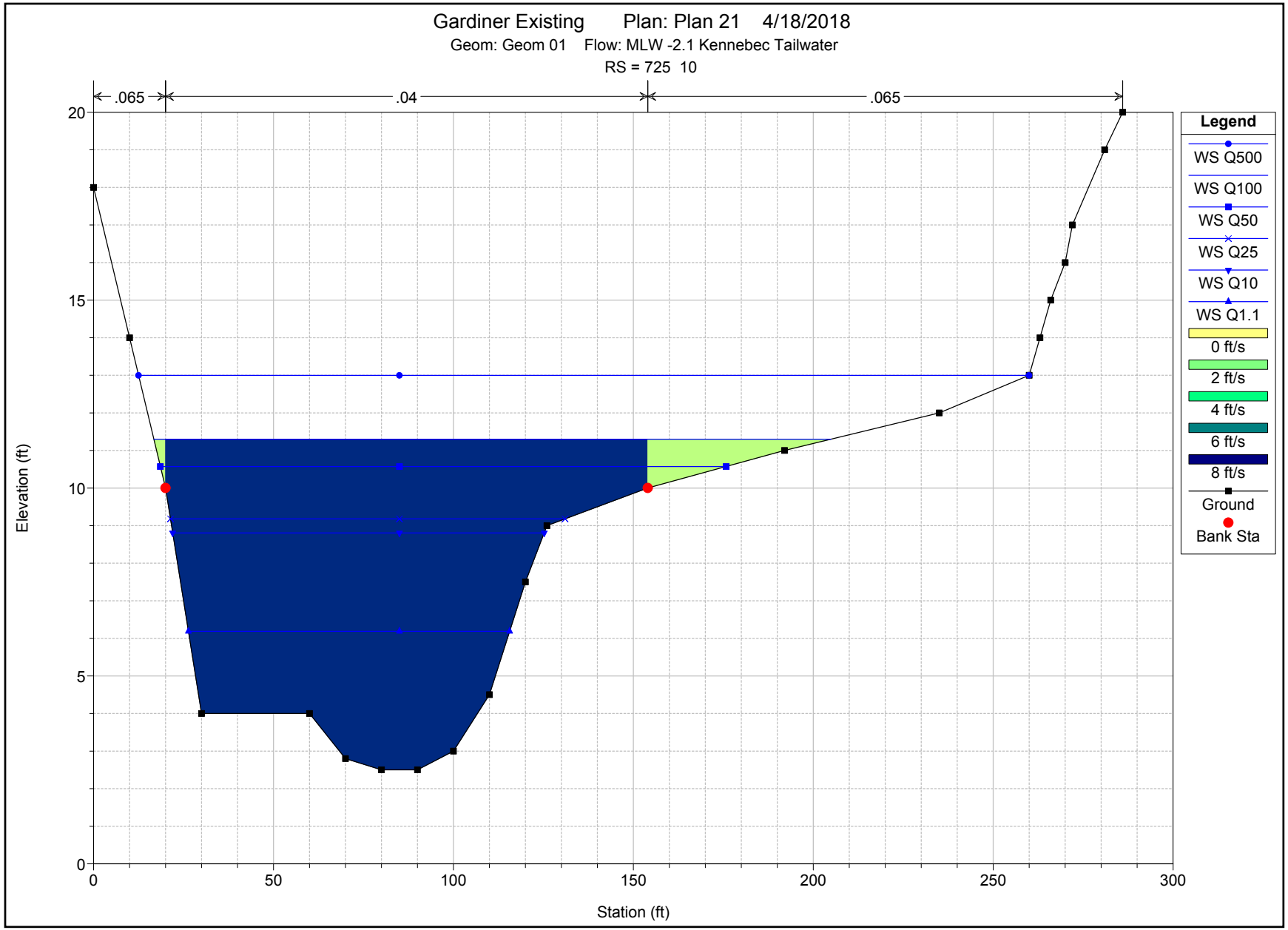

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 895 BR Bridge Street
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

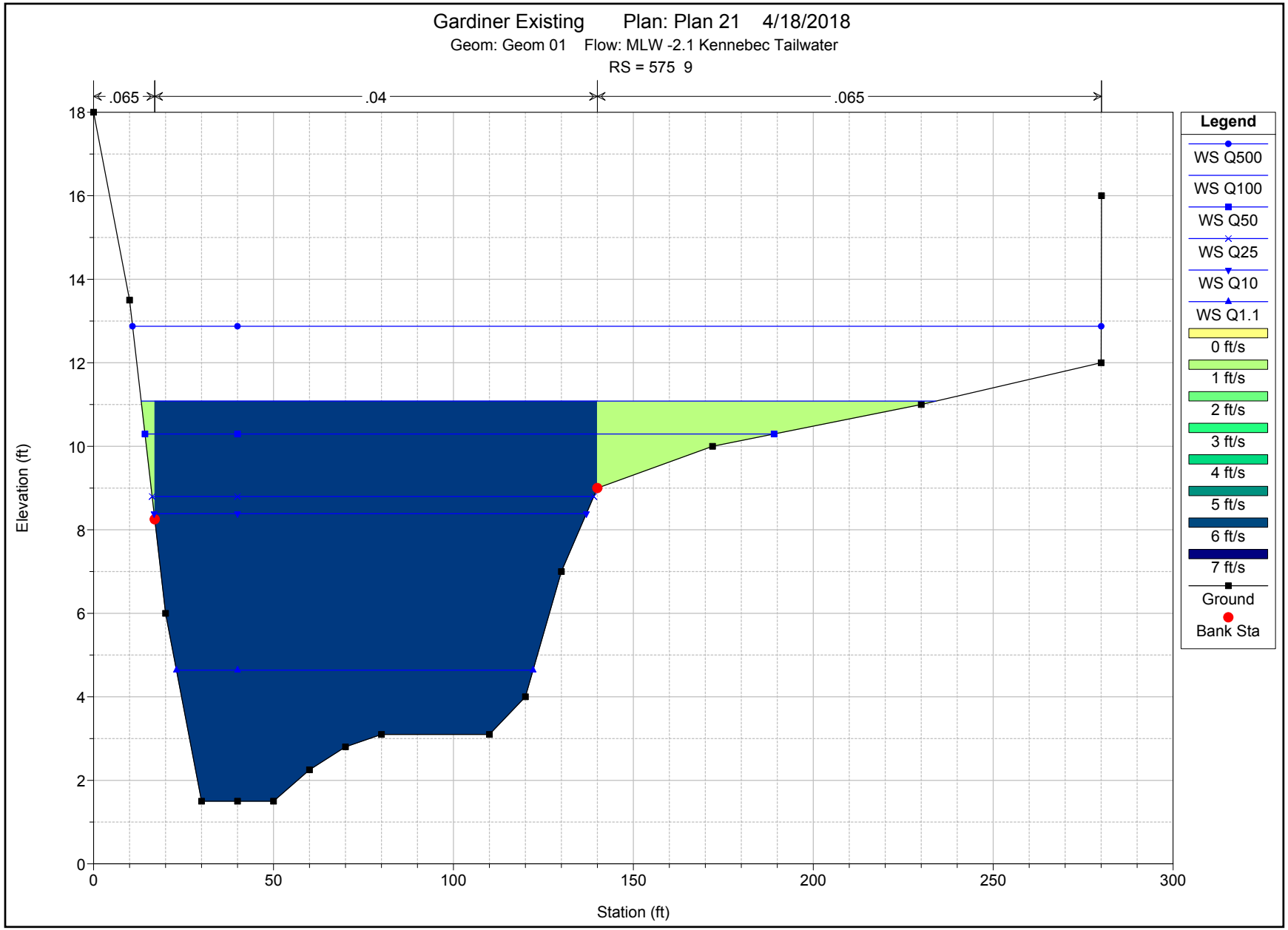

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 850 JD
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

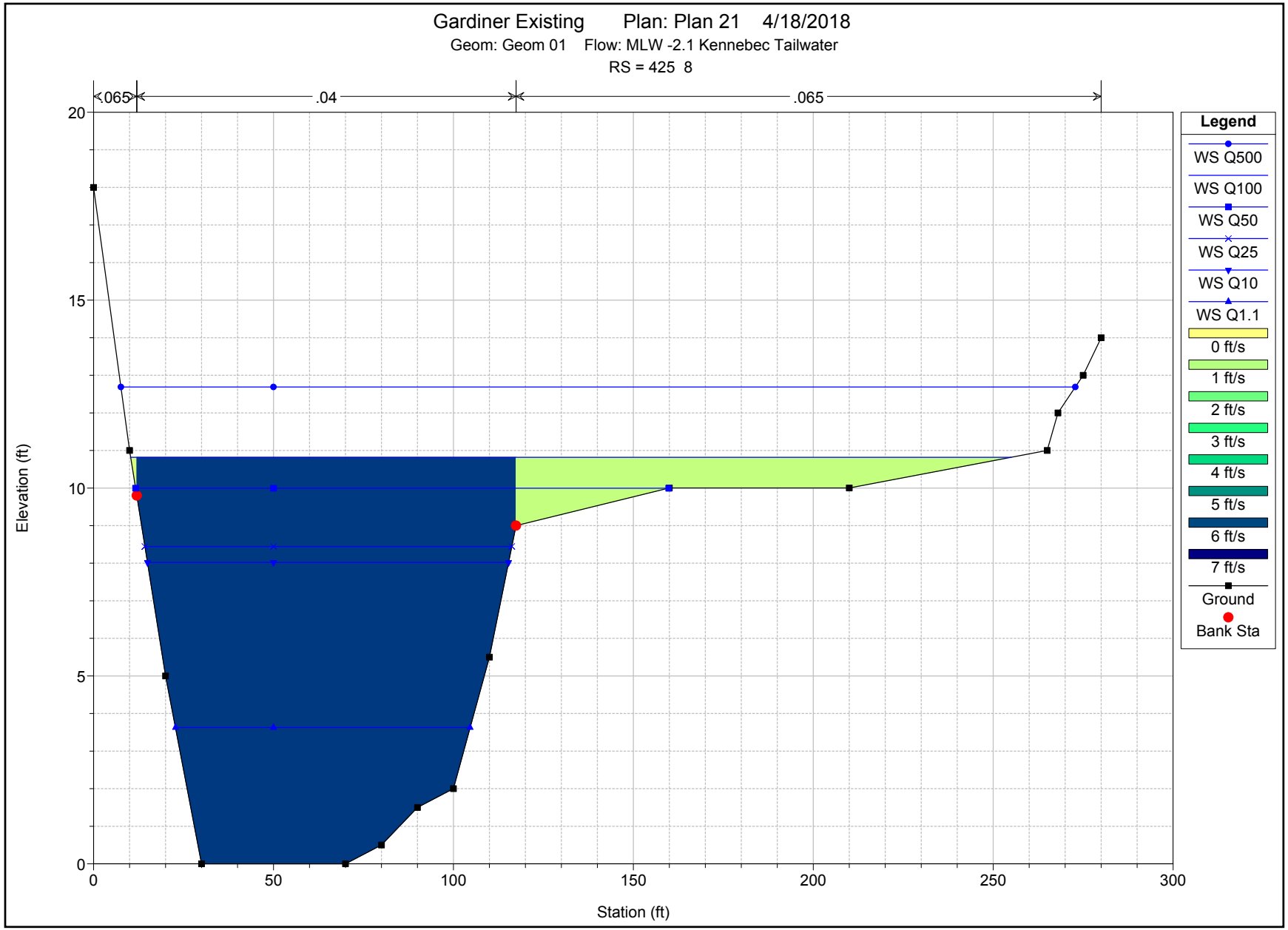

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 830 A
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

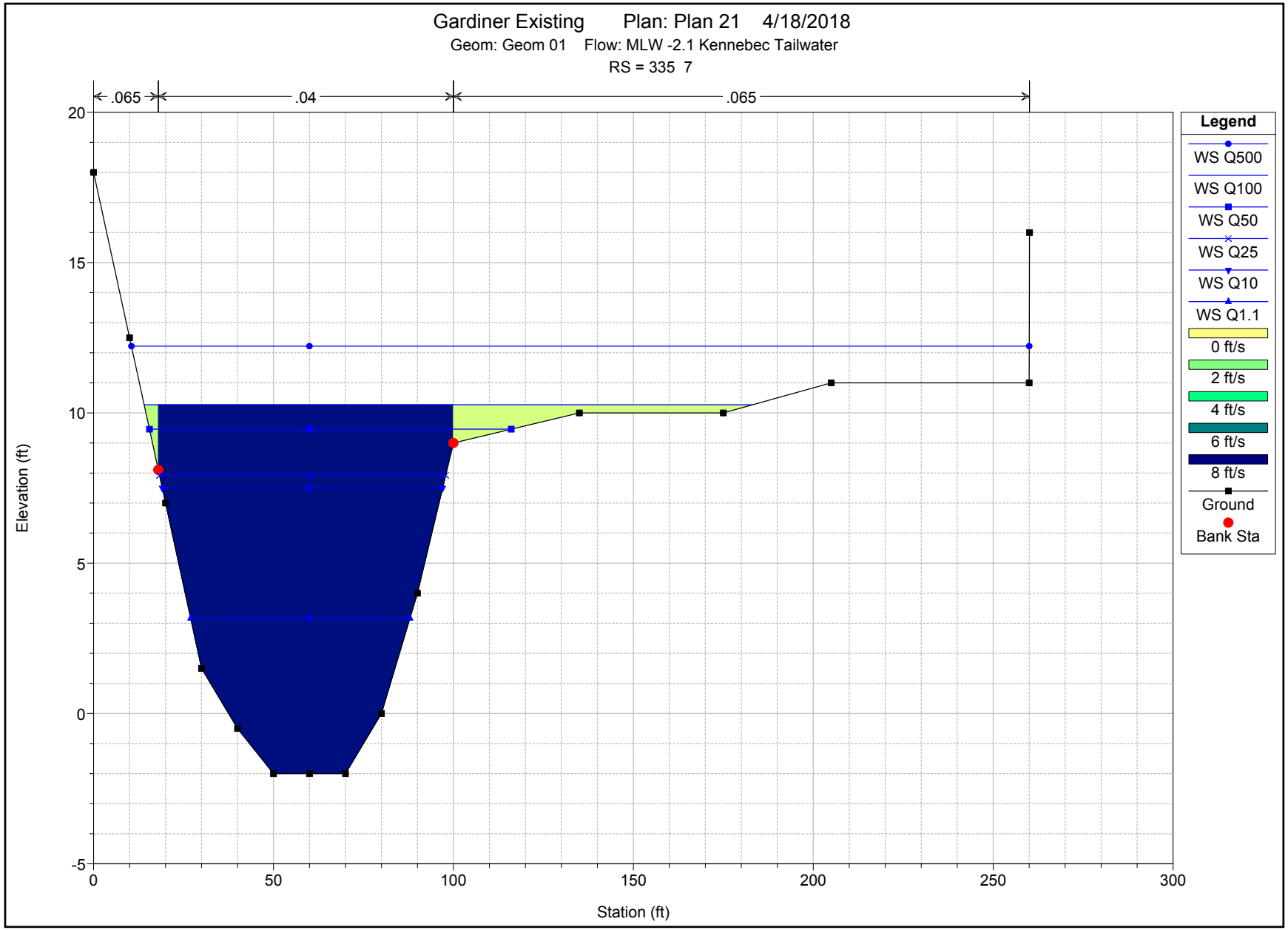

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 821 AD
.065
.035
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

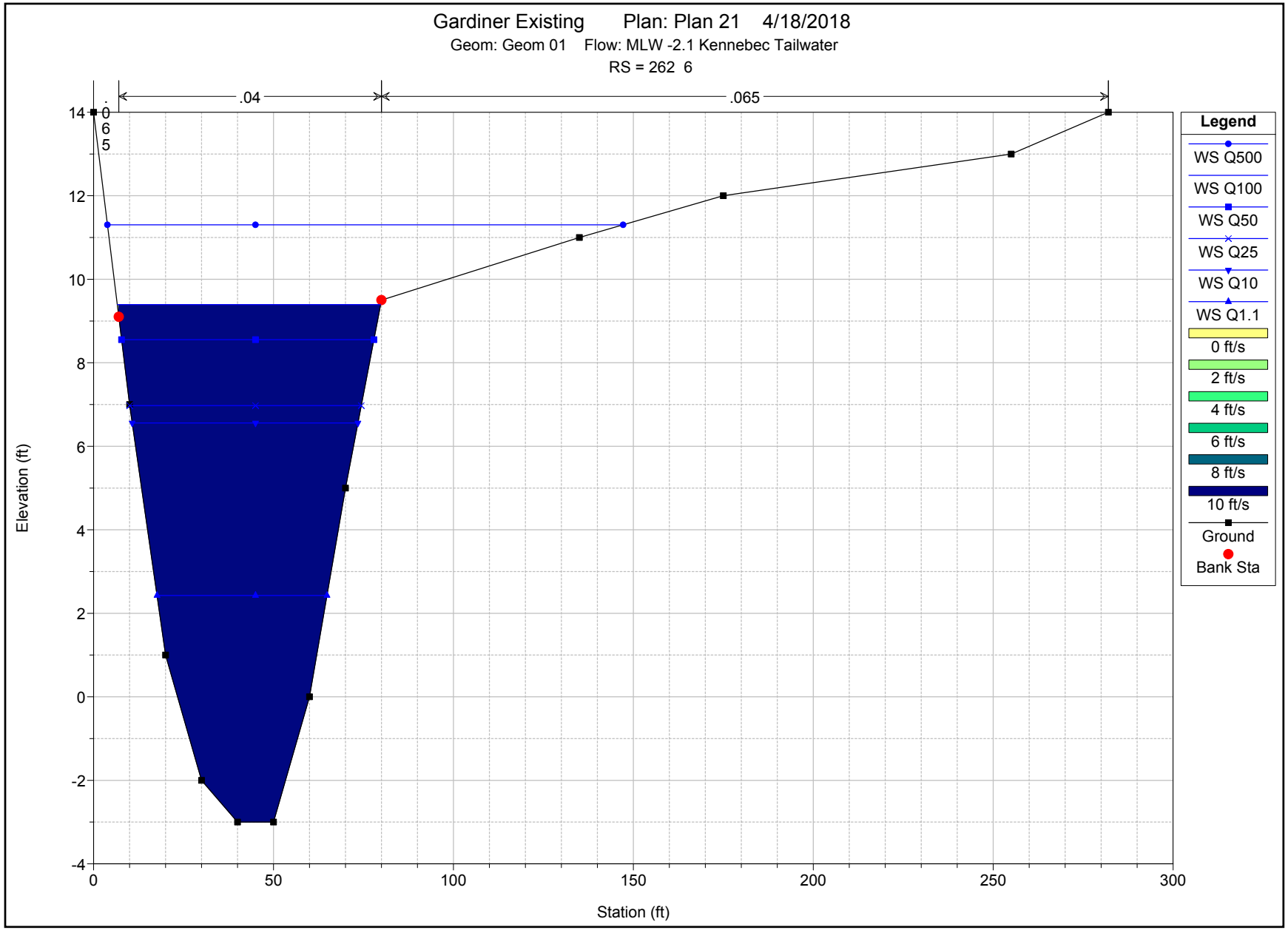

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 820 ADD
.065
.035
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

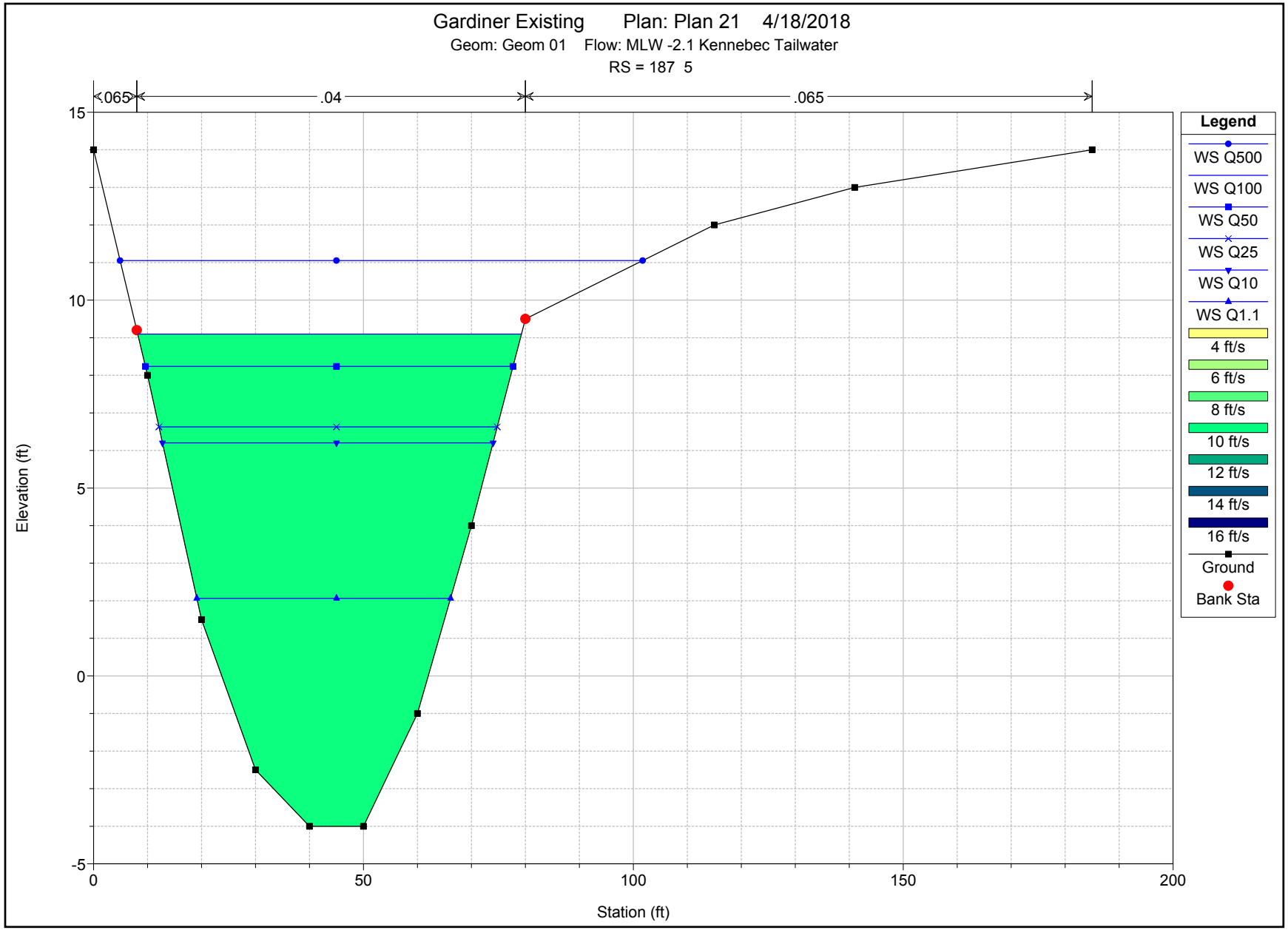

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 725 10
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

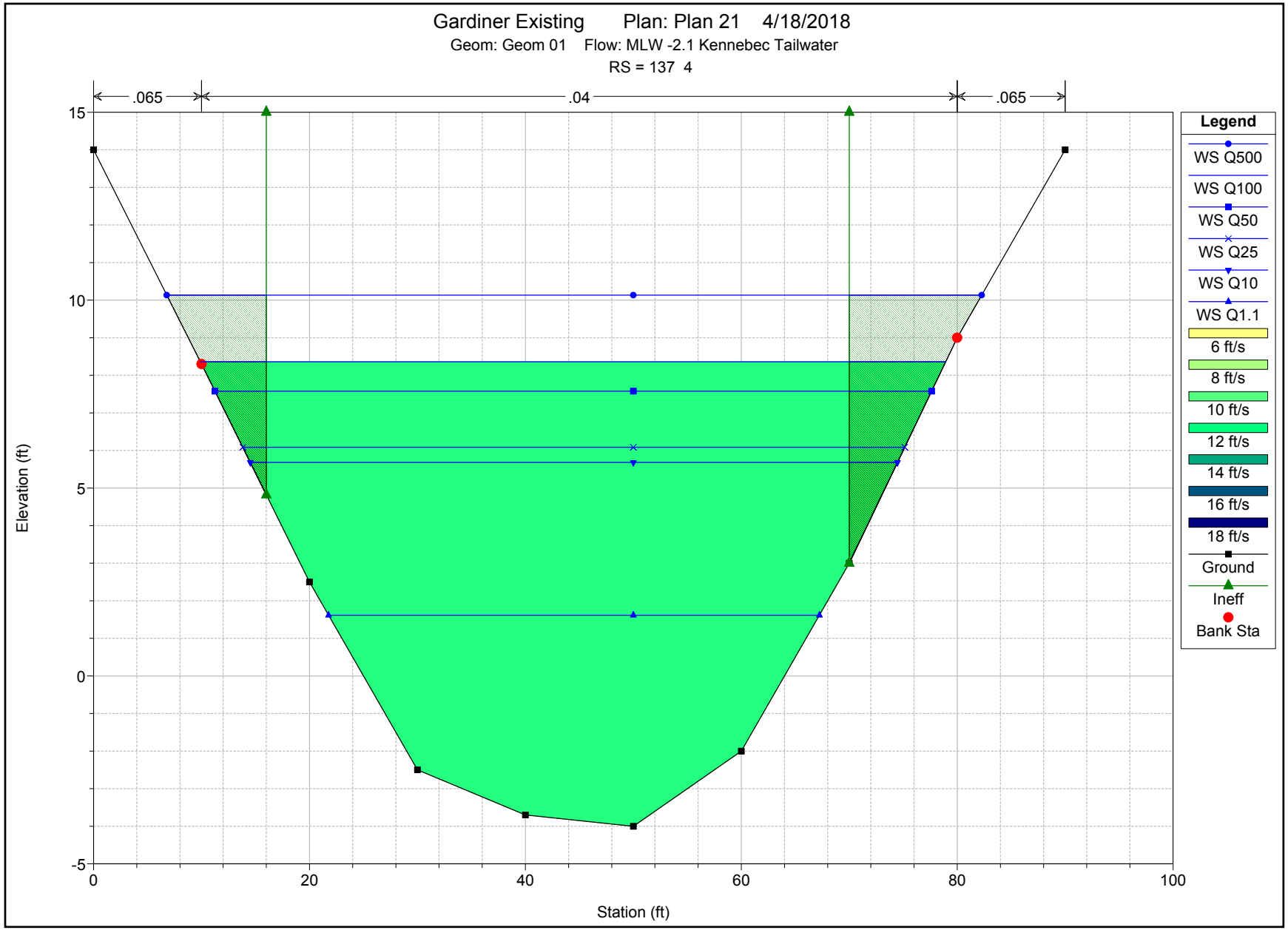

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 575 9
.065
.04
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

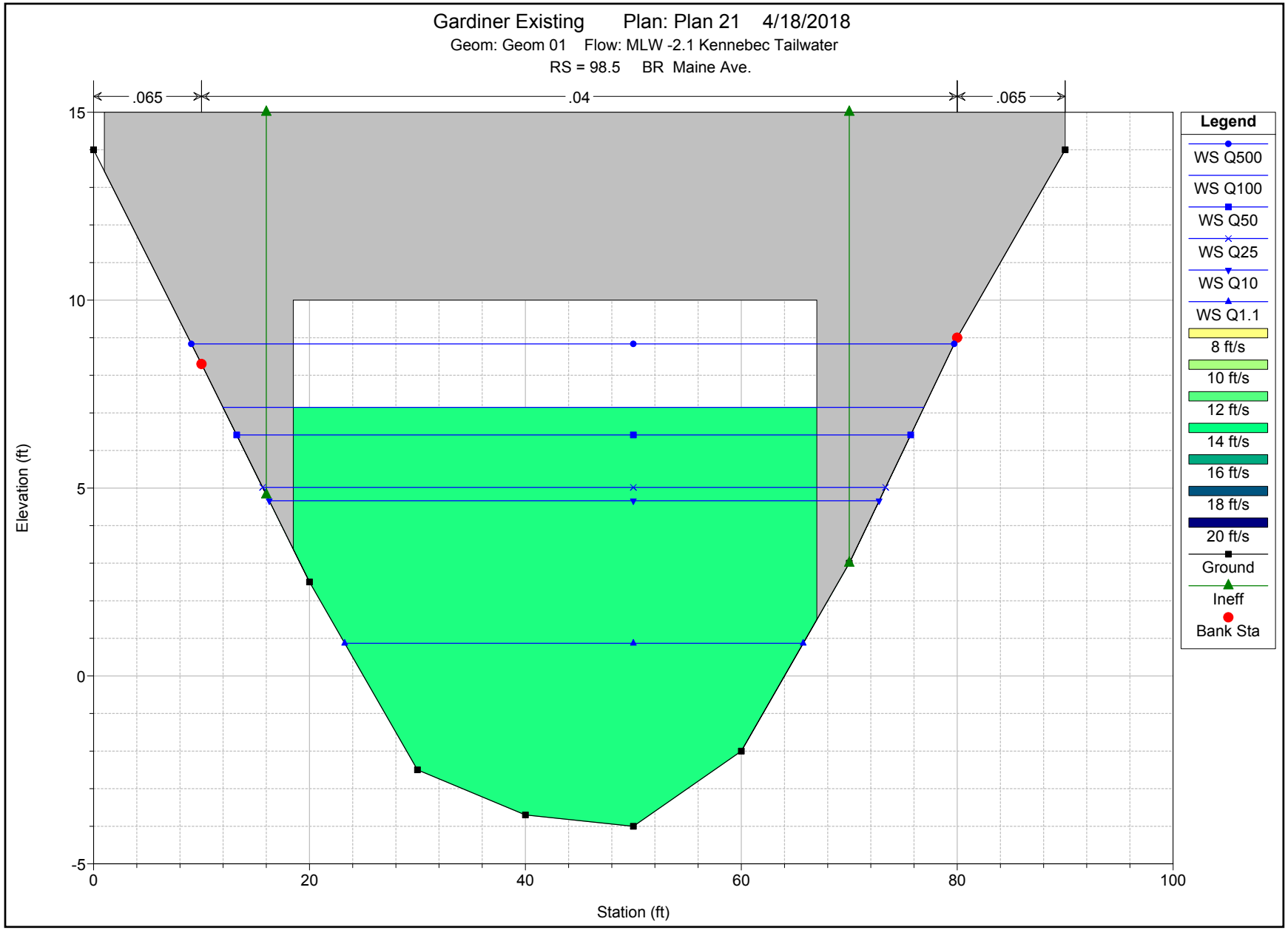

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 425 8
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

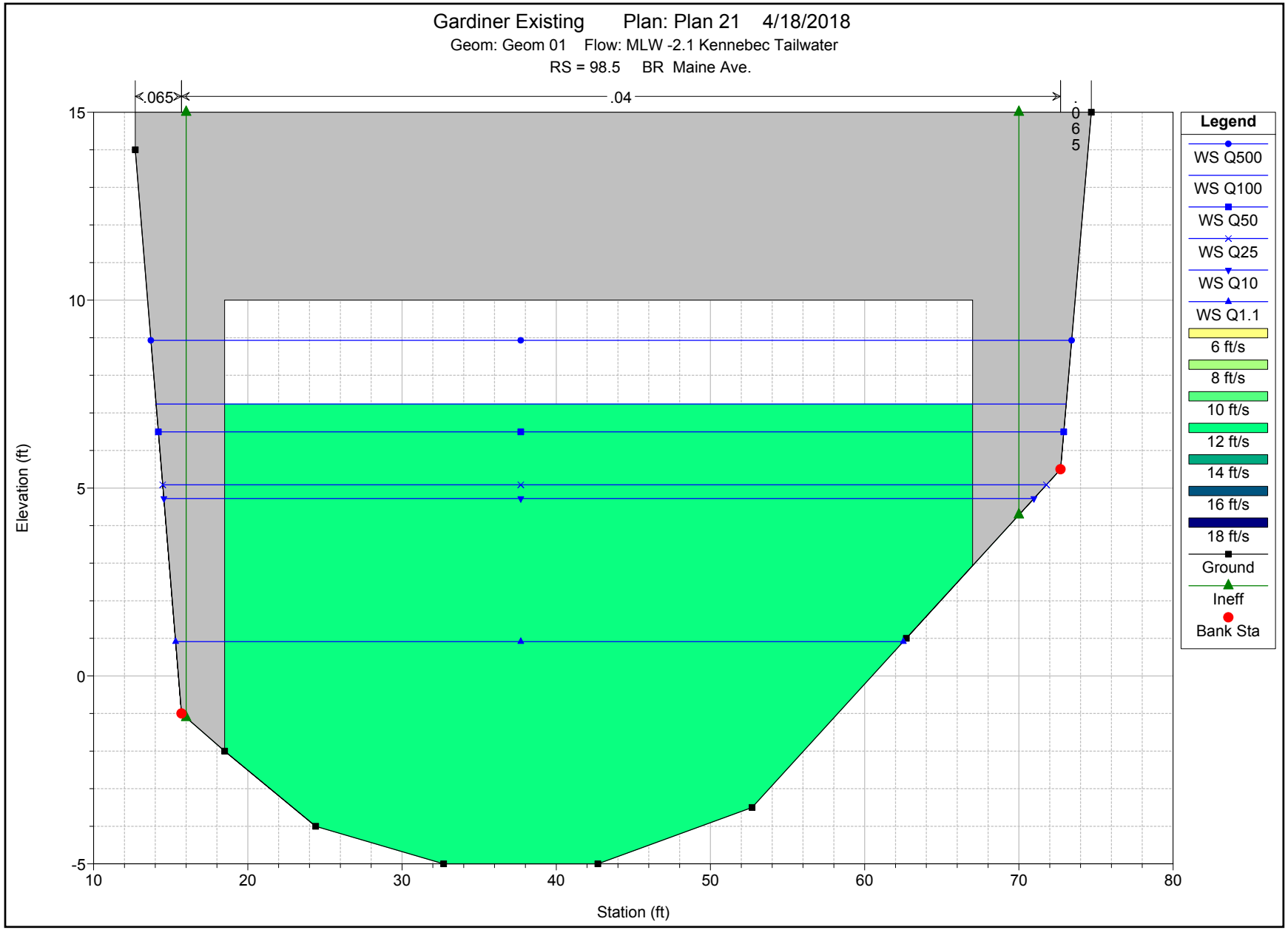

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 335 7
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

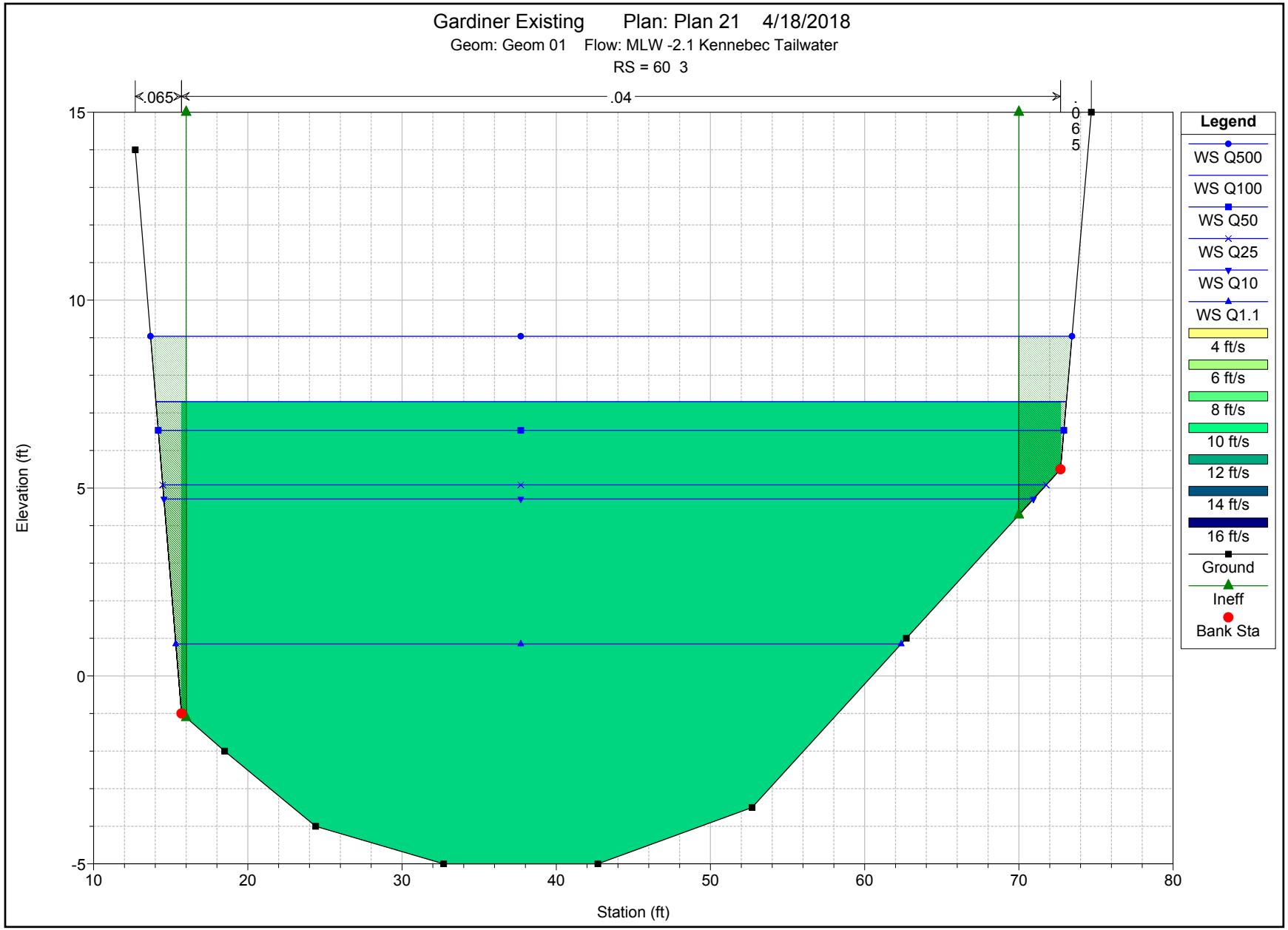

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 262 6
.04
.065
.0
6
5
Elevation (ft)
Station (ft)
14
12
10
8
6
4
2
0
-2
-4
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

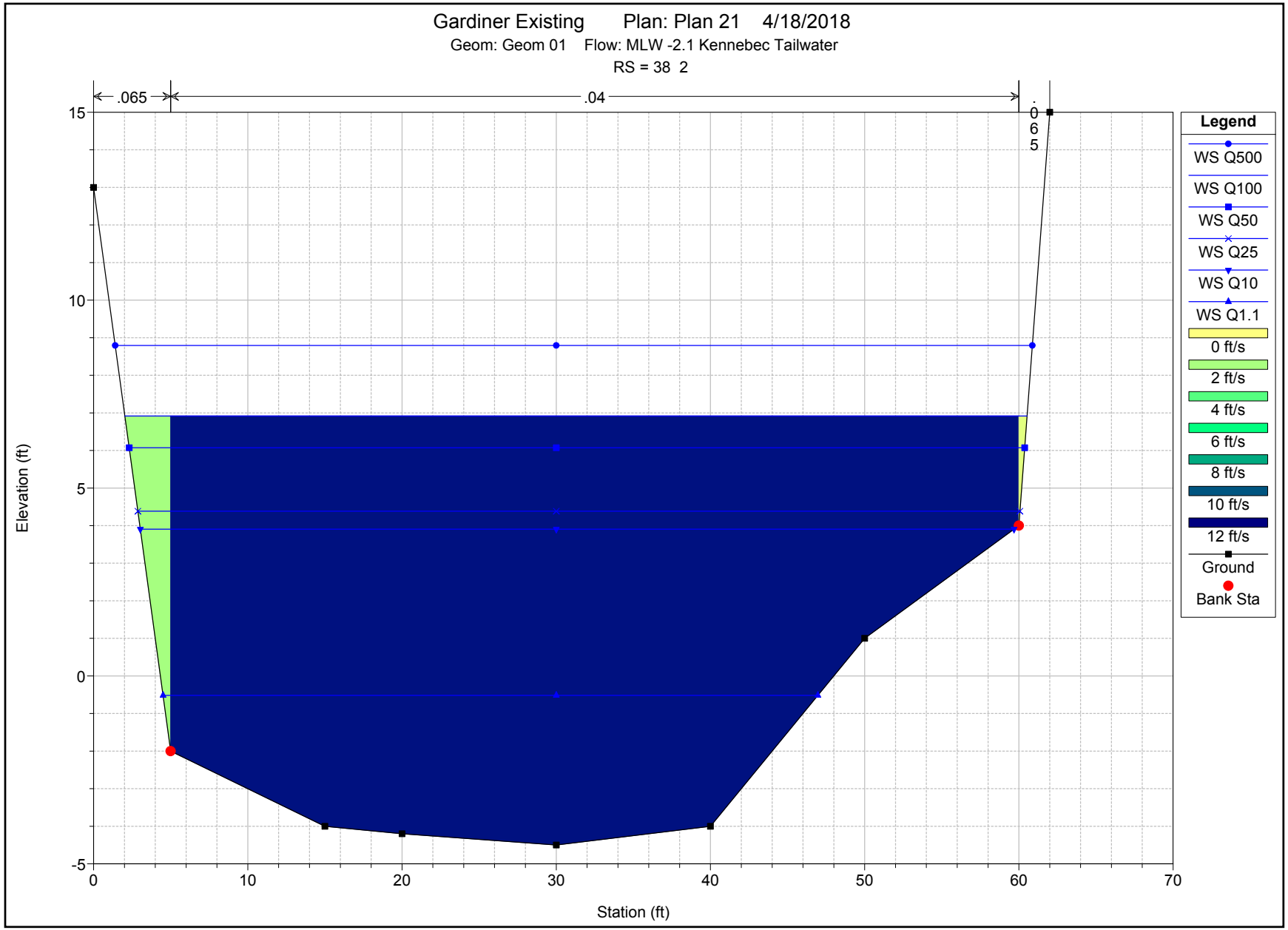

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 187 5
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

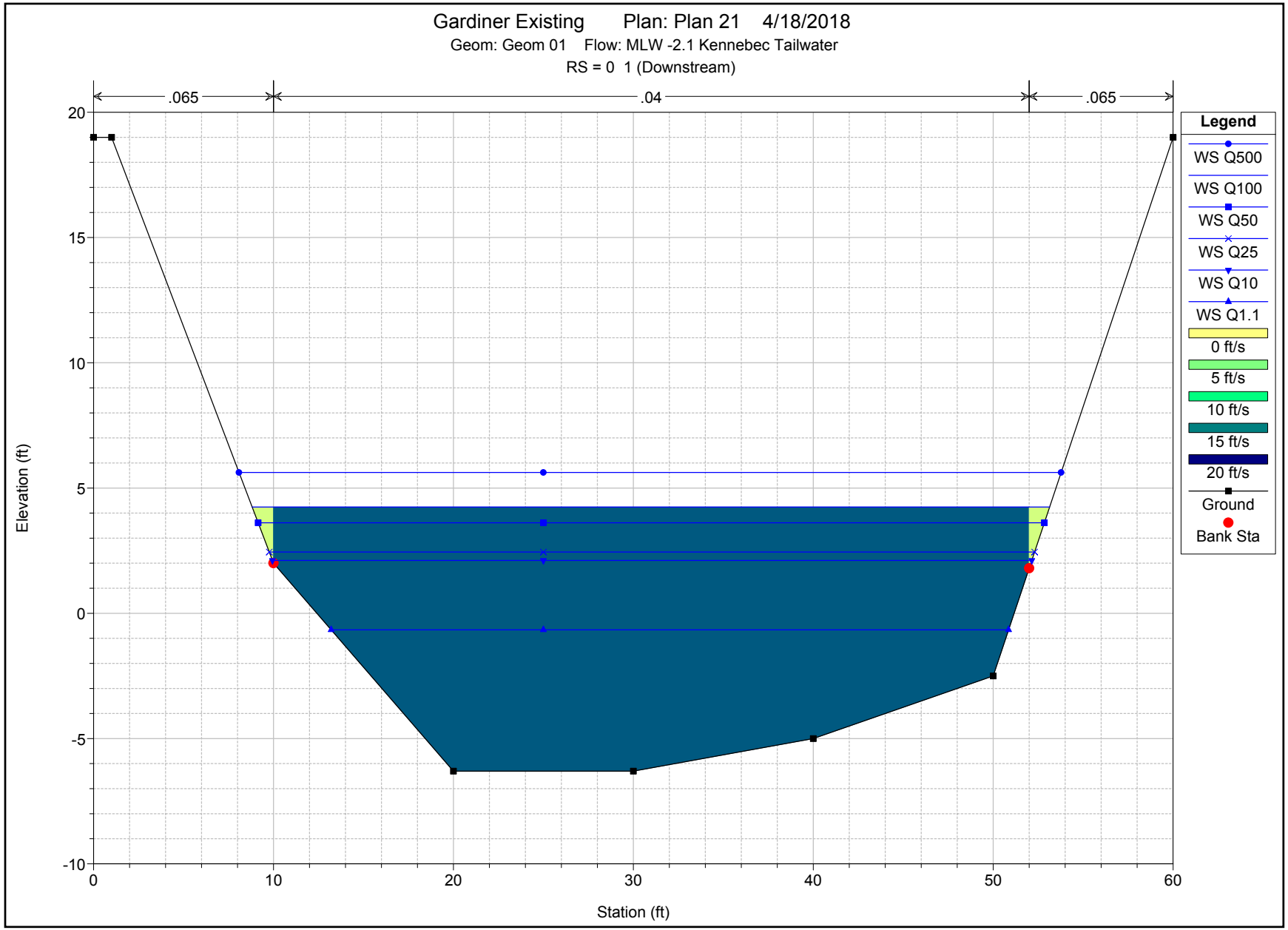

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 137 4
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

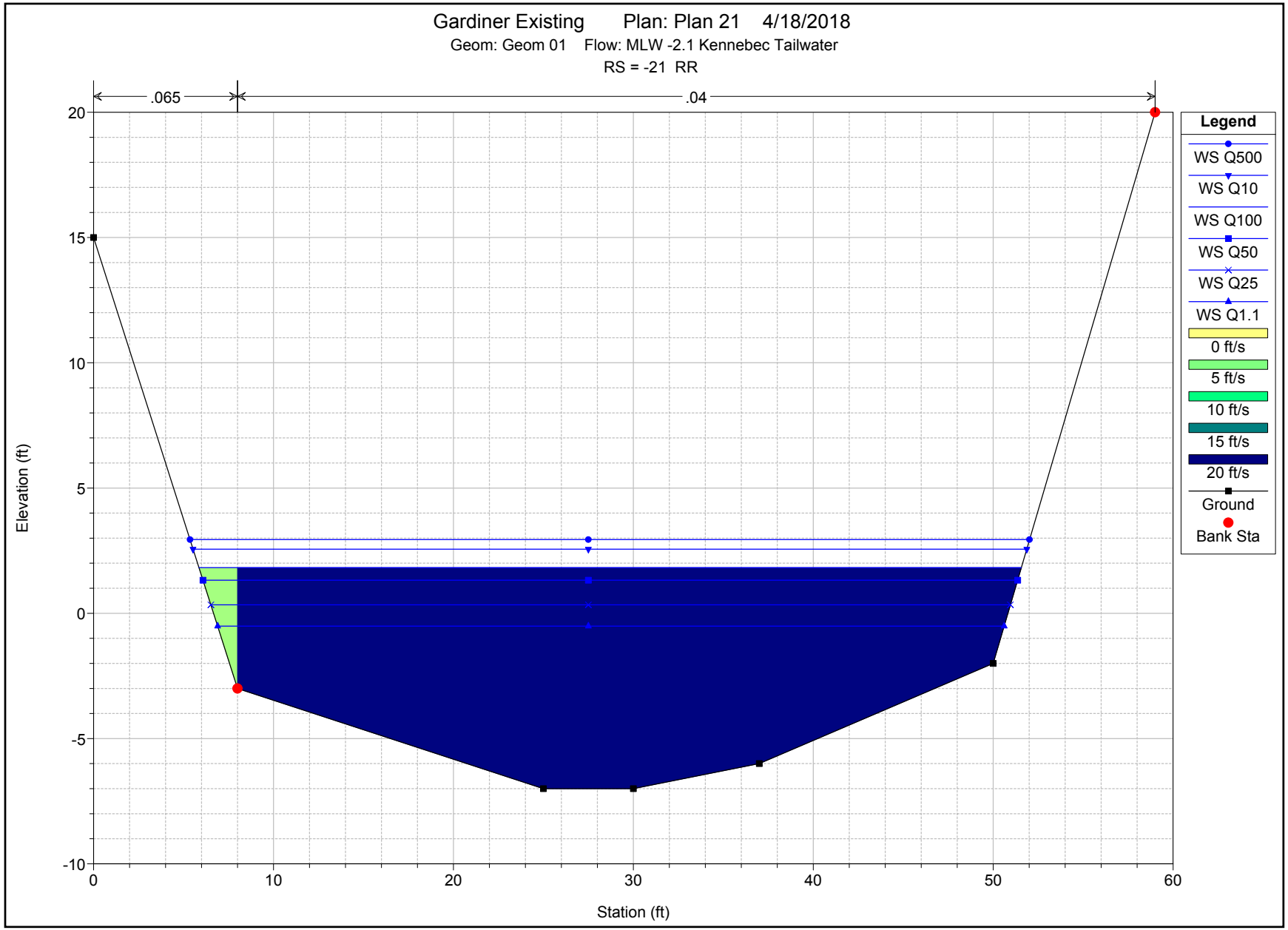

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
15
10
5
0
-5
0
20
40
60
80
100
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

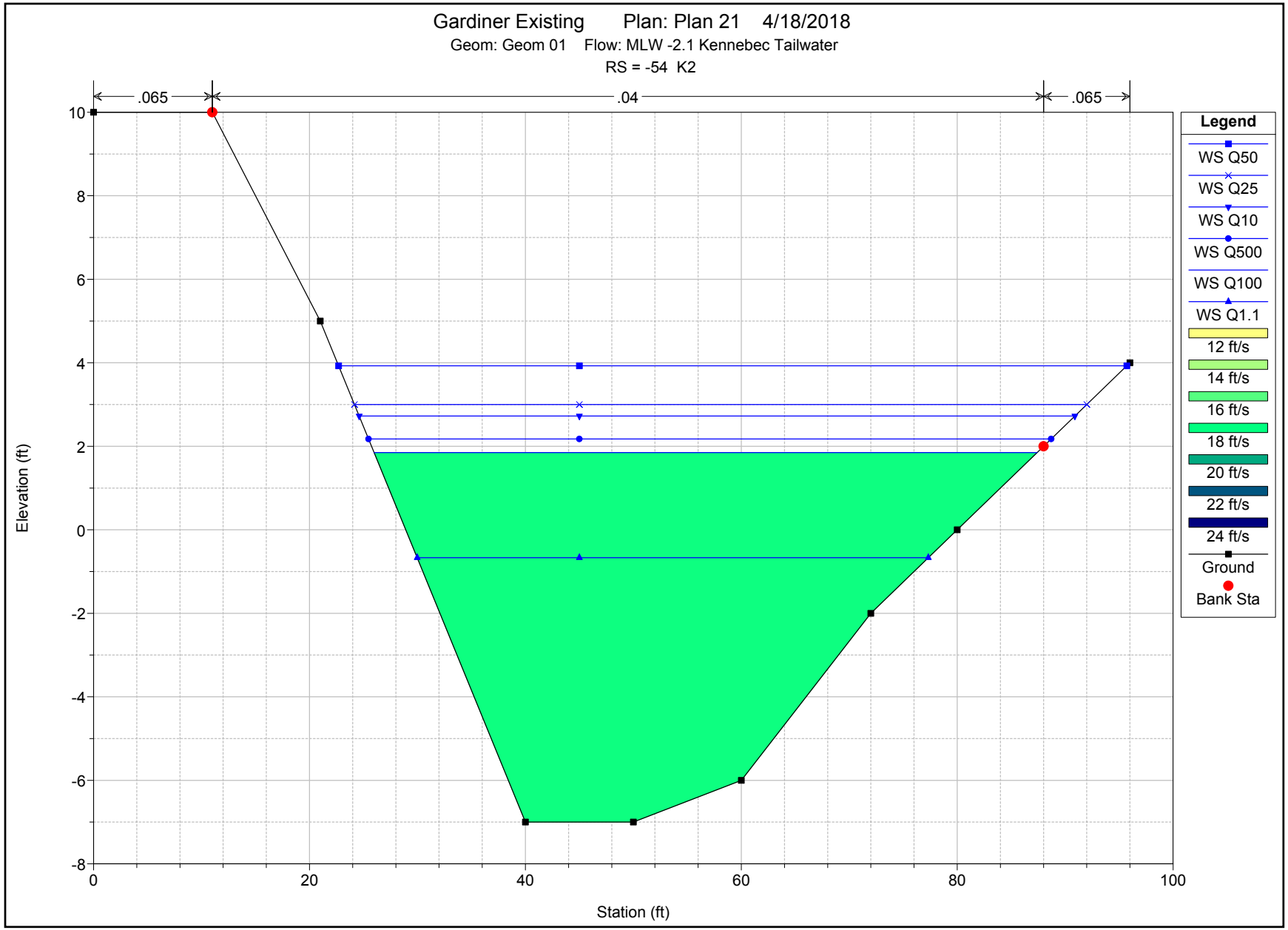

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

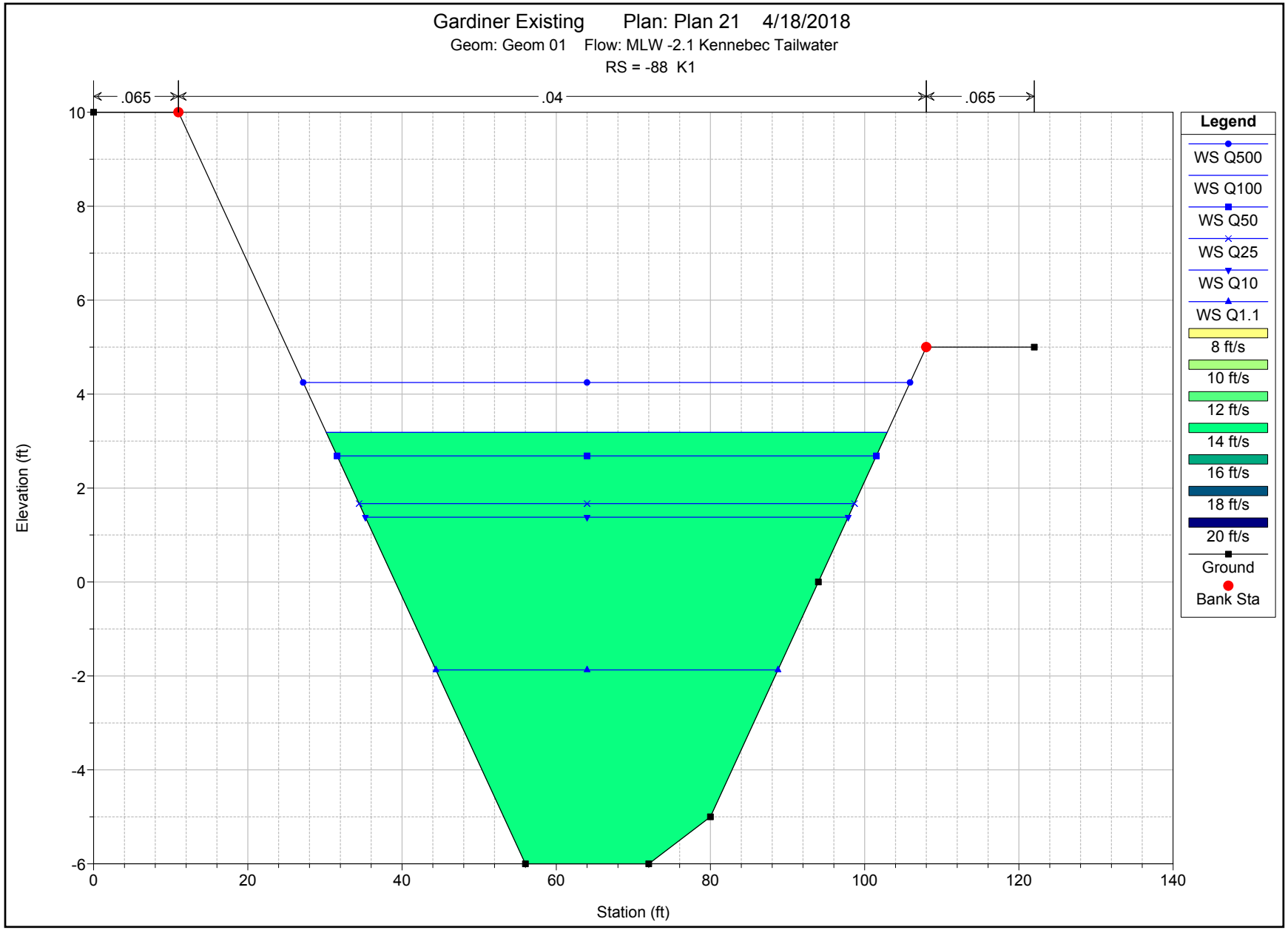

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 60 3
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

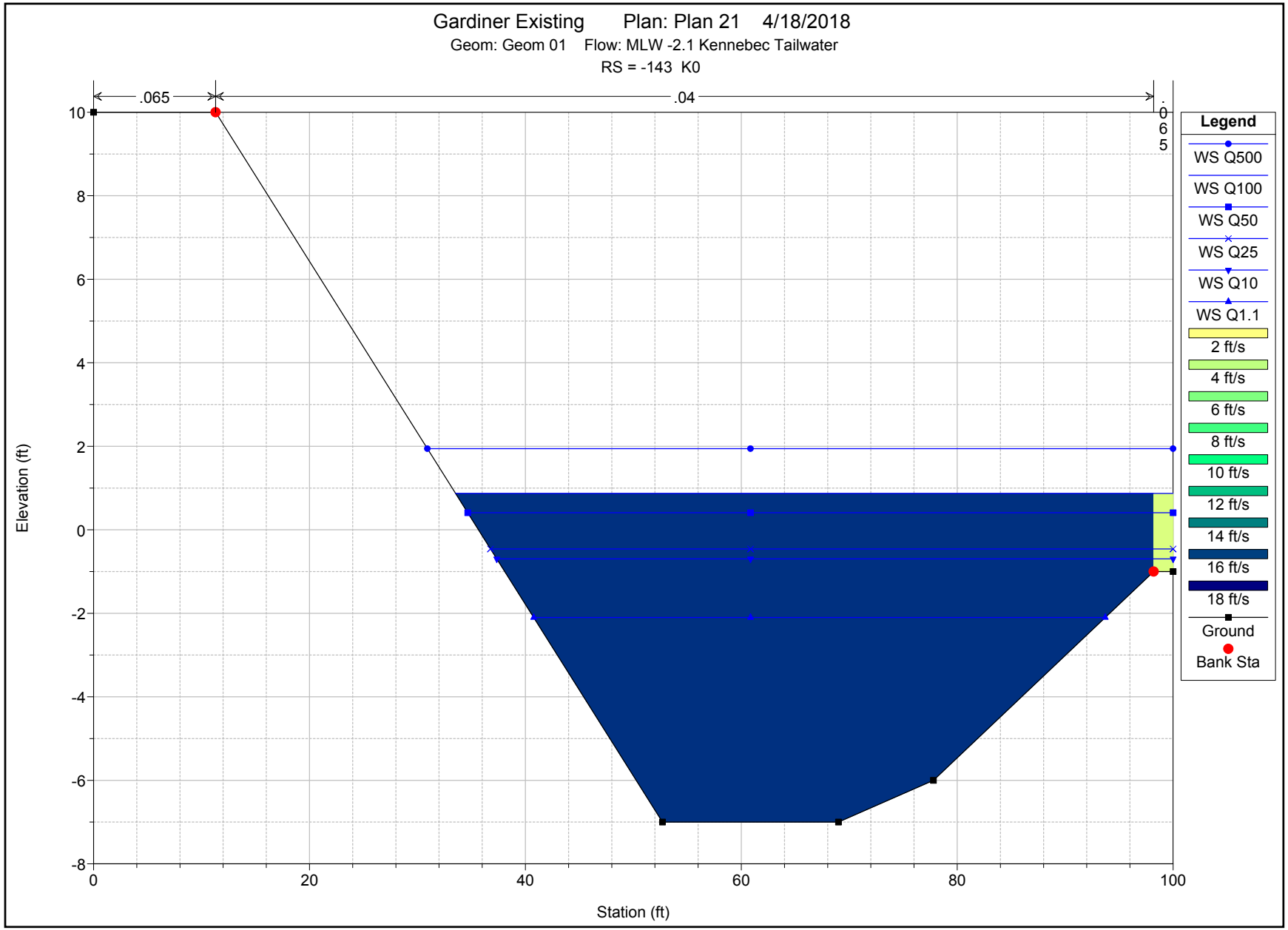

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 38 2
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
10
20
30
40
50
60
70
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 0 1 (Downstream)
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -21 RR
.065
.04
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q10
WS Q100
WS Q50
WS Q25
WS Q1.1
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -54 K2
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q50
WS Q25
WS Q10
WS Q500
WS Q100
WS Q1.1
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -88 K1
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -143 K0
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
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

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X     X  X        X            X   X    X    X   X
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PROJECT DATA
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Project File : Existing.prj
Run Date and Time: 4/18/2018 2:02:58 PM

Project in English units

PLAN DATA

Plan Title: Plan 21
Plan File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.p21

Geometry Title: Geom 01
Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.g01

Flow Title : MLW -2.1 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.f01

Plan Summary Information:
Number of: Cross Sections = 27 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 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: MLW -2.1 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.f01

Flow Data (cfs)

| River | Reach | RS | Q100 | Q1.1 | Q10 | Q25 | Q50 | Q500 |
|---|---|---|---|---|---|---|---|---|
| Cobosee Stream | Reach 1 | 1700 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |
| Cobosee Stream | Reach 1 | -88 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Cobosee Stream | Reach 1 | Q100 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q1.1 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q10 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q25 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q50 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q500 | Critical | Known WS = -2.1 |

GEOMETRY DATA

Geometry Title: Geom 01
Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.g01

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1700

INPUT
Description: Upstream (I)
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 40 | 10 | 39.7 | 20 | 39.2 | 30 | 37.2 | 40 | 34.5 |
| 50 | 29 | 60 | 23.5 | 70 | 17.5 | 80 | 15.5 | 90 | 14.5 |
| 100 | 13.8 | 110 | 14.2 | 120 | 14.8 | 130 | 15.7 | 140 | 19 |
| 150 | 25 | 160 | 31 | 170 | 33.3 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 60 | .04 | 150 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 60 | 150 | 65 | 65 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.48 | Element | | | |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.75 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 21.32 | Flow Area (sq ft) | | 559.56 | |
| E.G. Slope (ft/ft) | 0.006899 | Area (sq ft) | | 559.56 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 84.99 | Top Width (ft) | | 84.99 | |
| Vel Total (ft/s) | 10.56 | Avg. Vel. (ft/s) | | 10.56 | |
| Max Chl Dpth (ft) | 8.95 | Hydr. Depth (ft) | | 6.58 | |
| Conv. Total (cfs) | 71152.0 | Conv. (cfs) | | 71152.0 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 88.36 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.73 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.08 | 25.43 | 1.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.07 | 3.56 | 1.24 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.04 | Element | | | |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 18.54 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 17.33 | Flow Area (sq ft) | | 231.75 | |
| E.G. Slope (ft/ft) | 0.004837 | Area (sq ft) | | 231.75 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 70.35 | Top Width (ft) | | 70.35 | |
| Vel Total (ft/s) | 5.66 | Avg. Vel. (ft/s) | | 5.66 | |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | | 3.29 | |
| Conv. Total (cfs) | 18865.3 | Conv. (cfs) | | 18865.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 71.44 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 0.98 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.51 | Cum Volume (acre-ft) | 0.00 | 8.07 | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 2.70 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.15 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 19.81 | Flow Area (sq ft) | | 428.08 | |
| E.G. Slope (ft/ft) | 0.006488 | Area (sq ft) | | 428.08 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 79.67 | Top Width (ft) | | 79.67 | |
| Vel Total (ft/s) | 8.99 | Avg. Vel. (ft/s) | | 8.99 | |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 47797.3 | Conv. (cfs) | | 47797.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 82.15 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.11 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.01 | 17.91 | 0.02 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.29 | 0.04 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.73 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.40 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.05 | Flow Area (sq ft) | | 447.72 | |
| E.G. Slope (ft/ft) | 0.006586 | Area (sq ft) | | 447.72 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 80.49 | Top Width (ft) | | 80.49 | |
| Vel Total (ft/s) | 9.26 | Avg. Vel. (ft/s) | | 9.26 | |
| Max Chl Dpth (ft) | 7.60 | Hydr. Depth (ft) | | 5.56 | |
| Conv. Total (cfs) | 51113.1 | Conv. (cfs) | | 51113.1 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 83.10 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.01 | 18.98 | 0.03 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.35 | 0.05 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.28 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.89 | Flow Area (sq ft) | | 519.99 | |
| E.G. Slope (ft/ft) | 0.006865 | Area (sq ft) | | 519.99 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 83.43 | Top Width (ft) | | 83.43 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 63848.2 | Conv. (cfs) | | 63848.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 86.53 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.04 | 23.27 | 0.33 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.04 | 3.53 | 0.54 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.00 | Wt. n-Val. | 0.070 | 0.040 | |
| W.S. Elev (ft) | 23.79 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 22.27 | Flow Area (sq ft) | 0.08 | 649.66 | |
| E.G. Slope (ft/ft) | 0.006886 | Area (sq ft) | 0.08 | 649.66 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.03 | 7379.97 | |
| Top Width (ft) | 88.50 | Top Width (ft) | 0.52 | 87.98 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 0.44 | 11.36 | |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 0.14 | 7.38 | |
| Conv. Total (cfs) | 88934.8 | Conv. (cfs) | 0.4 | 88934.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | 0.60 | 91.84 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | 0.05 | 3.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.50 | Cum Volume (acre-ft) | 0.25 | 30.45 | 4.08 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.14 | 3.60 | 2.01 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1635

INPUT
Description: H

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 23.5 | 40 | 17 |
| 50 | 14 | 60 | 14.5 | 70 | 15 | 80 | 15.2 | 90 | 15.4 |
| 100 | 15.6 | 110 | 15.8 | 115 | 17.9 | 120 | 20 | 130 | 26.5 |
| 140 | 30.1 | 150 | 30.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .045 | 130 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 130 | 80 | 80 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.95 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 22.26 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.74 | |
| E.G. Slope (ft/ft) | 0.009286 | Area (sq ft) | | 565.74 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 91.56 | Top Width (ft) | | 91.56 | |
| Vel Total (ft/s) | 10.45 | Avg. Vel. (ft/s) | | 10.45 | |
| Max Chl Dpth (ft) | 8.26 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 61329.1 | Conv. (cfs) | | 61329.1 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 95.11 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.90 | Cum Volume (acre-ft) | 0.08 | 24.59 | 1.04 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.07 | 3.42 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.92 | |
| E.G. Slope (ft/ft) | 0.015059 | Area (sq ft) | | 181.92 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 75.56 | Top Width (ft) | | 75.56 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 10691.3 | Conv. (cfs) | | 10691.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 76.62 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.04 | Cum Volume (acre-ft) | 0.00 | 7.77 | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 2.60 | |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.47 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 407.41 | |
| E.G. Slope (ft/ft) | 0.010706 | Area (sq ft) | | 407.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 86.07 | Top Width (ft) | | 86.07 | |
| Vel Total (ft/s) | 9.45 | Avg. Vel. (ft/s) | | 9.45 | |
| Max Chl Dpth (ft) | 6.47 | Hydr. Depth (ft) | | 4.73 | |
| Conv. Total (cfs) | 37209.8 | Conv. (cfs) | | 37209.8 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 88.57 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.01 | 17.29 | 0.02 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 3.16 | 0.04 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.44 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 431.49 | |
| E.G. Slope (ft/ft) | 0.010420 | Area (sq ft) | | 431.49 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 86.93 | Top Width (ft) | | 86.93 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 6.75 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 40635.0 | Conv. (cfs) | | 40635.0 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 89.59 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.13 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.01 | 18.32 | 0.03 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.01 | 3.23 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.36 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 21.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 520.12 | |
| E.G. Slope (ft/ft) | 0.009593 | Area (sq ft) | | 520.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 90.01 | Top Width (ft) | | 90.01 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 7.75 | Hydr. Depth (ft) | | 5.78 | |
| Conv. Total (cfs) | 54011.4 | Conv. (cfs) | | 54011.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 93.26 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.91 | Cum Volume (acre-ft) | 0.04 | 22.49 | 0.33 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.04 | 3.40 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.89 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 23.37 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 669.19 | |
| E.G. Slope (ft/ft) | 0.008749 | Area (sq ft) | | 669.19 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 94.97 | Top Width (ft) | | 94.97 | |
| Vel Total (ft/s) | 11.03 | Avg. Vel. (ft/s) | | 11.03 | |
| Max Chl Dpth (ft) | 9.37 | Hydr. Depth (ft) | | 7.05 | |
| Conv. Total (cfs) | 78901.8 | Conv. (cfs) | | 78901.8 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 99.18 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | 0.25 | 29.47 | 4.08 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.14 | 3.46 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream

REACH: Reach 1 RS: 1555

INPUT
Description: G
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 21.5 | 40 | 15 |
| 50 | 13.8 | 60 | 13.6 | 70 | 13.3 | 80 | 13.5 | 90 | 13.5 |
| 100 | 14.5 | 110 | 19 | 120 | 26 | 130 | 29 | 140 | 29.5 |
| 150 | 29.9 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .042 | 120 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 120 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.62 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 20.34 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 20.16 | Flow Area (sq ft) | | 455.10 | |
| E.G. Slope (ft/ft) | 0.013988 | Area (sq ft) | | 455.10 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 80.13 | Top Width (ft) | | 80.13 | |
| Vel Total (ft/s) | 12.99 | Avg. Vel. (ft/s) | | 12.99 | |
| Max Chl Dpth (ft) | 7.04 | Hydr. Depth (ft) | | 5.68 | |
| Conv. Total (cfs) | 49970.8 | Conv. (cfs) | | 49970.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 83.23 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.77 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.37 | Cum Volume (acre-ft) | 0.08 | 23.65 | 1.04 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.07 | 3.27 | 1.24 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 16.65 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.93 | |
| E.G. Slope (ft/ft) | 0.011277 | Area (sq ft) | | 181.93 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 67.33 | Top Width (ft) | | 67.33 | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.35 | Hydr. Depth (ft) | | 2.70 | |
| Conv. Total (cfs) | 12355.1 | Conv. (cfs) | | 12355.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.41 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 1.87 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.00 | 7.43 | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 2.46 | |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.06 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.65 | Flow Area (sq ft) | | 355.06 | |
| E.G. Slope (ft/ft) | 0.012591 | Area (sq ft) | | 355.06 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.34 | Top Width (ft) | | 76.34 | |
| Vel Total (ft/s) | 10.84 | Avg. Vel. (ft/s) | | 10.84 | |
| Max Chl Dpth (ft) | 5.76 | Hydr. Depth (ft) | | 4.65 | |
| Conv. Total (cfs) | 34310.2 | Conv. (cfs) | | 34310.2 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 78.66 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.55 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.01 | 16.59 | 0.02 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 3.01 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.96 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.89 | Flow Area (sq ft) | | 368.78 | |
| E.G. Slope (ft/ft) | 0.013022 | Area (sq ft) | | 368.78 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 76.87 | Top Width (ft) | | 76.87 | |
| Vel Total (ft/s) | 11.25 | Avg. Vel. (ft/s) | | 11.25 | |
| Max Chl Dpth (ft) | 5.94 | Hydr. Depth (ft) | | 4.80 | |
| Conv. Total (cfs) | 36350.1 | Conv. (cfs) | | 36350.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 79.30 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.78 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.01 | 17.59 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.08 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.41 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.96 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 19.73 | Flow Area (sq ft) | | 424.40 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 424.40 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 78.99 | Top Width (ft) | | 78.99 | |
| Vel Total (ft/s) | 12.46 | Avg. Vel. (ft/s) | | 12.46 | |
| Max Chl Dpth (ft) | 6.66 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 44978.8 | Conv. (cfs) | | 44978.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 81.85 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.48 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.04 | 21.62 | 0.33 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 3.24 | 0.54 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.03 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 21.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 21.12 | Flow Area (sq ft) | | 528.58 | |
| E.G. Slope (ft/ft) | 0.013932 | Area (sq ft) | | 528.58 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 82.81 | Top Width (ft) | | 82.81 | |
| Vel Total (ft/s) | 13.96 | Avg. Vel. (ft/s) | | 13.96 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | | 6.38 | |
| Conv. Total (cfs) | 62523.5 | Conv. (cfs) | | 62523.5 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 86.46 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.25 | 28.37 | 4.08 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.14 | 3.30 | 2.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1455

INPUT
Description: F
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 45 | 10 | 38 | 20 | 31 | 30 | 24 | 40 | 16.5 |
| 50 | 12.5 | 60 | 11.8 | 70 | 12 | 80 | 12.3 | 90 | 12.6 |
| 100 | 12.8 | 110 | 14 | 120 | 18.5 | 130 | 23 | 140 | 28 |
| 150 | 30 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 120 | 120 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.52 | Element | | | |
| Vel Head (ft) | 2.37 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 19.15 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.73 | Flow Area (sq ft) | 4.67 | 476.75 | 0.46 |
| E.G. Slope (ft/ft) | 0.013387 | Area (sq ft) | 4.67 | 476.75 | 0.46 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.83 | 5896.66 | 0.51 |
| Top Width (ft) | 84.97 | Top Width (ft) | 3.53 | 80.00 | 1.44 |
| Vel Total (ft/s) | 12.26 | Avg. Vel. (ft/s) | 2.75 | 12.37 | 1.09 |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | 1.32 | 5.96 | 0.32 |
| Conv. Total (cfs) | 51079.8 | Conv. (cfs) | 110.9 | 50964.5 | 4.4 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 4.41 | 81.85 | 1.58 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.88 | 4.87 | 0.25 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.08 | 22.58 | 1.04 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.07 | 3.08 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.06 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 14.87 | Flow Area (sq ft) | | 165.73 | |
| E.G. Slope (ft/ft) | 0.018077 | Area (sq ft) | | 165.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 68.77 | Top Width (ft) | | 68.77 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 3.26 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 9758.1 | Conv. (cfs) | | 9758.1 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | | 69.60 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | | 2.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.24 | Cum Volume (acre-ft) | 0.00 | 7.03 | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 2.31 | |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
         This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.01 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.40 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.28 | Flow Area (sq ft) | 0.54 | 338.37 | |
| E.G. Slope (ft/ft) | 0.017110 | Area (sq ft) | 0.54 | 338.37 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.82 | 3849.18 | |
| Top Width (ft) | 78.76 | Top Width (ft) | 1.20 | 77.56 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 1.51 | 11.38 | |
| Max Chl Dpth (ft) | 5.60 | Hydr. Depth (ft) | 0.45 | 4.36 | |
| Conv. Total (cfs) | 29432.7 | Conv. (cfs) | 6.3 | 29426.5 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.50 | 79.17 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.38 | 4.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.01 | 15.79 | 0.02 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.01 | 2.84 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
         This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.07 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.67 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 17.49 | Flow Area (sq ft) | 0.91 | 359.10 | |
| E.G. Slope (ft/ft) | 0.016462 | Area (sq ft) | 0.91 | 359.10 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.60 | 4146.40 | |
| Top Width (ft) | 79.70 | Top Width (ft) | 1.56 | 78.15 | |
| Vel Total (ft/s) | 11.52 | Avg. Vel. (ft/s) | 1.76 | 11.55 | |
| Max Chl Dpth (ft) | 5.87 | Hydr. Depth (ft) | 0.58 | 4.60 | |
| Conv. Total (cfs) | 32328.9 | Conv. (cfs) | 12.5 | 32316.5 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.94 | 79.81 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.48 | 4.62 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.53 | Cum Volume (acre-ft) | 0.01 | 16.75 | 0.03 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.01 | 2.90 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.27 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 18.65 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.33 | Flow Area (sq ft) | 3.07 | 436.72 | 0.02 |
| E.G. Slope (ft/ft) | 0.014390 | Area (sq ft) | 3.07 | 436.72 | 0.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.61 | 5282.38 | 0.01 |
| Top Width (ft) | 83.19 | Top Width (ft) | 2.86 | 80.00 | 0.33 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 2.48 | 12.10 | 0.42 |
| Max Chl Dpth (ft) | 6.85 | Hydr. Depth (ft) | 1.07 | 5.46 | 0.07 |
| Conv. Total (cfs) | 44098.1 | Conv. (cfs) | 63.4 | 44034.6 | 0.1 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 3.58 | 81.85 | 0.36 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.77 | 4.79 | 0.06 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.34 | Cum Volume (acre-ft) | 0.04 | 20.64 | 0.33 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 3.06 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.58 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 20.29 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.55 | 567.83 | 3.54 |
| E.G. Slope (ft/ft) | 0.011588 | Area (sq ft) | 9.55 | 567.83 | 3.54 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.00 | 7341.95 | 7.06 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 89.01 | Top Width (ft) | 5.05 | 80.00 | 3.97 |
| Vel Total (ft/s) | 12.70 | Avg. Vel. (ft/s) | 3.24 | 12.93 | 1.99 |
| Max Chl Dpth (ft) | 8.49 | Hydr. Depth (ft) | 1.89 | 7.10 | 0.89 |
| Conv. Total (cfs) | 68558.4 | Conv. (cfs) | 288.0 | 68204.9 | 65.5 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 6.31 | 81.85 | 4.35 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 1.10 | 5.02 | 0.59 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.24 | 27.11 | 4.08 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.14 | 3.11 | 2.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1335

INPUT
Description: E
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.5 | 10 | 37.5 | 20 | 31 | 30 | 24 | 40 | 17 |
| 50 | 11 | 60 | 9.5 | 70 | 9.5 | 80 | 9.5 | 90 | 9.5 |
| 100 | 10.5 | 110 | 14 | 120 | 19 | 130 | 23 | 140 | 28 |
| 150 | 29 | 160 | 30 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .075 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.80 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 18.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.18 | 548.37 | |
| E.G. Slope (ft/ft) | 0.008451 | Area (sq ft) | 1.18 | 548.37 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.62 | 5908.38 | |
| Top Width (ft) | 80.41 | Top Width (ft) | 1.84 | 78.57 | |
| Vel Total (ft/s) | 10.75 | Avg. Vel. (ft/s) | 1.37 | 10.77 | |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 0.64 | 6.98 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 64289.9 | Conv. (cfs) | 17.6 | 64272.3 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.24 | 82.00 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.28 | 3.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.56 | Cum Volume (acre-ft) | 0.07 | 21.17 | 1.04 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.06 | 2.86 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.14 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 12.63 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | | 152.88 | |
| E.G. Slope (ft/ft) | 0.019322 | Area (sq ft) | | 152.88 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 58.82 | Top Width (ft) | | 58.82 | |
| Vel Total (ft/s) | 8.58 | Avg. Vel. (ft/s) | | 8.58 | |
| Max Chl Dpth (ft) | 3.13 | Hydr. Depth (ft) | | 2.60 | |
| Conv. Total (cfs) | 9438.7 | Conv. (cfs) | | 9438.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 59.79 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.87 | Cum Volume (acre-ft) | 0.00 | 6.59 | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 2.13 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.56 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.13 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 384.19 | |
| E.G. Slope (ft/ft) | 0.010520 | Area (sq ft) | | 384.19 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 72.81 | Top Width (ft) | | 72.81 | |
| Vel Total (ft/s) | 10.02 | Avg. Vel. (ft/s) | | 10.02 | |
| Max Chl Dpth (ft) | 6.63 | Hydr. Depth (ft) | | 5.28 | |
| Conv. Total (cfs) | 37536.7 | Conv. (cfs) | | 37536.7 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 75.49 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.65 | Cum Volume (acre-ft) | 0.01 | 14.80 | 0.02 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 2.63 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.07 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.47 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 409.60 | |
| E.G. Slope (ft/ft) | 0.010117 | Area (sq ft) | | 409.60 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 74.07 | Top Width (ft) | | 74.07 | |
| Vel Total (ft/s) | 10.13 | Avg. Vel. (ft/s) | | 10.13 | |
| Max Chl Dpth (ft) | 6.97 | Hydr. Depth (ft) | | 5.53 | |
| Conv. Total (cfs) | 41238.9 | Conv. (cfs) | | 41238.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 76.93 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.36 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.64 | Cum Volume (acre-ft) | 0.01 | 15.69 | 0.03 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 2.69 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.34 | 501.69 | |
| E.G. Slope (ft/ft) | 0.008914 | Area (sq ft) | 0.34 | 501.69 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.31 | 5289.69 | |
| Top Width (ft) | 78.36 | Top Width (ft) | 0.98 | 77.37 | |
| Vel Total (ft/s) | 10.54 | Avg. Vel. (ft/s) | 0.93 | 10.54 | |
| Max Chl Dpth (ft) | 8.19 | Hydr. Depth (ft) | 0.34 | 6.48 | |
| Conv. Total (cfs) | 56029.0 | Conv. (cfs) | 3.3 | 56025.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.20 | 80.66 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.16 | 3.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.03 | 19.34 | 0.33 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.03 | 2.84 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.58 | Element | | | |
| Vel Head (ft) | 1.97 | Wt. n-Val. | 0.065 | 0.045 | 0.075 |
| W.S. Elev (ft) | 19.61 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.86 | 653.69 | 0.46 |
| E.G. Slope (ft/ft) | 0.007511 | Area (sq ft) | 4.86 | 653.69 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.06 | 7369.59 | 0.34 |
| Top Width (ft) | 85.25 | Top Width (ft) | 3.73 | 80.00 | 1.52 |
| Vel Total (ft/s) | 11.20 | Avg. Vel. (ft/s) | 2.07 | 11.27 | 0.74 |
| Max Chl Dpth (ft) | 10.11 | Hydr. Depth (ft) | 1.30 | 8.17 | 0.30 |
| Conv. Total (cfs) | 85155.0 | Conv. (cfs) | 116.1 | 85034.9 | 3.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.55 | 83.60 | 1.64 |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.50 | 3.67 | 0.13 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.52 | Cum Volume (acre-ft) | 0.22 | 25.42 | 4.07 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.13 | 2.89 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1185

INPUT
Description: D
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.5 | 4 | 40 | 10 | 35 | 20 | 27.5 | 30 | 20 |
| 35 | 16 | 40 | 12 | 50 | 7 | 60 | 5.5 | 70 | 6 |
| 80 | 7 | 90 | 11 | 100 | 16 | 110 | 22 | 120 | 28 |
| 130 | 28.2 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 35 | .045 | 110 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 35 | 110 | 125 | 125 | 125 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.44 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.70 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.74 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 15.05 | Flow Area (sq ft) | | 448.42 | |
| E.G. Slope (ft/ft) | 0.013066 | Area (sq ft) | | 448.42 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 64.17 | Top Width (ft) | | 64.17 | |
| Vel Total (ft/s) | 13.18 | Avg. Vel. (ft/s) | | 13.18 | |
| Max Chl Dpth (ft) | 10.24 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 51703.8 | Conv. (cfs) | | 51703.8 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 68.72 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.68 | Cum Volume (acre-ft) | 0.06 | 19.45 | 1.04 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.06 | 2.62 | 1.24 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.82 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 10.99 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 180.57 | |
| E.G. Slope (ft/ft) | 0.008702 | Area (sq ft) | | 180.57 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.96 | Top Width (ft) | | 47.96 | |
| Vel Total (ft/s) | 7.27 | Avg. Vel. (ft/s) | | 7.27 | |
| Max Chl Dpth (ft) | 5.49 | Hydr. Depth (ft) | | 3.77 | |
| Conv. Total (cfs) | 14064.1 | Conv. (cfs) | | 14064.1 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 49.84 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 1.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.49 | Cum Volume (acre-ft) | 0.00 | 6.02 | |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 1.95 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.08 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.16 | Flow Area (sq ft) | | 346.47 | |
| E.G. Slope (ft/ft) | 0.011509 | Area (sq ft) | | 346.47 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 58.78 | Top Width (ft) | | 58.78 | |
| Vel Total (ft/s) | 11.11 | Avg. Vel. (ft/s) | | 11.11 | |
| Max Chl Dpth (ft) | 8.58 | Hydr. Depth (ft) | | 5.89 | |
| Conv. Total (cfs) | 35888.0 | Conv. (cfs) | | 35888.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 62.36 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 3.99 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.62 | Cum Volume (acre-ft) | 0.01 | 13.54 | 0.02 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 2.40 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.04 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.34 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.46 | Flow Area (sq ft) | | 361.81 | |
| E.G. Slope (ft/ft) | 0.011809 | Area (sq ft) | | 361.81 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 59.62 | Top Width (ft) | | 59.62 | |
| Vel Total (ft/s) | 11.46 | Avg. Vel. (ft/s) | | 11.46 | |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 6.07 | |
| Conv. Total (cfs) | 38171.0 | Conv. (cfs) | | 38171.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 63.35 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.21 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.63 | Cum Volume (acre-ft) | 0.01 | 14.37 | 0.03 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 2.46 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.48 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.27 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 14.52 | Flow Area (sq ft) | | 418.21 | |
| E.G. Slope (ft/ft) | 0.012741 | Area (sq ft) | | 418.21 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 62.62 | Top Width (ft) | | 62.62 | |
| Vel Total (ft/s) | 12.65 | Avg. Vel. (ft/s) | | 12.65 | |
| Max Chl Dpth (ft) | 9.77 | Hydr. Depth (ft) | | 6.68 | |
| Conv. Total (cfs) | 46865.0 | Conv. (cfs) | | 46865.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 66.90 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.66 | Cum Volume (acre-ft) | 0.03 | 17.76 | 0.33 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.03 | 2.60 | 0.54 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.33 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 16.59 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 16.20 | Flow Area (sq ft) | 0.22 | 503.78 | |
| E.G. Slope (ft/ft) | 0.014396 | Area (sq ft) | 0.22 | 503.78 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.23 | 7379.77 | |
| Top Width (ft) | 66.73 | Top Width (ft) | 0.74 | 65.99 | |
| Vel Total (ft/s) | 14.64 | Avg. Vel. (ft/s) | 1.03 | 14.65 | |
| Max Chl Dpth (ft) | 11.09 | Hydr. Depth (ft) | 0.30 | 7.63 | |
| Conv. Total (cfs) | 61508.4 | Conv. (cfs) | 1.9 | 61506.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | 0.95 | 70.86 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | 0.21 | 6.39 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.73 | Cum Volume (acre-ft) | 0.21 | 23.43 | 4.07 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.12 | 2.64 | 1.99 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1060

INPUT
Description: C
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 33 | 20 | 35 | 30 | 29 | 40 | 23 |
| 45 | 19.5 | 50 | 16 | 60 | 10 | 70 | 7 | 80 | 5.5 |
| 90 | 5 | 100 | 5 | 110 | 7 | 120 | 13 | 130 | 20 |
| 200 | 20.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 45 | .04 | 130 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 45 | 130 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.15 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.57 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.57 | Flow Area (sq ft) | | 415.00 | |
| E.G. Slope (ft/ft) | 0.013789 | Area (sq ft) | | 415.00 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 66.76 | Top Width (ft) | | 66.76 | |
| Vel Total (ft/s) | 14.24 | Avg. Vel. (ft/s) | | 14.24 | |
| Max Chl Dpth (ft) | 8.57 | Hydr. Depth (ft) | | 6.22 | |
| Conv. Total (cfs) | 50329.3 | Conv. (cfs) | | 50329.3 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 70.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.07 | Cum Volume (acre-ft) | 0.06 | 18.21 | 1.04 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.06 | 2.43 | 1.24 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.41 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.85 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 8.85 | Flow Area (sq ft) | | 137.48 | |
| E.G. Slope (ft/ft) | 0.017292 | Area (sq ft) | | 137.48 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 49.24 | Top Width (ft) | | 49.24 | |
| Vel Total (ft/s) | 9.54 | Avg. Vel. (ft/s) | | 9.54 | |
| Max Chl Dpth (ft) | 3.85 | Hydr. Depth (ft) | | 2.79 | |
| Conv. Total (cfs) | 9977.1 | Conv. (cfs) | | 9977.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 50.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 2.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.28 | Cum Volume (acre-ft) | 0.00 | 5.56 | |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 1.81 | |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 11.81 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 11.81 | Flow Area (sq ft) | | 302.66 | |
| E.G. Slope (ft/ft) | 0.014662 | Area (sq ft) | | 302.66 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.04 | Top Width (ft) | | 61.04 | |
| Vel Total (ft/s) | 12.72 | Avg. Vel. (ft/s) | | 12.72 | |
| Max Chl Dpth (ft) | 6.81 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 31795.8 | Conv. (cfs) | | 31795.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 63.64 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.35 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.12 | Cum Volume (acre-ft) | 0.01 | 12.61 | 0.02 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.00 | 2.23 | 0.04 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 12.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 12.10 | Flow Area (sq ft) | | 320.59 | |
| E.G. Slope (ft/ft) | 0.014382 | Area (sq ft) | | 320.59 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.01 | Top Width (ft) | | 62.01 | |
| Vel Total (ft/s) | 12.94 | Avg. Vel. (ft/s) | | 12.94 | |
| Max Chl Dpth (ft) | 7.10 | Hydr. Depth (ft) | | 5.17 | |
| Conv. Total (cfs) | 34588.7 | Conv. (cfs) | | 34588.7 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 64.77 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.44 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.10 | Cum Volume (acre-ft) | 0.01 | 13.39 | 0.03 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.01 | 2.29 | 0.05 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.10 | Flow Area (sq ft) | | 384.11 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 384.11 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.31 | Top Width (ft) | | 65.31 | |
| Vel Total (ft/s) | 13.77 | Avg. Vel. (ft/s) | | 13.77 | |
| Max Chl Dpth (ft) | 8.10 | Hydr. Depth (ft) | | 5.88 | |
| Conv. Total (cfs) | 44979.7 | Conv. (cfs) | | 44979.7 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.63 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.83 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.07 | Cum Volume (acre-ft) | 0.03 | 16.61 | 0.33 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.03 | 2.42 | 0.54 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 14.68 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 14.68 | Flow Area (sq ft) | | 490.87 | |
| E.G. Slope (ft/ft) | 0.013247 | Area (sq ft) | | 490.87 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 70.19 | Top Width (ft) | | 70.19 | |
| Vel Total (ft/s) | 15.03 | Avg. Vel. (ft/s) | | 15.03 | |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 64121.8 | Conv. (cfs) | | 64121.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 74.44 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.05 | Cum Volume (acre-ft) | 0.21 | 22.00 | 4.07 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.12 | 2.45 | 1.99 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 960

INPUT
Description: B
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 32 | 13.6 | 31 | 22.5 | 30 | 33.1 | 28 | 54.2 | 20 |
| 71.6 | 20 | 72.3 | 15 | 72.9 | 10.091 | 73.4 | 6 | 79.4 | 5 |
| 85.5 | 4 | 100.5 | 3.5 | 114.3 | 4 | 124.5 | 5 | 135.8 | 10.103 |
| 140 | 12 | 202.9 | 14.2 | 203 | 14.5 | 209.1 | 15 | 224.5 | 20 |
| 229.5 | 25 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 72.9 | .042 | 135.8 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 72.9 | 135.8 | 25 | 25 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.82 | Element | | | |
| Vel Head (ft) | 2.28 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.54 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 11.33 | Flow Area (sq ft) | 0.37 | 484.96 | 10.39 |
| E.G. Slope (ft/ft) | 0.008563 | Area (sq ft) | 0.37 | 484.96 | 10.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.20 | 5891.34 | 18.46 |
| Top Width (ft) | 82.79 | Top Width (ft) | 0.30 | 62.90 | 19.59 |
| Vel Total (ft/s) | 11.92 | Avg. Vel. (ft/s) | 0.55 | 12.15 | 1.78 |
| Max Chl Dpth (ft) | 9.04 | Hydr. Depth (ft) | 1.22 | 7.71 | 0.53 |
| Conv. Total (cfs) | 63865.3 | Conv. (cfs) | 2.2 | 63663.7 | 199.5 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 2.47 | 67.85 | 20.01 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.08 | 3.82 | 0.28 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.06 | 17.18 | 1.02 |
| C & E Loss (ft) | 0.63 | Cum SA (acres) | 0.06 | 2.28 | 1.22 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.38 | Element | | | |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 7.54 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 6.91 | Flow Area (sq ft) | | 178.49 | |
| E.G. Slope (ft/ft) | 0.009882 | Area (sq ft) | | 178.49 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 56.92 | Top Width (ft) | | 56.92 | |
| Vel Total (ft/s) | 7.35 | Avg. Vel. (ft/s) | | 7.35 | |
| Max Chl Dpth (ft) | 4.04 | Hydr. Depth (ft) | | 3.14 | |
| Conv. Total (cfs) | 13198.2 | Conv. (cfs) | | 13198.2 | |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | | 59.07 | |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | | 1.86 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.00 | 5.20 | |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 1.69 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.65 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.76 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.68 | Flow Area (sq ft) | 0.03 | 373.02 | 0.48 |
| E.G. Slope (ft/ft) | 0.008769 | Area (sq ft) | 0.03 | 373.02 | 0.48 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.01 | 3849.40 | 0.59 |
| Top Width (ft) | 64.43 | Top Width (ft) | 0.08 | 62.90 | 1.45 |
| Vel Total (ft/s) | 10.31 | Avg. Vel. (ft/s) | 0.23 | 10.32 | 1.24 |
| Max Chl Dpth (ft) | 7.26 | Hydr. Depth (ft) | 0.33 | 5.93 | 0.33 |
| Conv. Total (cfs) | 41114.1 | Conv. (cfs) | 0.1 | 41107.7 | 6.3 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 0.67 | 67.85 | 1.59 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.02 | 3.01 | 0.16 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 11.83 | 0.02 |
| C & E Loss (ft) | 0.39 | Cum SA (acres) | 0.00 | 2.09 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.75 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.04 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.93 | Flow Area (sq ft) | 0.05 | 390.62 | 0.97 |
| E.G. Slope (ft/ft) | 0.008725 | Area (sq ft) | 0.05 | 390.62 | 0.97 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.02 | 4146.46 | 1.52 |
| Top Width (ft) | 65.09 | Top Width (ft) | 0.12 | 62.90 | 2.07 |
| Vel Total (ft/s) | 10.59 | Avg. Vel. (ft/s) | 0.30 | 10.62 | 1.57 |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 7.54 | Hydr. Depth (ft) | 0.47 | 6.21 | 0.47 |
| Conv. Total (cfs) | 44408.5 | Conv. (cfs) | 0.2 | 44392.0 | 16.3 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 0.95 | 67.85 | 2.27 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.03 | 3.14 | 0.23 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 12.57 | 0.03 |
| C & E Loss (ft) | 0.42 | Cum SA (acres) | 0.01 | 2.14 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.10 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.04 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.87 | Flow Area (sq ft) | 0.23 | 453.88 | 4.20 |
| E.G. Slope (ft/ft) | 0.008580 | Area (sq ft) | 0.23 | 453.88 | 4.20 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.11 | 5280.65 | 9.24 |
| Top Width (ft) | 68.60 | Top Width (ft) | 0.24 | 62.90 | 5.47 |
| Vel Total (ft/s) | 11.54 | Avg. Vel. (ft/s) | 0.47 | 11.63 | 2.20 |
| Max Chl Dpth (ft) | 8.54 | Hydr. Depth (ft) | 0.98 | 7.22 | 0.77 |
| Conv. Total (cfs) | 57109.9 | Conv. (cfs) | 1.2 | 57009.0 | 99.7 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 1.97 | 67.85 | 5.87 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.06 | 3.58 | 0.38 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | 0.03 | 15.65 | 0.33 |
| C & E Loss (ft) | 0.55 | Cum SA (acres) | 0.03 | 2.27 | 0.53 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.93 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.41 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | 0.11 | 413.84 | 1.88 |
| E.G. Slope (ft/ft) | 0.022762 | Area (sq ft) | 0.11 | 413.84 | 1.88 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.06 | 7373.96 | 5.97 |
| Top Width (ft) | 65.95 | Top Width (ft) | 0.16 | 62.90 | 2.89 |
| Vel Total (ft/s) | 17.75 | Avg. Vel. (ft/s) | 0.59 | 17.82 | 3.17 |
| Max Chl Dpth (ft) | 7.91 | Hydr. Depth (ft) | 0.66 | 6.58 | 0.65 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 48916.0 | Conv. (cfs) | 0.4 | 48876.0 | 39.6 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 1.33 | 67.85 | 3.17 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.11 | 8.67 | 0.84 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.71 | Cum Volume (acre-ft) | 0.21 | 20.97 | 4.07 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.12 | 2.29 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 935

INPUT
Description: JU
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 12 | 30 | 20 | 28 | 50 | 10 | 75.8 | 6 |
| 82.4 | 4 | 92.4 | 3 | 105.2 | 2 | 121 | 3 | 128 | 5 |
| 136 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 | 208.7 | 13.4 |
| 231.8 | 20 | 232 | 26.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 50 | .042 | 136 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 50 | 136 | 85 | 85 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 232 | 30 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.06 | Element | | | |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 13.04 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 10.34 | Flow Area (sq ft) | 7.70 | 687.59 | 114.45 |
| E.G. Slope (ft/ft) | 0.003531 | Area (sq ft) | 7.70 | 687.59 | 120.00 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.49 | 5673.06 | 224.45 |
| Top Width (ft) | 158.21 | Top Width (ft) | 5.07 | 86.00 | 67.14 |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 7.30 | Avg. Vel. (ft/s) | 1.62 | 8.25 | 1.96 |
| Max Chl Dpth (ft) | 11.04 | Hydr. Depth (ft) | 1.52 | 8.00 | 1.94 |
| Conv. Total (cfs) | 99457.7 | Conv. (cfs) | 210.2 | 95470.3 | 3777.2 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 5.91 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.29 | 1.71 | 0.43 |
| Alpha | 1.23 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.06 | 16.84 | 0.99 |
| C & E Loss (ft) | 0.29 | Cum SA (acres) | 0.05 | 2.24 | 1.19 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.46 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 7.58 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 5.91 | Flow Area (sq ft) | | 241.37 | |
| E.G. Slope (ft/ft) | 0.004364 | Area (sq ft) | | 241.37 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 66.50 | Top Width (ft) | | 66.50 | |
| Vel Total (ft/s) | 5.44 | Avg. Vel. (ft/s) | | 5.44 | |
| Max Chl Dpth (ft) | 5.58 | Hydr. Depth (ft) | | 3.63 | |
| Conv. Total (cfs) | 19859.9 | Conv. (cfs) | | 19859.9 | |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | | 68.05 | |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | | 0.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.00 | 5.08 | |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.00 | 1.65 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 11.00 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 8.78 | Flow Area (sq ft) | 0.84 | 512.23 | 13.44 |
| E.G. Slope (ft/ft) | 0.004311 | Area (sq ft) | 0.84 | 512.23 | 13.44 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.71 | 3837.48 | 11.81 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 114.51 | Top Width (ft) | 1.67 | 86.00 | 26.84 |
| Vel Total (ft/s) | 7.31 | Avg. Vel. (ft/s) | 0.85 | 7.49 | 0.88 |
| Max Chl Dpth (ft) | 9.00 | Hydr. Depth (ft) | 0.50 | 5.96 | 0.50 |
| Conv. Total (cfs) | 58637.4 | Conv. (cfs) | 10.9 | 58446.7 | 179.8 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 1.95 | 88.44 | 26.86 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.12 | 1.56 | 0.13 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 11.58 | 0.01 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.00 | 2.05 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.22 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 11.32 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 9.03 | Flow Area (sq ft) | 1.44 | 539.21 | 23.18 |
| E.G. Slope (ft/ft) | 0.004193 | Area (sq ft) | 1.44 | 539.21 | 23.18 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.46 | 4122.46 | 24.08 |
| Top Width (ft) | 123.44 | Top Width (ft) | 2.19 | 86.00 | 35.25 |
| Vel Total (ft/s) | 7.36 | Avg. Vel. (ft/s) | 1.01 | 7.65 | 1.04 |
| Max Chl Dpth (ft) | 9.32 | Hydr. Depth (ft) | 0.66 | 6.27 | 0.66 |
| Conv. Total (cfs) | 64061.1 | Conv. (cfs) | 22.5 | 63666.7 | 371.9 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 2.56 | 88.44 | 35.27 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.15 | 1.60 | 0.17 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.01 | 12.30 | 0.02 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.01 | 2.10 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.45 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.99 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 12.46 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 9.93 | Flow Area (sq ft) | 5.05 | 637.91 | 80.37 |
| E.G. Slope (ft/ft) | 0.003743 | Area (sq ft) | 5.05 | 637.91 | 81.28 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.33 | 5154.48 | 128.19 |
| Top Width (ft) | 156.11 | Top Width (ft) | 4.10 | 86.00 | 66.01 |
| Vel Total (ft/s) | 7.31 | Avg. Vel. (ft/s) | 1.45 | 8.08 | 1.60 |
| Max Chl Dpth (ft) | 10.46 | Hydr. Depth (ft) | 1.23 | 7.42 | 1.36 |
| Conv. Total (cfs) | 86466.8 | Conv. (cfs) | 119.8 | 84251.7 | 2095.3 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 4.79 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.25 | 1.69 | 0.32 |
| Alpha | 1.19 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.03 | 15.33 | 0.30 |
| C & E Loss (ft) | 0.28 | Cum SA (acres) | 0.03 | 2.23 | 0.51 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 15.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.10 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 14.22 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 11.33 | Flow Area (sq ft) | 14.84 | 789.01 | 184.03 |
| E.G. Slope (ft/ft) | 0.003277 | Area (sq ft) | 14.84 | 789.01 | 205.75 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 28.83 | 6873.98 | 477.18 |
| Top Width (ft) | 168.60 | Top Width (ft) | 7.03 | 86.00 | 75.57 |
| Vel Total (ft/s) | 7.47 | Avg. Vel. (ft/s) | 1.94 | 8.71 | 2.59 |
| Max Chl Dpth (ft) | 12.22 | Hydr. Depth (ft) | 2.11 | 9.17 | 3.12 |
| Conv. Total (cfs) | 128913.2 | Conv. (cfs) | 503.7 | 120074.1 | 8335.4 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 8.20 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.37 | 1.83 | 0.64 |
| Alpha | 1.27 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.21 | 20.62 | 4.01 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.11 | 2.25 | 1.97 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 895

INPUT
Description: Bridge Street
Distance from Upstream XS = 17
Deck/Roadway Width = 56
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 30.2 | 30 | 0 |
| 30.2 | 30 | 26 | 246.2 | 26 | 22 |
| 246.2 | 26 | 0 | 260 | 26 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 12 | 30 | 20 | 28 | 50 | 10 | 75.8 | 6 |
| 82.4 | 4 | 92.4 | 3 | 105.2 | 2 | 121 | 3 | 128 | 5 |
| 136 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 | 208.7 | 13.4 |
| 231.8 | 20 | 232 | 26.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 50 | .042 | 136 | .07 |

Bank Sta: Left Right Coeff Contr. Expan.
50 136 .3 .5
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 232 | 30 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 30.2 | 30 | 0 |
| 30.2 | 30 | 26 | 246.2 | 26 | 22 |
| 246.2 | 26 | 0 | 260 | 26 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 28 | 26.8 | 20 | 27 | 14 | 39.8 | 10 | 75.2 | 5 |
| 94 | 1 | 115 | 1 | 126.8 | 5 | 131.6 | 5 | 151.3 | 9 |
| 174.5 | 10 | 238.1 | 15 | 238.2 | 25 | | | | |

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065    39.8     .04   131.6    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
          39.8   131.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      25      30       F
     195   238.2      30       F
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
   131.3   146.6      30     203     240      30

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =      26
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  3

Pier Data
Pier Station     Upstream=    83.2    Downstream=    83.2
Upstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28
Downstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28

Pier Data
Pier Station     Upstream=   138.2    Downstream=   138.2
Upstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28
Downstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28

Pier Data
Pier Station     Upstream=   193.2    Downstream=   193.2
Upstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28
Downstream     num=       2
    Width   Elev    Width   Elev
     7.7       3       4      28
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 14.06 | Element | | |
| W.S. US. (ft) | 13.04 | E.G. Elev (ft) | 13.67 | 12.90 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 11.70 | 11.51 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 10.78 | 9.93 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.70 | 10.51 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.78 | 8.79 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 548.45 | 672.20 |
| Weir Submerg | | Froude # Chl | 0.78 | 0.64 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4042.63 | 4256.51 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.52 | 5.04 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 141.57 | 160.45 |
| Delta EG (ft) | 1.34 | Conv. Total (cfs) | 56292.8 | 71093.0 |
| Delta WS (ft) | 1.49 | Top Width (ft) | 121.45 | 133.26 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.48 | 0.07 |
| BR Open Vel (ft/s) | 10.78 | C & E Loss (ft) | 0.29 | 0.12 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.67 | 1.81 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 8.04 | Element | | |

| | | | | |
|---|---|---|---|---|
| W.S. US. (ft) | 7.58 | E.G. Elev (ft) | 7.84 | 7.34 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 7.07 | 6.86 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 6.09 | 5.12 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 5.07 | 5.86 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 7.03 | 5.57 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 186.55 | 235.64 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.50 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 669.34 | 803.57 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 3.37 | 3.79 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 61.87 | 71.75 |
| Delta EG (ft) | 0.78 | Conv. Total (cfs) | 13774.8 | 19341.7 |
| Delta WS (ft) | 0.71 | Top Width (ft) | 55.33 | 62.17 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.35 | 0.05 |
| BR Open Vel (ft/s) | 7.03 | C & E Loss (ft) | 0.14 | 0.05 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.71 | 0.94 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.87 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.00 | E.G. Elev (ft) | 11.51 | 10.74 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 9.84 | 9.44 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 9.19 | 8.13 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.84 | 8.44 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.37 | 9.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 371.21 | 426.26 |
| Weir Submerg | | Froude # Chl | 0.83 | 0.71 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2381.82 | 2505.53 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.81 | 4.46 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 90.24 | 114.28 |
| Delta EG (ft) | 1.34 | Conv. Total (cfs) | 33717.1 | 41227.8 |
| Delta WS (ft) | 1.52 | Top Width (ft) | 77.17 | 95.67 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.59 | 0.08 |
| BR Open Vel (ft/s) | 10.37 | C & E Loss (ft) | 0.19 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.35 | 2.03 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT  Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 12.22 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.32 | E.G. Elev (ft) | 11.86 | 11.09 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 10.15 | 9.77 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 9.45 | 8.40 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.15 | 8.77 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.49 | 9.02 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 395.42 | 459.77 |
| Weir Submerg | | Froude # Chl | 0.82 | 0.70 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2612.10 | 2746.19 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 5.04 | 4.35 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 92.49 | 125.72 |
| Delta EG (ft) | 1.33 | Conv. Total (cfs) | 36929.0 | 44866.2 |
| Delta WS (ft) | 1.50 | Top Width (ft) | 78.50 | 105.79 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.58 | 0.08 |
| BR Open Vel (ft/s) | 10.49 | C & E Loss (ft) | 0.19 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.37 | 1.95 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT  Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 13.45 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 12.46 | E.G. Elev (ft) | 13.07 | 12.28 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 11.14 | 10.88 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 10.32 | 9.40 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.14 | 9.88 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.89 | 8.96 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 485.64 | 590.71 |
| Weir Submerg | | Froude # Chl | 0.80 | 0.67 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3520.21 | 3691.43 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.60 | 4.65 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 123.43 | 151.36 |
| Delta EG (ft) | 1.37 | Conv. Total (cfs) | 48863.6 | 60747.7 |
| Delta WS (ft) | 1.53 | Top Width (ft) | 105.53 | 126.95 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.52 | 0.07 |
| BR Open Vel (ft/s) | 10.89 | C & E Loss (ft) | 0.26 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.88 | 1.85 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 15.32 | Element | | |
| W.S. US. (ft) | 14.22 | E.G. Elev (ft) | 15.01 | 14.35 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 13.14 | 13.04 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 11.89 | 10.88 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.14 | 12.04 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.02 | 8.39 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 736.89 | 880.12 |
| Weir Submerg | | Froude # Chl | 0.70 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 5392.83 | 5799.20 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 5.54 | 6.36 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 159.87 | 173.12 |
| Delta EG (ft) | 1.12 | Conv. Total (cfs) | 78846.8 | 99858.9 |
| Delta WS (ft) | 1.14 | Top Width (ft) | 140.56 | 145.07 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.38 | 0.05 |
| BR Open Vel (ft/s) | 10.02 | C & E Loss (ft) | 0.28 | 0.10 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.52 | 1.73 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 850

INPUT
Description: JD
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 28 | 26.8 | 20 | 27 | 14 | 39.8 | 10 | 75.2 | 5 |
| 94 | 1 | 115 | 1 | 126.8 | 5 | 131.6 | 5 | 151.3 | 9 |

| | | | | | |
|---|---|---|---|---|---|
| 174.5 | 10 | 238.1 | 15 | 238.2 | 25 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 39.8 | .04 | 131.6 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 39.8 | 131.6 | 20 | 20 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 238.2 | 30 | F |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 131.3 | 146.6 | 30 | 203 | 240 | 30 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.72 | Element | | | |
| Vel Head (ft) | 1.16 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.56 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 9.38 | Flow Area (sq ft) | 3.87 | 656.53 | 77.33 |
| E.G. Slope (ft/ft) | 0.004490 | Area (sq ft) | 3.87 | 656.53 | 77.33 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.86 | 5749.56 | 155.58 |
| Top Width (ft) | 144.16 | Top Width (ft) | 4.98 | 91.50 | 47.69 |
| Vel Total (ft/s) | 8.01 | Avg. Vel. (ft/s) | 1.26 | 8.76 | 2.01 |
| Max Chl Dpth (ft) | 10.56 | Hydr. Depth (ft) | 0.78 | 7.18 | 1.62 |
| Conv. Total (cfs) | 88199.3 | Conv. (cfs) | 72.6 | 85804.9 | 2321.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 5.21 | 99.49 | 51.37 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.21 | 1.85 | 0.42 |
| Alpha | 1.16 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.06 | 15.72 | 0.87 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.05 | 2.08 | 1.11 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.25 | Element | | | |
| Vel Head (ft) | 0.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.86 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 4.89 | Flow Area (sq ft) | | 262.03 | |
| E.G. Slope (ft/ft) | 0.003268 | Area (sq ft) | | 262.03 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 69.29 | Top Width (ft) | | 69.29 | |
| Vel Total (ft/s) | 5.01 | Avg. Vel. (ft/s) | | 5.01 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 5.86 | Hydr. Depth (ft) | | 3.78 | |
| Conv. Total (cfs) | 22952.1 | Conv. (cfs) | | 22952.1 | |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 72.37 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.74 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 0.00 | 4.66 | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.53 | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.05 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.48 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.75 | Flow Area (sq ft) | | 467.67 | 7.19 |
| E.G. Slope (ft/ft) | 0.005737 | Area (sq ft) | | 467.67 | 7.19 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3843.10 | 6.90 |
| Top Width (ft) | 103.69 | Top Width (ft) | | 87.83 | 15.86 |
| Vel Total (ft/s) | 8.11 | Avg. Vel. (ft/s) | | 8.22 | 0.96 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 5.32 | 0.45 |
| Conv. Total (cfs) | 50829.1 | Conv. (cfs) | | 50738.0 | 91.1 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 93.70 | 17.40 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.79 | 0.15 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 10.77 | 0.00 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.00 | 1.89 | 0.01 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.88 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.07 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.82 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.01 | Flow Area (sq ft) | | 497.48 | 13.80 |
| E.G. Slope (ft/ft) | 0.005609 | Area (sq ft) | | 497.48 | 13.80 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4132.32 | 15.68 |
| Top Width (ft) | 113.83 | Top Width (ft) | | 90.20 | 23.63 |
| Vel Total (ft/s) | 8.11 | Avg. Vel. (ft/s) | | 8.31 | 1.14 |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | | 5.52 | 0.58 |
| Conv. Total (cfs) | 55384.5 | Conv. (cfs) | | 55175.1 | 209.4 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 96.43 | 25.51 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.81 | 0.19 |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.04 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 11.45 | 0.01 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.01 | 1.94 | 0.01 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.08 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.15 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.94 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.91 | Flow Area (sq ft) | 1.40 | 599.94 | 50.27 |
| E.G. Slope (ft/ft) | 0.004917 | Area (sq ft) | 1.40 | 599.94 | 50.27 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 1.32 | 5199.07 | 89.61 |
| Top Width (ft) | 134.32 | Top Width (ft) | 3.00 | 91.50 | 39.82 |
| Vel Total (ft/s) | 8.12 | Avg. Vel. (ft/s) | 0.94 | 8.67 | 1.78 |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 0.47 | 6.56 | 1.26 |
| Conv. Total (cfs) | 75439.9 | Conv. (cfs) | 18.8 | 74143.1 | 1278.0 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 3.14 | 98.87 | 42.86 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.14 | 1.86 | 0.36 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.03 | 14.31 | 0.23 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.03 | 2.07 | 0.44 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.12 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.08 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 10.40 | Flow Area (sq ft) | 15.20 | 796.26 | 151.22 |
| E.G. Slope (ft/ft) | 0.003513 | Area (sq ft) | 15.20 | 796.26 | 160.47 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 26.65 | 6944.32 | 409.03 |
| Top Width (ft) | 157.76 | Top Width (ft) | 9.86 | 91.50 | 56.40 |
| Vel Total (ft/s) | 7.67 | Avg. Vel. (ft/s) | 1.75 | 8.72 | 2.70 |
| Max Chl Dpth (ft) | 12.08 | Hydr. Depth (ft) | 1.54 | 8.70 | 3.12 |
| Conv. Total (cfs) | 124507.8 | Conv. (cfs) | 449.6 | 117157.4 | 6900.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 10.33 | 101.01 | 53.62 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.32 | 1.73 | 0.62 |
| Alpha | 1.22 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.18 | 19.26 | 3.74 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.10 | 2.09 | 1.86 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 830

INPUT
Description: A

Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 24.1 | 15 | 34.9 | 10.006 | 41.4 | 7 | 45.2 | 6 |
| 58.5 | 6 | 65 | 5 | 78 | 4 | 93.5 | 1 | 108.7 | 1 |
| 131.1 | 7 | 155 | 10 | 167.8 | 10 | 194.1 | 11 | 251.2 | 15 |
| 251.3 | 25 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 34.9 | .04 | 131.1 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 34.9 | 131.1 | 9 | 9 | .3 | .5 |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 132 | 155 | 25 | 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.54 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.56 | 712.89 | 53.34 |
| E.G. Slope (ft/ft) | 0.003454 | Area (sq ft) | 2.56 | 712.89 | 53.34 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.70 | 5835.78 | 71.52 |
| Top Width (ft) | 147.28 | Top Width (ft) | 3.32 | 96.20 | 47.76 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 1.06 | 8.19 | 1.34 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 0.77 | 7.41 | 1.12 |
| Conv. Total (cfs) | 100563.7 | Conv. (cfs) | 46.0 | 99300.7 | 1217.0 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 3.66 | 98.18 | 53.77 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 1.57 | 0.21 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.05 | 15.41 | 0.84 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 2.03 | 1.08 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.17 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.37 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.80 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 267.69 | |
| E.G. Slope (ft/ft) | 0.004037 | Area (sq ft) | | 267.69 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 88.18 | Top Width (ft) | | 88.18 | |
| Vel Total (ft/s) | 4.90 | Avg. Vel. (ft/s) | | 4.90 | |
| Max Chl Dpth (ft) | 5.80 | Hydr. Depth (ft) | | 3.04 | |
| Conv. Total (cfs) | 20650.0 | Conv. (cfs) | | 20650.0 | |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 89.45 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.75 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.00 | 4.54 | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.50 | |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.34 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.47 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 513.66 | 2.17 |
| E.G. Slope (ft/ft) | 0.004399 | Area (sq ft) | | 513.66 | 2.17 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3847.49 | 2.51 |
| Top Width (ft) | 95.94 | Top Width (ft) | | 95.04 | 0.90 |
| Vel Total (ft/s) | 7.46 | Avg. Vel. (ft/s) | | 7.49 | 1.16 |
| Max Chl Dpth (ft) | 8.47 | Hydr. Depth (ft) | | 5.40 | 2.41 |
| Conv. Total (cfs) | 58048.3 | Conv. (cfs) | | 58010.5 | 37.8 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 96.90 | 3.26 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.46 | 0.18 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 10.55 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.85 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.81 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 545.73 | 2.47 |
| E.G. Slope (ft/ft) | 0.004218 | Area (sq ft) | | 545.73 | 2.47 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4145.14 | 2.86 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 96.67 | Top Width (ft) | | 95.77 | 0.90 |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | | 7.60 | 1.16 |
| Max Chl Dpth (ft) | 8.81 | Hydr. Depth (ft) | | 5.70 | 2.75 |
| Conv. Total (cfs) | 63864.6 | Conv. (cfs) | | 63820.6 | 44.0 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 97.70 | 3.60 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.47 | 0.18 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 11.21 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.90 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.92 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.91 | 653.30 | 26.53 |
| E.G. Slope (ft/ft) | 0.003757 | Area (sq ft) | 0.91 | 653.30 | 26.53 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.71 | 5262.19 | 27.10 |
| Top Width (ft) | 136.18 | Top Width (ft) | 1.98 | 96.20 | 38.00 |
| Vel Total (ft/s) | 7.77 | Avg. Vel. (ft/s) | 0.78 | 8.05 | 1.02 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.46 | 6.79 | 0.70 |
| Conv. Total (cfs) | 86308.4 | Conv. (cfs) | 11.6 | 85854.6 | 442.2 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 2.19 | 98.18 | 42.75 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.56 | 0.15 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.03 | 14.02 | 0.21 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 2.02 | 0.42 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.07 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.15 | 859.71 | 130.67 |
| E.G. Slope (ft/ft) | 0.002737 | Area (sq ft) | 10.15 | 859.71 | 130.67 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.12 | 7098.19 | 266.69 |
| Top Width (ft) | 153.73 | Top Width (ft) | 6.63 | 96.20 | 50.90 |
| Vel Total (ft/s) | 7.38 | Avg. Vel. (ft/s) | 1.49 | 8.26 | 2.04 |
| Max Chl Dpth (ft) | 12.07 | Hydr. Depth (ft) | 1.53 | 8.94 | 2.57 |
| Conv. Total (cfs) | 141061.3 | Conv. (cfs) | 289.0 | 135674.9 | 5097.5 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 7.30 | 98.18 | 61.28 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.24 | 1.50 | 0.36 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.18 | 18.88 | 3.68 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.10 | 2.05 | 1.83 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 821

INPUT
Description: AD
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 16.5 | 22 | 12.5 | 27 | 10.25 | 32 | 8 | 42 | 6.5 |
| 52 | 6 | 62 | 4.5 | 72 | 3.5 | 82 | 1.5 | 92 | 1 |
| 102 | 1 | 112 | 4 | 122 | 7 | 132 | 9 | 154 | 10 |
| 203 | 11.5 | 235 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12 | .065 | 27 | .035 | 132 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 27 | 132 | 1 | 1 | .3 | .5 |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 132 | 155 | 25 | 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.53 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.82 | 729.91 | 36.68 |
| E.G. Slope (ft/ft) | 0.002866 | Area (sq ft) | 1.82 | 729.91 | 36.68 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.55 | 5872.59 | 35.86 |
| Top Width (ft) | 157.69 | Top Width (ft) | 2.84 | 105.00 | 49.85 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 0.85 | 8.05 | 0.98 |
| Max Chl Dpth (ft) | 10.53 | Hydr. Depth (ft) | 0.64 | 6.95 | 0.74 |
| Conv. Total (cfs) | 110396.7 | Conv. (cfs) | 29.0 | 109697.9 | 669.8 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 3.12 | 109.59 | 51.37 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.19 | 0.13 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.05 | 15.26 | 0.83 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.04 | 2.01 | 1.07 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.41 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.72 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 255.20 | |
| E.G. Slope (ft/ft) | 0.003214 | Area (sq ft) | | 255.20 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.51 | Top Width (ft) | | 80.51 | |
| Vel Total (ft/s) | 5.14 | Avg. Vel. (ft/s) | | 5.14 | |
| Max Chl Dpth (ft) | 5.72 | Hydr. Depth (ft) | | 3.17 | |
| Conv. Total (cfs) | 23142.0 | Conv. (cfs) | | 23142.0 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 81.75 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.63 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.00 | 4.48 | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.48 | |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.30 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.89 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.41 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 507.74 | |
| E.G. Slope (ft/ft) | 0.003921 | Area (sq ft) | | 507.74 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 103.12 | Top Width (ft) | | 103.12 | |
| Vel Total (ft/s) | 7.58 | Avg. Vel. (ft/s) | | 7.58 | |
| Max Chl Dpth (ft) | 8.41 | Hydr. Depth (ft) | | 4.92 | |
| Conv. Total (cfs) | 61483.1 | Conv. (cfs) | | 61483.1 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 105.41 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.18 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 10.44 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.83 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 545.09 | |
| E.G. Slope (ft/ft) | 0.003649 | Area (sq ft) | | 545.09 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 103.92 | Top Width (ft) | | 103.92 | |
| Vel Total (ft/s) | 7.61 | Avg. Vel. (ft/s) | | 7.61 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 8.77 | Hydr. Depth (ft) | | 5.25 | |
| Conv. Total (cfs) | 68666.2 | Conv. (cfs) | | 68666.2 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 106.65 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.16 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 11.10 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 1.88 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.88 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.98 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.90 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.47 | 664.17 | 12.43 |
| E.G. Slope (ft/ft) | 0.003150 | Area (sq ft) | 0.47 | 664.17 | 12.43 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.27 | 5280.75 | 8.98 |
| Top Width (ft) | 134.94 | Top Width (ft) | 1.45 | 105.00 | 28.49 |
| Vel Total (ft/s) | 7.81 | Avg. Vel. (ft/s) | 0.57 | 7.95 | 0.72 |
| Max Chl Dpth (ft) | 9.90 | Hydr. Depth (ft) | 0.33 | 6.33 | 0.44 |
| Conv. Total (cfs) | 94255.3 | Conv. (cfs) | 4.8 | 94090.4 | 160.0 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 1.59 | 108.96 | 29.38 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 1.20 | 0.08 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.03 | 13.88 | 0.21 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.02 | 2.00 | 0.42 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.98 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 13.07 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 8.87 | 891.56 | 113.66 |
| E.G. Slope (ft/ft) | 0.002233 | Area (sq ft) | 8.87 | 891.56 | 113.66 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 11.21 | 7168.61 | 200.18 |
| Top Width (ft) | 161.42 | Top Width (ft) | 6.42 | 105.00 | 50.00 |
| Vel Total (ft/s) | 7.28 | Avg. Vel. (ft/s) | 1.26 | 8.04 | 1.76 |
| Max Chl Dpth (ft) | 12.07 | Hydr. Depth (ft) | 1.38 | 8.49 | 2.27 |
| Conv. Total (cfs) | 156166.6 | Conv. (cfs) | 237.2 | 151693.4 | 4236.0 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 7.01 | 111.13 | 54.60 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.18 | 1.12 | 0.29 |
| Alpha | 1.19 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.18 | 18.70 | 3.65 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.09 | 2.02 | 1.82 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 820

INPUT
Description: ADD
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 10 | 12.5 | 15 | 10.25 | 20 | 8 | 30 | 6.5 |
| 40 | 6 | 50 | 4.5 | 60 | 3.5 | 70 | 1.5 | 80 | 1 |
| 90 | 1 | 100 | 4 | 110 | 7 | 119.4 | 9 | 119.5 | 9 |
| 142.2 | 10 | 142.3 | 10 | 150 | 10 | 160 | 10 | 170 | 11 |
| 180 | 11 | 185.5 | 11.5 | 185.6 | 11.5 | 290 | 12 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 15 | .035 | 142.3 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15 | 142.3 | 95 | 95 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.46 | Element | | | |
| Vel Head (ft) | 0.86 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.59 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.01 | 782.50 | 47.90 |
| E.G. Slope (ft/ft) | 0.002824 | Area (sq ft) | 2.01 | 782.50 | 47.90 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.76 | 5859.74 | 48.50 |
| Top Width (ft) | 193.15 | Top Width (ft) | 2.99 | 127.30 | 62.87 |
| Vel Total (ft/s) | 7.10 | Avg. Vel. (ft/s) | 0.88 | 7.49 | 1.01 |
| Max Chl Dpth (ft) | 10.59 | Hydr. Depth (ft) | 0.67 | 6.15 | 0.76 |
| Conv. Total (cfs) | 111218.0 | Conv. (cfs) | 33.1 | 110272.2 | 912.7 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 3.27 | 129.39 | 62.94 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.11 | 1.07 | 0.13 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 0.05 | 15.24 | 0.83 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 2.01 | 1.07 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.12 | Element | | | |
| Vel Head (ft) | 0.41 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.71 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | | 254.82 | |
| E.G. Slope (ft/ft) | 0.003228 | Area (sq ft) | | 254.82 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.46 | Top Width (ft) | | 80.46 | |
| Vel Total (ft/s) | 5.15 | Avg. Vel. (ft/s) | | 5.15 | |
| Max Chl Dpth (ft) | 5.71 | Hydr. Depth (ft) | | 3.17 | |
| Conv. Total (cfs) | 23093.7 | Conv. (cfs) | | 23093.7 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 81.70 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.63 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.42 | Cum Volume (acre-ft) | 0.00 | 4.48 | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.48 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.89 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.40 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 508.45 | |
| E.G. Slope (ft/ft) | 0.004315 | Area (sq ft) | | 508.45 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 111.75 | Top Width (ft) | | 111.75 | |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | | 7.57 | |
| Max Chl Dpth (ft) | 8.40 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 58609.7 | Conv. (cfs) | | 58609.7 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 113.65 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.21 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.48 | Cum Volume (acre-ft) | 0.01 | 10.43 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 1.82 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.65 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.88 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 551.32 | |
| E.G. Slope (ft/ft) | 0.004246 | Area (sq ft) | | 551.32 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 120.93 | Top Width (ft) | | 120.93 | |
| Vel Total (ft/s) | 7.52 | Avg. Vel. (ft/s) | | 7.52 | |
| Max Chl Dpth (ft) | 8.77 | Hydr. Depth (ft) | | 4.56 | |
| Conv. Total (cfs) | 63659.0 | Conv. (cfs) | | 63659.0 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 122.92 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.47 | Cum Volume (acre-ft) | 0.01 | 11.08 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 1.88 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.83 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.95 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.55 | 700.99 | 21.42 |
| E.G. Slope (ft/ft) | 0.003290 | Area (sq ft) | 0.55 | 700.99 | 21.42 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.34 | 5265.76 | 23.91 |
| Top Width (ft) | 156.10 | Top Width (ft) | 1.56 | 127.30 | 27.23 |
| Vel Total (ft/s) | 7.32 | Avg. Vel. (ft/s) | 0.61 | 7.51 | 1.12 |
| Max Chl Dpth (ft) | 9.95 | Hydr. Depth (ft) | 0.35 | 5.51 | 0.79 |
| Conv. Total (cfs) | 92223.0 | Conv. (cfs) | 5.9 | 91800.4 | 416.8 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 1.71 | 129.39 | 27.28 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.07 | 1.11 | 0.16 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.37 | Cum Volume (acre-ft) | 0.03 | 13.87 | 0.21 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 2.00 | 0.42 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.74 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 13.18 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.63 | 985.01 | 265.63 |
| E.G. Slope (ft/ft) | 0.001862 | Area (sq ft) | 9.63 | 985.01 | 265.63 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 11.41 | 6983.27 | 385.32 |
| Top Width (ft) | 281.71 | Top Width (ft) | 6.71 | 127.30 | 147.70 |
| Vel Total (ft/s) | 5.86 | Avg. Vel. (ft/s) | 1.18 | 7.09 | 1.45 |
| Max Chl Dpth (ft) | 12.18 | Hydr. Depth (ft) | 1.44 | 7.74 | 1.80 |
| Conv. Total (cfs) | 171022.7 | Conv. (cfs) | 264.3 | 161829.0 | 8929.4 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 7.33 | 129.39 | 148.96 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 0.88 | 0.21 |
| Alpha | 1.39 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.18 | 18.68 | 3.65 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.09 | 2.02 | 1.82 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 725

INPUT
Description: 10
10
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 14 | 20 | 10 | 30 | 4 | 60 | 4 |
| 70 | 2.8 | 80 | 2.5 | 90 | 2.5 | 100 | 3 | 110 | 4.5 |
| 120 | 7.5 | 126 | 9 | 154 | 10 | 192 | 11 | 235 | 12 |
| 260 | 13 | 263 | 14 | 266 | 15 | 270 | 16 | 272 | 17 |
| 281 | 19 | 286 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 20 | .04 | 154 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 20 | 154 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.30 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.12 | 798.33 | 32.38 |
| E.G. Slope (ft/ft) | 0.003724 | Area (sq ft) | 2.12 | 798.33 | 32.38 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.11 | 5874.50 | 33.39 |
| Top Width (ft) | 188.19 | Top Width (ft) | 3.25 | 134.00 | 50.94 |
| Vel Total (ft/s) | 7.10 | Avg. Vel. (ft/s) | 1.00 | 7.36 | 1.03 |
| Max Chl Dpth (ft) | 8.80 | Hydr. Depth (ft) | 0.65 | 5.96 | 0.64 |
| Conv. Total (cfs) | 96846.9 | Conv. (cfs) | 34.6 | 96265.2 | 547.2 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.50 | 136.51 | 50.96 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.14 | 1.36 | 0.15 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.05 | 13.52 | 0.74 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.04 | 1.73 | 0.95 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.68 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.49 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.19 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 233.27 | |
| E.G. Slope (ft/ft) | 0.006470 | Area (sq ft) | | 233.27 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 89.27 | Top Width (ft) | | 89.27 | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 5.62 | Avg. Vel. (ft/s) | | 5.62 | |
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.61 | |
| Conv. Total (cfs) | 16311.4 | Conv. (cfs) | | 16311.4 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 90.33 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.33 | Cum Volume (acre-ft) | 0.00 | 3.94 | |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.29 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.79 | Element | | | |
| Vel Head (ft) | 0.98 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.81 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 484.70 | |
| E.G. Slope (ft/ft) | 0.005976 | Area (sq ft) | | 484.70 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 103.23 | Top Width (ft) | | 103.23 | |
| Vel Total (ft/s) | 7.94 | Avg. Vel. (ft/s) | | 7.94 | |
| Max Chl Dpth (ft) | 6.31 | Hydr. Depth (ft) | | 4.70 | |
| Conv. Total (cfs) | 49802.5 | Conv. (cfs) | | 49802.5 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 105.37 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.72 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.67 | Cum Volume (acre-ft) | 0.01 | 9.35 | 0.00 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.59 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.15 | Element | | | |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 9.18 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 523.96 | |
| E.G. Slope (ft/ft) | 0.005798 | Area (sq ft) | | 523.96 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 109.64 | Top Width (ft) | | 109.64 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 6.68 | Hydr. Depth (ft) | | 4.78 | |
| Conv. Total (cfs) | 54477.2 | Conv. (cfs) | | 54477.2 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 111.90 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.63 | Cum Volume (acre-ft) | 0.01 | 9.91 | 0.00 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.01 | 1.62 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.88 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.57 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.41 | 700.79 | 6.24 |
| E.G. Slope (ft/ft) | 0.004654 | Area (sq ft) | 0.41 | 700.79 | 6.24 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.26 | 5285.51 | 4.23 |
| Top Width (ft) | 157.21 | Top Width (ft) | 1.43 | 134.00 | 21.78 |
| Vel Total (ft/s) | 7.48 | Avg. Vel. (ft/s) | 0.65 | 7.54 | 0.68 |
| Max Chl Dpth (ft) | 8.07 | Hydr. Depth (ft) | 0.29 | 5.23 | 0.29 |
| Conv. Total (cfs) | 77538.9 | Conv. (cfs) | 3.9 | 77473.0 | 62.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.54 | 136.51 | 21.78 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.08 | 1.49 | 0.08 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.47 | Cum Volume (acre-ft) | 0.03 | 12.34 | 0.18 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.02 | 1.71 | 0.36 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.72 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.00 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 11.24 | 1025.74 | 171.79 |
| E.G. Slope (ft/ft) | 0.002360 | Area (sq ft) | 11.24 | 1025.74 | 171.79 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.55 | 7101.22 | 263.23 |
| Top Width (ft) | 247.45 | Top Width (ft) | 7.50 | 134.00 | 105.95 |
| Vel Total (ft/s) | 6.11 | Avg. Vel. (ft/s) | 1.38 | 6.92 | 1.53 |
| Max Chl Dpth (ft) | 10.50 | Hydr. Depth (ft) | 1.50 | 7.65 | 1.62 |
| Conv. Total (cfs) | 151921.3 | Conv. (cfs) | 320.2 | 146182.5 | 5418.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 8.07 | 136.51 | 106.00 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.21 | 1.11 | 0.24 |
| Alpha | 1.24 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.15 | 16.49 | 3.17 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.08 | 1.74 | 1.54 |

CROSS SECTION

RIVER: Cobosee Stream

REACH: Reach 1 RS: 575

INPUT
Description: 9
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 13.5 | 17 | 8.25 | 20 | 6 | 30 | 1.5 |
| 40 | 1.5 | 50 | 1.5 | 60 | 2.25 | 70 | 2.8 | 80 | 3.1 |
| 110 | 3.1 | 120 | 4 | 130 | 7 | 140 | 9 | 172 | 10 |
| 230 | 11 | 280 | 12 | 280.1 | 16 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 17 | .04 | 140 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 17 | 140 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.59 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.08 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 5.34 | 937.10 | 84.46 |
| E.G. Slope (ft/ft) | 0.001918 | Area (sq ft) | 5.34 | 937.10 | 84.46 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 5.81 | 5825.50 | 78.69 |
| Top Width (ft) | 220.83 | Top Width (ft) | 3.77 | 123.00 | 94.05 |
| Vel Total (ft/s) | 5.76 | Avg. Vel. (ft/s) | 1.09 | 6.22 | 0.93 |
| Max Chl Dpth (ft) | 9.58 | Hydr. Depth (ft) | 1.42 | 7.62 | 0.90 |
| Conv. Total (cfs) | 134958.7 | Conv. (cfs) | 132.7 | 133029.1 | 1796.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.72 | 125.44 | 94.08 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.14 | 0.89 | 0.11 |
| Alpha | 1.15 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.04 | 10.53 | 0.54 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 1.28 | 0.70 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.64 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 197.13 | |
| E.G. Slope (ft/ft) | 0.012980 | Area (sq ft) | | 197.13 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 99.10 | Top Width (ft) | | 99.10 | |
| Vel Total (ft/s) | 6.66 | Avg. Vel. (ft/s) | | 6.66 | |
| Max Chl Dpth (ft) | 3.14 | Hydr. Depth (ft) | | 1.99 | |
| Conv. Total (cfs) | 11515.9 | Conv. (cfs) | | 11515.9 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 99.96 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.60 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.17 | Cum Volume (acre-ft) | 0.00 | 3.20 | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.97 | |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.01 | Element | | | |
| Vel Head (ft) | 0.63 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.39 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.01 | 606.57 | |
| E.G. Slope (ft/ft) | 0.003452 | Area (sq ft) | 0.01 | 606.57 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3850.00 | |
| Top Width (ft) | 120.11 | Top Width (ft) | 0.18 | 119.93 | |
| Vel Total (ft/s) | 6.35 | Avg. Vel. (ft/s) | 0.19 | 6.35 | |
| Max Chl Dpth (ft) | 6.89 | Hydr. Depth (ft) | 0.07 | 5.06 | |
| Conv. Total (cfs) | 65528.1 | Conv. (cfs) | 0.0 | 65528.1 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.23 | 122.31 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.01 | 1.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.42 | Cum Volume (acre-ft) | 0.01 | 7.47 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.21 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.42 | Element | | | |
| Vel Head (ft) | 0.62 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.80 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.20 | 656.34 | |
| E.G. Slope (ft/ft) | 0.003151 | Area (sq ft) | 0.20 | 656.34 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.09 | 4147.91 | |
| Top Width (ft) | 122.72 | Top Width (ft) | 0.73 | 121.99 | |
| Vel Total (ft/s) | 6.32 | Avg. Vel. (ft/s) | 0.47 | 6.32 | |
| Max Chl Dpth (ft) | 7.30 | Hydr. Depth (ft) | 0.27 | 5.38 | |
| Conv. Total (cfs) | 73891.2 | Conv. (cfs) | 1.7 | 73889.5 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.91 | 124.41 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.04 | 1.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.01 | 7.88 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.23 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.61 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.79 | 840.41 | 27.96 |
| E.G. Slope (ft/ft) | 0.002253 | Area (sq ft) | 2.79 | 840.41 | 27.96 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 2.65 | 5266.52 | 20.84 |
| Top Width (ft) | 174.83 | Top Width (ft) | 2.73 | 123.00 | 49.11 |
| Vel Total (ft/s) | 6.07 | Avg. Vel. (ft/s) | 0.95 | 6.27 | 0.75 |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 1.02 | 6.83 | 0.57 |
| Conv. Total (cfs) | 111443.1 | Conv. (cfs) | 55.7 | 110948.3 | 439.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.41 | 125.44 | 49.13 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.12 | 0.94 | 0.08 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.02 | 9.69 | 0.12 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.27 | 0.24 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.39 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.87 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 14.25 | 1157.61 | 314.35 |
| E.G. Slope (ft/ft) | 0.001335 | Area (sq ft) | 14.25 | 1157.61 | 314.35 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 17.94 | 6913.71 | 448.35 |
| Top Width (ft) | 269.19 | Top Width (ft) | 6.17 | 123.00 | 140.02 |
| Vel Total (ft/s) | 4.97 | Avg. Vel. (ft/s) | 1.26 | 5.97 | 1.43 |
| Max Chl Dpth (ft) | 11.37 | Hydr. Depth (ft) | 2.31 | 9.41 | 2.25 |
| Conv. Total (cfs) | 201954.9 | Conv. (cfs) | 491.0 | 189194.9 | 12269.1 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 7.71 | 125.44 | 140.91 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.15 | 0.77 | 0.19 |
| Alpha | 1.36 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.19 | Cum Volume (acre-ft) | 0.11 | 12.73 | 2.33 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.06 | 1.29 | 1.12 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 425

INPUT
Description: 8
Station Elevation Data  num=  17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 11 | 12 | 9.8 | 20 | 5 | 30 | 0 |
| 70 | 0 | 80 | .5 | 90 | 1.5 | 100 | 2 | 110 | 5.5 |
| 117.4 | 9 | 160 | 10 | 210 | 10 | 265 | 11 | 268 | 12 |
| 275 | 13 | 280 | 14 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 12 | .04 | 117.4 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 12 | 117.4 | 90 | 90 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.59 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.82 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.86 | 934.95 | 115.56 |
| E.G. Slope (ft/ft) | 0.001604 | Area (sq ft) | 0.86 | 934.95 | 115.56 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.46 | 5815.40 | 94.15 |
| Top Width (ft) | 244.73 | Top Width (ft) | 1.70 | 105.40 | 137.64 |
| Vel Total (ft/s) | 5.62 | Avg. Vel. (ft/s) | 0.53 | 6.22 | 0.81 |
| Max Chl Dpth (ft) | 10.82 | Hydr. Depth (ft) | 0.51 | 8.87 | 0.84 |
| Conv. Total (cfs) | 147573.0 | Conv. (cfs) | 11.4 | 145210.7 | 2350.9 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 1.98 | 109.37 | 137.65 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.04 | 0.86 | 0.08 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.03 | 7.31 | 0.20 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.89 | 0.30 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.46 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.63 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 240.73 | |
| E.G. Slope (ft/ft) | 0.005213 | Area (sq ft) | | 240.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 81.90 | Top Width (ft) | | 81.90 | |
| Vel Total (ft/s) | 5.45 | Avg. Vel. (ft/s) | | 5.45 | |
| Max Chl Dpth (ft) | 3.63 | Hydr. Depth (ft) | | 2.94 | |
| Conv. Total (cfs) | 18171.8 | Conv. (cfs) | | 18171.8 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 83.10 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.94 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 2.45 | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.66 | |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.56 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.02 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 643.65 | |
| E.G. Slope (ft/ft) | 0.002271 | Area (sq ft) | | 643.65 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 100.36 | Top Width (ft) | | 100.36 | |
| Vel Total (ft/s) | 5.98 | Avg. Vel. (ft/s) | | 5.98 | |
| Max Chl Dpth (ft) | 8.02 | Hydr. Depth (ft) | | 6.41 | |
| Conv. Total (cfs) | 80797.5 | Conv. (cfs) | | 80797.5 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 103.62 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.88 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.01 | 5.32 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.83 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.57 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.45 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 686.74 | |
| E.G. Slope (ft/ft) | 0.002174 | Area (sq ft) | | 686.74 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 101.97 | Top Width (ft) | | 101.97 | |
| Vel Total (ft/s) | 6.04 | Avg. Vel. (ft/s) | | 6.04 | |
| Max Chl Dpth (ft) | 8.45 | Hydr. Depth (ft) | | 6.73 | |
| Conv. Total (cfs) | 88971.9 | Conv. (cfs) | | 88971.9 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 105.44 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.88 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.23 | Cum Volume (acre-ft) | 0.01 | 5.57 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.84 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.60 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.00 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.03 | 848.26 | 21.14 |
| E.G. Slope (ft/ft) | 0.001827 | Area (sq ft) | 0.03 | 848.26 | 21.14 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.01 | 5277.02 | 12.98 |
| Top Width (ft) | 148.17 | Top Width (ft) | 0.33 | 105.40 | 42.44 |
| Vel Total (ft/s) | 6.08 | Avg. Vel. (ft/s) | 0.19 | 6.22 | 0.61 |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 10.00 | Hydr. Depth (ft) | 0.10 | 8.05 | 0.50 |
| Conv. Total (cfs) | 123773.8 | Conv. (cfs) | 0.1 | 123470.0 | 303.7 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 0.38 | 109.37 | 42.45 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.01 | 0.88 | 0.06 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.02 | 6.78 | 0.04 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.88 | 0.08 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.69 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 6.62 | 1132.07 | 395.93 |
| E.G. Slope (ft/ft) | 0.001159 | Area (sq ft) | 6.62 | 1132.07 | 395.93 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 5.99 | 6799.86 | 574.15 |
| Top Width (ft) | 265.24 | Top Width (ft) | 4.41 | 105.40 | 155.42 |
| Vel Total (ft/s) | 4.81 | Avg. Vel. (ft/s) | 0.90 | 6.01 | 1.45 |
| Max Chl Dpth (ft) | 12.69 | Hydr. Depth (ft) | 1.50 | 10.74 | 2.55 |
| Conv. Total (cfs) | 216784.7 | Conv. (cfs) | 175.8 | 199743.3 | 16865.5 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 5.28 | 109.37 | 155.66 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.09 | 0.75 | 0.18 |
| Alpha | 1.44 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.07 | 8.79 | 1.11 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.04 | 0.90 | 0.61 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 335

INPUT
Description: 7
Station Elevation Data  num=  17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 12.5 | 18 | 8.1 | 20 | 7 | 30 | 1.5 |
| 40 | -.5 | 50 | -2 | 60 | -2 | 70 | -2 | 80 | 0 |
| 90 | 4 | 100 | 9 | 135 | 10 | 175 | 10 | 205 | 11 |
| 260 | 11 | 260.1 | 16 | | | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 18 | .04 | 100 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 18 | 100 | 73 | 73 | 73 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.93 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.27 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.28 | 756.96 | 38.76 |
| E.G. Slope (ft/ft) | 0.002411 | Area (sq ft) | 4.28 | 756.96 | 38.76 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.64 | 5879.19 | 26.17 |
| Top Width (ft) | 169.01 | Top Width (ft) | 3.94 | 82.00 | 83.07 |
| Vel Total (ft/s) | 7.39 | Avg. Vel. (ft/s) | 1.08 | 7.77 | 0.68 |
| Max Chl Dpth (ft) | 12.27 | Hydr. Depth (ft) | 1.08 | 9.23 | 0.47 |
| Conv. Total (cfs) | 120358.1 | Conv. (cfs) | 94.5 | 119730.7 | 533.0 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 4.50 | 86.15 | 83.09 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.14 | 1.32 | 0.07 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.02 | 5.56 | 0.04 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 0.70 | 0.07 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.17 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 230.92 | |
| E.G. Slope (ft/ft) | 0.004095 | Area (sq ft) | | 230.92 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 60.95 | Top Width (ft) | | 60.95 | |
| Vel Total (ft/s) | 5.68 | Avg. Vel. (ft/s) | | 5.68 | |
| Max Chl Dpth (ft) | 5.17 | Hydr. Depth (ft) | | 3.79 | |
| Conv. Total (cfs) | 20502.4 | Conv. (cfs) | | 20502.4 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 62.49 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 0.94 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.00 | 1.96 | |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.51 | |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.31 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.50 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 532.59 | |
| E.G. Slope (ft/ft) | 0.003103 | Area (sq ft) | | 532.59 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 77.91 | Top Width (ft) | | 77.91 | |
| Vel Total (ft/s) | 7.23 | Avg. Vel. (ft/s) | | 7.23 | |
| Max Chl Dpth (ft) | 9.50 | Hydr. Depth (ft) | | 6.84 | |
| Conv. Total (cfs) | 69119.1 | Conv. (cfs) | | 69119.1 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 81.56 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.26 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 4.10 | 0.00 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.64 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.76 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.92 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.64 | |
| E.G. Slope (ft/ft) | 0.003034 | Area (sq ft) | | 565.64 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 79.52 | Top Width (ft) | | 79.52 | |
| Vel Total (ft/s) | 7.33 | Avg. Vel. (ft/s) | | 7.33 | |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | | 7.11 | |
| Conv. Total (cfs) | 75305.6 | Conv. (cfs) | | 75305.6 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 83.37 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.29 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 4.27 | 0.00 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.65 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.91 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.46 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.68 | 690.54 | 3.69 |
| E.G. Slope (ft/ft) | 0.002648 | Area (sq ft) | 1.68 | 690.54 | 3.69 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 1.40 | 5286.98 | 1.63 |
| Top Width (ft) | 100.54 | Top Width (ft) | 2.47 | 82.00 | 16.06 |
| Vel Total (ft/s) | 7.60 | Avg. Vel. (ft/s) | 0.83 | 7.66 | 0.44 |
| Max Chl Dpth (ft) | 11.46 | Hydr. Depth (ft) | 0.68 | 8.42 | 0.23 |
| Conv. Total (cfs) | 102796.6 | Conv. (cfs) | 27.2 | 102737.9 | 31.6 |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 2.82 | 86.15 | 16.07 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.10 | 1.33 | 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.01 | 5.19 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 0.68 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.83 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.22 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 15.43 | 916.88 | 302.59 |
| E.G. Slope (ft/ft) | 0.001761 | Area (sq ft) | 15.43 | 916.88 | 302.59 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 21.94 | 6916.37 | 441.69 |
| Top Width (ft) | 249.51 | Top Width (ft) | 7.49 | 82.00 | 160.02 |
| Vel Total (ft/s) | 5.98 | Avg. Vel. (ft/s) | 1.42 | 7.54 | 1.46 |
| Max Chl Dpth (ft) | 14.22 | Hydr. Depth (ft) | 2.06 | 11.18 | 1.89 |
| Conv. Total (cfs) | 175839.3 | Conv. (cfs) | 522.7 | 164792.6 | 10524.0 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 8.55 | 86.15 | 161.25 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.20 | 1.17 | 0.21 |
| Alpha | 1.50 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.05 | 6.67 | 0.39 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.03 | 0.71 | 0.29 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 262

INPUT
Description: 6
6
6
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 7 | 9.1 | 10 | 7 | 20 | 1 | 30 | -2 |
| 40 | -3 | 50 | -3 | 60 | 0 | 70 | 5 | 80 | 9.5 |
| 135 | 11 | 175 | 12 | 255 | 13 | 282 | 14 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 7 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 7 | 80 | 75 | 75 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.51 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 9.39 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.06 | 599.09 | |
| E.G. Slope (ft/ft) | 0.004665 | Area (sq ft) | 0.06 | 599.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.02 | 5909.98 | |
| Top Width (ft) | 73.18 | Top Width (ft) | 0.42 | 72.76 | |
| Vel Total (ft/s) | 9.86 | Avg. Vel. (ft/s) | 0.38 | 9.86 | |
| Max Chl Dpth (ft) | 12.39 | Hydr. Depth (ft) | 0.15 | 8.23 | |
| Conv. Total (cfs) | 86530.8 | Conv. (cfs) | 0.3 | 86530.5 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 0.51 | 78.14 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.04 | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.34 | Cum Volume (acre-ft) | 0.02 | 4.42 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 0.57 | 0.00 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.83 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.43 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 179.66 | |
| E.G. Slope (ft/ft) | 0.006859 | Area (sq ft) | | 179.66 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.23 | Top Width (ft) | | 47.23 | |
| Vel Total (ft/s) | 7.30 | Avg. Vel. (ft/s) | | 7.30 | |
| Max Chl Dpth (ft) | 5.43 | Hydr. Depth (ft) | | 3.80 | |
| Conv. Total (cfs) | 15841.4 | Conv. (cfs) | | 15841.4 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 49.13 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 1.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.00 | 1.62 | |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 0.42 | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.95 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.56 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 406.25 | |
| E.G. Slope (ft/ft) | 0.005852 | Area (sq ft) | | 406.25 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.72 | Top Width (ft) | | 62.72 | |
| Vel Total (ft/s) | 9.48 | Avg. Vel. (ft/s) | | 9.48 | |
| Max Chl Dpth (ft) | 9.56 | Hydr. Depth (ft) | | 6.48 | |
| Conv. Total (cfs) | 50329.6 | Conv. (cfs) | | 50329.6 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 66.70 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 3.31 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.52 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.97 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 432.83 | |
| E.G. Slope (ft/ft) | 0.005701 | Area (sq ft) | | 432.83 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 64.35 | Top Width (ft) | | 64.35 | |
| Vel Total (ft/s) | 9.58 | Avg. Vel. (ft/s) | | 9.58 | |
| Max Chl Dpth (ft) | 9.97 | Hydr. Depth (ft) | | 6.73 | |
| Conv. Total (cfs) | 54935.4 | Conv. (cfs) | | 54935.4 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 68.54 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.25 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.40 | Cum Volume (acre-ft) | 0.01 | 3.44 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.53 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.55 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 539.04 | |
| E.G. Slope (ft/ft) | 0.005045 | Area (sq ft) | | 539.04 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 70.12 | Top Width (ft) | | 70.12 | |
| Vel Total (ft/s) | 9.81 | Avg. Vel. (ft/s) | | 9.81 | |
| Max Chl Dpth (ft) | 11.55 | Hydr. Depth (ft) | | 7.69 | |
| Conv. Total (cfs) | 74480.0 | Conv. (cfs) | | 74480.0 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 75.15 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.26 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.01 | 4.16 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.56 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.50 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.30 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 3.47 | 738.55 | 59.83 |
| E.G. Slope (ft/ft) | 0.003559 | Area (sq ft) | 3.47 | 738.55 | 59.83 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 4.42 | 7300.07 | 75.51 |
| Top Width (ft) | 143.31 | Top Width (ft) | 3.15 | 73.00 | 67.17 |
| Vel Total (ft/s) | 9.20 | Avg. Vel. (ft/s) | 1.27 | 9.88 | 1.26 |
| Max Chl Dpth (ft) | 14.30 | Hydr. Depth (ft) | 1.10 | 10.12 | 0.89 |
| Conv. Total (cfs) | 123714.4 | Conv. (cfs) | 74.1 | 122374.5 | 1265.8 |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 3.84 | 78.40 | 67.19 |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.20 | 2.09 | 0.20 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.03 | 5.28 | 0.08 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 0.58 | 0.09 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 187

INPUT
Description: 5
Station Elevation Data  num=  13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 8 | 9.2 | 10 | 8 | 20 | 1.5 | 30 | -2.5 |
| 40 | -4 | 50 | -4 | 60 | -1 | 70 | 4 | 80 | 9.5 |
| 115 | 12 | 141 | 13 | 185 | 14 | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 80 | 50 | 50 | 50 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.55 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.46 | Wt. n-Val. | | 0.040 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 9.10 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 610.37 | |
| E.G. Slope (ft/ft) | 0.004309 | Area (sq ft) | | 610.37 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 71.09 | Top Width (ft) | | 71.09 | |
| Vel Total (ft/s) | 9.68 | Avg. Vel. (ft/s) | | 9.68 | |
| Max Chl Dpth (ft) | 13.10 | Hydr. Depth (ft) | | 8.59 | |
| Conv. Total (cfs) | 90037.4 | Conv. (cfs) | | 90037.4 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 77.13 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.13 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.02 | 3.38 | 0.00 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.01 | 0.44 | 0.00 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.77 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.70 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.06 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 194.73 | |
| E.G. Slope (ft/ft) | 0.005256 | Area (sq ft) | | 194.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.00 | Top Width (ft) | | 47.00 | |
| Vel Total (ft/s) | 6.74 | Avg. Vel. (ft/s) | | 6.74 | |
| Max Chl Dpth (ft) | 6.06 | Hydr. Depth (ft) | | 4.14 | |
| Conv. Total (cfs) | 18097.7 | Conv. (cfs) | | 18097.7 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 49.21 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 1.30 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.00 | 1.29 | |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.34 | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.31 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.20 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 419.08 | |
| E.G. Slope (ft/ft) | 0.005170 | Area (sq ft) | | 419.08 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.24 | Top Width (ft) | | 61.24 | |
| Vel Total (ft/s) | 9.19 | Avg. Vel. (ft/s) | | 9.19 | |
| Max Chl Dpth (ft) | 10.20 | Hydr. Depth (ft) | | 6.84 | |
| Conv. Total (cfs) | 53543.1 | Conv. (cfs) | | 53543.1 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 65.70 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.06 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 2.60 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.42 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.97 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.35 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.63 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 445.37 | |
| E.G. Slope (ft/ft) | 0.005066 | Area (sq ft) | | 445.37 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.67 | Top Width (ft) | | 62.67 | |
| Vel Total (ft/s) | 9.31 | Avg. Vel. (ft/s) | | 9.31 | |
| Max Chl Dpth (ft) | 10.63 | Hydr. Depth (ft) | | 7.11 | |
| Conv. Total (cfs) | 58280.8 | Conv. (cfs) | | 58280.8 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 67.36 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.09 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.01 | 2.68 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.42 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.24 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 550.65 | |
| E.G. Slope (ft/ft) | 0.004578 | Area (sq ft) | | 550.65 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 68.10 | Top Width (ft) | | 68.10 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 12.24 | Hydr. Depth (ft) | | 8.09 | |
| Conv. Total (cfs) | 78187.3 | Conv. (cfs) | | 78187.3 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 73.69 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.14 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.01 | 3.22 | 0.01 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 0.44 | 0.01 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.54 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.49 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.05 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.86 | 751.09 | 16.88 |
| E.G. Slope (ft/ft) | 0.003405 | Area (sq ft) | 2.86 | 751.09 | 16.88 |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 7380.00 | Flow (cfs) | 3.27 | 7357.75 | 18.98 |
| Top Width (ft) | 96.82 | Top Width (ft) | 3.09 | 72.00 | 21.74 |
| Vel Total (ft/s) | 9.57 | Avg. Vel. (ft/s) | 1.14 | 9.80 | 1.12 |
| Max Chl Dpth (ft) | 15.05 | Hydr. Depth (ft) | 0.93 | 10.43 | 0.78 |
| Conv. Total (cfs) | 126480.5 | Conv. (cfs) | 56.1 | 126099.1 | 325.3 |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | 3.60 | 78.17 | 21.79 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.17 | 2.04 | 0.16 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.19 | Cum Volume (acre-ft) | 0.03 | 4.00 | 0.02 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 0.45 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 137

INPUT
Description: 4
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 80 | 77 | 77 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 16 | 15 | F |
| 70 | 90 | 15 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.28 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.36 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.71 | Flow Area (sq ft) | | 531.20 | |
| E.G. Slope (ft/ft) | 0.004602 | Area (sq ft) | 0.00 | 565.91 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 69.03 | Top Width (ft) | 0.10 | 68.93 | |
| Vel Total (ft/s) | 11.13 | Avg. Vel. (ft/s) | | 11.13 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 12.36 | Hydr. Depth (ft) | | 9.84 | |
| Conv. Total (cfs) | 87123.8 | Conv. (cfs) | | 87123.8 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.67 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.02 | 2.71 | 0.00 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.00 | 0.36 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.62 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 0.50 | Flow Area (sq ft) | | 178.02 | |
| E.G. Slope (ft/ft) | 0.006774 | Area (sq ft) | | 178.02 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 45.47 | Top Width (ft) | | 45.47 | |
| Vel Total (ft/s) | 7.37 | Avg. Vel. (ft/s) | | 7.37 | |
| Max Chl Dpth (ft) | 5.62 | Hydr. Depth (ft) | | 3.92 | |
| Conv. Total (cfs) | 15941.3 | Conv. (cfs) | | 15941.3 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 47.57 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 1.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.00 | 1.08 | |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.00 | 0.29 | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.22 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.54 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.68 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.85 | Flow Area (sq ft) | | 386.61 | |
| E.G. Slope (ft/ft) | 0.005631 | Area (sq ft) | | 393.24 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 59.95 | Top Width (ft) | | 59.95 | |
| Vel Total (ft/s) | 9.96 | Avg. Vel. (ft/s) | | 9.96 | |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | | 7.16 | |
| Conv. Total (cfs) | 51305.8 | Conv. (cfs) | | 51305.8 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.37 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 2.14 | 0.00 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.35 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.08 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.15 | Flow Area (sq ft) | | 408.38 | |
| E.G. Slope (ft/ft) | 0.005446 | Area (sq ft) | | 417.68 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 61.32 | Top Width (ft) | | 61.32 | |
| Vel Total (ft/s) | 10.16 | Avg. Vel. (ft/s) | | 10.16 | |
| Max Chl Dpth (ft) | 10.08 | Hydr. Depth (ft) | | 7.56 | |
| Conv. Total (cfs) | 56209.1 | Conv. (cfs) | | 56209.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.42 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 2.19 | 0.00 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.35 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.82 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.58 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.20 | Flow Area (sq ft) | | 489.14 | |
| E.G. Slope (ft/ft) | 0.004854 | Area (sq ft) | | 513.17 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 66.39 | Top Width (ft) | | 66.39 | |
| Vel Total (ft/s) | 10.81 | Avg. Vel. (ft/s) | | 10.81 | |
| Max Chl Dpth (ft) | 11.58 | Hydr. Depth (ft) | | 9.06 | |
| Conv. Total (cfs) | 75931.7 | Conv. (cfs) | | 75931.7 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.59 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 2.61 | 0.01 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.00 | 0.36 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.28 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.15 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 10.13 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 6.86 | Flow Area (sq ft) | | 627.13 | |
| E.G. Slope (ft/ft) | 0.004126 | Area (sq ft) | 2.95 | 689.92 | 1.29 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 75.49 | Top Width (ft) | 3.22 | 70.00 | 2.27 |
| Vel Total (ft/s) | 11.77 | Avg. Vel. (ft/s) | | 11.77 | |
| Max Chl Dpth (ft) | 14.13 | Hydr. Depth (ft) | | 11.61 | |
| Conv. Total (cfs) | 114894.4 | Conv. (cfs) | | 114894.4 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.03 | 3.17 | 0.01 |
| C & E Loss (ft) | 0.27 | Cum SA (acres) | 0.01 | 0.37 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 98.5

INPUT
Description: Maine Ave.
Distance from Upstream XS = 22
Deck/Roadway Width = 38
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 1 | 15 | -10 | 18.5 | 15 | -10 | 18.5 | 15 | 10 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 67 | 15 | 10 | 67 | 15 | -10 | 100 | 15 | -10 | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.
10 80 .3 .5

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 16 | 15 | F |
| 70 | 90 | 15 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 1 | 15 | -10 | 18.5 | 15 | -10 | 18.5 | 15 | 10 |
| 67 | 15 | 10 | 67 | 15 | -10 | 100 | 15 | -10 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12.7 | 14 | 15.7 | -1 | 18.5 | -2 | 24.4 | -4 | 32.7 | -5 |
| 42.7 | -5 | 52.7 | -3.5 | 62.7 | 1 | 72.7 | 5.5 | 74.7 | 15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12.7 | .065 | 15.7 | .04 | 72.7 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.
15.7 72.7 .3 .5

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 12.7 | 16 | 15 | F |
| 70 | 74.7 | 15 | F |

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 10.28 | Element | | |
| W.S. US. (ft) | 8.36 | E.G. Elev (ft) | 9.90 | 9.38 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 7.15 | 7.23 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 5.73 | 4.60 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.15 | 12.23 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 13.33 | 11.76 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 443.49 | 502.43 |
| Weir Submerg | | Froude # Chl | 0.70 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4567.03 | 4877.91 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 9.14 | 10.36 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.11 | Conv. Total (cfs) | 69653.8 | 86471.9 |
| Delta WS (ft) | 1.06 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.22 | 0.08 |
| BR Open Vel (ft/s) | 13.33 | C & E Loss (ft) | 0.30 | 0.14 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.91 | 2.91 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 2.46 | Element | | |
| W.S. US. (ft) | 1.62 | E.G. Elev (ft) | 2.14 | 1.58 |

| | | | | |
|---|---|---|---|---|
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 0.87 | 0.91 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.51 | -0.78 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 4.87 | 5.91 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.04 | 6.55 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 145.15 | 200.43 |
| Weir Submerg | | Froude # Chl | 0.86 | 0.54 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 656.17 | 775.75 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 3.42 | 4.55 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 44.22 | 45.46 |
| Delta EG (ft) | 0.97 | Conv. Total (cfs) | 11909.0 | 20020.2 |
| Delta WS (ft) | 0.77 | Top Width (ft) | 42.48 | 44.01 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.26 | 0.07 |
| BR Open Vel (ft/s) | 9.04 | C & E Loss (ft) | 0.30 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.49 | 1.18 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.22 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 5.68 | E.G. Elev (ft) | 6.87 | 6.31 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 4.66 | 4.72 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.81 | 2.66 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.66 | 9.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.92 | 10.12 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 322.86 | 380.62 |
| Weir Submerg | | Froude # Chl | 0.71 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2593.88 | 2819.42 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 6.66 | 7.85 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.07 | Conv. Total (cfs) | 41034.6 | 54436.6 |
| Delta WS (ft) | 0.97 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.25 | 0.08 |
| BR Open Vel (ft/s) | 11.92 | C & E Loss (ft) | 0.31 | 0.07 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.48 | 2.36 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.69 | Element | | |
| W.S. US. (ft) | 6.08 | E.G. Elev (ft) | 7.33 | 6.77 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 5.02 | 5.09 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.10 | 2.98 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.02 | 10.09 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 12.19 | 10.42 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 340.25 | 398.26 |
| Weir Submerg | | Froude # Chl | 0.72 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2857.45 | 3093.35 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 7.02 | 8.21 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.08 | Conv. Total (cfs) | 44786.0 | 58706.1 |
| Delta WS (ft) | 1.00 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.24 | 0.08 |
| BR Open Vel (ft/s) | 12.19 | C & E Loss (ft) | 0.31 | 0.08 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.57 | 2.46 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 9.40 | Element | | |
| W.S. US. (ft) | 7.58 | E.G. Elev (ft) | 9.02 | 8.49 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 6.41 | 6.49 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.17 | 4.05 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.41 | 11.49 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 12.97 | 11.34 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 407.87 | 466.55 |
| Weir Submerg | | Froude # Chl | 0.71 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3939.28 | 4223.26 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 8.41 | 9.62 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.10 | Conv. Total (cfs) | 60582.1 | 76425.5 |
| Delta WS (ft) | 1.04 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.23 | 0.08 |

| | | | | |
|---|---|---|---|---|
| BR Open Vel (ft/s) | 12.97 | C & E Loss (ft) | 0.31 | 0.12 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.81 | 2.77 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 12.28 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 10.13 | E.G. Elev (ft) | 11.90 | 11.40 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 8.83 | 8.93 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 6.97 | 5.83 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 12.83 | 13.93 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 14.05 | 12.62 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 525.34 | 584.73 |
| Weir Submerg | | Froude # Chl | 0.69 | 0.60 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6158.37 | 6534.04 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 10.83 | 12.06 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.13 | Conv. Total (cfs) | 92371.1 | 111345.7 |
| Delta WS (ft) | 1.09 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.20 | 0.07 |
| BR Open Vel (ft/s) | 14.05 | C & E Loss (ft) | 0.30 | 0.18 |
| Coef of Q | | Shear Total (lb/sq ft) | 4.10 | 3.18 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 60

INPUT

Description: 3

Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12.7 | 14 | 15.7 | -1 | 18.5 | -2 | 24.4 | -4 | 32.7 | -5 |
| 42.7 | -5 | 52.7 | -3.5 | 62.7 | 1 | 72.7 | 5.5 | 74.7 | 15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12.7 | .065 | 15.7 | .04 | 72.7 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15.7 | 72.7 | 22 | 22 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 12.7 | 16 | 15 | F |
| 70 | 74.7 | 15 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.17 | Element | | | |
| Vel Head (ft) | 1.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.30 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.52 | Flow Area (sq ft) | | 538.71 | |
| E.G. Slope (ft/ft) | 0.004296 | Area (sq ft) | 6.88 | 547.71 | 0.34 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 59.04 | Top Width (ft) | 1.66 | 57.00 | 0.38 |
| Vel Total (ft/s) | 10.97 | Avg. Vel. (ft/s) | | 10.97 | |
| Max Chl Dpth (ft) | 12.30 | Hydr. Depth (ft) | | 9.98 | |
| Conv. Total (cfs) | 90166.5 | Conv. (cfs) | | 90166.5 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 1.83 | 0.00 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.27 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 1.49 | Element | | | |
| Vel Head (ft) | 0.64 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 0.85 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | -0.76 | Flow Area (sq ft) | | 203.66 | |
| E.G. Slope (ft/ft) | 0.004373 | Area (sq ft) | 0.34 | 204.23 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.04 | Top Width (ft) | 0.37 | 46.67 | |
| Vel Total (ft/s) | 6.44 | Avg. Vel. (ft/s) | | 6.44 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 5.85 | Hydr. Depth (ft) | | 4.39 | |
| Conv. Total (cfs) | 19840.0 | Conv. (cfs) | | 19840.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 47.96 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 1.16 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.00 | 0.77 | |
| C & E Loss (ft) | 0.28 | Cum SA (acres) | 0.00 | 0.21 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.45 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.71 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.53 | Flow Area (sq ft) | | 398.91 | |
| E.G. Slope (ft/ft) | 0.004963 | Area (sq ft) | 3.26 | 400.84 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 56.38 | Top Width (ft) | 1.14 | 55.24 | |
| Vel Total (ft/s) | 9.65 | Avg. Vel. (ft/s) | | 9.65 | |
| Max Chl Dpth (ft) | 9.71 | Hydr. Depth (ft) | | 7.39 | |
| Conv. Total (cfs) | 54649.0 | Conv. (cfs) | | 54649.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | 0.01 | 1.50 | 0.00 |
| C & E Loss (ft) | 0.15 | Cum SA (acres) | 0.00 | 0.26 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.60 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.52 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.08 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.84 | Flow Area (sq ft) | | 419.17 | |
| E.G. Slope (ft/ft) | 0.004884 | Area (sq ft) | 3.70 | 421.72 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 57.29 | Top Width (ft) | 1.22 | 56.08 | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 9.90 | Avg. Vel. (ft/s) | | 9.90 | |
| Max Chl Dpth (ft) | 10.08 | Hydr. Depth (ft) | | 7.76 | |
| Conv. Total (cfs) | 59353.4 | Conv. (cfs) | | 59353.4 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.27 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 1.51 | 0.00 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.00 | 0.26 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.76 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.54 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.97 | Flow Area (sq ft) | | 497.57 | |
| E.G. Slope (ft/ft) | 0.004485 | Area (sq ft) | 5.68 | 504.29 | 0.11 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 58.73 | Top Width (ft) | 1.51 | 57.00 | 0.22 |
| Vel Total (ft/s) | 10.63 | Avg. Vel. (ft/s) | | 10.63 | |
| Max Chl Dpth (ft) | 11.54 | Hydr. Depth (ft) | | 9.21 | |
| Conv. Total (cfs) | 78986.1 | Conv. (cfs) | | 78986.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.47 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.01 | 1.81 | 0.01 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 0.27 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.15 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.11 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 9.04 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.66 | Flow Area (sq ft) | | 632.87 | |
| E.G. Slope (ft/ft) | 0.003916 | Area (sq ft) | 10.08 | 647.10 | 1.32 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 59.75 | Top Width (ft) | 2.01 | 57.00 | 0.75 |
| Vel Total (ft/s) | 11.66 | Avg. Vel. (ft/s) | | 11.66 | |
| Max Chl Dpth (ft) | 14.04 | Hydr. Depth (ft) | | 11.72 | |
| Conv. Total (cfs) | 117936.0 | Conv. (cfs) | | 117936.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.75 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.02 | 2.14 | 0.01 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.28 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 38

INPUT
Description: 2
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13 | 5 | -2 | 15 | -4 | 20 | -4.2 | 30 | -4.5 |
| 40 | -4 | 50 | 1 | 60 | 4 | 62 | 15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 5 | .04 | 60 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 5 | 60 | 38 | 38 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.00 | Element | | | |
| Vel Head (ft) | 2.08 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.92 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 13.25 | 506.88 | 0.77 |
| E.G. Slope (ft/ft) | 0.005276 | Area (sq ft) | 13.25 | 506.88 | 0.77 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 27.66 | 5881.82 | 0.52 |
| Top Width (ft) | 58.50 | Top Width (ft) | 2.97 | 55.00 | 0.53 |
| Vel Total (ft/s) | 11.35 | Avg. Vel. (ft/s) | 2.09 | 11.60 | 0.68 |
| Max Chl Dpth (ft) | 11.42 | Hydr. Depth (ft) | 4.46 | 9.22 | 1.46 |
| Conv. Total (cfs) | 81362.3 | Conv. (cfs) | 380.8 | 80974.3 | 7.2 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 9.40 | 56.84 | 2.96 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.46 | 2.94 | 0.09 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 0.01 | 1.57 | 0.00 |
| C & E Loss (ft) | 0.22 | Cum SA (acres) | 0.00 | 0.24 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 1.05 | Element | | | |
| Vel Head (ft) | 1.57 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | -0.52 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | -0.52 | Flow Area (sq ft) | 0.37 | 130.56 | |
| E.G. Slope (ft/ft) | 0.016637 | Area (sq ft) | 0.37 | 130.56 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.41 | 1311.59 | |
| Top Width (ft) | 42.46 | Top Width (ft) | 0.49 | 41.97 | |
| Vel Total (ft/s) | 10.02 | Avg. Vel. (ft/s) | 1.12 | 10.05 | |
| Max Chl Dpth (ft) | 3.98 | Hydr. Depth (ft) | 0.74 | 3.11 | |
| Conv. Total (cfs) | 10171.9 | Conv. (cfs) | 3.2 | 10168.7 | |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 1.56 | 43.01 | |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.24 | 3.15 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.44 | Cum Volume (acre-ft) | 0.00 | 0.69 | |
| C & E Loss (ft) | 0.15 | Cum SA (acres) | 0.00 | 0.19 | |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.86 | Element | | | |
| Vel Head (ft) | 1.96 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.91 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 5.81 | 341.34 | |
| E.G. Slope (ft/ft) | 0.008331 | Area (sq ft) | 5.81 | 341.34 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 11.59 | 3838.41 | |
| Top Width (ft) | 56.65 | Top Width (ft) | 1.97 | 54.69 | |
| Vel Total (ft/s) | 11.09 | Avg. Vel. (ft/s) | 1.99 | 11.25 | |
| Max Chl Dpth (ft) | 8.41 | Hydr. Depth (ft) | 2.95 | 6.24 | |
| Conv. Total (cfs) | 42181.5 | Conv. (cfs) | 127.0 | 42054.5 | |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.23 | 56.51 | |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.49 | 3.14 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.42 | Cum Volume (acre-ft) | 0.01 | 1.31 | 0.00 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.00 | 0.23 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.34 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.96 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.38 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 6.79 | 367.54 | 0.01 |
| E.G. Slope (ft/ft) | 0.007611 | Area (sq ft) | 6.79 | 367.54 | 0.01 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 13.62 | 4134.37 | 0.00 |
| Top Width (ft) | 57.20 | Top Width (ft) | 2.13 | 55.00 | 0.07 |
| Vel Total (ft/s) | 11.08 | Avg. Vel. (ft/s) | 2.01 | 11.25 | 0.21 |
| Max Chl Dpth (ft) | 8.88 | Hydr. Depth (ft) | 3.19 | 6.68 | 0.19 |
| Conv. Total (cfs) | 47545.4 | Conv. (cfs) | 156.2 | 47389.2 | 0.0 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.73 | 56.84 | 0.39 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.48 | 3.07 | 0.02 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.00 | 1.31 | 0.00 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.00 | 0.23 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.07 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.86 | 460.56 | 0.39 |
| E.G. Slope (ft/ft) | 0.005824 | Area (sq ft) | 10.86 | 460.56 | 0.39 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 22.31 | 5267.47 | 0.22 |
| Top Width (ft) | 58.07 | Top Width (ft) | 2.69 | 55.00 | 0.38 |
| Vel Total (ft/s) | 11.21 | Avg. Vel. (ft/s) | 2.05 | 11.44 | 0.57 |
| Max Chl Dpth (ft) | 10.57 | Hydr. Depth (ft) | 4.04 | 8.37 | 1.04 |
| Conv. Total (cfs) | 69315.7 | Conv. (cfs) | 292.3 | 69020.6 | 2.9 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 8.51 | 56.84 | 2.11 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.46 | 2.95 | 0.07 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.01 | 1.56 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.24 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.02 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.23 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 8.79 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 19.41 | 610.11 | 2.09 |
| E.G. Slope (ft/ft) | 0.004425 | Area (sq ft) | 19.41 | 610.11 | 2.09 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 42.16 | 7336.04 | 1.81 |
| Top Width (ft) | 59.47 | Top Width (ft) | 3.60 | 55.00 | 0.87 |
| Vel Total (ft/s) | 11.68 | Avg. Vel. (ft/s) | 2.17 | 12.02 | 0.86 |
| Max Chl Dpth (ft) | 13.29 | Hydr. Depth (ft) | 5.40 | 11.09 | 2.40 |
| Conv. Total (cfs) | 110944.6 | Conv. (cfs) | 633.8 | 110283.7 | 27.1 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 11.38 | 56.84 | 4.87 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.47 | 2.97 | 0.12 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.02 | 1.82 | 0.01 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.00 | 0.25 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 0

INPUT
Description: 1 (Downstream)
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19 | 1 | 19 | 10 | 2 | 20 | -6.3 | 30 | -6.3 |
| 40 | -5 | 50 | -2.5 | 52 | 1.8 | 60 | 19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 52 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 52 | 21 | 21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.48 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.24 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.24 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.24 | Flow Area (sq ft) | 1.33 | 357.35 | 1.39 |
| E.G. Slope (ft/ft) | 0.013662 | Area (sq ft) | 1.33 | 357.35 | 1.39 |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.31 | 5905.31 | 2.38 |
| Top Width (ft) | 44.32 | Top Width (ft) | 1.19 | 42.00 | 1.14 |
| Vel Total (ft/s) | 16.41 | Avg. Vel. (ft/s) | 1.74 | 16.53 | 1.72 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 1.12 | 8.51 | 1.22 |
| Conv. Total (cfs) | 50562.8 | Conv. (cfs) | 19.8 | 50522.7 | 20.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 2.54 | 48.13 | 2.69 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.45 | 6.33 | 0.44 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.00 | 1.19 | 0.00 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 0.20 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.42 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.08 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -0.66 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | -1.54 | Flow Area (sq ft) | | 157.23 | |
| E.G. Slope (ft/ft) | 0.008477 | Area (sq ft) | | 157.23 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 37.65 | Top Width (ft) | | 37.65 | |
| Vel Total (ft/s) | 8.34 | Avg. Vel. (ft/s) | | 8.34 | |
| Max Chl Dpth (ft) | 5.64 | Hydr. Depth (ft) | | 4.18 | |
| Conv. Total (cfs) | 14249.8 | Conv. (cfs) | | 14249.8 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 41.26 | |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | | 2.02 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.00 | 0.56 | |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.15 | |

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.21 | Wt. n-Val. | 0.000 | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.11 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.11 | Flow Area (sq ft) | 0.00 | 267.76 | 0.02 |
| E.G. Slope (ft/ft) | 0.015198 | Area (sq ft) | 0.00 | 267.76 | 0.02 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3849.99 | 0.01 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 42.20 | Top Width (ft) | 0.06 | 42.00 | 0.14 |
| Vel Total (ft/s) | 14.38 | Avg. Vel. (ft/s) | 0.24 | 14.38 | 0.46 |
| Max Chl Dpth (ft) | 8.41 | Hydr. Depth (ft) | 0.05 | 6.38 | 0.15 |
| Conv. Total (cfs) | 31229.7 | Conv. (cfs) | 0.0 | 31229.6 | 0.1 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 0.12 | 48.13 | 0.34 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | | 5.28 | 0.06 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.00 | 1.04 | 0.00 |
| C & E Loss (ft) | 0.33 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.36 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.45 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.45 | Flow Area (sq ft) | 0.05 | 281.94 | 0.10 |
| E.G. Slope (ft/ft) | 0.014853 | Area (sq ft) | 0.05 | 281.94 | 0.10 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.03 | 4147.90 | 0.07 |
| Top Width (ft) | 42.54 | Top Width (ft) | 0.24 | 42.00 | 0.30 |
| Vel Total (ft/s) | 14.70 | Avg. Vel. (ft/s) | 0.62 | 14.71 | 0.74 |
| Max Chl Dpth (ft) | 8.75 | Hydr. Depth (ft) | 0.22 | 6.71 | 0.32 |
| Conv. Total (cfs) | 34035.3 | Conv. (cfs) | 0.3 | 34034.4 | 0.6 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 0.50 | 48.13 | 0.71 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.10 | 5.43 | 0.13 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.00 | 1.03 | 0.00 |
| C & E Loss (ft) | 0.32 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.58 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 3.96 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.62 | Flow Area (sq ft) | 0.69 | 331.05 | 0.77 |
| E.G. Slope (ft/ft) | 0.014135 | Area (sq ft) | 0.69 | 331.05 | 0.77 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.98 | 5287.92 | 1.10 |
| Top Width (ft) | 43.70 | Top Width (ft) | 0.86 | 42.00 | 0.84 |
| Vel Total (ft/s) | 15.91 | Avg. Vel. (ft/s) | 1.42 | 15.97 | 1.43 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.81 | 7.88 | 0.91 |
| Conv. Total (cfs) | 44494.8 | Conv. (cfs) | 8.3 | 44477.3 | 9.2 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.83 | 48.13 | 2.00 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.33 | 6.07 | 0.34 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.00 | 1.22 | 0.01 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.20 | 0.01 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.49 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.62 | Flow Area (sq ft) | 3.47 | 415.35 | 3.40 |
| E.G. Slope (ft/ft) | 0.012870 | Area (sq ft) | 3.47 | 415.35 | 3.40 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 8.07 | 7364.30 | 7.63 |
| Top Width (ft) | 45.70 | Top Width (ft) | 1.92 | 42.00 | 1.78 |
| Vel Total (ft/s) | 17.48 | Avg. Vel. (ft/s) | 2.32 | 17.73 | 2.25 |
| Max Chl Dpth (ft) | 11.92 | Hydr. Depth (ft) | 1.81 | 9.89 | 1.91 |
| Conv. Total (cfs) | 65054.0 | Conv. (cfs) | 71.1 | 64915.6 | 67.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 4.10 | 48.13 | 4.22 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.68 | 6.93 | 0.65 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.38 | 0.00 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is

not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -21

INPUT
Description: RR
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15 | 8 | -3 | 25 | -7 | 30 | -7 | 37 | -6 |
| 50 | -2 | 59 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 59 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 59 | 33 | 33 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.91 | Element | | | |
| Vel Head (ft) | 6.09 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.82 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 3.29 | Flow Area (sq ft) | 5.17 | 297.09 | |
| E.G. Slope (ft/ft) | 0.024570 | Area (sq ft) | 5.17 | 297.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 18.28 | 5891.73 | |
| Top Width (ft) | 45.71 | Top Width (ft) | 2.14 | 43.56 | |
| Vel Total (ft/s) | 19.55 | Avg. Vel. (ft/s) | 3.53 | 19.83 | |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | 2.41 | 6.82 | |
| Conv. Total (cfs) | 37703.4 | Conv. (cfs) | 116.6 | 37586.8 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 5.28 | 47.27 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.50 | 9.64 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.00 | 1.03 | 0.00 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.18 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.18 | Element | | | |
| Vel Head (ft) | 0.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | -0.51 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.38 | 196.50 | |
| E.G. Slope (ft/ft) | 0.004483 | Area (sq ft) | 1.38 | 196.50 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 1.34 | 1310.66 | |
| Top Width (ft) | 43.72 | Top Width (ft) | 1.11 | 42.61 | |
| Vel Total (ft/s) | 6.63 | Avg. Vel. (ft/s) | 0.97 | 6.67 | |
| Max Chl Dpth (ft) | 6.49 | Hydr. Depth (ft) | 1.24 | 4.61 | |
| Conv. Total (cfs) | 19594.6 | Conv. (cfs) | 20.0 | 19574.7 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 2.72 | 44.75 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.14 | 1.23 | |
| Alpha | 1.01 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.00 | 0.47 | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.13 | |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.66 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.10 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.56 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 1.22 | Flow Area (sq ft) | 6.87 | 329.34 | |
| E.G. Slope (ft/ft) | 0.007551 | Area (sq ft) | 6.87 | 329.34 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 14.81 | 3835.19 | |
| Top Width (ft) | 46.34 | Top Width (ft) | 2.47 | 43.87 | |
| Vel Total (ft/s) | 11.45 | Avg. Vel. (ft/s) | 2.15 | 11.64 | |
| Max Chl Dpth (ft) | 9.56 | Hydr. Depth (ft) | 2.78 | 7.51 | |
| Conv. Total (cfs) | 44306.6 | Conv. (cfs) | 170.4 | 44136.2 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.09 | 48.07 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.53 | 3.23 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.00 | 0.90 | 0.00 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.17 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Note:  Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.24 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.91 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 0.34 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 1.55 | Flow Area (sq ft) | 2.47 | 232.78 | |
| E.G. Slope (ft/ft) | 0.026135 | Area (sq ft) | 2.47 | 232.78 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 7.06 | 4140.94 | |
| Top Width (ft) | 44.44 | Top Width (ft) | 1.48 | 42.96 | |
| Vel Total (ft/s) | 17.63 | Avg. Vel. (ft/s) | 2.85 | 17.79 | |
| Max Chl Dpth (ft) | 7.34 | Hydr. Depth (ft) | 1.67 | 5.42 | |
| Conv. Total (cfs) | 25658.1 | Conv. (cfs) | 43.7 | 25614.4 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 3.65 | 45.66 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.11 | 8.32 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 0.91 | 0.00 |
| C & E Loss (ft) | 0.15 | Cum SA (acres) | 0.00 | 0.17 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 5.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.32 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 2.71 | Flow Area (sq ft) | 4.15 | 275.33 | |
| E.G. Slope (ft/ft) | 0.025006 | Area (sq ft) | 4.15 | 275.33 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 13.76 | 5276.24 | |
| Top Width (ft) | 45.28 | Top Width (ft) | 1.92 | 43.36 | |
| Vel Total (ft/s) | 18.93 | Avg. Vel. (ft/s) | 3.31 | 19.16 | |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.35 | |
| Conv. Total (cfs) | 33452.7 | Conv. (cfs) | 87.0 | 33365.6 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 4.73 | 46.73 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.37 | 9.20 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.00 | 1.07 | 0.01 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.18 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.98 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.94 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 4.65 | Flow Area (sq ft) | 7.84 | 346.01 | |
| E.G. Slope (ft/ft) | 0.023784 | Area (sq ft) | 7.84 | 346.01 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.34 | 7348.67 | |
| Top Width (ft) | 46.66 | Top Width (ft) | 2.64 | 44.02 | |
| Vel Total (ft/s) | 20.86 | Avg. Vel. (ft/s) | 4.00 | 21.24 | |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 2.97 | 7.86 | |
| Conv. Total (cfs) | 47853.6 | Conv. (cfs) | 203.2 | 47650.5 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.50 | 48.48 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.79 | 10.60 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.00 | 1.19 | 0.00 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -54

INPUT
Description: K2
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 21 | 5 | 40 | -7 | 50 | -7 |
| 60 | -6 | 72 | -2 | 80 | 0 | 88 | 2 | 96 | 4 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 88 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 88 | 34 | 34 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.72 | Element | | | |
| Vel Head (ft) | 4.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.85 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 3.09 | Flow Area (sq ft) | | 333.87 | |
| E.G. Slope (ft/ft) | 0.025698 | Area (sq ft) | | 333.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 61.41 | Top Width (ft) | | 61.41 | |
| Vel Total (ft/s) | 17.70 | Avg. Vel. (ft/s) | | 17.70 | |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | | 5.44 | |
| Conv. Total (cfs) | 36867.0 | Conv. (cfs) | | 36867.0 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 65.15 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 8.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.83 | Cum Volume (acre-ft) | | 0.79 | 0.00 |
| C & E Loss (ft) | 0.37 | Cum SA (acres) | | 0.14 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.02 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -0.67 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 196.83 | |
| E.G. Slope (ft/ft) | 0.005185 | Area (sq ft) | | 196.83 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.34 | Top Width (ft) | | 47.34 | |
| Vel Total (ft/s) | 6.67 | Avg. Vel. (ft/s) | | 6.67 | |
| Max Chl Dpth (ft) | 6.33 | Hydr. Depth (ft) | | 4.16 | |
| Conv. Total (cfs) | 18220.8 | Conv. (cfs) | | 18220.8 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 50.04 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.27 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.29 | Cum Volume (acre-ft) | | 0.33 | |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | | 0.10 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.52 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.72 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 388.60 | 1.05 |
| E.G. Slope (ft/ft) | 0.006877 | Area (sq ft) | | 388.60 | 1.05 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3849.01 | 0.99 |
| Top Width (ft) | 66.29 | Top Width (ft) | | 63.40 | 2.90 |
| Vel Total (ft/s) | 9.88 | Avg. Vel. (ft/s) | | 9.90 | 0.94 |
| Max Chl Dpth (ft) | 9.72 | Hydr. Depth (ft) | | 6.13 | 0.36 |
| Conv. Total (cfs) | 46426.8 | Conv. (cfs) | | 46414.9 | 11.9 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 67.40 | 2.98 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.48 | 0.15 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.63 | 0.00 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.13 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.62 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.62 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.00 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 1.58 | Flow Area (sq ft) | | 406.25 | 2.01 |
| E.G. Slope (ft/ft) | 0.006950 | Area (sq ft) | | 406.25 | 2.01 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4145.64 | 2.36 |
| Top Width (ft) | 67.84 | Top Width (ft) | | 63.84 | 4.01 |
| Vel Total (ft/s) | 10.16 | Avg. Vel. (ft/s) | | 10.20 | 1.18 |
| Max Chl Dpth (ft) | 10.00 | Hydr. Depth (ft) | | 6.36 | 0.50 |
| Conv. Total (cfs) | 49755.9 | Conv. (cfs) | | 49727.6 | 28.3 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 67.92 | 4.13 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.60 | 0.21 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.66 | 0.00 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.13 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.98 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.93 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 2.59 | Flow Area (sq ft) | | 466.13 | 7.44 |
| E.G. Slope (ft/ft) | 0.007362 | Area (sq ft) | | 466.13 | 7.44 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5276.04 | 13.96 |
| Top Width (ft) | 73.02 | Top Width (ft) | | 65.30 | 7.71 |
| Vel Total (ft/s) | 11.17 | Avg. Vel. (ft/s) | | 11.32 | 1.88 |
| Max Chl Dpth (ft) | 10.93 | Hydr. Depth (ft) | | 7.14 | 0.96 |
| Conv. Total (cfs) | 61651.5 | Conv. (cfs) | | 61488.8 | 162.7 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.66 | 7.95 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 3.08 | 0.43 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.79 | 0.00 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | | 0.14 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.75 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.18 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 354.06 | 0.06 |
| E.G. Slope (ft/ft) | 0.033780 | Area (sq ft) | | 354.06 | 0.06 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7379.95 | 0.05 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 62.53 | 0.70 |
| Vel Total (ft/s) | 20.84 | Avg. Vel. (ft/s) | | 20.84 | 0.81 |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.66 | 0.09 |
| Conv. Total (cfs) | 40153.7 | Conv. (cfs) | | 40153.5 | 0.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.37 | 0.72 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 11.25 | 0.18 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | | 0.93 | 0.00 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -88

INPUT
Description: K1
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 56 | -6 | 72 | -6 | 80 | -5 |
| 94 | 0 | 108 | 5 | 122 | 5 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 108 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 108 | 55 | 55 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.18 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 3.18 | Flow Area (sq ft) | | 428.87 | |
| E.G. Slope (ft/ft) | 0.013653 | Area (sq ft) | | 428.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 72.75 | Top Width (ft) | | 72.75 | |
| Vel Total (ft/s) | 13.78 | Avg. Vel. (ft/s) | | 13.78 | |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.90 | |
| Conv. Total (cfs) | 50579.2 | Conv. (cfs) | | 50579.2 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 75.82 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.74 | Cum Volume (acre-ft) | | 0.50 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | -0.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.52 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -1.87 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | -1.87 | Flow Area (sq ft) | | 132.74 | |
| E.G. Slope (ft/ft) | 0.017077 | Area (sq ft) | | 132.74 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 44.37 | Top Width (ft) | | 44.37 | |
| Vel Total (ft/s) | 9.88 | Avg. Vel. (ft/s) | | 9.88 | |
| Max Chl Dpth (ft) | 4.13 | Hydr. Depth (ft) | | 2.99 | |
| Conv. Total (cfs) | 10039.9 | Conv. (cfs) | | 10039.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 45.68 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 3.10 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.62 | Cum Volume (acre-ft) | | 0.20 | |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | | 0.06 | |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.83 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.45 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.38 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 1.38 | Flow Area (sq ft) | | 306.55 | |
| E.G. Slope (ft/ft) | 0.014466 | Area (sq ft) | | 306.55 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.61 | Top Width (ft) | | 62.61 | |
| Vel Total (ft/s) | 12.56 | Avg. Vel. (ft/s) | | 12.56 | |
| Max Chl Dpth (ft) | 7.38 | Hydr. Depth (ft) | | 4.90 | |
| Conv. Total (cfs) | 32009.6 | Conv. (cfs) | | 32009.6 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 65.05 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.26 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.80 | Cum Volume (acre-ft) | | 0.36 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.67 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 1.67 | Flow Area (sq ft) | | 324.94 | |
| E.G. Slope (ft/ft) | 0.014320 | Area (sq ft) | | 324.94 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 64.23 | Top Width (ft) | | 64.23 | |
| Vel Total (ft/s) | 12.77 | Avg. Vel. (ft/s) | | 12.77 | |
| Max Chl Dpth (ft) | 7.67 | Hydr. Depth (ft) | | 5.06 | |
| Conv. Total (cfs) | 34663.2 | Conv. (cfs) | | 34663.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 66.77 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.35 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.79 | Cum Volume (acre-ft) | | 0.38 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.68 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 2.68 | Flow Area (sq ft) | | 393.12 | |
| E.G. Slope (ft/ft) | 0.013858 | Area (sq ft) | | 393.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 69.94 | Top Width (ft) | | 69.94 | |
| Vel Total (ft/s) | 13.46 | Avg. Vel. (ft/s) | | 13.46 | |
| Max Chl Dpth (ft) | 8.68 | Hydr. Depth (ft) | | 5.62 | |
| Conv. Total (cfs) | 44937.7 | Conv. (cfs) | | 44937.7 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 72.83 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.67 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.75 | Cum Volume (acre-ft) | | 0.46 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.25 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 4.25 | Flow Area (sq ft) | | 509.28 | |
| E.G. Slope (ft/ft) | 0.013360 | Area (sq ft) | | 509.28 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 78.71 | Top Width (ft) | | 78.71 | |
| Vel Total (ft/s) | 14.49 | Avg. Vel. (ft/s) | | 14.49 | |
| Max Chl Dpth (ft) | 10.25 | Hydr. Depth (ft) | | 6.47 | |
| Conv. Total (cfs) | 63848.9 | Conv. (cfs) | | 63848.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 82.14 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 5.17 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | 0.59 | 0.00 |
| C & E Loss (ft) | | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for

additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -143

INPUT
Description: K0
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11.3 | 10 | 52.7 | -7 | 69 | -7 | 77.8 | -6 |
| 98.2 | -1 | 100 | -1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11.3 | .04 | 98.2 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11.3 | 98.2 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.21 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 0.87 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.76 | Flow Area (sq ft) | | 357.78 | 3.37 |
| E.G. Slope (ft/ft) | 0.021059 | Area (sq ft) | | 357.78 | 3.37 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5899.45 | 10.55 |
| Top Width (ft) | 66.47 | Top Width (ft) | | 64.67 | 1.80 |
| Vel Total (ft/s) | 16.36 | Avg. Vel. (ft/s) | | 16.49 | 3.13 |
| Max Chl Dpth (ft) | 7.87 | Hydr. Depth (ft) | | 5.53 | 1.87 |
| Conv. Total (cfs) | 40725.3 | Conv. (cfs) | | 40652.6 | 72.7 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.88 | 3.67 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 7.03 | 1.21 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.92 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | -1.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -2.10 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | -2.96 | Flow Area (sq ft) | | 178.85 | |
| E.G. Slope (ft/ft) | 0.007984 | Area (sq ft) | | 178.85 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 52.94 | Top Width (ft) | | 52.94 | |
| Vel Total (ft/s) | 7.34 | Avg. Vel. (ft/s) | | 7.34 | |
| Max Chl Dpth (ft) | 4.90 | Hydr. Depth (ft) | | 3.38 | |
| Conv. Total (cfs) | 14683.3 | Conv. (cfs) | | 14683.3 | |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 54.44 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

Note:  Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.42 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | -0.70 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.07 | Flow Area (sq ft) | | 259.44 | 0.55 |
| E.G. Slope (ft/ft) | 0.024042 | Area (sq ft) | | 259.44 | 0.55 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3849.21 | 0.79 |
| Top Width (ft) | 62.65 | Top Width (ft) | | 60.85 | 1.80 |
| Vel Total (ft/s) | 14.81 | Avg. Vel. (ft/s) | | 14.84 | 1.44 |
| Max Chl Dpth (ft) | 6.30 | Hydr. Depth (ft) | | 4.26 | 0.30 |
| Conv. Total (cfs) | 24829.7 | Conv. (cfs) | | 24824.6 | 5.1 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 62.76 | 2.10 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.21 | 0.39 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.01 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.56 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | -0.46 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.32 | Flow Area (sq ft) | | 273.91 | 0.97 |
| E.G. Slope (ft/ft) | 0.023585 | Area (sq ft) | | 273.91 | 0.97 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4146.10 | 1.91 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 61.43 | 1.80 |
| Vel Total (ft/s) | 15.09 | Avg. Vel. (ft/s) | | 15.14 | 1.96 |
| Max Chl Dpth (ft) | 6.54 | Hydr. Depth (ft) | | 4.46 | 0.54 |
| Conv. Total (cfs) | 27009.5 | Conv. (cfs) | | 26997.1 | 12.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 63.38 | 2.34 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.36 | 0.61 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.00 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.43 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.02 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 0.41 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.29 | Flow Area (sq ft) | | 328.10 | 2.53 |
| E.G. Slope (ft/ft) | 0.021991 | Area (sq ft) | | 328.10 | 2.53 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5282.66 | 7.34 |
| Top Width (ft) | 65.34 | Top Width (ft) | | 63.54 | 1.80 |
| Vel Total (ft/s) | 16.00 | Avg. Vel. (ft/s) | | 16.10 | 2.90 |
| Max Chl Dpth (ft) | 7.41 | Hydr. Depth (ft) | | 5.16 | 1.41 |
| Conv. Total (cfs) | 35672.4 | Conv. (cfs) | | 35622.9 | 49.5 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 65.66 | 3.21 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.86 | 1.08 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.95 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.57 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 1.94 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 2.81 | Flow Area (sq ft) | | 428.54 | 5.30 |
| E.G. Slope (ft/ft) | 0.018989 | Area (sq ft) | | 428.54 | 5.30 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7362.03 | 17.97 |
| Top Width (ft) | 69.08 | Top Width (ft) | | 67.28 | 1.80 |
| Vel Total (ft/s) | 17.01 | Avg. Vel. (ft/s) | | 17.18 | 3.39 |
| Max Chl Dpth (ft) | 8.94 | Hydr. Depth (ft) | | 6.37 | 2.94 |
| Conv. Total (cfs) | 53555.1 | Conv. (cfs) | | 53424.7 | 130.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 69.71 | 4.74 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 7.29 | 1.32 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

SUMMARY OF MANNING'S N VALUES

River:Cobosee Stream

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| Reach 1 | 1700 | .07 | .04 | .065 |
| Reach 1 | 1635 | .07 | .045 | .065 |
| Reach 1 | 1555 | .07 | .042 | .065 |
| Reach 1 | 1455 | .065 | .045 | .07 |
| Reach 1 | 1335 | .065 | .045 | .075 |
| Reach 1 | 1185 | .065 | .045 | .07 |
| Reach 1 | 1060 | .065 | .04 | .07 |
| Reach 1 | 960 | .07 | .042 | .05 |
| Reach 1 | 935 | .065 | .042 | .07 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | .065 | .04 | .065 |
| Reach 1 | 830 | .065 | .04 | .065 |
| Reach 1 | 821 | .065 | .035 | .065 |
| Reach 1 | 820 | .065 | .035 | .065 |
| Reach 1 | 725 | .065 | .04 | .065 |
| Reach 1 | 575 | .065 | .04 | .065 |
| Reach 1 | 425 | .065 | .04 | .065 |
| Reach 1 | 335 | .065 | .04 | .065 |

| | | | | |
|---|---|---|---|---|
| Reach 1 | 262 | .065 | .04 | .065 |
| Reach 1 | 187 | .065 | .04 | .065 |
| Reach 1 | 137 | .065 | .04 | .065 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | .065 | .04 | .065 |
| Reach 1 | 38 | .065 | .04 | .065 |
| Reach 1 | 0 | .065 | .04 | .065 |
| Reach 1 | -21 | .065 | .04 | .065 |
| Reach 1 | -54 | .065 | .04 | .065 |
| Reach 1 | -88 | .065 | .04 | .065 |
| Reach 1 | -143 | .065 | .04 | .065 |

SUMMARY OF REACH LENGTHS

River: Cobosee Stream

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| Reach 1 | 1700 | 65 | 65 | 65 |
| Reach 1 | 1635 | 80 | 80 | 80 |
| Reach 1 | 1555 | 100 | 100 | 100 |
| Reach 1 | 1455 | 120 | 120 | 120 |
| Reach 1 | 1335 | 150 | 150 | 150 |
| Reach 1 | 1185 | 125 | 125 | 125 |
| Reach 1 | 1060 | 100 | 100 | 100 |
| Reach 1 | 960 | 25 | 25 | 25 |
| Reach 1 | 935 | 85 | 85 | 85 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | 20 | 20 | 20 |
| Reach 1 | 830 | 9 | 9 | 9 |
| Reach 1 | 821 | 1 | 1 | 1 |
| Reach 1 | 820 | 95 | 95 | 95 |
| Reach 1 | 725 | 150 | 150 | 150 |
| Reach 1 | 575 | 150 | 150 | 150 |
| Reach 1 | 425 | 90 | 90 | 90 |
| Reach 1 | 335 | 73 | 73 | 73 |
| Reach 1 | 262 | 75 | 75 | 75 |
| Reach 1 | 187 | 50 | 50 | 50 |
| Reach 1 | 137 | 77 | 77 | 77 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | 22 | 22 | 22 |
| Reach 1 | 38 | 38 | 38 | 38 |
| Reach 1 | 0 | 21 | 21 | 21 |
| Reach 1 | -21 | 33 | 33 | 33 |
| Reach 1 | -54 | 34 | 34 | 34 |
| Reach 1 | -88 | 55 | 55 | 55 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Existing MLW.rep |
| Reach 1 | -143 | | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Cobosee Stream

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| Reach 1 | 1700 | .1 | .3 |
| Reach 1 | 1635 | .1 | .3 |
| Reach 1 | 1555 | .1 | .3 |
| Reach 1 | 1455 | .1 | .3 |
| Reach 1 | 1335 | .1 | .3 |
| Reach 1 | 1185 | .1 | .3 |
| Reach 1 | 1060 | .1 | .3 |
| Reach 1 | 960 | .3 | .5 |
| Reach 1 | 935 | .3 | .5 |
| Reach 1 | 895 | Bridge | |
| Reach 1 | 850 | .3 | .5 |
| Reach 1 | 830 | .3 | .5 |
| Reach 1 | 821 | .3 | .5 |
| Reach 1 | 820 | .3 | .5 |
| Reach 1 | 725 | .1 | .3 |
| Reach 1 | 575 | .1 | .3 |
| Reach 1 | 425 | .1 | .3 |
| Reach 1 | 335 | .1 | .3 |
| Reach 1 | 262 | .1 | .3 |
| Reach 1 | 187 | .1 | .3 |
| Reach 1 | 137 | .3 | .5 |
| Reach 1 | 98.5 | Bridge | |
| Reach 1 | 60 | .3 | .5 |
| Reach 1 | 38 | .1 | .3 |
| Reach 1 | 0 | .1 | .3 |
| Reach 1 | -21 | .1 | .3 |
| Reach 1 | -54 | .1 | .3 |
| Reach 1 | -88 | .1 | .3 |
| Reach 1 | -143 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1700 | | Q100 | 5910.00 | 13.80 | 22.75 | 21.32 | 24.48 | 0.006899 |
| 10.56 | 559.56 | 84.99 | | 0.73 | | | | | |
| Reach 1 | 1700 | | Q1.1 | 1312.00 | 13.80 | 18.54 | 17.33 | 19.04 | 0.004837 |
| 5.66 | 231.75 | 70.35 | | 0.55 | | | | | |
| Reach 1 | 1700 | | Q10 | 3850.00 | 13.80 | 21.15 | 19.81 | 22.41 | 0.006488 |
| 8.99 | 428.08 | 79.67 | | 0.68 | | | | | |
| Reach 1 | 1700 | | Q25 | 4148.00 | 13.80 | 21.40 | 20.05 | 22.73 | 0.006586 |
| 9.26 | 447.72 | 80.49 | | 0.69 | | | | | |
| Reach 1 | 1700 | | Q50 | 5290.00 | 13.80 | 22.28 | 20.89 | 23.89 | 0.006865 |
| 10.17 | 519.99 | 83.43 | | 0.72 | | | | | |
| Reach 1 | 1700 | | Q500 | 7380.00 | 13.80 | 23.79 | 22.27 | 25.79 | 0.006886 |
| 11.36 | 649.74 | 88.50 | | 0.74 | | | | | |
| Reach 1 | 1635 | | Q100 | 5910.00 | 14.00 | 22.26 | | 23.95 | 0.009286 |
| 10.45 | 565.74 | 91.56 | | 0.74 | | | | | |
| Reach 1 | 1635 | | Q1.1 | 1312.00 | 14.00 | 17.69 | | 18.50 | 0.015059 |
| 7.21 | 181.92 | 75.56 | | 0.82 | | | | | |
| Reach 1 | 1635 | | Q10 | 3850.00 | 14.00 | 20.47 | | 21.86 | 0.010706 |
| 9.45 | 407.41 | 86.07 | | 0.77 | | | | | |
| Reach 1 | 1635 | | Q25 | 4148.00 | 14.00 | 20.75 | | 22.19 | 0.010420 |
| 9.61 | 431.49 | 86.93 | | 0.76 | | | | | |
| Reach 1 | 1635 | | Q50 | 5290.00 | 14.00 | 21.75 | | 23.36 | 0.009593 |
| 10.17 | 520.12 | 90.01 | | 0.75 | | | | | |
| Reach 1 | 1635 | | Q500 | 7380.00 | 14.00 | 23.37 | | 25.25 | 0.008749 |
| 11.03 | 669.19 | 94.97 | | 0.73 | | | | | |
| Reach 1 | 1555 | | Q100 | 5910.00 | 13.30 | 20.34 | 20.16 | 22.96 | 0.013988 |
| 12.99 | 455.10 | 80.13 | | 0.96 | | | | | |
| Reach 1 | 1555 | | Q1.1 | 1312.00 | 13.30 | 16.65 | | 17.46 | 0.011277 |
| 7.21 | 181.93 | 67.33 | | 0.77 | | | | | |
| Reach 1 | 1555 | | Q10 | 3850.00 | 13.30 | 19.06 | 18.65 | 20.89 | 0.012591 |
| 10.84 | 355.06 | 76.34 | | 0.89 | | | | | |
| Reach 1 | 1555 | | Q25 | 4148.00 | 13.30 | 19.24 | 18.89 | 21.21 | 0.013022 |
| 11.25 | 368.78 | 76.87 | | 0.90 | | | | | |
| Reach 1 | 1555 | | Q50 | 5290.00 | 13.30 | 19.96 | 19.73 | 22.37 | 0.013832 |
| 12.46 | 424.40 | 78.99 | | 0.95 | | | | | |
| Reach 1 | 1555 | | Q500 | 7380.00 | 13.30 | 21.24 | 21.12 | 24.27 | 0.013932 |
| 13.96 | 528.58 | 82.81 | | 0.97 | | | | | |
| Reach 1 | 1455 | | Q100 | 5910.00 | 11.80 | 19.15 | 18.73 | 21.52 | 0.013387 |
| 12.37 | 481.88 | 84.97 | | 0.89 | | | | | |
| Reach 1 | 1455 | | Q1.1 | 1312.00 | 11.80 | 15.06 | 14.87 | 16.04 | 0.018077 |
| 7.92 | 165.73 | 68.77 | | 0.90 | | | | | |
| Reach 1 | 1455 | | Q10 | 3850.00 | 11.80 | 17.40 | 17.28 | 19.41 | 0.017110 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11.38 | 338.91 | 78.76 | | 0.96 | | | | | |
| Reach 1 | 1455 | | Q25 | 4148.00 | 11.80 | 17.67 | 17.49 | 19.74 | 0.016462 |
| 11.55 | 360.01 | 79.70 | | 0.95 | | | | | |
| Reach 1 | 1455 | | Q50 | 5290.00 | 11.80 | 18.65 | 18.33 | 20.92 | 0.014390 |
| 12.10 | 439.82 | 83.19 | | 0.91 | | | | | |
| Reach 1 | 1455 | | Q500 | 7380.00 | 11.80 | 20.29 | | 22.87 | 0.011588 |
| 12.93 | 580.92 | 89.01 | | 0.86 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1335 | | Q100 | 5910.00 | 9.50 | 18.29 | | 20.09 | 0.008451 |
| 10.77 | 549.55 | 80.41 | | 0.72 | | | | | |
| Reach 1 | 1335 | | Q1.1 | 1312.00 | 9.50 | 12.63 | 12.50 | 13.78 | 0.019322 |
| 8.58 | 152.88 | 58.82 | | 0.94 | | | | | |
| Reach 1 | 1335 | | Q10 | 3850.00 | 9.50 | 16.13 | | 17.69 | 0.010520 |
| 10.02 | 384.19 | 72.81 | | 0.77 | | | | | |
| Reach 1 | 1335 | | Q25 | 4148.00 | 9.50 | 16.47 | | 18.07 | 0.010117 |
| 10.13 | 409.60 | 74.07 | | 0.76 | | | | | |
| Reach 1 | 1335 | | Q50 | 5290.00 | 9.50 | 17.69 | | 19.41 | 0.008914 |
| 10.54 | 502.02 | 78.36 | | 0.73 | | | | | |
| Reach 1 | 1335 | | Q500 | 7380.00 | 9.50 | 19.61 | | 21.58 | 0.007511 |
| 11.27 | 659.01 | 85.25 | | 0.70 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1185 | | Q100 | 5910.00 | 5.50 | 15.74 | 15.05 | 18.44 | 0.013066 |
| 13.18 | 448.42 | 64.17 | | 0.88 | | | | | |
| Reach 1 | 1185 | | Q1.1 | 1312.00 | 5.50 | 10.99 | | 11.81 | 0.008702 |
| 7.27 | 180.57 | 47.96 | | 0.66 | | | | | |
| Reach 1 | 1185 | | Q10 | 3850.00 | 5.50 | 14.08 | 13.16 | 16.00 | 0.011509 |
| 11.11 | 346.47 | 58.78 | | 0.81 | | | | | |
| Reach 1 | 1185 | | Q25 | 4148.00 | 5.50 | 14.34 | 13.46 | 16.38 | 0.011809 |
| 11.46 | 361.81 | 59.62 | | 0.82 | | | | | |
| Reach 1 | 1185 | | Q50 | 5290.00 | 5.50 | 15.27 | 14.52 | 17.75 | 0.012741 |
| 12.65 | 418.21 | 62.62 | | 0.86 | | | | | |
| Reach 1 | 1185 | | Q500 | 7380.00 | 5.50 | 16.59 | 16.20 | 19.92 | 0.014396 |
| 14.65 | 504.00 | 66.73 | | 0.93 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1060 | | Q100 | 5910.00 | 5.00 | 13.57 | 13.57 | 16.72 | 0.013789 |
| 14.24 | 415.00 | 66.76 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q1.1 | 1312.00 | 5.00 | 8.85 | 8.85 | 10.26 | 0.017292 |
| 9.54 | 137.48 | 49.24 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q10 | 3850.00 | 5.00 | 11.81 | 11.81 | 14.33 | 0.014662 |
| 12.72 | 302.66 | 61.04 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q25 | 4148.00 | 5.00 | 12.10 | 12.10 | 14.70 | 0.014382 |
| 12.94 | 320.59 | 62.01 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q50 | 5290.00 | 5.00 | 13.10 | 13.10 | 16.05 | 0.013832 |
| 13.77 | 384.11 | 65.31 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q500 | 7380.00 | 5.00 | 14.68 | 14.68 | 18.19 | 0.013247 |
| 15.03 | 490.87 | 70.19 | | 1.00 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 960 | | Q100 | 5910.00 | 3.50 | 12.54 | 11.33 | 14.82 | 0.008563 |
| 12.15 | 495.72 | 82.79 | | 0.77 | | | | | |
| Reach 1 | 960 | | Q1.1 | 1312.00 | 3.50 | 7.54 | 6.91 | 8.38 | 0.009882 |
| 7.35 | 178.49 | 56.92 | | 0.73 | | | | | |
| Reach 1 | 960 | | Q10 | 3850.00 | 3.50 | 10.76 | 9.68 | 12.41 | 0.008769 |
| 10.32 | 373.52 | 64.43 | | 0.75 | | | | | |
| Reach 1 | 960 | | Q25 | 4148.00 | 3.50 | 11.04 | 9.93 | 12.79 | 0.008725 |
| 10.62 | 391.65 | 65.09 | | 0.75 | | | | | |
| Reach 1 | 960 | | Q50 | 5290.00 | 3.50 | 12.04 | 10.87 | 14.14 | 0.008580 |
| 11.63 | 458.31 | 68.60 | | 0.76 | | | | | |
| Reach 1 | 960 | | Q500 | 7380.00 | 3.50 | 11.41 | 12.50 | 16.33 | 0.022762 |
| 17.82 | 415.83 | 65.95 | | 1.22 | | | | | |
| Reach 1 | 935 | | Q100 | 5910.00 | 2.00 | 13.04 | 10.34 | 14.06 | 0.003531 |
| 8.25 | 809.75 | 158.21 | | 0.51 | | | | | |
| Reach 1 | 935 | | Q1.1 | 1312.00 | 2.00 | 7.58 | 5.91 | 8.04 | 0.004364 |
| 5.44 | 241.37 | 66.50 | | 0.50 | | | | | |
| Reach 1 | 935 | | Q10 | 3850.00 | 2.00 | 11.00 | 8.78 | 11.87 | 0.004311 |
| 7.49 | 526.51 | 114.51 | | 0.54 | | | | | |
| Reach 1 | 935 | | Q25 | 4148.00 | 2.00 | 11.32 | 9.03 | 12.22 | 0.004193 |
| 7.65 | 563.83 | 123.44 | | 0.54 | | | | | |
| Reach 1 | 935 | | Q50 | 5290.00 | 2.00 | 12.46 | 9.93 | 13.45 | 0.003743 |
| 8.08 | 723.33 | 156.11 | | 0.52 | | | | | |
| Reach 1 | 935 | | Q500 | 7380.00 | 2.00 | 14.22 | 11.33 | 15.32 | 0.003277 |
| 8.71 | 987.87 | 168.60 | | 0.51 | | | | | |
| Reach 1 | 895 | | Bridge | | | | | | |
| Reach 1 | 850 | | Q100 | 5910.00 | 1.00 | 11.56 | 9.38 | 12.72 | 0.004490 |
| 8.76 | 737.73 | 144.16 | | 0.58 | | | | | |
| Reach 1 | 850 | | Q1.1 | 1312.00 | 1.00 | 6.86 | 4.89 | 7.25 | 0.003268 |
| 5.01 | 262.03 | 69.29 | | 0.45 | | | | | |
| Reach 1 | 850 | | Q10 | 3850.00 | 1.00 | 9.48 | 7.75 | 10.53 | 0.005737 |
| 8.22 | 474.86 | 103.69 | | 0.63 | | | | | |
| Reach 1 | 850 | | Q25 | 4148.00 | 1.00 | 9.82 | 8.01 | 10.88 | 0.005609 |
| 8.31 | 511.28 | 113.83 | | 0.62 | | | | | |
| Reach 1 | 850 | | Q50 | 5290.00 | 1.00 | 10.94 | 8.91 | 12.08 | 0.004917 |
| 8.67 | 651.61 | 134.32 | | 0.60 | | | | | |
| Reach 1 | 850 | | Q500 | 7380.00 | 1.00 | 13.08 | 10.40 | 14.20 | 0.003513 |
| 8.72 | 962.68 | 157.76 | | 0.52 | | | | | |
| Reach 1 | 830 | | Q100 | 5910.00 | 1.00 | 11.54 | | 12.57 | 0.003454 |

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8.19      768.79      147.28                0.53
  Reach 1       830          Q1.1       1312.00        1.00        6.80                 7.17     0.004037
4.90      267.69       88.18                0.50
  Reach 1       830          Q10        3850.00        1.00        9.47                10.34     0.004399
7.49      515.84       95.94                0.57
  Reach 1       830          Q25        4148.00        1.00        9.81                10.70     0.004218
7.60      548.21       96.67                0.56
  Reach 1       830          Q50        5290.00        1.00       10.92                11.93     0.003757
8.05      680.74      136.18                0.54
  Reach 1       830          Q500       7380.00        1.00       13.07                14.09     0.002737
8.26     1000.53      153.73                0.49


  Reach 1       821          Q100       5910.00        1.00       11.53                12.53     0.002866
8.05      768.40      157.69                0.54
  Reach 1       821          Q1.1       1312.00        1.00        6.72                 7.13     0.003214
5.14      255.20       80.51                0.51
  Reach 1       821          Q10        3850.00        1.00        9.41                10.30     0.003921
7.58      507.74      103.12                0.60
  Reach 1       821          Q25        4148.00        1.00        9.77                10.67     0.003649
7.61      545.09      103.92                0.59
  Reach 1       821          Q50        5290.00        1.00       10.90                11.88     0.003150
7.95      677.07      134.94                0.56
  Reach 1       821          Q500       7380.00        1.00       13.07                14.04     0.002233
8.04     1014.09      161.42                0.49


  Reach 1       820          Q100       5910.00        1.00       11.59                12.46     0.002824
7.49      832.41      193.15                0.53
  Reach 1       820          Q1.1       1312.00        1.00        6.71                 7.12     0.003228
5.15      254.82       80.46                0.51
  Reach 1       820          Q10        3850.00        1.00        9.40                10.29     0.004315
7.57      508.45      111.75                0.63
  Reach 1       820          Q25        4148.00        1.00        9.77                10.65     0.004246
7.52      551.32      120.93                0.62
  Reach 1       820          Q50        5290.00        1.00       10.95                11.83     0.003290
7.51      722.96      156.10                0.56
  Reach 1       820          Q500       7380.00        1.00       13.18                13.92     0.001862
7.09     1260.27      281.71                0.45


  Reach 1       725          Q100       5910.00        2.50       11.30                12.14     0.003724
7.36      832.82      188.19                0.53
  Reach 1       725          Q1.1       1312.00        2.50        6.19                 6.68     0.006470
5.62      233.27       89.27                0.61
  Reach 1       725          Q10        3850.00        2.50        8.81                 9.79     0.005976
7.94      484.70      103.23                0.65
  Reach 1       725          Q25        4148.00        2.50        9.18                10.15     0.005798
7.92      523.96      109.64                0.64
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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Reach 1 | 725 | | Q50 | 5290.00 | 2.50 | 10.57 | 11.46 | 0.004654 |
| 7.54 | 707.44 | 157.21 | | 0.58 | | | | |
| Reach 1 | 725 | | Q500 | 7380.00 | 2.50 | 13.00 | 13.72 | 0.002360 |
| 6.92 | 1208.76 | 247.45 | | 0.44 | | | | |
| Reach 1 | 575 | | Q100 | 5910.00 | 1.50 | 11.08 | 11.67 | 0.001918 |
| 6.22 | 1026.90 | 220.83 | | 0.40 | | | | |
| Reach 1 | 575 | | Q1.1 | 1312.00 | 1.50 | 4.64 | 5.33 | 0.012980 |
| 6.66 | 197.13 | 99.10 | | 0.83 | | | | |
| Reach 1 | 575 | | Q10 | 3850.00 | 1.50 | 8.39 | 9.01 | 0.003452 |
| 6.35 | 606.59 | 120.11 | | 0.50 | | | | |
| Reach 1 | 575 | | Q25 | 4148.00 | 1.50 | 8.80 | 9.42 | 0.003151 |
| 6.32 | 656.54 | 122.72 | | 0.48 | | | | |
| Reach 1 | 575 | | Q50 | 5290.00 | 1.50 | 10.29 | 10.90 | 0.002253 |
| 6.27 | 871.16 | 174.83 | | 0.42 | | | | |
| Reach 1 | 575 | | Q500 | 7380.00 | 1.50 | 12.87 | 13.39 | 0.001335 |
| 5.97 | 1486.21 | 269.19 | | 0.34 | | | | |
| Reach 1 | 425 | | Q100 | 5910.00 | 0.00 | 10.82 | 11.41 | 0.001604 |
| 6.22 | 1051.38 | 244.73 | | 0.37 | | | | |
| Reach 1 | 425 | | Q1.1 | 1312.00 | 0.00 | 3.63 | 4.09 | 0.005213 |
| 5.45 | 240.73 | 81.90 | | 0.56 | | | | |
| Reach 1 | 425 | | Q10 | 3850.00 | 0.00 | 8.02 | 8.58 | 0.002271 |
| 5.98 | 643.65 | 100.36 | | 0.42 | | | | |
| Reach 1 | 425 | | Q25 | 4148.00 | 0.00 | 8.45 | 9.01 | 0.002174 |
| 6.04 | 686.74 | 101.97 | | 0.41 | | | | |
| Reach 1 | 425 | | Q50 | 5290.00 | 0.00 | 10.00 | 10.60 | 0.001827 |
| 6.22 | 869.43 | 148.17 | | 0.39 | | | | |
| Reach 1 | 425 | | Q500 | 7380.00 | 0.00 | 12.69 | 13.21 | 0.001159 |
| 6.01 | 1534.62 | 265.24 | | 0.32 | | | | |
| Reach 1 | 335 | | Q100 | 5910.00 | -2.00 | 10.27 | 11.20 | 0.002411 |
| 7.77 | 800.00 | 169.01 | | 0.45 | | | | |
| Reach 1 | 335 | | Q1.1 | 1312.00 | -2.00 | 3.17 | 3.67 | 0.004095 |
| 5.68 | 230.92 | 60.95 | | 0.51 | | | | |
| Reach 1 | 335 | | Q10 | 3850.00 | -2.00 | 7.50 | 8.31 | 0.003103 |
| 7.23 | 532.59 | 77.91 | | 0.49 | | | | |
| Reach 1 | 335 | | Q25 | 4148.00 | -2.00 | 7.92 | 8.76 | 0.003034 |
| 7.33 | 565.64 | 79.52 | | 0.48 | | | | |
| Reach 1 | 335 | | Q50 | 5290.00 | -2.00 | 9.46 | 10.37 | 0.002648 |
| 7.66 | 695.90 | 100.54 | | 0.46 | | | | |
| Reach 1 | 335 | | Q500 | 7380.00 | -2.00 | 12.22 | 13.05 | 0.001761 |
| 7.54 | 1234.90 | 249.51 | | 0.40 | | | | |
| Reach 1 | 262 | | Q100 | 5910.00 | -3.00 | 9.39 | 10.90 | 0.004665 |

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9.86      599.15       73.18                0.61
  Reach 1       262            Q1.1       1312.00       -3.00        2.43                    3.25     0.006859
7.30      179.66       47.23                0.66
  Reach 1       262            Q10        3850.00       -3.00        6.56                    7.95     0.005852
9.48      406.25       62.72                0.66
  Reach 1       262            Q25        4148.00       -3.00        6.97                    8.40     0.005701
9.58      432.83       64.35                0.65
  Reach 1       262            Q50        5290.00       -3.00        8.55                   10.05     0.005045
9.81      539.04       70.12                0.62
  Reach 1       262            Q500       7380.00       -3.00       11.30                   12.81     0.003559
9.88      801.85      143.31                0.55


  Reach 1       187            Q100       5910.00       -4.00        9.10                   10.55     0.004309
9.68      610.37       71.09                0.58
  Reach 1       187            Q1.1       1312.00       -4.00        2.06                    2.77     0.005256
6.74      194.73       47.00                0.58
  Reach 1       187            Q10        3850.00       -4.00        6.20                    7.51     0.005170
9.19      419.08       61.24                0.62
  Reach 1       187            Q25        4148.00       -4.00        6.63                    7.97     0.005066
9.31      445.37       62.67                0.62
  Reach 1       187            Q50        5290.00       -4.00        8.24                    9.67     0.004578
9.61      550.65       68.10                0.60
  Reach 1       187            Q500       7380.00       -4.00       11.05                   12.54     0.003405
9.80      770.83       96.82                0.53


  Reach 1       137            Q100       5910.00       -4.00        8.36        5.71        10.28     0.004602
11.13      531.20       69.03                0.63
  Reach 1       137            Q1.1       1312.00       -4.00        1.62        0.50         2.46     0.006774
7.37      178.02       45.47                0.66
  Reach 1       137            Q10        3850.00       -4.00        5.68        3.85         7.22     0.005631
9.96      386.61       59.95                0.66
  Reach 1       137            Q25        4148.00       -4.00        6.08        4.15         7.69     0.005446
10.16      408.38       61.32                0.65
  Reach 1       137            Q50        5290.00       -4.00        7.58        5.20         9.40     0.004854
10.81      489.14       66.39                0.63
  Reach 1       137            Q500       7380.00       -4.00       10.13        6.86        12.28     0.004126
11.77      627.13       75.49                0.61


  Reach 1      98.5                         Bridge


  Reach 1       60             Q100       5910.00       -5.00        7.30        4.52         9.17     0.004296
10.97      538.71       59.04                0.61
  Reach 1       60             Q1.1       1312.00       -5.00        0.85       -0.76         1.49     0.004373
6.44      203.66       47.04                0.54
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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Reach 1 | 60 | | Q10 | 3850.00 | -5.00 | 4.71 | 2.53 | 6.16 | 0.004963 |
| 9.65 | 398.91 | 56.38 | | 0.63 | | | | | |
| Reach 1 | 60 | | Q25 | 4148.00 | -5.00 | 5.08 | 2.84 | 6.60 | 0.004884 |
| 9.90 | 419.17 | 57.29 | | 0.63 | | | | | |
| Reach 1 | 60 | | Q50 | 5290.00 | -5.00 | 6.54 | 3.97 | 8.29 | 0.004485 |
| 10.63 | 497.57 | 58.73 | | 0.62 | | | | | |
| Reach 1 | 60 | | Q500 | 7380.00 | -5.00 | 9.04 | 5.66 | 11.15 | 0.003916 |
| 11.66 | 632.87 | 59.75 | | 0.60 | | | | | |
| Reach 1 | 38 | | Q100 | 5910.00 | -4.50 | 6.92 | | 9.00 | 0.005276 |
| 11.60 | 520.91 | 58.50 | | 0.67 | | | | | |
| Reach 1 | 38 | | Q1.1 | 1312.00 | -4.50 | -0.52 | -0.52 | 1.05 | 0.016637 |
| 10.05 | 130.93 | 42.46 | | 1.00 | | | | | |
| Reach 1 | 38 | | Q10 | 3850.00 | -4.50 | 3.91 | | 5.86 | 0.008331 |
| 11.25 | 347.15 | 56.65 | | 0.79 | | | | | |
| Reach 1 | 38 | | Q25 | 4148.00 | -4.50 | 4.38 | | 6.34 | 0.007611 |
| 11.25 | 374.35 | 57.20 | | 0.77 | | | | | |
| Reach 1 | 38 | | Q50 | 5290.00 | -4.50 | 6.07 | | 8.10 | 0.005824 |
| 11.44 | 471.82 | 58.07 | | 0.70 | | | | | |
| Reach 1 | 38 | | Q500 | 7380.00 | -4.50 | 8.79 | | 11.02 | 0.004425 |
| 12.02 | 631.61 | 59.47 | | 0.64 | | | | | |
| Reach 1 | 0 | | Q100 | 5910.00 | -6.30 | 4.24 | 4.24 | 8.48 | 0.013662 |
| 16.53 | 360.07 | 44.32 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q1.1 | 1312.00 | -6.30 | -0.66 | -1.54 | 0.42 | 0.008477 |
| 8.34 | 157.23 | 37.65 | | 0.72 | | | | | |
| Reach 1 | 0 | | Q10 | 3850.00 | -6.30 | 2.11 | 2.11 | 5.32 | 0.015198 |
| 14.38 | 267.79 | 42.20 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q25 | 4148.00 | -6.30 | 2.45 | 2.45 | 5.81 | 0.014853 |
| 14.71 | 282.09 | 42.54 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q50 | 5290.00 | -6.30 | 3.62 | 3.62 | 7.58 | 0.014135 |
| 15.97 | 332.50 | 43.70 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q500 | 7380.00 | -6.30 | 5.62 | 5.62 | 10.49 | 0.012870 |
| 17.73 | 422.22 | 45.70 | | 0.99 | | | | | |
| Reach 1 | -21 | | Q100 | 5910.00 | -7.00 | 1.82 | 3.29 | 7.91 | 0.024570 |
| 19.83 | 302.26 | 45.71 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q1.1 | 1312.00 | -7.00 | -0.51 | | 0.18 | 0.004483 |
| 6.67 | 197.87 | 43.72 | | 0.55 | | | | | |
| Reach 1 | -21 | | Q10 | 3850.00 | -7.00 | 2.56 | 1.22 | 4.66 | 0.007551 |
| 11.64 | 336.22 | 46.34 | | 0.75 | | | | | |
| Reach 1 | -21 | | Q25 | 4148.00 | -7.00 | 0.34 | 1.55 | 5.24 | 0.026135 |
| 17.79 | 235.26 | 44.44 | | 1.35 | | | | | |
| Reach 1 | -21 | | Q50 | 5290.00 | -7.00 | 1.32 | 2.71 | 7.01 | 0.025006 |
| 19.16 | 279.48 | 45.28 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q500 | 7380.00 | -7.00 | 2.94 | 4.65 | 9.92 | 0.023784 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 21.24 | 353.85 | 46.66 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q100 | 5910.00 | -7.00 | 1.85 | 3.09 | 6.72 | 0.025698 |
| 17.70 | 333.87 | 61.41 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q1.1 | 1312.00 | -7.00 | -0.67 | | 0.02 | 0.005185 |
| 6.67 | 196.83 | 47.34 | | 0.58 | | | | | |
| Reach 1 | -54 | | Q10 | 3850.00 | -7.00 | 2.72 | | 4.25 | 0.006877 |
| 9.90 | 389.65 | 66.29 | | 0.71 | | | | | |
| Reach 1 | -54 | | Q25 | 4148.00 | -7.00 | 3.00 | 1.58 | 4.62 | 0.006950 |
| 10.20 | 408.26 | 67.84 | | 0.71 | | | | | |
| Reach 1 | -54 | | Q50 | 5290.00 | -7.00 | 3.93 | 2.59 | 5.91 | 0.007362 |
| 11.32 | 473.56 | 73.02 | | 0.75 | | | | | |
| Reach 1 | -54 | | Q500 | 7380.00 | -7.00 | 2.18 | 4.20 | 8.92 | 0.033780 |
| 20.84 | 354.12 | 63.23 | | 1.54 | | | | | |
| Reach 1 | -88 | | Q100 | 5910.00 | -6.00 | 3.18 | 3.18 | 6.13 | 0.013653 |
| 13.78 | 428.87 | 72.75 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q1.1 | 1312.00 | -6.00 | -1.87 | -1.87 | -0.35 | 0.017077 |
| 9.88 | 132.74 | 44.37 | | 1.01 | | | | | |
| Reach 1 | -88 | | Q10 | 3850.00 | -6.00 | 1.38 | 1.38 | 3.83 | 0.014466 |
| 12.56 | 306.55 | 62.61 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q25 | 4148.00 | -6.00 | 1.67 | 1.67 | 4.20 | 0.014320 |
| 12.77 | 324.94 | 64.23 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q50 | 5290.00 | -6.00 | 2.68 | 2.68 | 5.50 | 0.013858 |
| 13.46 | 393.12 | 69.94 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q500 | 7380.00 | -6.00 | 4.25 | 4.25 | 7.51 | 0.013360 |
| 14.49 | 509.28 | 78.71 | | 1.00 | | | | | |
| Reach 1 | -143 | | Q100 | 5910.00 | -7.00 | 0.87 | 1.76 | 5.09 | 0.021059 |
| 16.49 | 361.15 | 66.47 | | 1.24 | | | | | |
| Reach 1 | -143 | | Q1.1 | 1312.00 | -7.00 | -2.10 | -2.96 | -1.26 | 0.007984 |
| 7.34 | 178.85 | 52.94 | | 0.70 | | | | | |
| Reach 1 | -143 | | Q10 | 3850.00 | -7.00 | -0.70 | 0.07 | 2.72 | 0.024042 |
| 14.84 | 259.99 | 62.65 | | 1.27 | | | | | |
| Reach 1 | -143 | | Q25 | 4148.00 | -7.00 | -0.46 | 0.32 | 3.10 | 0.023585 |
| 15.14 | 274.89 | 63.23 | | 1.26 | | | | | |
| Reach 1 | -143 | | Q50 | 5290.00 | -7.00 | 0.41 | 1.29 | 4.43 | 0.021991 |
| 16.10 | 330.63 | 65.34 | | 1.25 | | | | | |
| Reach 1 | -143 | | Q500 | 7380.00 | -7.00 | 1.94 | 2.81 | 6.52 | 0.018989 |
| 17.18 | 433.84 | 69.08 | | 1.20 | | | | | |

Profile Output Table - Six XS Bridge

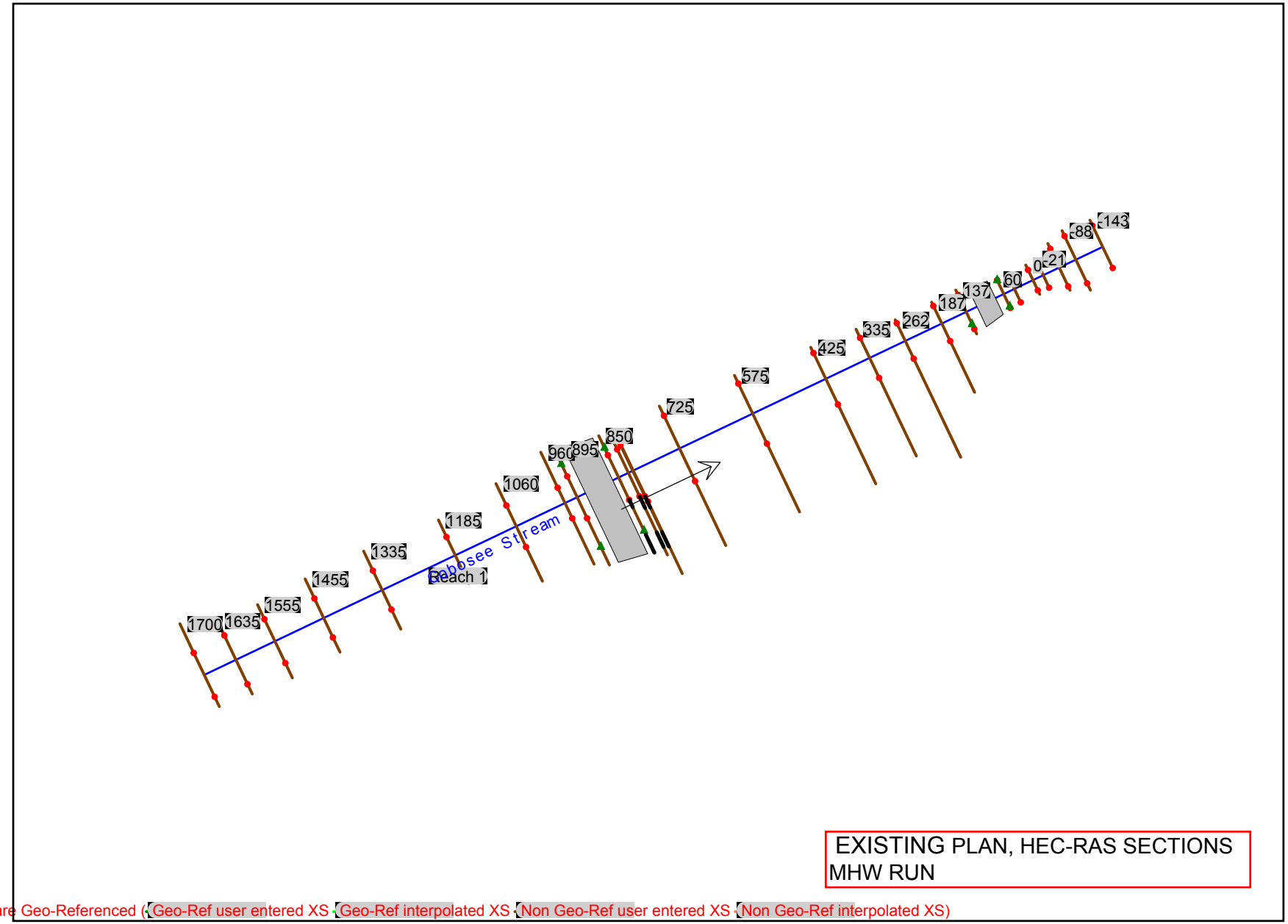
| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Crit W.S. | Frctn Loss | C & E Loss | Top Width |
|---|---|---|---|---|---|---|---|---|
| Q Left | Q Channel | Q Right | Vel Chnl | | | | | |
| (cfs) | (cfs) | (cfs) | (ft/s) | (ft) | (ft) | (ft) | (ft) | (ft) |
| Reach 1 | 960 | | Q100 | 14.82 | 12.54 | 11.33 | 0.13 | 0.63 | 82.79 |
| 0.20 | 5891.34 | 18.46 | 12.15 | | | | | | |
| Reach 1 | 960 | | Q1.1 | 8.38 | 7.54 | 6.91 | 0.16 | 0.19 | 56.92 |
| | 1312.00 | | 7.35 | | | | | | |
| Reach 1 | 960 | | Q10 | 12.41 | 10.76 | 9.68 | 0.15 | 0.39 | 64.43 |
| 0.01 | 3849.40 | 0.59 | 10.32 | | | | | | |
| Reach 1 | 960 | | Q25 | 12.79 | 11.04 | 9.93 | 0.15 | 0.42 | 65.09 |
| 0.02 | 4146.46 | 1.52 | 10.62 | | | | | | |
| Reach 1 | 960 | | Q50 | 14.14 | 12.04 | 10.87 | 0.14 | 0.55 | 68.60 |
| 0.11 | 5280.65 | 9.24 | 11.63 | | | | | | |
| Reach 1 | 960 | | Q500 | 16.33 | 11.41 | 12.50 | 1.71 | 0.14 | 65.95 |
| 0.06 | 7373.96 | 5.97 | 17.82 | | | | | | |
| Reach 1 | 935 | | Q100 | 14.06 | 13.04 | 10.34 | 0.10 | 0.29 | 158.21 |
| 12.49 | 5673.06 | 224.45 | 8.25 | | | | | | |
| Reach 1 | 935 | | Q1.1 | 8.04 | 7.58 | 5.91 | 0.10 | 0.09 | 66.50 |
| | 1312.00 | | 5.44 | | | | | | |
| Reach 1 | 935 | | Q10 | 11.87 | 11.00 | 8.78 | 0.12 | 0.24 | 114.51 |
| 0.71 | 3837.48 | 11.81 | 7.49 | | | | | | |
| Reach 1 | 935 | | Q25 | 12.22 | 11.32 | 9.03 | 0.11 | 0.24 | 123.44 |
| 1.46 | 4122.46 | 24.08 | 7.65 | | | | | | |
| Reach 1 | 935 | | Q50 | 13.45 | 12.46 | 9.93 | 0.10 | 0.28 | 156.11 |
| 7.33 | 5154.48 | 128.19 | 8.08 | | | | | | |
| Reach 1 | 935 | | Q500 | 15.32 | 14.22 | 11.33 | 0.09 | 0.23 | 168.60 |
| 28.83 | 6873.98 | 477.18 | 8.71 | | | | | | |
| Reach 1 | 895 | BR U | Q100 | 13.67 | 11.70 | 10.78 | 0.48 | 0.29 | 121.45 |
| 4.65 | 5851.97 | 53.38 | 11.34 | | | | | | |
| Reach 1 | 895 | BR U | Q1.1 | 7.84 | 7.07 | 6.09 | 0.35 | 0.14 | 55.33 |
| | 1312.00 | | 7.03 | | | | | | |
| Reach 1 | 895 | BR U | Q10 | 11.51 | 9.84 | 9.19 | 0.59 | 0.19 | 77.17 |
| | 3850.00 | | 10.37 | | | | | | |
| Reach 1 | 895 | BR U | Q25 | 11.86 | 10.15 | 9.45 | 0.58 | 0.19 | 78.50 |
| 0.01 | 4147.99 | | 10.49 | | | | | | |
| Reach 1 | 895 | BR U | Q50 | 13.07 | 11.14 | 10.32 | 0.52 | 0.26 | 105.53 |
| 1.67 | 5272.37 | 15.96 | 11.15 | | | | | | |
| Reach 1 | 895 | BR U | Q500 | 15.01 | 13.14 | 11.89 | 0.38 | 0.28 | 140.56 |
| 21.43 | 7059.92 | 298.66 | 11.21 | | | | | | |
| Reach 1 | 895 | BR D | Q100 | 12.90 | 11.51 | 9.93 | 0.07 | 0.12 | 133.26 |

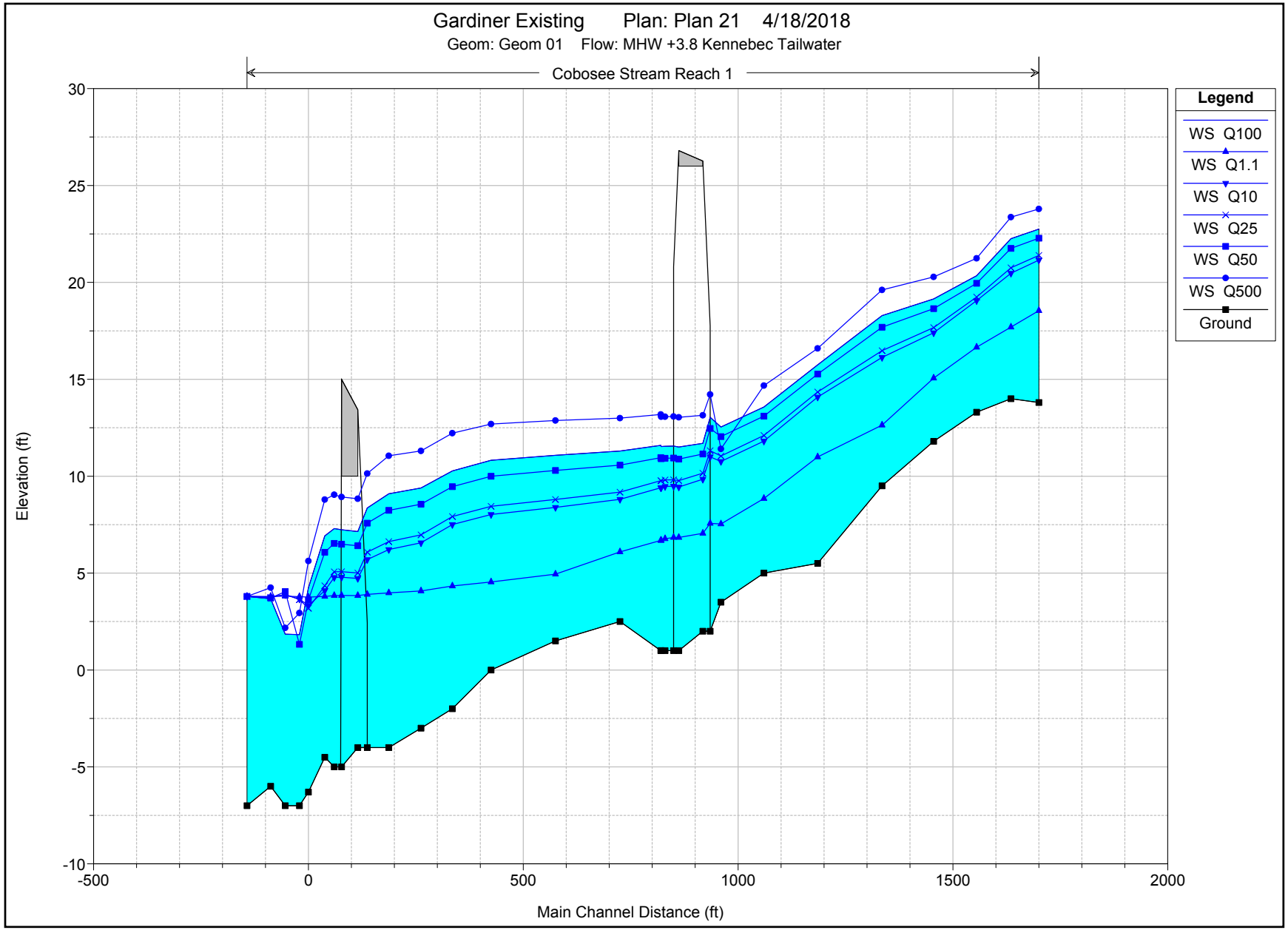
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.53 | 5712.93 | 191.53 | 9.62 | | | | | | |
| Reach 1 | 895 | BR D | Q1.1 | 7.34 | 6.86 | 5.12 | 0.05 | 0.05 | 62.17 |
| | 1312.00 | | 5.57 | | | | | | |
| Reach 1 | 895 | BR D | Q10 | 10.74 | 9.44 | 8.13 | 0.08 | 0.13 | 95.67 |
| | 3842.43 | 7.57 | 9.15 | | | | | | |
| Reach 1 | 895 | BR D | Q25 | 11.09 | 9.77 | 8.40 | 0.08 | 0.13 | 105.79 |
| | 4130.48 | 17.52 | 9.24 | | | | | | |
| Reach 1 | 895 | BR D | Q50 | 12.28 | 10.88 | 9.40 | 0.07 | 0.13 | 126.95 |
| 1.40 | 5183.68 | 104.92 | 9.58 | | | | | | |
| Reach 1 | 895 | BR D | Q500 | 14.35 | 13.04 | 10.88 | 0.05 | 0.10 | 145.07 |
| 32.16 | 6874.93 | 472.90 | 9.49 | | | | | | |
| Reach 1 | 850 | | Q100 | 12.72 | 11.56 | 9.38 | 0.08 | 0.07 | 144.16 |
| 4.86 | 5749.56 | 155.58 | 8.76 | | | | | | |
| Reach 1 | 850 | | Q1.1 | 7.25 | 6.86 | 4.89 | 0.07 | 0.01 | 69.29 |
| | 1312.00 | | 5.01 | | | | | | |
| Reach 1 | 850 | | Q10 | 10.53 | 9.48 | 7.75 | 0.10 | 0.09 | 103.69 |
| | 3843.10 | 6.90 | 8.22 | | | | | | |
| Reach 1 | 850 | | Q25 | 10.88 | 9.82 | 8.01 | 0.10 | 0.09 | 113.83 |
| | 4132.32 | 15.68 | 8.31 | | | | | | |
| Reach 1 | 850 | | Q50 | 12.08 | 10.94 | 8.91 | 0.09 | 0.07 | 134.32 |
| 1.32 | 5199.07 | 89.61 | 8.67 | | | | | | |
| Reach 1 | 850 | | Q500 | 14.20 | 13.08 | 10.40 | 0.06 | 0.05 | 157.76 |
| 26.65 | 6944.32 | 409.03 | 8.72 | | | | | | |
| Reach 1 | 830 | | Q100 | 12.57 | 11.54 | | 0.03 | 0.01 | 147.28 |
| 2.70 | 5835.78 | 71.52 | 8.19 | | | | | | |
| Reach 1 | 830 | | Q1.1 | 7.17 | 6.80 | | 0.03 | 0.01 | 88.18 |
| | 1312.00 | | 4.90 | | | | | | |
| Reach 1 | 830 | | Q10 | 10.34 | 9.47 | | 0.04 | 0.01 | 95.94 |
| | 3847.49 | 2.51 | 7.49 | | | | | | |
| Reach 1 | 830 | | Q25 | 10.70 | 9.81 | | 0.04 | 0.00 | 96.67 |
| | 4145.14 | 2.86 | 7.60 | | | | | | |
| Reach 1 | 830 | | Q50 | 11.93 | 10.92 | | 0.03 | 0.01 | 136.18 |
| 0.71 | 5262.19 | 27.10 | 8.05 | | | | | | |
| Reach 1 | 830 | | Q500 | 14.09 | 13.07 | | 0.02 | 0.02 | 153.73 |
| 15.12 | 7098.19 | 266.69 | 8.26 | | | | | | |
| Reach 1 | 187 | | Q100 | 10.55 | 9.10 | | 0.22 | 0.05 | 71.09 |
| | 5910.00 | | 9.68 | | | | | | |
| Reach 1 | 187 | | Q1.1 | 2.77 | 2.06 | | 0.30 | 0.01 | 47.00 |
| | 1312.00 | | 6.74 | | | | | | |
| Reach 1 | 187 | | Q10 | 7.51 | 6.20 | | 0.27 | 0.02 | 61.24 |
| | 3850.00 | | 9.19 | | | | | | |

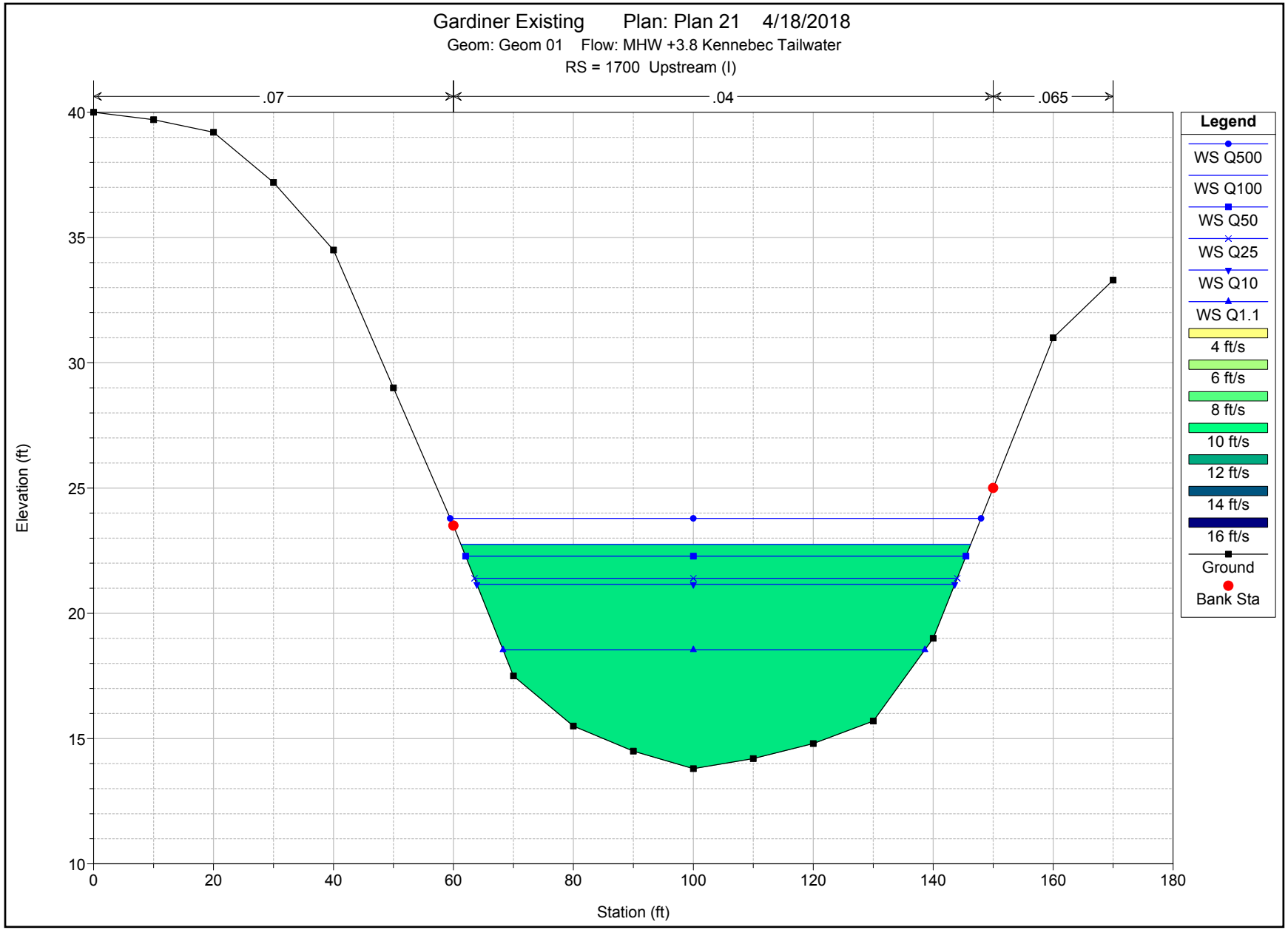
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 187 | | Q25 | 7.97 | 6.63 | | 0.26 | 0.03 | 62.67 |
| 4148.00 | | 9.31 | | | | | | | |
| Reach 1 | 187 | | Q50 | 9.67 | 8.24 | | 0.24 | 0.04 | 68.10 |
| 5290.00 | | 9.61 | | | | | | | |
| Reach 1 | 187 | | Q500 | 12.54 | 11.05 | | 0.19 | 0.07 | 96.82 |
| 3.27 | 7357.75 | 18.98 | 9.80 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 137 | | Q100 | 10.28 | 8.36 | 5.71 | 0.13 | 0.25 | 69.03 |
| 5910.00 | | 11.13 | | | | | | | |
| Reach 1 | 137 | | Q1.1 | 2.46 | 1.62 | 0.50 | 0.20 | 0.13 | 45.47 |
| 1312.00 | | 7.37 | | | | | | | |
| Reach 1 | 137 | | Q10 | 7.22 | 5.68 | 3.85 | 0.15 | 0.20 | 59.95 |
| 3850.00 | | 9.96 | | | | | | | |
| Reach 1 | 137 | | Q25 | 7.69 | 6.08 | 4.15 | 0.15 | 0.21 | 61.32 |
| 4148.00 | | 10.16 | | | | | | | |
| Reach 1 | 137 | | Q50 | 9.40 | 7.58 | 5.20 | 0.13 | 0.24 | 66.39 |
| 5290.00 | | 10.81 | | | | | | | |
| Reach 1 | 137 | | Q500 | 12.28 | 10.13 | 6.86 | 0.11 | 0.27 | 75.49 |
| 7380.00 | | 11.77 | | | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | BR U | Q100 | 9.90 | 7.15 | 5.73 | 0.22 | 0.30 | 48.50 |
| 5910.00 | | 13.33 | | | | | | | |
| Reach 1 | 98.5 | BR U | Q1.1 | 2.14 | 0.87 | 0.51 | 0.26 | 0.30 | 42.48 |
| 1312.00 | | 9.04 | | | | | | | |
| Reach 1 | 98.5 | BR U | Q10 | 6.87 | 4.66 | 3.81 | 0.25 | 0.31 | 48.50 |
| 3850.00 | | 11.92 | | | | | | | |
| Reach 1 | 98.5 | BR U | Q25 | 7.33 | 5.02 | 4.10 | 0.24 | 0.31 | 48.50 |
| 4148.00 | | 12.19 | | | | | | | |
| Reach 1 | 98.5 | BR U | Q50 | 9.02 | 6.41 | 5.17 | 0.23 | 0.31 | 48.50 |
| 5290.00 | | 12.97 | | | | | | | |
| Reach 1 | 98.5 | BR U | Q500 | 11.90 | 8.83 | 6.97 | 0.20 | 0.30 | 48.50 |
| 7380.00 | | 14.05 | | | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | BR D | Q100 | 9.38 | 7.23 | 4.60 | 0.08 | 0.14 | 48.50 |
| 5910.00 | | 11.76 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q1.1 | 1.58 | 0.91 | -0.78 | 0.07 | 0.01 | 44.01 |
| 1312.00 | | 6.55 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q10 | 6.31 | 4.72 | 2.66 | 0.08 | 0.07 | 48.50 |
| 3850.00 | | 10.12 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q25 | 6.77 | 5.09 | 2.98 | 0.08 | 0.08 | 48.50 |
| 4148.00 | | 10.42 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q50 | 8.49 | 6.49 | 4.05 | 0.08 | 0.12 | 48.50 |
| 5290.00 | | 11.34 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q500 | 11.40 | 8.93 | 5.83 | 0.07 | 0.18 | 48.50 |
| 7380.00 | | 12.62 | | | | | | | |

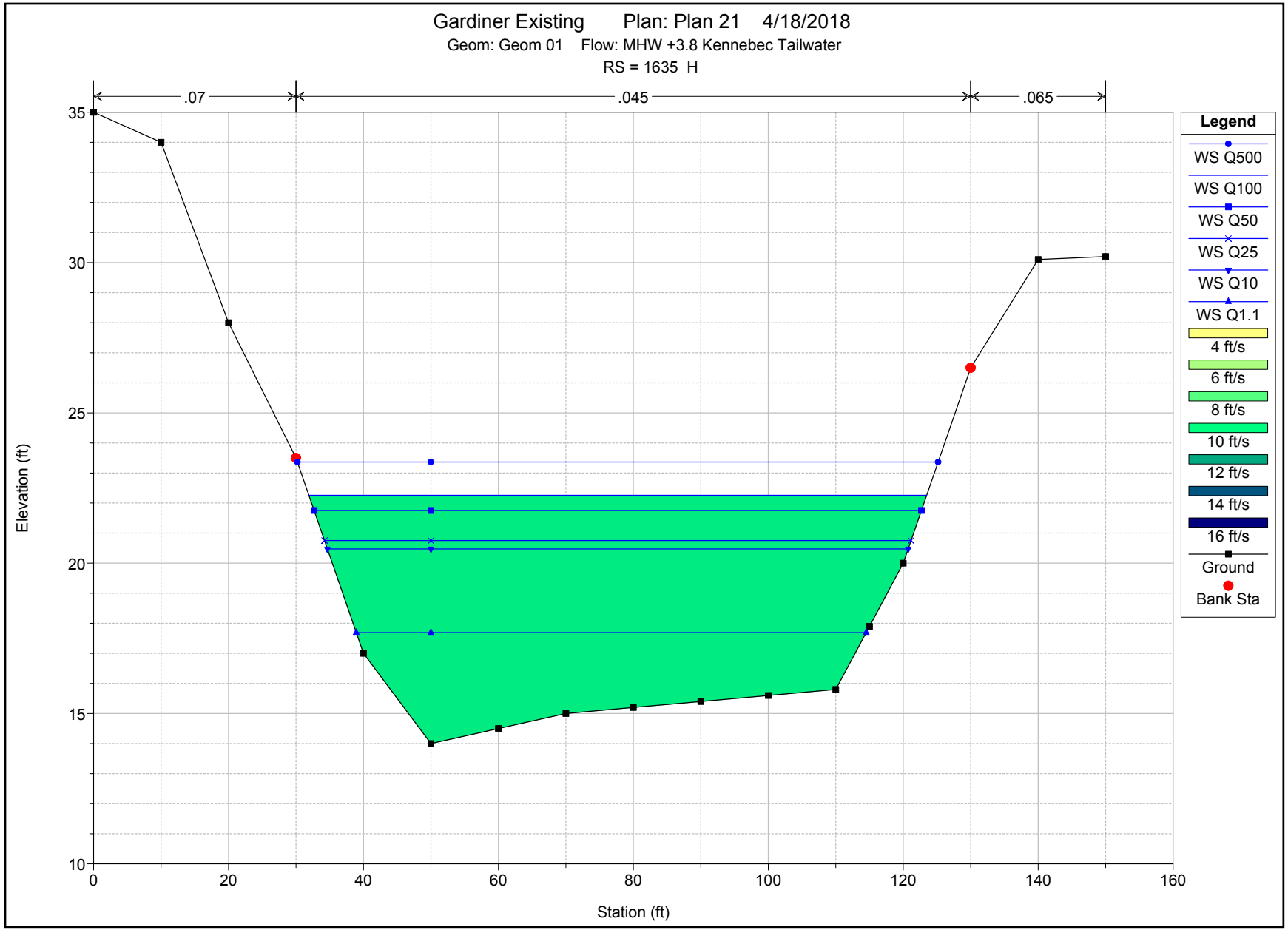
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 60 | | Q100 | 9.17 | 7.30 | 4.52 | 0.10 | 0.06 | 59.04 |
| | 5910.00 | | 10.97 | | | | | | |
| Reach 1 | 60 | | Q1.1 | 1.49 | 0.85 | -0.76 | 0.17 | 0.28 | 47.04 |
| | 1312.00 | | 6.44 | | | | | | |
| Reach 1 | 60 | | Q10 | 6.16 | 4.71 | 2.53 | 0.14 | 0.15 | 56.38 |
| | 3850.00 | | 9.65 | | | | | | |
| Reach 1 | 60 | | Q25 | 6.60 | 5.08 | 2.84 | 0.13 | 0.13 | 57.29 |
| | 4148.00 | | 9.90 | | | | | | |
| Reach 1 | 60 | | Q50 | 8.29 | 6.54 | 3.97 | 0.11 | 0.08 | 58.73 |
| | 5290.00 | | 10.63 | | | | | | |
| Reach 1 | 60 | | Q500 | 11.15 | 9.04 | 5.66 | 0.09 | 0.04 | 59.75 |
| | 7380.00 | | 11.66 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 38 | | Q100 | 9.00 | 6.92 | | 0.31 | 0.22 | 58.50 |
| 27.66 | 5881.82 | 0.52 | 11.60 | | | | | | |
| Reach 1 | 38 | | Q1.1 | 1.05 | -0.52 | -0.52 | 0.44 | 0.15 | 42.46 |
| 0.41 | 1311.59 | | 10.05 | | | | | | |
| Reach 1 | 38 | | Q10 | 5.86 | 3.91 | | 0.42 | 0.13 | 56.65 |
| 11.59 | 3838.41 | | 11.25 | | | | | | |
| Reach 1 | 38 | | Q25 | 6.34 | 4.38 | | 0.39 | 0.14 | 57.20 |
| 13.62 | 4134.37 | 0.00 | 11.25 | | | | | | |
| Reach 1 | 38 | | Q50 | 8.10 | 6.07 | | 0.33 | 0.19 | 58.07 |
| 22.31 | 5267.47 | 0.22 | 11.44 | | | | | | |
| Reach 1 | 38 | | Q500 | 11.02 | 8.79 | | 0.27 | 0.26 | 59.47 |
| 42.16 | 7336.04 | 1.81 | 12.02 | | | | | | |

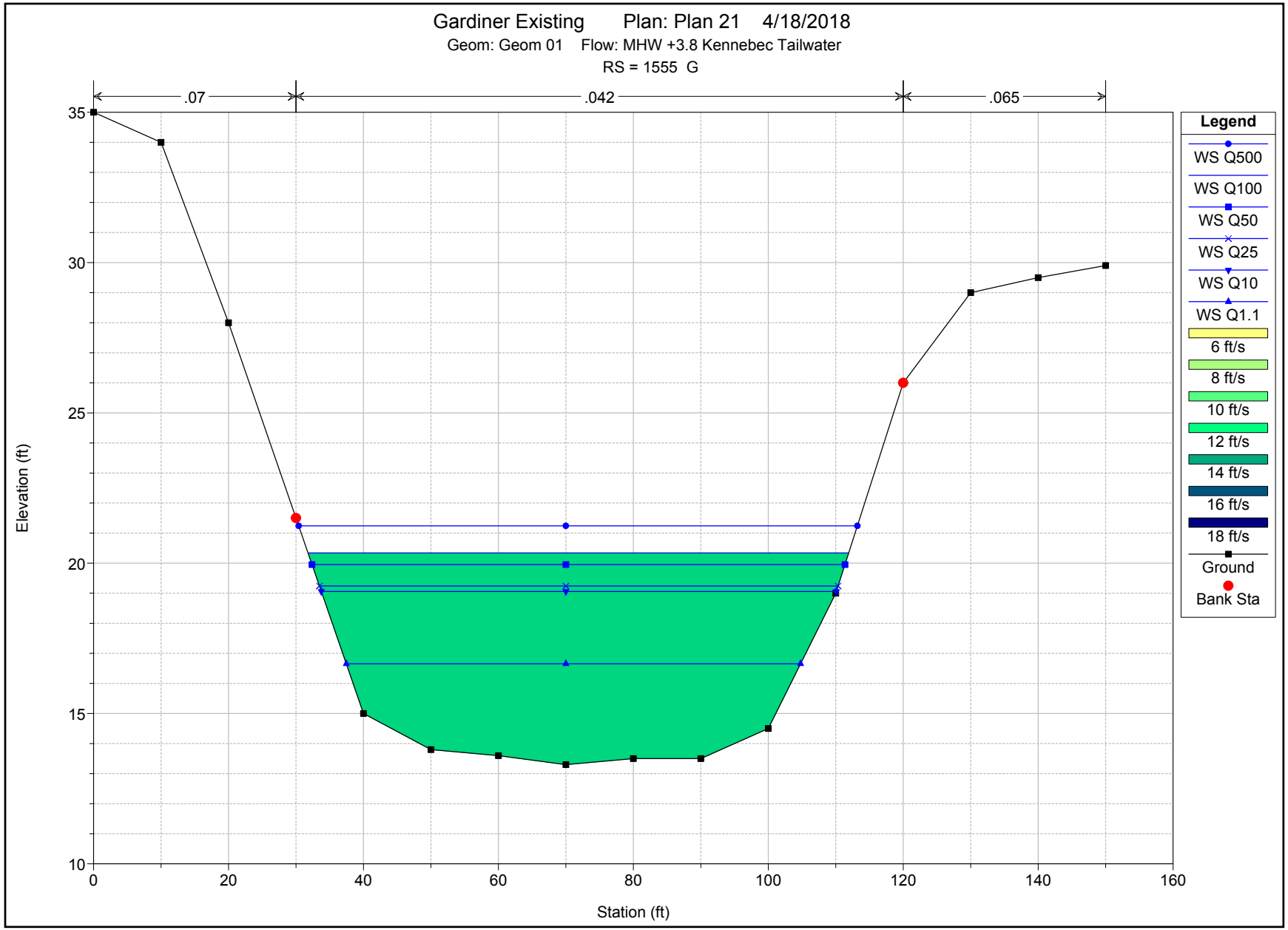
# APPENDIX E / HEC-RAS RESULTS FOR EXISTING CONDITIONS AT MHW

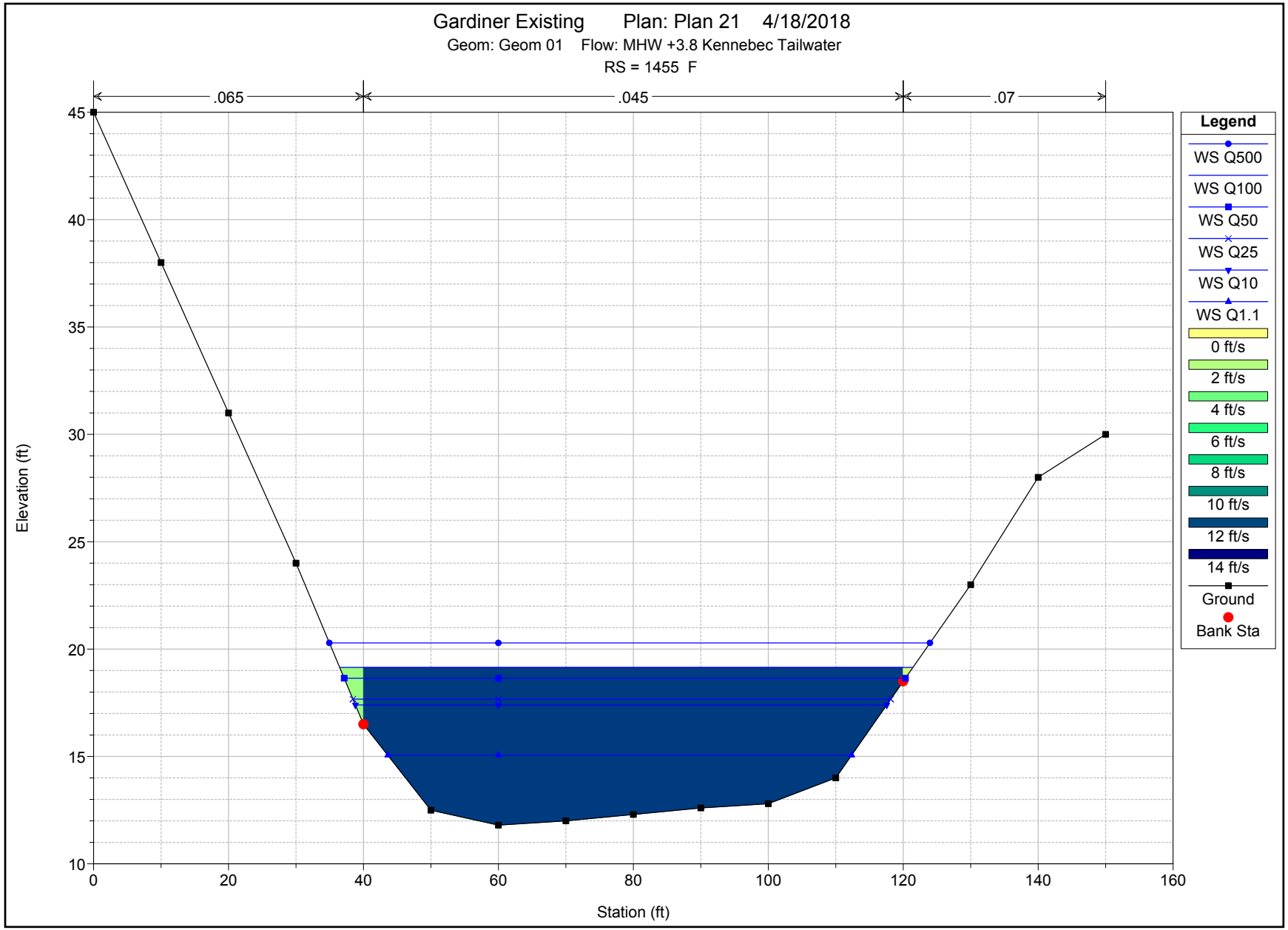

1700
1635
1555
1455
1335
1185
1060
960
895
850
725
575
425
335
262
187
137
60
21
88
143
Robosee Stream
Reach 1
EXISTING PLAN, HEC-RAS SECTIONS
MHW RUN
None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

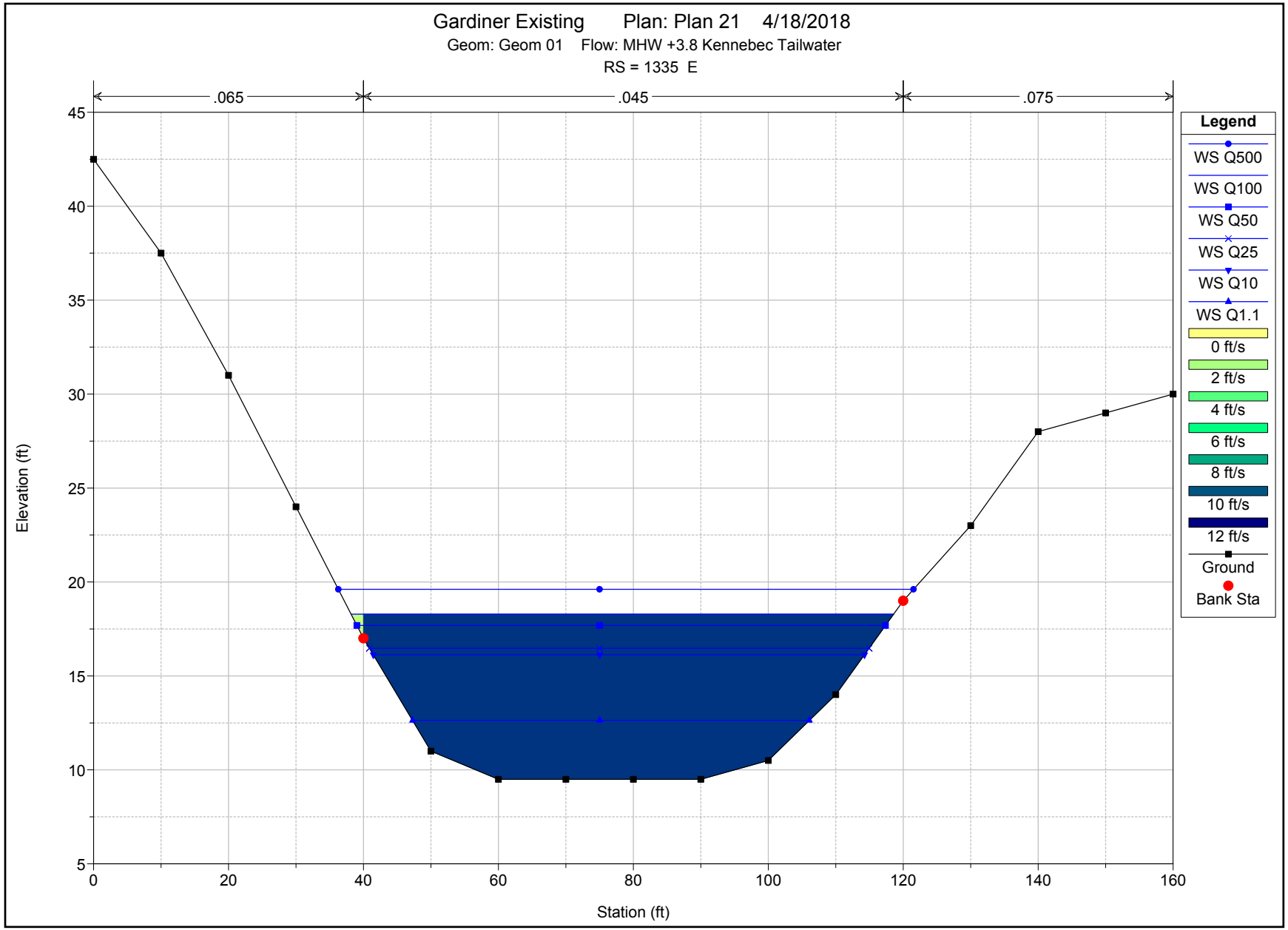

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
Cobosee Stream Reach 1
Legend
WS Q100
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q500
Ground
Elevation (ft)
30
25
20
15
10
5
0
-5
-10
-500
0
500
1000
1500
2000
Main Channel Distance (ft)

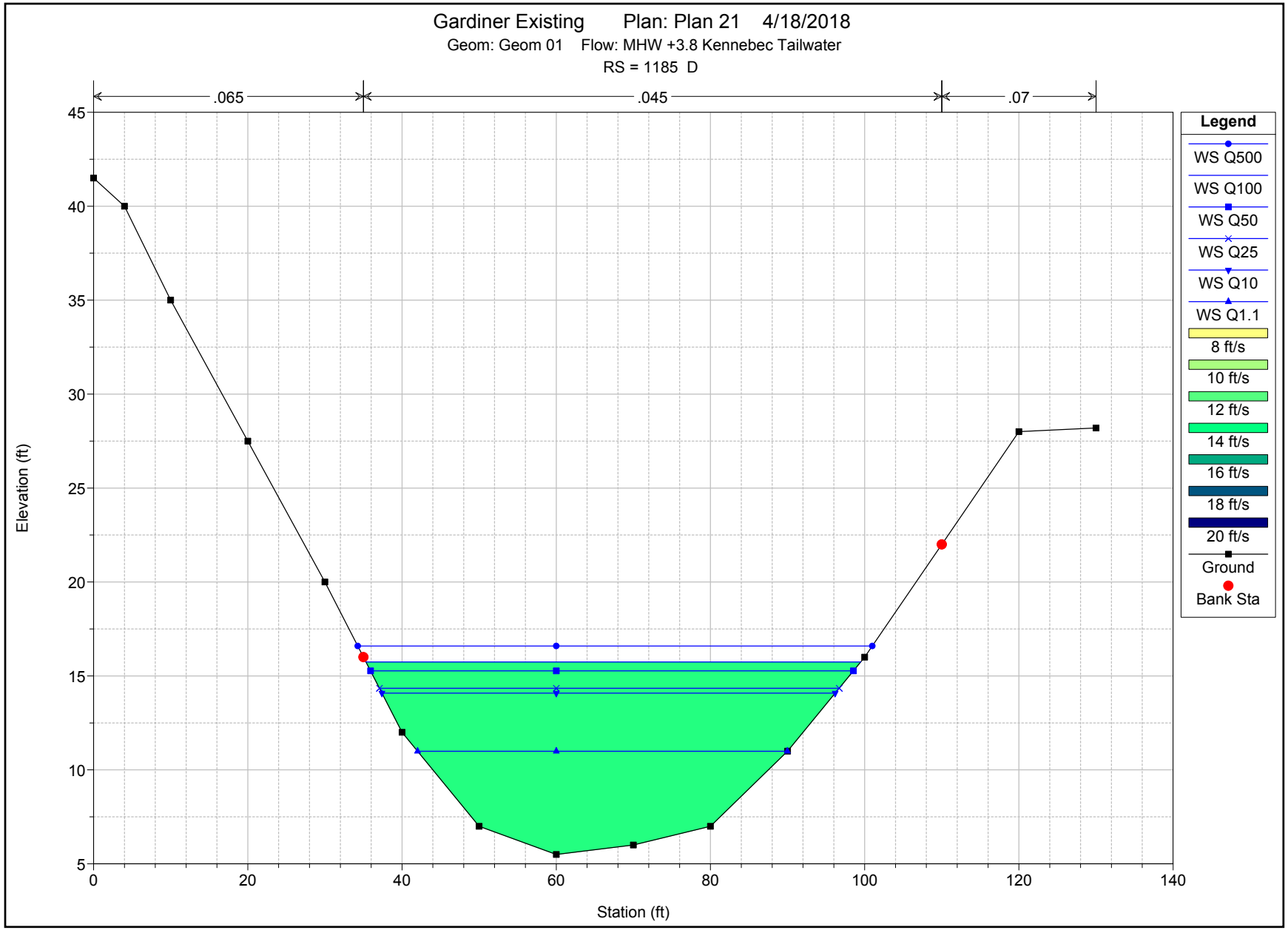

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1700 Upstream (I)
.07
.04
.065
Elevation (ft)
Station (ft)
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
180
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

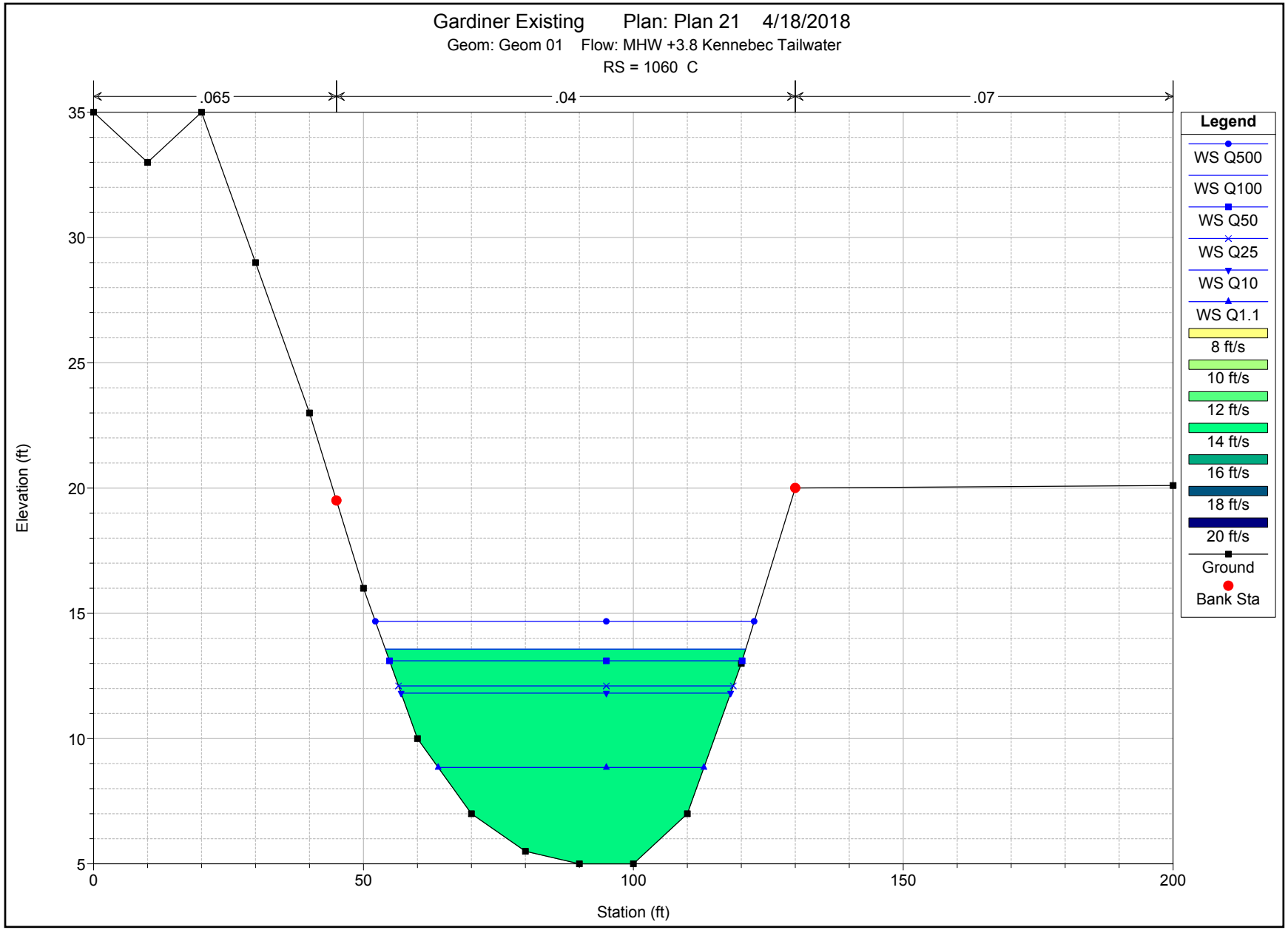

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1635 H
.07
.045
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

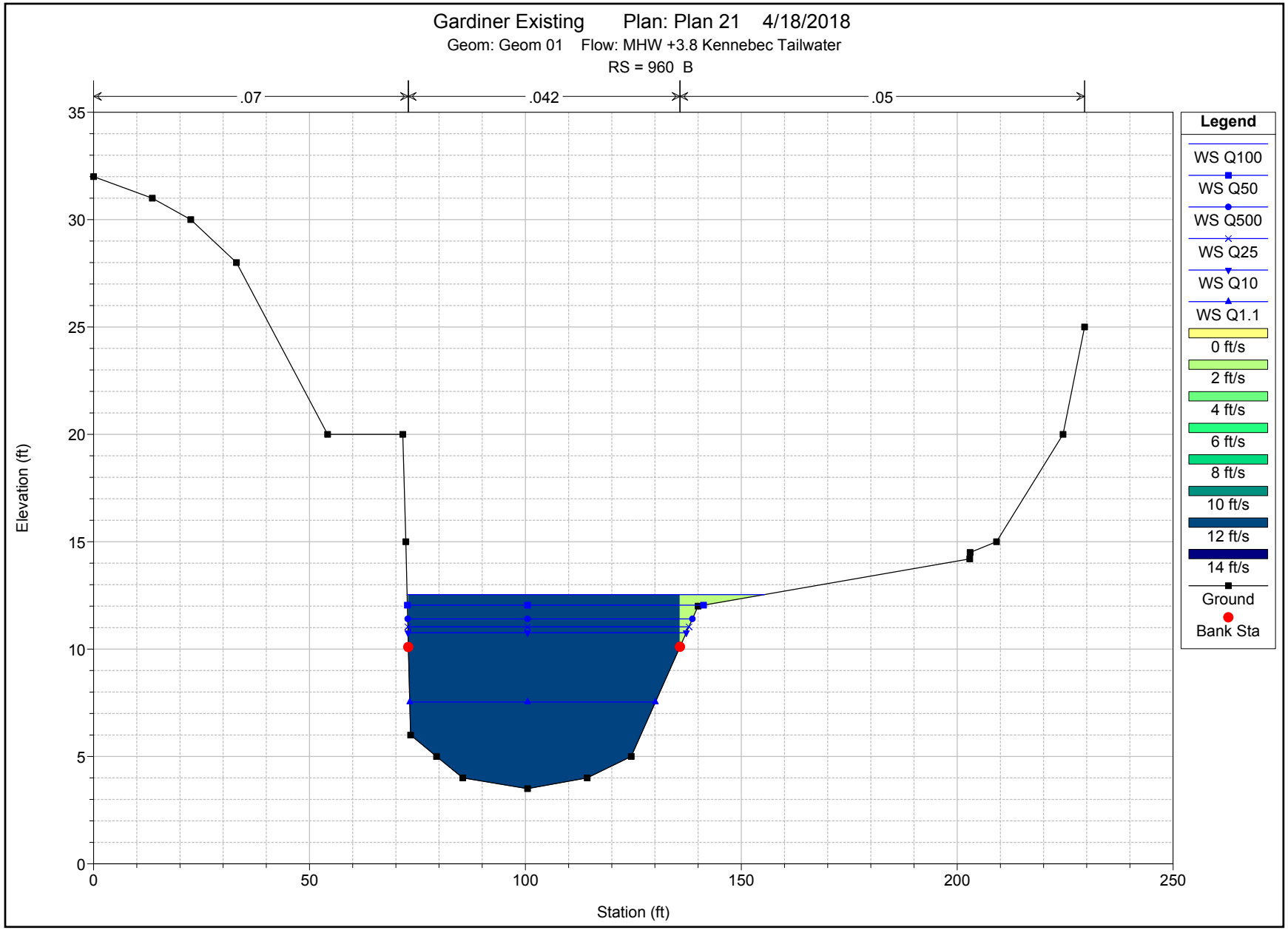

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1555 G
.07
.042
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta

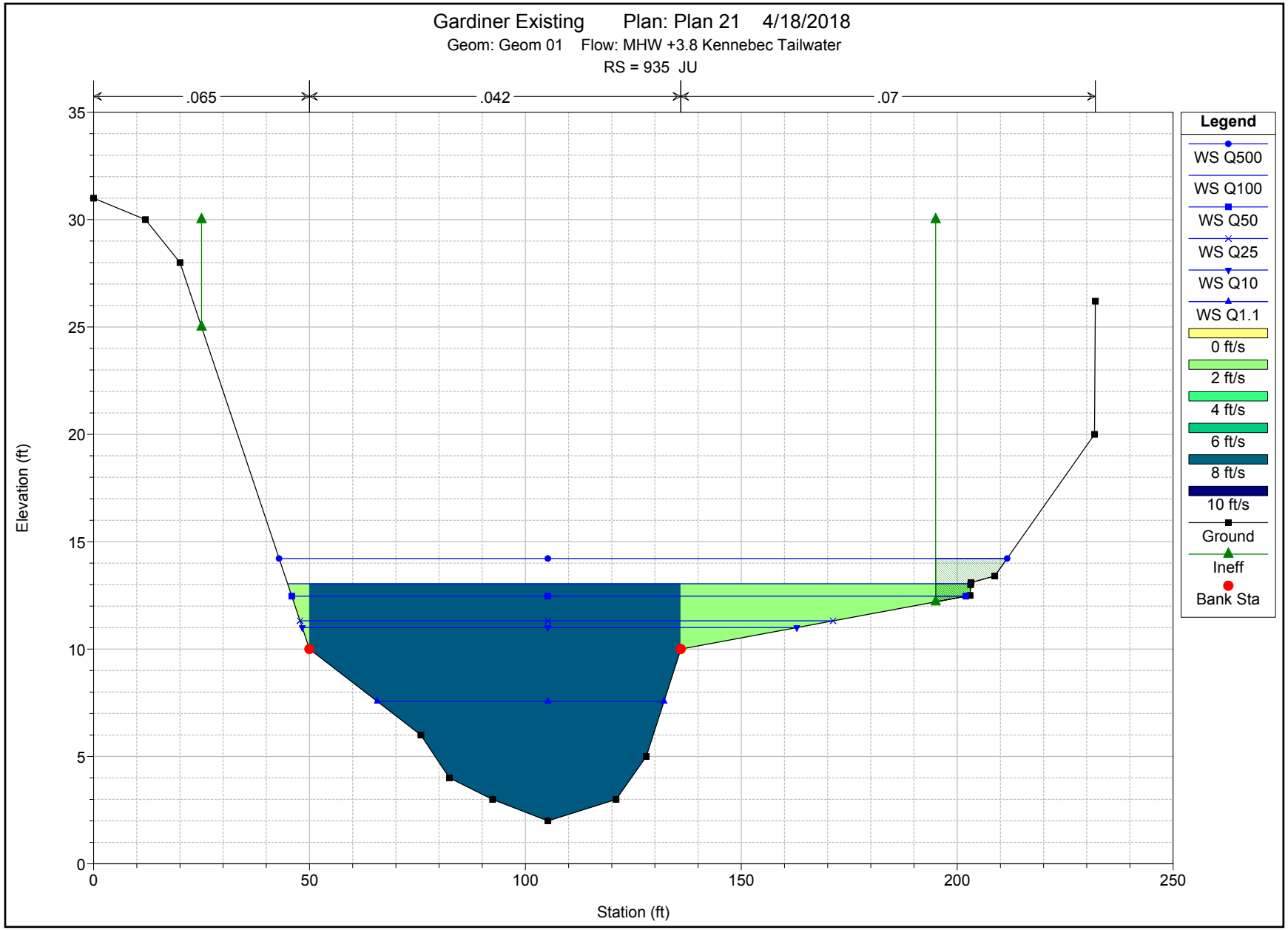

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1455 F
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

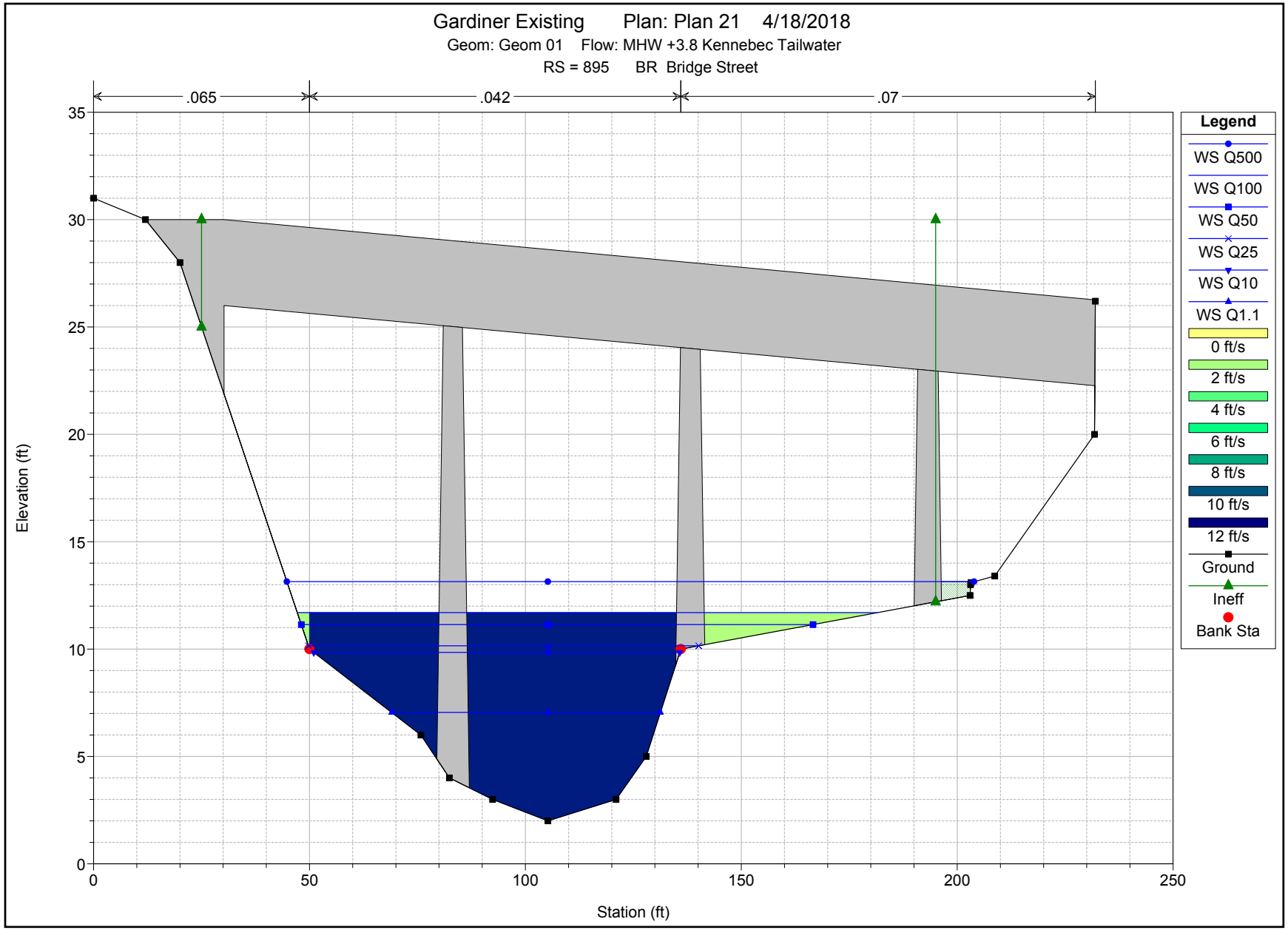

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1335 E
.065
.045
.075
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

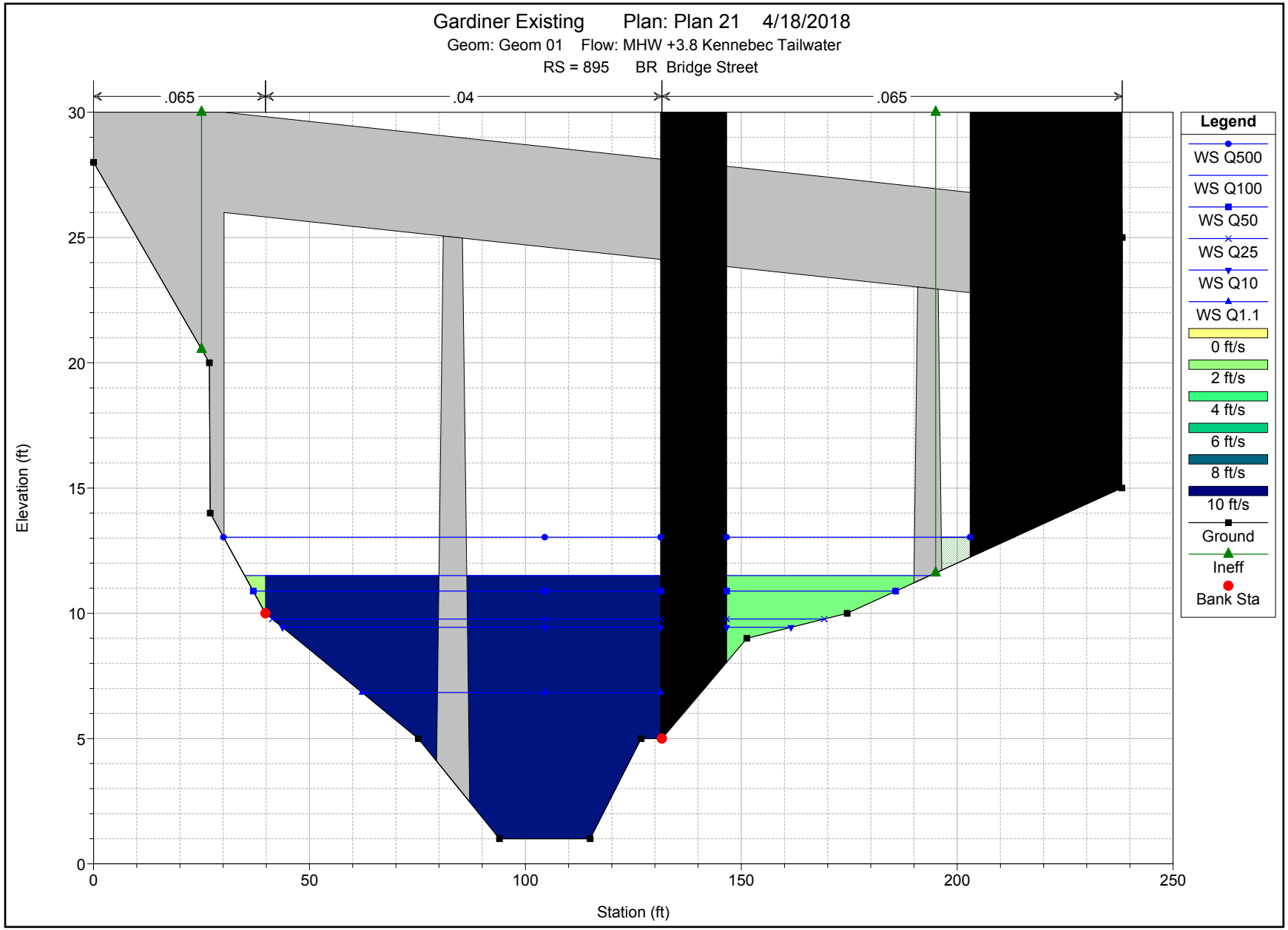

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1185 D
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

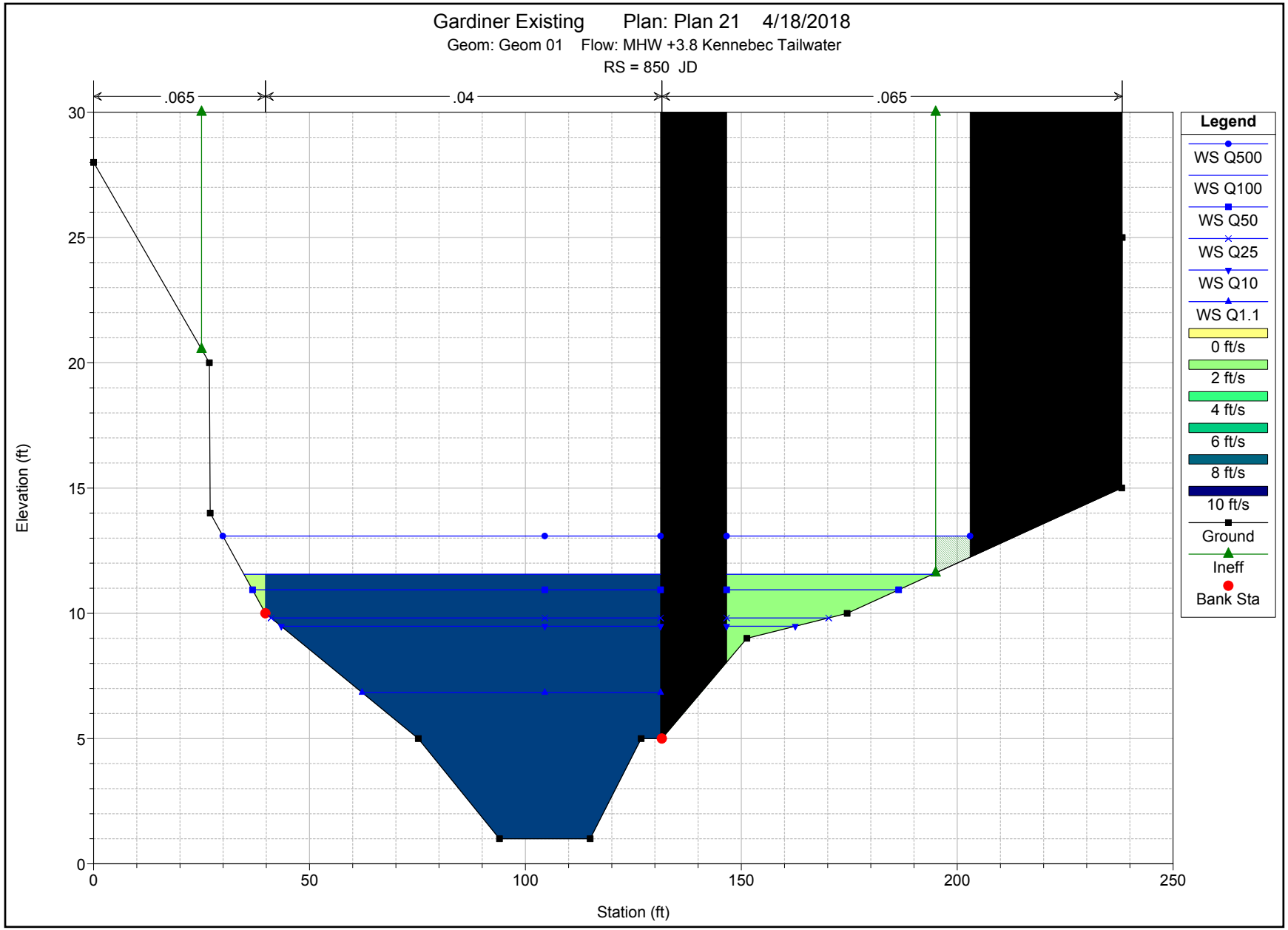

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1060 C
.065
.04
.07
Elevation (ft)
35
30
25
20
15
10
5
0
50
100
150
200
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

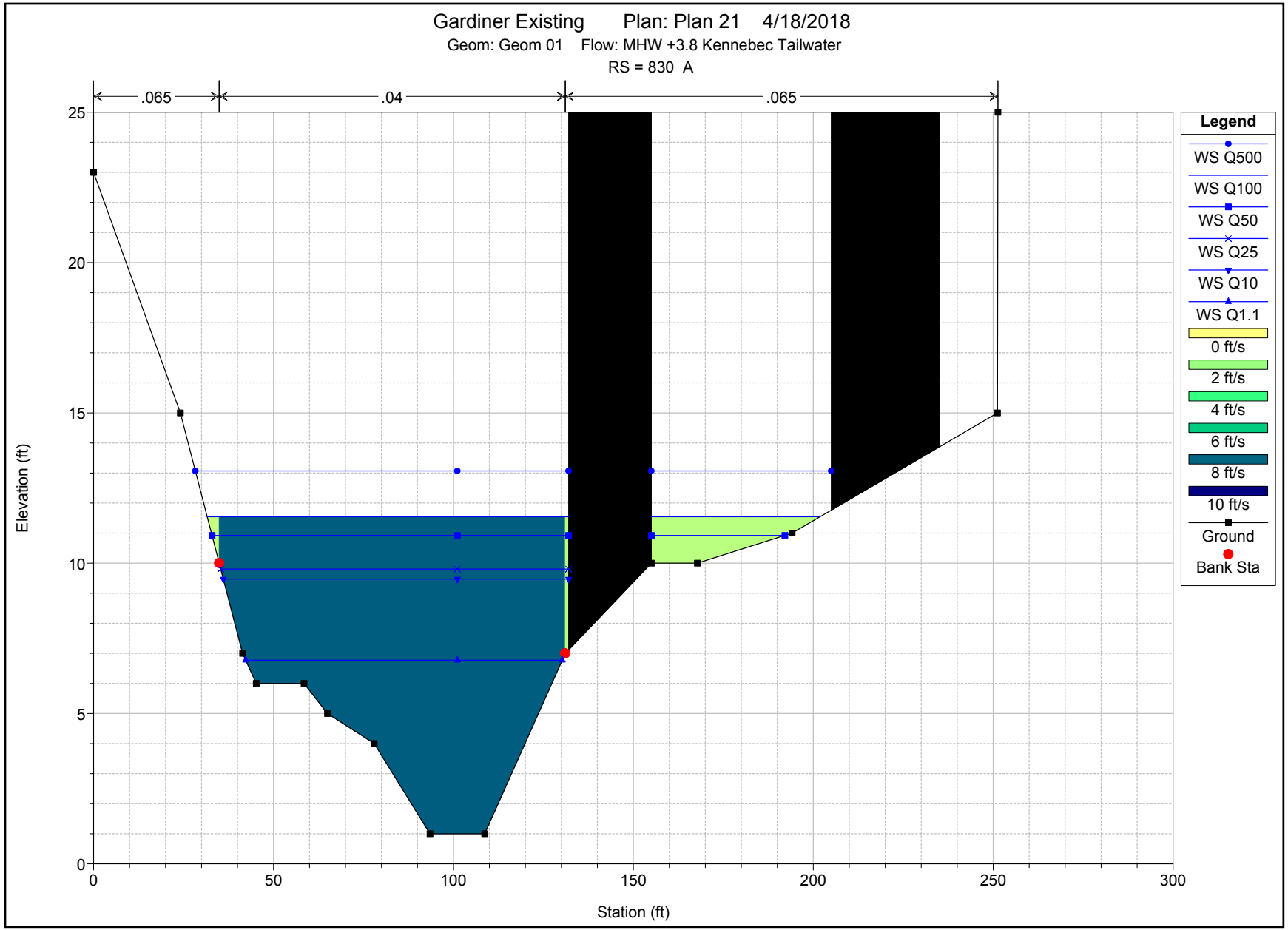

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 960 B
.07
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q100
WS Q50
WS Q500
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

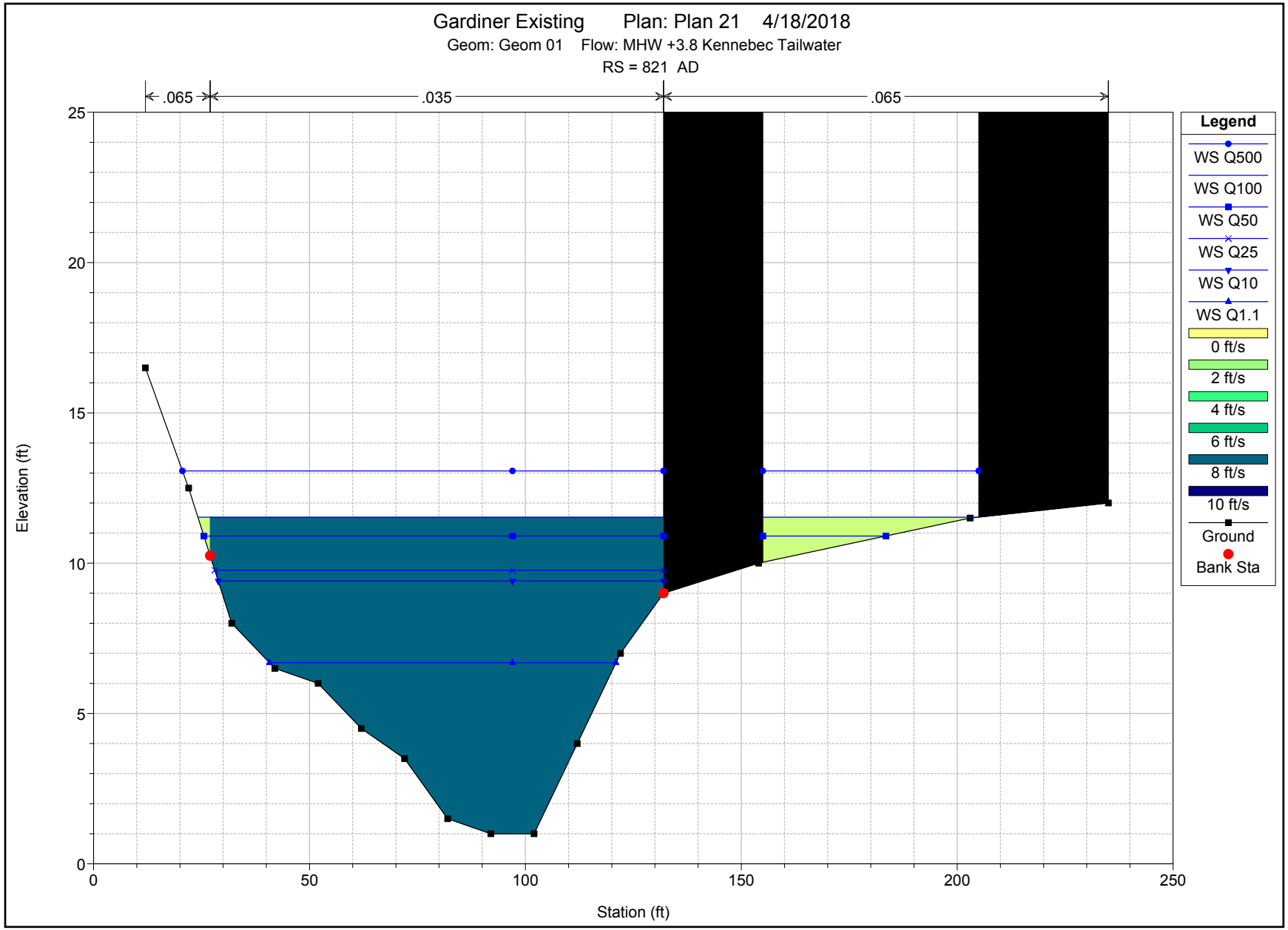

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 935 JU
.065
.042
.07
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

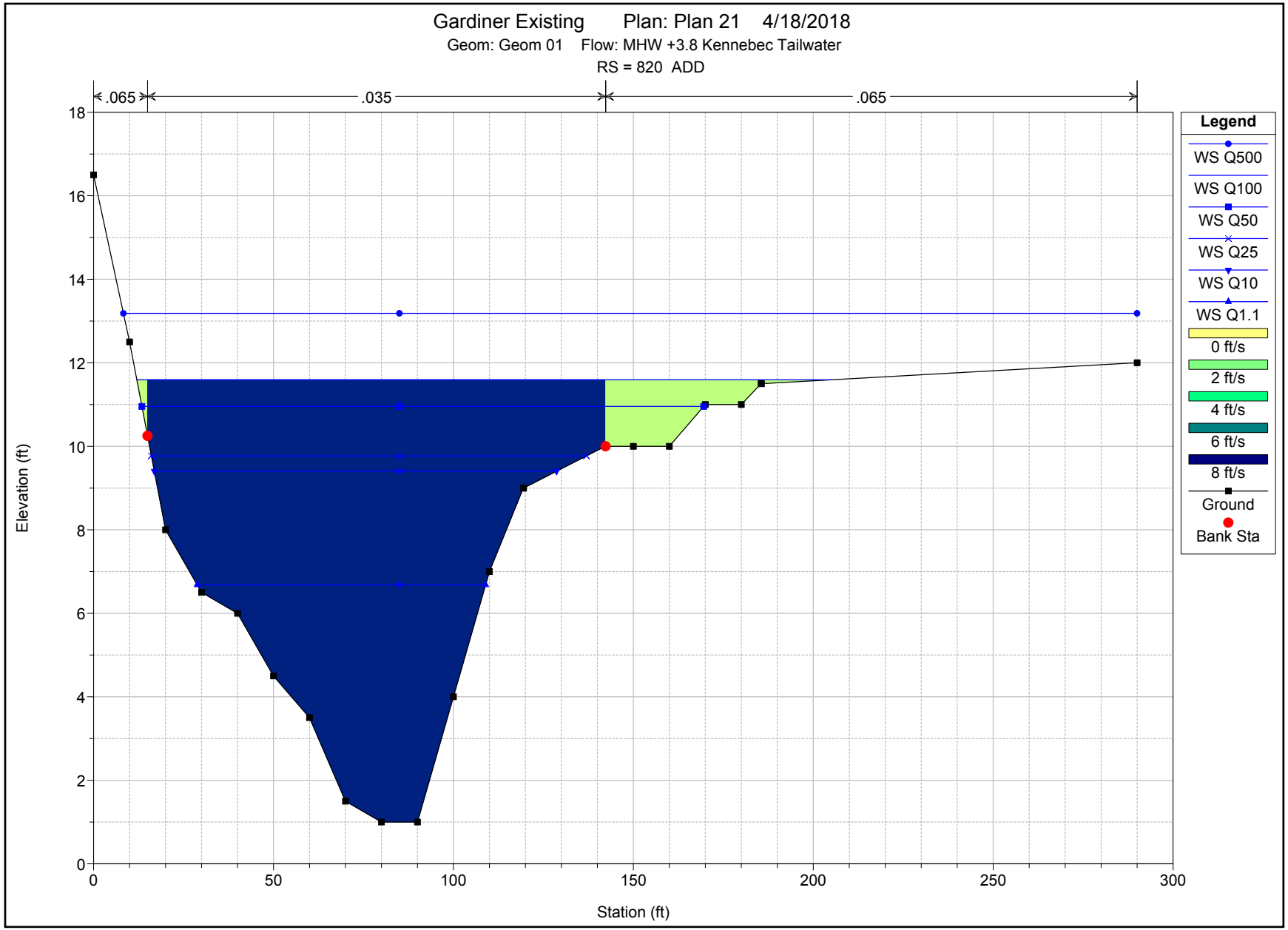

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 895 BR Bridge Street
.065
.042
.07
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

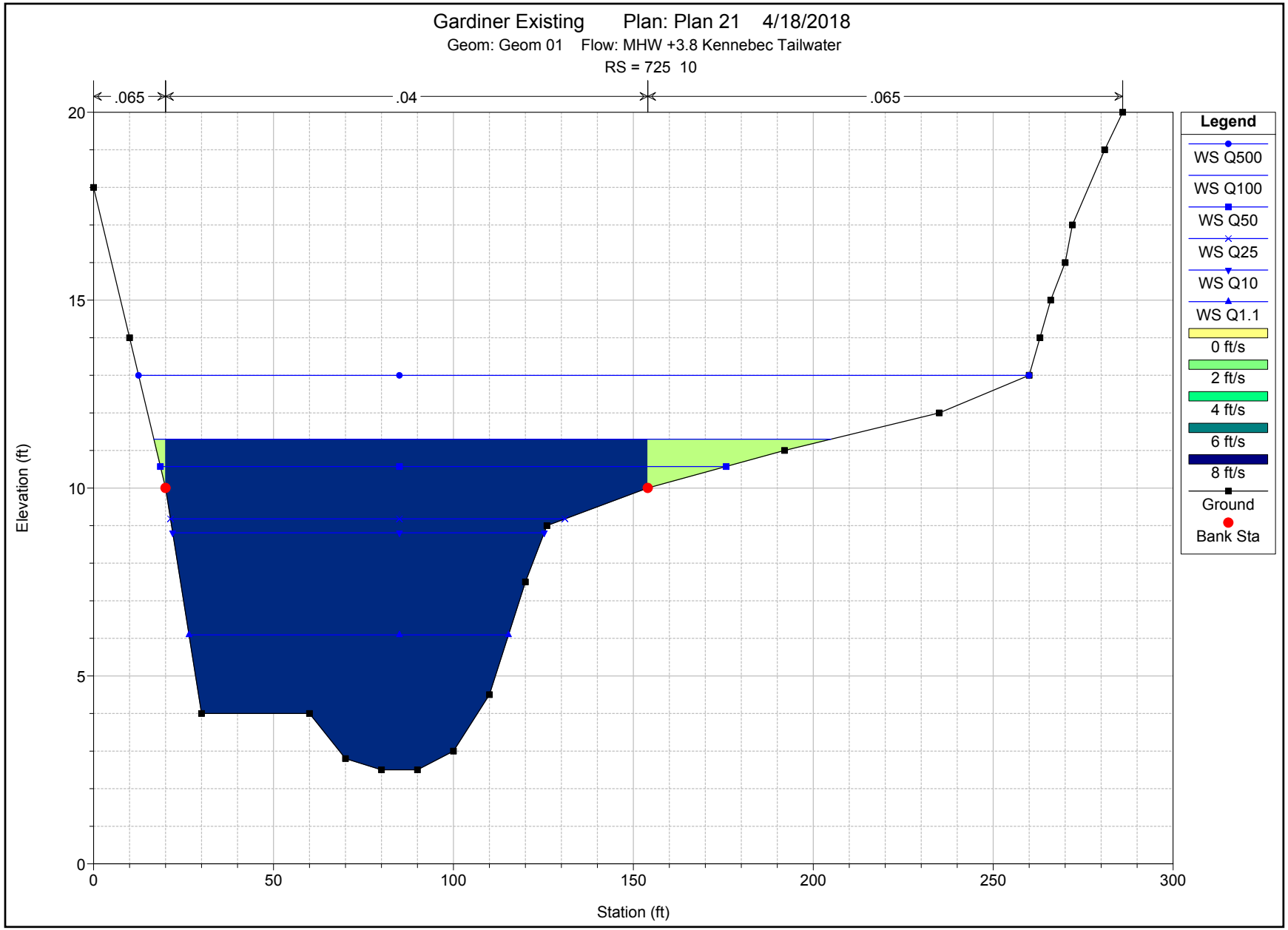

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 895 BR Bridge Street
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

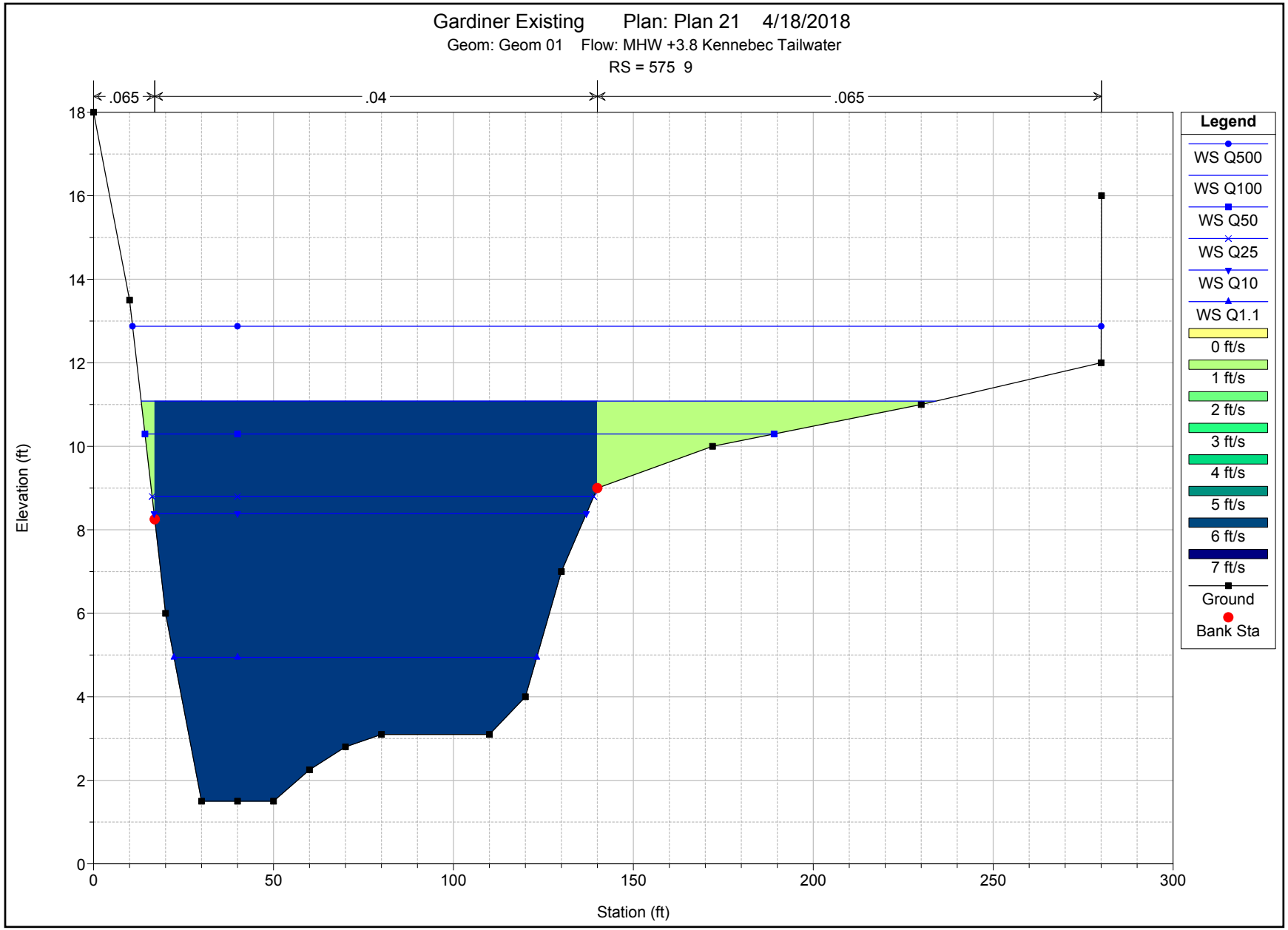

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 850 JD
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Ineff
Bank Sta

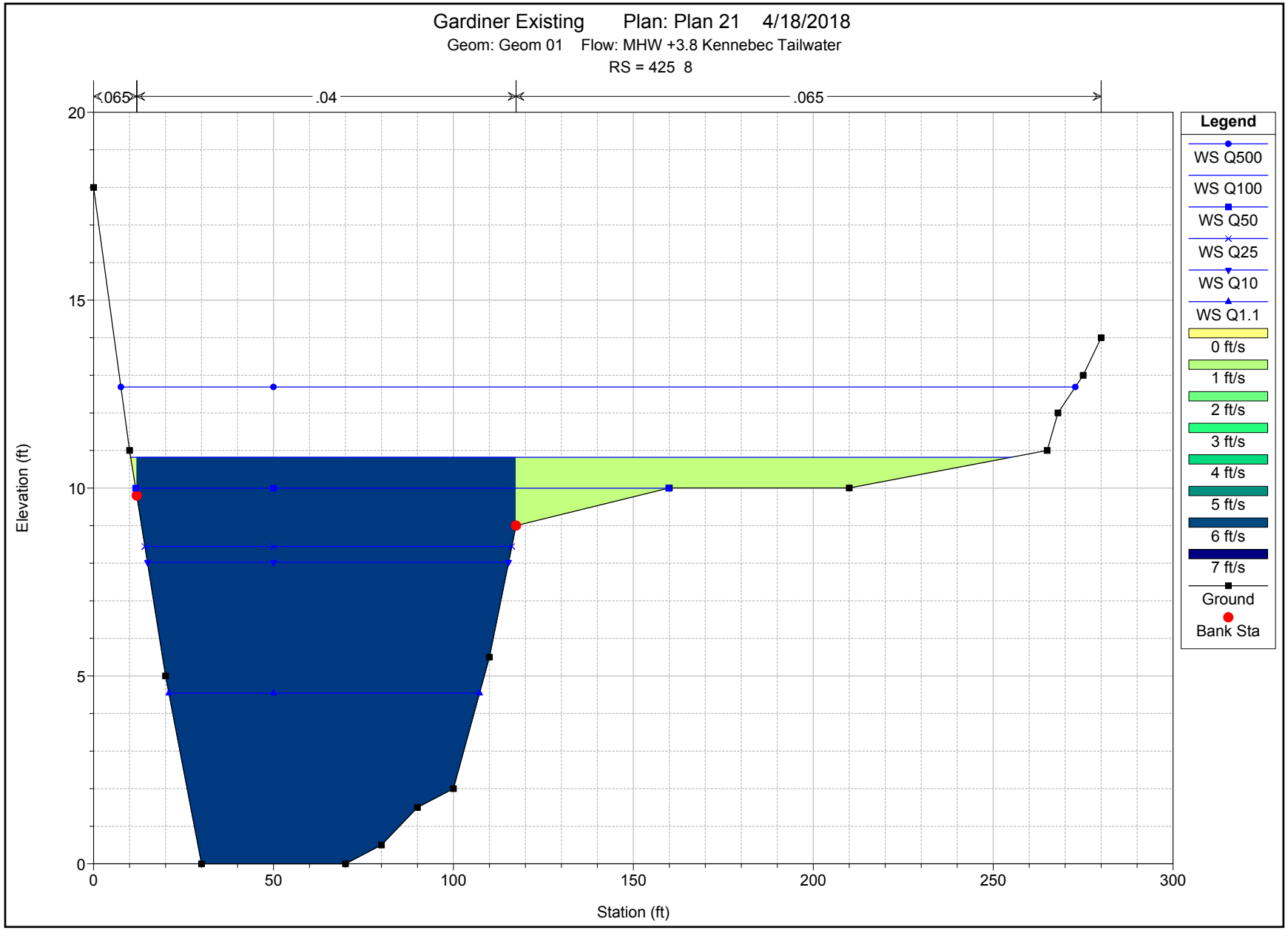

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 830 A
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

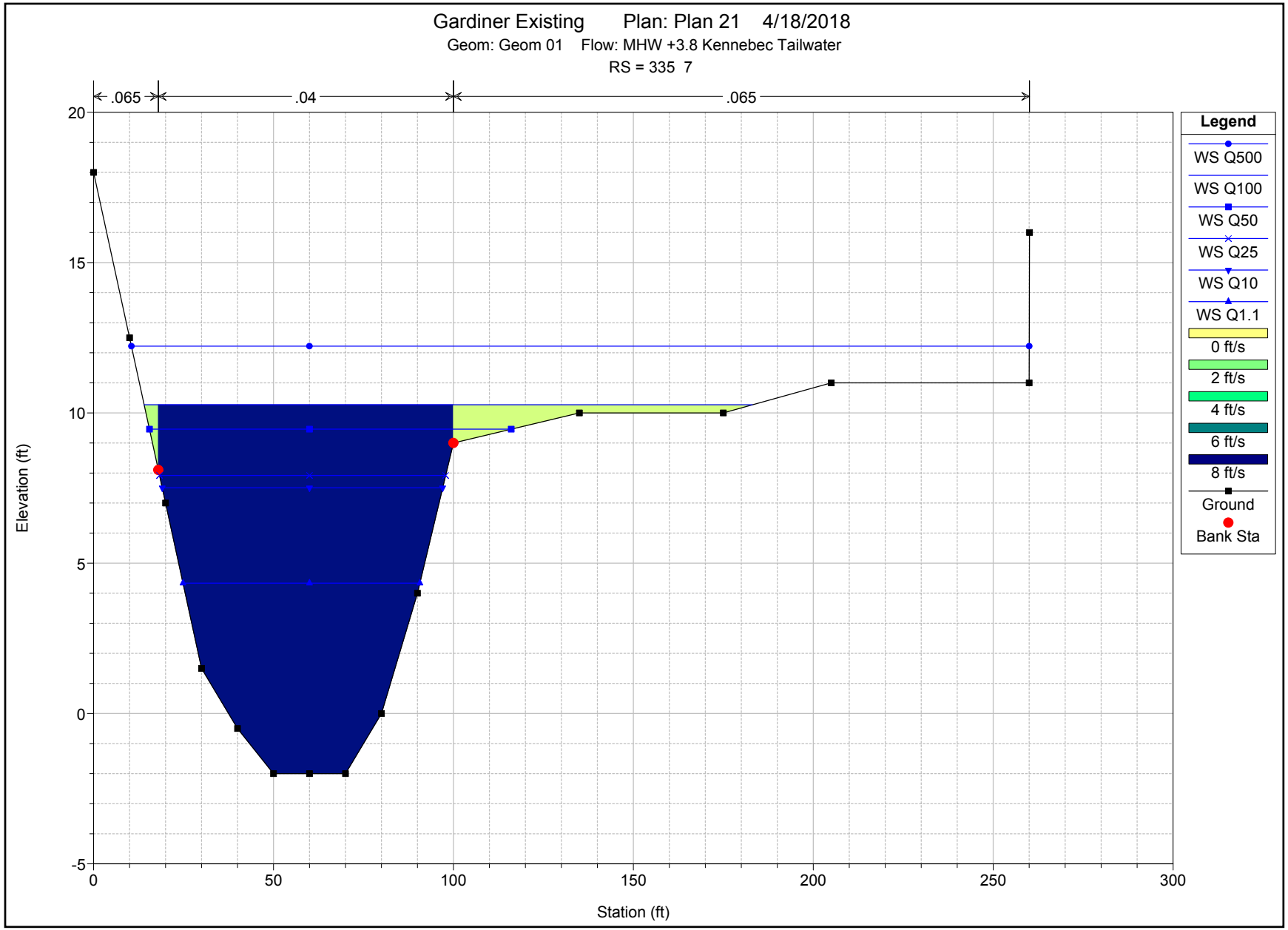

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 821 AD
.065
.035
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

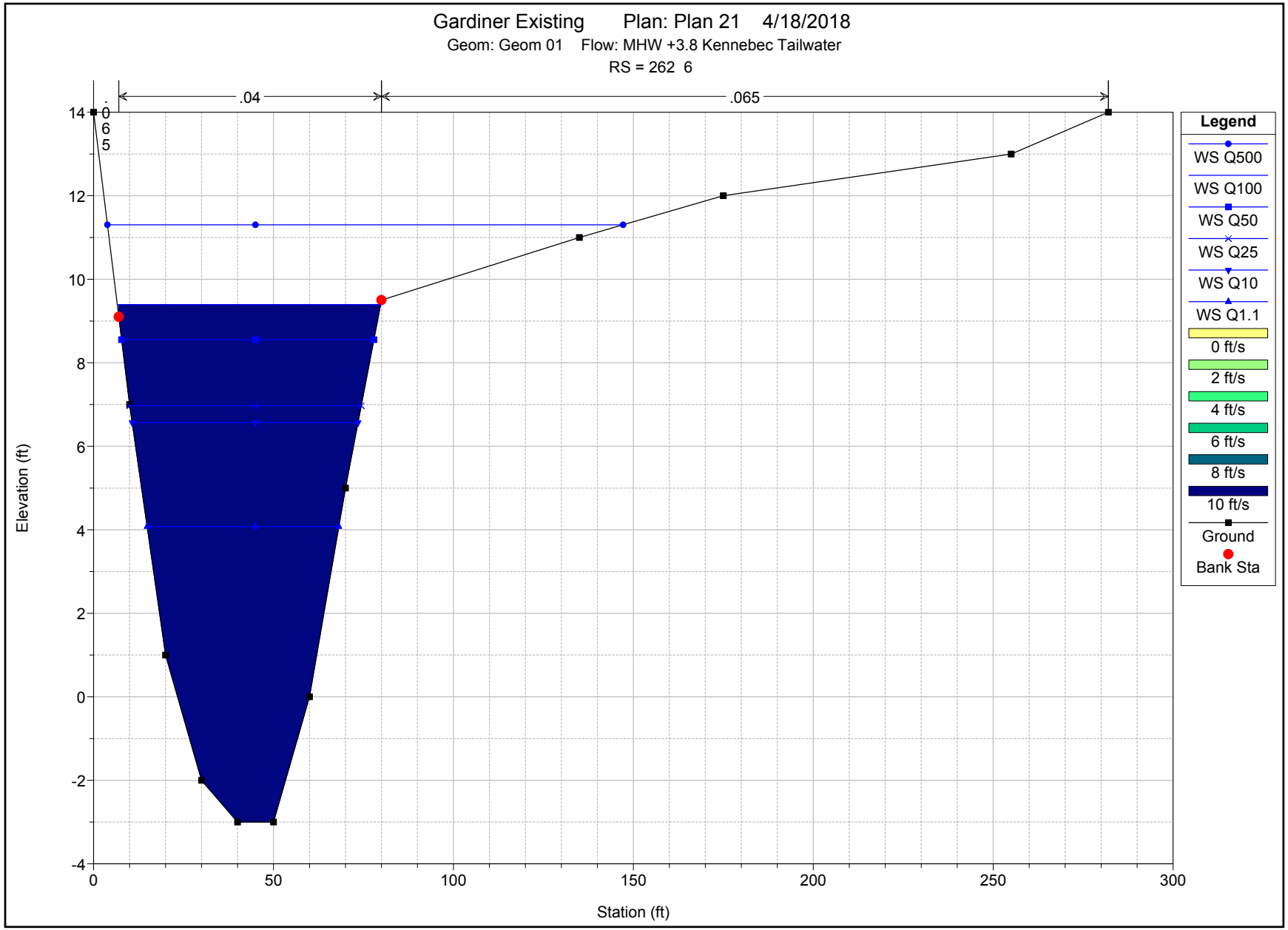

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 820 ADD
.065
.035
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

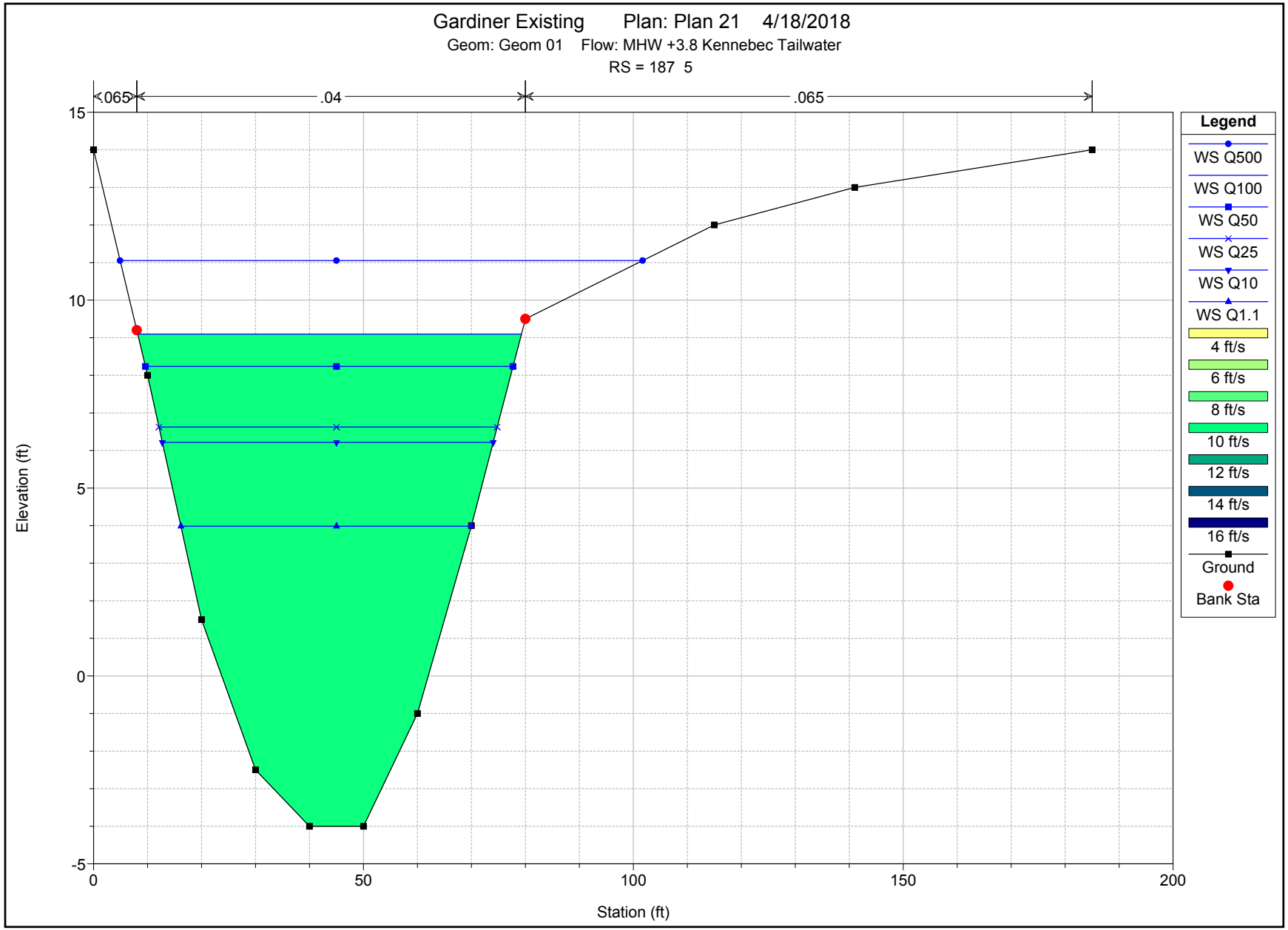

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 725 10
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

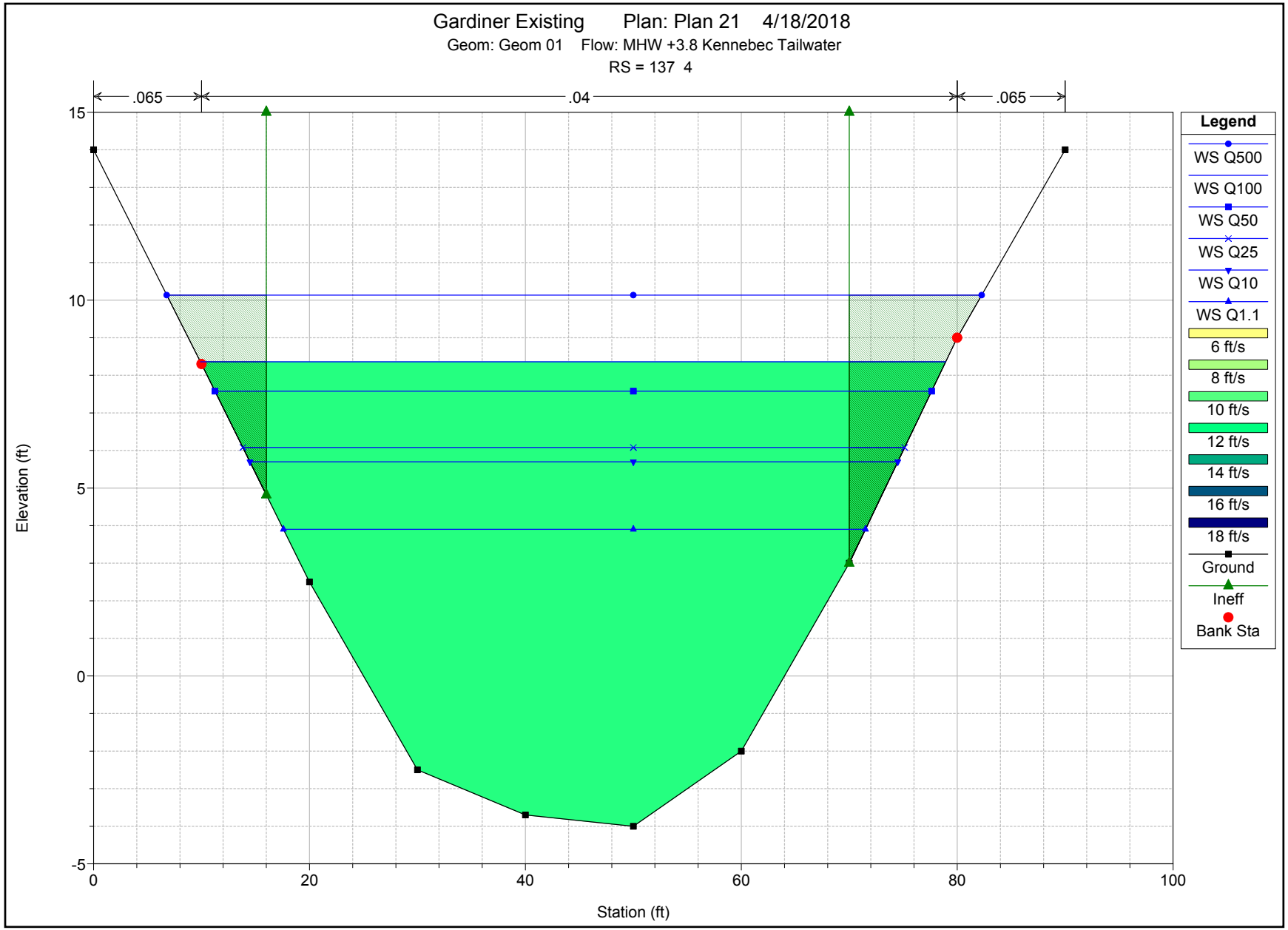

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 575 9
.065
.04
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

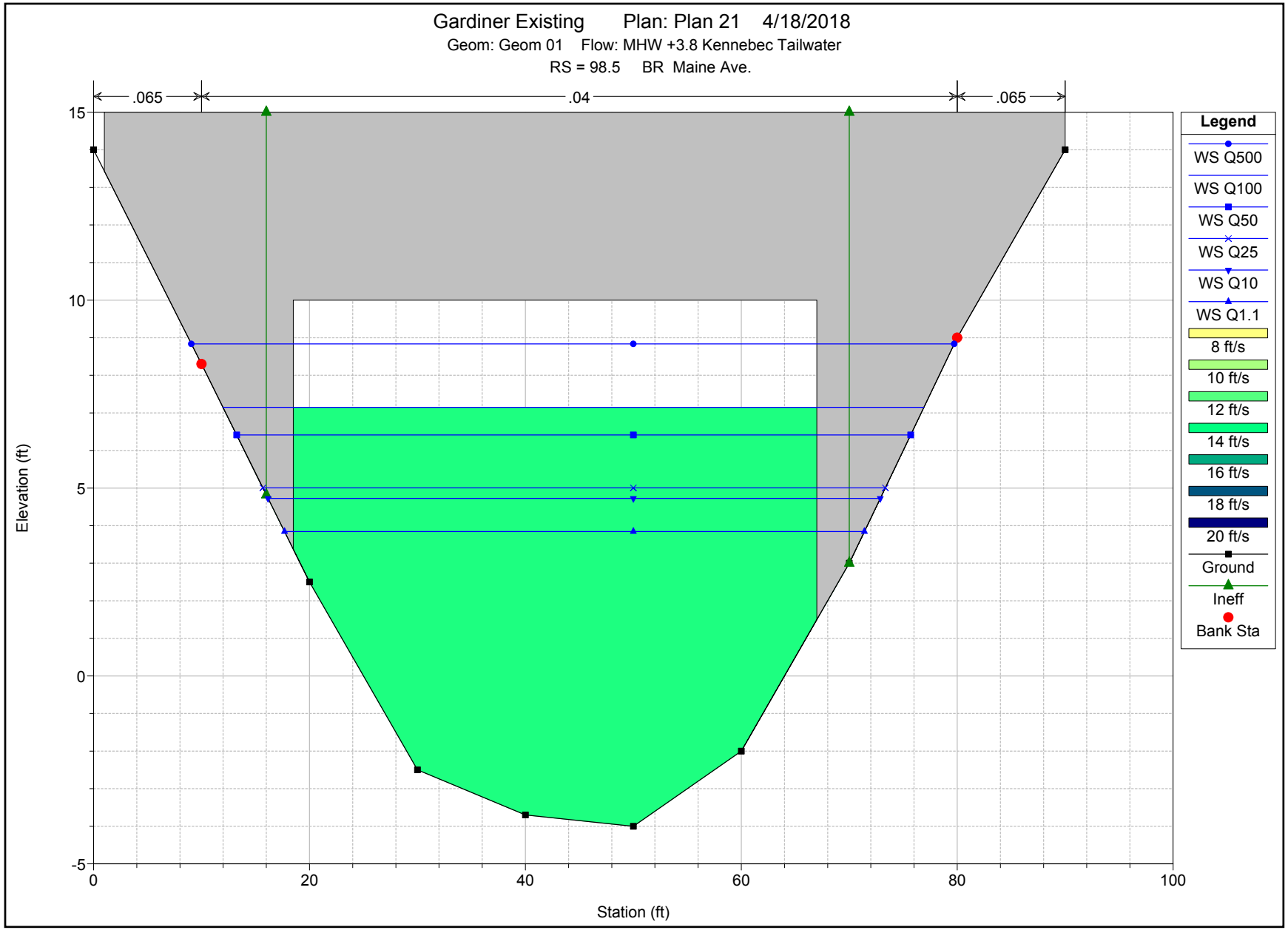

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 425 8
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

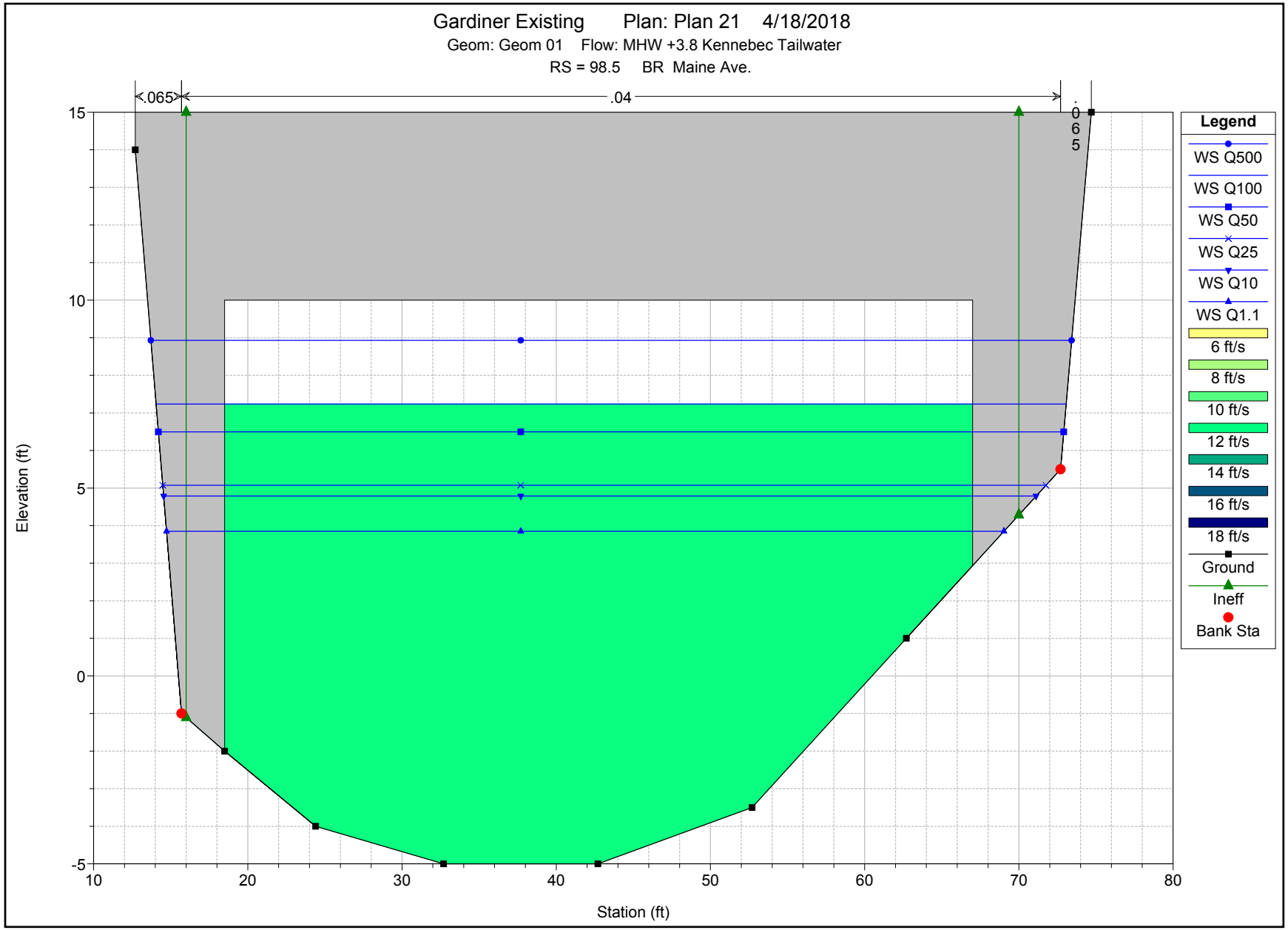

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 335 7
.065
.04
.065
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
250
300

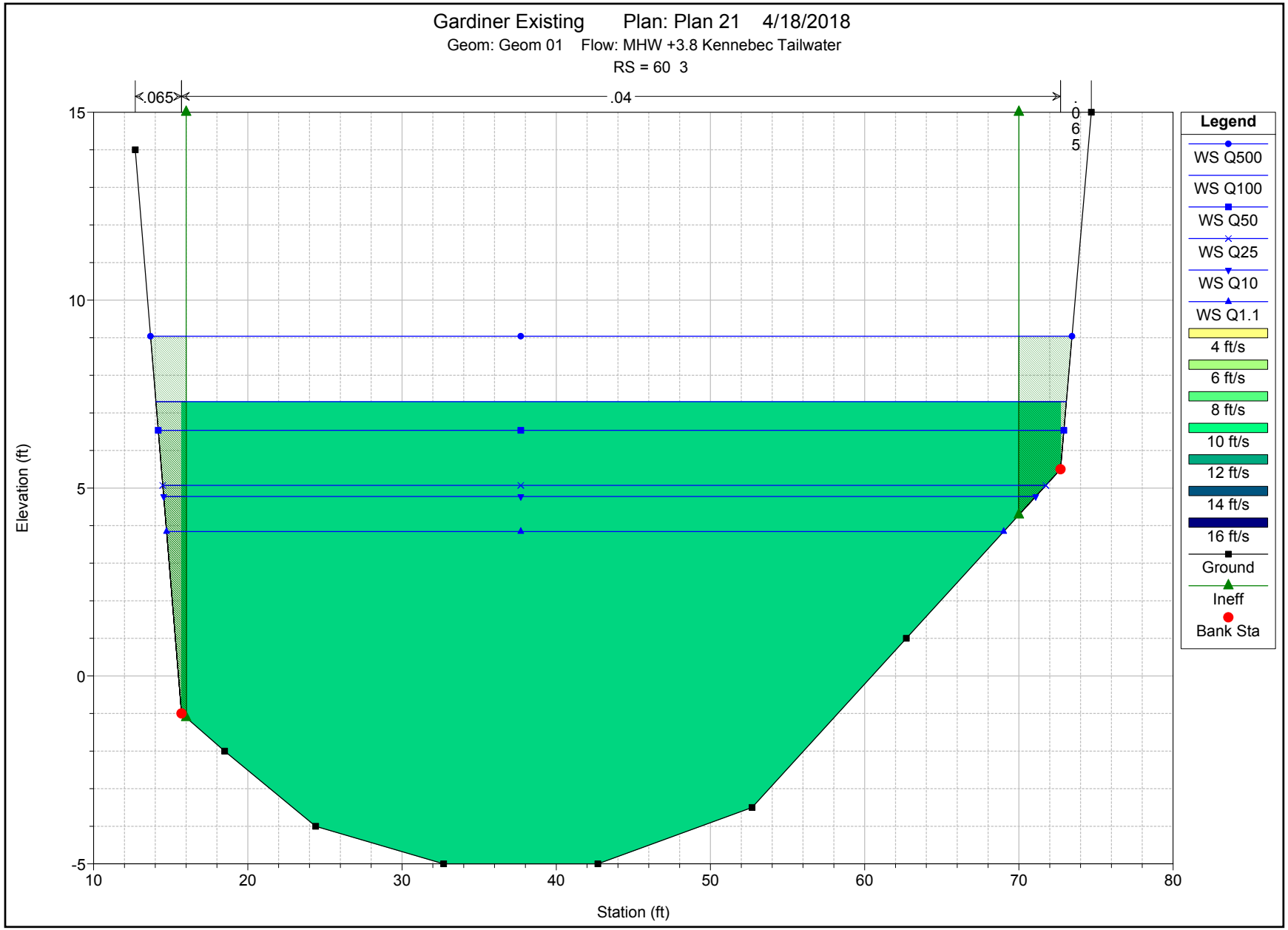

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 262 6
.04
.065
.0
6
5
Elevation (ft)
Station (ft)
14
12
10
8
6
4
2
0
-2
-4
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

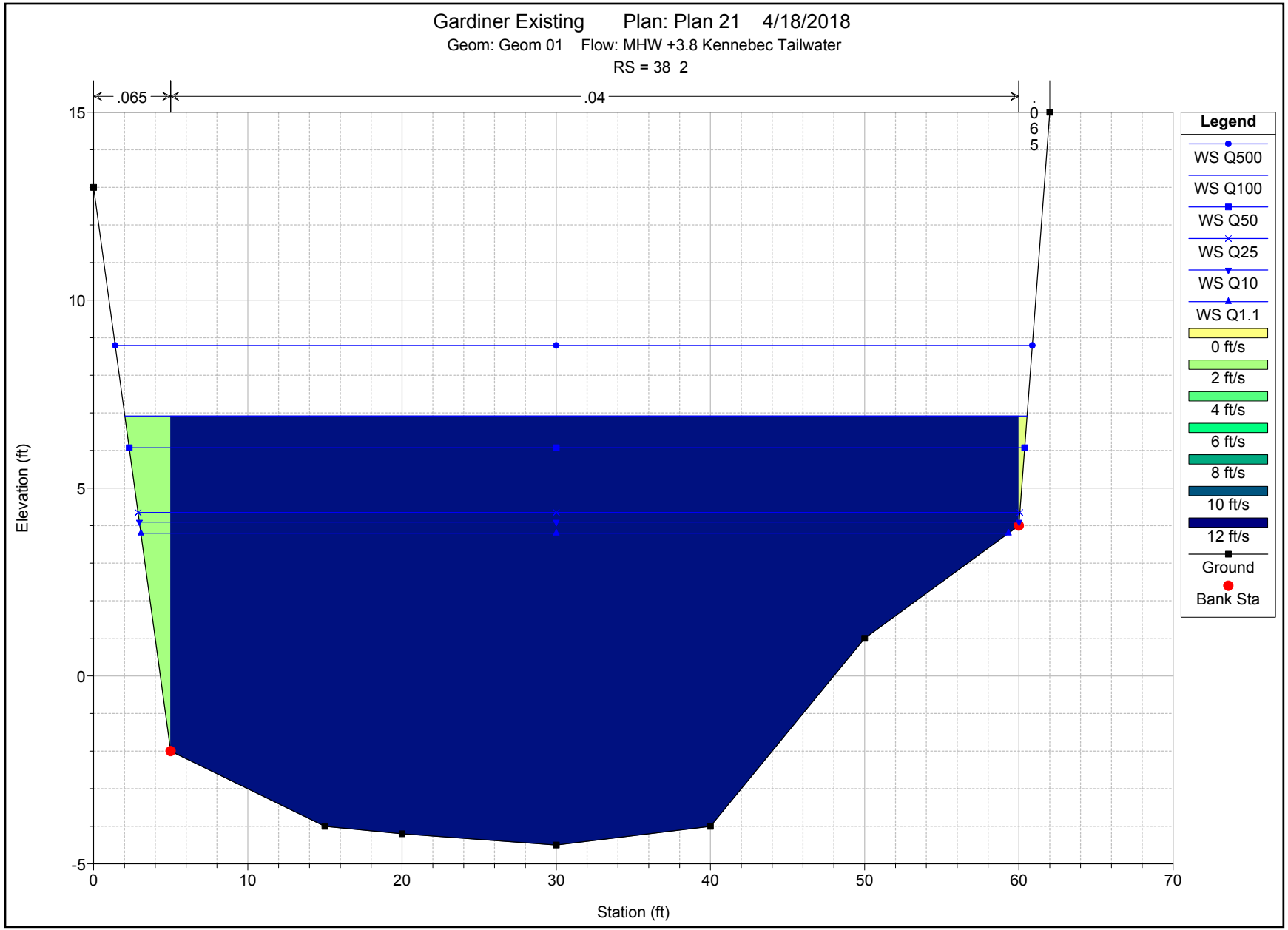

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 187 5
.065
.04
.065
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta
Elevation (ft)
15
10
5
0
-5
0
50
100
150
200
Station (ft)

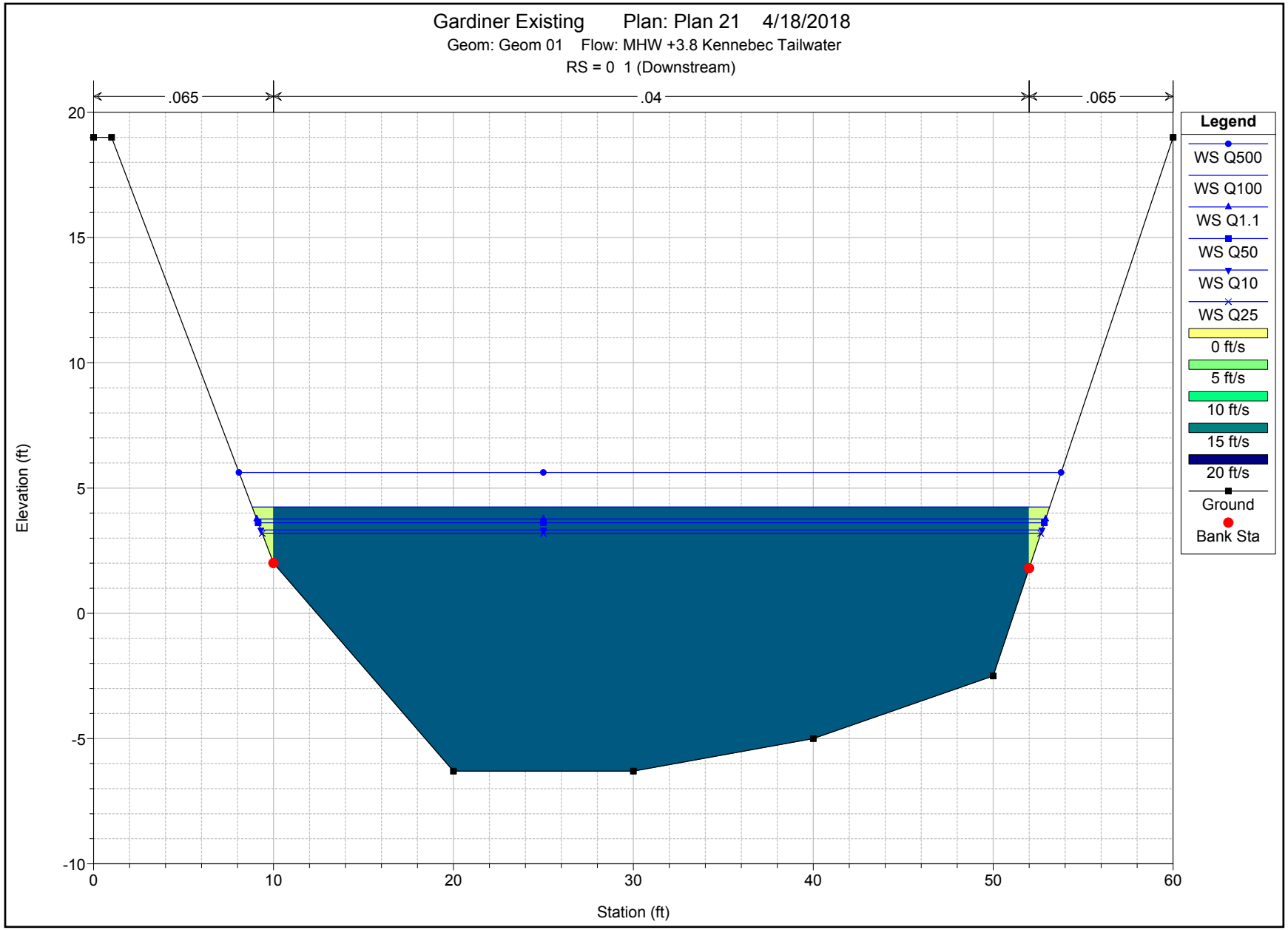

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 137 4
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

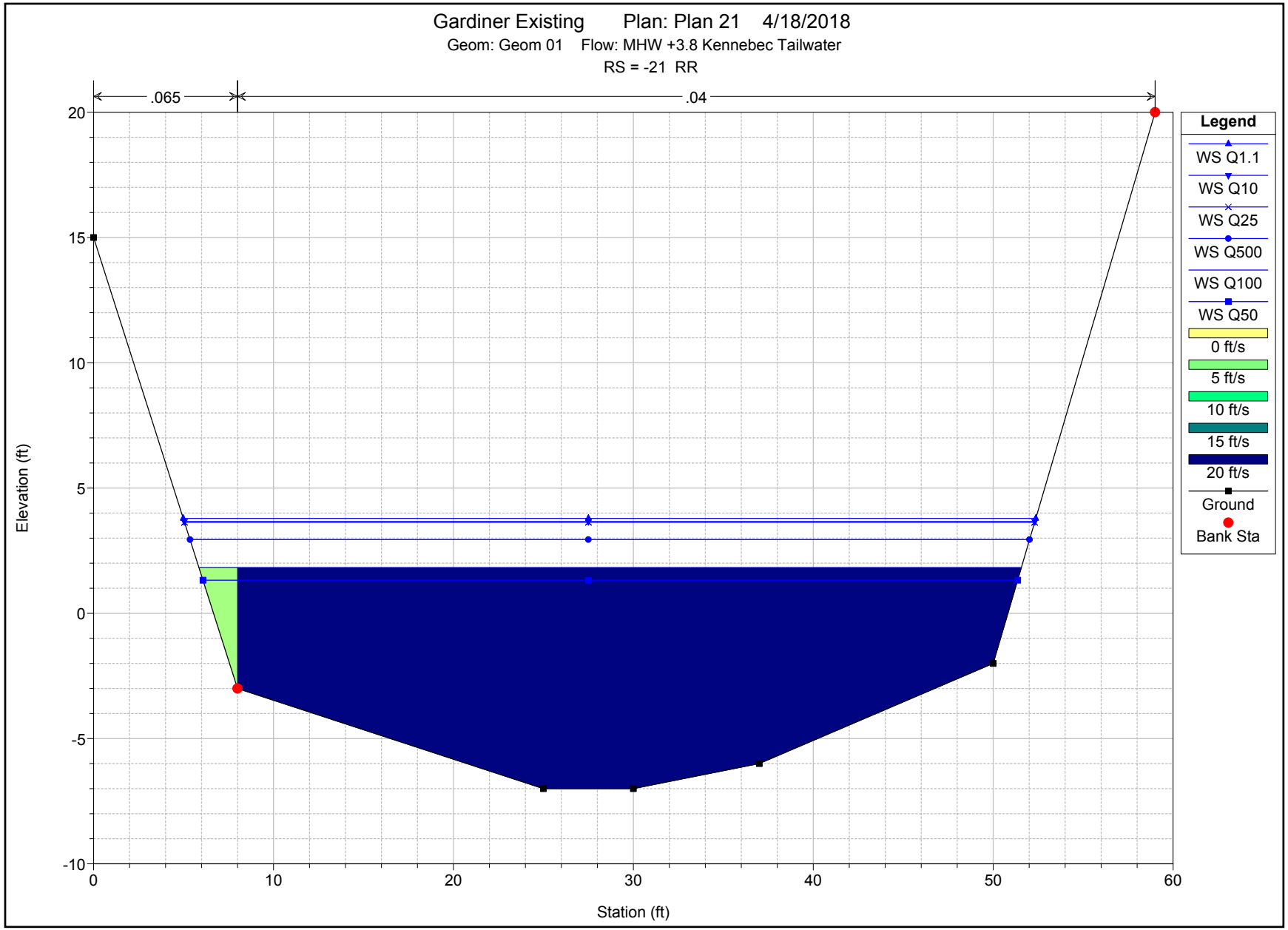

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
15
10
5
0
-5
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Ineff
Bank Sta

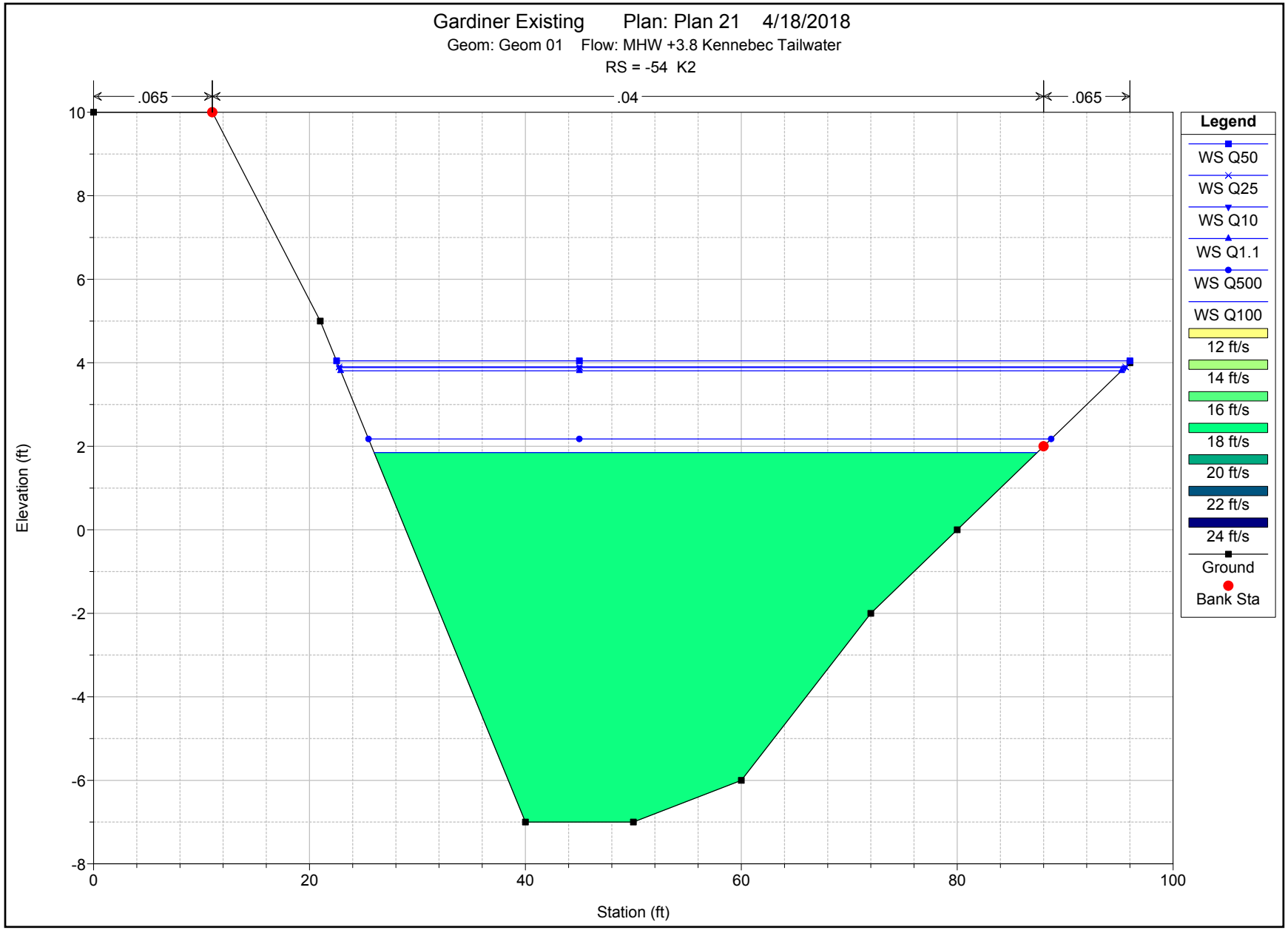

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

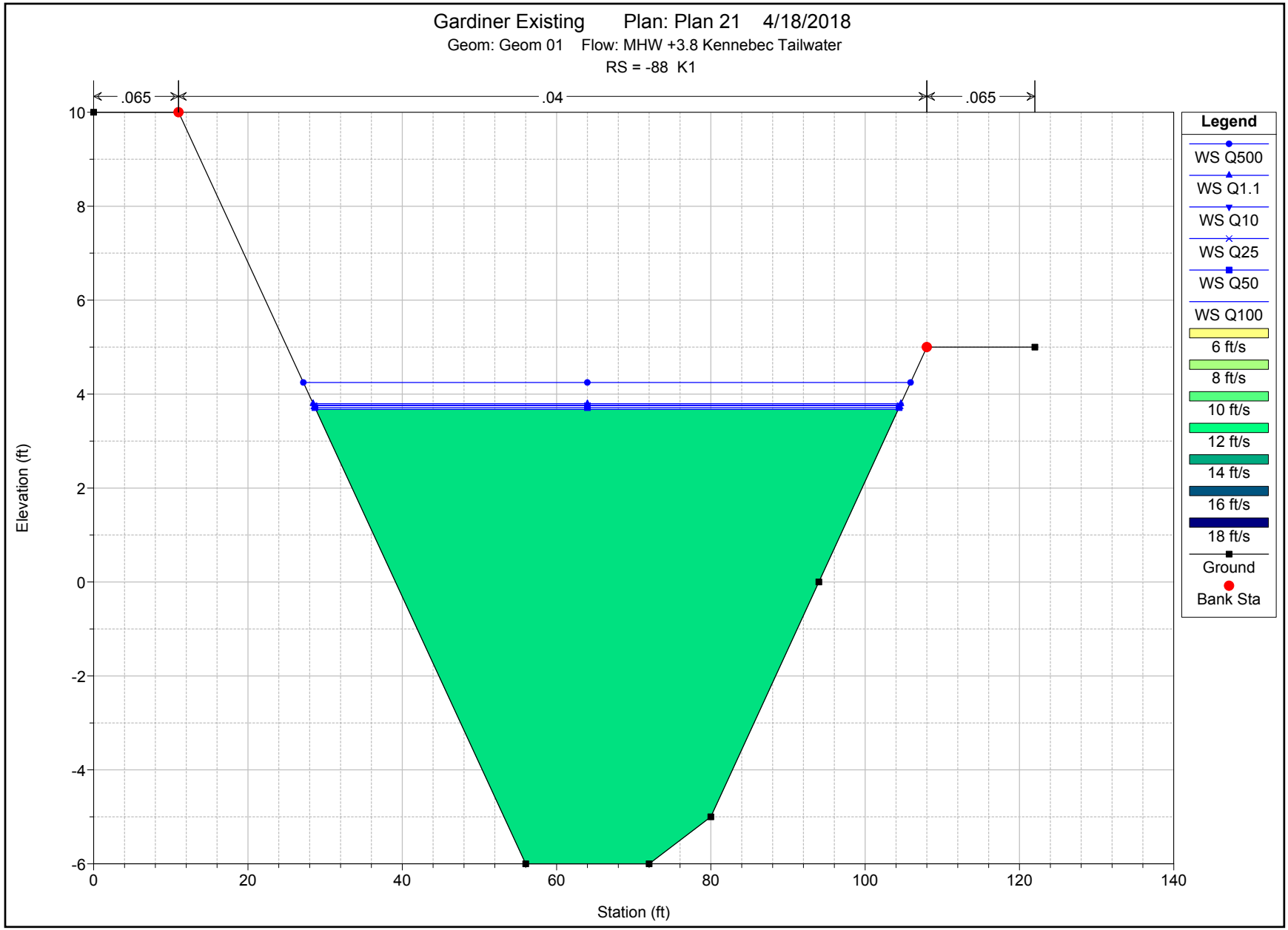

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 60 3
.065
.04
.065
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80

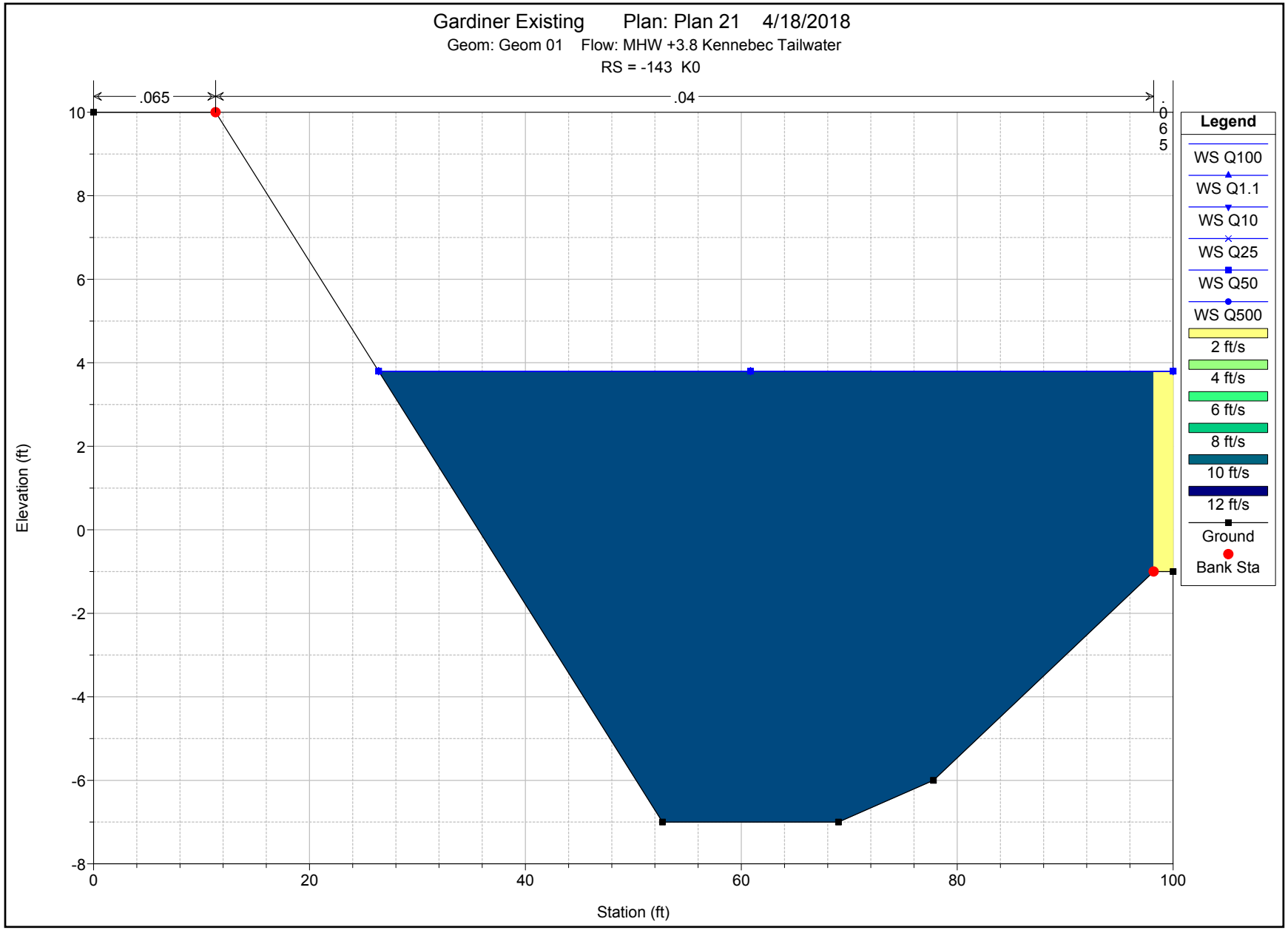

Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 38 2
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
10
20
30
40
50
60
70
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 0 1 (Downstream)
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q100
WS Q1.1
WS Q50
WS Q10
WS Q25
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -21 RR
.065
.04
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q1.1
WS Q10
WS Q25
WS Q500
WS Q100
WS Q50
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -54 K2
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q50
WS Q25
WS Q10
WS Q1.1
WS Q500
WS Q100
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -88 K1
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q100
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta


Gardiner Existing Plan: Plan 21 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -143 K0
.065
.04
.065
Legend
WS Q100
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q500
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100

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: Gardiner Existing
Project File : Existing.prj
Run Date and Time: 4/18/2018 9:40:21 AM

Project in English units

PLAN DATA

Plan Title: Plan 21
Plan File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.p21

Geometry Title: Geom 01
Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.g01

Flow Title : MHW +3.8 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.f02

Plan Summary Information:
Number of: Cross Sections = 27 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 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: MHW +3.8 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.f02

Flow Data (cfs)

| River | Reach | RS | Q100 | Q1.1 | Q10 | Q25 | Q50 | Q500 |
|---|---|---|---|---|---|---|---|---|
| Cobosee Stream | Reach 1 | 1700 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |
| Cobosee Stream | Reach 1 | -88 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Cobosee Stream | Reach 1 | Q100 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q1.1 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q10 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q25 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q50 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q500 | Critical | Known WS = 3.8 |

GEOMETRY DATA

Geometry Title: Geom 01

Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Existing\Existing.g01

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1700

INPUT
Description: Upstream (I)
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 40 | 10 | 39.7 | 20 | 39.2 | 30 | 37.2 | 40 | 34.5 |
| 50 | 29 | 60 | 23.5 | 70 | 17.5 | 80 | 15.5 | 90 | 14.5 |
| 100 | 13.8 | 110 | 14.2 | 120 | 14.8 | 130 | 15.7 | 140 | 19 |
| 150 | 25 | 160 | 31 | 170 | 33.3 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 60 | .04 | 150 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 60 | 150 | 65 | 65 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.48 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.75 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 21.32 | Flow Area (sq ft) | | 559.56 | |
| E.G. Slope (ft/ft) | 0.006899 | Area (sq ft) | | 559.56 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 84.99 | Top Width (ft) | | 84.99 | |
| Vel Total (ft/s) | 10.56 | Avg. Vel. (ft/s) | | 10.56 | |
| Max Chl Dpth (ft) | 8.95 | Hydr. Depth (ft) | | 6.58 | |
| Conv. Total (cfs) | 71152.0 | Conv. (cfs) | | 71152.0 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 88.36 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.73 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.08 | 25.59 | 1.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.07 | 3.56 | 1.24 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 18.54 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 17.33 | Flow Area (sq ft) | | 231.75 | |
| E.G. Slope (ft/ft) | 0.004837 | Area (sq ft) | | 231.75 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 70.35 | Top Width (ft) | | 70.35 | |
| Vel Total (ft/s) | 5.66 | Avg. Vel. (ft/s) | | 5.66 | |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | | 3.29 | |
| Conv. Total (cfs) | 18865.3 | Conv. (cfs) | | 18865.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 71.44 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 0.98 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.51 | Cum Volume (acre-ft) | 0.01 | 10.29 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 2.84 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.15 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 19.81 | Flow Area (sq ft) | | 428.08 | |
| E.G. Slope (ft/ft) | 0.006488 | Area (sq ft) | | 428.08 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 79.67 | Top Width (ft) | | 79.67 | |
| Vel Total (ft/s) | 8.99 | Avg. Vel. (ft/s) | | 8.99 | |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 47797.3 | Conv. (cfs) | | 47797.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 82.15 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.11 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.01 | 18.41 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.31 | 0.04 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.73 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.40 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.05 | Flow Area (sq ft) | | 447.72 | |
| E.G. Slope (ft/ft) | 0.006586 | Area (sq ft) | | 447.72 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 80.49 | Top Width (ft) | | 80.49 | |
| Vel Total (ft/s) | 9.26 | Avg. Vel. (ft/s) | | 9.26 | |
| Max Chl Dpth (ft) | 7.60 | Hydr. Depth (ft) | | 5.56 | |
| Conv. Total (cfs) | 51113.1 | Conv. (cfs) | | 51113.1 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 83.10 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.02 | 19.46 | 0.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.38 | 0.05 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.28 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.89 | Flow Area (sq ft) | | 519.99 | |
| E.G. Slope (ft/ft) | 0.006865 | Area (sq ft) | | 519.99 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 83.43 | Top Width (ft) | | 83.43 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 63848.2 | Conv. (cfs) | | 63848.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 86.53 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.04 | 23.50 | 0.34 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.04 | 3.54 | 0.54 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.00 | Wt. n-Val. | 0.070 | 0.040 | |
| W.S. Elev (ft) | 23.79 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 22.27 | Flow Area (sq ft) | 0.08 | 649.66 | |
| E.G. Slope (ft/ft) | 0.006886 | Area (sq ft) | 0.08 | 649.66 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.03 | 7379.97 | |
| Top Width (ft) | 88.50 | Top Width (ft) | 0.52 | 87.98 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 0.44 | 11.36 | |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 0.14 | 7.38 | |
| Conv. Total (cfs) | 88934.8 | Conv. (cfs) | 0.4 | 88934.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | 0.60 | 91.84 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | 0.05 | 3.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.50 | Cum Volume (acre-ft) | 0.25 | 30.53 | 4.08 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.14 | 3.60 | 2.01 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1635

INPUT
Description: H

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 23.5 | 40 | 17 |
| 50 | 14 | 60 | 14.5 | 70 | 15 | 80 | 15.2 | 90 | 15.4 |
| 100 | 15.6 | 110 | 15.8 | 115 | 17.9 | 120 | 20 | 130 | 26.5 |
| 140 | 30.1 | 150 | 30.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .045 | 130 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 130 | 80 | 80 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.95 | Element | | | |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 22.26 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.74 | |
| E.G. Slope (ft/ft) | 0.009286 | Area (sq ft) | | 565.74 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 91.56 | Top Width (ft) | | 91.56 | |
| Vel Total (ft/s) | 10.45 | Avg. Vel. (ft/s) | | 10.45 | |
| Max Chl Dpth (ft) | 8.26 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 61329.1 | Conv. (cfs) | | 61329.1 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 95.11 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.90 | Cum Volume (acre-ft) | 0.08 | 24.75 | 1.04 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.07 | 3.43 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.50 | Element | | | |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.92 | |
| E.G. Slope (ft/ft) | 0.015059 | Area (sq ft) | | 181.92 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 75.56 | Top Width (ft) | | 75.56 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 10691.3 | Conv. (cfs) | | 10691.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 76.62 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.04 | Cum Volume (acre-ft) | 0.01 | 9.98 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 2.73 | 0.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.47 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 407.41 | |
| E.G. Slope (ft/ft) | 0.010706 | Area (sq ft) | | 407.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 86.07 | Top Width (ft) | | 86.07 | |
| Vel Total (ft/s) | 9.45 | Avg. Vel. (ft/s) | | 9.45 | |
| Max Chl Dpth (ft) | 6.47 | Hydr. Depth (ft) | | 4.73 | |
| Conv. Total (cfs) | 37209.8 | Conv. (cfs) | | 37209.8 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 88.57 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.01 | 17.79 | 0.03 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 3.19 | 0.04 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.44 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 431.49 | |
| E.G. Slope (ft/ft) | 0.010420 | Area (sq ft) | | 431.49 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 86.93 | Top Width (ft) | | 86.93 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 6.75 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 40635.0 | Conv. (cfs) | | 40635.0 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 89.59 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.13 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.02 | 18.80 | 0.04 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.01 | 3.25 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.36 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 21.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 520.12 | |
| E.G. Slope (ft/ft) | 0.009593 | Area (sq ft) | | 520.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 90.01 | Top Width (ft) | | 90.01 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 7.75 | Hydr. Depth (ft) | | 5.78 | |
| Conv. Total (cfs) | 54011.4 | Conv. (cfs) | | 54011.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 93.26 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.91 | Cum Volume (acre-ft) | 0.04 | 22.72 | 0.34 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.04 | 3.41 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.89 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 23.37 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 669.19 | |
| E.G. Slope (ft/ft) | 0.008749 | Area (sq ft) | | 669.19 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 94.97 | Top Width (ft) | | 94.97 | |
| Vel Total (ft/s) | 11.03 | Avg. Vel. (ft/s) | | 11.03 | |
| Max Chl Dpth (ft) | 9.37 | Hydr. Depth (ft) | | 7.05 | |
| Conv. Total (cfs) | 78901.8 | Conv. (cfs) | | 78901.8 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 99.18 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | 0.25 | 29.55 | 4.08 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.14 | 3.47 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1555

INPUT
Description: G
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 21.5 | 40 | 15 |
| 50 | 13.8 | 60 | 13.6 | 70 | 13.3 | 80 | 13.5 | 90 | 13.5 |
| 100 | 14.5 | 110 | 19 | 120 | 26 | 130 | 29 | 140 | 29.5 |
| 150 | 29.9 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .042 | 120 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 120 | 100 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.62 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 20.34 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 20.16 | Flow Area (sq ft) | | 455.10 | |
| E.G. Slope (ft/ft) | 0.013988 | Area (sq ft) | | 455.10 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 80.13 | Top Width (ft) | | 80.13 | |
| Vel Total (ft/s) | 12.99 | Avg. Vel. (ft/s) | | 12.99 | |
| Max Chl Dpth (ft) | 7.04 | Hydr. Depth (ft) | | 5.68 | |
| Conv. Total (cfs) | 49970.8 | Conv. (cfs) | | 49970.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 83.23 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.77 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.37 | Cum Volume (acre-ft) | 0.08 | 23.81 | 1.04 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.07 | 3.27 | 1.24 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 16.65 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.93 | |
| E.G. Slope (ft/ft) | 0.011277 | Area (sq ft) | | 181.93 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 67.33 | Top Width (ft) | | 67.33 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.35 | Hydr. Depth (ft) | | 2.70 | |
| Conv. Total (cfs) | 12355.1 | Conv. (cfs) | | 12355.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.41 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 1.87 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.01 | 9.65 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 2.60 | 0.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.06 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.65 | Flow Area (sq ft) | | 355.06 | |
| E.G. Slope (ft/ft) | 0.012591 | Area (sq ft) | | 355.06 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.34 | Top Width (ft) | | 76.34 | |
| Vel Total (ft/s) | 10.84 | Avg. Vel. (ft/s) | | 10.84 | |
| Max Chl Dpth (ft) | 5.76 | Hydr. Depth (ft) | | 4.65 | |
| Conv. Total (cfs) | 34310.2 | Conv. (cfs) | | 34310.2 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 78.66 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.55 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.01 | 17.09 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 3.04 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.96 | Wt. n-Val. | | 0.042 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 19.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.89 | Flow Area (sq ft) | | 368.78 | |
| E.G. Slope (ft/ft) | 0.013022 | Area (sq ft) | | 368.78 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 76.87 | Top Width (ft) | | 76.87 | |
| Vel Total (ft/s) | 11.25 | Avg. Vel. (ft/s) | | 11.25 | |
| Max Chl Dpth (ft) | 5.94 | Hydr. Depth (ft) | | 4.80 | |
| Conv. Total (cfs) | 36350.1 | Conv. (cfs) | | 36350.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 79.30 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.78 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.02 | 18.07 | 0.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 3.10 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.41 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.96 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 19.73 | Flow Area (sq ft) | | 424.40 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 424.40 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 78.99 | Top Width (ft) | | 78.99 | |
| Vel Total (ft/s) | 12.46 | Avg. Vel. (ft/s) | | 12.46 | |
| Max Chl Dpth (ft) | 6.66 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 44978.8 | Conv. (cfs) | | 44978.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 81.85 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.48 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.04 | 21.85 | 0.34 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 3.25 | 0.54 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.03 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 21.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 21.12 | Flow Area (sq ft) | | 528.58 | |
| E.G. Slope (ft/ft) | 0.013932 | Area (sq ft) | | 528.58 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |

| | | | | |
|---|---|---|---|---|
| Top Width (ft) | 82.81 | Top Width (ft) | 82.81 | |
| Vel Total (ft/s) | 13.96 | Avg. Vel. (ft/s) | 13.96 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | 6.38 | |
| Conv. Total (cfs) | 62523.5 | Conv. (cfs) | 62523.5 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | 86.46 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.25 28.45 | 4.08 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.14 3.30 | 2.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1455

INPUT
Description: F
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 45 | 10 | 38 | 20 | 31 | 30 | 24 | 40 | 16.5 |
| 50 | 12.5 | 60 | 11.8 | 70 | 12 | 80 | 12.3 | 90 | 12.6 |
| 100 | 12.8 | 110 | 14 | 120 | 18.5 | 130 | 23 | 140 | 28 |
| 150 | 30 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 120 | 120 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.37 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 19.15 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.73 | Flow Area (sq ft) | 4.67 | 476.75 | 0.46 |
| E.G. Slope (ft/ft) | 0.013387 | Area (sq ft) | 4.67 | 476.75 | 0.46 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.83 | 5896.66 | 0.51 |
| Top Width (ft) | 84.97 | Top Width (ft) | 3.53 | 80.00 | 1.44 |
| Vel Total (ft/s) | 12.26 | Avg. Vel. (ft/s) | 2.75 | 12.37 | 1.09 |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | 1.32 | 5.96 | 0.32 |
| Conv. Total (cfs) | 51079.8 | Conv. (cfs) | 110.9 | 50964.5 | 4.4 |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 4.41 | 81.85 | 1.58 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.88 | 4.87 | 0.25 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.08 | 22.74 | 1.04 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.07 | 3.09 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.06 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 14.87 | Flow Area (sq ft) | | 165.73 | |
| E.G. Slope (ft/ft) | 0.018077 | Area (sq ft) | | 165.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 68.77 | Top Width (ft) | | 68.77 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 3.26 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 9758.1 | Conv. (cfs) | | 9758.1 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | | 69.60 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | | 2.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.24 | Cum Volume (acre-ft) | 0.01 | 9.25 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 2.44 | 0.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.01 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.40 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.28 | Flow Area (sq ft) | 0.54 | 338.37 | |
| E.G. Slope (ft/ft) | 0.017110 | Area (sq ft) | 0.54 | 338.37 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.82 | 3849.18 | |
| Top Width (ft) | 78.76 | Top Width (ft) | 1.20 | 77.56 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 1.51 | 11.38 | |
| Max Chl Dpth (ft) | 5.60 | Hydr. Depth (ft) | 0.45 | 4.36 | |
| Conv. Total (cfs) | 29432.7 | Conv. (cfs) | 6.3 | 29426.4 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.50 | 79.17 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.38 | 4.57 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.01 | 16.29 | 0.03 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.01 | 2.86 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.07 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.67 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.49 | Flow Area (sq ft) | 0.91 | 359.10 | |
| E.G. Slope (ft/ft) | 0.016462 | Area (sq ft) | 0.91 | 359.10 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.60 | 4146.40 | |
| Top Width (ft) | 79.70 | Top Width (ft) | 1.56 | 78.15 | |
| Vel Total (ft/s) | 11.52 | Avg. Vel. (ft/s) | 1.76 | 11.55 | |
| Max Chl Dpth (ft) | 5.87 | Hydr. Depth (ft) | 0.58 | 4.60 | |
| Conv. Total (cfs) | 32328.9 | Conv. (cfs) | 12.5 | 32316.5 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.94 | 79.81 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.48 | 4.62 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.53 | Cum Volume (acre-ft) | 0.02 | 17.23 | 0.04 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.01 | 2.92 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.27 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 18.65 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.33 | Flow Area (sq ft) | 3.07 | 436.72 | 0.02 |
| E.G. Slope (ft/ft) | 0.014390 | Area (sq ft) | 3.07 | 436.72 | 0.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.61 | 5282.38 | 0.01 |
| Top Width (ft) | 83.19 | Top Width (ft) | 2.86 | 80.00 | 0.33 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 2.48 | 12.10 | 0.42 |
| Max Chl Dpth (ft) | 6.85 | Hydr. Depth (ft) | 1.07 | 5.46 | 0.07 |
| Conv. Total (cfs) | 44098.1 | Conv. (cfs) | 63.4 | 44034.6 | 0.1 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 3.58 | 81.85 | 0.36 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.77 | 4.79 | 0.06 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.34 | Cum Volume (acre-ft) | 0.04 | 20.86 | 0.34 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 3.07 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.58 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 20.29 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.55 | 567.83 | 3.54 |
| E.G. Slope (ft/ft) | 0.011588 | Area (sq ft) | 9.55 | 567.83 | 3.54 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.00 | 7341.95 | 7.06 |
| Top Width (ft) | 89.01 | Top Width (ft) | 5.05 | 80.00 | 3.97 |
| Vel Total (ft/s) | 12.70 | Avg. Vel. (ft/s) | 3.24 | 12.93 | 1.99 |
| Max Chl Dpth (ft) | 8.49 | Hydr. Depth (ft) | 1.89 | 7.10 | 0.89 |
| Conv. Total (cfs) | 68558.4 | Conv. (cfs) | 288.0 | 68204.9 | 65.5 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 6.31 | 81.85 | 4.35 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 1.10 | 5.02 | 0.59 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.24 | 27.19 | 4.08 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.14 | 3.12 | 2.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1335

INPUT
Description: E
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.5 | 10 | 37.5 | 20 | 31 | 30 | 24 | 40 | 17 |
| 50 | 11 | 60 | 9.5 | 70 | 9.5 | 80 | 9.5 | 90 | 9.5 |
| 100 | 10.5 | 110 | 14 | 120 | 19 | 130 | 23 | 140 | 28 |
| 150 | 29 | 160 | 30 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .075 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 150 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.80 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 18.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.18 | 548.37 | |
| E.G. Slope (ft/ft) | 0.008451 | Area (sq ft) | 1.18 | 548.37 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.62 | 5908.38 | |
| Top Width (ft) | 80.41 | Top Width (ft) | 1.84 | 78.57 | |
| Vel Total (ft/s) | 10.75 | Avg. Vel. (ft/s) | 1.37 | 10.77 | |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 0.64 | 6.98 | |
| Conv. Total (cfs) | 64289.9 | Conv. (cfs) | 17.6 | 64272.3 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.24 | 82.00 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.28 | 3.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.56 | Cum Volume (acre-ft) | 0.07 | 21.33 | 1.04 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.06 | 2.87 | 1.24 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.14 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 12.63 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | | 152.88 | |
| E.G. Slope (ft/ft) | 0.019322 | Area (sq ft) | | 152.88 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 58.82 | Top Width (ft) | | 58.82 | |
| Vel Total (ft/s) | 8.58 | Avg. Vel. (ft/s) | | 8.58 | |
| Max Chl Dpth (ft) | 3.13 | Hydr. Depth (ft) | | 2.60 | |
| Conv. Total (cfs) | 9438.7 | Conv. (cfs) | | 9438.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 59.79 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.87 | Cum Volume (acre-ft) | 0.01 | 8.81 | 0.01 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 2.26 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.56 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.13 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 384.19 | |
| E.G. Slope (ft/ft) | 0.010520 | Area (sq ft) | | 384.19 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 72.81 | Top Width (ft) | | 72.81 | |
| Vel Total (ft/s) | 10.02 | Avg. Vel. (ft/s) | | 10.02 | |
| Max Chl Dpth (ft) | 6.63 | Hydr. Depth (ft) | | 5.28 | |
| Conv. Total (cfs) | 37536.7 | Conv. (cfs) | | 37536.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 75.49 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.65 | Cum Volume (acre-ft) | 0.01 | 15.30 | 0.03 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 2.65 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.07 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.47 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 409.60 | |
| E.G. Slope (ft/ft) | 0.010117 | Area (sq ft) | | 409.60 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 74.07 | Top Width (ft) | | 74.07 | |
| Vel Total (ft/s) | 10.13 | Avg. Vel. (ft/s) | | 10.13 | |
| Max Chl Dpth (ft) | 6.97 | Hydr. Depth (ft) | | 5.53 | |
| Conv. Total (cfs) | 41238.9 | Conv. (cfs) | | 41238.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 76.93 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.36 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.64 | Cum Volume (acre-ft) | 0.01 | 16.17 | 0.04 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 2.71 | 0.05 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.34 | 501.69 | |
| E.G. Slope (ft/ft) | 0.008914 | Area (sq ft) | 0.34 | 501.69 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.31 | 5289.69 | |
| Top Width (ft) | 78.36 | Top Width (ft) | 0.98 | 77.37 | |
| Vel Total (ft/s) | 10.54 | Avg. Vel. (ft/s) | 0.93 | 10.54 | |
| Max Chl Dpth (ft) | 8.19 | Hydr. Depth (ft) | 0.34 | 6.48 | |
| Conv. Total (cfs) | 56029.0 | Conv. (cfs) | 3.3 | 56025.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.20 | 80.66 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.16 | 3.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.03 | 19.57 | 0.34 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.03 | 2.85 | 0.54 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.97 | Wt. n-Val. | 0.065 | 0.045 | 0.075 |
| W.S. Elev (ft) | 19.61 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.86 | 653.69 | 0.46 |
| E.G. Slope (ft/ft) | 0.007511 | Area (sq ft) | 4.86 | 653.69 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.06 | 7369.59 | 0.34 |
| Top Width (ft) | 85.25 | Top Width (ft) | 3.73 | 80.00 | 1.52 |
| Vel Total (ft/s) | 11.20 | Avg. Vel. (ft/s) | 2.07 | 11.27 | 0.74 |
| Max Chl Dpth (ft) | 10.11 | Hydr. Depth (ft) | 1.30 | 8.17 | 0.30 |
| Conv. Total (cfs) | 85155.0 | Conv. (cfs) | 116.1 | 85034.9 | 3.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.55 | 83.60 | 1.64 |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.50 | 3.67 | 0.13 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.52 | Cum Volume (acre-ft) | 0.22 | 25.51 | 4.07 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.13 | 2.90 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1185

INPUT
Description: D
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.5 | 4 | 40 | 10 | 35 | 20 | 27.5 | 30 | 20 |
| 35 | 16 | 40 | 12 | 50 | 7 | 60 | 5.5 | 70 | 6 |
| 80 | 7 | 90 | 11 | 100 | 16 | 110 | 22 | 120 | 28 |
| 130 | 28.2 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 35 | .045 | 110 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 35 | 110 | 125 | 125 | 125 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.44 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.70 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.74 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 15.05 | Flow Area (sq ft) | | 448.42 | |
| E.G. Slope (ft/ft) | 0.013066 | Area (sq ft) | | 448.42 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 64.17 | Top Width (ft) | | 64.17 | |
| Vel Total (ft/s) | 13.18 | Avg. Vel. (ft/s) | | 13.18 | |
| Max Chl Dpth (ft) | 10.24 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 51703.8 | Conv. (cfs) | | 51703.8 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 68.72 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.68 | Cum Volume (acre-ft) | 0.06 | 19.62 | 1.04 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.06 | 2.63 | 1.24 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.82 | Wt. n-Val. | | 0.045 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 10.99 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 180.57 | |
| E.G. Slope (ft/ft) | 0.008702 | Area (sq ft) | | 180.57 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.96 | Top Width (ft) | | 47.96 | |
| Vel Total (ft/s) | 7.27 | Avg. Vel. (ft/s) | | 7.27 | |
| Max Chl Dpth (ft) | 5.49 | Hydr. Depth (ft) | | 3.77 | |
| Conv. Total (cfs) | 14064.2 | Conv. (cfs) | | 14064.2 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 49.84 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 1.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.49 | Cum Volume (acre-ft) | 0.01 | 8.24 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 2.08 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.08 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.16 | Flow Area (sq ft) | | 346.47 | |
| E.G. Slope (ft/ft) | 0.011509 | Area (sq ft) | | 346.47 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 58.78 | Top Width (ft) | | 58.78 | |
| Vel Total (ft/s) | 11.11 | Avg. Vel. (ft/s) | | 11.11 | |
| Max Chl Dpth (ft) | 8.58 | Hydr. Depth (ft) | | 5.89 | |
| Conv. Total (cfs) | 35888.0 | Conv. (cfs) | | 35888.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 62.36 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 3.99 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.62 | Cum Volume (acre-ft) | 0.01 | 14.04 | 0.03 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 2.43 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.04 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.34 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.46 | Flow Area (sq ft) | | 361.81 | |
| E.G. Slope (ft/ft) | 0.011809 | Area (sq ft) | | 361.81 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 59.62 | Top Width (ft) | | 59.62 | |
| Vel Total (ft/s) | 11.46 | Avg. Vel. (ft/s) | | 11.46 | |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 6.07 | |
| Conv. Total (cfs) | 38171.0 | Conv. (cfs) | | 38171.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 63.35 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.21 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.63 | Cum Volume (acre-ft) | 0.01 | 14.85 | 0.04 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 2.48 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.48 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.27 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 14.52 | Flow Area (sq ft) | | 418.21 | |
| E.G. Slope (ft/ft) | 0.012741 | Area (sq ft) | | 418.21 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 62.62 | Top Width (ft) | | 62.62 | |
| Vel Total (ft/s) | 12.65 | Avg. Vel. (ft/s) | | 12.65 | |
| Max Chl Dpth (ft) | 9.77 | Hydr. Depth (ft) | | 6.68 | |
| Conv. Total (cfs) | 46865.0 | Conv. (cfs) | | 46865.0 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 66.90 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.66 | Cum Volume (acre-ft) | 0.03 | 17.99 | 0.34 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.03 | 2.61 | 0.54 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.33 | Wt. n-Val. | 0.065 | 0.045 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 16.59 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 16.20 | Flow Area (sq ft) | 0.22 | 503.78 | |
| E.G. Slope (ft/ft) | 0.014396 | Area (sq ft) | 0.22 | 503.78 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.23 | 7379.77 | |
| Top Width (ft) | 66.73 | Top Width (ft) | 0.74 | 65.99 | |
| Vel Total (ft/s) | 14.64 | Avg. Vel. (ft/s) | 1.03 | 14.65 | |
| Max Chl Dpth (ft) | 11.09 | Hydr. Depth (ft) | 0.30 | 7.63 | |
| Conv. Total (cfs) | 61508.4 | Conv. (cfs) | 1.9 | 61506.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | 0.95 | 70.86 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | 0.21 | 6.39 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.73 | Cum Volume (acre-ft) | 0.21 | 23.51 | 4.07 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.12 | 2.64 | 1.99 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1060

INPUT
Description: C
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 33 | 20 | 35 | 30 | 29 | 40 | 23 |
| 45 | 19.5 | 50 | 16 | 60 | 10 | 70 | 7 | 80 | 5.5 |
| 90 | 5 | 100 | 5 | 110 | 7 | 120 | 13 | 130 | 20 |
| 200 | 20.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 45 | .04 | 130 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 45 | 130 | 100 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.15 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.57 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.57 | Flow Area (sq ft) | | 415.00 | |
| E.G. Slope (ft/ft) | 0.013789 | Area (sq ft) | | 415.00 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 66.76 | Top Width (ft) | | 66.76 | |
| Vel Total (ft/s) | 14.24 | Avg. Vel. (ft/s) | | 14.24 | |
| Max Chl Dpth (ft) | 8.57 | Hydr. Depth (ft) | | 6.22 | |
| Conv. Total (cfs) | 50329.3 | Conv. (cfs) | | 50329.3 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 70.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.07 | Cum Volume (acre-ft) | 0.06 | 18.38 | 1.04 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.06 | 2.44 | 1.24 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.41 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.85 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 8.85 | Flow Area (sq ft) | | 137.48 | |
| E.G. Slope (ft/ft) | 0.017292 | Area (sq ft) | | 137.48 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 49.24 | Top Width (ft) | | 49.24 | |
| Vel Total (ft/s) | 9.54 | Avg. Vel. (ft/s) | | 9.54 | |
| Max Chl Dpth (ft) | 3.85 | Hydr. Depth (ft) | | 2.79 | |
| Conv. Total (cfs) | 9977.1 | Conv. (cfs) | | 9977.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 50.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 2.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.29 | Cum Volume (acre-ft) | 0.01 | 7.78 | 0.01 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 1.94 | 0.01 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is

not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 11.81 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 11.81 | Flow Area (sq ft) | | 302.66 | |
| E.G. Slope (ft/ft) | 0.014662 | Area (sq ft) | | 302.66 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.04 | Top Width (ft) | | 61.04 | |
| Vel Total (ft/s) | 12.72 | Avg. Vel. (ft/s) | | 12.72 | |
| Max Chl Dpth (ft) | 6.81 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 31795.8 | Conv. (cfs) | | 31795.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 63.64 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.35 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.12 | Cum Volume (acre-ft) | 0.01 | 13.11 | 0.03 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.01 | 2.25 | 0.04 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 12.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 12.10 | Flow Area (sq ft) | | 320.59 | |
| E.G. Slope (ft/ft) | 0.014382 | Area (sq ft) | | 320.59 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.01 | Top Width (ft) | | 62.01 | |
| Vel Total (ft/s) | 12.94 | Avg. Vel. (ft/s) | | 12.94 | |
| Max Chl Dpth (ft) | 7.10 | Hydr. Depth (ft) | | 5.17 | |
| Conv. Total (cfs) | 34588.7 | Conv. (cfs) | | 34588.7 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 64.77 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.44 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.10 | Cum Volume (acre-ft) | 0.01 | 13.87 | 0.04 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.01 | 2.31 | 0.05 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.10 | Flow Area (sq ft) | | 384.11 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 384.11 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.31 | Top Width (ft) | | 65.31 | |
| Vel Total (ft/s) | 13.77 | Avg. Vel. (ft/s) | | 13.77 | |
| Max Chl Dpth (ft) | 8.10 | Hydr. Depth (ft) | | 5.88 | |
| Conv. Total (cfs) | 44979.7 | Conv. (cfs) | | 44979.7 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.63 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.83 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.07 | Cum Volume (acre-ft) | 0.03 | 16.84 | 0.34 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.03 | 2.43 | 0.54 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 14.68 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 14.68 | Flow Area (sq ft) | | 490.87 | |
| E.G. Slope (ft/ft) | 0.013247 | Area (sq ft) | | 490.87 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 70.19 | Top Width (ft) | | 70.19 | |
| Vel Total (ft/s) | 15.03 | Avg. Vel. (ft/s) | | 15.03 | |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 64121.8 | Conv. (cfs) | | 64121.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 74.44 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.05 | Cum Volume (acre-ft) | 0.21 | 22.09 | 4.07 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.12 | 2.45 | 1.99 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 960

INPUT
Description: B
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 32 | 13.6 | 31 | 22.5 | 30 | 33.1 | 28 | 54.2 | 20 |
| 71.6 | 20 | 72.3 | 15 | 72.9 | 10.091 | 73.4 | 6 | 79.4 | 5 |
| 85.5 | 4 | 100.5 | 3.5 | 114.3 | 4 | 124.5 | 5 | 135.8 | 10.103 |
| 140 | 12 | 202.9 | 14.2 | 203 | 14.5 | 209.1 | 15 | 224.5 | 20 |
| 229.5 | 25 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 72.9 | .042 | 135.8 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 72.9 | 135.8 | 25 | 25 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.82 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 2.28 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.54 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 11.33 | Flow Area (sq ft) | 0.37 | 484.96 | 10.39 |
| E.G. Slope (ft/ft) | 0.008563 | Area (sq ft) | 0.37 | 484.96 | 10.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.20 | 5891.34 | 18.46 |
| Top Width (ft) | 82.79 | Top Width (ft) | 0.30 | 62.90 | 19.59 |
| Vel Total (ft/s) | 11.92 | Avg. Vel. (ft/s) | 0.55 | 12.15 | 1.78 |
| Max Chl Dpth (ft) | 9.04 | Hydr. Depth (ft) | 1.22 | 7.71 | 0.53 |
| Conv. Total (cfs) | 63865.3 | Conv. (cfs) | 2.2 | 63663.7 | 199.5 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 2.47 | 67.85 | 20.01 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.08 | 3.82 | 0.28 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.06 | 17.34 | 1.03 |
| C & E Loss (ft) | 0.63 | Cum SA (acres) | 0.06 | 2.29 | 1.22 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 7.53 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 6.91 | Flow Area (sq ft) | | 177.88 | |
| E.G. Slope (ft/ft) | 0.009985 | Area (sq ft) | | 177.88 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 56.90 | Top Width (ft) | | 56.90 | |
| Vel Total (ft/s) | 7.38 | Avg. Vel. (ft/s) | | 7.38 | |
| Max Chl Dpth (ft) | 4.03 | Hydr. Depth (ft) | | 3.13 | |
| Conv. Total (cfs) | 13129.6 | Conv. (cfs) | | 13129.6 | |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | | 59.03 | |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | | 1.88 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.01 | 7.42 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 1.82 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.65 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.76 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 9.68 | Flow Area (sq ft) | 0.03 | 373.02 | 0.48 |
| E.G. Slope (ft/ft) | 0.008768 | Area (sq ft) | 0.03 | 373.02 | 0.48 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.01 | 3849.40 | 0.59 |
| Top Width (ft) | 64.43 | Top Width (ft) | 0.08 | 62.90 | 1.45 |
| Vel Total (ft/s) | 10.31 | Avg. Vel. (ft/s) | 0.23 | 10.32 | 1.24 |
| Max Chl Dpth (ft) | 7.26 | Hydr. Depth (ft) | 0.33 | 5.93 | 0.33 |
| Conv. Total (cfs) | 41115.5 | Conv. (cfs) | 0.1 | 41109.1 | 6.3 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 0.67 | 67.85 | 1.59 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.02 | 3.01 | 0.16 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 12.33 | 0.03 |
| C & E Loss (ft) | 0.39 | Cum SA (acres) | 0.01 | 2.11 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.75 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.04 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.93 | Flow Area (sq ft) | 0.05 | 390.62 | 0.97 |
| E.G. Slope (ft/ft) | 0.008725 | Area (sq ft) | 0.05 | 390.62 | 0.97 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.02 | 4146.46 | 1.52 |
| Top Width (ft) | 65.09 | Top Width (ft) | 0.12 | 62.90 | 2.07 |
| Vel Total (ft/s) | 10.59 | Avg. Vel. (ft/s) | 0.30 | 10.62 | 1.57 |
| Max Chl Dpth (ft) | 7.54 | Hydr. Depth (ft) | 0.47 | 6.21 | 0.47 |
| Conv. Total (cfs) | 44408.0 | Conv. (cfs) | 0.2 | 44391.5 | 16.3 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 0.95 | 67.85 | 2.27 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.03 | 3.14 | 0.23 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 13.05 | 0.04 |
| C & E Loss (ft) | 0.42 | Cum SA (acres) | 0.01 | 2.16 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.10 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.04 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.87 | Flow Area (sq ft) | 0.23 | 453.88 | 4.20 |
| E.G. Slope (ft/ft) | 0.008580 | Area (sq ft) | 0.23 | 453.88 | 4.20 |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.11 | 5280.65 | 9.24 |
| Top Width (ft) | 68.60 | Top Width (ft) | 0.24 | 62.90 | 5.47 |
| Vel Total (ft/s) | 11.54 | Avg. Vel. (ft/s) | 0.47 | 11.63 | 2.20 |
| Max Chl Dpth (ft) | 8.54 | Hydr. Depth (ft) | 0.98 | 7.22 | 0.77 |
| Conv. Total (cfs) | 57109.9 | Conv. (cfs) | 1.2 | 57009.0 | 99.7 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 1.97 | 67.85 | 5.87 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.06 | 3.58 | 0.38 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | 0.03 | 15.87 | 0.33 |
| C & E Loss (ft) | 0.55 | Cum SA (acres) | 0.03 | 2.28 | 0.53 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.93 | Wt. n-Val. | 0.070 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.41 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | 0.11 | 413.84 | 1.88 |
| E.G. Slope (ft/ft) | 0.022762 | Area (sq ft) | 0.11 | 413.84 | 1.88 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.06 | 7373.96 | 5.97 |
| Top Width (ft) | 65.95 | Top Width (ft) | 0.16 | 62.90 | 2.89 |
| Vel Total (ft/s) | 17.75 | Avg. Vel. (ft/s) | 0.59 | 17.82 | 3.17 |
| Max Chl Dpth (ft) | 7.91 | Hydr. Depth (ft) | 0.66 | 6.58 | 0.65 |
| Conv. Total (cfs) | 48916.0 | Conv. (cfs) | 0.4 | 48876.0 | 39.6 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 1.33 | 67.85 | 3.17 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 0.11 | 8.67 | 0.84 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.71 | Cum Volume (acre-ft) | 0.21 | 21.05 | 4.07 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.12 | 2.30 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 935

INPUT
Description: JU

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 12 | 30 | 20 | 28 | 50 | 10 | 75.8 | 6 |
| 82.4 | 4 | 92.4 | 3 | 105.2 | 2 | 121 | 3 | 128 | 5 |
| 136 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 | 208.7 | 13.4 |
| 231.8 | 20 | 232 | 26.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 50 | .042 | 136 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 50 | 136 | 85 | 85 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 232 | 30 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.06 | Element | | | |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 13.04 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 10.34 | Flow Area (sq ft) | 7.70 | 687.59 | 114.45 |
| E.G. Slope (ft/ft) | 0.003531 | Area (sq ft) | 7.70 | 687.59 | 120.00 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.49 | 5673.06 | 224.45 |
| Top Width (ft) | 158.21 | Top Width (ft) | 5.07 | 86.00 | 67.14 |
| Vel Total (ft/s) | 7.30 | Avg. Vel. (ft/s) | 1.62 | 8.25 | 1.96 |
| Max Chl Dpth (ft) | 11.04 | Hydr. Depth (ft) | 1.52 | 8.00 | 1.94 |
| Conv. Total (cfs) | 99457.7 | Conv. (cfs) | 210.2 | 95470.3 | 3777.2 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 5.91 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.29 | 1.71 | 0.43 |
| Alpha | 1.23 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.06 | 17.01 | 0.99 |
| C & E Loss (ft) | 0.29 | Cum SA (acres) | 0.05 | 2.25 | 1.19 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.03 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.46 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 7.57 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 5.91 | Flow Area (sq ft) | | 240.67 | |
| E.G. Slope (ft/ft) | 0.004399 | Area (sq ft) | | 240.67 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 66.41 | Top Width (ft) | | 66.41 | |
| Vel Total (ft/s) | 5.45 | Avg. Vel. (ft/s) | | 5.45 | |
| Max Chl Dpth (ft) | 5.57 | Hydr. Depth (ft) | | 3.62 | |
| Conv. Total (cfs) | 19781.8 | Conv. (cfs) | | 19781.8 | |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | | 67.97 | |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | | 0.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 7.30 | 0.01 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.00 | 1.78 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 11.00 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 8.78 | Flow Area (sq ft) | 0.84 | 512.24 | 13.44 |
| E.G. Slope (ft/ft) | 0.004311 | Area (sq ft) | 0.84 | 512.24 | 13.44 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.71 | 3837.48 | 11.81 |
| Top Width (ft) | 114.51 | Top Width (ft) | 1.67 | 86.00 | 26.84 |
| Vel Total (ft/s) | 7.31 | Avg. Vel. (ft/s) | 0.85 | 7.49 | 0.88 |
| Max Chl Dpth (ft) | 9.00 | Hydr. Depth (ft) | 0.50 | 5.96 | 0.50 |
| Conv. Total (cfs) | 58639.3 | Conv. (cfs) | 10.9 | 58448.6 | 179.9 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 1.95 | 88.44 | 26.86 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.12 | 1.56 | 0.13 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 12.08 | 0.02 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.01 | 2.07 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.22 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 11.32 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 9.03 | Flow Area (sq ft) | 1.44 | 539.21 | 23.18 |
| E.G. Slope (ft/ft) | 0.004193 | Area (sq ft) | 1.44 | 539.21 | 23.18 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.46 | 4122.46 | 24.08 |
| Top Width (ft) | 123.44 | Top Width (ft) | 2.19 | 86.00 | 35.25 |
| Vel Total (ft/s) | 7.36 | Avg. Vel. (ft/s) | 1.01 | 7.65 | 1.04 |
| Max Chl Dpth (ft) | 9.32 | Hydr. Depth (ft) | 0.66 | 6.27 | 0.66 |
| Conv. Total (cfs) | 64060.3 | Conv. (cfs) | 22.5 | 63666.0 | 371.9 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 2.56 | 88.44 | 35.27 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.15 | 1.60 | 0.17 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.01 | 12.78 | 0.03 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.01 | 2.12 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.45 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.99 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 12.46 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 9.93 | Flow Area (sq ft) | 5.05 | 637.91 | 80.37 |
| E.G. Slope (ft/ft) | 0.003743 | Area (sq ft) | 5.05 | 637.91 | 81.28 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.33 | 5154.48 | 128.19 |
| Top Width (ft) | 156.11 | Top Width (ft) | 4.10 | 86.00 | 66.01 |
| Vel Total (ft/s) | 7.31 | Avg. Vel. (ft/s) | 1.45 | 8.08 | 1.60 |
| Max Chl Dpth (ft) | 10.46 | Hydr. Depth (ft) | 1.23 | 7.42 | 1.36 |
| Conv. Total (cfs) | 86466.8 | Conv. (cfs) | 119.8 | 84251.7 | 2095.3 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 4.79 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.25 | 1.69 | 0.32 |
| Alpha | 1.19 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.03 | 15.56 | 0.31 |
| C & E Loss (ft) | 0.28 | Cum SA (acres) | 0.03 | 2.24 | 0.51 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 15.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.10 | Wt. n-Val. | 0.065 | 0.042 | 0.070 |
| W.S. Elev (ft) | 14.22 | Reach Len. (ft) | 17.00 | 17.00 | 17.00 |
| Crit W.S. (ft) | 11.33 | Flow Area (sq ft) | 14.84 | 789.01 | 184.03 |
| E.G. Slope (ft/ft) | 0.003277 | Area (sq ft) | 14.84 | 789.01 | 205.75 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 28.83 | 6873.98 | 477.18 |
| Top Width (ft) | 168.60 | Top Width (ft) | 7.03 | 86.00 | 75.57 |
| Vel Total (ft/s) | 7.47 | Avg. Vel. (ft/s) | 1.94 | 8.71 | 2.59 |
| Max Chl Dpth (ft) | 12.22 | Hydr. Depth (ft) | 2.11 | 9.17 | 3.12 |
| Conv. Total (cfs) | 128913.2 | Conv. (cfs) | 503.7 | 120074.1 | 8335.4 |
| Length Wtd. (ft) | 17.00 | Wetted Per. (ft) | 8.20 | 88.44 | 59.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.37 | 1.83 | 0.64 |
| Alpha | 1.27 | Stream Power (lb/ft s) | 232.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.21 | 20.70 | 4.01 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.11 | 2.25 | 1.97 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 895

INPUT
Description: Bridge Street
Distance from Upstream XS = 17
Deck/Roadway Width = 56
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|---|---|---|---|---|---|---|---|---|
| 0 | 30 | 0 | 30.2 | 30 | 0 | 30.2 | 30 | 26 |
| 246.2 | 26 | 22 | 246.2 | 26 | 0 | 260 | 26 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 12 | 30 | 20 | 28 | 50 | 10 | 75.8 | 6 |
| 82.4 | 4 | 92.4 | 3 | 105.2 | 2 | 121 | 3 | 128 | 5 |
| 136 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 | 208.7 | 13.4 |
| 231.8 | 20 | 232 | 26.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 50 | .042 | 136 | .07 |

Bank Sta: Left Right Coeff Contr. Expan.
50 136 .3 .5
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 232 | 30 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 30.2 | 30 | 0 | 30.2 | 30 | 26 |
| 246.2 | 26 | 22 | 246.2 | 26 | 0 | 260 | 26 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 28 | 26.8 | 20 | 27 | 14 | 39.8 | 10 | 75.2 | 5 |
| 94 | 1 | 115 | 1 | 126.8 | 5 | 131.6 | 5 | 151.3 | 9 |
| 174.5 | 10 | 238.1 | 15 | 238.2 | 25 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 39.8 | .04 | 131.6 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.
39.8 131.6 .3 .5
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 238.2 | 30 | F |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev |
|---|---|---|
| 131.3 | 146.6 | 30 |
| 203 | 240 | 30 |

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 26
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
Pier Station Upstream= 83.2 Downstream= 83.2
Upstream num= 2
Width Elev Width Elev
7.7 3 4 28
Downstream num= 2
Width Elev Width Elev
7.7 3 4 28

Pier Data
Pier Station Upstream= 138.2 Downstream= 138.2
Upstream num= 2
Width Elev Width Elev
7.7 3 4 28
Downstream num= 2
Width Elev Width Elev
7.7 3 4 28

Pier Data
Pier Station Upstream= 193.2 Downstream= 193.2
Upstream num= 2
Width Elev Width Elev
7.7 3 4 28
Downstream num= 2
Width Elev Width Elev
7.7 3 4 28

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth

inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 14.06 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 13.04 | E.G. Elev (ft) | 13.67 | 12.90 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 11.70 | 11.51 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 10.78 | 9.93 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.70 | 10.51 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.78 | 8.79 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 548.45 | 672.20 |
| Weir Submerg | | Froude # Chl | 0.78 | 0.64 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4042.63 | 4256.51 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.52 | 5.04 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 141.57 | 160.45 |
| Delta EG (ft) | 1.34 | Conv. Total (cfs) | 56292.8 | 71093.0 |
| Delta WS (ft) | 1.49 | Top Width (ft) | 121.45 | 133.26 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.48 | 0.07 |
| BR Open Vel (ft/s) | 10.78 | C & E Loss (ft) | 0.29 | 0.12 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.67 | 1.81 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 8.03 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 7.57 | E.G. Elev (ft) | 7.83 | 7.33 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 7.05 | 6.84 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 6.09 | 5.12 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 5.05 | 5.84 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 7.08 | 5.60 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 185.43 | 234.13 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.51 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 667.31 | 799.30 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 3.36 | 3.78 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 61.66 | 71.50 |
| Delta EG (ft) | 0.80 | Conv. Total (cfs) | 13668.9 | 19178.8 |
| Delta WS (ft) | 0.73 | Top Width (ft) | 55.17 | 61.99 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.36 | 0.05 |

| | | | | |
|---|---|---|---|---|
| BR Open Vel (ft/s) | 7.08 | C & E Loss (ft) | 0.14 | 0.05 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.73 | 0.96 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.87 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.00 | E.G. Elev (ft) | 11.52 | 10.74 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 9.85 | 9.44 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 9.19 | 8.13 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.85 | 8.44 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.37 | 9.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 371.27 | 426.37 |
| Weir Submerg | | Froude # Chl | 0.83 | 0.71 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2381.92 | 2505.77 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.81 | 4.46 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 90.24 | 114.33 |
| Delta EG (ft) | 1.34 | Conv. Total (cfs) | 33725.2 | 41240.5 |
| Delta WS (ft) | 1.52 | Top Width (ft) | 77.17 | 95.70 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.59 | 0.08 |
| BR Open Vel (ft/s) | 10.37 | C & E Loss (ft) | 0.19 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.35 | 2.03 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 12.22 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.32 | E.G. Elev (ft) | 11.86 | 11.09 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 10.15 | 9.77 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 9.45 | 8.40 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.15 | 8.77 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.49 | 9.02 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 395.40 | 459.73 |
| Weir Submerg | | Froude # Chl | 0.82 | 0.70 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2612.06 | 2746.11 |

| | | | |
|---|---|---|---|
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 5.04 | 4.35 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 92.48 | 125.71 |
| Delta EG (ft) | 1.33 | Conv. Total (cfs) | 36925.9 | 44862.0 |
| Delta WS (ft) | 1.50 | Top Width (ft) | 78.50 | 105.78 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.58 | 0.08 |
| BR Open Vel (ft/s) | 10.49 | C & E Loss (ft) | 0.19 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.37 | 1.95 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 13.45 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 12.46 | E.G. Elev (ft) | 13.07 | 12.28 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 11.14 | 10.88 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 10.32 | 9.40 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.14 | 9.88 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.89 | 8.96 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 485.64 | 590.71 |
| Weir Submerg | | Froude # Chl | 0.80 | 0.67 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3520.21 | 3691.43 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 4.60 | 4.65 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 123.43 | 151.36 |
| Delta EG (ft) | 1.37 | Conv. Total (cfs) | 48863.6 | 60747.7 |
| Delta WS (ft) | 1.53 | Top Width (ft) | 105.53 | 126.95 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.52 | 0.07 |
| BR Open Vel (ft/s) | 10.89 | C & E Loss (ft) | 0.26 | 0.13 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.88 | 1.85 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 15.32 | Element | Inside BR US | Inside BR DS |

| | | | | |
|---|---|---|---|---|
| W.S. US. (ft) | 14.22 | E.G. Elev (ft) | 15.01 | 14.35 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 13.14 | 13.04 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 11.89 | 10.88 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.14 | 12.04 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.02 | 8.39 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 736.89 | 880.12 |
| Weir Submerg | | Froude # Chl | 0.70 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 5392.83 | 5799.20 |
| Min El Weir Flow (ft) | 26.96 | Hydr Depth (ft) | 5.54 | 6.36 |
| Min El Prs (ft) | 26.00 | W.P. Total (ft) | 159.87 | 173.12 |
| Delta EG (ft) | 1.12 | Conv. Total (cfs) | 78846.8 | 99858.9 |
| Delta WS (ft) | 1.14 | Top Width (ft) | 140.56 | 145.07 |
| BR Open Area (sq ft) | 2374.70 | Frctn Loss (ft) | 0.38 | 0.05 |
| BR Open Vel (ft/s) | 10.02 | C & E Loss (ft) | 0.28 | 0.10 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.52 | 1.73 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 850

INPUT
Description: JD
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 28 | 26.8 | 20 | 27 | 14 | 39.8 | 10 | 75.2 | 5 |
| 94 | 1 | 115 | 1 | 126.8 | 5 | 131.6 | 5 | 151.3 | 9 |
| 174.5 | 10 | 238.1 | 15 | 238.2 | 25 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 39.8 | .04 | 131.6 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 39.8 | 131.6 | 20 | 20 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 0 | 25 | 30 | F |
| 195 | 238.2 | 30 | F |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 131.3 | 146.6 | 30 | 203 | 240 | 30 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.72 | Element | | | |
| Vel Head (ft) | 1.16 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.56 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 9.38 | Flow Area (sq ft) | 3.87 | 656.53 | 77.33 |
| E.G. Slope (ft/ft) | 0.004490 | Area (sq ft) | 3.87 | 656.53 | 77.33 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.86 | 5749.56 | 155.58 |
| Top Width (ft) | 144.16 | Top Width (ft) | 4.98 | 91.50 | 47.69 |
| Vel Total (ft/s) | 8.01 | Avg. Vel. (ft/s) | 1.26 | 8.76 | 2.01 |
| Max Chl Dpth (ft) | 10.56 | Hydr. Depth (ft) | 0.78 | 7.18 | 1.62 |
| Conv. Total (cfs) | 88199.3 | Conv. (cfs) | 72.6 | 85804.9 | 2321.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 5.21 | 99.49 | 51.37 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.21 | 1.85 | 0.42 |
| Alpha | 1.16 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.06 | 15.89 | 0.87 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.05 | 2.08 | 1.11 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.23 | Element | | | |
| Vel Head (ft) | 0.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.84 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 4.89 | Flow Area (sq ft) | | 260.32 | |
| E.G. Slope (ft/ft) | 0.003327 | Area (sq ft) | | 260.32 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 69.12 | Top Width (ft) | | 69.12 | |
| Vel Total (ft/s) | 5.04 | Avg. Vel. (ft/s) | | 5.04 | |
| Max Chl Dpth (ft) | 5.84 | Hydr. Depth (ft) | | 3.77 | |
| Conv. Total (cfs) | 22745.3 | Conv. (cfs) | | 22745.3 | |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 72.17 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.75 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.07 | Cum Volume (acre-ft) | 0.01 | 6.88 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.67 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.05 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.48 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.75 | Flow Area (sq ft) | | 467.77 | 7.21 |
| E.G. Slope (ft/ft) | 0.005734 | Area (sq ft) | | 467.77 | 7.21 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3843.08 | 6.92 |
| Top Width (ft) | 103.72 | Top Width (ft) | | 87.83 | 15.89 |
| Vel Total (ft/s) | 8.11 | Avg. Vel. (ft/s) | | 8.22 | 0.96 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 5.33 | 0.45 |
| Conv. Total (cfs) | 50844.7 | Conv. (cfs) | | 50753.2 | 91.4 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 93.71 | 17.43 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.79 | 0.15 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 11.27 | 0.01 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.00 | 1.91 | 0.01 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.88 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.07 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.82 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.01 | Flow Area (sq ft) | | 497.44 | 13.79 |
| E.G. Slope (ft/ft) | 0.005610 | Area (sq ft) | | 497.44 | 13.79 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4132.33 | 15.67 |
| Top Width (ft) | 113.81 | Top Width (ft) | | 90.19 | 23.62 |
| Vel Total (ft/s) | 8.11 | Avg. Vel. (ft/s) | | 8.31 | 1.14 |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | | 5.52 | 0.58 |
| Conv. Total (cfs) | 55379.3 | Conv. (cfs) | | 55170.1 | 209.3 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | | 96.43 | 25.50 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.81 | 0.19 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 11.93 | 0.02 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.01 | 1.96 | 0.01 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.08 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.15 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.94 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.91 | Flow Area (sq ft) | 1.40 | 599.94 | 50.27 |
| E.G. Slope (ft/ft) | 0.004917 | Area (sq ft) | 1.40 | 599.94 | 50.27 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 1.32 | 5199.07 | 89.61 |
| Top Width (ft) | 134.32 | Top Width (ft) | 3.00 | 91.50 | 39.82 |
| Vel Total (ft/s) | 8.12 | Avg. Vel. (ft/s) | 0.94 | 8.67 | 1.78 |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 0.47 | 6.56 | 1.26 |
| Conv. Total (cfs) | 75439.9 | Conv. (cfs) | 18.8 | 74143.1 | 1278.0 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 3.14 | 98.87 | 42.86 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.14 | 1.86 | 0.36 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.03 | 14.54 | 0.24 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.03 | 2.08 | 0.44 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.12 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.08 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 10.40 | Flow Area (sq ft) | 15.20 | 796.26 | 151.22 |
| E.G. Slope (ft/ft) | 0.003513 | Area (sq ft) | 15.20 | 796.26 | 160.47 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 26.65 | 6944.32 | 409.03 |
| Top Width (ft) | 157.76 | Top Width (ft) | 9.86 | 91.50 | 56.40 |
| Vel Total (ft/s) | 7.67 | Avg. Vel. (ft/s) | 1.75 | 8.72 | 2.70 |
| Max Chl Dpth (ft) | 12.08 | Hydr. Depth (ft) | 1.54 | 8.70 | 3.12 |
| Conv. Total (cfs) | 124507.8 | Conv. (cfs) | 449.6 | 117157.4 | 6900.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 10.33 | 101.01 | 53.62 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.32 | 1.73 | 0.62 |
| Alpha | 1.22 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.18 | 19.35 | 3.75 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.10 | 2.09 | 1.86 |

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 830

INPUT
Description: A
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 24.1 | 15 | 34.9 | 10.006 | 41.4 | 7 | 45.2 | 6 |
| 58.5 | 6 | 65 | 5 | 78 | 4 | 93.5 | 1 | 108.7 | 1 |
| 131.1 | 7 | 155 | 10 | 167.8 | 10 | 194.1 | 11 | 251.2 | 15 |
| 251.3 | 25 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 34.9 | .04 | 131.1 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 34.9 | 131.1 | 9 | 9 | .3 | .5 |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 132 | 155 | 25 | 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.54 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.56 | 712.89 | 53.34 |
| E.G. Slope (ft/ft) | 0.003454 | Area (sq ft) | 2.56 | 712.89 | 53.34 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.70 | 5835.78 | 71.52 |
| Top Width (ft) | 147.28 | Top Width (ft) | 3.32 | 96.20 | 47.76 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 1.06 | 8.19 | 1.34 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 0.77 | 7.41 | 1.12 |
| Conv. Total (cfs) | 100563.7 | Conv. (cfs) | 46.0 | 99300.7 | 1217.0 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 3.66 | 98.18 | 53.77 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 1.57 | 0.21 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.05 | 15.57 | 0.84 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 2.04 | 1.08 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.15 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.38 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.77 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 265.30 | |
| E.G. Slope (ft/ft) | 0.004146 | Area (sq ft) | | 265.30 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 87.98 | Top Width (ft) | | 87.98 | |
| Vel Total (ft/s) | 4.95 | Avg. Vel. (ft/s) | | 4.95 | |
| Max Chl Dpth (ft) | 5.77 | Hydr. Depth (ft) | | 3.02 | |
| Conv. Total (cfs) | 20376.1 | Conv. (cfs) | | 20376.1 | |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 89.24 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.77 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 6.76 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.63 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.34 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.47 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 513.78 | 2.17 |
| E.G. Slope (ft/ft) | 0.004396 | Area (sq ft) | | 513.78 | 2.17 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3847.49 | 2.51 |
| Top Width (ft) | 95.94 | Top Width (ft) | | 95.04 | 0.90 |
| Vel Total (ft/s) | 7.46 | Avg. Vel. (ft/s) | | 7.49 | 1.16 |
| Max Chl Dpth (ft) | 8.47 | Hydr. Depth (ft) | | 5.41 | 2.41 |
| Conv. Total (cfs) | 58068.7 | Conv. (cfs) | | 58030.8 | 37.9 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 96.91 | 3.26 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.45 | 0.18 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 11.05 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.87 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.80 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 545.70 | 2.47 |
| E.G. Slope (ft/ft) | 0.004219 | Area (sq ft) | | 545.70 | 2.47 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4145.14 | 2.86 |
| Top Width (ft) | 96.67 | Top Width (ft) | | 95.77 | 0.90 |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | | 7.60 | 1.16 |
| Max Chl Dpth (ft) | 8.80 | Hydr. Depth (ft) | | 5.70 | 2.75 |
| Conv. Total (cfs) | 63858.1 | Conv. (cfs) | | 63814.1 | 44.0 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | | 97.70 | 3.60 |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.47 | 0.18 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 11.69 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.92 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.92 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.91 | 653.30 | 26.53 |
| E.G. Slope (ft/ft) | 0.003757 | Area (sq ft) | 0.91 | 653.30 | 26.53 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.71 | 5262.19 | 27.10 |
| Top Width (ft) | 136.18 | Top Width (ft) | 1.98 | 96.20 | 38.00 |
| Vel Total (ft/s) | 7.77 | Avg. Vel. (ft/s) | 0.78 | 8.05 | 1.02 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.46 | 6.79 | 0.70 |
| Conv. Total (cfs) | 86308.4 | Conv. (cfs) | 11.6 | 85854.6 | 442.2 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 2.19 | 98.18 | 42.75 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.56 | 0.15 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.03 | 14.25 | 0.22 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 2.03 | 0.42 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.07 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.15 | 859.71 | 130.67 |
| E.G. Slope (ft/ft) | 0.002737 | Area (sq ft) | 10.15 | 859.71 | 130.67 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.12 | 7098.19 | 266.69 |
| Top Width (ft) | 153.73 | Top Width (ft) | 6.63 | 96.20 | 50.90 |
| Vel Total (ft/s) | 7.38 | Avg. Vel. (ft/s) | 1.49 | 8.26 | 2.04 |
| Max Chl Dpth (ft) | 12.07 | Hydr. Depth (ft) | 1.53 | 8.94 | 2.57 |
| Conv. Total (cfs) | 141061.3 | Conv. (cfs) | 289.0 | 135674.9 | 5097.5 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 7.30 | 98.18 | 61.28 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.24 | 1.50 | 0.36 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 251.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.18 | 18.97 | 3.68 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.10 | 2.05 | 1.83 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 821

INPUT
Description: AD
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 16.5 | 22 | 12.5 | 27 | 10.25 | 32 | 8 | 42 | 6.5 |
| 52 | 6 | 62 | 4.5 | 72 | 3.5 | 82 | 1.5 | 92 | 1 |
| 102 | 1 | 112 | 4 | 122 | 7 | 132 | 9 | 154 | 10 |
| 203 | 11.5 | 235 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12 | .065 | 27 | .035 | 132 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 27 | 132 | 1 | 1 | .3 | .5 |

Blocked Obstructions num= 2

| Sta L | Sta R | Elev | Sta L | Sta R | Elev |
|---|---|---|---|---|---|
| 132 | 155 | 25 | 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.53 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.82 | 729.91 | 36.68 |
| E.G. Slope (ft/ft) | 0.002866 | Area (sq ft) | 1.82 | 729.91 | 36.68 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.55 | 5872.59 | 35.86 |
| Top Width (ft) | 157.69 | Top Width (ft) | 2.84 | 105.00 | 49.85 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 0.85 | 8.05 | 0.98 |
| Max Chl Dpth (ft) | 10.53 | Hydr. Depth (ft) | 0.64 | 6.95 | 0.74 |
| Conv. Total (cfs) | 110396.7 | Conv. (cfs) | 29.0 | 109697.9 | 669.8 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 3.12 | 109.59 | 51.37 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.19 | 0.13 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.05 | 15.42 | 0.83 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.04 | 2.02 | 1.07 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.11 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.42 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.69 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 252.86 | |
| E.G. Slope (ft/ft) | 0.003298 | Area (sq ft) | | 252.86 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.22 | Top Width (ft) | | 80.22 | |
| Vel Total (ft/s) | 5.19 | Avg. Vel. (ft/s) | | 5.19 | |
| Max Chl Dpth (ft) | 5.69 | Hydr. Depth (ft) | | 3.15 | |
| Conv. Total (cfs) | 22844.8 | Conv. (cfs) | | 22844.8 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 81.45 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 6.70 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.61 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.30 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.89 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.41 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 507.88 | |
| E.G. Slope (ft/ft) | 0.003918 | Area (sq ft) | | 507.88 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 103.13 | Top Width (ft) | | 103.13 | |
| Vel Total (ft/s) | 7.58 | Avg. Vel. (ft/s) | | 7.58 | |
| Max Chl Dpth (ft) | 8.41 | Hydr. Depth (ft) | | 4.92 | |
| Conv. Total (cfs) | 61509.3 | Conv. (cfs) | | 61509.3 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 105.41 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.18 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 10.94 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.85 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.90 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 545.05 | |
| E.G. Slope (ft/ft) | 0.003650 | Area (sq ft) | | 545.05 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 103.92 | Top Width (ft) | | 103.92 | |
| Vel Total (ft/s) | 7.61 | Avg. Vel. (ft/s) | | 7.61 | |
| Max Chl Dpth (ft) | 8.77 | Hydr. Depth (ft) | | 5.24 | |
| Conv. Total (cfs) | 68658.2 | Conv. (cfs) | | 68658.2 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 106.64 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.16 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 11.58 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 1.90 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.88 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.98 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.90 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.47 | 664.17 | 12.43 |
| E.G. Slope (ft/ft) | 0.003150 | Area (sq ft) | 0.47 | 664.17 | 12.43 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.27 | 5280.75 | 8.98 |
| Top Width (ft) | 134.94 | Top Width (ft) | 1.45 | 105.00 | 28.49 |
| Vel Total (ft/s) | 7.81 | Avg. Vel. (ft/s) | 0.57 | 7.95 | 0.72 |
| Max Chl Dpth (ft) | 9.90 | Hydr. Depth (ft) | 0.33 | 6.33 | 0.44 |
| Conv. Total (cfs) | 94255.3 | Conv. (cfs) | 4.8 | 94090.4 | 160.0 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 1.59 | 108.96 | 29.38 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 1.20 | 0.08 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.03 | 14.11 | 0.22 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.02 | 2.01 | 0.42 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.98 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 13.07 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 8.87 | 891.56 | 113.66 |
| E.G. Slope (ft/ft) | 0.002233 | Area (sq ft) | 8.87 | 891.56 | 113.66 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 11.21 | 7168.61 | 200.18 |
| Top Width (ft) | 161.42 | Top Width (ft) | 6.42 | 105.00 | 50.00 |
| Vel Total (ft/s) | 7.28 | Avg. Vel. (ft/s) | 1.26 | 8.04 | 1.76 |
| Max Chl Dpth (ft) | 12.07 | Hydr. Depth (ft) | 1.38 | 8.49 | 2.27 |
| Conv. Total (cfs) | 156166.6 | Conv. (cfs) | 237.2 | 151693.4 | 4236.0 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 7.01 | 111.13 | 54.60 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.18 | 1.12 | 0.29 |
| Alpha | 1.19 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.18 | 18.78 | 3.65 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.09 | 2.03 | 1.82 |

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 820

INPUT
Description: ADD
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 10 | 12.5 | 15 | 10.25 | 20 | 8 | 30 | 6.5 |
| 40 | 6 | 50 | 4.5 | 60 | 3.5 | 70 | 1.5 | 80 | 1 |
| 90 | 1 | 100 | 4 | 110 | 7 | 119.4 | 9 | 119.5 | 9 |
| 142.2 | 10 | 142.3 | 10 | 150 | 10 | 160 | 10 | 170 | 11 |
| 180 | 11 | 185.5 | 11.5 | 185.6 | 11.5 | 290 | 12 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 15 | .035 | 142.3 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15 | 142.3 | 95 | 95 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.46 | Element | | | |
| Vel Head (ft) | 0.86 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.59 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.01 | 782.50 | 47.90 |
| E.G. Slope (ft/ft) | 0.002824 | Area (sq ft) | 2.01 | 782.50 | 47.90 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.76 | 5859.74 | 48.50 |
| Top Width (ft) | 193.15 | Top Width (ft) | 2.99 | 127.30 | 62.87 |
| Vel Total (ft/s) | 7.10 | Avg. Vel. (ft/s) | 0.88 | 7.49 | 1.01 |
| Max Chl Dpth (ft) | 10.59 | Hydr. Depth (ft) | 0.67 | 6.15 | 0.76 |
| Conv. Total (cfs) | 111218.0 | Conv. (cfs) | 33.1 | 110272.2 | 912.7 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 3.27 | 129.39 | 62.94 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.11 | 1.07 | 0.13 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 0.05 | 15.41 | 0.83 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 2.02 | 1.07 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.10 | Element | | | |
| Vel Head (ft) | 0.42 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.68 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | | 252.46 | |
| E.G. Slope (ft/ft) | 0.003313 | Area (sq ft) | | 252.46 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.17 | Top Width (ft) | | 80.17 | |
| Vel Total (ft/s) | 5.20 | Avg. Vel. (ft/s) | | 5.20 | |
| Max Chl Dpth (ft) | 5.68 | Hydr. Depth (ft) | | 3.15 | |
| Conv. Total (cfs) | 22794.7 | Conv. (cfs) | | 22794.7 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 81.40 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.01 | 6.70 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 1.61 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.89 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.40 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 508.60 | |
| E.G. Slope (ft/ft) | 0.004312 | Area (sq ft) | | 508.60 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 111.78 | Top Width (ft) | | 111.78 | |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | | 7.57 | |
| Max Chl Dpth (ft) | 8.40 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 58627.2 | Conv. (cfs) | | 58627.2 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 113.68 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.20 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.48 | Cum Volume (acre-ft) | 0.01 | 10.93 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 1.85 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.65 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.88 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 551.27 | |
| E.G. Slope (ft/ft) | 0.004247 | Area (sq ft) | | 551.27 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 120.92 | Top Width (ft) | | 120.92 | |
| Vel Total (ft/s) | 7.52 | Avg. Vel. (ft/s) | | 7.52 | |
| Max Chl Dpth (ft) | 8.77 | Hydr. Depth (ft) | | 4.56 | |
| Conv. Total (cfs) | 63653.2 | Conv. (cfs) | | 63653.2 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 122.91 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.47 | Cum Volume (acre-ft) | 0.01 | 11.56 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 1.90 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.83 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.95 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.55 | 700.99 | 21.42 |
| E.G. Slope (ft/ft) | 0.003290 | Area (sq ft) | 0.55 | 700.99 | 21.42 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.34 | 5265.76 | 23.91 |
| Top Width (ft) | 156.10 | Top Width (ft) | 1.56 | 127.30 | 27.23 |
| Vel Total (ft/s) | 7.32 | Avg. Vel. (ft/s) | 0.61 | 7.51 | 1.12 |
| Max Chl Dpth (ft) | 9.95 | Hydr. Depth (ft) | 0.35 | 5.51 | 0.79 |
| Conv. Total (cfs) | 92223.0 | Conv. (cfs) | 5.9 | 91800.4 | 416.8 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 1.71 | 129.39 | 27.28 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.07 | 1.11 | 0.16 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.37 | Cum Volume (acre-ft) | 0.03 | 14.10 | 0.22 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 2.01 | 0.42 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.74 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 13.18 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.63 | 985.01 | 265.63 |
| E.G. Slope (ft/ft) | 0.001862 | Area (sq ft) | 9.63 | 985.01 | 265.63 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 11.41 | 6983.27 | 385.32 |
| Top Width (ft) | 281.71 | Top Width (ft) | 6.71 | 127.30 | 147.70 |
| Vel Total (ft/s) | 5.86 | Avg. Vel. (ft/s) | 1.18 | 7.09 | 1.45 |
| Max Chl Dpth (ft) | 12.18 | Hydr. Depth (ft) | 1.44 | 7.74 | 1.80 |
| Conv. Total (cfs) | 171022.7 | Conv. (cfs) | 264.3 | 161829.0 | 8929.4 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 7.33 | 129.39 | 148.96 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 0.88 | 0.21 |
| Alpha | 1.39 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.18 | 18.76 | 3.65 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.09 | 2.03 | 1.82 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 725

INPUT
Description: 10
10
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 14 | 20 | 10 | 30 | 4 | 60 | 4 |
| 70 | 2.8 | 80 | 2.5 | 90 | 2.5 | 100 | 3 | 110 | 4.5 |
| 120 | 7.5 | 126 | 9 | 154 | 10 | 192 | 11 | 235 | 12 |
| 260 | 13 | 263 | 14 | 266 | 15 | 270 | 16 | 272 | 17 |
| 281 | 19 | 286 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 20 | .04 | 154 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 20 | 154 | 150 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.14 | Element | | | |
| Vel Head (ft) | 0.84 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.30 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.12 | 798.33 | 32.38 |
| E.G. Slope (ft/ft) | 0.003724 | Area (sq ft) | 2.12 | 798.33 | 32.38 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.11 | 5874.50 | 33.39 |
| Top Width (ft) | 188.19 | Top Width (ft) | 3.25 | 134.00 | 50.94 |
| Vel Total (ft/s) | 7.10 | Avg. Vel. (ft/s) | 1.00 | 7.36 | 1.03 |
| Max Chl Dpth (ft) | 8.80 | Hydr. Depth (ft) | 0.65 | 5.96 | 0.64 |
| Conv. Total (cfs) | 96846.9 | Conv. (cfs) | 34.6 | 96265.2 | 547.2 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.50 | 136.51 | 50.96 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.14 | 1.36 | 0.15 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.05 | 13.68 | 0.74 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.04 | 1.73 | 0.95 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.62 | Element | | | |
| Vel Head (ft) | 0.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.09 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 224.72 | |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.007272 | Area (sq ft) | | 224.72 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 88.79 | Top Width (ft) | | 88.79 | |
| Vel Total (ft/s) | 5.84 | Avg. Vel. (ft/s) | | 5.84 | |
| Max Chl Dpth (ft) | 3.59 | Hydr. Depth (ft) | | 2.53 | |
| Conv. Total (cfs) | 15385.9 | Conv. (cfs) | | 15385.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 89.81 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.14 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.16 | Cum Volume (acre-ft) | 0.01 | 6.18 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.43 | 0.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.98 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.81 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 484.97 | |
| E.G. Slope (ft/ft) | 0.005966 | Area (sq ft) | | 484.97 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 103.25 | Top Width (ft) | | 103.25 | |
| Vel Total (ft/s) | 7.94 | Avg. Vel. (ft/s) | | 7.94 | |
| Max Chl Dpth (ft) | 6.31 | Hydr. Depth (ft) | | 4.70 | |
| Conv. Total (cfs) | 49843.7 | Conv. (cfs) | | 49843.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 105.38 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.71 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.67 | Cum Volume (acre-ft) | 0.01 | 9.85 | 0.01 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.61 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.15 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 9.18 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 523.90 | |
| E.G. Slope (ft/ft) | 0.005799 | Area (sq ft) | | 523.90 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 109.62 | Top Width (ft) | | 109.62 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 6.68 | Hydr. Depth (ft) | | 4.78 | |
| Conv. Total (cfs) | 54471.4 | Conv. (cfs) | | 54471.4 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 111.88 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.70 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.63 | Cum Volume (acre-ft) | 0.01 | 10.39 | 0.01 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.01 | 1.64 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.88 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.57 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.41 | 700.79 | 6.24 |
| E.G. Slope (ft/ft) | 0.004654 | Area (sq ft) | 0.41 | 700.79 | 6.24 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.26 | 5285.51 | 4.23 |
| Top Width (ft) | 157.21 | Top Width (ft) | 1.43 | 134.00 | 21.78 |
| Vel Total (ft/s) | 7.48 | Avg. Vel. (ft/s) | 0.65 | 7.54 | 0.68 |
| Max Chl Dpth (ft) | 8.07 | Hydr. Depth (ft) | 0.29 | 5.23 | 0.29 |
| Conv. Total (cfs) | 77538.9 | Conv. (cfs) | 3.9 | 77473.0 | 62.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.54 | 136.51 | 21.78 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.08 | 1.49 | 0.08 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.47 | Cum Volume (acre-ft) | 0.03 | 12.57 | 0.18 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.02 | 1.73 | 0.36 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.72 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 13.00 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 11.24 | 1025.74 | 171.79 |
| E.G. Slope (ft/ft) | 0.002360 | Area (sq ft) | 11.24 | 1025.74 | 171.79 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.55 | 7101.22 | 263.23 |
| Top Width (ft) | 247.45 | Top Width (ft) | 7.50 | 134.00 | 105.95 |
| Vel Total (ft/s) | 6.11 | Avg. Vel. (ft/s) | 1.38 | 6.92 | 1.53 |
| Max Chl Dpth (ft) | 10.50 | Hydr. Depth (ft) | 1.50 | 7.65 | 1.62 |
| Conv. Total (cfs) | 151921.3 | Conv. (cfs) | 320.2 | 146182.5 | 5418.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 8.07 | 136.51 | 106.00 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.21 | 1.11 | 0.24 |
| Alpha | 1.24 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.15 | 16.57 | 3.17 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.08 | 1.74 | 1.54 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 575

INPUT
Description: 9
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 13.5 | 17 | 8.25 | 20 | 6 | 30 | 1.5 |
| 40 | 1.5 | 50 | 1.5 | 60 | 2.25 | 70 | 2.8 | 80 | 3.1 |
| 110 | 3.1 | 120 | 4 | 130 | 7 | 140 | 9 | 172 | 10 |
| 230 | 11 | 280 | 12 | 280.1 | 16 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 17 | .04 | 140 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 17 | 140 | 150 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.59 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.08 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 5.34 | 937.10 | 84.46 |
| E.G. Slope (ft/ft) | 0.001918 | Area (sq ft) | 5.34 | 937.10 | 84.46 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 5.81 | 5825.50 | 78.69 |
| Top Width (ft) | 220.83 | Top Width (ft) | 3.77 | 123.00 | 94.05 |
| Vel Total (ft/s) | 5.76 | Avg. Vel. (ft/s) | 1.09 | 6.22 | 0.93 |
| Max Chl Dpth (ft) | 9.58 | Hydr. Depth (ft) | 1.42 | 7.62 | 0.90 |
| Conv. Total (cfs) | 134958.7 | Conv. (cfs) | 132.7 | 133029.1 | 1796.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.72 | 125.44 | 94.08 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.14 | 0.89 | 0.11 |
| Alpha | 1.15 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.04 | 10.69 | 0.54 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 1.29 | 0.70 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.94 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 227.65 | |
| E.G. Slope (ft/ft) | 0.008227 | Area (sq ft) | | 227.65 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 100.80 | Top Width (ft) | | 100.80 | |
| Vel Total (ft/s) | 5.76 | Avg. Vel. (ft/s) | | 5.76 | |
| Max Chl Dpth (ft) | 3.44 | Hydr. Depth (ft) | | 2.26 | |
| Conv. Total (cfs) | 14464.9 | Conv. (cfs) | | 14464.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 101.77 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.15 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.58 | Cum Volume (acre-ft) | 0.01 | 5.40 | 0.01 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 1.10 | 0.01 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.62 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.39 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.01 | 607.03 | |
| E.G. Slope (ft/ft) | 0.003444 | Area (sq ft) | 0.01 | 607.03 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3850.00 | |
| Top Width (ft) | 120.14 | Top Width (ft) | 0.19 | 119.95 | |
| Vel Total (ft/s) | 6.34 | Avg. Vel. (ft/s) | 0.20 | 6.34 | |
| Max Chl Dpth (ft) | 6.89 | Hydr. Depth (ft) | 0.07 | 5.06 | |
| Conv. Total (cfs) | 65604.0 | Conv. (cfs) | 0.0 | 65603.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.23 | 122.33 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.01 | 1.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 7.97 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.23 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.42 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.62 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.80 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.20 | 656.25 | |
| E.G. Slope (ft/ft) | 0.003153 | Area (sq ft) | 0.20 | 656.25 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.09 | 4147.91 | |
| Top Width (ft) | 122.71 | Top Width (ft) | 0.73 | 121.98 | |
| Vel Total (ft/s) | 6.32 | Avg. Vel. (ft/s) | 0.47 | 6.32 | |
| Max Chl Dpth (ft) | 7.30 | Hydr. Depth (ft) | 0.27 | 5.38 | |
| Conv. Total (cfs) | 73874.6 | Conv. (cfs) | 1.7 | 73872.9 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.91 | 124.41 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.04 | 1.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.01 | 8.36 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 1.25 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.61 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.79 | 840.41 | 27.96 |
| E.G. Slope (ft/ft) | 0.002253 | Area (sq ft) | 2.79 | 840.41 | 27.96 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 2.65 | 5266.52 | 20.84 |
| Top Width (ft) | 174.83 | Top Width (ft) | 2.73 | 123.00 | 49.11 |
| Vel Total (ft/s) | 6.07 | Avg. Vel. (ft/s) | 0.95 | 6.27 | 0.75 |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 1.02 | 6.83 | 0.57 |
| Conv. Total (cfs) | 111443.1 | Conv. (cfs) | 55.7 | 110948.3 | 439.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.41 | 125.44 | 49.13 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.12 | 0.94 | 0.08 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.02 | 9.91 | 0.13 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.28 | 0.24 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.39 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.87 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 14.25 | 1157.61 | 314.35 |
| E.G. Slope (ft/ft) | 0.001335 | Area (sq ft) | 14.25 | 1157.61 | 314.35 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 17.94 | 6913.71 | 448.35 |
| Top Width (ft) | 269.19 | Top Width (ft) | 6.17 | 123.00 | 140.02 |
| Vel Total (ft/s) | 4.97 | Avg. Vel. (ft/s) | 1.26 | 5.97 | 1.43 |
| Max Chl Dpth (ft) | 11.37 | Hydr. Depth (ft) | 2.31 | 9.41 | 2.25 |
| Conv. Total (cfs) | 201954.9 | Conv. (cfs) | 491.0 | 189194.9 | 12269.1 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 7.71 | 125.44 | 140.91 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.15 | 0.77 | 0.19 |
| Alpha | 1.36 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.19 | Cum Volume (acre-ft) | 0.11 | 12.81 | 2.33 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.06 | 1.30 | 1.12 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 425

INPUT
Description: 8
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 11 | 12 | 9.8 | 20 | 5 | 30 | 0 |
| 70 | 0 | 80 | .5 | 90 | 1.5 | 100 | 2 | 110 | 5.5 |
| 117.4 | 9 | 160 | 10 | 210 | 10 | 265 | 11 | 268 | 12 |
| 275 | 13 | 280 | 14 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 12 | .04 | 117.4 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 12 | 117.4 | 90 | 90 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.41 | Element | | | |
| Vel Head (ft) | 0.59 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.82 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.86 | 934.95 | 115.56 |
| E.G. Slope (ft/ft) | 0.001604 | Area (sq ft) | 0.86 | 934.95 | 115.56 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.46 | 5815.40 | 94.15 |
| Top Width (ft) | 244.73 | Top Width (ft) | 1.70 | 105.40 | 137.64 |
| Vel Total (ft/s) | 5.62 | Avg. Vel. (ft/s) | 0.53 | 6.22 | 0.81 |
| Max Chl Dpth (ft) | 10.82 | Hydr. Depth (ft) | 0.51 | 8.87 | 0.84 |
| Conv. Total (cfs) | 147573.0 | Conv. (cfs) | 11.4 | 145210.7 | 2350.9 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 1.98 | 109.37 | 137.65 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.04 | 0.86 | 0.08 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.03 | 7.47 | 0.20 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.90 | 0.30 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.81 | Element | | | |
| Vel Head (ft) | 0.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.54 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 317.80 | |
| E.G. Slope (ft/ft) | 0.002227 | Area (sq ft) | | 317.80 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 86.35 | Top Width (ft) | | 86.35 | |
| Vel Total (ft/s) | 4.13 | Avg. Vel. (ft/s) | | 4.13 | |
| Max Chl Dpth (ft) | 4.54 | Hydr. Depth (ft) | | 3.68 | |
| Conv. Total (cfs) | 27804.0 | Conv. (cfs) | | 27804.0 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 87.93 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.50 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.01 | 4.46 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.78 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.55 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.02 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 644.11 | |
| E.G. Slope (ft/ft) | 0.002266 | Area (sq ft) | | 644.11 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 100.38 | Top Width (ft) | | 100.38 | |
| Vel Total (ft/s) | 5.98 | Avg. Vel. (ft/s) | | 5.98 | |
| Max Chl Dpth (ft) | 8.02 | Hydr. Depth (ft) | | 6.42 | |
| Conv. Total (cfs) | 80885.0 | Conv. (cfs) | | 80885.0 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 103.64 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.88 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.01 | 5.81 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.85 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.57 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.45 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 686.64 | |
| E.G. Slope (ft/ft) | 0.002174 | Area (sq ft) | | 686.64 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 101.97 | Top Width (ft) | | 101.97 | |
| Vel Total (ft/s) | 6.04 | Avg. Vel. (ft/s) | | 6.04 | |
| Max Chl Dpth (ft) | 8.45 | Hydr. Depth (ft) | | 6.73 | |
| Conv. Total (cfs) | 88953.4 | Conv. (cfs) | | 88953.4 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 105.44 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.88 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.23 | Cum Volume (acre-ft) | 0.01 | 6.05 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.86 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.60 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 10.00 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.03 | 848.26 | 21.14 |
| E.G. Slope (ft/ft) | 0.001827 | Area (sq ft) | 0.03 | 848.26 | 21.14 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.01 | 5277.02 | 12.98 |
| Top Width (ft) | 148.17 | Top Width (ft) | 0.33 | 105.40 | 42.44 |
| Vel Total (ft/s) | 6.08 | Avg. Vel. (ft/s) | 0.19 | 6.22 | 0.61 |
| Max Chl Dpth (ft) | 10.00 | Hydr. Depth (ft) | 0.10 | 8.05 | 0.50 |
| Conv. Total (cfs) | 123773.8 | Conv. (cfs) | 0.1 | 123470.0 | 303.7 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 0.38 | 109.37 | 42.45 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.01 | 0.88 | 0.06 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.02 | 7.01 | 0.04 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.89 | 0.08 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.69 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 6.62 | 1132.07 | 395.93 |
| E.G. Slope (ft/ft) | 0.001159 | Area (sq ft) | 6.62 | 1132.07 | 395.93 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 5.99 | 6799.86 | 574.15 |
| Top Width (ft) | 265.24 | Top Width (ft) | 4.41 | 105.40 | 155.42 |
| Vel Total (ft/s) | 4.81 | Avg. Vel. (ft/s) | 0.90 | 6.01 | 1.45 |
| Max Chl Dpth (ft) | 12.69 | Hydr. Depth (ft) | 1.50 | 10.74 | 2.55 |
| Conv. Total (cfs) | 216784.7 | Conv. (cfs) | 175.8 | 199743.3 | 16865.5 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 5.28 | 109.37 | 155.66 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.09 | 0.75 | 0.18 |
| Alpha | 1.44 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.07 | 8.87 | 1.11 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.04 | 0.90 | 0.61 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 335

INPUT
Description: 7
Station Elevation Data  num=  17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 12.5 | 18 | 8.1 | 20 | 7 | 30 | 1.5 |
| 40 | -.5 | 50 | -2 | 60 | -2 | 70 | -2 | 80 | 0 |
| 90 | 4 | 100 | 9 | 135 | 10 | 175 | 10 | 205 | 11 |
| 260 | 11 | 260.1 | 16 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 18 | .04 | 100 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 18 | 100 | 73 | 73 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.93 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.27 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.28 | 756.96 | 38.76 |
| E.G. Slope (ft/ft) | 0.002411 | Area (sq ft) | 4.28 | 756.96 | 38.76 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.64 | 5879.19 | 26.17 |
| Top Width (ft) | 169.01 | Top Width (ft) | 3.94 | 82.00 | 83.07 |
| Vel Total (ft/s) | 7.39 | Avg. Vel. (ft/s) | 1.08 | 7.77 | 0.68 |
| Max Chl Dpth (ft) | 12.27 | Hydr. Depth (ft) | 1.08 | 9.23 | 0.47 |
| Conv. Total (cfs) | 120358.1 | Conv. (cfs) | 94.5 | 119730.7 | 533.0 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 4.50 | 86.15 | 83.09 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.14 | 1.32 | 0.07 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.02 | 5.72 | 0.04 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 0.70 | 0.07 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.62 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.29 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.34 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 305.17 | |
| E.G. Slope (ft/ft) | 0.001807 | Area (sq ft) | | 305.17 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 65.83 | Top Width (ft) | | 65.83 | |
| Vel Total (ft/s) | 4.30 | Avg. Vel. (ft/s) | | 4.30 | |
| Max Chl Dpth (ft) | 6.34 | Hydr. Depth (ft) | | 4.64 | |
| Conv. Total (cfs) | 30867.5 | Conv. (cfs) | | 30867.5 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 67.92 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 0.51 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 3.81 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.62 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.51 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 533.04 | |
| E.G. Slope (ft/ft) | 0.003095 | Area (sq ft) | | 533.04 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 77.94 | Top Width (ft) | | 77.94 | |
| Vel Total (ft/s) | 7.22 | Avg. Vel. (ft/s) | | 7.22 | |
| Max Chl Dpth (ft) | 9.51 | Hydr. Depth (ft) | | 6.84 | |
| Conv. Total (cfs) | 69203.3 | Conv. (cfs) | | 69203.3 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 81.59 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.26 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 4.60 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.67 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.76 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.92 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.55 | |
| E.G. Slope (ft/ft) | 0.003035 | Area (sq ft) | | 565.55 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 79.51 | Top Width (ft) | | 79.51 | |
| Vel Total (ft/s) | 7.33 | Avg. Vel. (ft/s) | | 7.33 | |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | | 7.11 | |
| Conv. Total (cfs) | 75287.9 | Conv. (cfs) | | 75287.9 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 83.37 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.29 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 4.75 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.67 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.37 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.91 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.46 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.68 | 690.54 | 3.69 |
| E.G. Slope (ft/ft) | 0.002648 | Area (sq ft) | 1.68 | 690.54 | 3.69 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 1.40 | 5286.98 | 1.63 |
| Top Width (ft) | 100.54 | Top Width (ft) | 2.47 | 82.00 | 16.06 |
| Vel Total (ft/s) | 7.60 | Avg. Vel. (ft/s) | 0.83 | 7.66 | 0.44 |
| Max Chl Dpth (ft) | 11.46 | Hydr. Depth (ft) | 0.68 | 8.42 | 0.23 |
| Conv. Total (cfs) | 102796.6 | Conv. (cfs) | 27.2 | 102737.9 | 31.6 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 2.82 | 86.15 | 16.07 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.10 | 1.33 | 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.01 | 5.42 | 0.02 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 0.70 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.83 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.22 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 15.43 | 916.88 | 302.59 |
| E.G. Slope (ft/ft) | 0.001761 | Area (sq ft) | 15.43 | 916.88 | 302.59 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 21.94 | 6916.37 | 441.69 |
| Top Width (ft) | 249.51 | Top Width (ft) | 7.49 | 82.00 | 160.02 |
| Vel Total (ft/s) | 5.98 | Avg. Vel. (ft/s) | 1.42 | 7.54 | 1.46 |
| Max Chl Dpth (ft) | 14.22 | Hydr. Depth (ft) | 2.06 | 11.18 | 1.89 |
| Conv. Total (cfs) | 175839.3 | Conv. (cfs) | 522.7 | 164792.6 | 10524.0 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 8.55 | 86.15 | 161.25 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.20 | 1.17 | 0.21 |
| Alpha | 1.50 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.05 | 6.75 | 0.39 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.03 | 0.71 | 0.29 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 262

INPUT
Description: 6
6
6
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 7 | 9.1 | 10 | 7 | 20 | 1 | 30 | -2 |
| 40 | -3 | 50 | -3 | 60 | 0 | 70 | 5 | 80 | 9.5 |
| 135 | 11 | 175 | 12 | 255 | 13 | 282 | 14 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 7 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 7 | 80 | 75 | 75 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.51 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 9.39 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.06 | 599.09 | |
| E.G. Slope (ft/ft) | 0.004665 | Area (sq ft) | 0.06 | 599.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.02 | 5909.98 | |
| Top Width (ft) | 73.18 | Top Width (ft) | 0.42 | 72.76 | |
| Vel Total (ft/s) | 9.86 | Avg. Vel. (ft/s) | 0.38 | 9.86 | |
| Max Chl Dpth (ft) | 12.39 | Hydr. Depth (ft) | 0.15 | 8.23 | |
| Conv. Total (cfs) | 86530.8 | Conv. (cfs) | 0.3 | 86530.5 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 0.51 | 78.14 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.04 | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.34 | Cum Volume (acre-ft) | 0.02 | 4.59 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 0.57 | 0.00 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.47 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.08 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 262.64 | |
| E.G. Slope (ft/ft) | 0.002305 | Area (sq ft) | | 262.64 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.29 | Top Width (ft) | | 53.29 | |
| Vel Total (ft/s) | 5.00 | Avg. Vel. (ft/s) | | 5.00 | |
| Max Chl Dpth (ft) | 7.08 | Hydr. Depth (ft) | | 4.93 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 27326.8 | Conv. (cfs) | | 27326.8 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 56.03 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 0.67 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 3.34 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.52 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.57 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 406.88 | |
| E.G. Slope (ft/ft) | 0.005827 | Area (sq ft) | | 406.88 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.76 | Top Width (ft) | | 62.76 | |
| Vel Total (ft/s) | 9.46 | Avg. Vel. (ft/s) | | 9.46 | |
| Max Chl Dpth (ft) | 9.57 | Hydr. Depth (ft) | | 6.48 | |
| Conv. Total (cfs) | 50437.4 | Conv. (cfs) | | 50437.4 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 66.75 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 3.81 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.55 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.97 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 432.71 | |
| E.G. Slope (ft/ft) | 0.005706 | Area (sq ft) | | 432.71 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 64.34 | Top Width (ft) | | 64.34 | |
| Vel Total (ft/s) | 9.59 | Avg. Vel. (ft/s) | | 9.59 | |
| Max Chl Dpth (ft) | 9.97 | Hydr. Depth (ft) | | 6.73 | |
| Conv. Total (cfs) | 54913.1 | Conv. (cfs) | | 54913.1 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 68.53 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.25 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.40 | Cum Volume (acre-ft) | 0.01 | 3.92 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.55 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.55 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 539.04 | |
| E.G. Slope (ft/ft) | 0.005045 | Area (sq ft) | | 539.04 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 70.12 | Top Width (ft) | | 70.12 | |
| Vel Total (ft/s) | 9.81 | Avg. Vel. (ft/s) | | 9.81 | |
| Max Chl Dpth (ft) | 11.55 | Hydr. Depth (ft) | | 7.69 | |
| Conv. Total (cfs) | 74480.0 | Conv. (cfs) | | 74480.0 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 75.15 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.26 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.01 | 4.39 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.57 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.50 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.30 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 3.47 | 738.55 | 59.83 |
| E.G. Slope (ft/ft) | 0.003559 | Area (sq ft) | 3.47 | 738.55 | 59.83 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 4.42 | 7300.07 | 75.51 |
| Top Width (ft) | 143.31 | Top Width (ft) | 3.15 | 73.00 | 67.17 |
| Vel Total (ft/s) | 9.20 | Avg. Vel. (ft/s) | 1.27 | 9.88 | 1.26 |
| Max Chl Dpth (ft) | 14.30 | Hydr. Depth (ft) | 1.10 | 10.12 | 0.89 |
| Conv. Total (cfs) | 123714.4 | Conv. (cfs) | 74.1 | 122374.5 | 1265.8 |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 3.84 | 78.40 | 67.19 |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.20 | 2.09 | 0.20 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.03 | 5.36 | 0.09 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 0.58 | 0.09 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 187

INPUT
Description: 5
Station Elevation Data  num=  13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 8 | 9.2 | 10 | 8 | 20 | 1.5 | 30 | -2.5 |
| 40 | -4 | 50 | -4 | 60 | -1 | 70 | 4 | 80 | 9.5 |

| | | | | | |
|---|---|---|---|---|---|
| 115 | 12 | 141 | 13 | 185 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 80 | 50 | 50 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.55 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.46 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 9.10 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 610.37 | |
| E.G. Slope (ft/ft) | 0.004309 | Area (sq ft) | | 610.37 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 71.09 | Top Width (ft) | | 71.09 | |
| Vel Total (ft/s) | 9.68 | Avg. Vel. (ft/s) | | 9.68 | |
| Max Chl Dpth (ft) | 13.10 | Hydr. Depth (ft) | | 8.59 | |
| Conv. Total (cfs) | 90037.4 | Conv. (cfs) | | 90037.4 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 77.13 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.13 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.02 | 3.54 | 0.01 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.01 | 0.45 | 0.00 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.30 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.31 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.98 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 291.39 | |
| E.G. Slope (ft/ft) | 0.001669 | Area (sq ft) | | 291.39 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.79 | Top Width (ft) | | 53.79 | |
| Vel Total (ft/s) | 4.50 | Avg. Vel. (ft/s) | | 4.50 | |
| Max Chl Dpth (ft) | 7.98 | Hydr. Depth (ft) | | 5.42 | |
| Conv. Total (cfs) | 32114.6 | Conv. (cfs) | | 32114.6 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 57.02 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 0.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.01 | 2.86 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.43 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.31 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.22 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 419.83 | |
| E.G. Slope (ft/ft) | 0.005145 | Area (sq ft) | | 419.83 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.28 | Top Width (ft) | | 61.28 | |
| Vel Total (ft/s) | 9.17 | Avg. Vel. (ft/s) | | 9.17 | |
| Max Chl Dpth (ft) | 10.22 | Hydr. Depth (ft) | | 6.85 | |
| Conv. Total (cfs) | 53676.0 | Conv. (cfs) | | 53676.0 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 65.75 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.05 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 3.10 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.44 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.97 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.35 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.63 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 445.22 | |
| E.G. Slope (ft/ft) | 0.005070 | Area (sq ft) | | 445.22 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.66 | Top Width (ft) | | 62.66 | |
| Vel Total (ft/s) | 9.32 | Avg. Vel. (ft/s) | | 9.32 | |
| Max Chl Dpth (ft) | 10.63 | Hydr. Depth (ft) | | 7.11 | |
| Conv. Total (cfs) | 58253.7 | Conv. (cfs) | | 58253.7 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 67.35 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.09 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | 0.01 | 3.16 | 0.01 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.44 | 0.01 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.67 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.24 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 550.65 | |
| E.G. Slope (ft/ft) | 0.004578 | Area (sq ft) | | 550.65 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 68.10 | Top Width (ft) | | 68.10 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 12.24 | Hydr. Depth (ft) | | 8.09 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 78187.3 | Conv. (cfs) | | 78187.3 | |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | | 73.69 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.14 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.01 | 3.45 | 0.01 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 0.45 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.54 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.49 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.05 | Reach Len. (ft) | 50.00 | 50.00 | 50.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.86 | 751.09 | 16.88 |
| E.G. Slope (ft/ft) | 0.003405 | Area (sq ft) | 2.86 | 751.09 | 16.88 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 3.27 | 7357.75 | 18.98 |
| Top Width (ft) | 96.82 | Top Width (ft) | 3.09 | 72.00 | 21.74 |
| Vel Total (ft/s) | 9.57 | Avg. Vel. (ft/s) | 1.14 | 9.80 | 1.12 |
| Max Chl Dpth (ft) | 15.05 | Hydr. Depth (ft) | 0.93 | 10.43 | 0.78 |
| Conv. Total (cfs) | 126480.5 | Conv. (cfs) | 56.1 | 126099.1 | 325.3 |
| Length Wtd. (ft) | 50.00 | Wetted Per. (ft) | 3.60 | 78.17 | 21.79 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.17 | 2.04 | 0.16 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.19 | Cum Volume (acre-ft) | 0.03 | 4.08 | 0.02 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 0.46 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 137

INPUT
Description: 4
Station Elevation Data  num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values  num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

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

```
          10      80              77      77      77             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      16      15       F
      70      90      15       F
```

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.28 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.36 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.71 | Flow Area (sq ft) | | 531.20 | |
| E.G. Slope (ft/ft) | 0.004602 | Area (sq ft) | 0.00 | 565.91 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 69.03 | Top Width (ft) | 0.10 | 68.93 | |
| Vel Total (ft/s) | 11.13 | Avg. Vel. (ft/s) | | 11.13 | |
| Max Chl Dpth (ft) | 12.36 | Hydr. Depth (ft) | | 9.84 | |
| Conv. Total (cfs) | 87123.8 | Conv. (cfs) | | 87123.8 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.67 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.02 | 2.87 | 0.01 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.00 | 0.37 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.22 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.32 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.90 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 0.50 | Flow Area (sq ft) | | 291.23 | |
| E.G. Slope (ft/ft) | 0.001610 | Area (sq ft) | | 291.91 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.92 | Top Width (ft) | | 53.92 | |
| Vel Total (ft/s) | 4.50 | Avg. Vel. (ft/s) | | 4.50 | |
| Max Chl Dpth (ft) | 7.90 | Hydr. Depth (ft) | | 5.56 | |
| Conv. Total (cfs) | 32698.3 | Conv. (cfs) | | 32698.3 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 55.43 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 0.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 2.53 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.37 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.23 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.70 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.85 | Flow Area (sq ft) | | 387.51 | |
| E.G. Slope (ft/ft) | 0.005588 | Area (sq ft) | | 394.23 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 60.01 | Top Width (ft) | | 60.01 | |
| Vel Total (ft/s) | 9.94 | Avg. Vel. (ft/s) | | 9.94 | |
| Max Chl Dpth (ft) | 9.70 | Hydr. Depth (ft) | | 7.18 | |
| Conv. Total (cfs) | 51503.6 | Conv. (cfs) | | 51503.6 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.36 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 2.63 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.37 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.68 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.08 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.15 | Flow Area (sq ft) | | 408.21 | |
| E.G. Slope (ft/ft) | 0.005453 | Area (sq ft) | | 417.48 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 61.31 | Top Width (ft) | | 61.31 | |
| Vel Total (ft/s) | 10.16 | Avg. Vel. (ft/s) | | 10.16 | |
| Max Chl Dpth (ft) | 10.08 | Hydr. Depth (ft) | | 7.56 | |
| Conv. Total (cfs) | 56170.0 | Conv. (cfs) | | 56170.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.43 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 2.67 | 0.01 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.37 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.82 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.58 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.20 | Flow Area (sq ft) | | 489.14 | |
| E.G. Slope (ft/ft) | 0.004854 | Area (sq ft) | | 513.17 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 66.39 | Top Width (ft) | | 66.39 | |
| Vel Total (ft/s) | 10.81 | Avg. Vel. (ft/s) | | 10.81 | |
| Max Chl Dpth (ft) | 11.58 | Hydr. Depth (ft) | | 9.06 | |
| Conv. Total (cfs) | 75931.7 | Conv. (cfs) | | 75931.7 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.59 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 2.84 | 0.01 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.00 | 0.37 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.28 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.15 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 10.13 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 6.86 | Flow Area (sq ft) | | 627.13 | |
| E.G. Slope (ft/ft) | 0.004126 | Area (sq ft) | 2.95 | 689.92 | 1.29 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 75.49 | Top Width (ft) | 3.22 | 70.00 | 2.27 |
| Vel Total (ft/s) | 11.77 | Avg. Vel. (ft/s) | | 11.77 | |
| Max Chl Dpth (ft) | 14.13 | Hydr. Depth (ft) | | 11.61 | |
| Conv. Total (cfs) | 114894.4 | Conv. (cfs) | | 114894.4 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.03 | 3.26 | 0.01 |
| C & E Loss (ft) | 0.27 | Cum SA (acres) | 0.01 | 0.37 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 98.5

INPUT
Description: Maine Ave.
Distance from Upstream XS = 22
Deck/Roadway Width = 38
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 1 | 15 | -10 | 18.5 | 15 | -10 |
| 67 | 15 | 10 | 67 | 15 | -10 |
| 18.5 | 15 | 10 | 100 | 15 | -10 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.
10 80 .3 .5
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 16 | 15 | F |
| 70 | 90 | 15 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 1 | 15 | -10 | 18.5 | 15 | -10 |
| 67 | 15 | 10 | 67 | 15 | -10 |
| 18.5 | 15 | 10 | 100 | 15 | -10 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12.7 | 14 | 15.7 | -1 | 18.5 | -2 | 24.4 | -4 | 32.7 | -5 |

```
    42.7      -5    52.7    -3.5    62.7       1    72.7     5.5    74.7      15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    12.7    .065    15.7     .04    72.7    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
          15.7    72.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    12.7      16      15        F
      70    74.7      15        F

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =      .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #Q100

  E.G. US. (ft)                 10.28    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)                  8.36    E.G. Elev (ft)                9.90          9.38
  Q Total (cfs)               5910.00    W.S. Elev (ft)                7.15          7.23
  Q Bridge (cfs)              5910.00    Crit W.S. (ft)                5.73          4.60
  Q Weir (cfs)                           Max Chl Dpth (ft)            11.15         12.23
  Weir Sta Lft (ft)                      Vel Total (ft/s)             13.33         11.76
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           443.49        502.43
  Weir Submerg                           Froude # Chl                  0.70          0.59
  Weir Max Depth (ft)                    Specif Force (cu ft)       4567.03       4877.91
```

| | | | |
|---|---|---|---|
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 9.14 | 10.36 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.11 | Conv. Total (cfs) | 69653.8 | 86471.9 |
| Delta WS (ft) | 1.06 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.22 | 0.08 |
| BR Open Vel (ft/s) | 13.33 | C & E Loss (ft) | 0.30 | 0.14 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.91 | 2.91 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 4.22 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 3.90 | E.G. Elev (ft) | 4.18 | 4.08 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 3.84 | 3.85 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.51 | -0.78 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.84 | 8.85 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.63 | 3.88 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 283.19 | 338.24 |
| Weir Submerg | | Froude # Chl | 0.29 | 0.23 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 1109.03 | 1454.01 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 5.84 | 6.97 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 0.16 | Conv. Total (cfs) | 32981.4 | 44715.3 |
| Delta WS (ft) | 0.06 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.04 | 0.01 |
| BR Open Vel (ft/s) | 4.63 | C & E Loss (ft) | 0.05 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 0.55 | 0.36 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.23 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 5.70 | E.G. Elev (ft) | 6.89 | 6.35 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 4.72 | 4.79 |

| | | | | |
|---|---|---|---|---|
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.81 | 2.66 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.72 | 9.79 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.81 | 10.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 326.01 | 383.70 |
| Weir Submerg | | Froude # Chl | 0.70 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2601.18 | 2834.02 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 6.72 | 7.91 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.03 | Conv. Total (cfs) | 41705.0 | 55174.7 |
| Delta WS (ft) | 0.92 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.24 | 0.08 |
| BR Open Vel (ft/s) | 11.81 | C & E Loss (ft) | 0.30 | 0.07 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.40 | 2.31 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.68 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 6.08 | E.G. Elev (ft) | 7.32 | 6.76 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 5.01 | 5.07 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.10 | 2.98 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.01 | 10.07 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 12.21 | 10.43 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 339.62 | 397.64 |
| Weir Submerg | | Froude # Chl | 0.72 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2855.95 | 3090.37 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 7.00 | 8.20 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.09 | Conv. Total (cfs) | 44647.6 | 58554.6 |
| Delta WS (ft) | 1.01 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.25 | 0.08 |
| BR Open Vel (ft/s) | 12.21 | C & E Loss (ft) | 0.31 | 0.08 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.59 | 2.47 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 9.40 | Element | | |
| W.S. US. (ft) | 7.58 | E.G. Elev (ft) | 9.02 | 8.49 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 6.41 | 6.49 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.17 | 4.05 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.41 | 11.49 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 12.97 | 11.34 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 407.87 | 466.55 |
| Weir Submerg | | Froude # Chl | 0.71 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3939.28 | 4223.26 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 8.41 | 9.62 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.10 | Conv. Total (cfs) | 60582.1 | 76425.5 |
| Delta WS (ft) | 1.04 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.23 | 0.08 |
| BR Open Vel (ft/s) | 12.97 | C & E Loss (ft) | 0.31 | 0.12 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.81 | 2.77 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 12.28 | Element | | |
| W.S. US. (ft) | 10.13 | E.G. Elev (ft) | 11.90 | 11.40 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 8.83 | 8.93 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 6.97 | 5.83 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 12.83 | 13.93 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 14.05 | 12.62 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 525.34 | 584.73 |
| Weir Submerg | | Froude # Chl | 0.69 | 0.60 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6158.37 | 6534.04 |
| Min El Weir Flow (ft) | 15.01 | Hydr Depth (ft) | 10.83 | 12.06 |
| Min El Prs (ft) | 10.00 | W.P. Total (ft) | 51.01 | 50.38 |
| Delta EG (ft) | 1.13 | Conv. Total (cfs) | 92371.1 | 111345.7 |
| Delta WS (ft) | 1.09 | Top Width (ft) | 48.50 | 48.50 |
| BR Open Area (sq ft) | 581.85 | Frctn Loss (ft) | 0.20 | 0.07 |
| BR Open Vel (ft/s) | 14.05 | C & E Loss (ft) | 0.30 | 0.18 |

| | | | | |
|---|---|---|---|---|
| Coef of Q | | Shear Total (lb/sq ft) | 4.10 | 3.18 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 12.70 |

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 60

INPUT
Description: 3
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12.7 | 14 | 15.7 | -1 | 18.5 | -2 | 24.4 | -4 | 32.7 | -5 |
| 42.7 | -5 | 52.7 | -3.5 | 62.7 | 1 | 72.7 | 5.5 | 74.7 | 15 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12.7 | .065 | 15.7 | .04 | 72.7 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15.7 | 72.7 | 22 | 22 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 12.7 | 16 | 15 | F |
| 70 | 74.7 | 15 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.17 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.30 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.52 | Flow Area (sq ft) | | 538.71 | |
| E.G. Slope (ft/ft) | 0.004296 | Area (sq ft) | 6.88 | 547.71 | 0.34 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 59.04 | Top Width (ft) | 1.66 | 57.00 | 0.38 |
| Vel Total (ft/s) | 10.97 | Avg. Vel. (ft/s) | | 10.97 | |
| Max Chl Dpth (ft) | 12.30 | Hydr. Depth (ft) | | 9.98 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 90166.5 | Conv. (cfs) | | 90166.5 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 2.00 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.28 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.06 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.22 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.84 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | -0.76 | Flow Area (sq ft) | | 352.38 | |
| E.G. Slope (ft/ft) | 0.000849 | Area (sq ft) | 2.35 | 353.85 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 54.29 | Top Width (ft) | 0.97 | 53.32 | |
| Vel Total (ft/s) | 3.72 | Avg. Vel. (ft/s) | | 3.72 | |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 6.65 | |
| Conv. Total (cfs) | 45020.1 | Conv. (cfs) | | 45020.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 55.25 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 0.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.01 | 1.98 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.42 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.77 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.53 | Flow Area (sq ft) | | 402.48 | |
| E.G. Slope (ft/ft) | 0.004818 | Area (sq ft) | 3.33 | 404.49 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 56.54 | Top Width (ft) | 1.15 | 55.39 | |
| Vel Total (ft/s) | 9.57 | Avg. Vel. (ft/s) | | 9.57 | |
| Max Chl Dpth (ft) | 9.77 | Hydr. Depth (ft) | | 7.45 | |
| Conv. Total (cfs) | 55466.1 | Conv. (cfs) | | 55466.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.15 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 1.99 | 0.01 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.60 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.07 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.84 | Flow Area (sq ft) | | 418.46 | |
| E.G. Slope (ft/ft) | 0.004912 | Area (sq ft) | 3.69 | 420.99 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 57.26 | Top Width (ft) | 1.21 | 56.05 | |
| Vel Total (ft/s) | 9.91 | Avg. Vel. (ft/s) | | 9.91 | |
| Max Chl Dpth (ft) | 10.07 | Hydr. Depth (ft) | | 7.75 | |
| Conv. Total (cfs) | 59186.1 | Conv. (cfs) | | 59186.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.28 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 1.99 | 0.01 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.76 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.54 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.97 | Flow Area (sq ft) | | 497.57 | |
| E.G. Slope (ft/ft) | 0.004485 | Area (sq ft) | 5.68 | 504.29 | 0.11 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 58.73 | Top Width (ft) | 1.51 | 57.00 | 0.22 |
| Vel Total (ft/s) | 10.63 | Avg. Vel. (ft/s) | | 10.63 | |
| Max Chl Dpth (ft) | 11.54 | Hydr. Depth (ft) | | 9.21 | |
| Conv. Total (cfs) | 78986.1 | Conv. (cfs) | | 78986.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.47 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.01 | 2.03 | 0.01 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.15 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.11 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 9.04 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.66 | Flow Area (sq ft) | | 632.87 | |
| E.G. Slope (ft/ft) | 0.003916 | Area (sq ft) | 10.08 | 647.10 | 1.32 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 59.75 | Top Width (ft) | 2.01 | 57.00 | 0.75 |
| Vel Total (ft/s) | 11.66 | Avg. Vel. (ft/s) | | 11.66 | |
| Max Chl Dpth (ft) | 14.04 | Hydr. Depth (ft) | | 11.72 | |
| Conv. Total (cfs) | 117936.0 | Conv. (cfs) | | 117936.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 56.33 | |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.75 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 74.70 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.02 | 2.22 | 0.01 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.28 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 38

INPUT
Description: 2
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13 | 5 | -2 | 15 | -4 | 20 | -4.2 | 30 | -4.5 |
| 40 | -4 | 50 | 1 | 60 | 4 | 62 | 15 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 5 | .04 | 60 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 5 | 60 | 38 | 38 | 38 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.00 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 2.08 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.92 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 13.25 | 506.88 | 0.77 |
| E.G. Slope (ft/ft) | 0.005276 | Area (sq ft) | 13.25 | 506.88 | 0.77 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 27.66 | 5881.82 | 0.52 |
| Top Width (ft) | 58.50 | Top Width (ft) | 2.97 | 55.00 | 0.53 |
| Vel Total (ft/s) | 11.35 | Avg. Vel. (ft/s) | 2.09 | 11.60 | 0.68 |
| Max Chl Dpth (ft) | 11.42 | Hydr. Depth (ft) | 4.46 | 9.22 | 1.46 |
| Conv. Total (cfs) | 81362.3 | Conv. (cfs) | 380.8 | 80974.3 | 7.2 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 9.40 | 56.84 | 2.96 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.46 | 2.94 | 0.09 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 0.01 | 1.73 | 0.01 |
| C & E Loss (ft) | 0.22 | Cum SA (acres) | 0.00 | 0.25 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.03 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 5.60 | 335.40 | |
| E.G. Slope (ft/ft) | 0.001017 | Area (sq ft) | 5.60 | 335.40 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 3.85 | 1308.15 | |
| Top Width (ft) | 56.26 | Top Width (ft) | 1.93 | 54.32 | |
| Vel Total (ft/s) | 3.85 | Avg. Vel. (ft/s) | 0.69 | 3.90 | |
| Max Chl Dpth (ft) | 8.30 | Hydr. Depth (ft) | 2.90 | 6.17 | |
| Conv. Total (cfs) | 41147.3 | Conv. (cfs) | 120.8 | 41026.4 | |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.11 | 56.13 | |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.06 | 0.38 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 1.80 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.94 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.84 | Wt. n-Val. | 0.065 | 0.040 | 0.000 |
| W.S. Elev (ft) | 4.09 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 6.19 | 351.69 | 0.00 |
| E.G. Slope (ft/ft) | 0.007597 | Area (sq ft) | 6.19 | 351.69 | 0.00 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 12.03 | 3837.97 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 57.05 | Top Width (ft) | 2.03 | 55.00 | 0.02 |
| Vel Total (ft/s) | 10.76 | Avg. Vel. (ft/s) | 1.94 | 10.91 | 0.08 |
| Max Chl Dpth (ft) | 8.59 | Hydr. Depth (ft) | 3.05 | 6.39 | 0.05 |
| Conv. Total (cfs) | 44170.9 | Conv. (cfs) | 138.1 | 44032.9 | 0.0 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.42 | 56.84 | 0.10 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.46 | 2.93 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 1.79 | 0.01 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.98 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.35 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 6.72 | 365.72 | 0.01 |
| E.G. Slope (ft/ft) | 0.007739 | Area (sq ft) | 6.72 | 365.72 | 0.01 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 13.55 | 4134.45 | 0.00 |
| Top Width (ft) | 57.18 | Top Width (ft) | 2.12 | 55.00 | 0.06 |
| Vel Total (ft/s) | 11.14 | Avg. Vel. (ft/s) | 2.02 | 11.30 | 0.20 |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | 3.17 | 6.65 | 0.17 |
| Conv. Total (cfs) | 47153.1 | Conv. (cfs) | 154.0 | 46999.1 | 0.0 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.69 | 56.84 | 0.36 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.49 | 3.11 | 0.02 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.34 | Cum Volume (acre-ft) | 0.01 | 1.80 | 0.01 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.07 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.86 | 460.56 | 0.39 |
| E.G. Slope (ft/ft) | 0.005824 | Area (sq ft) | 10.86 | 460.56 | 0.39 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 22.31 | 5267.47 | 0.22 |
| Top Width (ft) | 58.07 | Top Width (ft) | 2.69 | 55.00 | 0.38 |
| Vel Total (ft/s) | 11.21 | Avg. Vel. (ft/s) | 2.05 | 11.44 | 0.57 |
| Max Chl Dpth (ft) | 10.57 | Hydr. Depth (ft) | 4.04 | 8.37 | 1.04 |
| Conv. Total (cfs) | 69315.7 | Conv. (cfs) | 292.3 | 69020.6 | 2.9 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 8.51 | 56.84 | 2.11 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.46 | 2.95 | 0.07 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.01 | 1.79 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.02 | Element | | | |
| Vel Head (ft) | 2.23 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 8.79 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 19.41 | 610.11 | 2.09 |
| E.G. Slope (ft/ft) | 0.004425 | Area (sq ft) | 19.41 | 610.11 | 2.09 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 42.16 | 7336.04 | 1.81 |
| Top Width (ft) | 59.47 | Top Width (ft) | 3.60 | 55.00 | 0.87 |
| Vel Total (ft/s) | 11.68 | Avg. Vel. (ft/s) | 2.17 | 12.02 | 0.86 |
| Max Chl Dpth (ft) | 13.29 | Hydr. Depth (ft) | 5.40 | 11.09 | 2.40 |
| Conv. Total (cfs) | 110944.6 | Conv. (cfs) | 633.8 | 110283.7 | 27.1 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 11.38 | 56.84 | 4.87 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.47 | 2.97 | 0.12 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 62.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.02 | 1.91 | 0.01 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.00 | 0.25 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 0

INPUT
Description: 1 (Downstream)
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19 | 1 | 19 | 10 | 2 | 20 | -6.3 | 30 | -6.3 |
| 40 | -5 | 50 | -2.5 | 52 | 1.8 | 60 | 19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 52 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 52 | 21 | 21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.48 | Element | | | |
| Vel Head (ft) | 4.24 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.24 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.24 | Flow Area (sq ft) | 1.33 | 357.35 | 1.39 |
| E.G. Slope (ft/ft) | 0.013662 | Area (sq ft) | 1.33 | 357.35 | 1.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.31 | 5905.31 | 2.38 |
| Top Width (ft) | 44.32 | Top Width (ft) | 1.19 | 42.00 | 1.14 |
| Vel Total (ft/s) | 16.41 | Avg. Vel. (ft/s) | 1.74 | 16.53 | 1.72 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 1.12 | 8.51 | 1.22 |
| Conv. Total (cfs) | 50562.8 | Conv. (cfs) | 19.8 | 50522.7 | 20.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 2.54 | 48.13 | 2.69 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.45 | 6.33 | 0.44 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.28 | Cum Volume (acre-ft) | 0.00 | 1.35 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.00 | Element | | | |
| Vel Head (ft) | 0.23 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.82 | 337.25 | 0.90 |
| E.G. Slope (ft/ft) | 0.000817 | Area (sq ft) | 0.82 | 337.25 | 0.90 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.30 | 1311.38 | 0.33 |
| Top Width (ft) | 43.85 | Top Width (ft) | 0.93 | 42.00 | 0.91 |
| Vel Total (ft/s) | 3.87 | Avg. Vel. (ft/s) | 0.36 | 3.89 | 0.36 |
| Max Chl Dpth (ft) | 10.06 | Hydr. Depth (ft) | 0.88 | 8.03 | 0.98 |
| Conv. Total (cfs) | 45896.4 | Conv. (cfs) | 10.4 | 45874.6 | 11.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.99 | 48.13 | 2.16 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.02 | 0.36 | 0.02 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 0.01 | 1.51 | 0.01 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.59 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.26 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.33 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.47 | 318.92 | 0.54 |
| E.G. Slope (ft/ft) | 0.008481 | Area (sq ft) | 0.47 | 318.92 | 0.54 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.45 | 3849.01 | 0.54 |
| Top Width (ft) | 43.41 | Top Width (ft) | 0.70 | 42.00 | 0.71 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 0.97 | 12.07 | 0.99 |
| Max Chl Dpth (ft) | 9.63 | Hydr. Depth (ft) | 0.66 | 7.59 | 0.76 |
| Conv. Total (cfs) | 41806.1 | Conv. (cfs) | 4.9 | 41795.4 | 5.8 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.50 | 48.13 | 1.68 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.16 | 3.51 | 0.17 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 1.50 | 0.01 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.72 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.19 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.45 | Flow Area (sq ft) | 0.37 | 313.07 | 0.45 |
| E.G. Slope (ft/ft) | 0.010472 | Area (sq ft) | 0.37 | 313.07 | 0.45 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.37 | 4147.17 | 0.46 |
| Top Width (ft) | 43.27 | Top Width (ft) | 0.63 | 42.00 | 0.65 |
| Vel Total (ft/s) | 13.21 | Avg. Vel. (ft/s) | 1.00 | 13.25 | 1.03 |
| Max Chl Dpth (ft) | 9.49 | Hydr. Depth (ft) | 0.59 | 7.45 | 0.69 |
| Conv. Total (cfs) | 40534.4 | Conv. (cfs) | 3.6 | 40526.3 | 4.5 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.34 | 48.13 | 1.53 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.18 | 4.25 | 0.19 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.01 | 1.50 | 0.01 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.96 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.62 | Flow Area (sq ft) | 0.69 | 331.05 | 0.77 |
| E.G. Slope (ft/ft) | 0.014135 | Area (sq ft) | 0.69 | 331.05 | 0.77 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.98 | 5287.92 | 1.10 |
| Top Width (ft) | 43.70 | Top Width (ft) | 0.86 | 42.00 | 0.84 |
| Vel Total (ft/s) | 15.91 | Avg. Vel. (ft/s) | 1.42 | 15.97 | 1.43 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.81 | 7.88 | 0.91 |
| Conv. Total (cfs) | 44494.8 | Conv. (cfs) | 8.3 | 44477.3 | 9.2 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.83 | 48.13 | 2.00 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.33 | 6.07 | 0.34 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.00 | 1.45 | 0.01 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.49 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.62 | Flow Area (sq ft) | 3.47 | 415.35 | 3.40 |
| E.G. Slope (ft/ft) | 0.012870 | Area (sq ft) | 3.47 | 415.35 | 3.40 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 8.07 | 7364.30 | 7.63 |
| Top Width (ft) | 45.70 | Top Width (ft) | 1.92 | 42.00 | 1.78 |
| Vel Total (ft/s) | 17.48 | Avg. Vel. (ft/s) | 2.32 | 17.73 | 2.25 |
| Max Chl Dpth (ft) | 11.92 | Hydr. Depth (ft) | 1.81 | 9.89 | 1.91 |
| Conv. Total (cfs) | 65054.0 | Conv. (cfs) | 71.1 | 64915.6 | 67.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 4.10 | 48.13 | 4.22 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.68 | 6.93 | 0.65 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.46 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -21

INPUT
Description: RR
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15 | 8 | -3 | 25 | -7 | 30 | -7 | 37 | -6 |
| 50 | -2 | 59 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 59 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 59 | 33 | 33 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.91 | Element | | | |
| Vel Head (ft) | 6.09 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.82 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 3.29 | Flow Area (sq ft) | 5.17 | 297.09 | |
| E.G. Slope (ft/ft) | 0.024570 | Area (sq ft) | 5.17 | 297.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 18.28 | 5891.73 | |
| Top Width (ft) | 45.71 | Top Width (ft) | 2.14 | 43.56 | |
| Vel Total (ft/s) | 19.55 | Avg. Vel. (ft/s) | 3.53 | 19.83 | |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | 2.41 | 6.82 | |
| Conv. Total (cfs) | 37703.4 | Conv. (cfs) | 116.6 | 37586.8 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 5.28 | 47.27 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.50 | 9.64 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.00 | 1.20 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.97 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.18 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.79 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.24 | 383.45 | |
| E.G. Slope (ft/ft) | 0.000546 | Area (sq ft) | 10.24 | 383.45 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 6.78 | 1305.22 | |
| Top Width (ft) | 47.38 | Top Width (ft) | 3.02 | 44.37 | |
| Vel Total (ft/s) | 3.33 | Avg. Vel. (ft/s) | 0.66 | 3.40 | |
| Max Chl Dpth (ft) | 10.79 | Hydr. Depth (ft) | 3.39 | 8.64 | |
| Conv. Total (cfs) | 56140.0 | Conv. (cfs) | 289.9 | 55850.1 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.43 | 49.39 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.05 | 0.26 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.66 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.87 | 377.98 | |
| E.G. Slope (ft/ft) | 0.004917 | Area (sq ft) | 9.87 | 377.98 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 19.36 | 3830.64 | |
| Top Width (ft) | 47.28 | Top Width (ft) | 2.96 | 44.32 | |
| Vel Total (ft/s) | 9.93 | Avg. Vel. (ft/s) | 1.96 | 10.13 | |
| Max Chl Dpth (ft) | 10.66 | Hydr. Depth (ft) | 3.33 | 8.53 | |
| Conv. Total (cfs) | 54902.8 | Conv. (cfs) | 276.1 | 54626.7 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.29 | 49.26 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.42 | 2.36 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.49 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.86 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.63 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.78 | 376.59 | |
| E.G. Slope (ft/ft) | 0.005774 | Area (sq ft) | 9.78 | 376.59 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 20.72 | 4127.28 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 47.25 | Top Width (ft) | 2.95 | 44.30 | |
| Vel Total (ft/s) | 10.74 | Avg. Vel. (ft/s) | 2.12 | 10.96 | |
| Max Chl Dpth (ft) | 10.63 | Hydr. Depth (ft) | 3.32 | 8.50 | |
| Conv. Total (cfs) | 54589.5 | Conv. (cfs) | 272.6 | 54316.9 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.26 | 49.22 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.49 | 2.76 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 5.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.32 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 2.71 | Flow Area (sq ft) | 4.15 | 275.33 | |
| E.G. Slope (ft/ft) | 0.025006 | Area (sq ft) | 4.15 | 275.33 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 13.76 | 5276.24 | |
| Top Width (ft) | 45.28 | Top Width (ft) | 1.92 | 43.36 | |
| Vel Total (ft/s) | 18.93 | Avg. Vel. (ft/s) | 3.31 | 19.16 | |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.35 | |
| Conv. Total (cfs) | 33452.7 | Conv. (cfs) | 87.0 | 33365.6 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 4.73 | 46.73 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.37 | 9.20 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.00 | 1.30 | 0.01 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.98 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.94 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 4.65 | Flow Area (sq ft) | 7.84 | 346.01 | |
| E.G. Slope (ft/ft) | 0.023784 | Area (sq ft) | 7.84 | 346.01 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.34 | 7348.67 | |
| Top Width (ft) | 46.66 | Top Width (ft) | 2.64 | 44.02 | |
| Vel Total (ft/s) | 20.86 | Avg. Vel. (ft/s) | 4.00 | 21.24 | |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 2.97 | 7.86 | |
| Conv. Total (cfs) | 47853.6 | Conv. (cfs) | 203.2 | 47650.5 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.50 | 48.48 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.79 | 10.60 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.00 | 1.28 | 0.01 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -54

INPUT
Description: K2
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 21 | 5 | 40 | -7 | 50 | -7 |
| 60 | -6 | 72 | -2 | 80 | 0 | 88 | 2 | 96 | 4 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 88 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 88 | 34 | 34 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.85 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 3.09 | Flow Area (sq ft) | | 333.87 | |
| E.G. Slope (ft/ft) | 0.025698 | Area (sq ft) | | 333.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 61.41 | Top Width (ft) | | 61.41 | |
| Vel Total (ft/s) | 17.70 | Avg. Vel. (ft/s) | | 17.70 | |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | | 5.44 | |
| Conv. Total (cfs) | 36867.0 | Conv. (cfs) | | 36867.0 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 65.15 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 8.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.83 | Cum Volume (acre-ft) | | 0.96 | 0.01 |
| C & E Loss (ft) | 0.37 | Cum SA (acres) | | 0.15 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.13 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.81 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 458.26 | 6.54 |
| E.G. Slope (ft/ft) | 0.000478 | Area (sq ft) | | 458.26 | 6.54 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1309.01 | 2.99 |
| Top Width (ft) | 72.34 | Top Width (ft) | | 65.11 | 7.23 |
| Vel Total (ft/s) | 2.82 | Avg. Vel. (ft/s) | | 2.86 | 0.46 |
| Max Chl Dpth (ft) | 10.81 | Hydr. Depth (ft) | | 7.04 | 0.90 |
| Conv. Total (cfs) | 60036.6 | Conv. (cfs) | | 59899.7 | 136.9 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.43 | 7.45 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 0.20 | 0.03 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | | 1.02 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.95 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.06 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.88 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 463.24 | 7.10 |
| E.G. Slope (ft/ft) | 0.003976 | Area (sq ft) | | 463.24 | 7.10 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3840.36 | 9.64 |
| Top Width (ft) | 72.77 | Top Width (ft) | | 65.23 | 7.54 |
| Vel Total (ft/s) | 8.19 | Avg. Vel. (ft/s) | | 8.29 | 1.36 |
| Max Chl Dpth (ft) | 10.88 | Hydr. Depth (ft) | | 7.10 | 0.94 |
| Conv. Total (cfs) | 61057.1 | Conv. (cfs) | | 60904.1 | 152.9 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.57 | 7.77 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.65 | 0.23 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.23 | Wt. n-Val. | | 0.040 | 0.065 |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 3.90 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 464.36 | 7.23 |
| E.G. Slope (ft/ft) | 0.004581 | Area (sq ft) | | 464.36 | 7.23 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4137.40 | 10.60 |
| Top Width (ft) | 72.87 | Top Width (ft) | | 65.26 | 7.61 |
| Vel Total (ft/s) | 8.80 | Avg. Vel. (ft/s) | | 8.91 | 1.47 |
| Max Chl Dpth (ft) | 10.90 | Hydr. Depth (ft) | | 7.12 | 0.95 |
| Conv. Total (cfs) | 61288.0 | Conv. (cfs) | | 61131.3 | 156.7 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.61 | 7.84 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.91 | 0.26 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.05 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 2.59 | Flow Area (sq ft) | | 473.77 | 8.36 |
| E.G. Slope (ft/ft) | 0.006997 | Area (sq ft) | | 473.77 | 8.36 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5273.91 | 16.09 |
| Top Width (ft) | 73.49 | Top Width (ft) | | 65.49 | 8.00 |
| Vel Total (ft/s) | 10.97 | Avg. Vel. (ft/s) | | 11.13 | 1.92 |
| Max Chl Dpth (ft) | 11.05 | Hydr. Depth (ft) | | 7.23 | 1.05 |
| Conv. Total (cfs) | 63239.1 | Conv. (cfs) | | 63046.8 | 192.3 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.88 | 8.29 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.96 | 0.44 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | | 1.02 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note:  Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.75 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.18 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 354.06 | 0.06 |
| E.G. Slope (ft/ft) | 0.033780 | Area (sq ft) | | 354.06 | 0.06 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7379.95 | 0.05 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 62.53 | 0.70 |
| Vel Total (ft/s) | 20.84 | Avg. Vel. (ft/s) | | 20.84 | 0.81 |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.66 | 0.09 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 40153.7 | Conv. (cfs) | | 40153.5 | 0.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.37 | 0.72 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 11.25 | 0.18 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -88

INPUT
Description: K1
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 56 | -6 | 72 | -6 | 80 | -5 |
| 94 | 0 | 108 | 5 | 122 | 5 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 108 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 108 | 55 | 55 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.18 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.67 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 3.18 | Flow Area (sq ft) | | 465.10 | |
| E.G. Slope (ft/ft) | 0.010956 | Area (sq ft) | | 465.10 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 75.49 | Top Width (ft) | | 75.49 | |
| Vel Total (ft/s) | 12.71 | Avg. Vel. (ft/s) | | 12.71 | |
| Max Chl Dpth (ft) | 9.67 | Hydr. Depth (ft) | | 6.16 | |
| Conv. Total (cfs) | 56462.2 | Conv. (cfs) | | 56462.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 78.73 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.42 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.12 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 474.41 | |
| E.G. Slope (ft/ft) | 0.000512 | Area (sq ft) | | 474.41 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 76.18 | Top Width (ft) | | 76.18 | |
| Vel Total (ft/s) | 2.77 | Avg. Vel. (ft/s) | | 2.77 | |
| Max Chl Dpth (ft) | 9.80 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 58000.7 | Conv. (cfs) | | 58000.7 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.46 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 0.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 471.93 | |
| E.G. Slope (ft/ft) | 0.004469 | Area (sq ft) | | 471.93 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.00 | Top Width (ft) | | 76.00 | |
| Vel Total (ft/s) | 8.16 | Avg. Vel. (ft/s) | | 8.16 | |
| Max Chl Dpth (ft) | 9.76 | Hydr. Depth (ft) | | 6.21 | |
| Conv. Total (cfs) | 57589.3 | Conv. (cfs) | | 57589.3 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.26 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 1.66 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.20 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 471.36 | |
| E.G. Slope (ft/ft) | 0.005205 | Area (sq ft) | | 471.36 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 75.96 | Top Width (ft) | | 75.96 | |
| Vel Total (ft/s) | 8.80 | Avg. Vel. (ft/s) | | 8.80 | |
| Max Chl Dpth (ft) | 9.76 | Hydr. Depth (ft) | | 6.21 | |
| Conv. Total (cfs) | 57495.0 | Conv. (cfs) | | 57495.0 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.22 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 1.93 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.98 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.71 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 468.09 | |
| E.G. Slope (ft/ft) | 0.008627 | Area (sq ft) | | 468.09 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 75.72 | Top Width (ft) | | 75.72 | |
| Vel Total (ft/s) | 11.30 | Avg. Vel. (ft/s) | | 11.30 | |
| Max Chl Dpth (ft) | 9.71 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 56955.1 | Conv. (cfs) | | 56955.1 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 78.96 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 3.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.25 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 4.25 | Flow Area (sq ft) | | 509.28 | |
| E.G. Slope (ft/ft) | 0.013360 | Area (sq ft) | | 509.28 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 78.71 | Top Width (ft) | | 78.71 | |
| Vel Total (ft/s) | 14.49 | Avg. Vel. (ft/s) | | 14.49 | |
| Max Chl Dpth (ft) | 10.25 | Hydr. Depth (ft) | | 6.47 | |
| Conv. Total (cfs) | 63848.9 | Conv. (cfs) | | 63848.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 82.14 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 5.17 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | 0.67 | 0.01 |
| C & E Loss (ft) | | Cum SA (acres) | | 0.10 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -143

INPUT
Description: K0
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11.3 | 10 | 52.7 | -7 | 69 | -7 | 77.8 | -6 |
| 98.2 | -1 | 100 | -1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11.3 | .04 | 98.2 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11.3 | 98.2 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.75 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.005536 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5892.41 | 17.59 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 10.44 | Avg. Vel. (ft/s) | | 10.57 | 2.04 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.58 | 0.45 |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.09 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | -2.96 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.000273 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1308.10 | 3.90 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 2.32 | Avg. Vel. (ft/s) | | 2.35 | 0.45 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 0.13 | 0.02 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.73 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.08 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.002349 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3838.54 | 11.46 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 6.80 | Avg. Vel. (ft/s) | | 6.88 | 1.33 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.10 | 0.19 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.65 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.85 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 0.32 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.002727 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4135.66 | 12.34 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 7.33 | Avg. Vel. (ft/s) | | 7.42 | 1.43 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.27 | 0.22 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.29 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.004435 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5274.26 | 15.74 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 9.34 | Avg. Vel. (ft/s) | | 9.46 | 1.82 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.07 | 0.36 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.70 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 2.81 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.008632 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7358.04 | 21.96 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 13.03 | Avg. Vel. (ft/s) | | 13.20 | 2.54 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 4.03 | 0.71 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |

Frctn Loss (ft)  Cum Volume (acre-ft)
C & E Loss (ft)  Cum SA (acres)

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:Cobosee Stream

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| Reach 1 | 1700 | .07 | .04 | .065 |
| Reach 1 | 1635 | .07 | .045 | .065 |
| Reach 1 | 1555 | .07 | .042 | .065 |
| Reach 1 | 1455 | .065 | .045 | .07 |
| Reach 1 | 1335 | .065 | .045 | .075 |
| Reach 1 | 1185 | .065 | .045 | .07 |
| Reach 1 | 1060 | .065 | .04 | .07 |
| Reach 1 | 960 | .07 | .042 | .05 |
| Reach 1 | 935 | .065 | .042 | .07 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | .065 | .04 | .065 |
| Reach 1 | 830 | .065 | .04 | .065 |
| Reach 1 | 821 | .065 | .035 | .065 |
| Reach 1 | 820 | .065 | .035 | .065 |
| Reach 1 | 725 | .065 | .04 | .065 |
| Reach 1 | 575 | .065 | .04 | .065 |
| Reach 1 | 425 | .065 | .04 | .065 |
| Reach 1 | 335 | .065 | .04 | .065 |
| Reach 1 | 262 | .065 | .04 | .065 |
| Reach 1 | 187 | .065 | .04 | .065 |
| Reach 1 | 137 | .065 | .04 | .065 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | .065 | .04 | .065 |
| Reach 1 | 38 | .065 | .04 | .065 |
| Reach 1 | 0 | .065 | .04 | .065 |
| Reach 1 | -21 | .065 | .04 | .065 |
| Reach 1 | -54 | .065 | .04 | .065 |
| Reach 1 | -88 | .065 | .04 | .065 |
| Reach 1 | -143 | .065 | .04 | .065 |

SUMMARY OF REACH LENGTHS

River: Cobosee Stream

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| Reach 1 | 1700 | 65 | 65 | 65 |
| Reach 1 | 1635 | 80 | 80 | 80 |
| Reach 1 | 1555 | 100 | 100 | 100 |
| Reach 1 | 1455 | 120 | 120 | 120 |
| Reach 1 | 1335 | 150 | 150 | 150 |
| Reach 1 | 1185 | 125 | 125 | 125 |
| Reach 1 | 1060 | 100 | 100 | 100 |
| Reach 1 | 960 | 25 | 25 | 25 |
| Reach 1 | 935 | 85 | 85 | 85 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | 20 | 20 | 20 |
| Reach 1 | 830 | 9 | 9 | 9 |
| Reach 1 | 821 | 1 | 1 | 1 |
| Reach 1 | 820 | 95 | 95 | 95 |
| Reach 1 | 725 | 150 | 150 | 150 |
| Reach 1 | 575 | 150 | 150 | 150 |
| Reach 1 | 425 | 90 | 90 | 90 |
| Reach 1 | 335 | 73 | 73 | 73 |
| Reach 1 | 262 | 75 | 75 | 75 |
| Reach 1 | 187 | 50 | 50 | 50 |
| Reach 1 | 137 | 77 | 77 | 77 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | 22 | 22 | 22 |
| Reach 1 | 38 | 38 | 38 | 38 |
| Reach 1 | 0 | 21 | 21 | 21 |
| Reach 1 | -21 | 33 | 33 | 33 |
| Reach 1 | -54 | 34 | 34 | 34 |
| Reach 1 | -88 | 55 | 55 | 55 |
| Reach 1 | -143 | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Cobosee Stream

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| Reach 1 | 1700 | .1 | .3 |
| Reach 1 | 1635 | .1 | .3 |
| Reach 1 | 1555 | .1 | .3 |
| Reach 1 | 1455 | .1 | .3 |

| | | | | |
|---|---|---|---|---|
| Reach 1 | 1335 | | .1 | .3 |
| Reach 1 | 1185 | | .1 | .3 |
| Reach 1 | 1060 | | .1 | .3 |
| Reach 1 | 960 | | .3 | .5 |
| Reach 1 | 935 | | .3 | .5 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | | .3 | .5 |
| Reach 1 | 830 | | .3 | .5 |
| Reach 1 | 821 | | .3 | .5 |
| Reach 1 | 820 | | .3 | .5 |
| Reach 1 | 725 | | .1 | .3 |
| Reach 1 | 575 | | .1 | .3 |
| Reach 1 | 425 | | .1 | .3 |
| Reach 1 | 335 | | .1 | .3 |
| Reach 1 | 262 | | .1 | .3 |
| Reach 1 | 187 | | .1 | .3 |
| Reach 1 | 137 | | .3 | .5 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | | .3 | .5 |
| Reach 1 | 38 | | .1 | .3 |
| Reach 1 | 0 | | .1 | .3 |
| Reach 1 | -21 | | .1 | .3 |
| Reach 1 | -54 | | .1 | .3 |
| Reach 1 | -88 | | .1 | .3 |
| Reach 1 | -143 | | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1700 | Q100 | 5910.00 | 13.80 | 22.75 | 21.32 | 24.48 | 0.006899 | 10.56 | 559.56 | 84.99 | 0.73 |
| Reach 1 | 1700 | Q1.1 | 1312.00 | 13.80 | 18.54 | 17.33 | 19.04 | 0.004837 | 5.66 | 231.75 | 70.35 | 0.55 |
| Reach 1 | 1700 | Q10 | 3850.00 | 13.80 | 21.15 | 19.81 | 22.41 | 0.006488 | 8.99 | 428.08 | 79.67 | 0.68 |
| Reach 1 | 1700 | Q25 | 4148.00 | 13.80 | 21.40 | 20.05 | 22.73 | 0.006586 | 9.26 | 447.72 | 80.49 | 0.69 |
| Reach 1 | 1700 | Q50 | 5290.00 | 13.80 | 22.28 | 20.89 | 23.89 | 0.006865 | 10.17 | 519.99 | 83.43 | 0.72 |
| Reach 1 | 1700 | Q500 | 7380.00 | 13.80 | 23.79 | 22.27 | 25.79 | 0.006886 | 11.36 | 649.74 | 88.50 | 0.74 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1635 | | Q100 | 5910.00 | 14.00 | 22.26 | | 23.95 | 0.009286 |
| 10.45 | 565.74 | 91.56 | | 0.74 | | | | | |
| Reach 1 | 1635 | | Q1.1 | 1312.00 | 14.00 | 17.69 | | 18.50 | 0.015059 |
| 7.21 | 181.92 | 75.56 | | 0.82 | | | | | |
| Reach 1 | 1635 | | Q10 | 3850.00 | 14.00 | 20.47 | | 21.86 | 0.010706 |
| 9.45 | 407.41 | 86.07 | | 0.77 | | | | | |
| Reach 1 | 1635 | | Q25 | 4148.00 | 14.00 | 20.75 | | 22.19 | 0.010420 |
| 9.61 | 431.49 | 86.93 | | 0.76 | | | | | |
| Reach 1 | 1635 | | Q50 | 5290.00 | 14.00 | 21.75 | | 23.36 | 0.009593 |
| 10.17 | 520.12 | 90.01 | | 0.75 | | | | | |
| Reach 1 | 1635 | | Q500 | 7380.00 | 14.00 | 23.37 | | 25.25 | 0.008749 |
| 11.03 | 669.19 | 94.97 | | 0.73 | | | | | |
| Reach 1 | 1555 | | Q100 | 5910.00 | 13.30 | 20.34 | 20.16 | 22.96 | 0.013988 |
| 12.99 | 455.10 | 80.13 | | 0.96 | | | | | |
| Reach 1 | 1555 | | Q1.1 | 1312.00 | 13.30 | 16.65 | | 17.46 | 0.011277 |
| 7.21 | 181.93 | 67.33 | | 0.77 | | | | | |
| Reach 1 | 1555 | | Q10 | 3850.00 | 13.30 | 19.06 | 18.65 | 20.89 | 0.012591 |
| 10.84 | 355.06 | 76.34 | | 0.89 | | | | | |
| Reach 1 | 1555 | | Q25 | 4148.00 | 13.30 | 19.24 | 18.89 | 21.21 | 0.013022 |
| 11.25 | 368.78 | 76.87 | | 0.90 | | | | | |
| Reach 1 | 1555 | | Q50 | 5290.00 | 13.30 | 19.96 | 19.73 | 22.37 | 0.013832 |
| 12.46 | 424.40 | 78.99 | | 0.95 | | | | | |
| Reach 1 | 1555 | | Q500 | 7380.00 | 13.30 | 21.24 | 21.12 | 24.27 | 0.013932 |
| 13.96 | 528.58 | 82.81 | | 0.97 | | | | | |
| Reach 1 | 1455 | | Q100 | 5910.00 | 11.80 | 19.15 | 18.73 | 21.52 | 0.013387 |
| 12.37 | 481.88 | 84.97 | | 0.89 | | | | | |
| Reach 1 | 1455 | | Q1.1 | 1312.00 | 11.80 | 15.06 | 14.87 | 16.04 | 0.018077 |
| 7.92 | 165.73 | 68.77 | | 0.90 | | | | | |
| Reach 1 | 1455 | | Q10 | 3850.00 | 11.80 | 17.40 | 17.28 | 19.41 | 0.017110 |
| 11.38 | 338.91 | 78.76 | | 0.96 | | | | | |
| Reach 1 | 1455 | | Q25 | 4148.00 | 11.80 | 17.67 | 17.49 | 19.74 | 0.016462 |
| 11.55 | 360.01 | 79.70 | | 0.95 | | | | | |
| Reach 1 | 1455 | | Q50 | 5290.00 | 11.80 | 18.65 | 18.33 | 20.92 | 0.014390 |
| 12.10 | 439.82 | 83.19 | | 0.91 | | | | | |
| Reach 1 | 1455 | | Q500 | 7380.00 | 11.80 | 20.29 | | 22.87 | 0.011588 |
| 12.93 | 580.92 | 89.01 | | 0.86 | | | | | |
| Reach 1 | 1335 | | Q100 | 5910.00 | 9.50 | 18.29 | | 20.09 | 0.008451 |
| 10.77 | 549.55 | 80.41 | | 0.72 | | | | | |
| Reach 1 | 1335 | | Q1.1 | 1312.00 | 9.50 | 12.63 | 12.50 | 13.78 | 0.019322 |
| 8.58 | 152.88 | 58.82 | | 0.94 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1335 | | Q10 | 3850.00 | 9.50 | 16.13 | | 17.69 | 0.010520 |
| 10.02 | 384.19 | 72.81 | | 0.77 | | | | | |
| Reach 1 | 1335 | | Q25 | 4148.00 | 9.50 | 16.47 | | 18.07 | 0.010117 |
| 10.13 | 409.60 | 74.07 | | 0.76 | | | | | |
| Reach 1 | 1335 | | Q50 | 5290.00 | 9.50 | 17.69 | | 19.41 | 0.008914 |
| 10.54 | 502.02 | 78.36 | | 0.73 | | | | | |
| Reach 1 | 1335 | | Q500 | 7380.00 | 9.50 | 19.61 | | 21.58 | 0.007511 |
| 11.27 | 659.01 | 85.25 | | 0.70 | | | | | |
| Reach 1 | 1185 | | Q100 | 5910.00 | 5.50 | 15.74 | 15.05 | 18.44 | 0.013066 |
| 13.18 | 448.42 | 64.17 | | 0.88 | | | | | |
| Reach 1 | 1185 | | Q1.1 | 1312.00 | 5.50 | 10.99 | | 11.81 | 0.008702 |
| 7.27 | 180.57 | 47.96 | | 0.66 | | | | | |
| Reach 1 | 1185 | | Q10 | 3850.00 | 5.50 | 14.08 | 13.16 | 16.00 | 0.011509 |
| 11.11 | 346.47 | 58.78 | | 0.81 | | | | | |
| Reach 1 | 1185 | | Q25 | 4148.00 | 5.50 | 14.34 | 13.46 | 16.38 | 0.011809 |
| 11.46 | 361.81 | 59.62 | | 0.82 | | | | | |
| Reach 1 | 1185 | | Q50 | 5290.00 | 5.50 | 15.27 | 14.52 | 17.75 | 0.012741 |
| 12.65 | 418.21 | 62.62 | | 0.86 | | | | | |
| Reach 1 | 1185 | | Q500 | 7380.00 | 5.50 | 16.59 | 16.20 | 19.92 | 0.014396 |
| 14.65 | 504.00 | 66.73 | | 0.93 | | | | | |
| Reach 1 | 1060 | | Q100 | 5910.00 | 5.00 | 13.57 | 13.57 | 16.72 | 0.013789 |
| 14.24 | 415.00 | 66.76 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q1.1 | 1312.00 | 5.00 | 8.85 | 8.85 | 10.26 | 0.017292 |
| 9.54 | 137.48 | 49.24 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q10 | 3850.00 | 5.00 | 11.81 | 11.81 | 14.33 | 0.014662 |
| 12.72 | 302.66 | 61.04 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q25 | 4148.00 | 5.00 | 12.10 | 12.10 | 14.70 | 0.014382 |
| 12.94 | 320.59 | 62.01 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q50 | 5290.00 | 5.00 | 13.10 | 13.10 | 16.05 | 0.013832 |
| 13.77 | 384.11 | 65.31 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q500 | 7380.00 | 5.00 | 14.68 | 14.68 | 18.19 | 0.013247 |
| 15.03 | 490.87 | 70.19 | | 1.00 | | | | | |
| Reach 1 | 960 | | Q100 | 5910.00 | 3.50 | 12.54 | 11.33 | 14.82 | 0.008563 |
| 12.15 | 495.72 | 82.79 | | 0.77 | | | | | |
| Reach 1 | 960 | | Q1.1 | 1312.00 | 3.50 | 7.53 | 6.91 | 8.38 | 0.009985 |
| 7.38 | 177.88 | 56.90 | | 0.74 | | | | | |
| Reach 1 | 960 | | Q10 | 3850.00 | 3.50 | 10.76 | 9.68 | 12.41 | 0.008768 |
| 10.32 | 373.53 | 64.43 | | 0.75 | | | | | |
| Reach 1 | 960 | | Q25 | 4148.00 | 3.50 | 11.04 | 9.93 | 12.79 | 0.008725 |
| 10.62 | 391.64 | 65.09 | | 0.75 | | | | | |
| Reach 1 | 960 | | Q50 | 5290.00 | 3.50 | 12.04 | 10.87 | 14.14 | 0.008580 |
| 11.63 | 458.31 | 68.60 | | 0.76 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 960 | | Q500 | 7380.00 | 3.50 | 11.41 | 12.50 | 16.33 | 0.022762 |
| 17.82 | 415.83 | 65.95 | | 1.22 | | | | | |
| Reach 1 | 935 | | Q100 | 5910.00 | 2.00 | 13.04 | 10.34 | 14.06 | 0.003531 |
| 8.25 | 809.75 | 158.21 | | 0.51 | | | | | |
| Reach 1 | 935 | | Q1.1 | 1312.00 | 2.00 | 7.57 | 5.91 | 8.03 | 0.004399 |
| 5.45 | 240.67 | 66.41 | | 0.50 | | | | | |
| Reach 1 | 935 | | Q10 | 3850.00 | 2.00 | 11.00 | 8.78 | 11.87 | 0.004311 |
| 7.49 | 526.52 | 114.51 | | 0.54 | | | | | |
| Reach 1 | 935 | | Q25 | 4148.00 | 2.00 | 11.32 | 9.03 | 12.22 | 0.004193 |
| 7.65 | 563.83 | 123.44 | | 0.54 | | | | | |
| Reach 1 | 935 | | Q50 | 5290.00 | 2.00 | 12.46 | 9.93 | 13.45 | 0.003743 |
| 8.08 | 723.33 | 156.11 | | 0.52 | | | | | |
| Reach 1 | 935 | | Q500 | 7380.00 | 2.00 | 14.22 | 11.33 | 15.32 | 0.003277 |
| 8.71 | 987.87 | 168.60 | | 0.51 | | | | | |
| Reach 1 | 895 | | Bridge | | | | | | |
| Reach 1 | 850 | | Q100 | 5910.00 | 1.00 | 11.56 | 9.38 | 12.72 | 0.004490 |
| 8.76 | 737.73 | 144.16 | | 0.58 | | | | | |
| Reach 1 | 850 | | Q1.1 | 1312.00 | 1.00 | 6.84 | 4.89 | 7.23 | 0.003327 |
| 5.04 | 260.32 | 69.12 | | 0.46 | | | | | |
| Reach 1 | 850 | | Q10 | 3850.00 | 1.00 | 9.48 | 7.75 | 10.53 | 0.005734 |
| 8.22 | 474.98 | 103.72 | | 0.63 | | | | | |
| Reach 1 | 850 | | Q25 | 4148.00 | 1.00 | 9.82 | 8.01 | 10.88 | 0.005610 |
| 8.31 | 511.23 | 113.81 | | 0.62 | | | | | |
| Reach 1 | 850 | | Q50 | 5290.00 | 1.00 | 10.94 | 8.91 | 12.08 | 0.004917 |
| 8.67 | 651.61 | 134.32 | | 0.60 | | | | | |
| Reach 1 | 850 | | Q500 | 7380.00 | 1.00 | 13.08 | 10.40 | 14.20 | 0.003513 |
| 8.72 | 962.68 | 157.76 | | 0.52 | | | | | |
| Reach 1 | 830 | | Q100 | 5910.00 | 1.00 | 11.54 | | 12.57 | 0.003454 |
| 8.19 | 768.79 | 147.28 | | 0.53 | | | | | |
| Reach 1 | 830 | | Q1.1 | 1312.00 | 1.00 | 6.77 | | 7.15 | 0.004146 |
| 4.95 | 265.30 | 87.98 | | 0.50 | | | | | |
| Reach 1 | 830 | | Q10 | 3850.00 | 1.00 | 9.47 | | 10.34 | 0.004396 |
| 7.49 | 515.95 | 95.94 | | 0.57 | | | | | |
| Reach 1 | 830 | | Q25 | 4148.00 | 1.00 | 9.80 | | 10.70 | 0.004219 |
| 7.60 | 548.17 | 96.67 | | 0.56 | | | | | |
| Reach 1 | 830 | | Q50 | 5290.00 | 1.00 | 10.92 | | 11.93 | 0.003757 |
| 8.05 | 680.74 | 136.18 | | 0.54 | | | | | |
| Reach 1 | 830 | | Q500 | 7380.00 | 1.00 | 13.07 | | 14.09 | 0.002737 |
| 8.26 | 1000.53 | 153.73 | | 0.49 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 821 | | Q100 | 5910.00 | 1.00 | 11.53 | | 12.53 | 0.002866 |
| 8.05 | 768.40 | 157.69 | | 0.54 | | | | | |
| Reach 1 | 821 | | Q1.1 | 1312.00 | 1.00 | 6.69 | | 7.11 | 0.003298 |
| 5.19 | 252.86 | 80.22 | | 0.52 | | | | | |
| Reach 1 | 821 | | Q10 | 3850.00 | 1.00 | 9.41 | | 10.30 | 0.003918 |
| 7.58 | 507.88 | 103.13 | | 0.60 | | | | | |
| Reach 1 | 821 | | Q25 | 4148.00 | 1.00 | 9.77 | | 10.67 | 0.003650 |
| 7.61 | 545.05 | 103.92 | | 0.59 | | | | | |
| Reach 1 | 821 | | Q50 | 5290.00 | 1.00 | 10.90 | | 11.88 | 0.003150 |
| 7.95 | 677.07 | 134.94 | | 0.56 | | | | | |
| Reach 1 | 821 | | Q500 | 7380.00 | 1.00 | 13.07 | | 14.04 | 0.002233 |
| 8.04 | 1014.09 | 161.42 | | 0.49 | | | | | |
| Reach 1 | 820 | | Q100 | 5910.00 | 1.00 | 11.59 | | 12.46 | 0.002824 |
| 7.49 | 832.41 | 193.15 | | 0.53 | | | | | |
| Reach 1 | 820 | | Q1.1 | 1312.00 | 1.00 | 6.68 | | 7.10 | 0.003313 |
| 5.20 | 252.46 | 80.17 | | 0.52 | | | | | |
| Reach 1 | 820 | | Q10 | 3850.00 | 1.00 | 9.40 | | 10.29 | 0.004312 |
| 7.57 | 508.60 | 111.78 | | 0.63 | | | | | |
| Reach 1 | 820 | | Q25 | 4148.00 | 1.00 | 9.77 | | 10.65 | 0.004247 |
| 7.52 | 551.27 | 120.92 | | 0.62 | | | | | |
| Reach 1 | 820 | | Q50 | 5290.00 | 1.00 | 10.95 | | 11.83 | 0.003290 |
| 7.51 | 722.96 | 156.10 | | 0.56 | | | | | |
| Reach 1 | 820 | | Q500 | 7380.00 | 1.00 | 13.18 | | 13.92 | 0.001862 |
| 7.09 | 1260.27 | 281.71 | | 0.45 | | | | | |
| Reach 1 | 725 | | Q100 | 5910.00 | 2.50 | 11.30 | | 12.14 | 0.003724 |
| 7.36 | 832.82 | 188.19 | | 0.53 | | | | | |
| Reach 1 | 725 | | Q1.1 | 1312.00 | 2.50 | 6.09 | | 6.62 | 0.007272 |
| 5.84 | 224.72 | 88.79 | | 0.65 | | | | | |
| Reach 1 | 725 | | Q10 | 3850.00 | 2.50 | 8.81 | | 9.79 | 0.005966 |
| 7.94 | 484.97 | 103.25 | | 0.65 | | | | | |
| Reach 1 | 725 | | Q25 | 4148.00 | 2.50 | 9.18 | | 10.15 | 0.005799 |
| 7.92 | 523.90 | 109.62 | | 0.64 | | | | | |
| Reach 1 | 725 | | Q50 | 5290.00 | 2.50 | 10.57 | | 11.46 | 0.004654 |
| 7.54 | 707.44 | 157.21 | | 0.58 | | | | | |
| Reach 1 | 725 | | Q500 | 7380.00 | 2.50 | 13.00 | | 13.72 | 0.002360 |
| 6.92 | 1208.76 | 247.45 | | 0.44 | | | | | |
| Reach 1 | 575 | | Q100 | 5910.00 | 1.50 | 11.08 | | 11.67 | 0.001918 |
| 6.22 | 1026.90 | 220.83 | | 0.40 | | | | | |
| Reach 1 | 575 | | Q1.1 | 1312.00 | 1.50 | 4.94 | | 5.46 | 0.008227 |
| 5.76 | 227.65 | 100.80 | | 0.68 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 575 | | Q10 | 3850.00 | 1.50 | 8.39 | 9.01 | 0.003444 | |
| 6.34 | 607.05 | 120.14 | 0.50 | | | | | | |
| Reach 1 | 575 | | Q25 | 4148.00 | 1.50 | 8.80 | 9.42 | 0.003153 | |
| 6.32 | 656.45 | 122.71 | 0.48 | | | | | | |
| Reach 1 | 575 | | Q50 | 5290.00 | 1.50 | 10.29 | 10.90 | 0.002253 | |
| 6.27 | 871.16 | 174.83 | 0.42 | | | | | | |
| Reach 1 | 575 | | Q500 | 7380.00 | 1.50 | 12.87 | 13.39 | 0.001335 | |
| 5.97 | 1486.21 | 269.19 | 0.34 | | | | | | |
| Reach 1 | 425 | | Q100 | 5910.00 | 0.00 | 10.82 | 11.41 | 0.001604 | |
| 6.22 | 1051.38 | 244.73 | 0.37 | | | | | | |
| Reach 1 | 425 | | Q1.1 | 1312.00 | 0.00 | 4.54 | 4.81 | 0.002227 | |
| 4.13 | 317.80 | 86.35 | 0.38 | | | | | | |
| Reach 1 | 425 | | Q10 | 3850.00 | 0.00 | 8.02 | 8.58 | 0.002266 | |
| 5.98 | 644.11 | 100.38 | 0.42 | | | | | | |
| Reach 1 | 425 | | Q25 | 4148.00 | 0.00 | 8.45 | 9.01 | 0.002174 | |
| 6.04 | 686.64 | 101.97 | 0.41 | | | | | | |
| Reach 1 | 425 | | Q50 | 5290.00 | 0.00 | 10.00 | 10.60 | 0.001827 | |
| 6.22 | 869.43 | 148.17 | 0.39 | | | | | | |
| Reach 1 | 425 | | Q500 | 7380.00 | 0.00 | 12.69 | 13.21 | 0.001159 | |
| 6.01 | 1534.62 | 265.24 | 0.32 | | | | | | |
| Reach 1 | 335 | | Q100 | 5910.00 | -2.00 | 10.27 | 11.20 | 0.002411 | |
| 7.77 | 800.00 | 169.01 | 0.45 | | | | | | |
| Reach 1 | 335 | | Q1.1 | 1312.00 | -2.00 | 4.34 | 4.62 | 0.001807 | |
| 4.30 | 305.17 | 65.83 | 0.35 | | | | | | |
| Reach 1 | 335 | | Q10 | 3850.00 | -2.00 | 7.51 | 8.32 | 0.003095 | |
| 7.22 | 533.04 | 77.94 | 0.49 | | | | | | |
| Reach 1 | 335 | | Q25 | 4148.00 | -2.00 | 7.92 | 8.76 | 0.003035 | |
| 7.33 | 565.55 | 79.51 | 0.48 | | | | | | |
| Reach 1 | 335 | | Q50 | 5290.00 | -2.00 | 9.46 | 10.37 | 0.002648 | |
| 7.66 | 695.90 | 100.54 | 0.46 | | | | | | |
| Reach 1 | 335 | | Q500 | 7380.00 | -2.00 | 12.22 | 13.05 | 0.001761 | |
| 7.54 | 1234.90 | 249.51 | 0.40 | | | | | | |
| Reach 1 | 262 | | Q100 | 5910.00 | -3.00 | 9.39 | 10.90 | 0.004665 | |
| 9.86 | 599.15 | 73.18 | 0.61 | | | | | | |
| Reach 1 | 262 | | Q1.1 | 1312.00 | -3.00 | 4.08 | 4.47 | 0.002305 | |
| 5.00 | 262.64 | 53.29 | 0.40 | | | | | | |
| Reach 1 | 262 | | Q10 | 3850.00 | -3.00 | 6.57 | 7.96 | 0.005827 | |
| 9.46 | 406.88 | 62.76 | 0.65 | | | | | | |
| Reach 1 | 262 | | Q25 | 4148.00 | -3.00 | 6.97 | 8.40 | 0.005706 | |
| 9.59 | 432.71 | 64.34 | 0.65 | | | | | | |
| Reach 1 | 262 | | Q50 | 5290.00 | -3.00 | 8.55 | 10.05 | 0.005045 | |
| 9.81 | 539.04 | 70.12 | 0.62 | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 262 | | Q500 | 7380.00 | -3.00 | 11.30 | | 12.81 | 0.003559 |
| 9.88 | 801.85 | 143.31 | | 0.55 | | | | | |
| Reach 1 | 187 | | Q100 | 5910.00 | -4.00 | 9.10 | | 10.55 | 0.004309 |
| 9.68 | 610.37 | 71.09 | | 0.58 | | | | | |
| Reach 1 | 187 | | Q1.1 | 1312.00 | -4.00 | 3.98 | | 4.30 | 0.001669 |
| 4.50 | 291.39 | 53.79 | | 0.34 | | | | | |
| Reach 1 | 187 | | Q10 | 3850.00 | -4.00 | 6.22 | | 7.52 | 0.005145 |
| 9.17 | 419.83 | 61.28 | | 0.62 | | | | | |
| Reach 1 | 187 | | Q25 | 4148.00 | -4.00 | 6.63 | | 7.97 | 0.005070 |
| 9.32 | 445.22 | 62.66 | | 0.62 | | | | | |
| Reach 1 | 187 | | Q50 | 5290.00 | -4.00 | 8.24 | | 9.67 | 0.004578 |
| 9.61 | 550.65 | 68.10 | | 0.60 | | | | | |
| Reach 1 | 187 | | Q500 | 7380.00 | -4.00 | 11.05 | | 12.54 | 0.003405 |
| 9.80 | 770.83 | 96.82 | | 0.53 | | | | | |
| Reach 1 | 137 | | Q100 | 5910.00 | -4.00 | 8.36 | 5.71 | 10.28 | 0.004602 |
| 11.13 | 531.20 | 69.03 | | 0.63 | | | | | |
| Reach 1 | 137 | | Q1.1 | 1312.00 | -4.00 | 3.90 | 0.50 | 4.22 | 0.001610 |
| 4.50 | 291.23 | 53.92 | | 0.34 | | | | | |
| Reach 1 | 137 | | Q10 | 3850.00 | -4.00 | 5.70 | 3.85 | 7.23 | 0.005588 |
| 9.94 | 387.51 | 60.01 | | 0.65 | | | | | |
| Reach 1 | 137 | | Q25 | 4148.00 | -4.00 | 6.08 | 4.15 | 7.68 | 0.005453 |
| 10.16 | 408.21 | 61.31 | | 0.65 | | | | | |
| Reach 1 | 137 | | Q50 | 5290.00 | -4.00 | 7.58 | 5.20 | 9.40 | 0.004854 |
| 10.81 | 489.14 | 66.39 | | 0.63 | | | | | |
| Reach 1 | 137 | | Q500 | 7380.00 | -4.00 | 10.13 | 6.86 | 12.28 | 0.004126 |
| 11.77 | 627.13 | 75.49 | | 0.61 | | | | | |
| Reach 1 | 98.5 | | | Bridge | | | | | |
| Reach 1 | 60 | | Q100 | 5910.00 | -5.00 | 7.30 | 4.52 | 9.17 | 0.004296 |
| 10.97 | 538.71 | 59.04 | | 0.61 | | | | | |
| Reach 1 | 60 | | Q1.1 | 1312.00 | -5.00 | 3.84 | -0.76 | 4.06 | 0.000849 |
| 3.72 | 352.38 | 54.29 | | 0.25 | | | | | |
| Reach 1 | 60 | | Q10 | 3850.00 | -5.00 | 4.77 | 2.53 | 6.20 | 0.004818 |
| 9.57 | 402.48 | 56.54 | | 0.62 | | | | | |
| Reach 1 | 60 | | Q25 | 4148.00 | -5.00 | 5.07 | 2.84 | 6.60 | 0.004912 |
| 9.91 | 418.46 | 57.26 | | 0.63 | | | | | |
| Reach 1 | 60 | | Q50 | 5290.00 | -5.00 | 6.54 | 3.97 | 8.29 | 0.004485 |
| 10.63 | 497.57 | 58.73 | | 0.62 | | | | | |
| Reach 1 | 60 | | Q500 | 7380.00 | -5.00 | 9.04 | 5.66 | 11.15 | 0.003916 |
| 11.66 | 632.87 | 59.75 | | 0.60 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 38 | | Q100 | 5910.00 | -4.50 | 6.92 | | 9.00 | 0.005276 |
| 11.60 | 520.91 | 58.50 | | 0.67 | | | | | |
| Reach 1 | 38 | | Q1.1 | 1312.00 | -4.50 | 3.80 | | 4.03 | 0.001017 |
| 3.90 | 341.00 | 56.26 | | 0.28 | | | | | |
| Reach 1 | 38 | | Q10 | 3850.00 | -4.50 | 4.09 | | 5.94 | 0.007597 |
| 10.91 | 357.89 | 57.05 | | 0.76 | | | | | |
| Reach 1 | 38 | | Q25 | 4148.00 | -4.50 | 4.35 | | 6.33 | 0.007739 |
| 11.30 | 372.45 | 57.18 | | 0.77 | | | | | |
| Reach 1 | 38 | | Q50 | 5290.00 | -4.50 | 6.07 | | 8.10 | 0.005824 |
| 11.44 | 471.82 | 58.07 | | 0.70 | | | | | |
| Reach 1 | 38 | | Q500 | 7380.00 | -4.50 | 8.79 | | 11.02 | 0.004425 |
| 12.02 | 631.61 | 59.47 | | 0.64 | | | | | |
| Reach 1 | 0 | | Q100 | 5910.00 | -6.30 | 4.24 | 4.24 | 8.48 | 0.013662 |
| 16.53 | 360.07 | 44.32 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q1.1 | 1312.00 | -6.30 | 3.76 | | 4.00 | 0.000817 |
| 3.89 | 338.97 | 43.85 | | 0.24 | | | | | |
| Reach 1 | 0 | | Q10 | 3850.00 | -6.30 | 3.33 | | 5.59 | 0.008481 |
| 12.07 | 319.93 | 43.41 | | 0.77 | | | | | |
| Reach 1 | 0 | | Q25 | 4148.00 | -6.30 | 3.19 | 2.45 | 5.91 | 0.010472 |
| 13.25 | 313.90 | 43.27 | | 0.86 | | | | | |
| Reach 1 | 0 | | Q50 | 5290.00 | -6.30 | 3.62 | 3.62 | 7.58 | 0.014135 |
| 15.97 | 332.50 | 43.70 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q500 | 7380.00 | -6.30 | 5.62 | 5.62 | 10.49 | 0.012870 |
| 17.73 | 422.22 | 45.70 | | 0.99 | | | | | |
| Reach 1 | -21 | | Q100 | 5910.00 | -7.00 | 1.82 | 3.29 | 7.91 | 0.024570 |
| 19.83 | 302.26 | 45.71 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q1.1 | 1312.00 | -7.00 | 3.79 | | 3.97 | 0.000546 |
| 3.40 | 393.69 | 47.38 | | 0.20 | | | | | |
| Reach 1 | -21 | | Q10 | 3850.00 | -7.00 | 3.66 | | 5.25 | 0.004917 |
| 10.13 | 387.85 | 47.28 | | 0.61 | | | | | |
| Reach 1 | -21 | | Q25 | 4148.00 | -7.00 | 3.63 | | 5.49 | 0.005774 |
| 10.96 | 386.37 | 47.25 | | 0.66 | | | | | |
| Reach 1 | -21 | | Q50 | 5290.00 | -7.00 | 1.32 | 2.71 | 7.01 | 0.025006 |
| 19.16 | 279.48 | 45.28 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q500 | 7380.00 | -7.00 | 2.94 | 4.65 | 9.92 | 0.023784 |
| 21.24 | 353.85 | 46.66 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q100 | 5910.00 | -7.00 | 1.85 | 3.09 | 6.72 | 0.025698 |
| 17.70 | 333.87 | 61.41 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q1.1 | 1312.00 | -7.00 | 3.81 | | 3.93 | 0.000478 |
| 2.86 | 464.80 | 72.34 | | 0.19 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | -54 | Q10 | 3850.00 | -7.00 | 3.88 | | 4.95 | 0.003976 | |
| 8.29 | 470.34 | 72.77 | 0.55 | | | | | | |
| Reach 1 | -54 | Q25 | 4148.00 | -7.00 | 3.90 | | 5.13 | 0.004581 | |
| 8.91 | 471.60 | 72.87 | 0.59 | | | | | | |
| Reach 1 | -54 | Q50 | 5290.00 | -7.00 | 4.05 | 2.59 | 5.96 | 0.006997 | |
| 11.13 | 482.13 | 73.49 | 0.73 | | | | | | |
| Reach 1 | -54 | Q500 | 7380.00 | -7.00 | 2.18 | 4.20 | 8.92 | 0.033780 | |
| 20.84 | 354.12 | 63.23 | 1.54 | | | | | | |
| Reach 1 | -88 | Q100 | 5910.00 | -6.00 | 3.67 | 3.18 | 6.18 | 0.010956 | |
| 12.71 | 465.10 | 75.49 | 0.90 | | | | | | |
| Reach 1 | -88 | Q1.1 | 1312.00 | -6.00 | 3.80 | | 3.92 | 0.000512 | |
| 2.77 | 474.41 | 76.18 | 0.20 | | | | | | |
| Reach 1 | -88 | Q10 | 3850.00 | -6.00 | 3.76 | | 4.80 | 0.004469 | |
| 8.16 | 471.93 | 76.00 | 0.58 | | | | | | |
| Reach 1 | -88 | Q25 | 4148.00 | -6.00 | 3.76 | | 4.96 | 0.005205 | |
| 8.80 | 471.36 | 75.96 | 0.62 | | | | | | |
| Reach 1 | -88 | Q50 | 5290.00 | -6.00 | 3.71 | | 5.70 | 0.008627 | |
| 11.30 | 468.09 | 75.72 | 0.80 | | | | | | |
| Reach 1 | -88 | Q500 | 7380.00 | -6.00 | 4.25 | 4.25 | 7.51 | 0.013360 | |
| 14.49 | 509.28 | 78.71 | 1.00 | | | | | | |
| Reach 1 | -143 | Q100 | 5910.00 | -7.00 | 3.80 | 1.75 | 5.53 | 0.005536 | |
| 10.57 | 566.27 | 73.60 | 0.67 | | | | | | |
| Reach 1 | -143 | Q1.1 | 1312.00 | -7.00 | 3.80 | -2.96 | 3.89 | 0.000273 | |
| 2.35 | 566.27 | 73.60 | 0.15 | | | | | | |
| Reach 1 | -143 | Q10 | 3850.00 | -7.00 | 3.80 | 0.08 | 4.53 | 0.002349 | |
| 6.88 | 566.27 | 73.60 | 0.44 | | | | | | |
| Reach 1 | -143 | Q25 | 4148.00 | -7.00 | 3.80 | 0.32 | 4.65 | 0.002727 | |
| 7.42 | 566.27 | 73.60 | 0.47 | | | | | | |
| Reach 1 | -143 | Q50 | 5290.00 | -7.00 | 3.80 | 1.29 | 5.19 | 0.004435 | |
| 9.46 | 566.27 | 73.60 | 0.60 | | | | | | |
| Reach 1 | -143 | Q500 | 7380.00 | -7.00 | 3.80 | 2.81 | 6.50 | 0.008632 | |
| 13.20 | 566.27 | 73.60 | 0.83 | | | | | | |

Profile Output Table - Six XS Bridge

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Crit W.S. | Frctn Loss | C & E Loss | Top Width | Q Left | Q Channel | Q Right | Vel Chnl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft/s) |

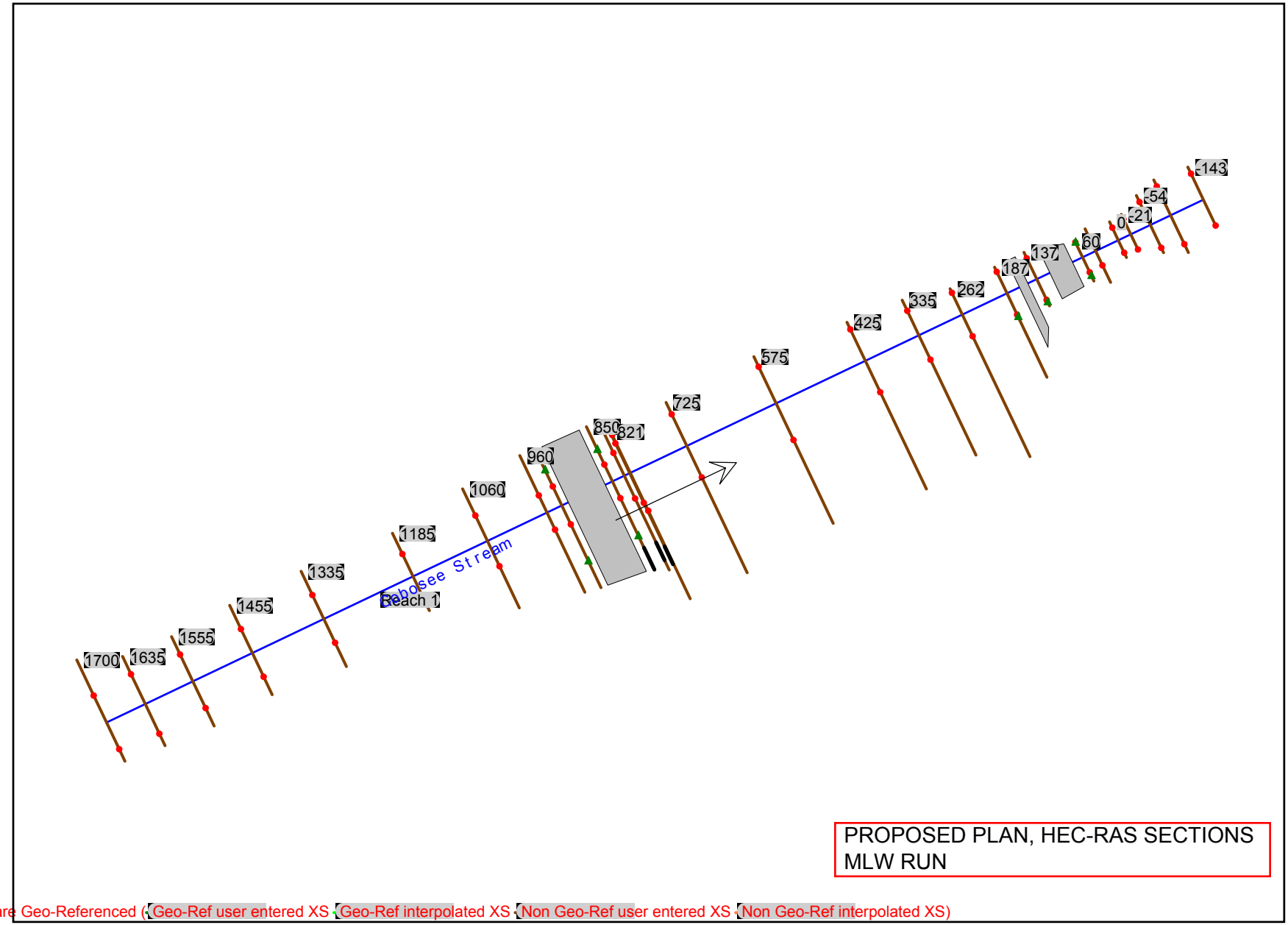
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 960 | | Q100 | 14.82 | 12.54 | 11.33 | 0.13 | 0.63 | 82.79 |
| 0.20 | 5891.34 | 18.46 | 12.15 | | | | | | |
| Reach 1 | 960 | | Q1.1 | 8.38 | 7.53 | 6.91 | 0.16 | 0.19 | 56.90 |
| | 1312.00 | | 7.38 | | | | | | |
| Reach 1 | 960 | | Q10 | 12.41 | 10.76 | 9.68 | 0.15 | 0.39 | 64.43 |
| 0.01 | 3849.40 | 0.59 | 10.32 | | | | | | |
| Reach 1 | 960 | | Q25 | 12.79 | 11.04 | 9.93 | 0.15 | 0.42 | 65.09 |
| 0.02 | 4146.46 | 1.52 | 10.62 | | | | | | |
| Reach 1 | 960 | | Q50 | 14.14 | 12.04 | 10.87 | 0.14 | 0.55 | 68.60 |
| 0.11 | 5280.65 | 9.24 | 11.63 | | | | | | |
| Reach 1 | 960 | | Q500 | 16.33 | 11.41 | 12.50 | 1.71 | 0.14 | 65.95 |
| 0.06 | 7373.96 | 5.97 | 17.82 | | | | | | |
| Reach 1 | 935 | | Q100 | 14.06 | 13.04 | 10.34 | 0.10 | 0.29 | 158.21 |
| 12.49 | 5673.06 | 224.45 | 8.25 | | | | | | |
| Reach 1 | 935 | | Q1.1 | 8.03 | 7.57 | 5.91 | 0.10 | 0.09 | 66.41 |
| | 1312.00 | | 5.45 | | | | | | |
| Reach 1 | 935 | | Q10 | 11.87 | 11.00 | 8.78 | 0.12 | 0.24 | 114.51 |
| 0.71 | 3837.48 | 11.81 | 7.49 | | | | | | |
| Reach 1 | 935 | | Q25 | 12.22 | 11.32 | 9.03 | 0.11 | 0.24 | 123.44 |
| 1.46 | 4122.46 | 24.08 | 7.65 | | | | | | |
| Reach 1 | 935 | | Q50 | 13.45 | 12.46 | 9.93 | 0.10 | 0.28 | 156.11 |
| 7.33 | 5154.48 | 128.19 | 8.08 | | | | | | |
| Reach 1 | 935 | | Q500 | 15.32 | 14.22 | 11.33 | 0.09 | 0.23 | 168.60 |
| 28.83 | 6873.98 | 477.18 | 8.71 | | | | | | |
| Reach 1 | 895 | BR U | Q100 | 13.67 | 11.70 | 10.78 | 0.48 | 0.29 | 121.45 |
| 4.65 | 5851.97 | 53.38 | 11.34 | | | | | | |
| Reach 1 | 895 | BR U | Q1.1 | 7.83 | 7.05 | 6.09 | 0.36 | 0.14 | 55.17 |
| | 1312.00 | | 7.08 | | | | | | |
| Reach 1 | 895 | BR U | Q10 | 11.52 | 9.85 | 9.19 | 0.59 | 0.19 | 77.17 |
| | 3850.00 | | 10.37 | | | | | | |
| Reach 1 | 895 | BR U | Q25 | 11.86 | 10.15 | 9.45 | 0.58 | 0.19 | 78.50 |
| 0.01 | 4147.99 | | 10.49 | | | | | | |
| Reach 1 | 895 | BR U | Q50 | 13.07 | 11.14 | 10.32 | 0.52 | 0.26 | 105.53 |
| 1.67 | 5272.37 | 15.96 | 11.15 | | | | | | |
| Reach 1 | 895 | BR U | Q500 | 15.01 | 13.14 | 11.89 | 0.38 | 0.28 | 140.56 |
| 21.43 | 7059.92 | 298.66 | 11.21 | | | | | | |
| Reach 1 | 895 | BR D | Q100 | 12.90 | 11.51 | 9.93 | 0.07 | 0.12 | 133.26 |
| 5.53 | 5712.93 | 191.53 | 9.62 | | | | | | |
| Reach 1 | 895 | BR D | Q1.1 | 7.33 | 6.84 | 5.12 | 0.05 | 0.05 | 61.99 |
| | 1312.00 | | 5.60 | | | | | | |
| Reach 1 | 895 | BR D | Q10 | 10.74 | 9.44 | 8.13 | 0.08 | 0.13 | 95.70 |
| | 3842.41 | 7.59 | 9.15 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 895 | BR D | Q25 | 11.09 | 9.77 | 8.40 | 0.08 | 0.13 | 105.78 |
| | 4130.49 | 17.51 | 9.24 | | | | | | |
| Reach 1 | 895 | BR D | Q50 | 12.28 | 10.88 | 9.40 | 0.07 | 0.13 | 126.95 |
| 1.40 | 5183.68 | 104.92 | 9.58 | | | | | | |
| Reach 1 | 895 | BR D | Q500 | 14.35 | 13.04 | 10.88 | 0.05 | 0.10 | 145.07 |
| 32.16 | 6874.93 | 472.90 | 9.49 | | | | | | |
| Reach 1 | 850 | | Q100 | 12.72 | 11.56 | 9.38 | 0.08 | 0.07 | 144.16 |
| 4.86 | 5749.56 | 155.58 | 8.76 | | | | | | |
| Reach 1 | 850 | | Q1.1 | 7.23 | 6.84 | 4.89 | 0.07 | 0.01 | 69.12 |
| | 1312.00 | | 5.04 | | | | | | |
| Reach 1 | 850 | | Q10 | 10.53 | 9.48 | 7.75 | 0.10 | 0.09 | 103.72 |
| | 3843.08 | 6.92 | 8.22 | | | | | | |
| Reach 1 | 850 | | Q25 | 10.88 | 9.82 | 8.01 | 0.10 | 0.09 | 113.81 |
| | 4132.33 | 15.67 | 8.31 | | | | | | |
| Reach 1 | 850 | | Q50 | 12.08 | 10.94 | 8.91 | 0.09 | 0.07 | 134.32 |
| 1.32 | 5199.07 | 89.61 | 8.67 | | | | | | |
| Reach 1 | 850 | | Q500 | 14.20 | 13.08 | 10.40 | 0.06 | 0.05 | 157.76 |
| 26.65 | 6944.32 | 409.03 | 8.72 | | | | | | |
| Reach 1 | 830 | | Q100 | 12.57 | 11.54 | | 0.03 | 0.01 | 147.28 |
| 2.70 | 5835.78 | 71.52 | 8.19 | | | | | | |
| Reach 1 | 830 | | Q1.1 | 7.15 | 6.77 | | 0.03 | 0.01 | 87.98 |
| | 1312.00 | | 4.95 | | | | | | |
| Reach 1 | 830 | | Q10 | 10.34 | 9.47 | | 0.04 | 0.01 | 95.94 |
| | 3847.49 | 2.51 | 7.49 | | | | | | |
| Reach 1 | 830 | | Q25 | 10.70 | 9.80 | | 0.04 | 0.00 | 96.67 |
| | 4145.14 | 2.86 | 7.60 | | | | | | |
| Reach 1 | 830 | | Q50 | 11.93 | 10.92 | | 0.03 | 0.01 | 136.18 |
| 0.71 | 5262.19 | 27.10 | 8.05 | | | | | | |
| Reach 1 | 830 | | Q500 | 14.09 | 13.07 | | 0.02 | 0.02 | 153.73 |
| 15.12 | 7098.19 | 266.69 | 8.26 | | | | | | |
| Reach 1 | 187 | | Q100 | 10.55 | 9.10 | | 0.22 | 0.05 | 71.09 |
| | 5910.00 | | 9.68 | | | | | | |
| Reach 1 | 187 | | Q1.1 | 4.30 | 3.98 | | 0.08 | 0.00 | 53.79 |
| | 1312.00 | | 4.50 | | | | | | |
| Reach 1 | 187 | | Q10 | 7.52 | 6.22 | | 0.27 | 0.02 | 61.28 |
| | 3850.00 | | 9.17 | | | | | | |
| Reach 1 | 187 | | Q25 | 7.97 | 6.63 | | 0.26 | 0.03 | 62.66 |
| | 4148.00 | | 9.32 | | | | | | |
| Reach 1 | 187 | | Q50 | 9.67 | 8.24 | | 0.24 | 0.04 | 68.10 |
| | 5290.00 | | 9.61 | | | | | | |

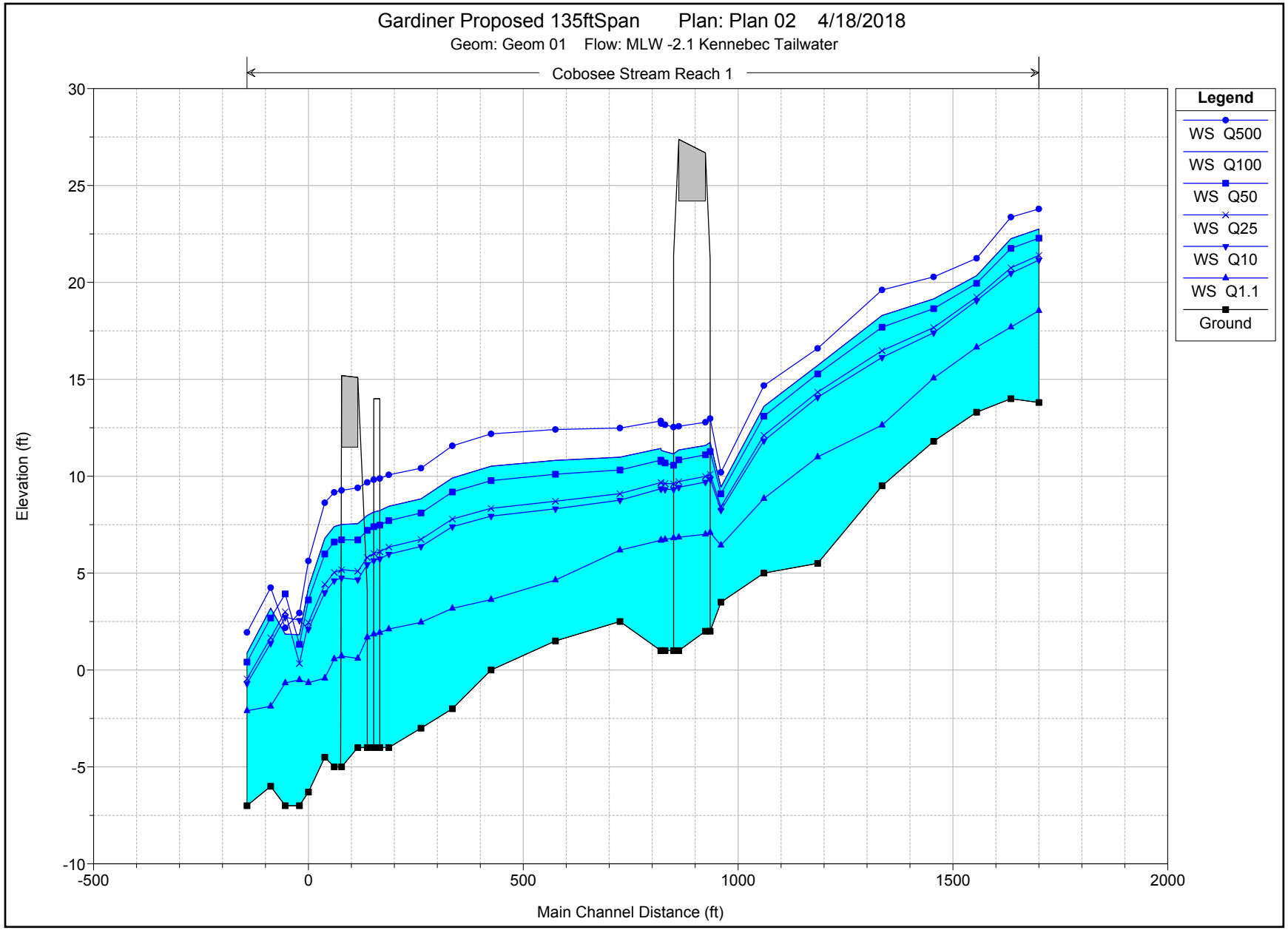
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 187 | | Q500 | 12.54 | 11.05 | | 0.19 | 0.07 | 96.82 |
| 3.27 | 7357.75 | 18.98 | 9.80 | | | | | | |
| Reach 1 | 137 | | Q100 | 10.28 | 8.36 | 5.71 | 0.13 | 0.25 | 69.03 |
| | 5910.00 | | 11.13 | | | | | | |
| Reach 1 | 137 | | Q1.1 | 4.22 | 3.90 | 0.50 | 0.04 | 0.01 | 53.92 |
| | 1312.00 | | 4.50 | | | | | | |
| Reach 1 | 137 | | Q10 | 7.23 | 5.70 | 3.85 | 0.15 | 0.19 | 60.01 |
| | 3850.00 | | 9.94 | | | | | | |
| Reach 1 | 137 | | Q25 | 7.68 | 6.08 | 4.15 | 0.15 | 0.21 | 61.31 |
| | 4148.00 | | 10.16 | | | | | | |
| Reach 1 | 137 | | Q50 | 9.40 | 7.58 | 5.20 | 0.13 | 0.24 | 66.39 |
| | 5290.00 | | 10.81 | | | | | | |
| Reach 1 | 137 | | Q500 | 12.28 | 10.13 | 6.86 | 0.11 | 0.27 | 75.49 |
| | 7380.00 | | 11.77 | | | | | | |
| Reach 1 | 98.5 | BR U | Q100 | 9.90 | 7.15 | 5.73 | 0.22 | 0.30 | 48.50 |
| | 5910.00 | | 13.33 | | | | | | |
| Reach 1 | 98.5 | BR U | Q1.1 | 4.18 | 3.84 | 0.51 | 0.04 | 0.05 | 48.50 |
| | 1312.00 | | 4.63 | | | | | | |
| Reach 1 | 98.5 | BR U | Q10 | 6.89 | 4.72 | 3.81 | 0.24 | 0.30 | 48.50 |
| | 3850.00 | | 11.81 | | | | | | |
| Reach 1 | 98.5 | BR U | Q25 | 7.32 | 5.01 | 4.10 | 0.25 | 0.31 | 48.50 |
| | 4148.00 | | 12.21 | | | | | | |
| Reach 1 | 98.5 | BR U | Q50 | 9.02 | 6.41 | 5.17 | 0.23 | 0.31 | 48.50 |
| | 5290.00 | | 12.97 | | | | | | |
| Reach 1 | 98.5 | BR U | Q500 | 11.90 | 8.83 | 6.97 | 0.20 | 0.30 | 48.50 |
| | 7380.00 | | 14.05 | | | | | | |
| Reach 1 | 98.5 | BR D | Q100 | 9.38 | 7.23 | 4.60 | 0.08 | 0.14 | 48.50 |
| | 5910.00 | | 11.76 | | | | | | |
| Reach 1 | 98.5 | BR D | Q1.1 | 4.08 | 3.85 | -0.78 | 0.01 | 0.01 | 48.50 |
| | 1312.00 | | 3.88 | | | | | | |
| Reach 1 | 98.5 | BR D | Q10 | 6.35 | 4.79 | 2.66 | 0.08 | 0.07 | 48.50 |
| | 3850.00 | | 10.03 | | | | | | |
| Reach 1 | 98.5 | BR D | Q25 | 6.76 | 5.07 | 2.98 | 0.08 | 0.08 | 48.50 |
| | 4148.00 | | 10.43 | | | | | | |
| Reach 1 | 98.5 | BR D | Q50 | 8.49 | 6.49 | 4.05 | 0.08 | 0.12 | 48.50 |
| | 5290.00 | | 11.34 | | | | | | |
| Reach 1 | 98.5 | BR D | Q500 | 11.40 | 8.93 | 5.83 | 0.07 | 0.18 | 48.50 |
| | 7380.00 | | 12.62 | | | | | | |
| Reach 1 | 60 | | Q100 | 9.17 | 7.30 | 4.52 | 0.10 | 0.06 | 59.04 |
| | 5910.00 | | 10.97 | | | | | | |

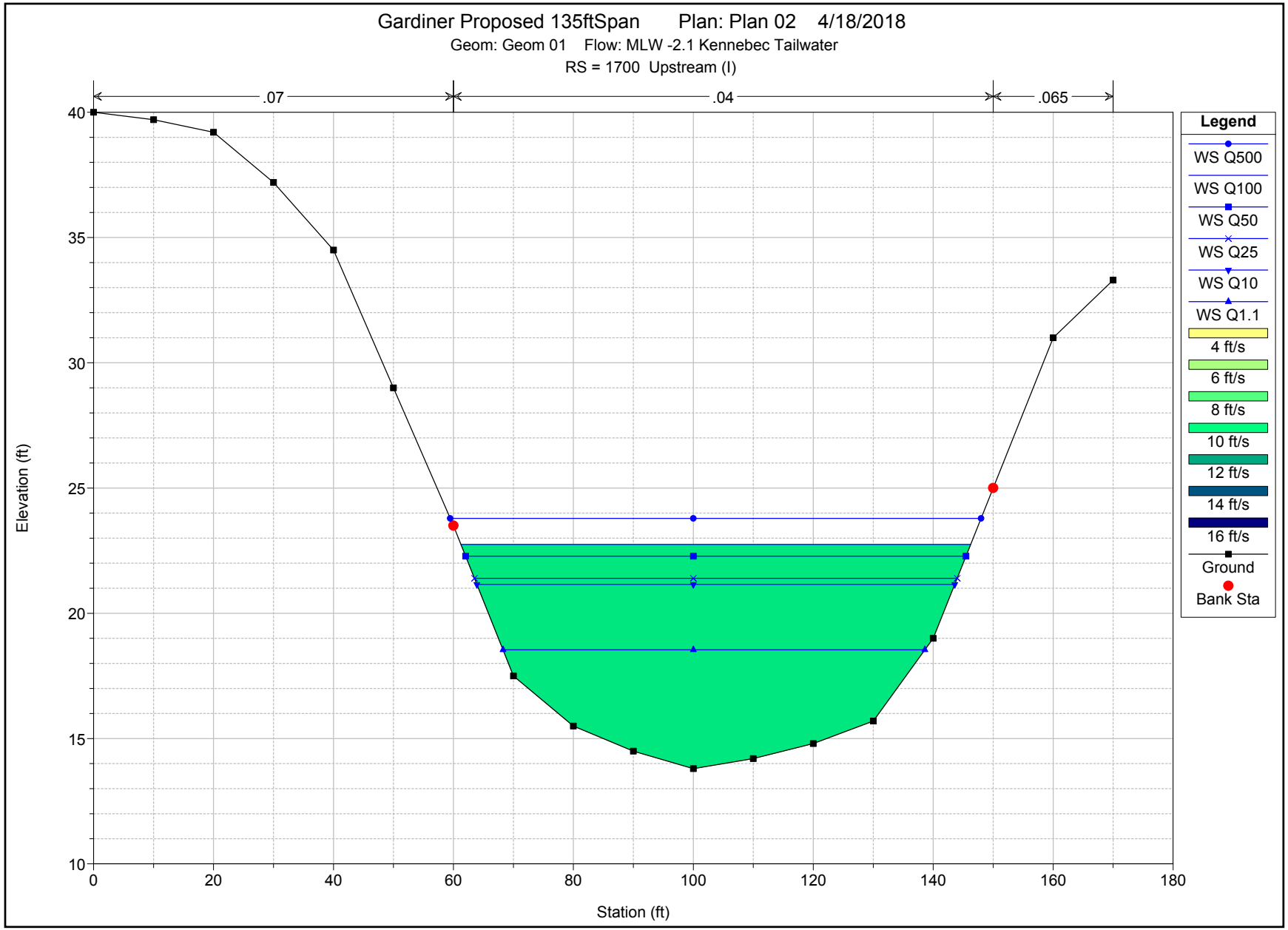
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 60 | | Q1.1 | 4.06 | 3.84 | -0.76 | 0.02 | 0.01 | 54.29 |
| | 1312.00 | | 3.72 | | | | | | |
| Reach 1 | 60 | | Q10 | 6.20 | 4.77 | 2.53 | 0.13 | 0.13 | 56.54 |
| | 3850.00 | | 9.57 | | | | | | |
| Reach 1 | 60 | | Q25 | 6.60 | 5.07 | 2.84 | 0.13 | 0.14 | 57.26 |
| | 4148.00 | | 9.91 | | | | | | |
| Reach 1 | 60 | | Q50 | 8.29 | 6.54 | 3.97 | 0.11 | 0.08 | 58.73 |
| | 5290.00 | | 10.63 | | | | | | |
| Reach 1 | 60 | | Q500 | 11.15 | 9.04 | 5.66 | 0.09 | 0.04 | 59.75 |
| | 7380.00 | | 11.66 | | | | | | |
| Reach 1 | 38 | | Q100 | 9.00 | 6.92 | | 0.31 | 0.22 | 58.50 |
| 27.66 | 5881.82 | 0.52 | 11.60 | | | | | | |
| Reach 1 | 38 | | Q1.1 | 4.03 | 3.80 | | 0.03 | 0.00 | 56.26 |
| 3.85 | 1308.15 | | 3.90 | | | | | | |
| Reach 1 | 38 | | Q10 | 5.94 | 4.09 | | 0.30 | 0.04 | 57.05 |
| 12.03 | 3837.97 | 0.00 | 10.91 | | | | | | |
| Reach 1 | 38 | | Q25 | 6.33 | 4.35 | | 0.34 | 0.07 | 57.18 |
| 13.55 | 4134.45 | 0.00 | 11.30 | | | | | | |
| Reach 1 | 38 | | Q50 | 8.10 | 6.07 | | 0.33 | 0.19 | 58.07 |
| 22.31 | 5267.47 | 0.22 | 11.44 | | | | | | |
| Reach 1 | 38 | | Q500 | 11.02 | 8.79 | | 0.27 | 0.26 | 59.47 |
| 42.16 | 7336.04 | 1.81 | 12.02 | | | | | | |

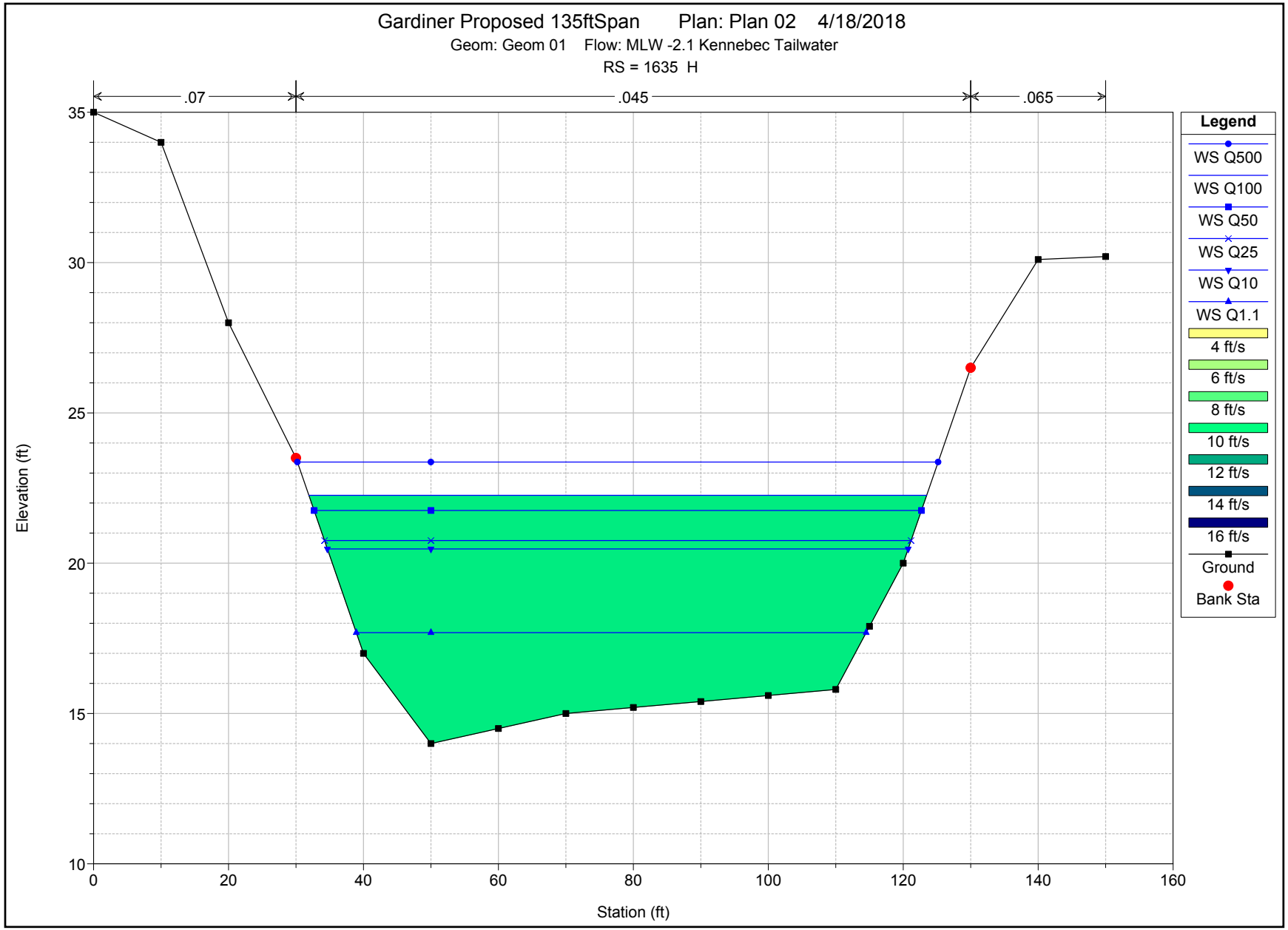
# APPENDIX F / HEC-RAS RESULTS FOR PROPOSED CONDITIONS AT MLW

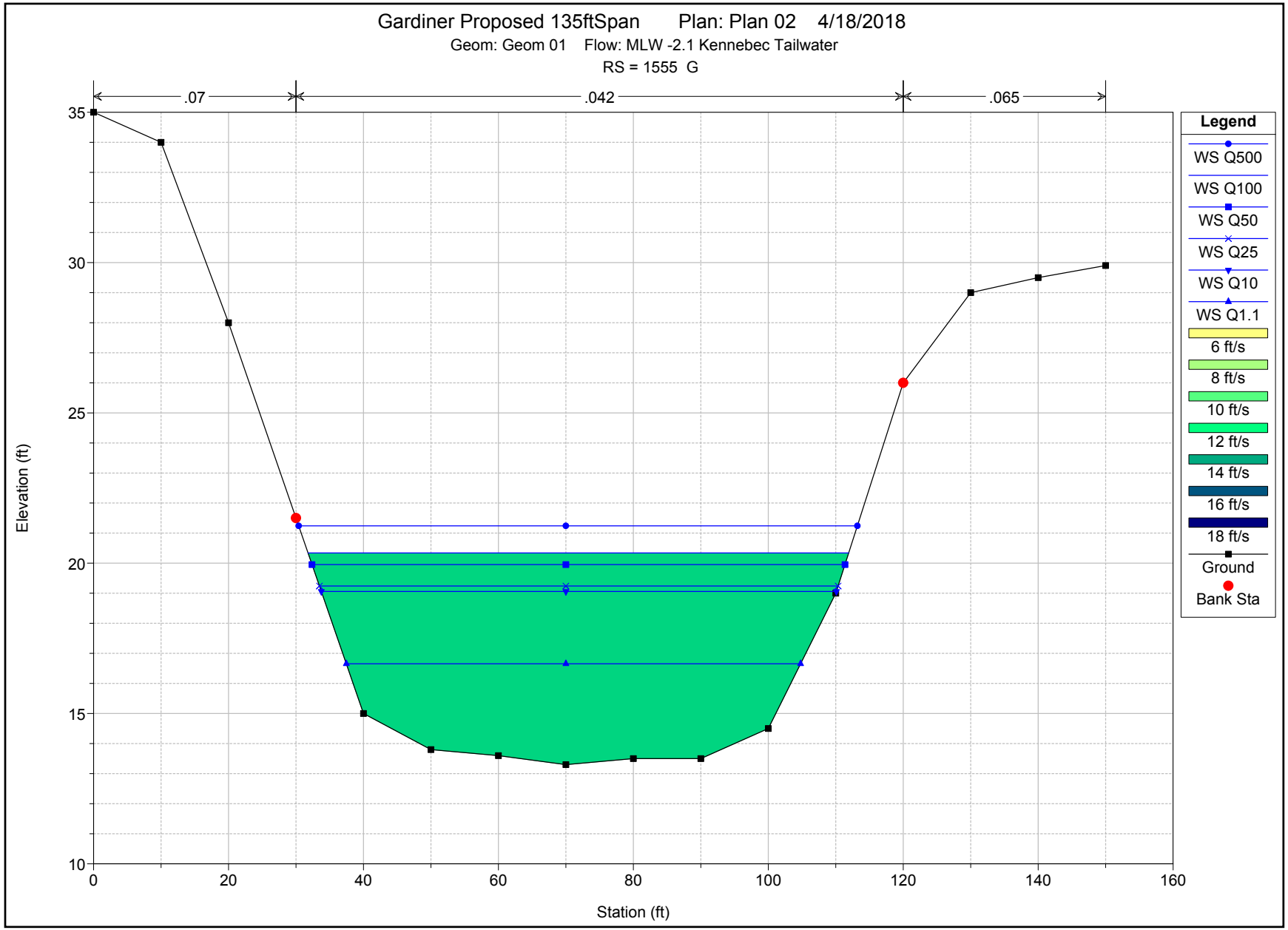


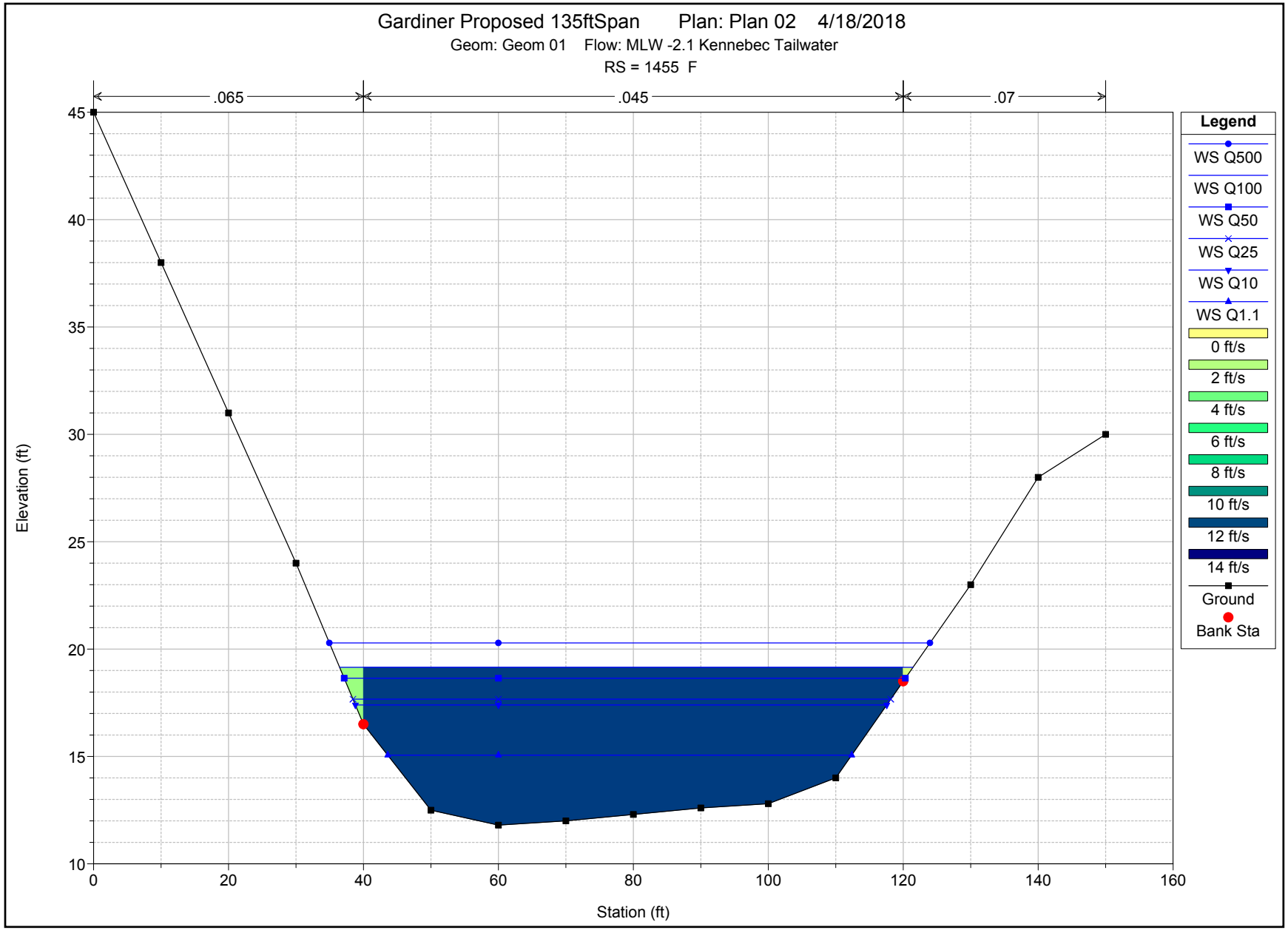

None of the XS's are Geo-Referenced ( Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)

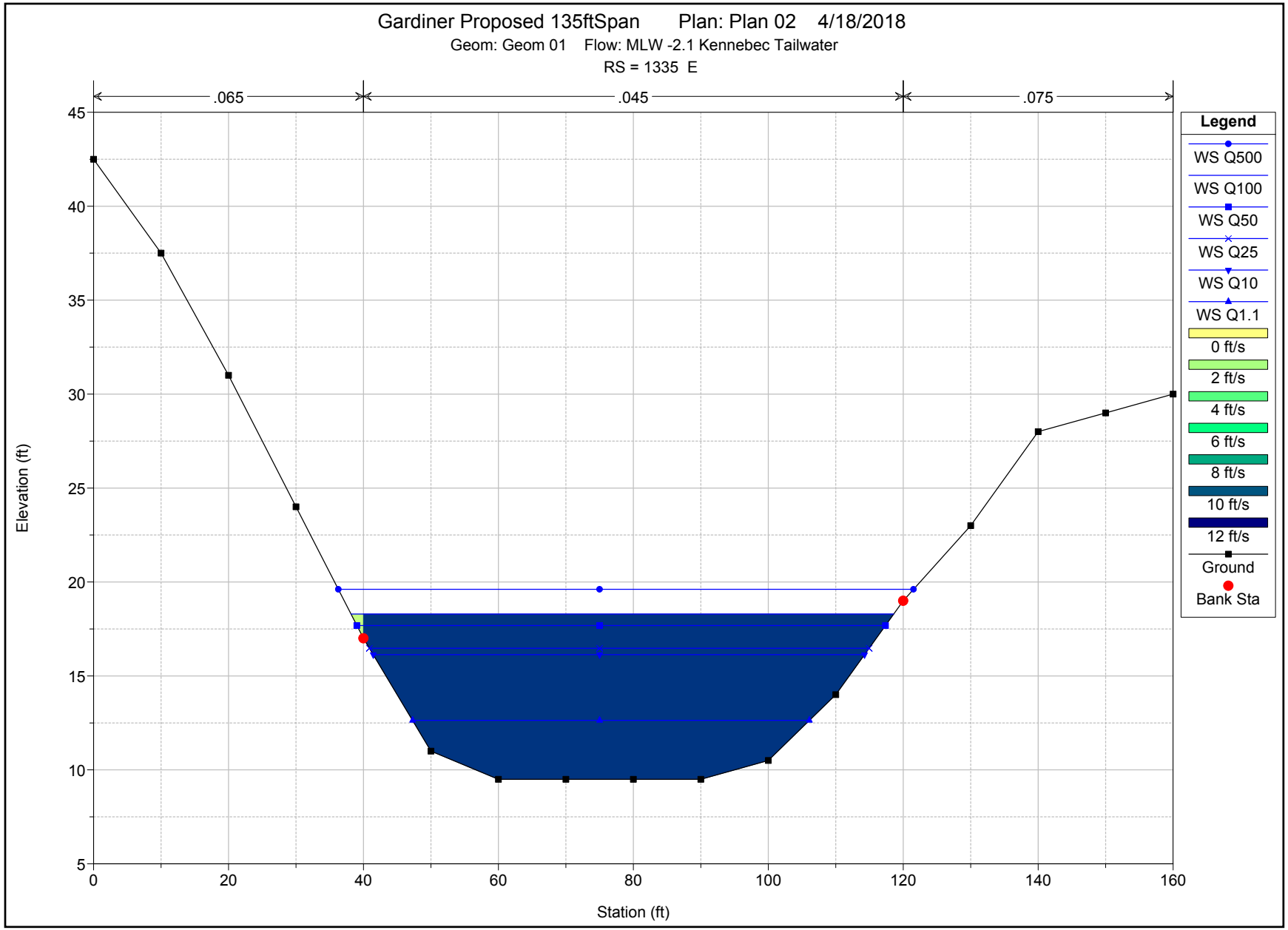

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
Cobosee Stream Reach 1
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
Ground
Elevation (ft)
Main Channel Distance (ft)
30
25
20
15
10
5
0
-5
-10
-500
0
500
1000
1500
2000

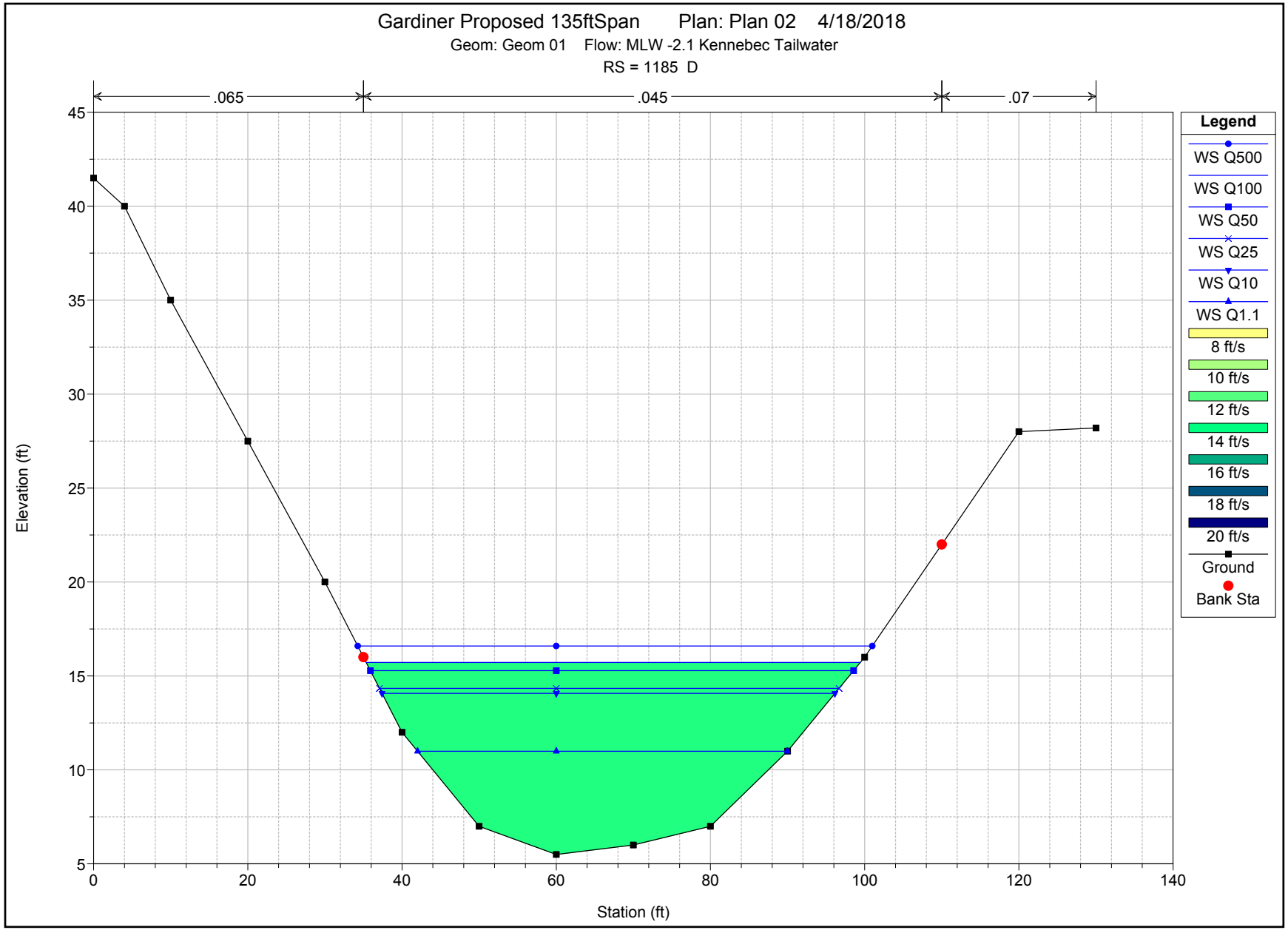

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1700 Upstream (I)
.07
.04
.065
Elevation (ft)
Station (ft)
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
180
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

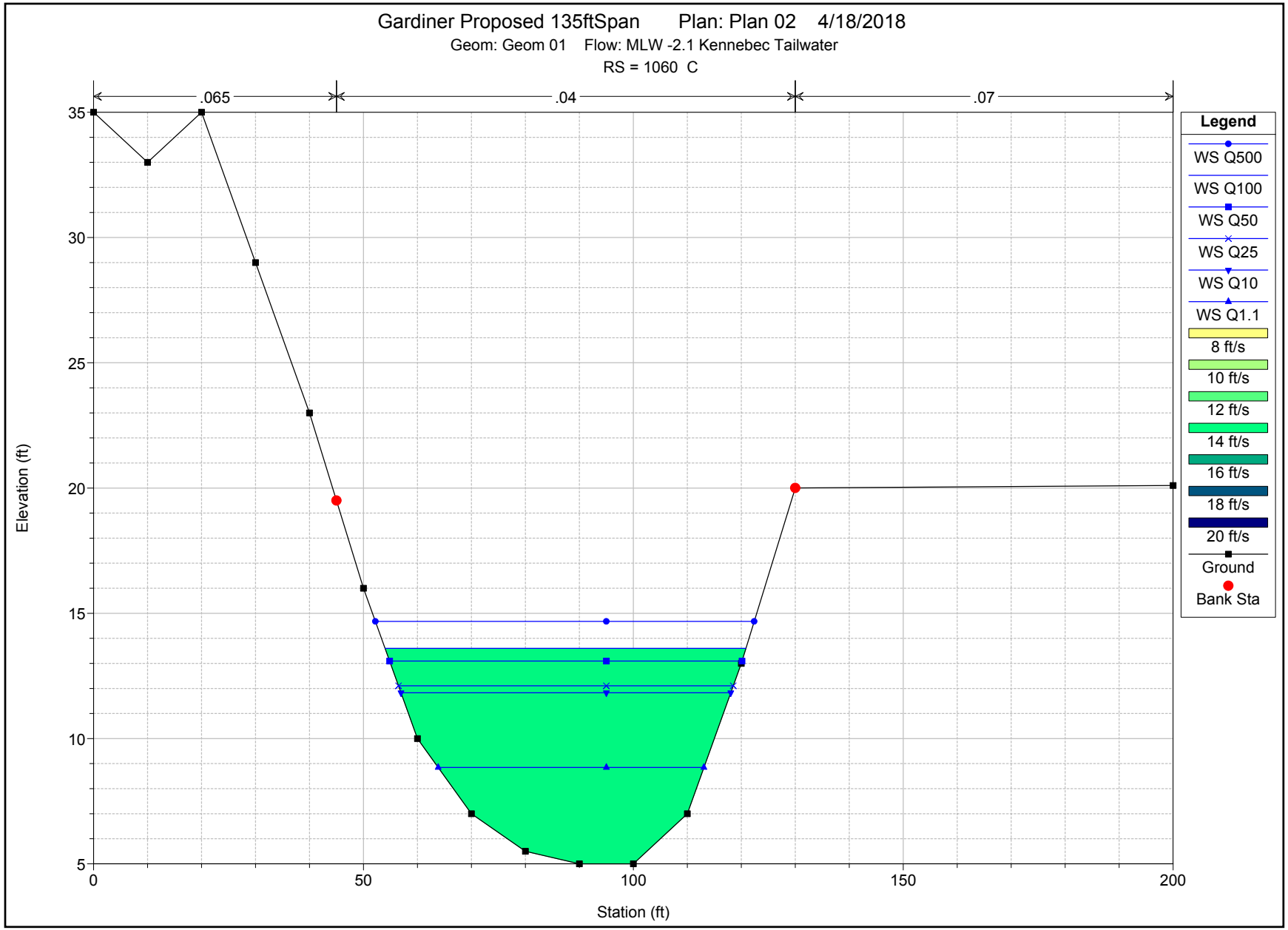

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1635 H
.07
.045
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

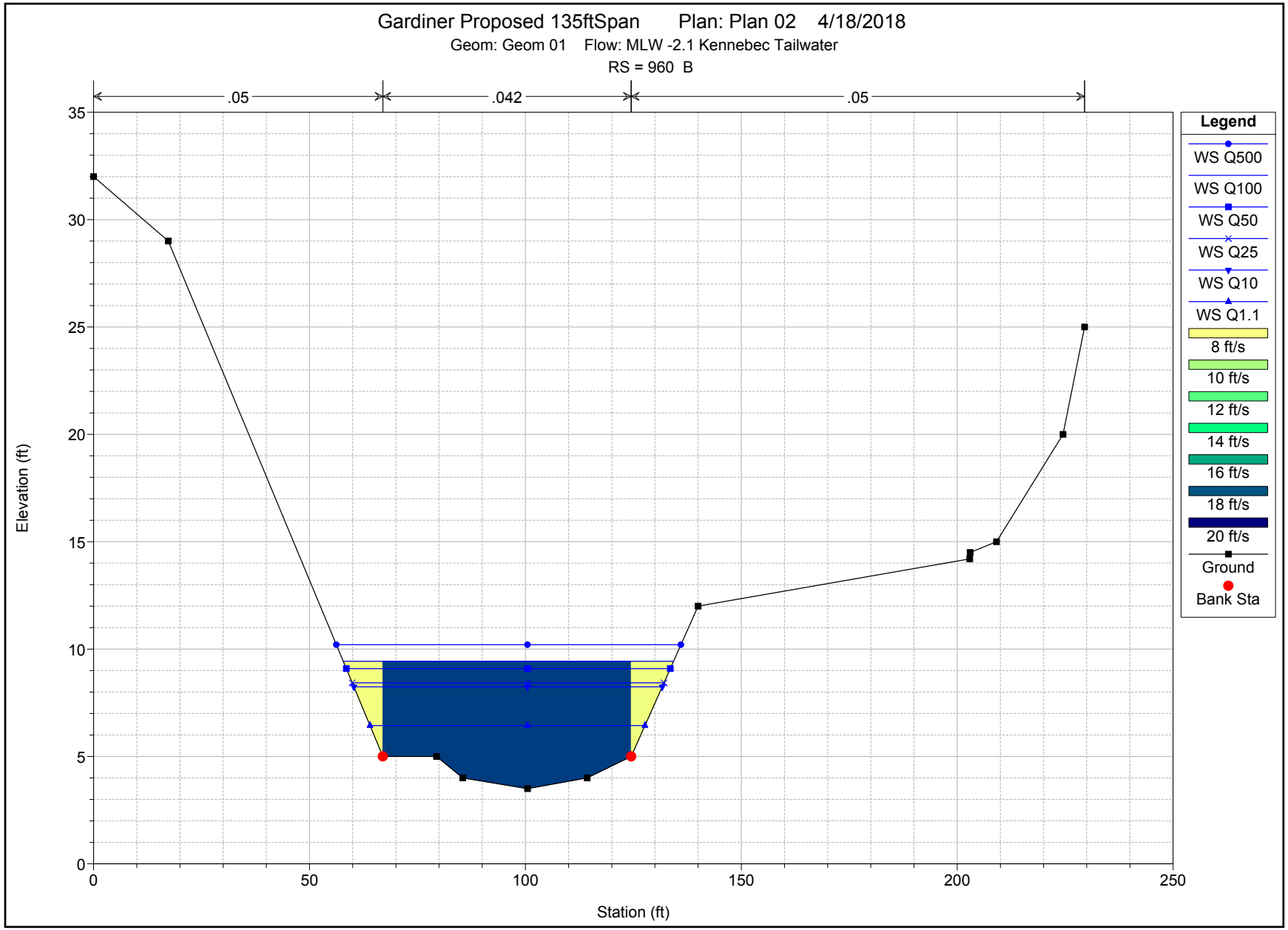

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1555 G
.07
.042
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta

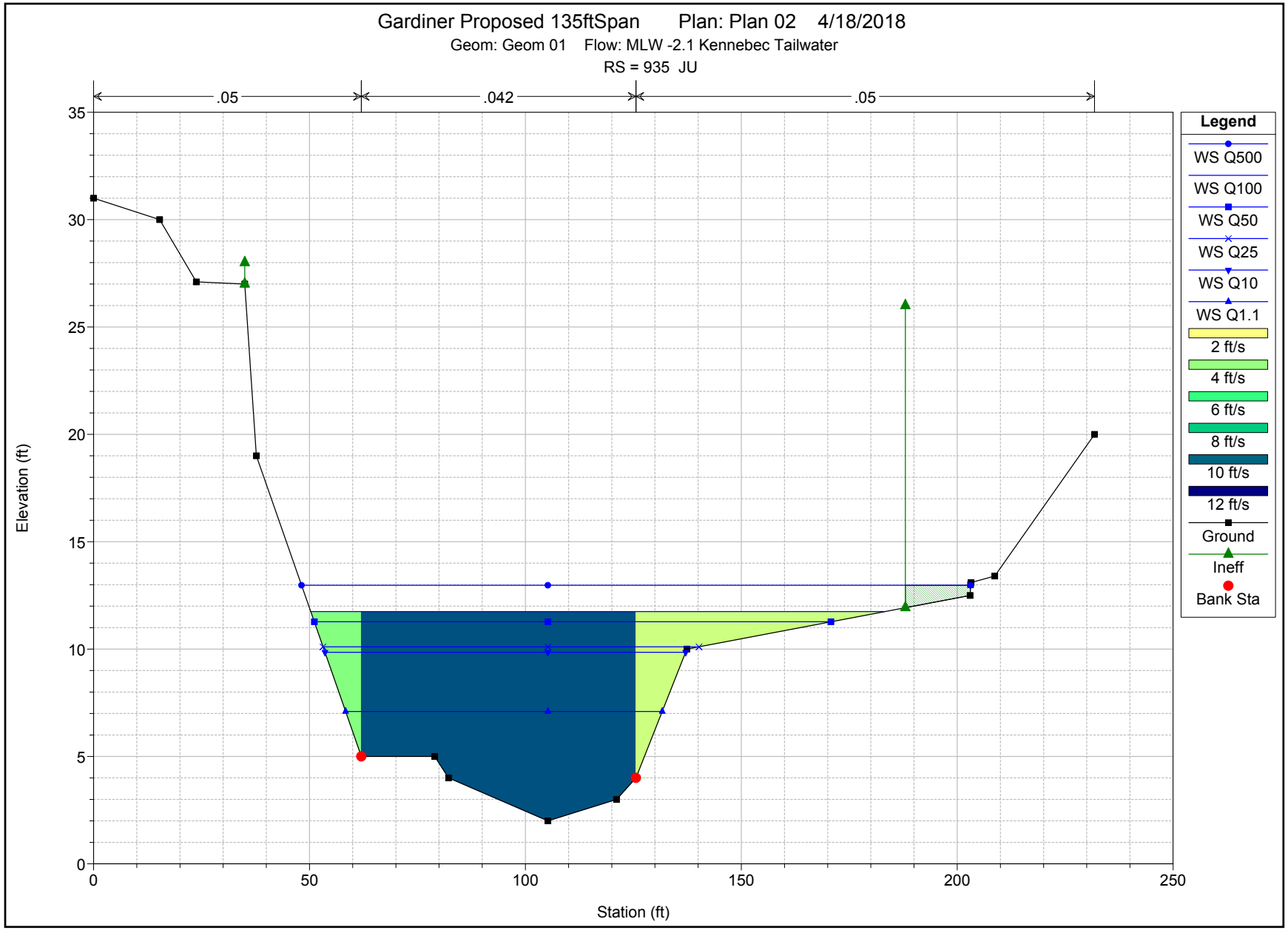

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1455 F
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

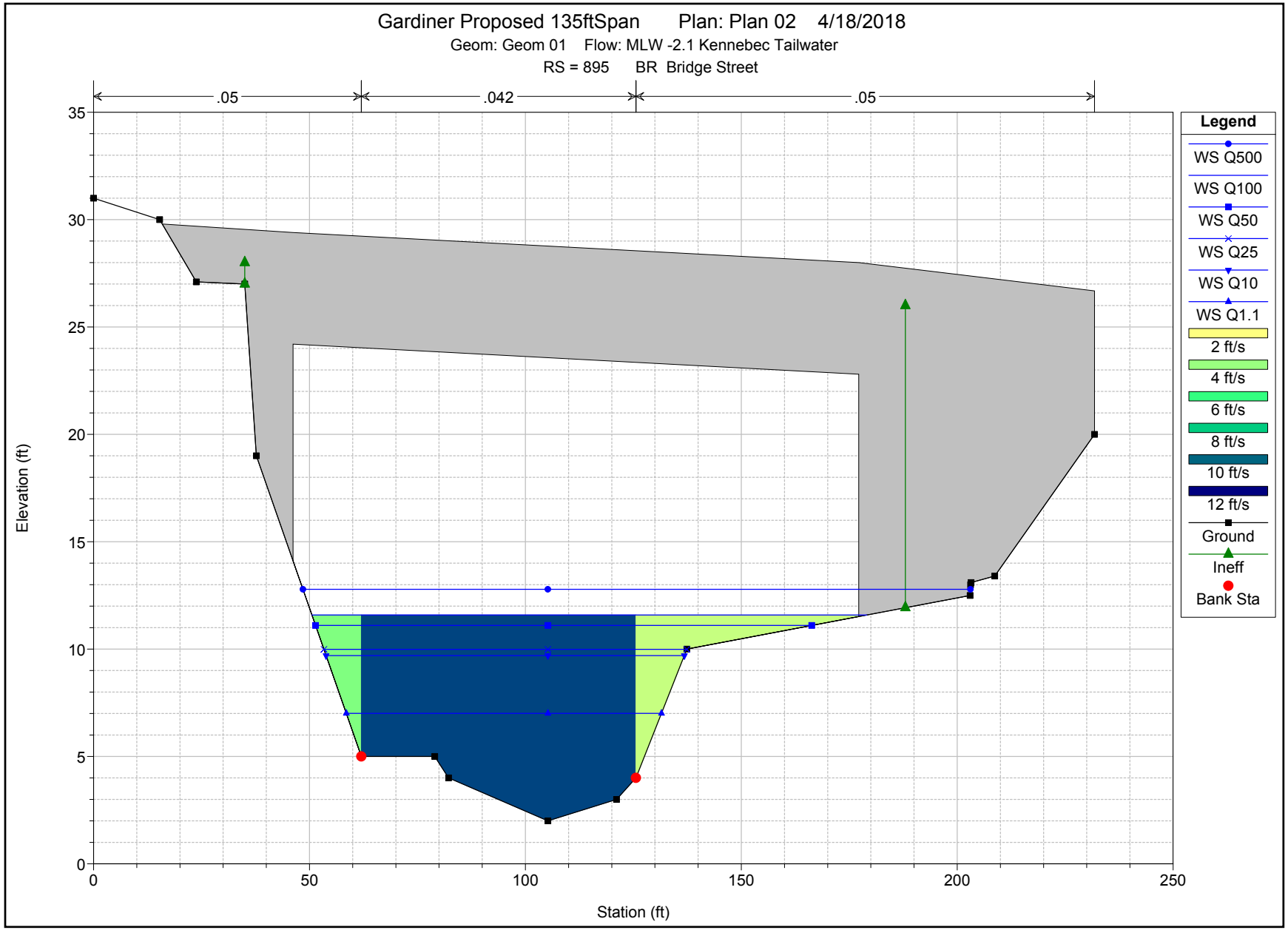

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1335 E
.065
.045
.075
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

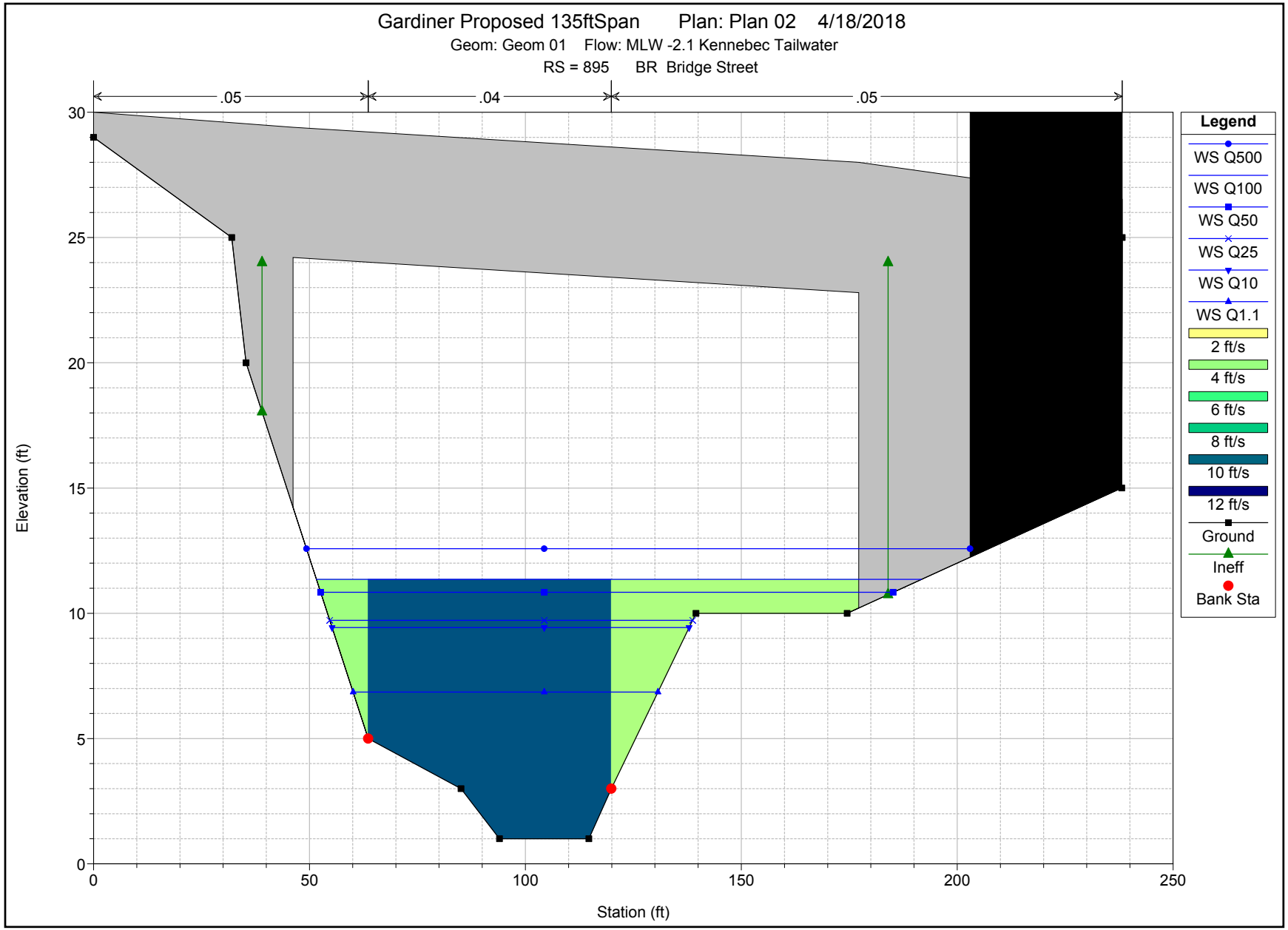

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1185 D
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

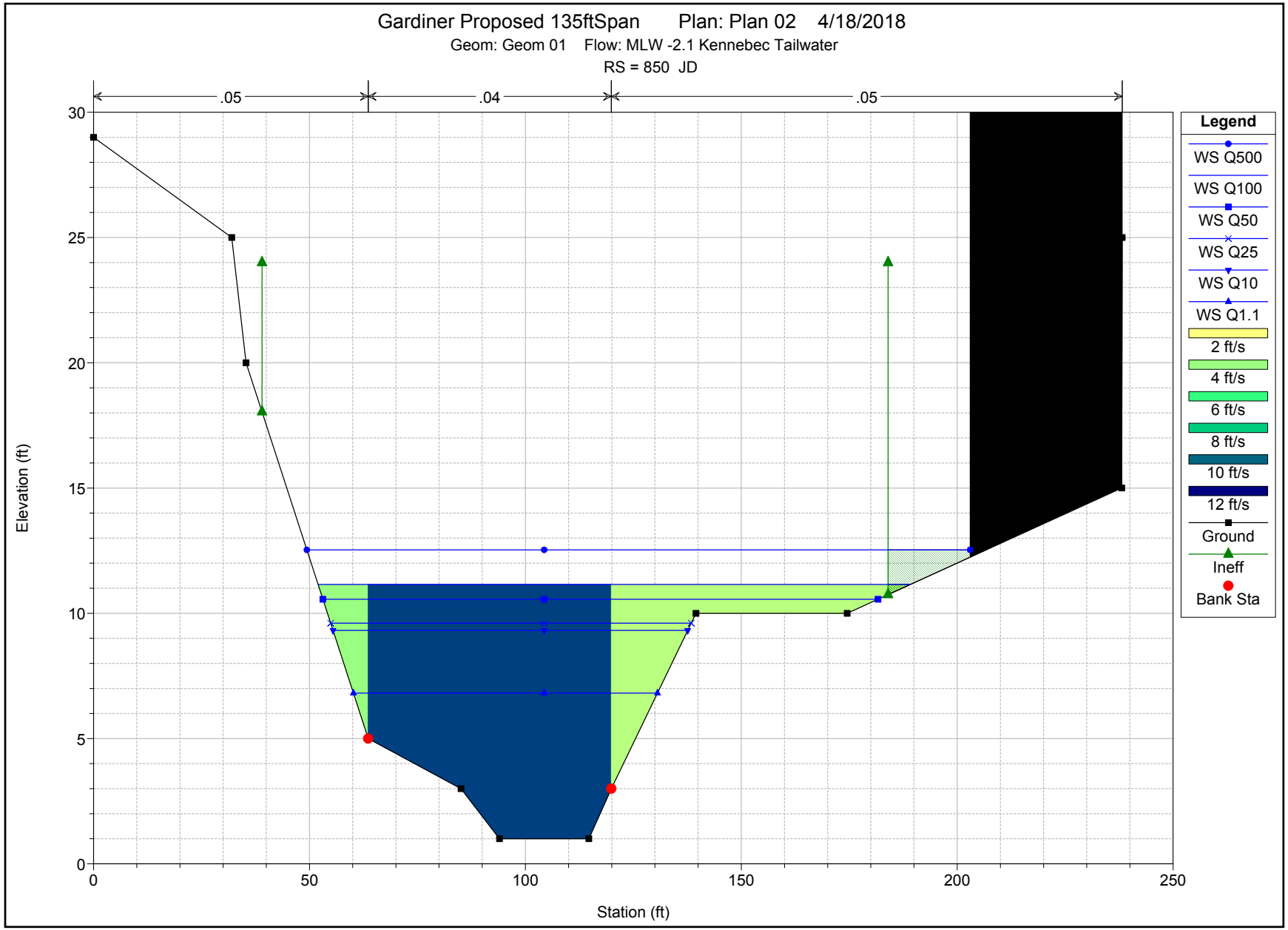

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 1060 C
.065
.04
.07
Elevation (ft)
Station (ft)
35
30
25
20
15
10
5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

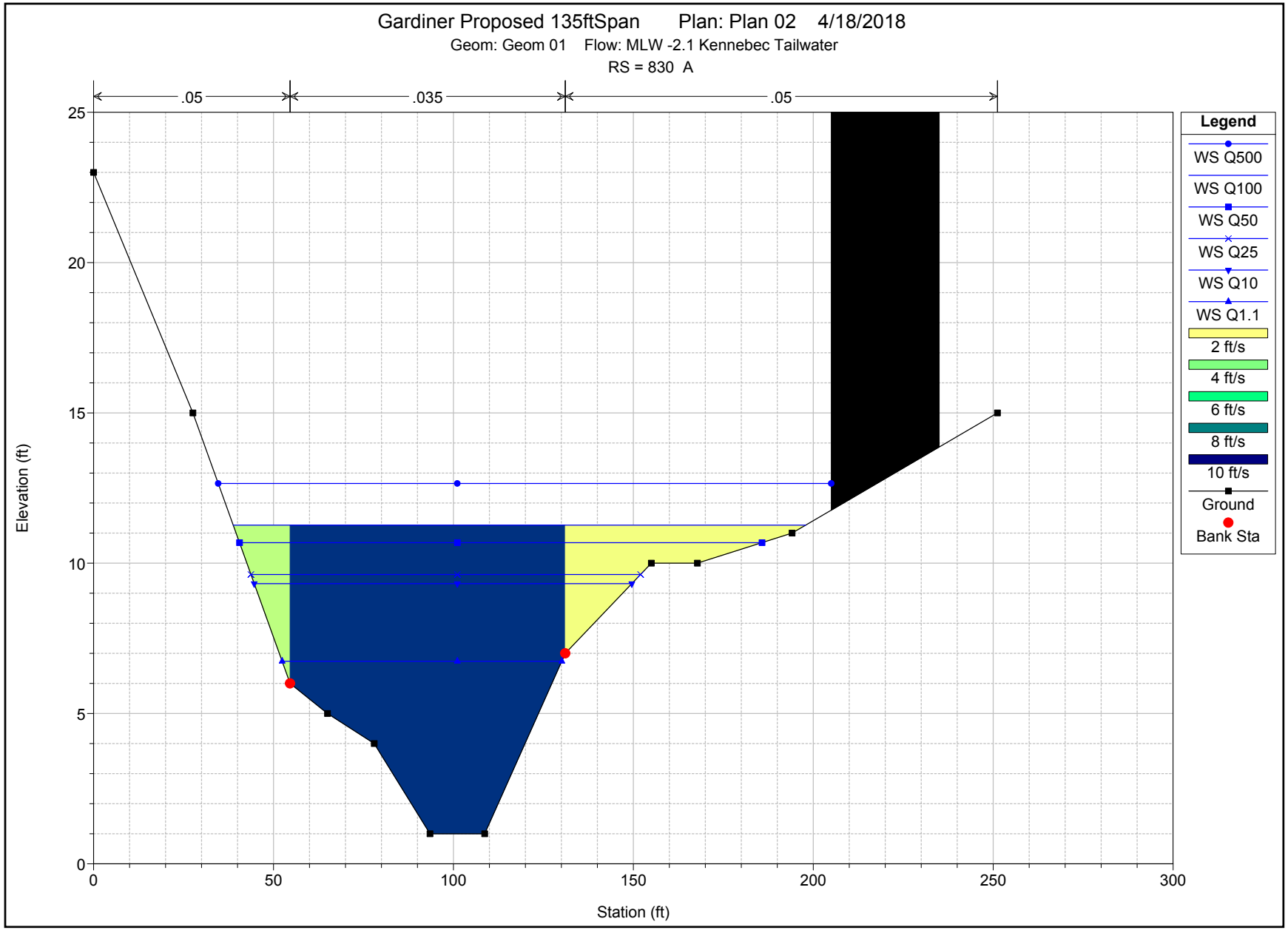

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 960 B
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

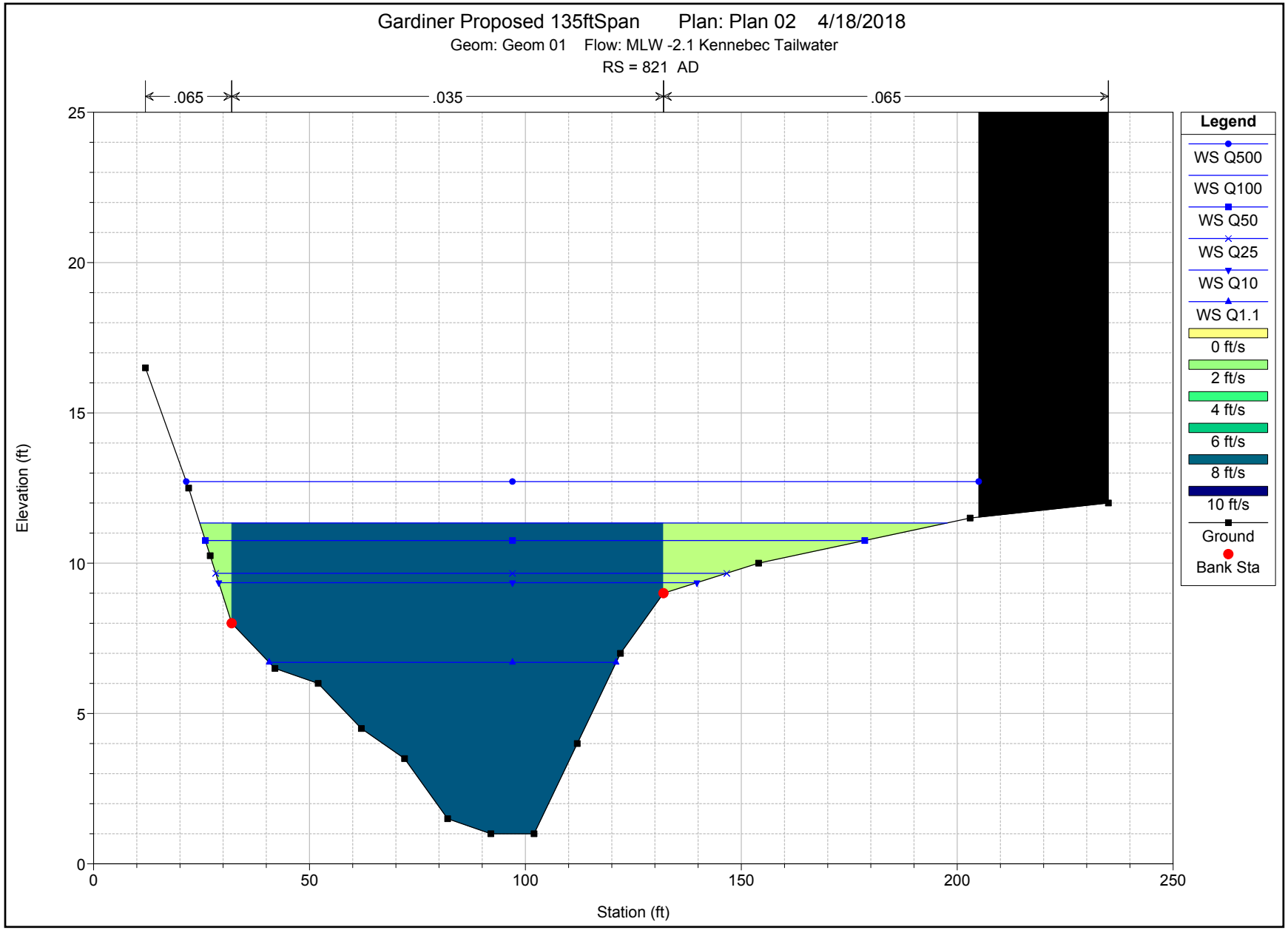

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 935 JU
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

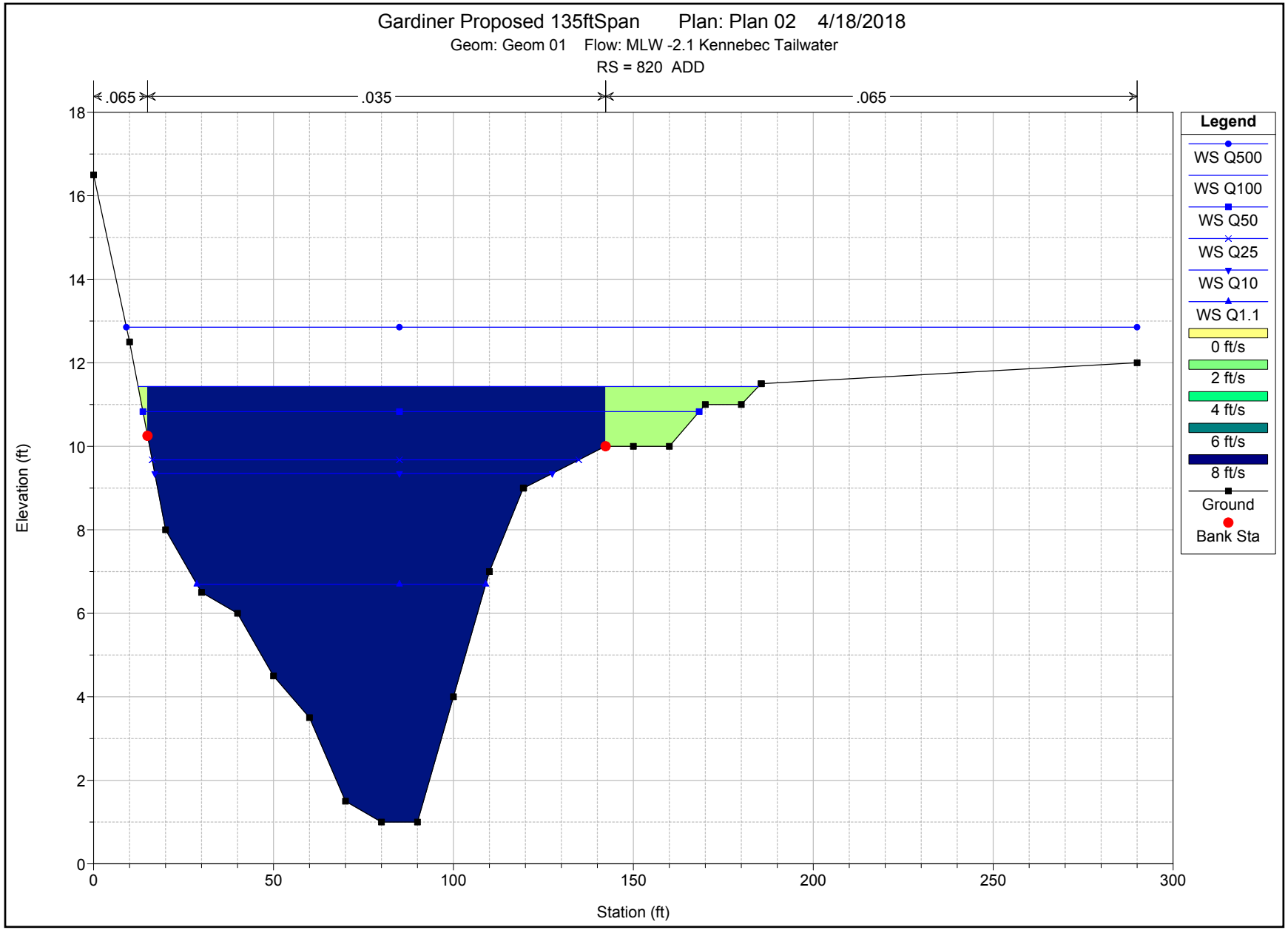

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 895 BR Bridge Street
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

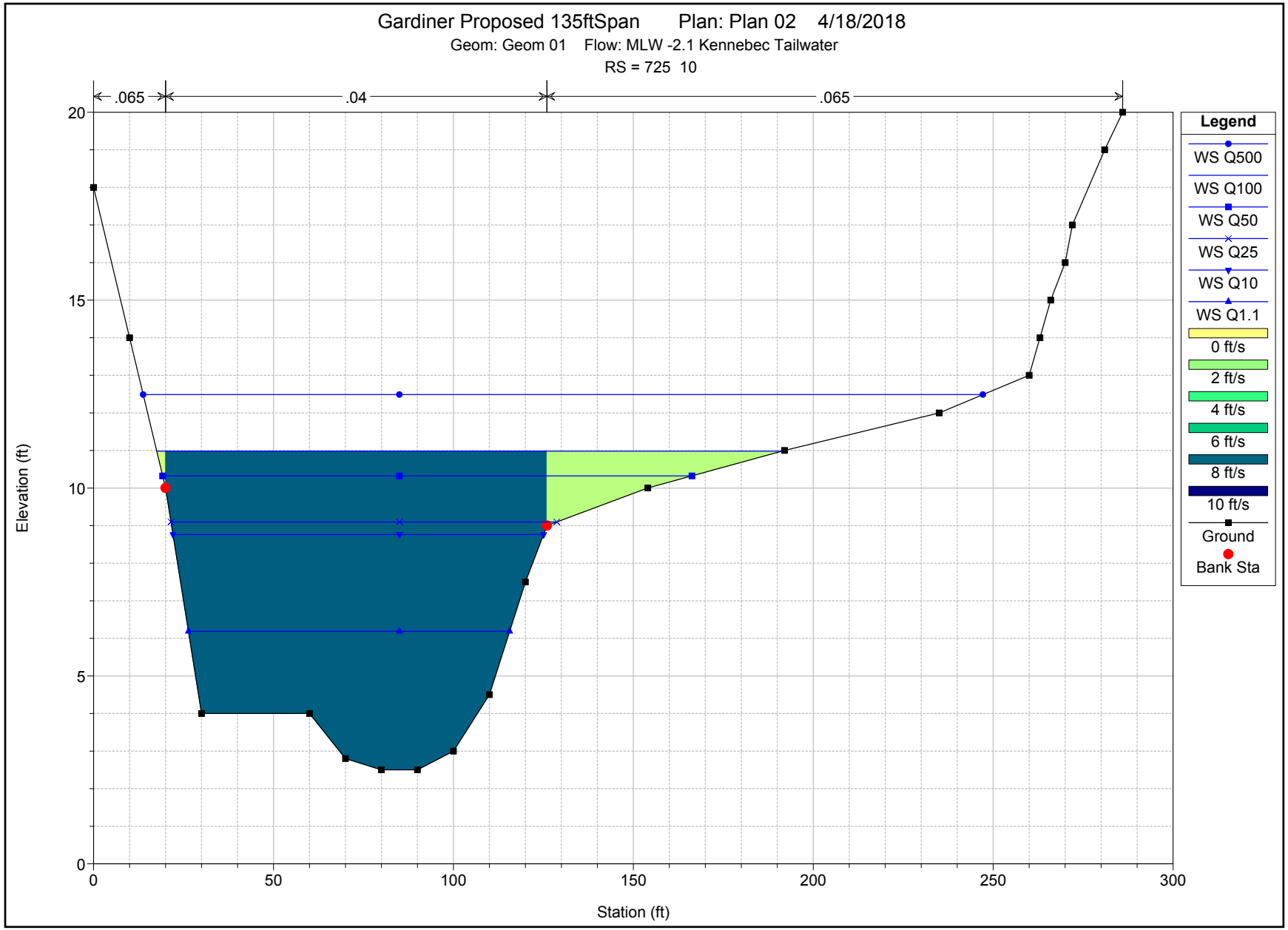

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 895 BR Bridge Street
.05
.04
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

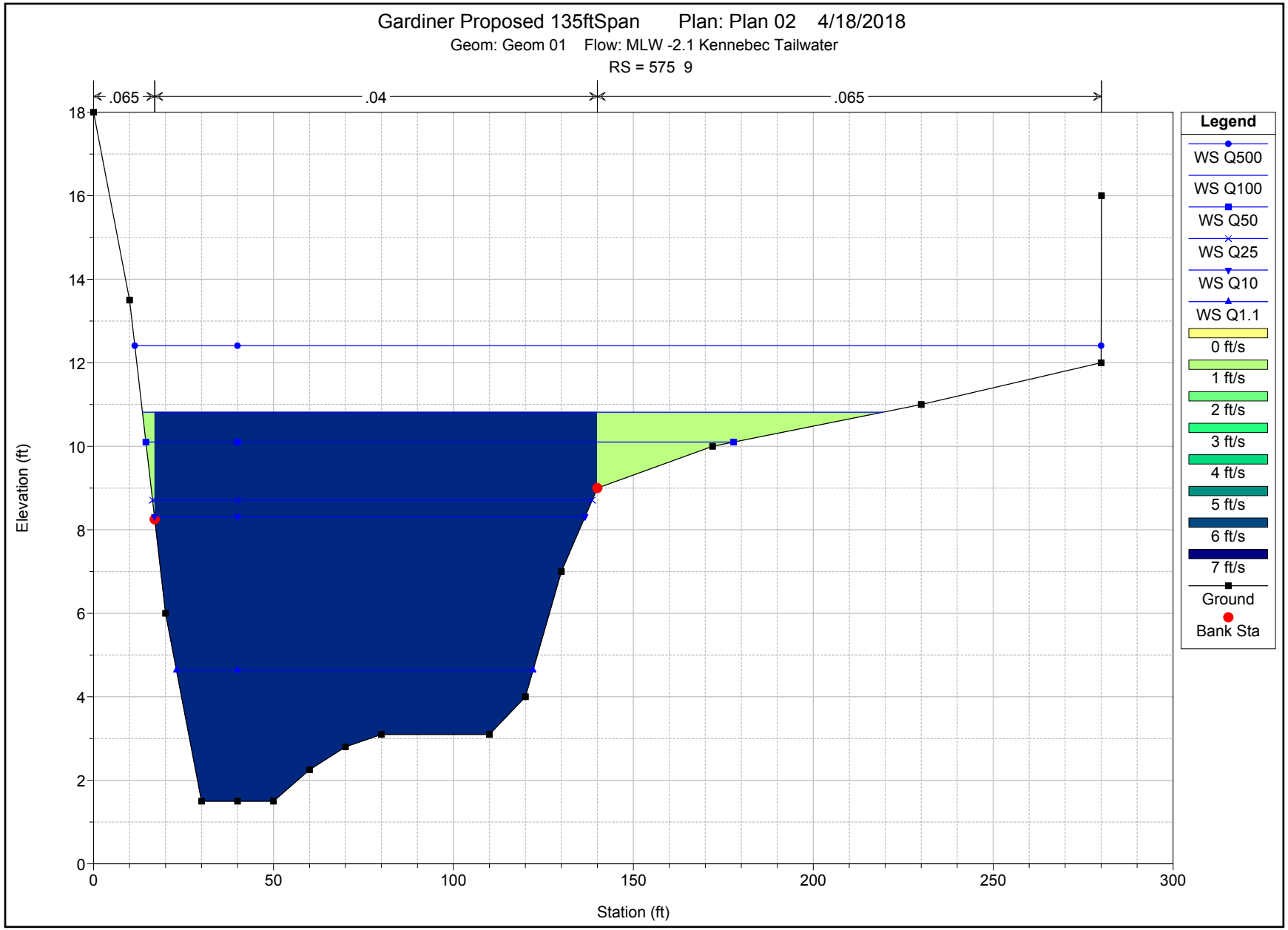

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 850 JD
.05
.04
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

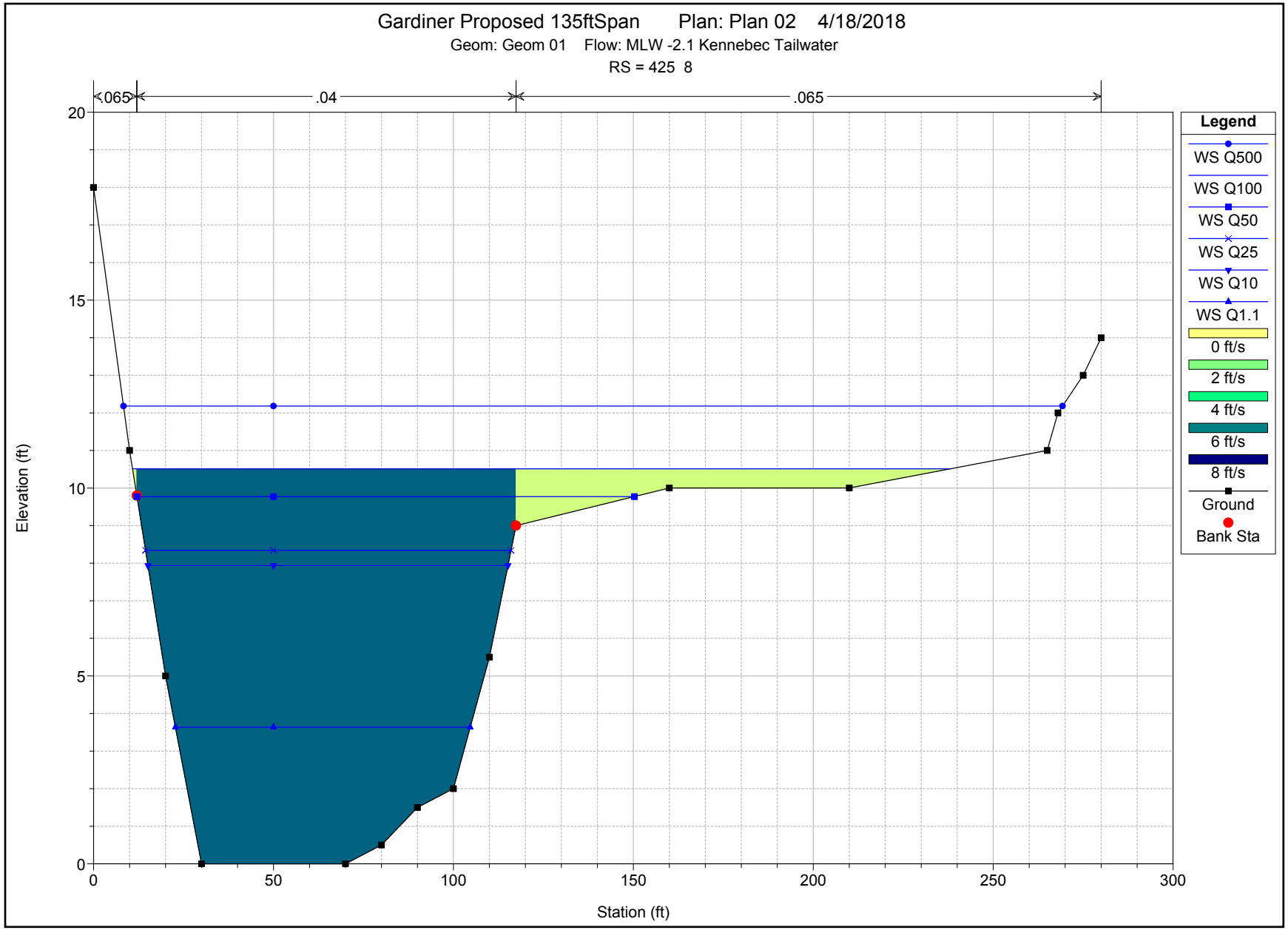

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 830 A
.05
.035
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

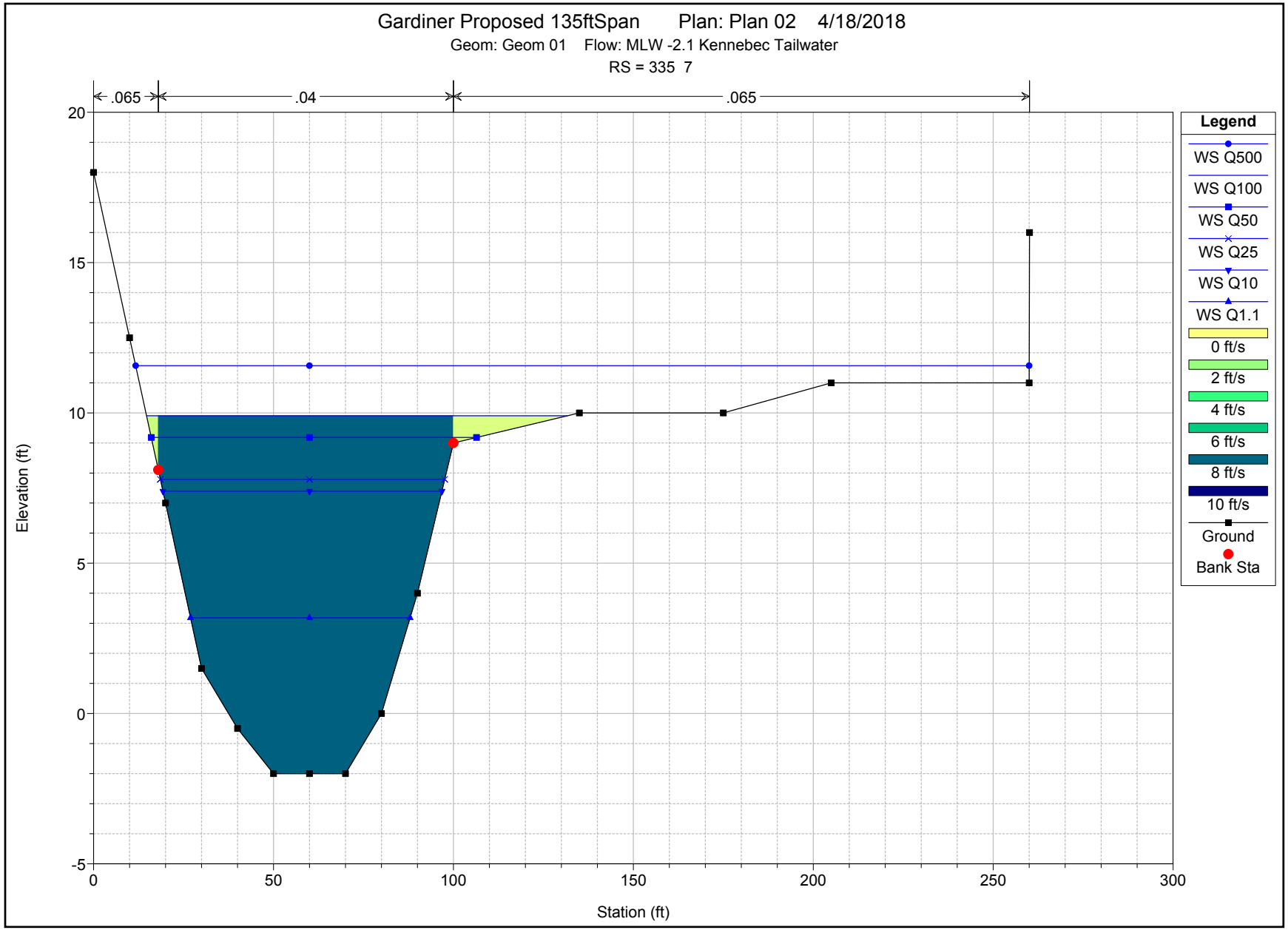

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 821 AD
.065
.035
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

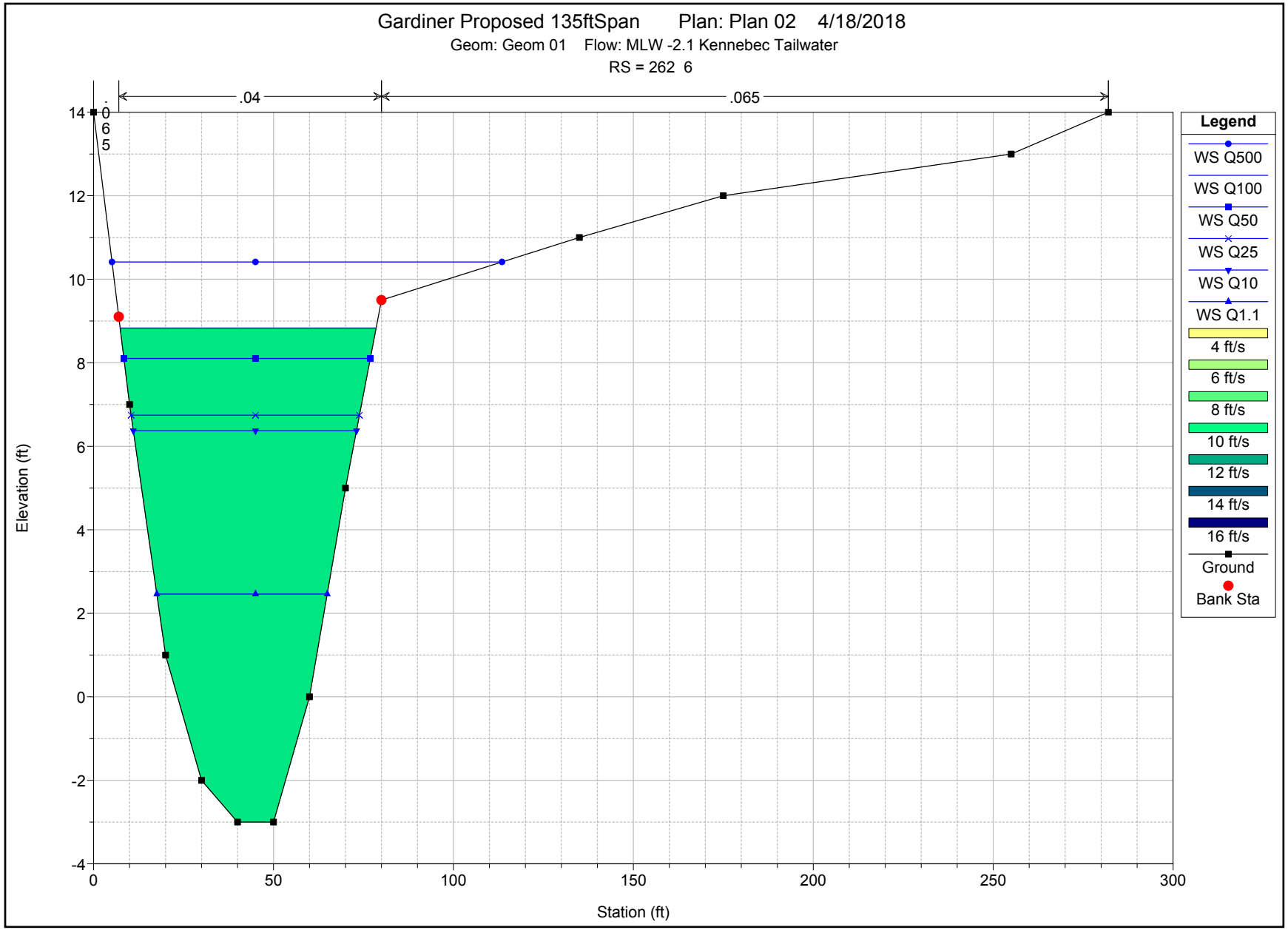

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 820 ADD
.065
.035
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

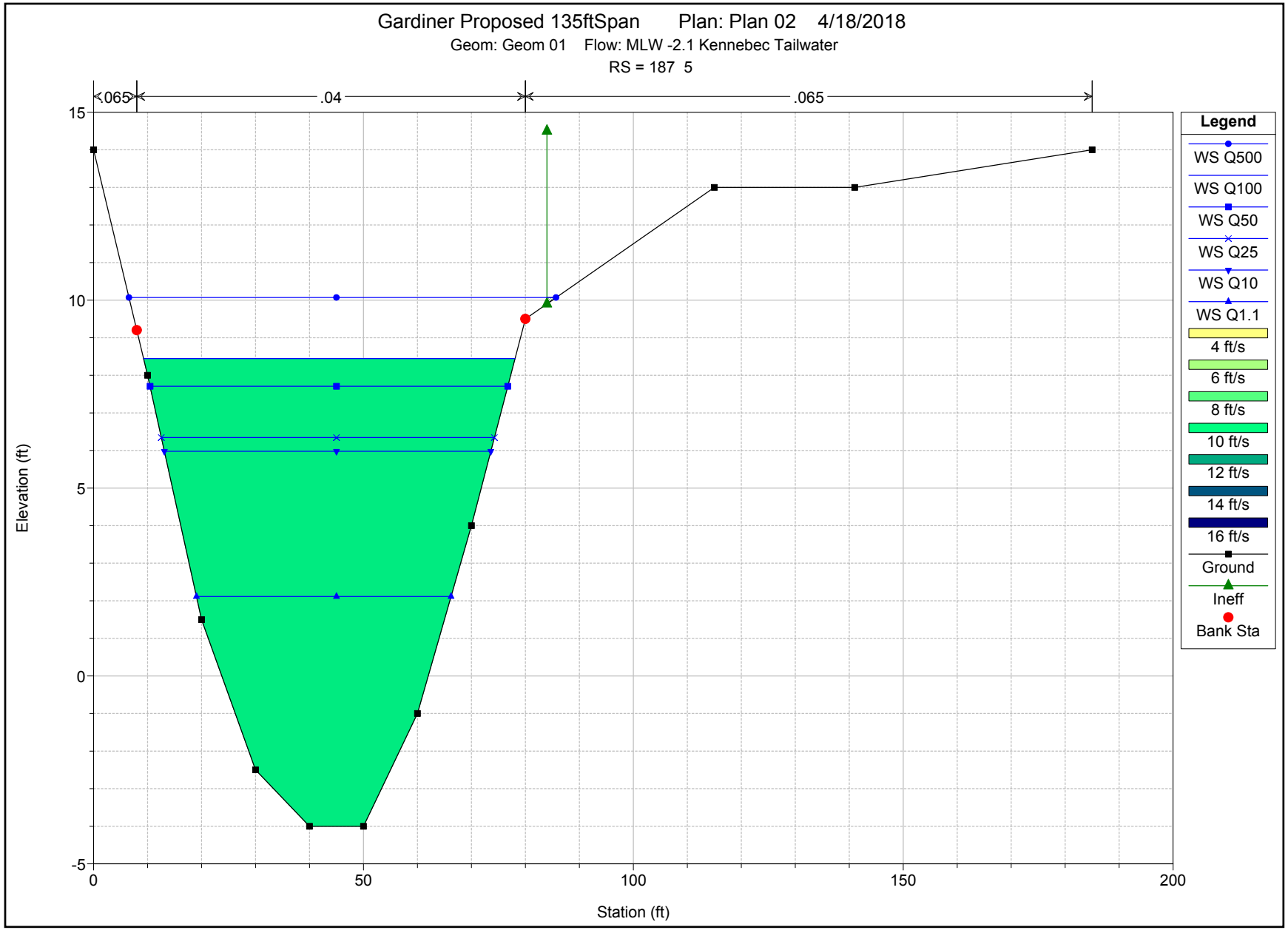

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 725 10
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

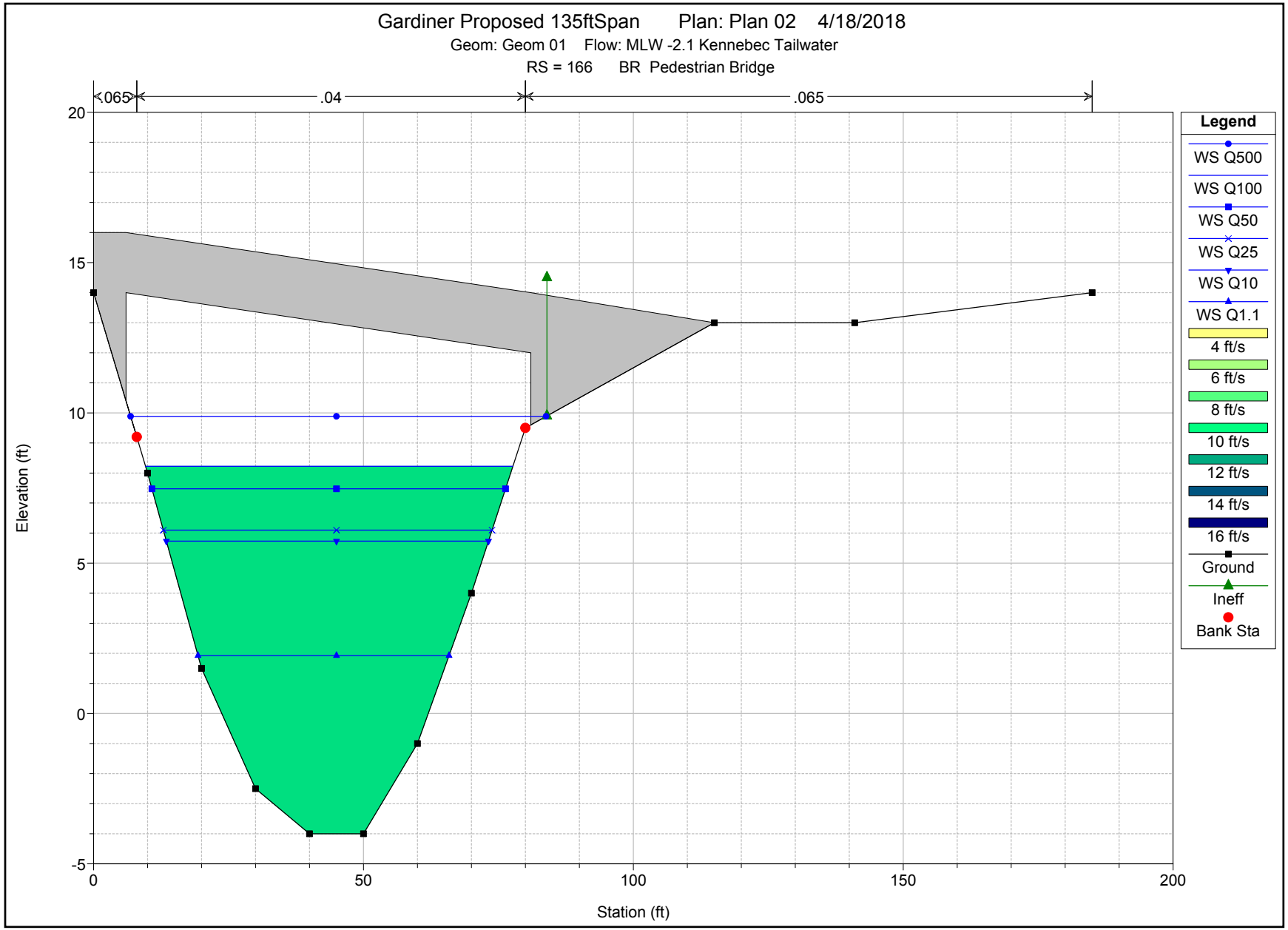

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 575 9
.065
.04
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

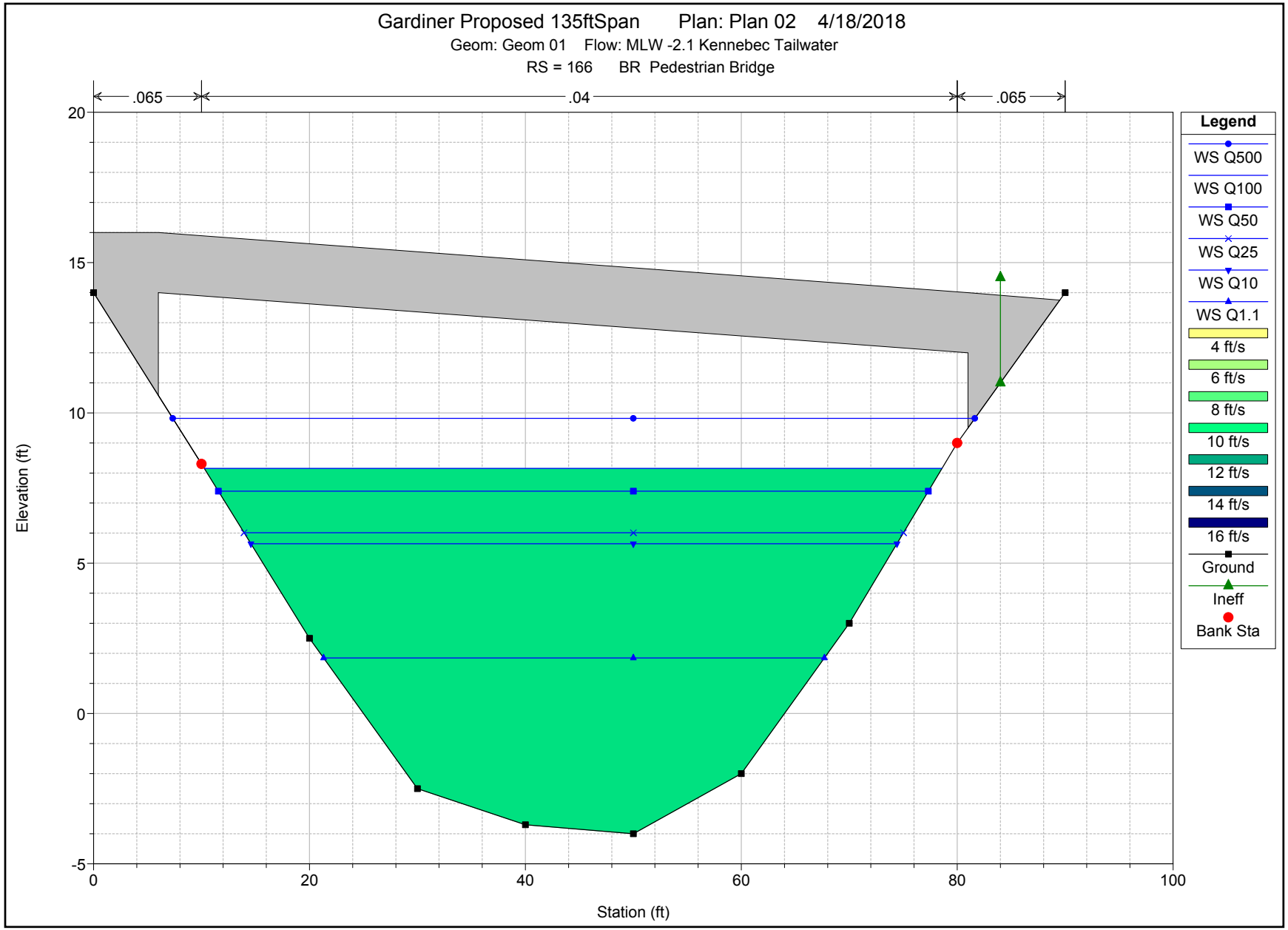

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 425 8
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

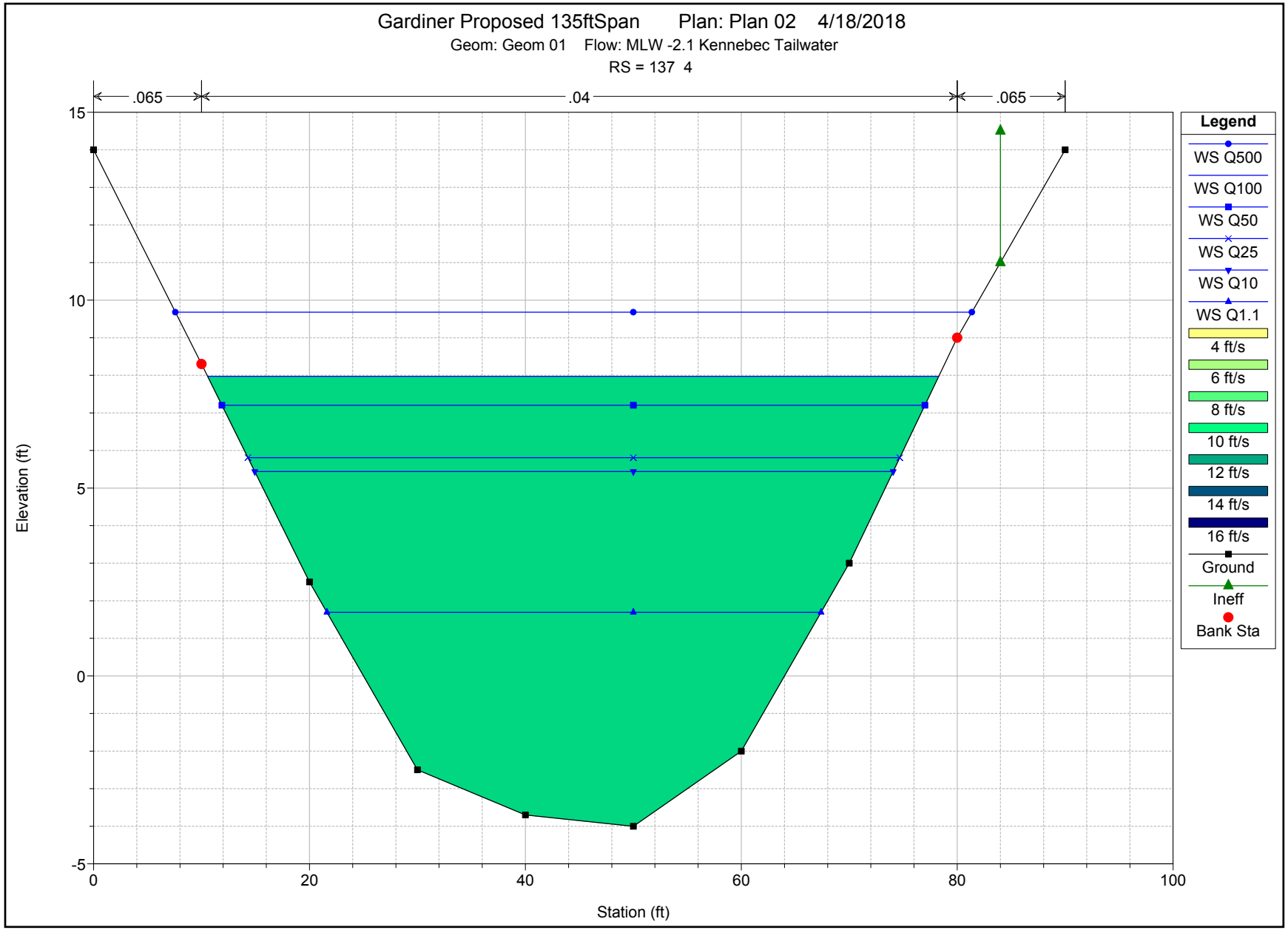

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 335 7
.065
.04
.065
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
250
300

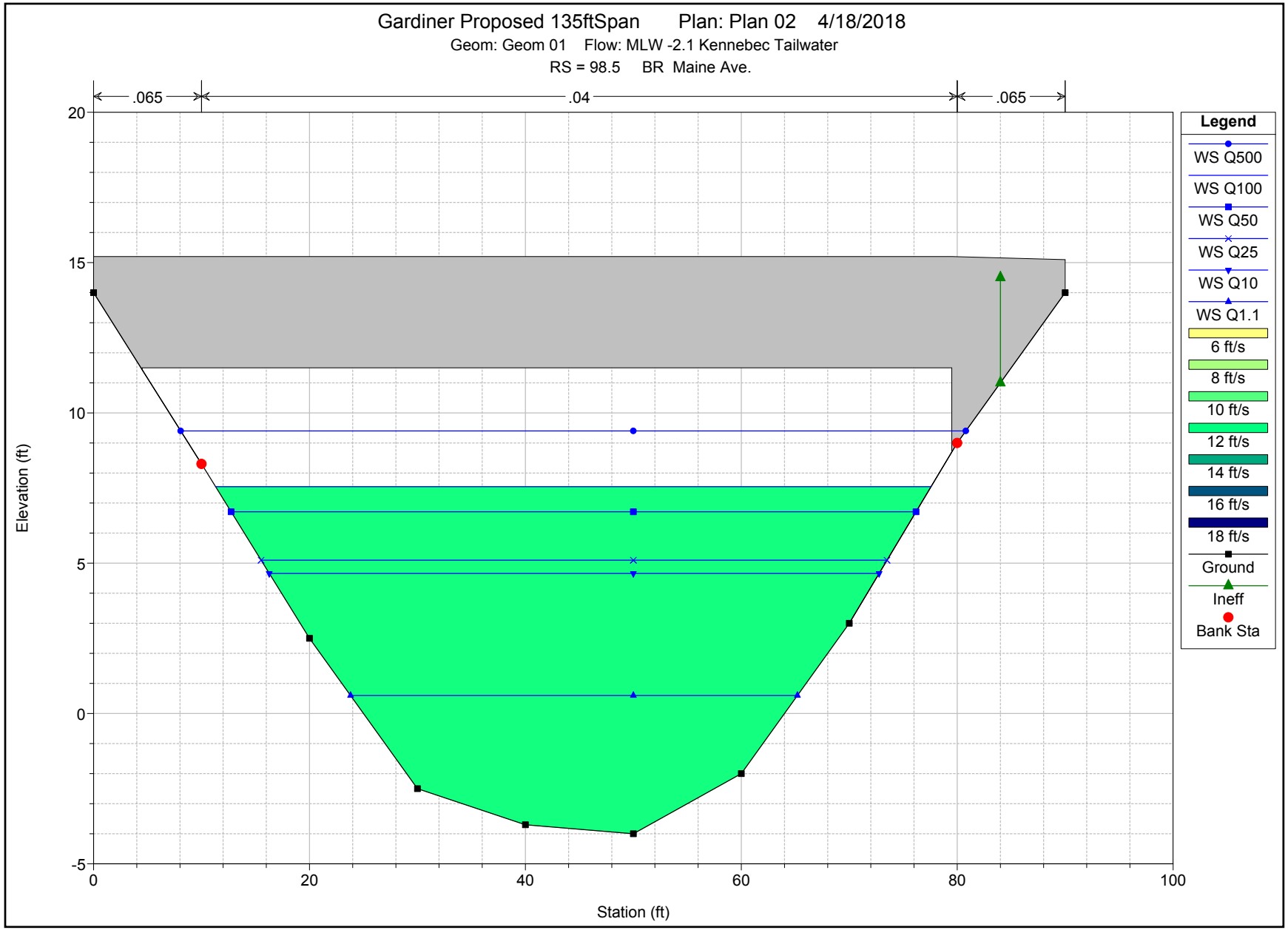

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 262 6
.04
.065
.0
6
5
Elevation (ft)
Station (ft)
14
12
10
8
6
4
2
0
-2
-4
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

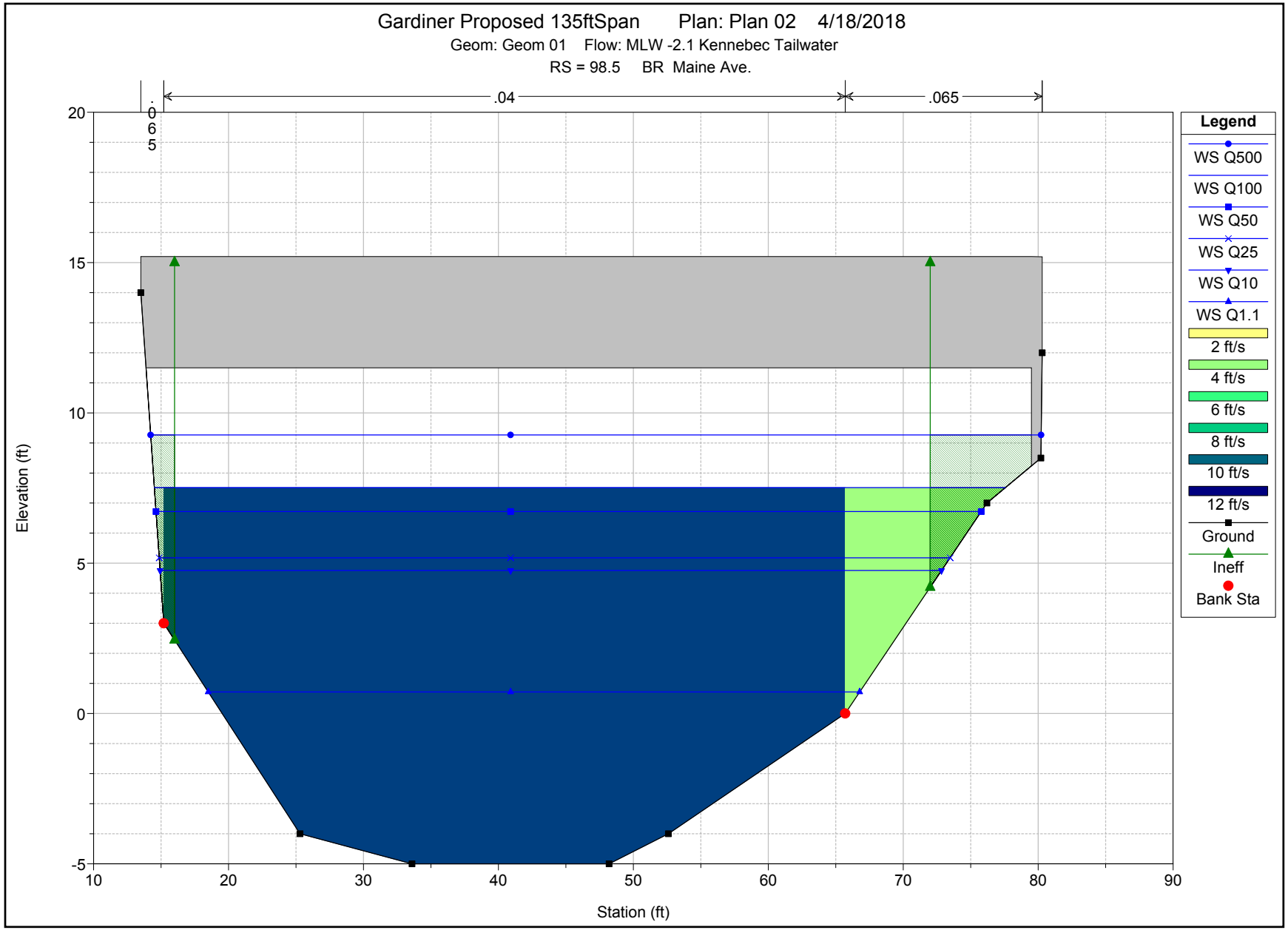

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 187 5
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

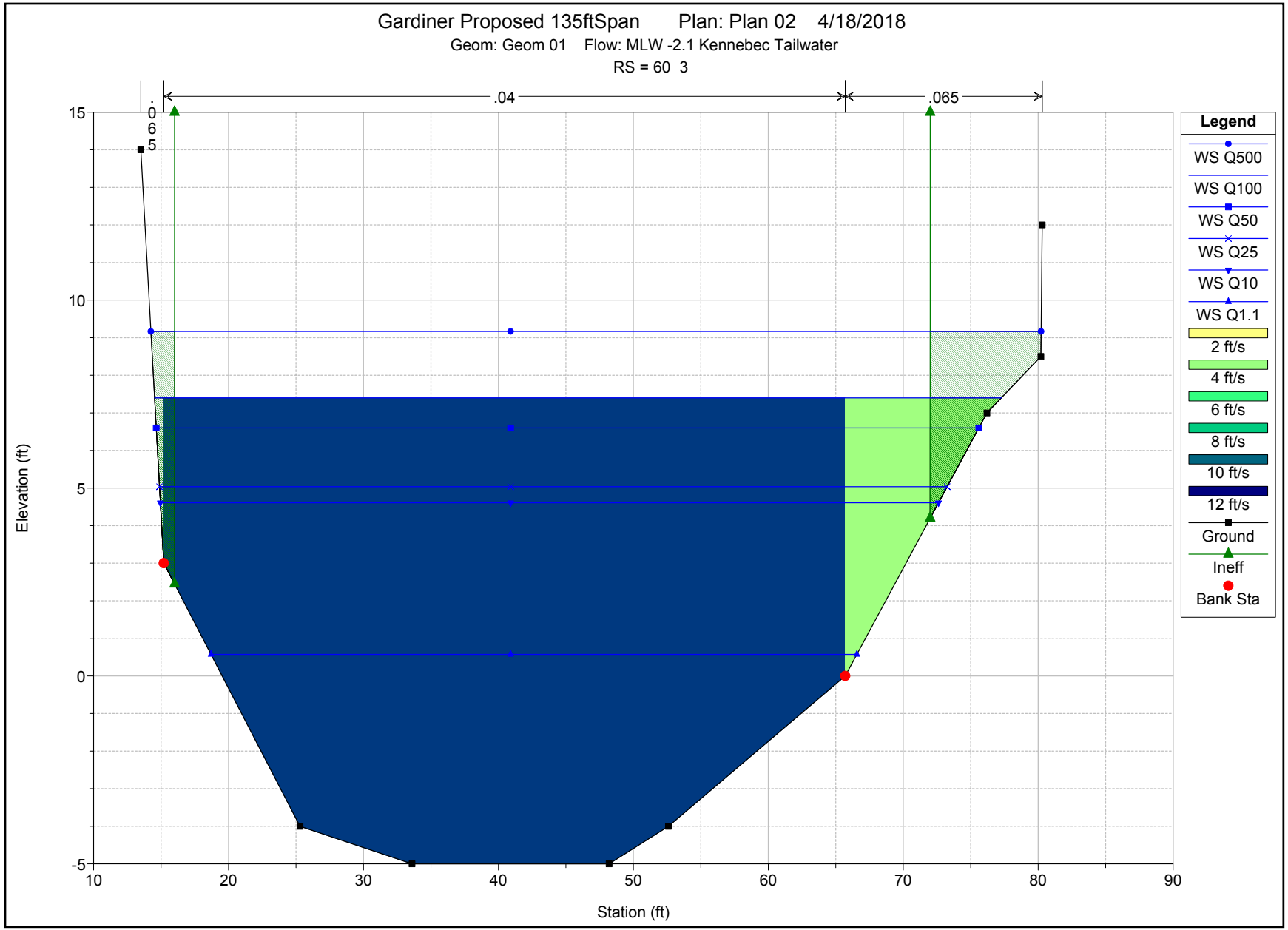

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 166 BR Pedestrian Bridge
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

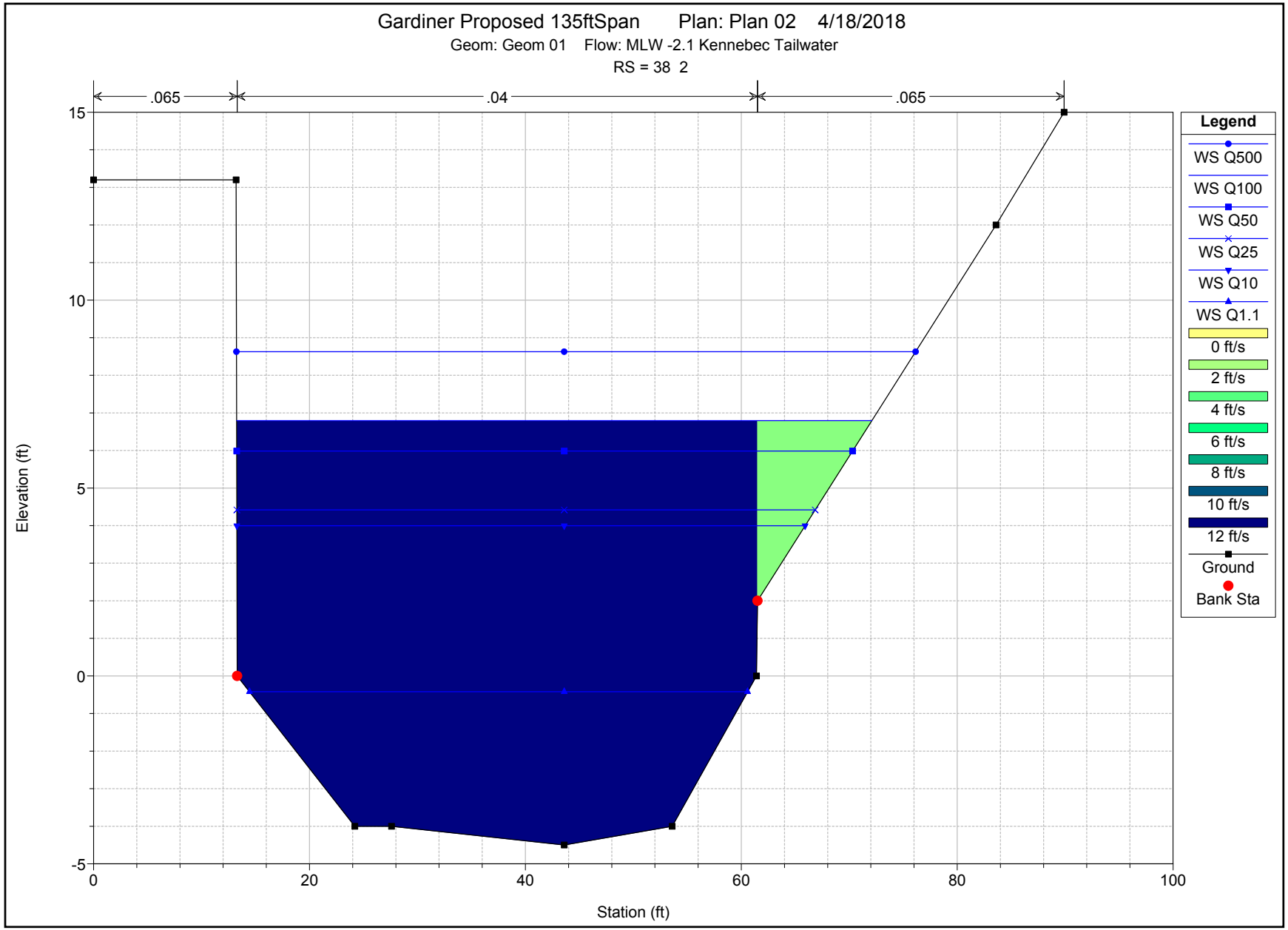

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 166 BR Pedestrian Bridge
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

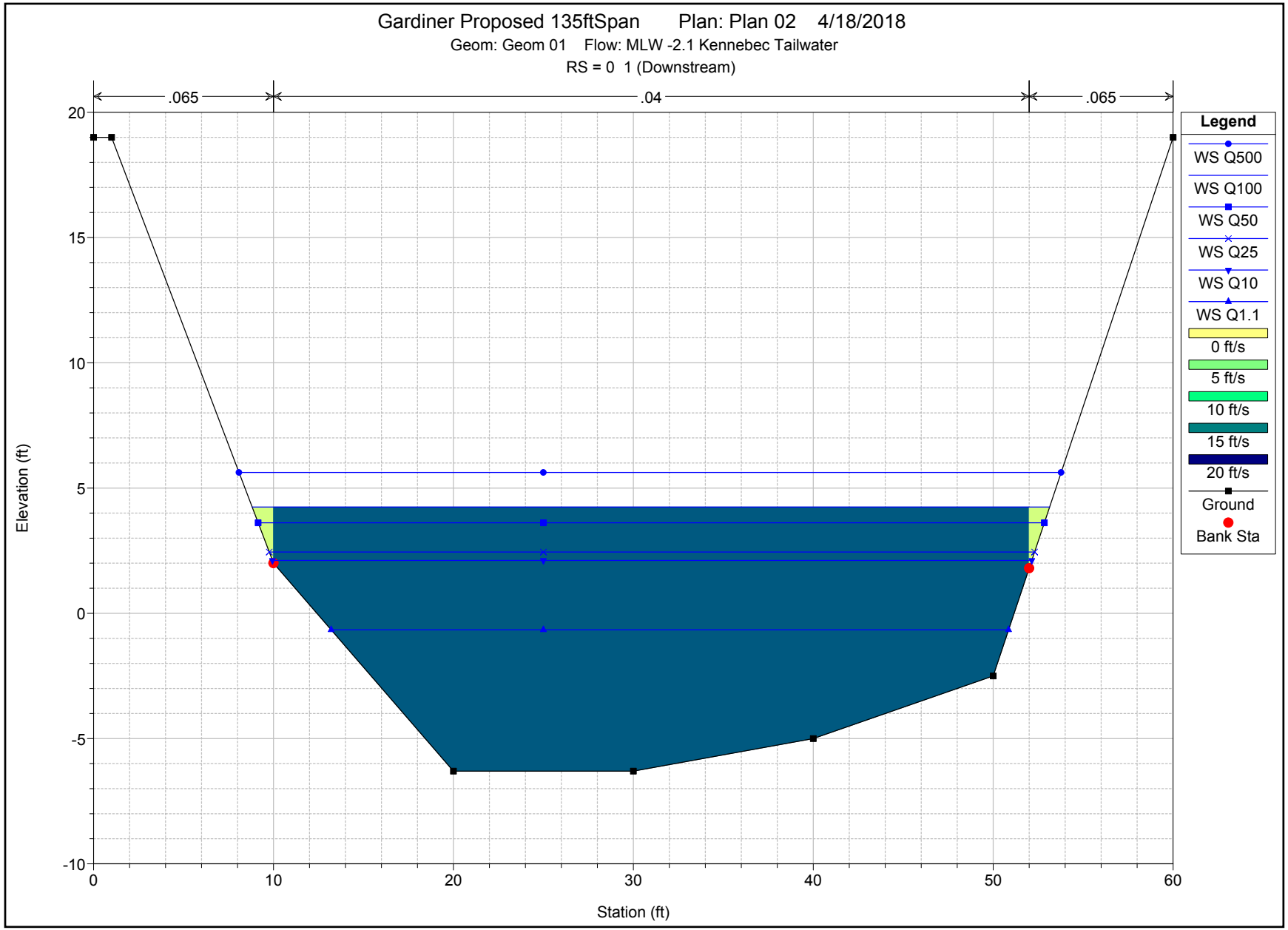

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 137 4
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

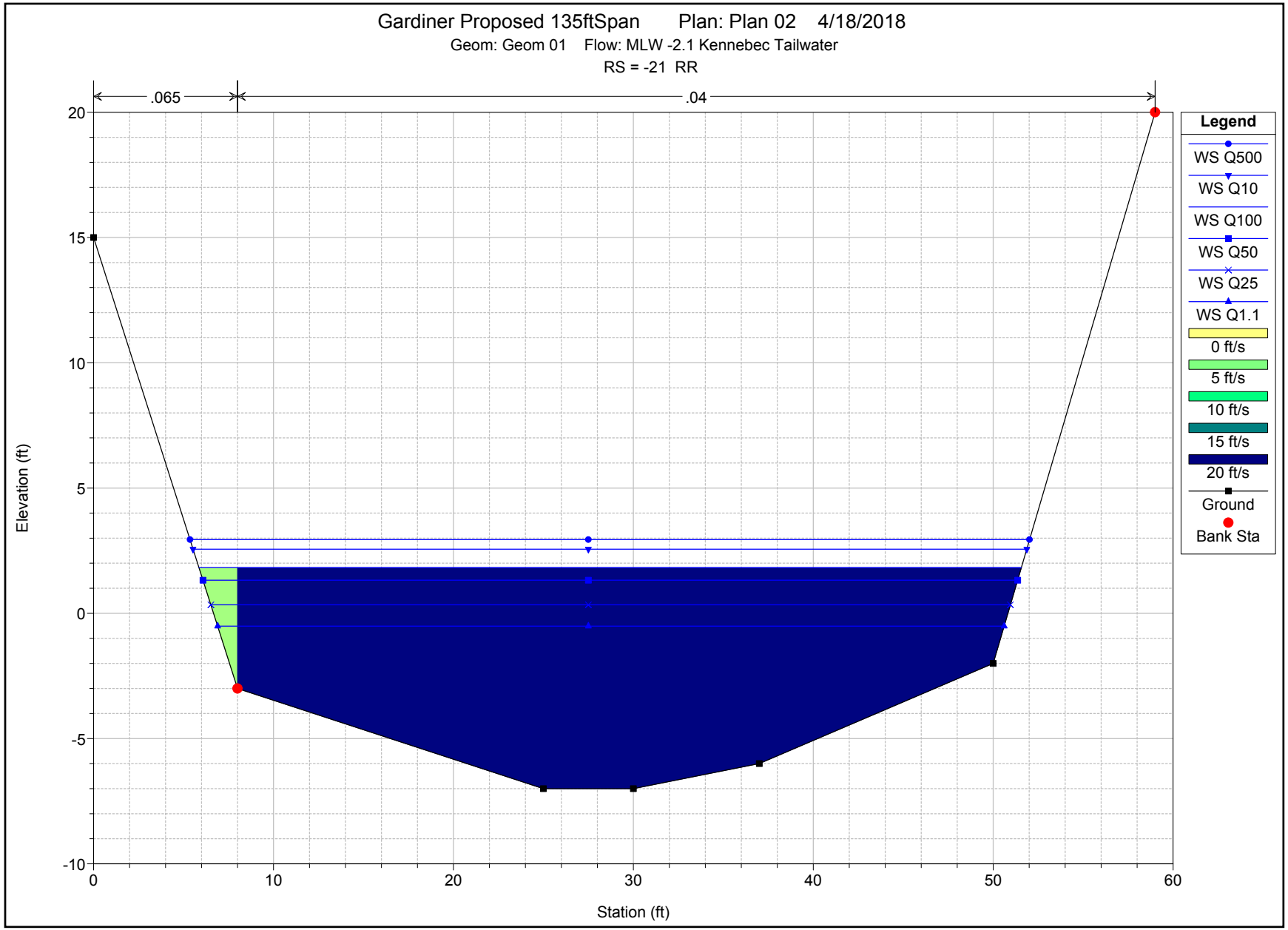

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

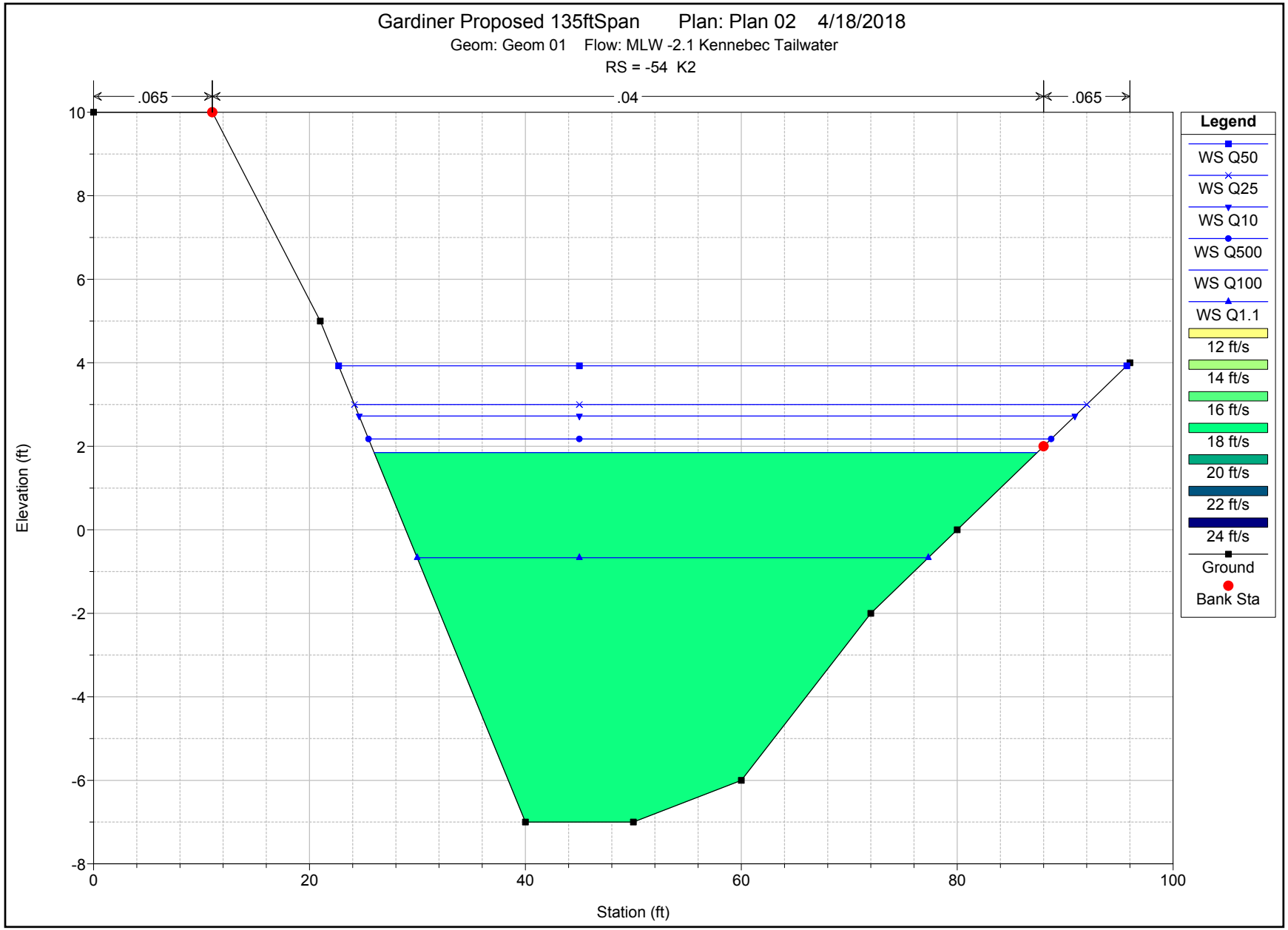

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
10
20
30
40
50
60
70
80
90

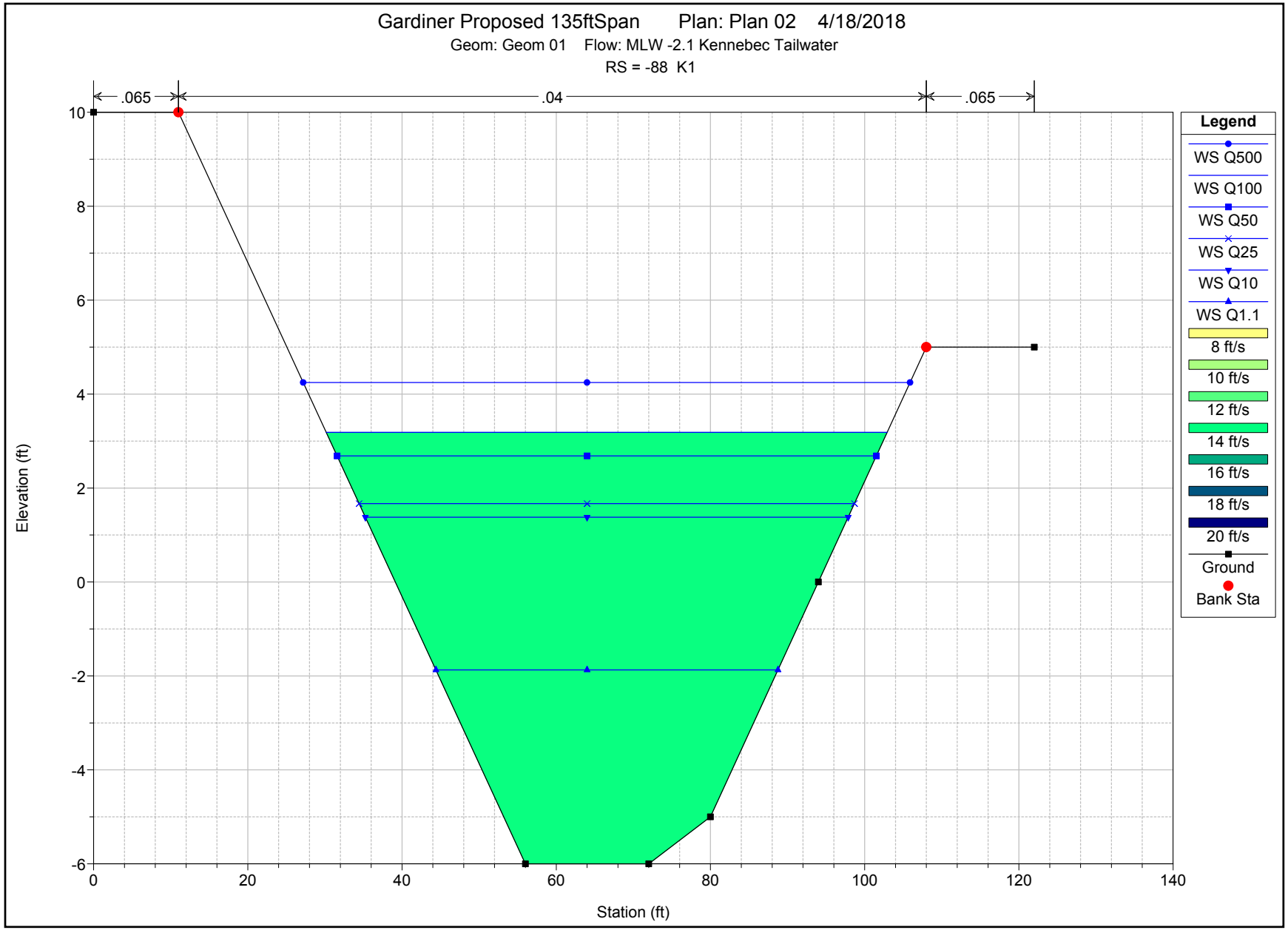

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 60 3
.04
.065
.
0
6
5
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80
90
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

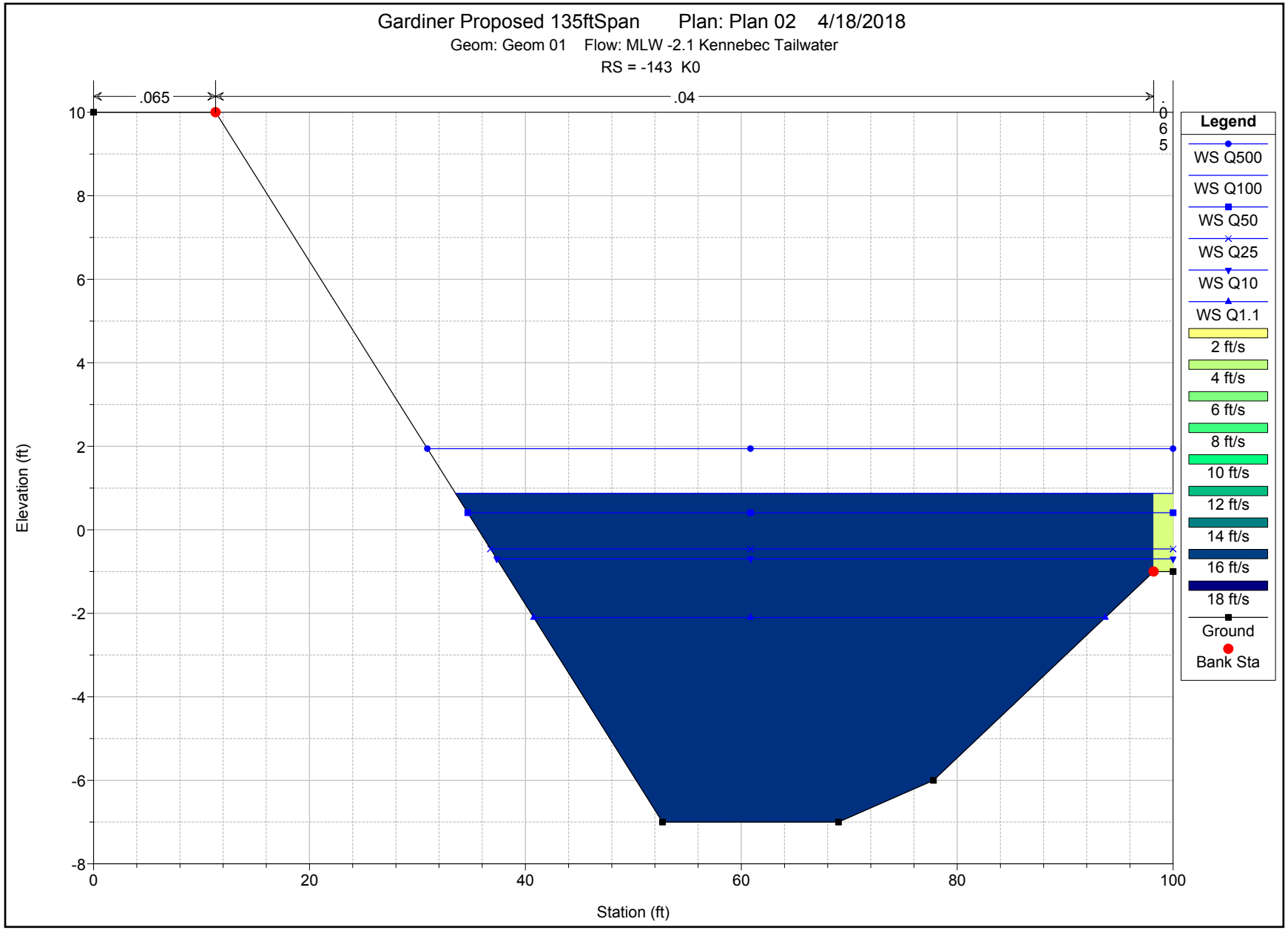

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 38 2
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = 0 1 (Downstream)
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -21 RR
.065
.04
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q10
WS Q100
WS Q50
WS Q25
WS Q1.1
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -54 K2
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q50
WS Q25
WS Q10
WS Q500
WS Q100
WS Q1.1
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -88 K1
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MLW -2.1 Kennebec Tailwater
RS = -143 K0
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
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: Gardiner Proposed 135ftSpan
Project File : GardinerProposed5.prj
Run Date and Time: 4/18/2018 3:01:22 PM

Project in English units

PLAN DATA

Plan Title: Plan 02
Plan File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.p02

Geometry Title: Geom 01
Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.g01

Flow Title : MLW -2.1 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.f03

Plan Summary Information:
Number of: Cross Sections = 27 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 3 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: MLW -2.1 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.f03

Flow Data (cfs)

| River | Reach | RS | Q100 | Q1.1 | Q10 | Q25 | Q50 | Q500 |
|---|---|---|---|---|---|---|---|---|
| Cobosee Stream | Reach 1 | 1700 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |
| Cobosee Stream | Reach 1 | -88 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Cobosee Stream | Reach 1 | Q100 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q1.1 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q10 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q25 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q50 | Critical | Known WS = -2.1 |
| Cobosee Stream | Reach 1 | Q500 | Critical | Known WS = -2.1 |

GEOMETRY DATA

Geometry Title: Geom 01

Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.g01

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1700

INPUT
Description: Upstream (I)
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 40 | 10 | 39.7 | 20 | 39.2 | 30 | 37.2 | 40 | 34.5 |
| 50 | 29 | 60 | 23.5 | 70 | 17.5 | 80 | 15.5 | 90 | 14.5 |
| 100 | 13.8 | 110 | 14.2 | 120 | 14.8 | 130 | 15.7 | 140 | 19 |
| 150 | 25 | 160 | 31 | 170 | 33.3 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 60 | .04 | 150 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 60 | 150 | 65 | 65 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.48 | Element | | | |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.75 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 21.32 | Flow Area (sq ft) | | 559.56 | |
| E.G. Slope (ft/ft) | 0.006899 | Area (sq ft) | | 559.56 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 84.99 | Top Width (ft) | | 84.99 | |
| Vel Total (ft/s) | 10.56 | Avg. Vel. (ft/s) | | 10.56 | |
| Max Chl Dpth (ft) | 8.95 | Hydr. Depth (ft) | | 6.58 | |
| Conv. Total (cfs) | 71151.3 | Conv. (cfs) | | 71151.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 88.36 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.73 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.19 | 24.29 | 1.09 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.10 | 3.40 | 1.11 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.04 | Element | | | |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 18.54 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 17.33 | Flow Area (sq ft) | | 231.75 | |
| E.G. Slope (ft/ft) | 0.004837 | Area (sq ft) | | 231.75 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 70.35 | Top Width (ft) | | 70.35 | |
| Vel Total (ft/s) | 5.66 | Avg. Vel. (ft/s) | | 5.66 | |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | | 3.29 | |
| Conv. Total (cfs) | 18865.3 | Conv. (cfs) | | 18865.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 71.44 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 0.98 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.51 | Cum Volume (acre-ft) | 0.01 | 8.04 | 0.04 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 2.70 | 0.03 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.15 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 19.81 | Flow Area (sq ft) | | 428.08 | |
| E.G. Slope (ft/ft) | 0.006488 | Area (sq ft) | | 428.08 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 79.67 | Top Width (ft) | | 79.67 | |
| Vel Total (ft/s) | 8.99 | Avg. Vel. (ft/s) | | 8.99 | |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 47797.5 | Conv. (cfs) | | 47797.5 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 82.15 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.11 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.07 | 17.49 | 0.16 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 3.21 | 0.07 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.73 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.40 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.05 | Flow Area (sq ft) | | 447.72 | |
| E.G. Slope (ft/ft) | 0.006586 | Area (sq ft) | | 447.72 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 80.49 | Top Width (ft) | | 80.49 | |
| Vel Total (ft/s) | 9.26 | Avg. Vel. (ft/s) | | 9.26 | |
| Max Chl Dpth (ft) | 7.60 | Hydr. Depth (ft) | | 5.56 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 51113.2 | Conv. (cfs) | | 51113.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 83.10 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.08 | 18.48 | 0.18 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 3.26 | 0.08 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.28 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.89 | Flow Area (sq ft) | | 519.99 | |
| E.G. Slope (ft/ft) | 0.006865 | Area (sq ft) | | 519.99 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 83.43 | Top Width (ft) | | 83.43 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 63848.2 | Conv. (cfs) | | 63848.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 86.53 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.14 | 22.37 | 0.52 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.07 | 3.37 | 0.56 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.00 | Wt. n-Val. | 0.070 | 0.040 | |
| W.S. Elev (ft) | 23.79 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 22.27 | Flow Area (sq ft) | 0.08 | 649.67 | |
| E.G. Slope (ft/ft) | 0.006886 | Area (sq ft) | 0.08 | 649.67 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.03 | 7379.97 | |
| Top Width (ft) | 88.50 | Top Width (ft) | 0.52 | 87.98 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 0.44 | 11.36 | |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 0.14 | 7.38 | |
| Conv. Total (cfs) | 88935.3 | Conv. (cfs) | 0.4 | 88934.8 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | 0.60 | 91.84 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | 0.05 | 3.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.50 | Cum Volume (acre-ft) | 0.36 | 28.88 | 3.67 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.16 | 3.46 | 2.01 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1635

INPUT
Description: H
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 23.5 | 40 | 17 |
| 50 | 14 | 60 | 14.5 | 70 | 15 | 80 | 15.2 | 90 | 15.4 |
| 100 | 15.6 | 110 | 15.8 | 115 | 17.9 | 120 | 20 | 130 | 26.5 |
| 140 | 30.1 | 150 | 30.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .045 | 130 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 130 | 80 | 80 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.95 | Element | | | |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 22.26 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.73 | |
| E.G. Slope (ft/ft) | 0.009287 | Area (sq ft) | | 565.73 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 91.56 | Top Width (ft) | | 91.56 | |
| Vel Total (ft/s) | 10.45 | Avg. Vel. (ft/s) | | 10.45 | |
| Max Chl Dpth (ft) | 8.26 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 61328.2 | Conv. (cfs) | | 61328.2 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 95.11 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.90 | Cum Volume (acre-ft) | 0.19 | 23.45 | 1.09 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.10 | 3.27 | 1.11 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.50 | Element | | | |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.92 | |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.015059 | Area (sq ft) | | 181.92 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 75.56 | Top Width (ft) | | 75.56 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 10691.3 | Conv. (cfs) | | 10691.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 76.62 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.04 | Cum Volume (acre-ft) | 0.01 | 7.73 | 0.04 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 2.59 | 0.03 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.47 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 407.41 | |
| E.G. Slope (ft/ft) | 0.010705 | Area (sq ft) | | 407.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 86.08 | Top Width (ft) | | 86.08 | |
| Vel Total (ft/s) | 9.45 | Avg. Vel. (ft/s) | | 9.45 | |
| Max Chl Dpth (ft) | 6.47 | Hydr. Depth (ft) | | 4.73 | |
| Conv. Total (cfs) | 37210.3 | Conv. (cfs) | | 37210.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 88.57 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.07 | 16.87 | 0.16 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 3.09 | 0.07 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 431.49 | |
| E.G. Slope (ft/ft) | 0.010420 | Area (sq ft) | | 431.49 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 86.93 | Top Width (ft) | | 86.93 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 6.75 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 40635.4 | Conv. (cfs) | | 40635.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 89.59 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.13 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.08 | 17.82 | 0.18 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.04 | 3.13 | 0.08 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.36 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 21.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 520.12 | |
| E.G. Slope (ft/ft) | 0.009593 | Area (sq ft) | | 520.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 90.01 | Top Width (ft) | | 90.01 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 7.75 | Hydr. Depth (ft) | | 5.78 | |
| Conv. Total (cfs) | 54011.4 | Conv. (cfs) | | 54011.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 93.26 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.91 | Cum Volume (acre-ft) | 0.14 | 21.59 | 0.52 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.07 | 3.24 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.89 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 23.37 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 669.19 | |
| E.G. Slope (ft/ft) | 0.008748 | Area (sq ft) | | 669.19 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 94.97 | Top Width (ft) | | 94.97 | |
| Vel Total (ft/s) | 11.03 | Avg. Vel. (ft/s) | | 11.03 | |
| Max Chl Dpth (ft) | 9.37 | Hydr. Depth (ft) | | 7.05 | |
| Conv. Total (cfs) | 78902.3 | Conv. (cfs) | | 78902.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 99.18 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | 0.36 | 27.90 | 3.67 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.16 | 3.32 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1555

INPUT
Description: G
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 21.5 | 40 | 15 |
| 50 | 13.8 | 60 | 13.6 | 70 | 13.3 | 80 | 13.5 | 90 | 13.5 |
| 100 | 14.5 | 110 | 19 | 120 | 26 | 130 | 29 | 140 | 29.5 |
| 150 | 29.9 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .042 | 120 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 120 | 100 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.62 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 20.34 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 20.16 | Flow Area (sq ft) | | 455.11 | |
| E.G. Slope (ft/ft) | 0.013986 | Area (sq ft) | | 455.11 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 80.13 | Top Width (ft) | | 80.13 | |
| Vel Total (ft/s) | 12.99 | Avg. Vel. (ft/s) | | 12.99 | |
| Max Chl Dpth (ft) | 7.04 | Hydr. Depth (ft) | | 5.68 | |
| Conv. Total (cfs) | 49972.8 | Conv. (cfs) | | 49972.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 83.24 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.77 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.37 | Cum Volume (acre-ft) | 0.19 | 22.51 | 1.09 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.10 | 3.11 | 1.11 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 16.65 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.93 | |
| E.G. Slope (ft/ft) | 0.011277 | Area (sq ft) | | 181.93 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 67.33 | Top Width (ft) | | 67.33 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.35 | Hydr. Depth (ft) | | 2.70 | |
| Conv. Total (cfs) | 12355.0 | Conv. (cfs) | | 12355.0 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.41 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 1.87 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.01 | 7.39 | 0.04 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 2.46 | 0.03 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.06 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.65 | Flow Area (sq ft) | | 355.05 | |
| E.G. Slope (ft/ft) | 0.012593 | Area (sq ft) | | 355.05 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.34 | Top Width (ft) | | 76.34 | |
| Vel Total (ft/s) | 10.84 | Avg. Vel. (ft/s) | | 10.84 | |
| Max Chl Dpth (ft) | 5.76 | Hydr. Depth (ft) | | 4.65 | |
| Conv. Total (cfs) | 34308.4 | Conv. (cfs) | | 34308.4 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 78.66 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.55 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.07 | 16.17 | 0.16 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.04 | 2.94 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.21 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.96 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.89 | Flow Area (sq ft) | | 368.77 | |
| E.G. Slope (ft/ft) | 0.013023 | Area (sq ft) | | 368.77 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 76.87 | Top Width (ft) | | 76.87 | |
| Vel Total (ft/s) | 11.25 | Avg. Vel. (ft/s) | | 11.25 | |
| Max Chl Dpth (ft) | 5.94 | Hydr. Depth (ft) | | 4.80 | |
| Conv. Total (cfs) | 36348.9 | Conv. (cfs) | | 36348.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 79.30 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.78 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.08 | 17.09 | 0.18 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 2.98 | 0.08 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.41 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.96 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 19.73 | Flow Area (sq ft) | | 424.40 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 424.40 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 78.99 | Top Width (ft) | | 78.99 | |
| Vel Total (ft/s) | 12.46 | Avg. Vel. (ft/s) | | 12.46 | |
| Max Chl Dpth (ft) | 6.66 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 44978.9 | Conv. (cfs) | | 44978.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 81.85 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.48 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.14 | 20.73 | 0.52 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.07 | 3.09 | 0.56 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.03 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 21.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 21.12 | Flow Area (sq ft) | | 528.57 | |
| E.G. Slope (ft/ft) | 0.013933 | Area (sq ft) | | 528.57 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 82.81 | Top Width (ft) | | 82.81 | |
| Vel Total (ft/s) | 13.96 | Avg. Vel. (ft/s) | | 13.96 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | | 6.38 | |
| Conv. Total (cfs) | 62522.2 | Conv. (cfs) | | 62522.2 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 86.46 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.36 | 26.80 | 3.67 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.16 | 3.16 | 2.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1455

INPUT
Description: F
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 45 | 10 | 38 | 20 | 31 | 30 | 24 | 40 | 16.5 |
| 50 | 12.5 | 60 | 11.8 | 70 | 12 | 80 | 12.3 | 90 | 12.6 |
| 100 | 12.8 | 110 | 14 | 120 | 18.5 | 130 | 23 | 140 | 28 |
| 150 | 30 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 120 | 120 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.37 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 19.15 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.73 | Flow Area (sq ft) | 4.68 | 476.91 | 0.47 |
| E.G. Slope (ft/ft) | 0.013371 | Area (sq ft) | 4.68 | 476.91 | 0.47 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.85 | 5896.64 | 0.51 |
| Top Width (ft) | 84.97 | Top Width (ft) | 3.53 | 80.00 | 1.44 |
| Vel Total (ft/s) | 12.26 | Avg. Vel. (ft/s) | 2.75 | 12.36 | 1.09 |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | 1.32 | 5.96 | 0.32 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 51109.1 | Conv. (cfs) | 111.1 | 50993.5 | 4.4 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 4.41 | 81.85 | 1.58 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.88 | 4.86 | 0.25 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.18 | 21.44 | 1.09 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.09 | 2.93 | 1.10 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.06 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 14.87 | Flow Area (sq ft) | | 165.73 | |
| E.G. Slope (ft/ft) | 0.018077 | Area (sq ft) | | 165.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 68.77 | Top Width (ft) | | 68.77 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 3.26 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 9758.3 | Conv. (cfs) | | 9758.3 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | | 69.60 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | | 2.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.24 | Cum Volume (acre-ft) | 0.01 | 6.99 | 0.04 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 2.31 | 0.03 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.01 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.40 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.28 | Flow Area (sq ft) | 0.54 | 338.38 | |
| E.G. Slope (ft/ft) | 0.017108 | Area (sq ft) | 0.54 | 338.38 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.82 | 3849.18 | |
| Top Width (ft) | 78.76 | Top Width (ft) | 1.20 | 77.56 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 1.51 | 11.38 | |
| Max Chl Dpth (ft) | 5.60 | Hydr. Depth (ft) | 0.45 | 4.36 | |
| Conv. Total (cfs) | 29434.9 | Conv. (cfs) | 6.3 | 29428.6 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.50 | 79.17 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.38 | 4.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.07 | 15.38 | 0.16 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.04 | 2.76 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.07 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.67 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.49 | Flow Area (sq ft) | 0.91 | 359.11 | |
| E.G. Slope (ft/ft) | 0.016461 | Area (sq ft) | 0.91 | 359.11 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.60 | 4146.40 | |
| Top Width (ft) | 79.70 | Top Width (ft) | 1.56 | 78.15 | |
| Vel Total (ft/s) | 11.52 | Avg. Vel. (ft/s) | 1.76 | 11.55 | |
| Max Chl Dpth (ft) | 5.87 | Hydr. Depth (ft) | 0.58 | 4.60 | |
| Conv. Total (cfs) | 32330.5 | Conv. (cfs) | 12.5 | 32318.0 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.94 | 79.81 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.48 | 4.62 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.53 | Cum Volume (acre-ft) | 0.08 | 16.25 | 0.18 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.04 | 2.81 | 0.08 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.27 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 18.65 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.33 | Flow Area (sq ft) | 3.07 | 436.66 | 0.02 |
| E.G. Slope (ft/ft) | 0.014397 | Area (sq ft) | 3.07 | 436.66 | 0.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.60 | 5282.39 | 0.01 |
| Top Width (ft) | 83.19 | Top Width (ft) | 2.86 | 80.00 | 0.32 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 2.48 | 12.10 | 0.42 |
| Max Chl Dpth (ft) | 6.85 | Hydr. Depth (ft) | 1.07 | 5.46 | 0.07 |
| Conv. Total (cfs) | 44088.4 | Conv. (cfs) | 63.4 | 44024.9 | 0.1 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 3.58 | 81.85 | 0.36 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.77 | 4.80 | 0.06 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.34 | Cum Volume (acre-ft) | 0.14 | 19.74 | 0.52 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.07 | 2.90 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.58 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 20.28 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.55 | 567.80 | 3.54 |
| E.G. Slope (ft/ft) | 0.011590 | Area (sq ft) | 9.55 | 567.80 | 3.54 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 30.99 | 7341.96 | 7.05 |
| Top Width (ft) | 89.01 | Top Width (ft) | 5.05 | 80.00 | 3.97 |
| Vel Total (ft/s) | 12.70 | Avg. Vel. (ft/s) | 3.24 | 12.93 | 1.99 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | 1.89 | 7.10 | 0.89 |
| Conv. Total (cfs) | 68552.3 | Conv. (cfs) | 287.9 | 68198.9 | 65.5 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 6.31 | 81.85 | 4.35 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 1.10 | 5.02 | 0.59 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.34 | 25.54 | 3.67 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.16 | 2.97 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1335

INPUT
Description: E
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.5 | 10 | 37.5 | 20 | 31 | 30 | 24 | 40 | 17 |
| 50 | 11 | 60 | 9.5 | 70 | 9.5 | 80 | 9.5 | 90 | 9.5 |
| 100 | 10.5 | 110 | 14 | 120 | 19 | 130 | 23 | 140 | 28 |
| 150 | 29 | 160 | 30 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .075 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.09 | Element | | | |
| Vel Head (ft) | 1.80 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 18.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.19 | 548.74 | |
| E.G. Slope (ft/ft) | 0.008433 | Area (sq ft) | 1.19 | 548.74 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.63 | 5908.37 | |
| Top Width (ft) | 80.42 | Top Width (ft) | 1.84 | 78.58 | |
| Vel Total (ft/s) | 10.75 | Avg. Vel. (ft/s) | 1.37 | 10.77 | |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 0.65 | 6.98 | |
| Conv. Total (cfs) | 64355.9 | Conv. (cfs) | 17.8 | 64338.2 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.25 | 82.01 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.28 | 3.52 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.56 | Cum Volume (acre-ft) | 0.17 | 20.03 | 1.09 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.09 | 2.71 | 1.10 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.78 | Element | | | |
| Vel Head (ft) | 1.14 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 12.63 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | | 152.87 | |
| E.G. Slope (ft/ft) | 0.019322 | Area (sq ft) | | 152.87 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 58.82 | Top Width (ft) | | 58.82 | |
| Vel Total (ft/s) | 8.58 | Avg. Vel. (ft/s) | | 8.58 | |
| Max Chl Dpth (ft) | 3.13 | Hydr. Depth (ft) | | 2.60 | |
| Conv. Total (cfs) | 9438.5 | Conv. (cfs) | | 9438.5 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 59.79 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.87 | Cum Volume (acre-ft) | 0.01 | 6.56 | 0.04 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.01 | 2.13 | 0.03 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.56 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.13 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 384.33 | |
| E.G. Slope (ft/ft) | 0.010509 | Area (sq ft) | | 384.33 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 72.81 | Top Width (ft) | | 72.81 | |
| Vel Total (ft/s) | 10.02 | Avg. Vel. (ft/s) | | 10.02 | |
| Max Chl Dpth (ft) | 6.63 | Hydr. Depth (ft) | | 5.28 | |
| Conv. Total (cfs) | 37556.8 | Conv. (cfs) | | 37556.8 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 75.49 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.65 | Cum Volume (acre-ft) | 0.07 | 14.38 | 0.16 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 2.55 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.07 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.48 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 409.66 | |
| E.G. Slope (ft/ft) | 0.010113 | Area (sq ft) | | 409.66 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 74.08 | Top Width (ft) | | 74.08 | |
| Vel Total (ft/s) | 10.13 | Avg. Vel. (ft/s) | | 10.13 | |
| Max Chl Dpth (ft) | 6.98 | Hydr. Depth (ft) | | 5.53 | |
| Conv. Total (cfs) | 41247.6 | Conv. (cfs) | | 41247.6 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 76.94 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.36 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.64 | Cum Volume (acre-ft) | 0.08 | 15.19 | 0.18 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.04 | 2.60 | 0.08 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.68 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.34 | 501.53 | |
| E.G. Slope (ft/ft) | 0.008923 | Area (sq ft) | 0.34 | 501.53 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.31 | 5289.69 | |
| Top Width (ft) | 78.35 | Top Width (ft) | 0.98 | 77.37 | |
| Vel Total (ft/s) | 10.54 | Avg. Vel. (ft/s) | 0.93 | 10.55 | |
| Max Chl Dpth (ft) | 8.18 | Hydr. Depth (ft) | 0.34 | 6.48 | |
| Conv. Total (cfs) | 56001.4 | Conv. (cfs) | 3.3 | 55998.1 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.19 | 80.66 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.16 | 3.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.58 | Cum Volume (acre-ft) | 0.13 | 18.45 | 0.52 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.06 | 2.69 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.97 | Wt. n-Val. | 0.065 | 0.045 | 0.075 |
| W.S. Elev (ft) | 19.61 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.86 | 653.63 | 0.46 |
| E.G. Slope (ft/ft) | 0.007513 | Area (sq ft) | 4.86 | 653.63 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.06 | 7369.60 | 0.34 |
| Top Width (ft) | 85.25 | Top Width (ft) | 3.73 | 80.00 | 1.52 |
| Vel Total (ft/s) | 11.20 | Avg. Vel. (ft/s) | 2.07 | 11.27 | 0.74 |
| Max Chl Dpth (ft) | 10.11 | Hydr. Depth (ft) | 1.30 | 8.17 | 0.30 |
| Conv. Total (cfs) | 85143.6 | Conv. (cfs) | 116.1 | 85023.6 | 3.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.55 | 83.60 | 1.64 |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.50 | 3.67 | 0.13 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.52 | Cum Volume (acre-ft) | 0.33 | 23.85 | 3.66 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.14 | 2.75 | 2.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1185

INPUT
Description: D
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.5 | 4 | 40 | 10 | 35 | 20 | 27.5 | 30 | 20 |
| 35 | 16 | 40 | 12 | 50 | 7 | 60 | 5.5 | 70 | 6 |
| 80 | 7 | 90 | 11 | 100 | 16 | 110 | 22 | 120 | 28 |
| 130 | 28.2 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 35 | .045 | 110 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 35 | 110 | 125 | 125 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.43 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.72 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.71 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 15.05 | Flow Area (sq ft) | | 446.60 | |
| E.G. Slope (ft/ft) | 0.013216 | Area (sq ft) | | 446.60 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 64.07 | Top Width (ft) | | 64.07 | |
| Vel Total (ft/s) | 13.23 | Avg. Vel. (ft/s) | | 13.23 | |
| Max Chl Dpth (ft) | 10.21 | Hydr. Depth (ft) | | 6.97 | |
| Conv. Total (cfs) | 51408.5 | Conv. (cfs) | | 51408.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 68.61 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 5.37 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.68 | Cum Volume (acre-ft) | 0.17 | 18.31 | 1.09 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.08 | 2.46 | 1.10 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.81 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.82 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 10.99 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 180.58 | |
| E.G. Slope (ft/ft) | 0.008701 | Area (sq ft) | | 180.58 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.96 | Top Width (ft) | | 47.96 | |
| Vel Total (ft/s) | 7.27 | Avg. Vel. (ft/s) | | 7.27 | |
| Max Chl Dpth (ft) | 5.49 | Hydr. Depth (ft) | | 3.77 | |
| Conv. Total (cfs) | 14065.5 | Conv. (cfs) | | 14065.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 49.85 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 1.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.49 | Cum Volume (acre-ft) | 0.01 | 5.98 | 0.04 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.01 | 1.95 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.93 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.07 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.16 | Flow Area (sq ft) | | 345.58 | |
| E.G. Slope (ft/ft) | 0.011593 | Area (sq ft) | | 345.58 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 58.73 | Top Width (ft) | | 58.73 | |
| Vel Total (ft/s) | 11.14 | Avg. Vel. (ft/s) | | 11.14 | |
| Max Chl Dpth (ft) | 8.57 | Hydr. Depth (ft) | | 5.88 | |
| Conv. Total (cfs) | 35757.5 | Conv. (cfs) | | 35757.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 62.30 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.01 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.62 | Cum Volume (acre-ft) | 0.07 | 13.12 | 0.16 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.04 | 2.33 | 0.07 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.05 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.34 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.46 | Flow Area (sq ft) | | 361.45 | |
| E.G. Slope (ft/ft) | 0.011842 | Area (sq ft) | | 361.45 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 59.60 | Top Width (ft) | | 59.60 | |
| Vel Total (ft/s) | 11.48 | Avg. Vel. (ft/s) | | 11.48 | |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 6.06 | |
| Conv. Total (cfs) | 38117.1 | Conv. (cfs) | | 38117.1 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 63.33 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.63 | Cum Volume (acre-ft) | 0.08 | 13.86 | 0.18 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.04 | 2.37 | 0.08 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.47 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.28 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 14.52 | Flow Area (sq ft) | | 419.10 | |
| E.G. Slope (ft/ft) | 0.012665 | Area (sq ft) | | 419.10 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 62.66 | Top Width (ft) | | 62.66 | |
| Vel Total (ft/s) | 12.62 | Avg. Vel. (ft/s) | | 12.62 | |
| Max Chl Dpth (ft) | 9.78 | Hydr. Depth (ft) | | 6.69 | |
| Conv. Total (cfs) | 47005.3 | Conv. (cfs) | | 47005.3 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 66.95 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.66 | Cum Volume (acre-ft) | 0.13 | 16.86 | 0.52 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.06 | 2.45 | 0.56 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.92 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 3.33 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 16.59 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 16.20 | Flow Area (sq ft) | 0.22 | 503.94 | |
| E.G. Slope (ft/ft) | 0.014382 | Area (sq ft) | 0.22 | 503.94 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.23 | 7379.77 | |
| Top Width (ft) | 66.73 | Top Width (ft) | 0.74 | 65.99 | |
| Vel Total (ft/s) | 14.64 | Avg. Vel. (ft/s) | 1.04 | 14.64 | |
| Max Chl Dpth (ft) | 11.09 | Hydr. Depth (ft) | 0.30 | 7.64 | |
| Conv. Total (cfs) | 61538.8 | Conv. (cfs) | 1.9 | 61536.9 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | 0.95 | 70.86 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | 0.21 | 6.39 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.73 | Cum Volume (acre-ft) | 0.32 | 21.86 | 3.66 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.14 | 2.50 | 2.00 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1060

INPUT
Description: C
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 33 | 20 | 35 | 30 | 29 | 40 | 23 |
| 45 | 19.5 | 50 | 16 | 60 | 10 | 70 | 7 | 80 | 5.5 |
| 90 | 5 | 100 | 5 | 110 | 7 | 120 | 13 | 130 | 20 |
| 200 | 20.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 45 | .04 | 130 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 45 | 130 | 100 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.12 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.60 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.60 | Flow Area (sq ft) | | 416.89 | |
| E.G. Slope (ft/ft) | 0.013608 | Area (sq ft) | | 416.89 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 66.85 | Top Width (ft) | | 66.85 | |
| Vel Total (ft/s) | 14.18 | Avg. Vel. (ft/s) | | 14.18 | |
| Max Chl Dpth (ft) | 8.60 | Hydr. Depth (ft) | | 6.24 | |
| Conv. Total (cfs) | 50662.6 | Conv. (cfs) | | 50662.6 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 70.46 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.03 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.12 | Cum Volume (acre-ft) | 0.17 | 17.07 | 1.09 |
| C & E Loss (ft) | 0.22 | Cum SA (acres) | 0.08 | 2.28 | 1.10 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.41 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.85 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 8.85 | Flow Area (sq ft) | | 137.48 | |
| E.G. Slope (ft/ft) | 0.017292 | Area (sq ft) | | 137.48 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 49.24 | Top Width (ft) | | 49.24 | |
| Vel Total (ft/s) | 9.54 | Avg. Vel. (ft/s) | | 9.54 | |
| Max Chl Dpth (ft) | 3.85 | Hydr. Depth (ft) | | 2.79 | |
| Conv. Total (cfs) | 9977.1 | Conv. (cfs) | | 9977.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 50.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 2.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.49 | Cum Volume (acre-ft) | 0.01 | 5.52 | 0.04 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.01 | 1.81 | 0.03 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.49 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 11.83 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 11.83 | Flow Area (sq ft) | | 303.74 | |
| E.G. Slope (ft/ft) | 0.014509 | Area (sq ft) | | 303.74 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.10 | Top Width (ft) | | 61.10 | |
| Vel Total (ft/s) | 12.68 | Avg. Vel. (ft/s) | | 12.68 | |
| Max Chl Dpth (ft) | 6.83 | Hydr. Depth (ft) | | 4.97 | |
| Conv. Total (cfs) | 31962.1 | Conv. (cfs) | | 31962.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 63.71 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.07 | 12.19 | 0.16 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 2.16 | 0.07 |

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 12.11 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 12.11 | Flow Area (sq ft) | | 320.83 | |
| E.G. Slope (ft/ft) | 0.014350 | Area (sq ft) | | 320.83 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.03 | Top Width (ft) | | 62.03 | |
| Vel Total (ft/s) | 12.93 | Avg. Vel. (ft/s) | | 12.93 | |
| Max Chl Dpth (ft) | 7.11 | Hydr. Depth (ft) | | 5.17 | |
| Conv. Total (cfs) | 34626.6 | Conv. (cfs) | | 34626.6 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 64.79 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.44 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.08 | 12.89 | 0.18 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 2.19 | 0.08 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.10 | Flow Area (sq ft) | | 383.70 | |
| E.G. Slope (ft/ft) | 0.013874 | Area (sq ft) | | 383.70 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.29 | Top Width (ft) | | 65.29 | |
| Vel Total (ft/s) | 13.79 | Avg. Vel. (ft/s) | | 13.79 | |
| Max Chl Dpth (ft) | 8.10 | Hydr. Depth (ft) | | 5.88 | |
| Conv. Total (cfs) | 44910.9 | Conv. (cfs) | | 44910.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.61 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.84 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.13 | Cum Volume (acre-ft) | 0.13 | 15.71 | 0.52 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.06 | 2.26 | 0.56 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 14.68 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 14.68 | Flow Area (sq ft) | | 490.72 | |
| E.G. Slope (ft/ft) | 0.013258 | Area (sq ft) | | 490.72 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 70.18 | Top Width (ft) | | 70.18 | |
| Vel Total (ft/s) | 15.04 | Avg. Vel. (ft/s) | | 15.04 | |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 64094.8 | Conv. (cfs) | | 64094.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 74.43 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.32 | 20.43 | 3.66 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.14 | 2.30 | 2.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 960

INPUT
Description: B
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 32 | 17.3 | 29 | 67 | 5 | 79.4 | 5 | 85.5 | 4 |
| 100.5 | 3.5 | 114.3 | 4 | 124.5 | 5 | 140 | 12 | 202.9 | 14.2 |
| 203 | 14.5 | 209.1 | 15 | 224.5 | 20 | 229.5 | 25 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 67 | .042 | 124.5 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 67 | 124.5 | 25 | 25 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.55 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 5.12 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.43 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.91 | Flow Area (sq ft) | 20.34 | 299.03 | 21.75 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.030767 | Area (sq ft) | 20.34 | 299.03 | 21.75 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 168.11 | 5560.68 | 181.20 |
| Top Width (ft) | 76.49 | Top Width (ft) | 9.18 | 57.50 | 9.82 |
| Vel Total (ft/s) | 17.32 | Avg. Vel. (ft/s) | 8.26 | 18.60 | 8.33 |
| Max Chl Dpth (ft) | 5.93 | Hydr. Depth (ft) | 2.22 | 5.20 | 2.22 |
| Conv. Total (cfs) | 33693.3 | Conv. (cfs) | 958.4 | 31701.8 | 1033.1 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 10.19 | 57.65 | 10.77 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.83 | 9.96 | 3.88 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.97 | Cum Volume (acre-ft) | 0.15 | 16.25 | 1.06 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.07 | 2.13 | 1.09 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 6.44 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 6.75 | Flow Area (sq ft) | 2.14 | 126.86 | 2.29 |
| E.G. Slope (ft/ft) | 0.029093 | Area (sq ft) | 2.14 | 126.86 | 2.29 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 8.13 | 1295.11 | 8.76 |
| Top Width (ft) | 63.66 | Top Width (ft) | 2.98 | 57.50 | 3.18 |
| Vel Total (ft/s) | 9.99 | Avg. Vel. (ft/s) | 3.79 | 10.21 | 3.82 |
| Max Chl Dpth (ft) | 2.94 | Hydr. Depth (ft) | 0.72 | 2.21 | 0.72 |
| Conv. Total (cfs) | 7692.0 | Conv. (cfs) | 47.7 | 7593.0 | 51.4 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 3.31 | 57.65 | 3.49 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 1.18 | 4.00 | 1.19 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.21 | Cum Volume (acre-ft) | 0.01 | 5.22 | 0.04 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 1.68 | 0.02 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.85 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 8.24 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.32 | Flow Area (sq ft) | 10.89 | 230.65 | 11.65 |
| E.G. Slope (ft/ft) | 0.032272 | Area (sq ft) | 10.89 | 230.65 | 11.65 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 74.85 | 3694.47 | 80.68 |
| Top Width (ft) | 71.40 | Top Width (ft) | 6.72 | 57.50 | 7.18 |
| Vel Total (ft/s) | 15.21 | Avg. Vel. (ft/s) | 6.87 | 16.02 | 6.93 |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | 1.62 | 4.01 | 1.62 |
| Conv. Total (cfs) | 21431.3 | Conv. (cfs) | 416.7 | 20565.5 | 449.1 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 7.46 | 57.65 | 7.88 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 2.94 | 8.06 | 2.98 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.09 | Cum Volume (acre-ft) | 0.06 | 11.58 | 0.14 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.03 | 2.02 | 0.06 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.48 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.06 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 8.43 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.57 | Flow Area (sq ft) | 12.16 | 241.21 | 13.00 |
| E.G. Slope (ft/ft) | 0.032073 | Area (sq ft) | 12.16 | 241.21 | 13.00 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 86.43 | 3968.41 | 93.16 |
| Top Width (ft) | 72.19 | Top Width (ft) | 7.10 | 57.50 | 7.59 |
| Vel Total (ft/s) | 15.57 | Avg. Vel. (ft/s) | 7.11 | 16.45 | 7.16 |
| Max Chl Dpth (ft) | 4.93 | Hydr. Depth (ft) | 1.71 | 4.19 | 1.71 |
| Conv. Total (cfs) | 23161.7 | Conv. (cfs) | 482.6 | 22158.9 | 520.2 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 7.88 | 57.65 | 8.33 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.09 | 8.38 | 3.13 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.07 | Cum Volume (acre-ft) | 0.07 | 12.24 | 0.16 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.03 | 2.05 | 0.07 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q50

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.86 | Element | | | |
| Vel Head (ft) | 4.76 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.09 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.43 | Flow Area (sq ft) | 17.35 | 279.49 | 18.55 |
| E.G. Slope (ft/ft) | 0.031227 | Area (sq ft) | 17.35 | 279.49 | 18.55 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 136.92 | 5005.50 | 147.58 |
| Top Width (ft) | 75.04 | Top Width (ft) | 8.48 | 57.50 | 9.06 |
| Vel Total (ft/s) | 16.77 | Avg. Vel. (ft/s) | 7.89 | 17.91 | 7.96 |
| Max Chl Dpth (ft) | 5.59 | Hydr. Depth (ft) | 2.05 | 4.86 | 2.05 |
| Conv. Total (cfs) | 29935.7 | Conv. (cfs) | 774.8 | 28325.7 | 835.2 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 9.41 | 57.65 | 9.94 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.59 | 9.45 | 3.64 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.00 | Cum Volume (acre-ft) | 0.11 | 14.95 | 0.50 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.05 | 2.12 | 0.55 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | | | |
| Vel Head (ft) | 5.85 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.20 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 11.80 | Flow Area (sq ft) | 28.01 | 343.23 | 29.95 |
| E.G. Slope (ft/ft) | 0.029537 | Area (sq ft) | 28.01 | 343.23 | 29.95 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 252.32 | 6855.72 | 271.96 |
| Top Width (ft) | 79.79 | Top Width (ft) | 10.77 | 57.50 | 11.52 |
| Vel Total (ft/s) | 18.40 | Avg. Vel. (ft/s) | 9.01 | 19.97 | 9.08 |
| Max Chl Dpth (ft) | 6.70 | Hydr. Depth (ft) | 2.60 | 5.97 | 2.60 |
| Conv. Total (cfs) | 42940.8 | Conv. (cfs) | 1468.1 | 39890.3 | 1582.4 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 11.96 | 57.65 | 12.64 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 4.32 | 10.98 | 4.37 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.90 | Cum Volume (acre-ft) | 0.28 | 19.48 | 3.63 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.12 | 2.15 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 935

INPUT
Description: JU
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 15.3 | 30 | 23.8 | 27.1 | 35 | 27 | 37.7 | 19 |
| 62 | 5 | 79 | 5 | 82.2 | 4 | 105.2 | 2 | 121.1 | 3 |
| 125.6 | 4 | 137.4 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 |
| 208.7 | 13.4 | 231.8 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 62 | .042 | 125.6 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 62 | 125.6 | 85 | 85 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 35 | 28 | F |
| 188 | 231.8 | 26 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.57 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.75 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 9.85 | Flow Area (sq ft) | 39.49 | 523.09 | 95.95 |
| E.G. Slope (ft/ft) | 0.005265 | Area (sq ft) | 39.49 | 523.09 | 95.95 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 174.05 | 5450.01 | 285.95 |
| Top Width (ft) | 132.90 | Top Width (ft) | 11.71 | 63.60 | 57.59 |
| Vel Total (ft/s) | 8.97 | Avg. Vel. (ft/s) | 4.41 | 10.42 | 2.98 |
| Max Chl Dpth (ft) | 9.75 | Hydr. Depth (ft) | 3.37 | 8.22 | 1.67 |
| Conv. Total (cfs) | 81446.2 | Conv. (cfs) | 2398.5 | 75107.0 | 3940.7 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 13.51 | 63.98 | 59.06 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.96 | 2.69 | 0.53 |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.26 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.13 | 16.02 | 1.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.07 | 2.10 | 1.07 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.48 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 7.09 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 5.89 | Flow Area (sq ft) | 3.80 | 227.24 | 9.41 |
| E.G. Slope (ft/ft) | 0.004686 | Area (sq ft) | 3.80 | 227.24 | 9.41 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 7.25 | 1281.04 | 23.71 |
| Top Width (ft) | 73.32 | Top Width (ft) | 3.63 | 63.60 | 6.08 |
| Vel Total (ft/s) | 5.46 | Avg. Vel. (ft/s) | 1.91 | 5.64 | 2.52 |
| Max Chl Dpth (ft) | 5.09 | Hydr. Depth (ft) | 1.05 | 3.57 | 1.55 |
| Conv. Total (cfs) | 19166.7 | Conv. (cfs) | 105.9 | 18714.4 | 346.4 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 4.19 | 63.98 | 6.82 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.27 | 1.04 | 0.40 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 0.01 | 5.12 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 1.65 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.06 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.21 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.85 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 8.32 | Flow Area (sq ft) | 20.41 | 402.56 | 33.65 |
| E.G. Slope (ft/ft) | 0.005604 | Area (sq ft) | 20.41 | 402.56 | 33.65 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 74.51 | 3633.67 | 141.82 |
| Top Width (ft) | 83.52 | Top Width (ft) | 8.42 | 63.60 | 11.51 |
| Vel Total (ft/s) | 8.43 | Avg. Vel. (ft/s) | 3.65 | 9.03 | 4.21 |
| Max Chl Dpth (ft) | 7.85 | Hydr. Depth (ft) | 2.43 | 6.33 | 2.93 |
| Conv. Total (cfs) | 51429.6 | Conv. (cfs) | 995.3 | 48539.8 | 1894.5 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 9.72 | 63.98 | 12.91 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.74 | 2.20 | 0.91 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.05 | 11.40 | 0.13 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.02 | 1.98 | 0.05 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.40 | Element | | | |
| Vel Head (ft) | 1.30 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.11 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 8.55 | Flow Area (sq ft) | 22.63 | 418.90 | 36.81 |
| E.G. Slope (ft/ft) | 0.005706 | Area (sq ft) | 22.63 | 418.90 | 36.81 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 86.27 | 3917.98 | 143.74 |
| Top Width (ft) | 87.07 | Top Width (ft) | 8.86 | 63.60 | 14.61 |
| Vel Total (ft/s) | 8.67 | Avg. Vel. (ft/s) | 3.81 | 9.35 | 3.90 |
| Max Chl Dpth (ft) | 8.11 | Hydr. Depth (ft) | 2.55 | 6.59 | 2.52 |
| Conv. Total (cfs) | 54913.3 | Conv. (cfs) | 1142.2 | 51868.2 | 1903.0 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 10.23 | 63.98 | 16.05 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.79 | 2.33 | 0.82 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.06 | 12.05 | 0.15 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 2.02 | 0.07 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q50

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.74 | Element | | | |
| Vel Head (ft) | 1.47 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.27 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 9.42 | Flow Area (sq ft) | 34.13 | 492.93 | 71.59 |
| E.G. Slope (ft/ft) | 0.005275 | Area (sq ft) | 34.13 | 492.93 | 71.59 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 143.42 | 4940.89 | 205.69 |
| Top Width (ft) | 119.63 | Top Width (ft) | 10.88 | 63.60 | 45.15 |
| Vel Total (ft/s) | 8.84 | Avg. Vel. (ft/s) | 4.20 | 10.02 | 2.87 |
| Max Chl Dpth (ft) | 9.27 | Hydr. Depth (ft) | 3.14 | 7.75 | 1.59 |
| Conv. Total (cfs) | 72834.0 | Conv. (cfs) | 1974.7 | 68027.4 | 2832.0 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 12.56 | 63.98 | 46.61 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.89 | 2.54 | 0.51 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.10 | 14.73 | 0.48 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.05 | 2.09 | 0.53 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.97 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 11.03 | Flow Area (sq ft) | 55.13 | 600.98 | 171.93 |
| E.G. Slope (ft/ft) | 0.004645 | Area (sq ft) | 55.13 | 600.98 | 183.29 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 255.06 | 6451.11 | 673.83 |
| Top Width (ft) | 154.93 | Top Width (ft) | 13.83 | 63.60 | 77.49 |
| Vel Total (ft/s) | 8.91 | Avg. Vel. (ft/s) | 4.63 | 10.73 | 3.92 |
| Max Chl Dpth (ft) | 10.97 | Hydr. Depth (ft) | 3.98 | 9.45 | 2.76 |
| Conv. Total (cfs) | 108286.3 | Conv. (cfs) | 3742.5 | 94656.7 | 9887.1 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 15.97 | 63.98 | 63.87 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 1.00 | 2.72 | 0.78 |
| Alpha | 1.29 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 0.26 | 19.21 | 3.57 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.12 | 2.12 | 1.96 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 895

INPUT
Description: Bridge Street
Distance from Upstream XS = 11
Deck/Roadway Width = 62
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 46.2 | 29.4 | 0 |
| 46.2 | 29.4 | 24.2 | 177.2 | 28 | 22.8 |
| 177.2 | 28 | 0 | 260 | 26 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

```
       0      31    15.3      30    23.8    27.1      35      27    37.7      19
      62       5      79       5    82.2       4   105.2       2   121.1       3
   125.6       4   137.4      10     203    12.5   203.1      13   203.2    13.1
   208.7    13.4   231.8      20

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      62    .042   125.6     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
           62   125.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      35      28        F
     188   231.8      26        F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      30       0    46.2    29.4       0    46.2    29.4    24.2
   177.2      28    22.8   177.2      28       0     260      26       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      29      32      25    35.3      20    63.6       5    85.1       3
      94       1   114.7       1   119.9       3   139.5      10   174.5      10
   238.1      15   238.2      25

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    63.6     .04   119.9     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          63.6   119.9             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      39      24        F
     184   238.2      24        F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     203     240      30

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =      26
Energy head used in spillway design         =
```

Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 13.32 | Element | | |
| W.S. US. (ft) | 11.75 | E.G. Elev (ft) | 13.24 | 12.86 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 11.59 | 11.35 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 9.85 | 9.23 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.59 | 10.35 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.26 | 8.59 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 637.90 | 688.22 |
| Weir Submerg | | Froude # Chl | 0.59 | 0.54 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4208.66 | 4466.50 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.04 | 5.48 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 130.24 | 129.07 |
| Delta EG (ft) | 0.53 | Conv. Total (cfs) | 78585.2 | 90366.7 |
| Delta WS (ft) | 0.60 | Top Width (ft) | 126.63 | 125.59 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.30 | 0.05 |
| BR Open Vel (ft/s) | 9.26 | C & E Loss (ft) | 0.07 | 0.04 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.73 | 1.42 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.58 | Element | | |

| | | | | |
|---|---|---|---|---|
| W.S. US. (ft) | 7.09 | E.G. Elev (ft) | 7.52 | 7.23 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 7.01 | 6.85 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 5.89 | 4.95 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 5.01 | 5.85 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 5.61 | 4.77 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 234.02 | 275.04 |
| Weir Submerg | | Froude # Chl | 0.55 | 0.42 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 666.46 | 843.36 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 3.21 | 3.90 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 74.63 | 72.41 |
| Delta EG (ft) | 0.37 | Conv. Total (cfs) | 18369.3 | 26058.2 |
| Delta WS (ft) | 0.28 | Top Width (ft) | 72.99 | 70.59 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.22 | 0.03 |
| BR Open Vel (ft/s) | 5.61 | C & E Loss (ft) | 0.07 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.00 | 0.60 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.06 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 9.85 | E.G. Elev (ft) | 10.97 | 10.60 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 9.70 | 9.43 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 8.32 | 7.59 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.70 | 8.43 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 8.67 | 8.15 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 444.02 | 472.38 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.60 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2415.14 | 2625.58 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.35 | 5.71 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 85.97 | 85.56 |
| Delta EG (ft) | 0.52 | Conv. Total (cfs) | 49300.7 | 58028.0 |
| Delta WS (ft) | 0.53 | Top Width (ft) | 82.96 | 82.66 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.32 | 0.05 |
| BR Open Vel (ft/s) | 8.67 | C & E Loss (ft) | 0.05 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.97 | 1.52 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT  Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.40 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 10.11 | E.G. Elev (ft) | 11.33 | 10.96 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 9.99 | 9.72 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 8.55 | 7.85 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.99 | 8.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 8.85 | 8.35 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 468.49 | 496.70 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.60 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2658.45 | 2876.22 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.57 | 5.91 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 87.20 | 87.05 |
| Delta EG (ft) | 0.51 | Conv. Total (cfs) | 53456.6 | 62394.7 |
| Delta WS (ft) | 0.50 | Top Width (ft) | 84.05 | 84.03 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.32 | 0.05 |
| BR Open Vel (ft/s) | 8.85 | C & E Loss (ft) | 0.05 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.02 | 1.57 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT  Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 12.74 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.27 | E.G. Elev (ft) | 12.65 | 12.30 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 11.10 | 10.84 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 9.42 | 8.76 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.10 | 9.84 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.14 | 8.48 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 578.84 | 623.95 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.54 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3673.21 | 3921.31 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.04 | 5.01 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 118.38 | 127.98 |
| Delta EG (ft) | 0.55 | Conv. Total (cfs) | 69944.6 | 79903.7 |
| Delta WS (ft) | 0.71 | Top Width (ft) | 114.91 | 124.62 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.31 | 0.06 |
| BR Open Vel (ft/s) | 9.14 | C & E Loss (ft) | 0.05 | 0.05 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.75 | 1.33 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 14.57 | Element | | |
| W.S. US. (ft) | 12.97 | E.G. Elev (ft) | 14.49 | 14.15 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 12.79 | 12.58 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 11.03 | 10.97 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.79 | 11.58 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.33 | 8.75 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 790.75 | 843.24 |
| Weir Submerg | | Froude # Chl | 0.56 | 0.52 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 5551.62 | 5877.45 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 6.14 | 6.59 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 132.64 | 131.68 |
| Delta EG (ft) | 0.46 | Conv. Total (cfs) | 103912.3 | 118131.2 |
| Delta WS (ft) | 0.44 | Top Width (ft) | 128.71 | 127.89 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.27 | 0.05 |
| BR Open Vel (ft/s) | 9.33 | C & E Loss (ft) | 0.07 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.88 | 1.56 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 850

INPUT
Description: JD
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 29 | 32 | 25 | 35.3 | 20 | 63.6 | 5 | 85.1 | 3 |
| 94 | 1 | 114.7 | 1 | 119.9 | 3 | 139.5 | 10 | 174.5 | 10 |
| 238.1 | 15 | 238.2 | 25 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 63.6 | .04 | 119.9 | .05 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
63.6 119.9 20 20 20 .3 .5

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 39 | 24 | F |
| 184 | 238.2 | 24 | F |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 203 | 240 | 30 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.78 | Element | | | |
| Vel Head (ft) | 1.63 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 11.15 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 9.23 | Flow Area (sq ft) | 35.67 | 492.82 | 138.74 |
| E.G. Slope (ft/ft) | 0.004722 | Area (sq ft) | 35.67 | 492.82 | 139.77 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 141.84 | 5300.11 | 468.05 |
| Top Width (ft) | 137.13 | Top Width (ft) | 11.60 | 56.30 | 69.22 |
| Vel Total (ft/s) | 8.86 | Avg. Vel. (ft/s) | 3.98 | 10.75 | 3.37 |
| Max Chl Dpth (ft) | 10.15 | Hydr. Depth (ft) | 3.07 | 8.75 | 2.16 |
| Conv. Total (cfs) | 86009.0 | Conv. (cfs) | 2064.2 | 77133.2 | 6811.6 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 13.13 | 56.99 | 65.34 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.80 | 2.55 | 0.63 |
| Alpha | 1.34 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.06 | 15.02 | 0.80 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.04 | 1.98 | 0.96 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.20 | Element | | | |
| Vel Head (ft) | 0.39 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 6.82 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 4.95 | Flow Area (sq ft) | 3.11 | 248.80 | 20.38 |
| E.G. Slope (ft/ft) | 0.002613 | Area (sq ft) | 3.11 | 248.80 | 20.38 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 4.08 | 1262.17 | 45.75 |
| Top Width (ft) | 70.41 | Top Width (ft) | 3.42 | 56.30 | 10.68 |
| Vel Total (ft/s) | 4.82 | Avg. Vel. (ft/s) | 1.31 | 5.07 | 2.25 |
| Max Chl Dpth (ft) | 5.82 | Hydr. Depth (ft) | 0.91 | 4.42 | 1.91 |
| Conv. Total (cfs) | 25664.0 | Conv. (cfs) | 79.7 | 24689.3 | 895.0 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 3.88 | 56.99 | 11.34 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.13 | 0.71 | 0.29 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.00 | 4.66 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.53 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.54 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.22 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 9.32 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.59 | Flow Area (sq ft) | 17.58 | 389.65 | 55.87 |
| E.G. Slope (ft/ft) | 0.004663 | Area (sq ft) | 17.58 | 389.65 | 55.87 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 54.87 | 3560.66 | 234.48 |
| Top Width (ft) | 82.13 | Top Width (ft) | 8.14 | 56.30 | 17.69 |
| Vel Total (ft/s) | 8.31 | Avg. Vel. (ft/s) | 3.12 | 9.14 | 4.20 |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.92 | 3.16 |
| Conv. Total (cfs) | 56381.9 | Conv. (cfs) | 803.5 | 52144.5 | 3433.9 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 9.22 | 56.99 | 18.78 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.56 | 1.99 | 0.87 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.01 | 10.63 | 0.04 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.01 | 1.87 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.29 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 9.61 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.85 | Flow Area (sq ft) | 20.01 | 405.91 | 61.09 |
| E.G. Slope (ft/ft) | 0.004678 | Area (sq ft) | 20.01 | 405.91 | 61.09 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 65.32 | 3818.07 | 264.61 |
| Top Width (ft) | 83.49 | Top Width (ft) | 8.69 | 56.30 | 18.50 |
| Vel Total (ft/s) | 8.52 | Avg. Vel. (ft/s) | 3.26 | 9.41 | 4.33 |
| Max Chl Dpth (ft) | 8.61 | Hydr. Depth (ft) | 2.30 | 7.21 | 3.30 |
| Conv. Total (cfs) | 60646.1 | Conv. (cfs) | 955.0 | 55822.4 | 3868.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 9.83 | 56.99 | 19.64 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.59 | 2.08 | 0.91 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.01 | 11.25 | 0.05 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.01 | 1.90 | 0.04 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.63 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 10.56 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.76 | Flow Area (sq ft) | 29.19 | 459.78 | 101.34 |
| E.G. Slope (ft/ft) | 0.005052 | Area (sq ft) | 29.19 | 459.78 | 101.34 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 112.29 | 4883.80 | 293.91 |
| Top Width (ft) | 128.55 | Top Width (ft) | 10.50 | 56.30 | 61.76 |
| Vel Total (ft/s) | 8.96 | Avg. Vel. (ft/s) | 3.85 | 10.62 | 2.90 |
| Max Chl Dpth (ft) | 9.56 | Hydr. Depth (ft) | 2.78 | 8.17 | 1.64 |
| Conv. Total (cfs) | 74422.7 | Conv. (cfs) | 1579.8 | 68708.1 | 4134.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 11.88 | 56.99 | 62.99 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.78 | 2.54 | 0.51 |
| Alpha | 1.31 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.03 | 13.79 | 0.30 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.03 | 1.97 | 0.44 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.57 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 12.53 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 11.04 | Flow Area (sq ft) | 53.50 | 570.57 | 227.26 |
| E.G. Slope (ft/ft) | 0.003944 | Area (sq ft) | 53.50 | 570.57 | 246.97 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 222.51 | 6183.78 | 973.71 |
| Top Width (ft) | 153.61 | Top Width (ft) | 14.21 | 56.30 | 83.10 |
| Vel Total (ft/s) | 8.67 | Avg. Vel. (ft/s) | 4.16 | 10.84 | 4.28 |
| Max Chl Dpth (ft) | 11.53 | Hydr. Depth (ft) | 3.77 | 10.13 | 3.55 |
| Conv. Total (cfs) | 117510.7 | Conv. (cfs) | 3543.0 | 98463.4 | 15504.2 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 16.08 | 56.99 | 65.34 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.82 | 2.47 | 0.86 |
| Alpha | 1.35 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.16 | 18.07 | 3.20 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.09 | 2.00 | 1.85 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 830

INPUT
Description: A
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 27.6 | 15 | 54.6 | 6 | 65 | 5 | 78 | 4 |
| 93.5 | 1 | 108.7 | 1 | 131.1 | 7 | 155 | 10 | 167.8 | 10 |
| 194.1 | 11 | 251.2 | 15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 54.6 | .035 | 131.1 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 54.6 | 131.1 | 9 | 9 | .3 | .5 |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.25 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 11.26 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 41.58 | 602.52 | 102.89 |
| E.G. Slope (ft/ft) | 0.003074 | Area (sq ft) | 41.58 | 602.52 | 102.89 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 126.11 | 5558.21 | 225.68 |
| Top Width (ft) | 159.08 | Top Width (ft) | 15.79 | 76.50 | 66.78 |
| Vel Total (ft/s) | 7.91 | Avg. Vel. (ft/s) | 3.03 | 9.22 | 2.19 |
| Max Chl Dpth (ft) | 10.26 | Hydr. Depth (ft) | 2.63 | 7.88 | 1.54 |
| Conv. Total (cfs) | 106589.9 | Conv. (cfs) | 2274.5 | 100245.2 | 4070.2 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 16.65 | 77.66 | 67.00 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.48 | 1.49 | 0.29 |
| Alpha | 1.28 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.04 | 14.77 | 0.74 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.04 | 1.95 | 0.93 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.41 | Wt. n-Val. | 0.050 | 0.035 | |
| W.S. Elev (ft) | 6.74 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.81 | 256.24 | |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.002907 | Area (sq ft) | 0.81 | 256.24 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.65 | 1311.35 | |
| Top Width (ft) | 77.73 | Top Width (ft) | 2.21 | 75.52 | |
| Vel Total (ft/s) | 5.10 | Avg. Vel. (ft/s) | 0.79 | 5.12 | |
| Max Chl Dpth (ft) | 5.74 | Hydr. Depth (ft) | 0.37 | 3.39 | |
| Conv. Total (cfs) | 24334.4 | Conv. (cfs) | 12.0 | 24322.4 | |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 2.33 | 76.65 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 0.61 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.00 | 4.54 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.50 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.05 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 9.32 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 16.52 | 453.66 | 21.42 |
| E.G. Slope (ft/ft) | 0.003638 | Area (sq ft) | 16.52 | 453.66 | 21.42 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 40.08 | 3767.76 | 42.16 |
| Top Width (ft) | 104.93 | Top Width (ft) | 9.96 | 76.50 | 18.47 |
| Vel Total (ft/s) | 7.83 | Avg. Vel. (ft/s) | 2.43 | 8.31 | 1.97 |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 1.66 | 5.93 | 1.16 |
| Conv. Total (cfs) | 63831.9 | Conv. (cfs) | 664.6 | 62468.4 | 699.0 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 10.50 | 77.66 | 18.62 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.36 | 1.33 | 0.26 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 10.43 | 0.02 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 1.84 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.71 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.09 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 9.62 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 19.70 | 477.00 | 27.43 |
| E.G. Slope (ft/ft) | 0.003539 | Area (sq ft) | 19.70 | 477.00 | 27.43 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 49.98 | 4040.20 | 57.82 |
| Top Width (ft) | 108.28 | Top Width (ft) | 10.87 | 76.50 | 20.91 |
| Vel Total (ft/s) | 7.91 | Avg. Vel. (ft/s) | 2.54 | 8.47 | 2.11 |
| Max Chl Dpth (ft) | 8.62 | Hydr. Depth (ft) | 1.81 | 6.24 | 1.31 |
| Conv. Total (cfs) | 69728.7 | Conv. (cfs) | 840.2 | 67916.6 | 971.9 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 11.46 | 77.66 | 21.07 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.38 | 1.36 | 0.29 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.00 | 11.04 | 0.03 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 1.87 | 0.03 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.23 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 10.68 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 32.89 | 557.96 | 67.02 |
| E.G. Slope (ft/ft) | 0.003296 | Area (sq ft) | 32.89 | 557.96 | 67.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 95.53 | 5063.76 | 130.71 |
| Top Width (ft) | 145.20 | Top Width (ft) | 14.05 | 76.50 | 54.65 |
| Vel Total (ft/s) | 8.04 | Avg. Vel. (ft/s) | 2.90 | 9.08 | 1.95 |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | 2.34 | 7.29 | 1.23 |
| Conv. Total (cfs) | 92137.7 | Conv. (cfs) | 1663.9 | 88197.3 | 2276.6 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 14.81 | 77.66 | 54.85 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.46 | 1.48 | 0.25 |
| Alpha | 1.22 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.02 | 13.56 | 0.26 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.02 | 1.94 | 0.41 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.21 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 12.65 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 66.36 | 708.58 | 203.58 |
| E.G. Slope (ft/ft) | 0.002508 | Area (sq ft) | 66.36 | 708.58 | 203.58 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 212.46 | 6578.08 | 589.46 |
| Top Width (ft) | 170.35 | Top Width (ft) | 19.95 | 76.50 | 73.90 |
| Vel Total (ft/s) | 7.54 | Avg. Vel. (ft/s) | 3.20 | 9.28 | 2.90 |
| Max Chl Dpth (ft) | 11.65 | Hydr. Depth (ft) | 3.33 | 9.26 | 2.75 |
| Conv. Total (cfs) | 147364.2 | Conv. (cfs) | 4242.5 | 131351.3 | 11770.4 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 21.03 | 77.66 | 75.02 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.49 | 1.43 | 0.42 |
| Alpha | 1.37 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.13 | 17.78 | 3.10 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.08 | 1.97 | 1.81 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 821

INPUT

Description: AD

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 16.5 | 22 | 12.5 | 27 | 10.25 | 32 | 8 | 42 | 6.5 |
| 52 | 6 | 62 | 4.5 | 72 | 3.5 | 82 | 1.5 | 92 | 1 |
| 102 | 1 | 112 | 4 | 122 | 7 | 132 | 9 | 154 | 10 |
| 203 | 11.5 | 235 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12 | .065 | 32 | .035 | 132 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 32 | 132 | 1 | 1 | .1 | .3 |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.39 | Element | | | |
| Vel Head (ft) | 1.05 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.34 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 12.37 | 698.68 | 69.60 |
| E.G. Slope (ft/ft) | 0.002923 | Area (sq ft) | 12.37 | 698.68 | 69.60 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 20.23 | 5800.40 | 89.38 |
| Top Width (ft) | 173.08 | Top Width (ft) | 7.42 | 100.00 | 65.67 |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | 1.63 | 8.30 | 1.28 |
| Max Chl Dpth (ft) | 10.34 | Hydr. Depth (ft) | 1.67 | 6.99 | 1.06 |
| Conv. Total (cfs) | 109310.4 | Conv. (cfs) | 374.1 | 107283.2 | 1653.1 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 8.13 | 101.58 | 65.71 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.28 | 1.26 | 0.19 |
| Alpha | 1.18 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.03 | 14.64 | 0.73 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.03 | 1.93 | 0.92 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.12 | Element | | | |
| Vel Head (ft) | 0.41 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.70 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 253.80 | |
| E.G. Slope (ft/ft) | 0.003264 | Area (sq ft) | | 253.80 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.33 | Top Width (ft) | | 80.33 | |
| Vel Total (ft/s) | 5.17 | Avg. Vel. (ft/s) | | 5.17 | |
| Max Chl Dpth (ft) | 5.70 | Hydr. Depth (ft) | | 3.16 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 22963.7 | Conv. (cfs) | | 22963.7 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 81.57 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.63 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.00 | 4.49 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.49 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 9.35 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.03 | 500.07 | 1.35 |
| E.G. Slope (ft/ft) | 0.003921 | Area (sq ft) | 2.03 | 500.07 | 1.35 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 2.10 | 3847.29 | 0.61 |
| Top Width (ft) | 110.72 | Top Width (ft) | 3.00 | 100.00 | 7.72 |
| Vel Total (ft/s) | 7.65 | Avg. Vel. (ft/s) | 1.04 | 7.69 | 0.45 |
| Max Chl Dpth (ft) | 8.35 | Hydr. Depth (ft) | 0.68 | 5.00 | 0.18 |
| Conv. Total (cfs) | 61483.9 | Conv. (cfs) | 33.5 | 61440.7 | 9.7 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 3.29 | 101.58 | 7.72 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 1.21 | 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.00 | 10.33 | 0.02 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.82 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.61 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.94 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 9.66 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 3.08 | 531.45 | 4.86 |
| E.G. Slope (ft/ft) | 0.003709 | Area (sq ft) | 3.08 | 531.45 | 4.86 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 3.57 | 4141.19 | 3.24 |
| Top Width (ft) | 118.32 | Top Width (ft) | 3.70 | 100.00 | 14.62 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 1.16 | 7.79 | 0.67 |
| Max Chl Dpth (ft) | 8.66 | Hydr. Depth (ft) | 0.83 | 5.31 | 0.33 |
| Conv. Total (cfs) | 68110.7 | Conv. (cfs) | 58.6 | 67999.0 | 53.2 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 4.06 | 101.58 | 14.63 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.18 | 1.21 | 0.08 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.00 | 10.94 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.85 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.75 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 8.42 | 640.31 | 36.83 |
| E.G. Slope (ft/ft) | 0.003187 | Area (sq ft) | 8.42 | 640.31 | 36.83 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 12.65 | 5236.74 | 40.61 |
| Top Width (ft) | 152.72 | Top Width (ft) | 6.12 | 100.00 | 46.60 |
| Vel Total (ft/s) | 7.72 | Avg. Vel. (ft/s) | 1.50 | 8.18 | 1.10 |
| Max Chl Dpth (ft) | 9.75 | Hydr. Depth (ft) | 1.38 | 6.40 | 0.79 |
| Conv. Total (cfs) | 93710.0 | Conv. (cfs) | 224.0 | 92766.5 | 719.5 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 6.71 | 101.58 | 46.64 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.25 | 1.25 | 0.16 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 13.44 | 0.25 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.02 | 1.92 | 0.40 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.04 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 12.71 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 24.70 | 836.41 | 169.35 |
| E.G. Slope (ft/ft) | 0.002344 | Area (sq ft) | 24.70 | 836.41 | 169.35 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 45.39 | 7009.82 | 324.79 |
| Top Width (ft) | 183.54 | Top Width (ft) | 10.54 | 100.00 | 73.00 |
| Vel Total (ft/s) | 7.16 | Avg. Vel. (ft/s) | 1.84 | 8.38 | 1.92 |
| Max Chl Dpth (ft) | 11.71 | Hydr. Depth (ft) | 2.34 | 8.36 | 2.32 |
| Conv. Total (cfs) | 152445.9 | Conv. (cfs) | 937.6 | 144799.3 | 6709.1 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 11.54 | 101.58 | 74.23 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.31 | 1.20 | 0.33 |
| Alpha | 1.30 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.12 | 17.62 | 3.06 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.08 | 1.95 | 1.80 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 820

INPUT
Description: ADD
Station Elevation Data  num=  24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 10 | 12.5 | 15 | 10.25 | 20 | 8 | 30 | 6.5 |
| 40 | 6 | 50 | 4.5 | 60 | 3.5 | 70 | 1.5 | 80 | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | 1 | 100 | 4 | 110 | 7 | 119.4 | 9 | 119.5 | 9 | | |
| 142.2 | 10 | 142.3 | 10 | 150 | 10 | 160 | 10 | 170 | 11 | | |
| 180 | 11 | 185.5 | 11.5 | 185.6 | 11.5 | 290 | 12 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 15 | .035 | 142.3 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15 | 142.3 | 95 | 95 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.34 | Element | | | |
| Vel Head (ft) | 0.91 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.43 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.55 | 761.88 | 40.00 |
| E.G. Slope (ft/ft) | 0.003087 | Area (sq ft) | 1.55 | 761.88 | 40.00 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.30 | 5859.92 | 48.78 |
| Top Width (ft) | 172.37 | Top Width (ft) | 2.63 | 127.30 | 42.45 |
| Vel Total (ft/s) | 7.36 | Avg. Vel. (ft/s) | 0.84 | 7.69 | 1.22 |
| Max Chl Dpth (ft) | 10.43 | Hydr. Depth (ft) | 0.59 | 5.98 | 0.94 |
| Conv. Total (cfs) | 106370.9 | Conv. (cfs) | 23.5 | 105469.6 | 877.9 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 2.88 | 129.39 | 42.52 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.13 | 0.18 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.03 | 14.62 | 0.73 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 1.93 | 0.92 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.11 | Element | | | |
| Vel Head (ft) | 0.42 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.70 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 253.43 | |
| E.G. Slope (ft/ft) | 0.003278 | Area (sq ft) | | 253.43 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 80.29 | Top Width (ft) | | 80.29 | |
| Vel Total (ft/s) | 5.18 | Avg. Vel. (ft/s) | | 5.18 | |
| Max Chl Dpth (ft) | 5.70 | Hydr. Depth (ft) | | 3.16 | |
| Conv. Total (cfs) | 22917.2 | Conv. (cfs) | | 22917.2 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 81.52 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.00 | 4.48 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.48 | 0.00 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.91 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.35 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 502.71 | |
| E.G. Slope (ft/ft) | 0.004413 | Area (sq ft) | | 502.71 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 110.46 | Top Width (ft) | | 110.46 | |
| Vel Total (ft/s) | 7.66 | Avg. Vel. (ft/s) | | 7.66 | |
| Max Chl Dpth (ft) | 8.35 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 57954.3 | Conv. (cfs) | | 57954.3 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 112.35 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.49 | Cum Volume (acre-ft) | 0.00 | 10.32 | 0.02 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.82 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.59 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.68 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 540.00 | |
| E.G. Slope (ft/ft) | 0.004433 | Area (sq ft) | | 540.00 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 118.58 | Top Width (ft) | | 118.58 | |
| Vel Total (ft/s) | 7.68 | Avg. Vel. (ft/s) | | 7.68 | |
| Max Chl Dpth (ft) | 8.68 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 62301.9 | Conv. (cfs) | | 62301.9 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 120.54 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.24 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.48 | Cum Volume (acre-ft) | 0.00 | 10.93 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.85 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.83 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.37 | 685.12 | 18.10 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.003558 | Area (sq ft) | 0.37 | 685.12 | 18.10 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.21 | 5270.42 | 19.37 |
| Top Width (ft) | 154.57 | Top Width (ft) | 1.29 | 127.30 | 25.99 |
| Vel Total (ft/s) | 7.52 | Avg. Vel. (ft/s) | 0.56 | 7.69 | 1.07 |
| Max Chl Dpth (ft) | 9.83 | Hydr. Depth (ft) | 0.29 | 5.38 | 0.70 |
| Conv. Total (cfs) | 88690.2 | Conv. (cfs) | 3.5 | 88361.8 | 324.8 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 1.41 | 129.39 | 26.03 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 1.18 | 0.15 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.01 | 13.42 | 0.25 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.02 | 1.92 | 0.40 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 12.85 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 7.54 | 942.66 | 216.48 |
| E.G. Slope (ft/ft) | 0.002211 | Area (sq ft) | 7.54 | 942.66 | 216.48 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 9.01 | 7071.98 | 299.01 |
| Top Width (ft) | 280.88 | Top Width (ft) | 5.88 | 127.30 | 147.70 |
| Vel Total (ft/s) | 6.33 | Avg. Vel. (ft/s) | 1.20 | 7.50 | 1.38 |
| Max Chl Dpth (ft) | 11.85 | Hydr. Depth (ft) | 1.28 | 7.41 | 1.47 |
| Conv. Total (cfs) | 156949.4 | Conv. (cfs) | 191.6 | 150398.7 | 6359.1 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 6.43 | 129.39 | 148.63 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.16 | 1.01 | 0.20 |
| Alpha | 1.35 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.12 | 17.60 | 3.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.08 | 1.95 | 1.79 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 725

INPUT
Description: 10
10
Station Elevation Data  num=  22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 14 | 20 | 10 | 30 | 4 | 60 | 4 |
| 70 | 2.8 | 80 | 2.5 | 90 | 2.5 | 100 | 3 | 110 | 4.5 |
| 120 | 7.5 | 126 | 9 | 154 | 10 | 192 | 11 | 235 | 12 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 260 | 13 | 263 | 14 | 266 | 15 | 270 | 16 | 272 | 17 |
| 281 | 19 | 286 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 20 | .04 | 126 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 20 | 126 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.98 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.20 | 714.06 | 59.80 |
| E.G. Slope (ft/ft) | 0.003914 | Area (sq ft) | 1.20 | 714.06 | 59.80 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.02 | 5828.36 | 80.62 |
| Top Width (ft) | 173.76 | Top Width (ft) | 2.45 | 106.00 | 65.31 |
| Vel Total (ft/s) | 7.63 | Avg. Vel. (ft/s) | 0.85 | 8.16 | 1.35 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | 0.49 | 6.74 | 0.92 |
| Conv. Total (cfs) | 94467.6 | Conv. (cfs) | 16.3 | 93162.6 | 1288.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.64 | 108.49 | 65.34 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.11 | 1.61 | 0.22 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.03 | 13.01 | 0.62 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.03 | 1.68 | 0.80 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.68 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.49 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.19 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 233.26 | |
| E.G. Slope (ft/ft) | 0.006471 | Area (sq ft) | | 233.26 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 89.27 | Top Width (ft) | | 89.27 | |
| Vel Total (ft/s) | 5.62 | Avg. Vel. (ft/s) | | 5.62 | |
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.61 | |
| Conv. Total (cfs) | 16310.2 | Conv. (cfs) | | 16310.2 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 90.33 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.33 | Cum Volume (acre-ft) | 0.00 | 3.95 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.30 | 0.00 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.76 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.76 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 480.32 | |
| E.G. Slope (ft/ft) | 0.006140 | Area (sq ft) | | 480.32 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 102.99 | Top Width (ft) | | 102.99 | |
| Vel Total (ft/s) | 8.02 | Avg. Vel. (ft/s) | | 8.02 | |
| Max Chl Dpth (ft) | 6.26 | Hydr. Depth (ft) | | 4.66 | |
| Conv. Total (cfs) | 49134.6 | Conv. (cfs) | | 49134.6 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 105.11 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.75 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.69 | Cum Volume (acre-ft) | 0.00 | 9.25 | 0.02 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.58 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.01 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.10 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 514.99 | 0.13 |
| E.G. Slope (ft/ft) | 0.005766 | Area (sq ft) | | 514.99 | 0.13 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4147.97 | 0.03 |
| Top Width (ft) | 107.22 | Top Width (ft) | | 104.50 | 2.72 |
| Vel Total (ft/s) | 8.05 | Avg. Vel. (ft/s) | | 8.05 | 0.23 |
| Max Chl Dpth (ft) | 6.60 | Hydr. Depth (ft) | | 4.93 | 0.05 |
| Conv. Total (cfs) | 54626.0 | Conv. (cfs) | | 54625.6 | 0.4 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 106.73 | 2.72 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.74 | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.64 | Cum Volume (acre-ft) | 0.00 | 9.78 | 0.03 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.61 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.32 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.13 | 644.27 | 25.04 |
| E.G. Slope (ft/ft) | 0.004495 | Area (sq ft) | 0.13 | 644.27 | 25.04 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.06 | 5262.01 | 27.94 |
| Top Width (ft) | 147.09 | Top Width (ft) | 0.81 | 106.00 | 40.28 |
| Vel Total (ft/s) | 7.90 | Avg. Vel. (ft/s) | 0.43 | 8.17 | 1.12 |
| Max Chl Dpth (ft) | 7.82 | Hydr. Depth (ft) | 0.16 | 6.08 | 0.62 |
| Conv. Total (cfs) | 78903.6 | Conv. (cfs) | 0.8 | 78486.0 | 416.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.87 | 108.49 | 40.31 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.04 | 1.67 | 0.17 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.49 | Cum Volume (acre-ft) | 0.01 | 11.97 | 0.20 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.02 | 1.66 | 0.33 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.44 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.95 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.49 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 7.72 | 873.50 | 204.41 |
| E.G. Slope (ft/ft) | 0.002895 | Area (sq ft) | 7.72 | 873.50 | 204.41 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.45 | 7013.32 | 356.23 |
| Top Width (ft) | 233.36 | Top Width (ft) | 6.21 | 106.00 | 121.15 |
| Vel Total (ft/s) | 6.80 | Avg. Vel. (ft/s) | 1.35 | 8.03 | 1.74 |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 1.24 | 8.24 | 1.69 |
| Conv. Total (cfs) | 137168.8 | Conv. (cfs) | 194.3 | 130353.5 | 6621.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 6.69 | 108.49 | 121.20 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.21 | 1.46 | 0.30 |
| Alpha | 1.33 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.10 | 15.62 | 2.60 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.06 | 1.70 | 1.50 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 575

INPUT
Description: 9
Station Elevation Data  num=  18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 13.5 | 17 | 8.25 | 20 | 6 | 30 | 1.5 |
| 40 | 1.5 | 50 | 1.5 | 60 | 2.25 | 70 | 2.8 | 80 | 3.1 |
| 110 | 3.1 | 120 | 4 | 130 | 7 | 140 | 9 | 172 | 10 |
| 230 | 11 | 280 | 12 | 280.1 | 16 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 17 | .04 | 140 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 17 | 140 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.82 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.39 | 904.54 | 61.45 |
| E.G. Slope (ft/ft) | 0.002176 | Area (sq ft) | 4.39 | 904.54 | 61.45 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.76 | 5849.98 | 55.25 |
| Top Width (ft) | 205.77 | Top Width (ft) | 3.42 | 123.00 | 79.35 |
| Vel Total (ft/s) | 6.09 | Avg. Vel. (ft/s) | 1.09 | 6.47 | 0.90 |
| Max Chl Dpth (ft) | 9.32 | Hydr. Depth (ft) | 1.28 | 7.35 | 0.77 |
| Conv. Total (cfs) | 126703.0 | Conv. (cfs) | 102.1 | 125416.3 | 1184.5 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.28 | 125.44 | 79.37 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.14 | 0.98 | 0.11 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.02 | 10.23 | 0.41 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 1.28 | 0.55 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.33 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.64 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 197.15 | |
| E.G. Slope (ft/ft) | 0.012975 | Area (sq ft) | | 197.15 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 99.11 | Top Width (ft) | | 99.11 | |
| Vel Total (ft/s) | 6.65 | Avg. Vel. (ft/s) | | 6.65 | |
| Max Chl Dpth (ft) | 3.14 | Hydr. Depth (ft) | | 1.99 | |
| Conv. Total (cfs) | 11518.0 | Conv. (cfs) | | 11518.0 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 99.96 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.60 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.16 | Cum Volume (acre-ft) | 0.00 | 3.21 | 0.00 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.97 | 0.00 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.000 | 0.040 | |
| W.S. Elev (ft) | 8.32 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.00 | 598.52 | |
| E.G. Slope (ft/ft) | 0.003596 | Area (sq ft) | 0.00 | 598.52 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3850.00 | |
| Top Width (ft) | 119.69 | Top Width (ft) | 0.09 | 119.59 | |
| Vel Total (ft/s) | 6.43 | Avg. Vel. (ft/s) | 0.13 | 6.43 | |
| Max Chl Dpth (ft) | 6.82 | Hydr. Depth (ft) | 0.03 | 5.00 | |
| Conv. Total (cfs) | 64204.0 | Conv. (cfs) | 0.0 | 64204.0 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.11 | 121.97 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.10 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.00 | 7.39 | 0.02 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.20 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.71 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.14 | 645.69 | |
| E.G. Slope (ft/ft) | 0.003312 | Area (sq ft) | 0.14 | 645.69 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.06 | 4147.94 | |
| Top Width (ft) | 122.16 | Top Width (ft) | 0.61 | 121.55 | |
| Vel Total (ft/s) | 6.42 | Avg. Vel. (ft/s) | 0.43 | 6.42 | |
| Max Chl Dpth (ft) | 7.21 | Hydr. Depth (ft) | 0.23 | 5.31 | |
| Conv. Total (cfs) | 72074.4 | Conv. (cfs) | 1.0 | 72073.3 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.77 | 123.96 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.04 | 1.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 7.78 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.22 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.65 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.10 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.28 | 816.53 | 19.52 |
| E.G. Slope (ft/ft) | 0.002487 | Area (sq ft) | 2.28 | 816.53 | 19.52 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 2.13 | 5273.56 | 14.31 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 163.32 | Top Width (ft) | 2.47 | 123.00 | 37.85 |
| Vel Total (ft/s) | 6.31 | Avg. Vel. (ft/s) | 0.93 | 6.46 | 0.73 |
| Max Chl Dpth (ft) | 8.60 | Hydr. Depth (ft) | 0.93 | 6.64 | 0.52 |
| Conv. Total (cfs) | 106074.6 | Conv. (cfs) | 42.7 | 105745.0 | 286.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.08 | 125.44 | 37.87 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.11 | 1.01 | 0.08 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.01 | 9.46 | 0.13 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.27 | 0.19 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.41 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 11.53 | 1100.49 | 249.33 |
| E.G. Slope (ft/ft) | 0.001633 | Area (sq ft) | 11.53 | 1100.49 | 249.33 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 14.96 | 7027.33 | 337.70 |
| Top Width (ft) | 268.56 | Top Width (ft) | 5.55 | 123.00 | 140.01 |
| Vel Total (ft/s) | 5.42 | Avg. Vel. (ft/s) | 1.30 | 6.39 | 1.35 |
| Max Chl Dpth (ft) | 10.91 | Hydr. Depth (ft) | 2.08 | 8.95 | 1.78 |
| Conv. Total (cfs) | 182619.6 | Conv. (cfs) | 370.2 | 173892.8 | 8356.6 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 6.93 | 125.44 | 140.44 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.17 | 0.89 | 0.18 |
| Alpha | 1.32 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.23 | Cum Volume (acre-ft) | 0.07 | 12.22 | 1.81 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.04 | 1.30 | 1.05 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 425

INPUT
Description: 8
Station Elevation Data  num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 11 | 12 | 9.8 | 20 | 5 | 30 | 0 |
| 70 | 0 | 80 | .5 | 90 | 1.5 | 100 | 2 | 110 | 5.5 |
| 117.4 | 9 | 160 | 10 | 210 | 10 | 265 | 11 | 268 | 12 |
| 275 | 13 | 280 | 14 | | | | | | |

Manning's n Values  num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 12 | .04 | 117.4 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 12 | 117.4 | 90 | 90 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.65 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.51 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.42 | 902.74 | 76.06 |
| E.G. Slope (ft/ft) | 0.001827 | Area (sq ft) | 0.42 | 902.74 | 76.06 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.19 | 5855.22 | 54.59 |
| Top Width (ft) | 227.41 | Top Width (ft) | 1.19 | 105.40 | 120.82 |
| Vel Total (ft/s) | 6.04 | Avg. Vel. (ft/s) | 0.44 | 6.49 | 0.72 |
| Max Chl Dpth (ft) | 10.51 | Hydr. Depth (ft) | 0.36 | 8.56 | 0.63 |
| Conv. Total (cfs) | 138249.0 | Conv. (cfs) | 4.4 | 136967.6 | 1277.1 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 1.39 | 109.37 | 120.84 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.03 | 0.94 | 0.07 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.01 | 7.11 | 0.17 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.89 | 0.21 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.46 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.64 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 241.53 | |
| E.G. Slope (ft/ft) | 0.005159 | Area (sq ft) | | 241.53 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 81.94 | Top Width (ft) | | 81.94 | |
| Vel Total (ft/s) | 5.43 | Avg. Vel. (ft/s) | | 5.43 | |
| Max Chl Dpth (ft) | 3.64 | Hydr. Depth (ft) | | 2.95 | |
| Conv. Total (cfs) | 18265.6 | Conv. (cfs) | | 18265.6 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 83.16 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.94 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 2.46 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.66 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.57 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.94 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 635.41 | |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.002359 | Area (sq ft) | | 635.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 100.05 | Top Width (ft) | | 100.05 | |
| Vel Total (ft/s) | 6.06 | Avg. Vel. (ft/s) | | 6.06 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | | 6.35 | |
| Conv. Total (cfs) | 79260.7 | Conv. (cfs) | | 79260.7 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 103.26 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.91 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.00 | 5.27 | 0.02 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.82 | 0.01 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.58 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.34 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 676.07 | |
| E.G. Slope (ft/ft) | 0.002277 | Area (sq ft) | | 676.07 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 101.58 | Top Width (ft) | | 101.58 | |
| Vel Total (ft/s) | 6.14 | Avg. Vel. (ft/s) | | 6.14 | |
| Max Chl Dpth (ft) | 8.34 | Hydr. Depth (ft) | | 6.66 | |
| Conv. Total (cfs) | 86926.8 | Conv. (cfs) | | 86926.8 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 104.99 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.92 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.00 | 5.50 | 0.03 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.84 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 824.66 | 12.71 |
| E.G. Slope (ft/ft) | 0.002010 | Area (sq ft) | | 824.66 | 12.71 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5283.10 | 6.90 |
| Top Width (ft) | 138.26 | Top Width (ft) | | 105.35 | 32.90 |
| Vel Total (ft/s) | 6.32 | Avg. Vel. (ft/s) | | 6.41 | 0.54 |
| Max Chl Dpth (ft) | 9.77 | Hydr. Depth (ft) | | 7.83 | 0.39 |
| Conv. Total (cfs) | 117990.1 | Conv. (cfs) | | 117836.1 | 154.0 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 109.31 | 32.91 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.95 | 0.05 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.01 | 6.63 | 0.07 |

| | | | | |
|---|---|---|---|---|
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.88 | 0.07 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.18 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.56 | 1078.68 | 318.10 |
| E.G. Slope (ft/ft) | 0.001414 | Area (sq ft) | 4.56 | 1078.68 | 318.10 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 4.02 | 6928.81 | 447.16 |
| Top Width (ft) | 260.97 | Top Width (ft) | 3.69 | 105.40 | 151.88 |
| Vel Total (ft/s) | 5.27 | Avg. Vel. (ft/s) | 0.88 | 6.42 | 1.41 |
| Max Chl Dpth (ft) | 12.18 | Hydr. Depth (ft) | 1.24 | 10.23 | 2.09 |
| Conv. Total (cfs) | 196291.8 | Conv. (cfs) | 107.0 | 184291.2 | 11893.6 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 4.39 | 109.37 | 152.07 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.09 | 0.87 | 0.18 |
| Alpha | 1.40 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.04 | 8.47 | 0.84 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.03 | 0.91 | 0.55 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 335

INPUT
Description: 7
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 12.5 | 18 | 8.1 | 20 | 7 | 30 | 1.5 |
| 40 | -.5 | 50 | -2 | 60 | -2 | 70 | -2 | 80 | 0 |
| 90 | 4 | 100 | 9 | 135 | 10 | 175 | 10 | 205 | 11 |
| 260 | 11 | 260.1 | 16 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 18 | .04 | 100 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 18 | 100 | 73 | 73 | 73 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 9.90 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.96 | 726.97 | 14.28 |
| E.G. Slope (ft/ft) | 0.002776 | Area (sq ft) | 2.96 | 726.97 | 14.28 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 3.04 | 5896.84 | 10.12 |
| Top Width (ft) | 116.89 | Top Width (ft) | 3.28 | 82.00 | 31.61 |
| Vel Total (ft/s) | 7.94 | Avg. Vel. (ft/s) | 1.03 | 8.11 | 0.71 |
| Max Chl Dpth (ft) | 11.90 | Hydr. Depth (ft) | 0.90 | 8.87 | 0.45 |
| Conv. Total (cfs) | 112178.6 | Conv. (cfs) | 57.8 | 111928.8 | 192.1 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 3.74 | 86.15 | 31.63 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.14 | 1.46 | 0.08 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.28 | Cum Volume (acre-ft) | 0.01 | 5.43 | 0.08 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 0.70 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.68 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.18 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 231.87 | |
| E.G. Slope (ft/ft) | 0.004046 | Area (sq ft) | | 231.87 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 61.02 | Top Width (ft) | | 61.02 | |
| Vel Total (ft/s) | 5.66 | Avg. Vel. (ft/s) | | 5.66 | |
| Max Chl Dpth (ft) | 5.18 | Hydr. Depth (ft) | | 3.80 | |
| Conv. Total (cfs) | 20627.0 | Conv. (cfs) | | 20627.0 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 62.57 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 0.94 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.37 | Cum Volume (acre-ft) | 0.00 | 1.97 | 0.00 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.52 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.23 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.40 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 524.52 | |
| E.G. Slope (ft/ft) | 0.003241 | Area (sq ft) | | 524.52 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 77.52 | Top Width (ft) | | 77.52 | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 7.34 | Avg. Vel. (ft/s) | | 7.34 | |
| Max Chl Dpth (ft) | 9.40 | Hydr. Depth (ft) | | 6.77 | |
| Conv. Total (cfs) | 67630.2 | Conv. (cfs) | | 67630.2 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 81.11 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.31 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.00 | 4.07 | 0.02 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.64 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.66 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.79 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 555.22 | |
| E.G. Slope (ft/ft) | 0.003199 | Area (sq ft) | | 555.22 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 79.02 | Top Width (ft) | | 79.02 | |
| Vel Total (ft/s) | 7.47 | Avg. Vel. (ft/s) | | 7.47 | |
| Max Chl Dpth (ft) | 9.79 | Hydr. Depth (ft) | | 7.03 | |
| Conv. Total (cfs) | 73340.6 | Conv. (cfs) | | 73340.6 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 82.80 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.00 | 4.23 | 0.03 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.65 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.18 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.07 | 667.92 | 0.59 |
| E.G. Slope (ft/ft) | 0.002961 | Area (sq ft) | 1.07 | 667.92 | 0.59 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.81 | 5289.04 | 0.15 |
| Top Width (ft) | 90.38 | Top Width (ft) | 1.97 | 82.00 | 6.41 |
| Vel Total (ft/s) | 7.90 | Avg. Vel. (ft/s) | 0.76 | 7.92 | 0.25 |
| Max Chl Dpth (ft) | 11.18 | Hydr. Depth (ft) | 0.54 | 8.15 | 0.09 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 97208.9 | Conv. (cfs) | 14.8 | 97191.4 | 2.7 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 2.25 | 86.15 | 6.41 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.09 | 1.43 | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 5.09 | 0.06 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.68 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.59 | Element | | | |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.57 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.93 | 863.45 | 198.34 |
| E.G. Slope (ft/ft) | 0.002277 | Area (sq ft) | 10.93 | 863.45 | 198.34 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.76 | 7115.18 | 249.06 |
| Top Width (ft) | 248.32 | Top Width (ft) | 6.30 | 82.00 | 160.01 |
| Vel Total (ft/s) | 6.88 | Avg. Vel. (ft/s) | 1.44 | 8.24 | 1.26 |
| Max Chl Dpth (ft) | 13.57 | Hydr. Depth (ft) | 1.73 | 10.53 | 1.24 |
| Conv. Total (cfs) | 154651.5 | Conv. (cfs) | 330.3 | 149102.0 | 5219.2 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 7.20 | 86.15 | 160.60 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.22 | 1.42 | 0.18 |
| Alpha | 1.38 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.02 | 6.46 | 0.30 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.02 | 0.72 | 0.23 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 262

INPUT
Description: 6
6
6
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 7 | 9.1 | 10 | 7 | 20 | 1 | 30 | -2 |
| 40 | -3 | 50 | -3 | 60 | 0 | 70 | 5 | 80 | 9.5 |
| 135 | 11 | 175 | 12 | 255 | 13 | 282 | 14 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 7 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 7 | 80 | 75 | 75 | 75 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.74 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.83 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 558.57 | |
| E.G. Slope (ft/ft) | 0.005707 | Area (sq ft) | | 558.57 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 71.13 | Top Width (ft) | | 71.13 | |
| Vel Total (ft/s) | 10.58 | Avg. Vel. (ft/s) | | 10.58 | |
| Max Chl Dpth (ft) | 11.83 | Hydr. Depth (ft) | | 7.85 | |
| Conv. Total (cfs) | 78231.2 | Conv. (cfs) | | 78231.2 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 76.30 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.61 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 4.35 | 0.07 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.57 | 0.02 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.46 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.27 | |
| E.G. Slope (ft/ft) | 0.006684 | Area (sq ft) | | 181.27 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.36 | Top Width (ft) | | 47.36 | |
| Vel Total (ft/s) | 7.24 | Avg. Vel. (ft/s) | | 7.24 | |
| Max Chl Dpth (ft) | 5.46 | Hydr. Depth (ft) | | 3.83 | |
| Conv. Total (cfs) | 16047.3 | Conv. (cfs) | | 16047.3 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 49.27 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 1.54 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.44 | Cum Volume (acre-ft) | 0.00 | 1.62 | 0.00 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.00 | 0.42 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.85 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.48 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.37 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 394.89 | |
| E.G. Slope (ft/ft) | 0.006329 | Area (sq ft) | | 394.89 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.01 | Top Width (ft) | | 62.01 | |
| Vel Total (ft/s) | 9.75 | Avg. Vel. (ft/s) | | 9.75 | |
| Max Chl Dpth (ft) | 9.37 | Hydr. Depth (ft) | | 6.37 | |
| Conv. Total (cfs) | 48392.9 | Conv. (cfs) | | 48392.9 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 65.91 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.37 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.00 | 3.30 | 0.02 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.52 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.74 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 418.05 | |
| E.G. Slope (ft/ft) | 0.006275 | Area (sq ft) | | 418.05 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 63.45 | Top Width (ft) | | 63.45 | |
| Vel Total (ft/s) | 9.92 | Avg. Vel. (ft/s) | | 9.92 | |
| Max Chl Dpth (ft) | 9.74 | Hydr. Depth (ft) | | 6.59 | |
| Conv. Total (cfs) | 52362.1 | Conv. (cfs) | | 52362.1 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 67.52 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.43 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.00 | 3.42 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.53 | 0.02 |

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.10 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 507.69 | |
| E.G. Slope (ft/ft) | 0.005954 | Area (sq ft) | | 507.69 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 68.47 | Top Width (ft) | | 68.47 | |
| Vel Total (ft/s) | 10.42 | Avg. Vel. (ft/s) | | 10.42 | |
| Max Chl Dpth (ft) | 11.10 | Hydr. Depth (ft) | | 7.41 | |
| Conv. Total (cfs) | 68556.3 | Conv. (cfs) | | 68556.3 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 73.25 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.00 | 4.10 | 0.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.56 | 0.02 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.85 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.41 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.23 | 673.56 | 15.31 |
| E.G. Slope (ft/ft) | 0.004923 | Area (sq ft) | 1.23 | 673.56 | 15.31 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 1.31 | 7364.13 | 14.57 |
| Top Width (ft) | 108.39 | Top Width (ft) | 1.88 | 73.00 | 33.51 |
| Vel Total (ft/s) | 10.69 | Avg. Vel. (ft/s) | 1.06 | 10.93 | 0.95 |
| Max Chl Dpth (ft) | 13.41 | Hydr. Depth (ft) | 0.66 | 9.23 | 0.46 |
| Conv. Total (cfs) | 105185.4 | Conv. (cfs) | 18.7 | 104959.1 | 207.6 |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 2.29 | 78.40 | 33.52 |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.17 | 2.64 | 0.14 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.01 | 5.17 | 0.13 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 0.59 | 0.06 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 187

INPUT
Description: 5
Station Elevation Data  num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 8 | 9.2 | 10 | 8 | 20 | 1.5 | 30 | -2.5 |
| 40 | -4 | 50 | -4 | 60 | -1 | 70 | 4 | 80 | 9.5 |
| 115 | 13 | 141 | 13 | 185 | 14 | | | | |

Manning's n Values  num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 80 | 50 | 50 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 84 | 185 | 14.5 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.70 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.44 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.94 | Flow Area (sq ft) | | 564.77 | |
| E.G. Slope (ft/ft) | 0.005330 | Area (sq ft) | | 564.77 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 68.82 | Top Width (ft) | | 68.82 | |
| Vel Total (ft/s) | 10.46 | Avg. Vel. (ft/s) | | 10.46 | |
| Max Chl Dpth (ft) | 12.44 | Hydr. Depth (ft) | | 8.21 | |
| Conv. Total (cfs) | 80952.3 | Conv. (cfs) | | 80952.3 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 74.52 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.52 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 3.39 | 0.07 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.45 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.11 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 0.60 | Flow Area (sq ft) | | 197.00 | |
| E.G. Slope (ft/ft) | 0.005083 | Area (sq ft) | | 197.00 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.17 | Top Width (ft) | | 47.17 | |
| Vel Total (ft/s) | 6.66 | Avg. Vel. (ft/s) | | 6.66 | |
| Max Chl Dpth (ft) | 6.11 | Hydr. Depth (ft) | | 4.18 | |
| Conv. Total (cfs) | 18401.8 | Conv. (cfs) | | 18401.8 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 49.41 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 1.27 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.00 | 1.30 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.34 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water

surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.40 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.98 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.99 | Flow Area (sq ft) | | 405.37 | |
| E.G. Slope (ft/ft) | 0.005674 | Area (sq ft) | | 405.37 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 60.48 | Top Width (ft) | | 60.48 | |
| Vel Total (ft/s) | 9.50 | Avg. Vel. (ft/s) | | 9.50 | |
| Max Chl Dpth (ft) | 9.98 | Hydr. Depth (ft) | | 6.70 | |
| Conv. Total (cfs) | 51112.5 | Conv. (cfs) | | 51112.5 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 64.82 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.00 | 2.61 | 0.02 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.42 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.46 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.34 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.29 | Flow Area (sq ft) | | 427.77 | |
| E.G. Slope (ft/ft) | 0.005668 | Area (sq ft) | | 427.77 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 61.72 | Top Width (ft) | | 61.72 | |
| Vel Total (ft/s) | 9.70 | Avg. Vel. (ft/s) | | 9.70 | |
| Max Chl Dpth (ft) | 10.34 | Hydr. Depth (ft) | | 6.93 | |
| Conv. Total (cfs) | 55097.6 | Conv. (cfs) | | 55097.6 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 66.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.28 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.00 | 2.69 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.42 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.64 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.71 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.39 | Flow Area (sq ft) | | 515.03 | |
| E.G. Slope (ft/ft) | 0.005505 | Area (sq ft) | | 515.03 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 66.29 | Top Width (ft) | | 66.29 | |
| Vel Total (ft/s) | 10.27 | Avg. Vel. (ft/s) | | 10.27 | |
| Max Chl Dpth (ft) | 11.71 | Hydr. Depth (ft) | | 7.77 | |
| Conv. Total (cfs) | 71301.0 | Conv. (cfs) | | 71301.0 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 71.59 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.47 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.00 | 3.22 | 0.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.44 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.07 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 7.13 | Flow Area (sq ft) | 0.63 | 680.26 | 1.48 |
| E.G. Slope (ft/ft) | 0.004763 | Area (sq ft) | 0.63 | 680.26 | 1.62 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.51 | 7378.29 | 1.19 |
| Top Width (ft) | 79.14 | Top Width (ft) | 1.45 | 72.00 | 5.69 |
| Vel Total (ft/s) | 10.82 | Avg. Vel. (ft/s) | 0.82 | 10.85 | 0.81 |
| Max Chl Dpth (ft) | 14.07 | Hydr. Depth (ft) | 0.43 | 9.45 | 0.37 |
| Conv. Total (cfs) | 106933.9 | Conv. (cfs) | 7.4 | 106909.2 | 17.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.69 | 78.17 | 4.02 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.11 | 2.59 | 0.11 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 4.01 | 0.11 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 0.46 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 166

```
INPUT
Description: Pedestrian Bridge
Distance from Upstream XS =      21
Deck/Roadway Width        =      14
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      16       0       6      16       0       6      16      14
      81      14      12      81      14       0     115      13       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      14       8     9.2      10       8      20     1.5      30    -2.5
      40      -4      50      -4      60      -1      70       4      80     9.5
     115      13     141      13     185      14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065       8     .04      80    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
            8      80            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
      84     185    14.5       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      16       0       6      16       0       6      16      14
      81      14      12      81      14       0     115      13       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      14      10     8.3      20     2.5      30    -2.5      40    -3.7
      50      -4      60      -2      70       3      80       9      90      14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065      10     .04      80    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
           10      80            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
```

84 90 14.5 F

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 =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Element | Inside BR US | Inside BR DS |
|---|---|---|---|---|---|
| E.G. US. (ft) | 10.14 | | E.G. Elev (ft) | 10.02 | 9.93 |
| W.S. US. (ft) | 8.44 | | W.S. Elev (ft) | 8.22 | 8.15 |
| Q Total (cfs) | 5910.00 | | Crit W.S. (ft) | 5.94 | 5.85 |
| Q Bridge (cfs) | 5910.00 | | Max Chl Dpth (ft) | 12.22 | 12.15 |
| Q Weir (cfs) | | | Vel Total (ft/s) | 10.75 | 10.71 |
| Weir Sta Lft (ft) | | | Flow Area (sq ft) | 549.69 | 551.62 |
| Weir Sta Rgt (ft) | | | Froude # Chl | 0.67 | 0.66 |
| Weir Submerg | | | Specif Force (cu ft) | 4682.83 | 4678.50 |
| Weir Max Depth (ft) | | | Hydr Depth (ft) | 8.08 | 8.07 |
| Min El Weir Flow (ft) | 13.92 | | W.P. Total (ft) | 73.63 | 73.91 |
| Min El Prs (ft) | 14.00 | | Conv. Total (cfs) | 78001.3 | 78262.5 |
| Delta EG (ft) | 0.31 | | Top Width (ft) | 68.05 | 68.32 |
| Delta WS (ft) | 0.47 | | Frctn Loss (ft) | 0.08 | 0.09 |
| BR Open Area (sq ft) | 901.15 | | C & E Loss (ft) | 0.00 | 0.01 |
| BR Open Vel (ft/s) | 10.75 | | Shear Total (lb/sq ft) | 2.68 | 2.66 |
| Coef of Q | | | Power Total (lb/ft s) | 0.00 | 0.00 |
| Br Sel Method | Energy only | | | | |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water

surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 2.80 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 2.11 | E.G. Elev (ft) | 2.68 | 2.60 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 1.93 | 1.85 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.59 | 0.50 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 5.93 | 5.85 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 6.97 | 6.96 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 188.32 | 188.64 |
| Weir Submerg | | Froude # Chl | 0.61 | 0.61 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 740.84 | 734.29 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 4.05 | 4.07 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 48.65 | 48.60 |
| Delta EG (ft) | 0.30 | Conv. Total (cfs) | 17246.4 | 17307.2 |
| Delta WS (ft) | 0.42 | Top Width (ft) | 46.51 | 46.39 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.08 | 0.09 |
| BR Open Vel (ft/s) | 6.97 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.40 | 1.39 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.38 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 5.98 | E.G. Elev (ft) | 7.24 | 7.15 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 5.73 | 5.65 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.98 | 3.90 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.73 | 9.65 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.85 | 9.84 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 390.78 | 391.30 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.68 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2721.40 | 2713.38 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 6.55 | 6.54 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 63.87 | 64.06 |
| Delta EG (ft) | 0.34 | Conv. Total (cfs) | 48559.3 | 48573.6 |
| Delta WS (ft) | 0.54 | Top Width (ft) | 59.67 | 59.84 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.09 | 0.10 |
| BR Open Vel (ft/s) | 9.85 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.40 | 2.40 |

| | | | | |
|---|---|---|---|---|
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.80 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 6.34 | E.G. Elev (ft) | 7.67 | 7.58 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 6.10 | 6.01 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.29 | 4.20 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.10 | 10.01 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.05 | 10.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 412.84 | 413.47 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.68 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2984.76 | 2976.88 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 6.78 | 6.77 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 65.30 | 65.50 |
| Delta EG (ft) | 0.33 | Conv. Total (cfs) | 52432.9 | 52462.7 |
| Delta WS (ft) | 0.54 | Top Width (ft) | 60.90 | 61.09 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.09 | 0.10 |
| BR Open Vel (ft/s) | 10.05 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.47 | 2.46 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 9.35 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 7.71 | E.G. Elev (ft) | 9.21 | 9.13 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 7.47 | 7.40 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.40 | 5.30 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.47 | 11.40 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.59 | 10.56 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 499.65 | 501.01 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.67 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4055.74 | 4049.51 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 7.63 | 7.62 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 70.67 | 70.93 |
| Delta EG (ft) | 0.32 | Conv. Total (cfs) | 68369.7 | 68513.6 |

| | | | | |
|---|---|---|---|---|
| Delta WS (ft) | 0.50 | Top Width (ft) | 65.51 | 65.77 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.08 | 0.09 |
| BR Open Vel (ft/s) | 10.59 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.64 | 2.63 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 11.90 | Element | | |
| W.S. US. (ft) | 10.07 | E.G. Elev (ft) | 11.78 | 11.71 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 9.88 | 9.82 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 7.13 | 7.04 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.88 | 13.82 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.05 | 11.01 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 667.59 | 670.26 |
| Weir Submerg | | Froude # Chl | 0.52 | 0.52 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6253.85 | 6260.42 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 9.00 | 9.10 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 80.51 | 80.04 |
| Delta EG (ft) | 0.26 | Conv. Total (cfs) | 103433.0 | 105776.4 |
| Delta WS (ft) | 0.39 | Top Width (ft) | 74.14 | 73.66 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.07 | 0.07 |
| BR Open Vel (ft/s) | 11.05 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.64 | 2.54 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 137

INPUT
Description: 4
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 80 | 77 | 77 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 84 | 90 | 14.5 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.84 | Element | | | |
| Vel Head (ft) | 1.86 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.97 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.85 | Flow Area (sq ft) | | 539.62 | |
| E.G. Slope (ft/ft) | 0.006060 | Area (sq ft) | | 539.62 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 67.73 | Top Width (ft) | | 67.73 | |
| Vel Total (ft/s) | 10.95 | Avg. Vel. (ft/s) | | 10.95 | |
| Max Chl Dpth (ft) | 11.97 | Hydr. Depth (ft) | | 7.97 | |
| Conv. Total (cfs) | 75920.1 | Conv. (cfs) | | 75920.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 73.21 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.79 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | 0.01 | 2.75 | 0.07 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.37 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.50 | Element | | | |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.69 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 0.51 | Flow Area (sq ft) | | 181.49 | |
| E.G. Slope (ft/ft) | 0.006412 | Area (sq ft) | | 181.49 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 45.77 | Top Width (ft) | | 45.77 | |
| Vel Total (ft/s) | 7.23 | Avg. Vel. (ft/s) | | 7.23 | |
| Max Chl Dpth (ft) | 5.69 | Hydr. Depth (ft) | | 3.97 | |
| Conv. Total (cfs) | 16384.2 | Conv. (cfs) | | 16384.2 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 47.91 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 1.52 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.21 | Cum Volume (acre-ft) | 0.00 | 1.08 | 0.00 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.29 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.44 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.89 | Flow Area (sq ft) | | 378.85 | |
| E.G. Slope (ft/ft) | 0.006877 | Area (sq ft) | | 378.85 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 59.13 | Top Width (ft) | | 59.13 | |
| Vel Total (ft/s) | 10.16 | Avg. Vel. (ft/s) | | 10.16 | |
| Max Chl Dpth (ft) | 9.44 | Hydr. Depth (ft) | | 6.41 | |
| Conv. Total (cfs) | 46424.9 | Conv. (cfs) | | 46424.9 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 63.23 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.00 | 2.16 | 0.02 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.00 | 0.35 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.47 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.66 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.81 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 400.81 | |
| E.G. Slope (ft/ft) | 0.006819 | Area (sq ft) | | 400.81 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 60.38 | Top Width (ft) | | 60.38 | |
| Vel Total (ft/s) | 10.35 | Avg. Vel. (ft/s) | | 10.35 | |
| Max Chl Dpth (ft) | 9.81 | Hydr. Depth (ft) | | 6.64 | |
| Conv. Total (cfs) | 50233.4 | Conv. (cfs) | | 50233.4 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 64.68 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.00 | 2.21 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.35 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.02 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.82 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.20 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.30 | Flow Area (sq ft) | | 488.44 | |
| E.G. Slope (ft/ft) | 0.006396 | Area (sq ft) | | 488.44 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.11 | Top Width (ft) | | 65.11 | |
| Vel Total (ft/s) | 10.83 | Avg. Vel. (ft/s) | | 10.83 | |
| Max Chl Dpth (ft) | 11.20 | Hydr. Depth (ft) | | 7.50 | |
| Conv. Total (cfs) | 66144.0 | Conv. (cfs) | | 66144.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 70.18 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.78 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.00 | 2.65 | 0.06 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 0.36 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.63 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.95 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.68 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 7.04 | Flow Area (sq ft) | 1.67 | 658.13 | 0.46 |
| E.G. Slope (ft/ft) | 0.005108 | Area (sq ft) | 1.67 | 658.13 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 1.94 | 7377.72 | 0.34 |
| Top Width (ft) | 73.78 | Top Width (ft) | 2.42 | 70.00 | 1.36 |
| Vel Total (ft/s) | 11.18 | Avg. Vel. (ft/s) | 1.16 | 11.21 | 0.74 |
| Max Chl Dpth (ft) | 13.68 | Hydr. Depth (ft) | 0.69 | 9.40 | 0.34 |
| Conv. Total (cfs) | 103257.5 | Conv. (cfs) | 27.2 | 103225.6 | 4.8 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | 2.79 | 75.86 | 1.52 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.19 | 2.77 | 0.10 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 3.24 | 0.11 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.38 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 98.5

INPUT
Description: Maine Ave.
Distance from Upstream XS = 22
Deck/Roadway Width = 38
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 15.2 | -10 | 4.5 | 15.2 | -10 |
| 4.5 | 15.2 | 11.5 | 79.5 | 15.2 | -10 |
| 100 | 15 | -10 | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.
10 80 .3 .5
Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 84 | 90 | 14.5 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 15.2 | -10 | 4.5 | 15.2 | -10 |
| 4.5 | 15.2 | 11.5 | 79.5 | 15.2 | -10 |
| 100 | 15 | -10 | | | |

Downstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 13.5 | 14 | 15.2 | 3 | 25.3 | -4 | 33.6 | -5 | 48.2 | -5 |

```
    52.6      -4    65.7       0    76.2       7    80.2     8.5    80.3      12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    13.5    .065    15.2     .04    65.7    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
          15.2    65.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    13.5      16      15       F
      72    80.3      15       F

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =      .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #Q100

  E.G. US. (ft)                  9.84    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)                  7.97    E.G. Elev (ft)                 9.62          9.28
  Q Total (cfs)               5910.00    W.S. Elev (ft)                 7.55          7.51
  Q Bridge (cfs)              5910.00    Crit W.S. (ft)                 5.85          4.37
  Q Weir (cfs)                           Max Chl Dpth (ft)             11.55         12.51
  Weir Sta Lft (ft)                      Vel Total (ft/s)              11.57         10.35
  Weir Sta Rgt (ft)                      Flow Area (sq ft)            510.99        571.03
  Weir Submerg                           Froude # Chl                   0.73          0.58
  Weir Max Depth (ft)                    Specif Force (cu ft)        4514.16       5040.94
```

| | | | | |
|---|---|---|---|---|
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 7.71 | 10.20 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 71.53 | 60.06 |
| Delta EG (ft) | 0.63 | Conv. Total (cfs) | 70410.5 | 96122.0 |
| Delta WS (ft) | 0.57 | Top Width (ft) | 66.28 | 63.06 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.19 | 0.07 |
| BR Open Vel (ft/s) | 11.57 | C & E Loss (ft) | 0.16 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.14 | 2.24 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 2.50 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 1.69 | E.G. Elev (ft) | 2.09 | 1.38 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 0.60 | 0.72 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.50 | -0.83 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 4.60 | 5.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.80 | 6.50 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 133.86 | 201.78 |
| Weir Submerg | | Froude # Chl | 0.96 | 0.56 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 649.68 | 759.81 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 3.23 | 4.18 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 43.02 | 50.74 |
| Delta EG (ft) | 1.23 | Conv. Total (cfs) | 10598.2 | 19083.1 |
| Delta WS (ft) | 1.12 | Top Width (ft) | 41.40 | 48.28 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.30 | 0.08 |
| BR Open Vel (ft/s) | 9.80 | C & E Loss (ft) | 0.42 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.98 | 1.17 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.04 | Element | Inside BR US | Inside BR DS |

| | | | | |
|---|---|---|---|---|
| W.S. US. (ft) | 5.44 | E.G. Elev (ft) | 6.73 | 6.15 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 4.66 | 4.76 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.90 | 2.44 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.66 | 9.76 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.53 | 9.24 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 333.83 | 416.76 |
| Weir Submerg | | Froude # Chl | 0.84 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2557.97 | 2861.60 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 5.91 | 7.44 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 60.17 | 60.06 |
| Delta EG (ft) | 0.99 | Conv. Total (cfs) | 38865.9 | 58200.4 |
| Delta WS (ft) | 0.83 | Top Width (ft) | 56.49 | 57.91 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.24 | 0.08 |
| BR Open Vel (ft/s) | 11.53 | C & E Loss (ft) | 0.34 | 0.02 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.40 | 1.90 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.47 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 5.81 | E.G. Elev (ft) | 7.17 | 6.63 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 5.10 | 5.18 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.20 | 2.74 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.10 | 10.18 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.56 | 9.42 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 358.94 | 440.42 |
| Weir Submerg | | Froude # Chl | 0.82 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2819.66 | 3154.92 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 6.19 | 7.86 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 61.89 | 60.06 |
| Delta EG (ft) | 0.93 | Conv. Total (cfs) | 43039.6 | 63503.1 |
| Delta WS (ft) | 0.77 | Top Width (ft) | 57.98 | 58.61 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.23 | 0.07 |
| BR Open Vel (ft/s) | 11.56 | C & E Loss (ft) | 0.31 | 0.02 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.36 | 1.95 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 9.02 | Element | | |
| W.S. US. (ft) | 7.20 | E.G. Elev (ft) | 8.79 | 8.38 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 6.71 | 6.72 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.30 | 3.80 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.71 | 11.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.58 | 10.05 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 456.68 | 526.54 |
| Weir Submerg | | Froude # Chl | 0.76 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3889.39 | 4348.86 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 7.20 | 9.40 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 68.23 | 60.06 |
| Delta EG (ft) | 0.72 | Conv. Total (cfs) | 60250.1 | 84392.2 |
| Delta WS (ft) | 0.60 | Top Width (ft) | 63.44 | 61.15 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.20 | 0.07 |
| BR Open Vel (ft/s) | 11.58 | C & E Loss (ft) | 0.21 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.22 | 2.15 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 11.63 | Element | | |
| W.S. US. (ft) | 9.68 | E.G. Elev (ft) | 11.48 | 11.27 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 9.40 | 9.27 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 7.04 | 5.55 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.40 | 14.27 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.54 | 11.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 639.25 | 669.32 |
| Weir Submerg | | Froude # Chl | 0.56 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6105.25 | 6773.86 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 8.95 | 11.95 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 77.49 | 60.06 |

| | | | | |
|---|---|---|---|---|
| Delta EG (ft) | 0.43 | Conv. Total (cfs) | 98586.1 | 124198.6 |
| Delta WS (ft) | 0.52 | Top Width (ft) | 71.43 | 65.27 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.17 | 0.06 |
| BR Open Vel (ft/s) | 11.54 | C & E Loss (ft) | 0.03 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.89 | 2.46 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 60

INPUT
Description: 3
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 13.5 | 14 | 15.2 | 3 | 25.3 | -4 | 33.6 | -5 | 48.2 | -5 |
| 52.6 | -4 | 65.7 | 0 | 76.2 | 7 | 80.2 | 8.5 | 80.3 | 12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 13.5 | .065 | 15.2 | .04 | 65.7 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15.2 | 65.7 | 22 | 22 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 13.5 | 16 | 15 | F |
| 72 | 80.3 | 15 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.80 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 7.40 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.37 | Flow Area (sq ft) | | 531.34 | 33.39 |
| E.G. Slope (ft/ft) | 0.003918 | Area (sq ft) | 1.50 | 535.08 | 41.16 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5781.54 | 128.46 |
| Top Width (ft) | 62.75 | Top Width (ft) | 0.68 | 50.50 | 11.57 |
| Vel Total (ft/s) | 10.47 | Avg. Vel. (ft/s) | | 10.88 | 3.85 |
| Max Chl Dpth (ft) | 12.40 | Hydr. Depth (ft) | | 10.69 | 5.30 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 94422.3 | Conv. (cfs) | | 92369.9 | 2052.4 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.48 | 1.08 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.00 | 1.82 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.26 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 1.28 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.71 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 0.57 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | -0.83 | Flow Area (sq ft) | | 194.61 | 0.25 |
| E.G. Slope (ft/ft) | 0.005264 | Area (sq ft) | | 194.61 | 0.25 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1311.84 | 0.16 |
| Top Width (ft) | 47.86 | Top Width (ft) | | 47.00 | 0.86 |
| Vel Total (ft/s) | 6.73 | Avg. Vel. (ft/s) | | 6.74 | 0.64 |
| Max Chl Dpth (ft) | 5.57 | Hydr. Depth (ft) | | 4.14 | 0.29 |
| Conv. Total (cfs) | 18084.0 | Conv. (cfs) | | 18081.8 | 2.2 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 49.20 | 1.03 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 1.30 | 0.08 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.00 | 0.77 | 0.00 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.06 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.45 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.61 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.44 | Flow Area (sq ft) | | 392.56 | 15.80 |
| E.G. Slope (ft/ft) | 0.004666 | Area (sq ft) | 0.20 | 394.07 | 15.92 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3809.73 | 40.27 |
| Top Width (ft) | 57.66 | Top Width (ft) | 0.25 | 50.50 | 6.91 |
| Vel Total (ft/s) | 9.43 | Avg. Vel. (ft/s) | | 9.70 | 2.55 |
| Max Chl Dpth (ft) | 9.61 | Hydr. Depth (ft) | | 7.90 | 2.51 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 56362.0 | Conv. (cfs) | | 55772.5 | 589.5 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.18 | 0.61 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.00 | 1.50 | 0.01 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.54 | Element | | | |
| Vel Head (ft) | 1.50 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.04 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.74 | Flow Area (sq ft) | | 413.84 | 18.49 |
| E.G. Slope (ft/ft) | 0.004524 | Area (sq ft) | 0.32 | 415.69 | 19.02 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4096.43 | 51.57 |
| Top Width (ft) | 58.37 | Top Width (ft) | 0.31 | 50.50 | 7.55 |
| Vel Total (ft/s) | 9.59 | Avg. Vel. (ft/s) | | 9.90 | 2.79 |
| Max Chl Dpth (ft) | 10.04 | Hydr. Depth (ft) | | 8.33 | 2.94 |
| Conv. Total (cfs) | 61669.7 | Conv. (cfs) | | 60902.9 | 766.8 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.23 | 0.69 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.00 | 1.52 | 0.01 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.30 | Element | | | |
| Vel Head (ft) | 1.70 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.60 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.80 | Flow Area (sq ft) | | 491.54 | 28.34 |
| E.G. Slope (ft/ft) | 0.004093 | Area (sq ft) | 1.00 | 494.64 | 32.66 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5190.07 | 99.93 |
| Top Width (ft) | 60.95 | Top Width (ft) | 0.56 | 50.50 | 9.90 |
| Vel Total (ft/s) | 10.18 | Avg. Vel. (ft/s) | | 10.56 | 3.53 |
| Max Chl Dpth (ft) | 11.60 | Hydr. Depth (ft) | | 9.89 | 4.50 |
| Conv. Total (cfs) | 82690.9 | Conv. (cfs) | | 81128.9 | 1562.0 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.39 | 0.96 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.00 | 1.80 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.26 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.04 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.16 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.55 | Flow Area (sq ft) | | 619.07 | 44.51 |
| E.G. Slope (ft/ft) | 0.003631 | Area (sq ft) | 2.94 | 624.23 | 65.15 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7180.31 | 199.69 |
| Top Width (ft) | 65.97 | Top Width (ft) | 0.95 | 50.50 | 14.52 |
| Vel Total (ft/s) | 11.12 | Avg. Vel. (ft/s) | | 11.60 | 4.49 |
| Max Chl Dpth (ft) | 14.16 | Hydr. Depth (ft) | | 12.46 | 7.06 |
| Conv. Total (cfs) | 122479.0 | Conv. (cfs) | | 119165.0 | 3314.1 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.67 | 1.33 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.01 | 2.11 | 0.06 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 0.27 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 38

INPUT
Description: 2
Station Elevation Data num= 11

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.2 | 13.2 | 13.2 | 13.3 | 0 | 24.2 | -4 | 27.6 | -4 |
| 43.6 | -4.5 | 53.6 | -4 | 61.4 | 0 | 61.5 | 2 | 83.6 | 12 |
| 89.9 | 15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 13.3 | .04 | 61.5 | .065 |

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

13.3 61.5 38 38 38 .1 .3

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.98 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.19 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.79 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.17 | 488.82 | 25.39 |
| E.G. Slope (ft/ft) | 0.005186 | Area (sq ft) | 0.17 | 488.82 | 25.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.03 | 5839.64 | 70.33 |
| Top Width (ft) | 58.84 | Top Width (ft) | 0.05 | 48.20 | 10.59 |
| Vel Total (ft/s) | 11.49 | Avg. Vel. (ft/s) | 0.14 | 11.95 | 2.77 |
| Max Chl Dpth (ft) | 11.29 | Hydr. Depth (ft) | 3.40 | 10.14 | 2.40 |
| Conv. Total (cfs) | 82068.1 | Conv. (cfs) | 0.3 | 81091.1 | 976.7 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.79 | 51.80 | 11.63 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 3.06 | 0.71 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.00 | 1.56 | 0.01 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.24 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -0.42 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | -0.59 | Flow Area (sq ft) | | 141.70 | |
| E.G. Slope (ft/ft) | 0.014529 | Area (sq ft) | | 141.70 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 46.14 | Top Width (ft) | | 46.14 | |
| Vel Total (ft/s) | 9.26 | Avg. Vel. (ft/s) | | 9.26 | |
| Max Chl Dpth (ft) | 4.08 | Hydr. Depth (ft) | | 3.07 | |
| Conv. Total (cfs) | 10884.8 | Conv. (cfs) | | 10884.8 | |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | | 47.66 | |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | | 2.70 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 0.69 | |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.19 | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.82 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.83 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.00 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.06 | 353.98 | 4.40 |
| E.G. Slope (ft/ft) | 0.006584 | Area (sq ft) | 0.06 | 353.98 | 4.40 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.01 | 3842.33 | 7.66 |
| Top Width (ft) | 52.64 | Top Width (ft) | 0.03 | 48.20 | 4.41 |
| Vel Total (ft/s) | 10.74 | Avg. Vel. (ft/s) | 0.11 | 10.85 | 1.74 |
| Max Chl Dpth (ft) | 8.50 | Hydr. Depth (ft) | 2.00 | 7.34 | 1.00 |
| Conv. Total (cfs) | 47447.7 | Conv. (cfs) | 0.1 | 47353.2 | 94.4 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 4.00 | 51.80 | 4.84 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.81 | 0.37 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.00 | 1.32 | 0.00 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.00 | 0.23 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.31 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.89 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.42 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.07 | 374.32 | 6.46 |
| E.G. Slope (ft/ft) | 0.006331 | Area (sq ft) | 0.07 | 374.32 | 6.46 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.01 | 4135.47 | 12.53 |
| Top Width (ft) | 53.58 | Top Width (ft) | 0.03 | 48.20 | 5.34 |
| Vel Total (ft/s) | 10.89 | Avg. Vel. (ft/s) | 0.12 | 11.05 | 1.94 |
| Max Chl Dpth (ft) | 8.92 | Hydr. Depth (ft) | 2.21 | 7.77 | 1.21 |
| Conv. Total (cfs) | 52132.6 | Conv. (cfs) | 0.1 | 51975.0 | 157.4 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 4.42 | 51.80 | 5.86 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.86 | 0.44 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.35 | Cum Volume (acre-ft) | 0.00 | 1.32 | 0.01 |
| C & E Loss (ft) | 0.15 | Cum SA (acres) | 0.00 | 0.23 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.08 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 2.09 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.99 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.14 | 449.90 | 17.55 |
| E.G. Slope (ft/ft) | 0.005518 | Area (sq ft) | 0.14 | 449.90 | 17.55 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.02 | 5245.62 | 44.36 |
| Top Width (ft) | 57.05 | Top Width (ft) | 0.05 | 48.20 | 8.81 |
| Vel Total (ft/s) | 11.31 | Avg. Vel. (ft/s) | 0.14 | 11.66 | 2.53 |
| Max Chl Dpth (ft) | 10.49 | Hydr. Depth (ft) | 2.99 | 9.33 | 1.99 |
| Conv. Total (cfs) | 71215.8 | Conv. (cfs) | 0.2 | 70618.4 | 597.2 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 5.99 | 51.80 | 9.67 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.99 | 0.63 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.00 | 1.56 | 0.02 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.24 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.38 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 8.63 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.28 | 577.30 | 48.55 |
| E.G. Slope (ft/ft) | 0.004557 | Area (sq ft) | 0.28 | 577.30 | 48.55 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.04 | 7223.42 | 156.53 |
| Top Width (ft) | 62.91 | Top Width (ft) | 0.07 | 48.20 | 14.65 |
| Vel Total (ft/s) | 11.79 | Avg. Vel. (ft/s) | 0.16 | 12.51 | 3.22 |
| Max Chl Dpth (ft) | 13.13 | Hydr. Depth (ft) | 4.31 | 11.98 | 3.31 |
| Conv. Total (cfs) | 109319.4 | Conv. (cfs) | 0.7 | 107000.0 | 2318.7 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 8.63 | 51.80 | 16.08 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 3.17 | 0.86 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.81 | 0.03 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 0

INPUT
Description: 1 (Downstream)
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19 | 1 | 19 | 10 | 2 | 20 | -6.3 | 30 | -6.3 |
| 40 | -5 | 50 | -2.5 | 52 | 1.8 | 60 | 19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 52 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 52 | 21 | 21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.48 | Element | | | |
| Vel Head (ft) | 4.24 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.24 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.24 | Flow Area (sq ft) | 1.33 | 357.35 | 1.39 |
| E.G. Slope (ft/ft) | 0.013662 | Area (sq ft) | 1.33 | 357.35 | 1.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.31 | 5905.31 | 2.38 |
| Top Width (ft) | 44.32 | Top Width (ft) | 1.19 | 42.00 | 1.14 |
| Vel Total (ft/s) | 16.41 | Avg. Vel. (ft/s) | 1.74 | 16.53 | 1.72 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 1.12 | 8.51 | 1.22 |
| Conv. Total (cfs) | 50562.8 | Conv. (cfs) | 19.8 | 50522.7 | 20.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 2.54 | 48.13 | 2.69 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.45 | 6.33 | 0.44 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.00 | 1.19 | 0.00 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 0.20 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.42 | Element | | | |
| Vel Head (ft) | 1.08 | Wt. n-Val. | | 0.040 | |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | -0.66 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 157.23 | |
| E.G. Slope (ft/ft) | 0.008477 | Area (sq ft) | | 157.23 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 37.65 | Top Width (ft) | | 37.65 | |
| Vel Total (ft/s) | 8.34 | Avg. Vel. (ft/s) | | 8.34 | |
| Max Chl Dpth (ft) | 5.64 | Hydr. Depth (ft) | | 4.18 | |
| Conv. Total (cfs) | 14249.8 | Conv. (cfs) | | 14249.8 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 41.26 | |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | | 2.02 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.00 | 0.56 | |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.15 | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.21 | Wt. n-Val. | 0.000 | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.11 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.11 | Flow Area (sq ft) | 0.00 | 267.76 | 0.02 |
| E.G. Slope (ft/ft) | 0.015198 | Area (sq ft) | 0.00 | 267.76 | 0.02 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3849.99 | 0.01 |
| Top Width (ft) | 42.20 | Top Width (ft) | 0.06 | 42.00 | 0.14 |
| Vel Total (ft/s) | 14.38 | Avg. Vel. (ft/s) | 0.24 | 14.38 | 0.46 |
| Max Chl Dpth (ft) | 8.41 | Hydr. Depth (ft) | 0.05 | 6.38 | 0.15 |
| Conv. Total (cfs) | 31229.7 | Conv. (cfs) | 0.0 | 31229.6 | 0.1 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 0.12 | 48.13 | 0.34 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | | 5.28 | 0.06 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.00 | 1.04 | 0.00 |
| C & E Loss (ft) | 0.33 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.81 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.36 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.45 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.45 | Flow Area (sq ft) | 0.05 | 281.94 | 0.10 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.014853 | Area (sq ft) | 0.05 | 281.94 | 0.10 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.03 | 4147.90 | 0.07 |
| Top Width (ft) | 42.54 | Top Width (ft) | 0.24 | 42.00 | 0.30 |
| Vel Total (ft/s) | 14.70 | Avg. Vel. (ft/s) | 0.62 | 14.71 | 0.74 |
| Max Chl Dpth (ft) | 8.75 | Hydr. Depth (ft) | 0.22 | 6.71 | 0.32 |
| Conv. Total (cfs) | 34035.3 | Conv. (cfs) | 0.3 | 34034.4 | 0.6 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 0.50 | 48.13 | 0.71 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.10 | 5.43 | 0.13 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.00 | 1.03 | 0.00 |
| C & E Loss (ft) | 0.32 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.96 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.62 | Flow Area (sq ft) | 0.69 | 331.05 | 0.77 |
| E.G. Slope (ft/ft) | 0.014135 | Area (sq ft) | 0.69 | 331.05 | 0.77 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.98 | 5287.92 | 1.10 |
| Top Width (ft) | 43.70 | Top Width (ft) | 0.86 | 42.00 | 0.84 |
| Vel Total (ft/s) | 15.91 | Avg. Vel. (ft/s) | 1.42 | 15.97 | 1.43 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.81 | 7.88 | 0.91 |
| Conv. Total (cfs) | 44494.8 | Conv. (cfs) | 8.3 | 44477.3 | 9.2 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.83 | 48.13 | 2.00 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.33 | 6.07 | 0.34 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.00 | 1.22 | 0.01 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.20 | 0.01 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.49 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.62 | Flow Area (sq ft) | 3.47 | 415.35 | 3.40 |
| E.G. Slope (ft/ft) | 0.012870 | Area (sq ft) | 3.47 | 415.35 | 3.40 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 8.07 | 7364.30 | 7.63 |
| Top Width (ft) | 45.70 | Top Width (ft) | 1.92 | 42.00 | 1.78 |
| Vel Total (ft/s) | 17.48 | Avg. Vel. (ft/s) | 2.32 | 17.73 | 2.25 |
| Max Chl Dpth (ft) | 11.92 | Hydr. Depth (ft) | 1.81 | 9.89 | 1.91 |
| Conv. Total (cfs) | 65054.0 | Conv. (cfs) | 71.1 | 64915.6 | 67.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 4.10 | 48.13 | 4.22 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.68 | 6.93 | 0.65 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.38 | 0.00 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: -21

INPUT
Description: RR
Station Elevation Data  num=  7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15 | 8 | -3 | 25 | -7 | 30 | -7 | 37 | -6 |
| 50 | -2 | 59 | 20 | | | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 59 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 59 | 33 | 33 | .1 | .3 |

CROSS SECTION OUTPUT  Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.09 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.82 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 3.29 | Flow Area (sq ft) | 5.17 | 297.09 | |
| E.G. Slope (ft/ft) | 0.024570 | Area (sq ft) | 5.17 | 297.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 18.28 | 5891.73 | |
| Top Width (ft) | 45.71 | Top Width (ft) | 2.14 | 43.56 | |
| Vel Total (ft/s) | 19.55 | Avg. Vel. (ft/s) | 3.53 | 19.83 | |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | 2.41 | 6.82 | |
| Conv. Total (cfs) | 37703.4 | Conv. (cfs) | 116.6 | 37586.8 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 5.28 | 47.27 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.50 | 9.64 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.00 | 1.03 | 0.00 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.18 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.18 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | -0.51 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.38 | 196.50 | |
| E.G. Slope (ft/ft) | 0.004483 | Area (sq ft) | 1.38 | 196.50 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 1.34 | 1310.66 | |
| Top Width (ft) | 43.72 | Top Width (ft) | 1.11 | 42.61 | |
| Vel Total (ft/s) | 6.63 | Avg. Vel. (ft/s) | 0.97 | 6.67 | |
| Max Chl Dpth (ft) | 6.49 | Hydr. Depth (ft) | 1.24 | 4.61 | |
| Conv. Total (cfs) | 19594.6 | Conv. (cfs) | 20.0 | 19574.7 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 2.72 | 44.75 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.14 | 1.23 | |
| Alpha | 1.01 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.00 | 0.47 | |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.13 | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.66 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.10 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.56 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 1.22 | Flow Area (sq ft) | 6.87 | 329.34 | |
| E.G. Slope (ft/ft) | 0.007551 | Area (sq ft) | 6.87 | 329.34 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 14.81 | 3835.19 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 46.34 | Top Width (ft) | 2.47 | 43.87 | |
| Vel Total (ft/s) | 11.45 | Avg. Vel. (ft/s) | 2.15 | 11.64 | |
| Max Chl Dpth (ft) | 9.56 | Hydr. Depth (ft) | 2.78 | 7.51 | |
| Conv. Total (cfs) | 44306.6 | Conv. (cfs) | 170.4 | 44136.2 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.09 | 48.07 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.53 | 3.23 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.00 | 0.90 | 0.00 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.17 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.24 | Element | | | |
| Vel Head (ft) | 4.91 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 0.34 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 1.55 | Flow Area (sq ft) | 2.47 | 232.78 | |
| E.G. Slope (ft/ft) | 0.026135 | Area (sq ft) | 2.47 | 232.78 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 7.06 | 4140.94 | |
| Top Width (ft) | 44.44 | Top Width (ft) | 1.48 | 42.96 | |
| Vel Total (ft/s) | 17.63 | Avg. Vel. (ft/s) | 2.85 | 17.79 | |
| Max Chl Dpth (ft) | 7.34 | Hydr. Depth (ft) | 1.67 | 5.42 | |
| Conv. Total (cfs) | 25658.1 | Conv. (cfs) | 43.7 | 25614.4 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 3.65 | 45.66 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.11 | 8.32 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.00 | 0.91 | 0.00 |
| C & E Loss (ft) | 0.15 | Cum SA (acres) | 0.00 | 0.17 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.01 | Element | | | |
| Vel Head (ft) | 5.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.32 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 2.71 | Flow Area (sq ft) | 4.15 | 275.33 | |
| E.G. Slope (ft/ft) | 0.025006 | Area (sq ft) | 4.15 | 275.33 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 13.76 | 5276.24 | |
| Top Width (ft) | 45.28 | Top Width (ft) | 1.92 | 43.36 | |
| Vel Total (ft/s) | 18.93 | Avg. Vel. (ft/s) | 3.31 | 19.16 | |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.35 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 33452.7 | Conv. (cfs) | 87.0 | 33365.6 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 4.73 | 46.73 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.37 | 9.20 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.00 | 1.07 | 0.01 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.18 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.98 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.94 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 4.65 | Flow Area (sq ft) | 7.84 | 346.01 | |
| E.G. Slope (ft/ft) | 0.023784 | Area (sq ft) | 7.84 | 346.01 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.34 | 7348.67 | |
| Top Width (ft) | 46.66 | Top Width (ft) | 2.64 | 44.02 | |
| Vel Total (ft/s) | 20.86 | Avg. Vel. (ft/s) | 4.00 | 21.24 | |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 2.97 | 7.86 | |
| Conv. Total (cfs) | 47853.6 | Conv. (cfs) | 203.2 | 47650.5 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.50 | 48.48 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.79 | 10.60 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.00 | 1.19 | 0.00 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -54

INPUT
Description: K2
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 21 | 5 | 40 | -7 | 50 | -7 |
| 60 | -6 | 72 | -2 | 80 | 0 | 88 | 2 | 96 | 4 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 88 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 88 | 34 | 34 | 34 .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.85 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 3.09 | Flow Area (sq ft) | | 333.87 | |
| E.G. Slope (ft/ft) | 0.025698 | Area (sq ft) | | 333.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 61.41 | Top Width (ft) | | 61.41 | |
| Vel Total (ft/s) | 17.70 | Avg. Vel. (ft/s) | | 17.70 | |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | | 5.44 | |
| Conv. Total (cfs) | 36867.0 | Conv. (cfs) | | 36867.0 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 65.15 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 8.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.83 | Cum Volume (acre-ft) | | 0.79 | 0.00 |
| C & E Loss (ft) | 0.37 | Cum SA (acres) | | 0.14 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 0.02 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -0.67 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 196.83 | |
| E.G. Slope (ft/ft) | 0.005185 | Area (sq ft) | | 196.83 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.34 | Top Width (ft) | | 47.34 | |
| Vel Total (ft/s) | 6.67 | Avg. Vel. (ft/s) | | 6.67 | |
| Max Chl Dpth (ft) | 6.33 | Hydr. Depth (ft) | | 4.16 | |
| Conv. Total (cfs) | 18220.8 | Conv. (cfs) | | 18220.8 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 50.04 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.27 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.29 | Cum Volume (acre-ft) | | 0.33 | |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | | 0.10 | |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.52 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.72 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 388.60 | 1.05 |
| E.G. Slope (ft/ft) | 0.006877 | Area (sq ft) | | 388.60 | 1.05 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3849.01 | 0.99 |
| Top Width (ft) | 66.29 | Top Width (ft) | | 63.40 | 2.90 |
| Vel Total (ft/s) | 9.88 | Avg. Vel. (ft/s) | | 9.90 | 0.94 |
| Max Chl Dpth (ft) | 9.72 | Hydr. Depth (ft) | | 6.13 | 0.36 |
| Conv. Total (cfs) | 46426.8 | Conv. (cfs) | | 46414.9 | 11.9 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 67.40 | 2.98 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.48 | 0.15 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.63 | 0.00 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.13 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.62 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.62 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.00 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 1.58 | Flow Area (sq ft) | | 406.25 | 2.01 |
| E.G. Slope (ft/ft) | 0.006950 | Area (sq ft) | | 406.25 | 2.01 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4145.64 | 2.36 |
| Top Width (ft) | 67.84 | Top Width (ft) | | 63.84 | 4.01 |
| Vel Total (ft/s) | 10.16 | Avg. Vel. (ft/s) | | 10.20 | 1.18 |
| Max Chl Dpth (ft) | 10.00 | Hydr. Depth (ft) | | 6.36 | 0.50 |
| Conv. Total (cfs) | 49755.9 | Conv. (cfs) | | 49727.6 | 28.3 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 67.92 | 4.13 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.60 | 0.21 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.66 | 0.00 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.13 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.98 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.93 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 2.59 | Flow Area (sq ft) | | 466.13 | 7.44 |
| E.G. Slope (ft/ft) | 0.007362 | Area (sq ft) | | 466.13 | 7.44 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5276.04 | 13.96 |
| Top Width (ft) | 73.02 | Top Width (ft) | | 65.30 | 7.71 |
| Vel Total (ft/s) | 11.17 | Avg. Vel. (ft/s) | | 11.32 | 1.88 |
| Max Chl Dpth (ft) | 10.93 | Hydr. Depth (ft) | | 7.14 | 0.96 |
| Conv. Total (cfs) | 61651.5 | Conv. (cfs) | | 61488.8 | 162.7 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.66 | 7.95 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 3.08 | 0.43 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.79 | 0.00 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | | 0.14 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.75 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.18 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 354.06 | 0.06 |
| E.G. Slope (ft/ft) | 0.033780 | Area (sq ft) | | 354.06 | 0.06 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7379.95 | 0.05 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 62.53 | 0.70 |
| Vel Total (ft/s) | 20.84 | Avg. Vel. (ft/s) | | 20.84 | 0.81 |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.66 | 0.09 |
| Conv. Total (cfs) | 40153.7 | Conv. (cfs) | | 40153.5 | 0.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.37 | 0.72 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 11.25 | 0.18 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | | 0.93 | 0.00 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -88

INPUT
Description: K1
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 56 | -6 | 72 | -6 | 80 | -5 |
| 94 | 0 | 108 | 5 | 122 | 5 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 108 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 108 | 55 | 55 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.18 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 3.18 | Flow Area (sq ft) | | 428.87 | |
| E.G. Slope (ft/ft) | 0.013653 | Area (sq ft) | | 428.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 72.75 | Top Width (ft) | | 72.75 | |
| Vel Total (ft/s) | 13.78 | Avg. Vel. (ft/s) | | 13.78 | |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.90 | |
| Conv. Total (cfs) | 50579.2 | Conv. (cfs) | | 50579.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 75.82 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.74 | Cum Volume (acre-ft) | | 0.50 | 0.00 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | -0.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.52 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -1.87 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | -1.87 | Flow Area (sq ft) | | 132.74 | |
| E.G. Slope (ft/ft) | 0.017077 | Area (sq ft) | | 132.74 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 44.37 | Top Width (ft) | | 44.37 | |
| Vel Total (ft/s) | 9.88 | Avg. Vel. (ft/s) | | 9.88 | |
| Max Chl Dpth (ft) | 4.13 | Hydr. Depth (ft) | | 2.99 | |
| Conv. Total (cfs) | 10039.9 | Conv. (cfs) | | 10039.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 45.68 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 3.10 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.62 | Cum Volume (acre-ft) | | 0.20 | |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | | 0.06 | |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.83 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.45 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.38 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 1.38 | Flow Area (sq ft) | | 306.55 | |
| E.G. Slope (ft/ft) | 0.014466 | Area (sq ft) | | 306.55 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.61 | Top Width (ft) | | 62.61 | |
| Vel Total (ft/s) | 12.56 | Avg. Vel. (ft/s) | | 12.56 | |
| Max Chl Dpth (ft) | 7.38 | Hydr. Depth (ft) | | 4.90 | |
| Conv. Total (cfs) | 32009.6 | Conv. (cfs) | | 32009.6 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 65.05 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.26 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.80 | Cum Volume (acre-ft) | | 0.36 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The

program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.67 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 1.67 | Flow Area (sq ft) | | 324.94 | |
| E.G. Slope (ft/ft) | 0.014320 | Area (sq ft) | | 324.94 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 64.23 | Top Width (ft) | | 64.23 | |
| Vel Total (ft/s) | 12.77 | Avg. Vel. (ft/s) | | 12.77 | |
| Max Chl Dpth (ft) | 7.67 | Hydr. Depth (ft) | | 5.06 | |
| Conv. Total (cfs) | 34663.2 | Conv. (cfs) | | 34663.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 66.77 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.35 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.79 | Cum Volume (acre-ft) | | 0.38 | 0.00 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.81 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 2.68 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 2.68 | Flow Area (sq ft) | | 393.12 | |
| E.G. Slope (ft/ft) | 0.013858 | Area (sq ft) | | 393.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 69.94 | Top Width (ft) | | 69.94 | |
| Vel Total (ft/s) | 13.46 | Avg. Vel. (ft/s) | | 13.46 | |
| Max Chl Dpth (ft) | 8.68 | Hydr. Depth (ft) | | 5.62 | |
| Conv. Total (cfs) | 44937.7 | Conv. (cfs) | | 44937.7 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 72.83 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.67 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.75 | Cum Volume (acre-ft) | | 0.46 | 0.00 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.08 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.25 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 4.25 | Flow Area (sq ft) | | 509.28 | |
| E.G. Slope (ft/ft) | 0.013360 | Area (sq ft) | | 509.28 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 78.71 | Top Width (ft) | | 78.71 | |
| Vel Total (ft/s) | 14.49 | Avg. Vel. (ft/s) | | 14.49 | |
| Max Chl Dpth (ft) | 10.25 | Hydr. Depth (ft) | | 6.47 | |
| Conv. Total (cfs) | 63848.9 | Conv. (cfs) | | 63848.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 82.14 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 5.17 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | 0.59 | 0.00 |
| C & E Loss (ft) | | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -143

INPUT

Description: K0

Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11.3 | 10 | 52.7 | -7 | 69 | -7 | 77.8 | -6 |
| 98.2 | -1 | 100 | -1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11.3 | .04 | 98.2 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11.3 | 98.2 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.21 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 0.87 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.76 | Flow Area (sq ft) | | 357.78 | 3.37 |
| E.G. Slope (ft/ft) | 0.021059 | Area (sq ft) | | 357.78 | 3.37 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5899.45 | 10.55 |
| Top Width (ft) | 66.47 | Top Width (ft) | | 64.67 | 1.80 |
| Vel Total (ft/s) | 16.36 | Avg. Vel. (ft/s) | | 16.49 | 3.13 |
| Max Chl Dpth (ft) | 7.87 | Hydr. Depth (ft) | | 5.53 | 1.87 |
| Conv. Total (cfs) | 40725.3 | Conv. (cfs) | | 40652.6 | 72.7 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.88 | 3.67 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 7.03 | 1.21 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.92 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | -1.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | -2.10 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | -2.96 | Flow Area (sq ft) | | 178.85 | |
| E.G. Slope (ft/ft) | 0.007984 | Area (sq ft) | | 178.85 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 52.94 | Top Width (ft) | | 52.94 | |
| Vel Total (ft/s) | 7.34 | Avg. Vel. (ft/s) | | 7.34 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 4.90 | Hydr. Depth (ft) | | 3.38 | |
| Conv. Total (cfs) | 14683.3 | Conv. (cfs) | | 14683.3 | |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 54.44 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 2.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.42 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | -0.70 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.07 | Flow Area (sq ft) | | 259.44 | 0.55 |
| E.G. Slope (ft/ft) | 0.024042 | Area (sq ft) | | 259.44 | 0.55 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3849.21 | 0.79 |
| Top Width (ft) | 62.65 | Top Width (ft) | | 60.85 | 1.80 |
| Vel Total (ft/s) | 14.81 | Avg. Vel. (ft/s) | | 14.84 | 1.44 |
| Max Chl Dpth (ft) | 6.30 | Hydr. Depth (ft) | | 4.26 | 0.30 |
| Conv. Total (cfs) | 24829.7 | Conv. (cfs) | | 24824.6 | 5.1 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 62.76 | 2.10 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.21 | 0.39 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.01 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.56 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | -0.46 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.32 | Flow Area (sq ft) | | 273.91 | 0.97 |
| E.G. Slope (ft/ft) | 0.023585 | Area (sq ft) | | 273.91 | 0.97 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4146.10 | 1.91 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 61.43 | 1.80 |
| Vel Total (ft/s) | 15.09 | Avg. Vel. (ft/s) | | 15.14 | 1.96 |
| Max Chl Dpth (ft) | 6.54 | Hydr. Depth (ft) | | 4.46 | 0.54 |
| Conv. Total (cfs) | 27009.5 | Conv. (cfs) | | 26997.1 | 12.4 |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | | Wetted Per. (ft) | | 63.38 | 2.34 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.36 | 0.61 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.00 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.43 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.02 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 0.41 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.29 | Flow Area (sq ft) | | 328.10 | 2.53 |
| E.G. Slope (ft/ft) | 0.021991 | Area (sq ft) | | 328.10 | 2.53 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5282.66 | 7.34 |
| Top Width (ft) | 65.34 | Top Width (ft) | | 63.54 | 1.80 |
| Vel Total (ft/s) | 16.00 | Avg. Vel. (ft/s) | | 16.10 | 2.90 |
| Max Chl Dpth (ft) | 7.41 | Hydr. Depth (ft) | | 5.16 | 1.41 |
| Conv. Total (cfs) | 35672.4 | Conv. (cfs) | | 35622.9 | 49.5 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 65.66 | 3.21 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 6.86 | 1.08 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.95 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.57 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 1.94 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 2.81 | Flow Area (sq ft) | | 428.54 | 5.30 |
| E.G. Slope (ft/ft) | 0.018989 | Area (sq ft) | | 428.54 | 5.30 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7362.03 | 17.97 |
| Top Width (ft) | 69.08 | Top Width (ft) | | 67.28 | 1.80 |
| Vel Total (ft/s) | 17.01 | Avg. Vel. (ft/s) | | 17.18 | 3.39 |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 8.94 | Hydr. Depth (ft) | | 6.37 | 2.94 |
| Conv. Total (cfs) | 53555.1 | Conv. (cfs) | | 53424.7 | 130.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 69.71 | 4.74 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 7.29 | 1.32 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | | | |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

SUMMARY OF MANNING'S N VALUES

River:Cobosee Stream

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| Reach 1 | 1700 | .07 | .04 | .065 |
| Reach 1 | 1635 | .07 | .045 | .065 |
| Reach 1 | 1555 | .07 | .042 | .065 |
| Reach 1 | 1455 | .065 | .045 | .07 |
| Reach 1 | 1335 | .065 | .045 | .075 |
| Reach 1 | 1185 | .065 | .045 | .07 |
| Reach 1 | 1060 | .065 | .04 | .07 |
| Reach 1 | 960 | .05 | .042 | .05 |
| Reach 1 | 935 | .05 | .042 | .05 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | .05 | .04 | .05 |
| Reach 1 | 830 | .05 | .035 | .05 |
| Reach 1 | 821 | .065 | .035 | .065 |
| Reach 1 | 820 | .065 | .035 | .065 |
| Reach 1 | 725 | .065 | .04 | .065 |
| Reach 1 | 575 | .065 | .04 | .065 |
| Reach 1 | 425 | .065 | .04 | .065 |
| Reach 1 | 335 | .065 | .04 | .065 |
| Reach 1 | 262 | .065 | .04 | .065 |
| Reach 1 | 187 | .065 | .04 | .065 |
| Reach 1 | 166 | Bridge | | |
| Reach 1 | 137 | .065 | .04 | .065 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | .065 | .04 | .065 |
| Reach 1 | 38 | .065 | .04 | .065 |
| Reach 1 | 0 | .065 | .04 | .065 |
| Reach 1 | -21 | .065 | .04 | .065 |

| | | | | |
|---|---|---|---|---|
| Reach 1 | -54 | .065 | .04 | .065 |
| Reach 1 | -88 | .065 | .04 | .065 |
| Reach 1 | -143 | .065 | .04 | .065 |

SUMMARY OF REACH LENGTHS

River: Cobosee Stream

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| Reach 1 | 1700 | 65 | 65 | 65 |
| Reach 1 | 1635 | 80 | 80 | 80 |
| Reach 1 | 1555 | 100 | 100 | 100 |
| Reach 1 | 1455 | 120 | 120 | 120 |
| Reach 1 | 1335 | 150 | 150 | 150 |
| Reach 1 | 1185 | 125 | 125 | 125 |
| Reach 1 | 1060 | 100 | 100 | 100 |
| Reach 1 | 960 | 25 | 25 | 25 |
| Reach 1 | 935 | 85 | 85 | 85 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | 20 | 20 | 20 |
| Reach 1 | 830 | 9 | 9 | 9 |
| Reach 1 | 821 | 1 | 1 | 1 |
| Reach 1 | 820 | 95 | 95 | 95 |
| Reach 1 | 725 | 150 | 150 | 150 |
| Reach 1 | 575 | 150 | 150 | 150 |
| Reach 1 | 425 | 90 | 90 | 90 |
| Reach 1 | 335 | 73 | 73 | 73 |
| Reach 1 | 262 | 75 | 75 | 75 |
| Reach 1 | 187 | 50 | 50 | 50 |
| Reach 1 | 166 | Bridge | | |
| Reach 1 | 137 | 77 | 77 | 77 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | 22 | 22 | 22 |
| Reach 1 | 38 | 38 | 38 | 38 |
| Reach 1 | 0 | 21 | 21 | 21 |
| Reach 1 | -21 | 33 | 33 | 33 |
| Reach 1 | -54 | 34 | 34 | 34 |
| Reach 1 | -88 | 55 | 55 | 55 |
| Reach 1 | -143 | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Cobosee Stream

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| Reach 1 | 1700 | .1 | .3 |
| Reach 1 | 1635 | .1 | .3 |
| Reach 1 | 1555 | .1 | .3 |
| Reach 1 | 1455 | .1 | .3 |
| Reach 1 | 1335 | .1 | .3 |
| Reach 1 | 1185 | .1 | .3 |
| Reach 1 | 1060 | .1 | .3 |
| Reach 1 | 960 | .3 | .5 |
| Reach 1 | 935 | .3 | .5 |
| Reach 1 | 895 | Bridge | |
| Reach 1 | 850 | .3 | .5 |
| Reach 1 | 830 | .3 | .5 |
| Reach 1 | 821 | .1 | .3 |
| Reach 1 | 820 | .1 | .3 |
| Reach 1 | 725 | .1 | .3 |
| Reach 1 | 575 | .1 | .3 |
| Reach 1 | 425 | .1 | .3 |
| Reach 1 | 335 | .1 | .3 |
| Reach 1 | 262 | .1 | .3 |
| Reach 1 | 187 | .1 | .3 |
| Reach 1 | 166 | Bridge | |
| Reach 1 | 137 | .3 | .5 |
| Reach 1 | 98.5 | Bridge | |
| Reach 1 | 60 | .3 | .5 |
| Reach 1 | 38 | .1 | .3 |
| Reach 1 | 0 | .1 | .3 |
| Reach 1 | -21 | .1 | .3 |
| Reach 1 | -54 | .1 | .3 |
| Reach 1 | -88 | .1 | .3 |
| Reach 1 | -143 | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1700 | Q100 | 5910.00 | 13.80 | 22.75 | 21.32 | 24.48 | 0.006899 | 10.56 | 559.56 | 84.99 | 0.73 |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1700 | | Q1.1 | 1312.00 | 13.80 | 18.54 | 17.33 | 19.04 | 0.004837 |
| 5.66 | 231.75 | 70.35 | | 0.55 | | | | | |
| Reach 1 | 1700 | | Q10 | 3850.00 | 13.80 | 21.15 | 19.81 | 22.41 | 0.006488 |
| 8.99 | 428.08 | 79.67 | | 0.68 | | | | | |
| Reach 1 | 1700 | | Q25 | 4148.00 | 13.80 | 21.40 | 20.05 | 22.73 | 0.006586 |
| 9.26 | 447.72 | 80.49 | | 0.69 | | | | | |
| Reach 1 | 1700 | | Q50 | 5290.00 | 13.80 | 22.28 | 20.89 | 23.89 | 0.006865 |
| 10.17 | 519.99 | 83.43 | | 0.72 | | | | | |
| Reach 1 | 1700 | | Q500 | 7380.00 | 13.80 | 23.79 | 22.27 | 25.79 | 0.006886 |
| 11.36 | 649.74 | 88.50 | | 0.74 | | | | | |
| Reach 1 | 1635 | | Q100 | 5910.00 | 14.00 | 22.26 | | 23.95 | 0.009287 |
| 10.45 | 565.73 | 91.56 | | 0.74 | | | | | |
| Reach 1 | 1635 | | Q1.1 | 1312.00 | 14.00 | 17.69 | | 18.50 | 0.015059 |
| 7.21 | 181.92 | 75.56 | | 0.82 | | | | | |
| Reach 1 | 1635 | | Q10 | 3850.00 | 14.00 | 20.47 | | 21.86 | 0.010705 |
| 9.45 | 407.41 | 86.08 | | 0.77 | | | | | |
| Reach 1 | 1635 | | Q25 | 4148.00 | 14.00 | 20.75 | | 22.19 | 0.010420 |
| 9.61 | 431.49 | 86.93 | | 0.76 | | | | | |
| Reach 1 | 1635 | | Q50 | 5290.00 | 14.00 | 21.75 | | 23.36 | 0.009593 |
| 10.17 | 520.12 | 90.01 | | 0.75 | | | | | |
| Reach 1 | 1635 | | Q500 | 7380.00 | 14.00 | 23.37 | | 25.25 | 0.008748 |
| 11.03 | 669.19 | 94.97 | | 0.73 | | | | | |
| Reach 1 | 1555 | | Q100 | 5910.00 | 13.30 | 20.34 | 20.16 | 22.96 | 0.013986 |
| 12.99 | 455.11 | 80.13 | | 0.96 | | | | | |
| Reach 1 | 1555 | | Q1.1 | 1312.00 | 13.30 | 16.65 | | 17.46 | 0.011277 |
| 7.21 | 181.93 | 67.33 | | 0.77 | | | | | |
| Reach 1 | 1555 | | Q10 | 3850.00 | 13.30 | 19.06 | 18.65 | 20.89 | 0.012593 |
| 10.84 | 355.05 | 76.34 | | 0.89 | | | | | |
| Reach 1 | 1555 | | Q25 | 4148.00 | 13.30 | 19.24 | 18.89 | 21.21 | 0.013023 |
| 11.25 | 368.77 | 76.87 | | 0.91 | | | | | |
| Reach 1 | 1555 | | Q50 | 5290.00 | 13.30 | 19.96 | 19.73 | 22.37 | 0.013832 |
| 12.46 | 424.40 | 78.99 | | 0.95 | | | | | |
| Reach 1 | 1555 | | Q500 | 7380.00 | 13.30 | 21.24 | 21.12 | 24.27 | 0.013933 |
| 13.96 | 528.57 | 82.81 | | 0.97 | | | | | |
| Reach 1 | 1455 | | Q100 | 5910.00 | 11.80 | 19.15 | 18.73 | 21.52 | 0.013371 |
| 12.36 | 482.06 | 84.97 | | 0.89 | | | | | |
| Reach 1 | 1455 | | Q1.1 | 1312.00 | 11.80 | 15.06 | 14.87 | 16.04 | 0.018077 |
| 7.92 | 165.73 | 68.77 | | 0.90 | | | | | |
| Reach 1 | 1455 | | Q10 | 3850.00 | 11.80 | 17.40 | 17.28 | 19.41 | 0.017108 |
| 11.38 | 338.92 | 78.76 | | 0.96 | | | | | |
| Reach 1 | 1455 | | Q25 | 4148.00 | 11.80 | 17.67 | 17.49 | 19.74 | 0.016461 |
| 11.55 | 360.02 | 79.70 | | 0.95 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1455 | | Q50 | 5290.00 | 11.80 | 18.65 | 18.33 | 20.92 | 0.014397 |
| 12.10 | 439.76 | 83.19 | | 0.91 | | | | | |
| Reach 1 | 1455 | | Q500 | 7380.00 | 11.80 | 20.28 | | 22.87 | 0.011590 |
| 12.93 | 580.89 | 89.01 | | 0.86 | | | | | |
| Reach 1 | 1335 | | Q100 | 5910.00 | 9.50 | 18.29 | | 20.09 | 0.008433 |
| 10.77 | 549.92 | 80.42 | | 0.72 | | | | | |
| Reach 1 | 1335 | | Q1.1 | 1312.00 | 9.50 | 12.63 | 12.50 | 13.78 | 0.019322 |
| 8.58 | 152.87 | 58.82 | | 0.94 | | | | | |
| Reach 1 | 1335 | | Q10 | 3850.00 | 9.50 | 16.13 | | 17.69 | 0.010509 |
| 10.02 | 384.33 | 72.81 | | 0.77 | | | | | |
| Reach 1 | 1335 | | Q25 | 4148.00 | 9.50 | 16.48 | | 18.07 | 0.010113 |
| 10.13 | 409.66 | 74.08 | | 0.76 | | | | | |
| Reach 1 | 1335 | | Q50 | 5290.00 | 9.50 | 17.68 | | 19.41 | 0.008923 |
| 10.55 | 501.86 | 78.35 | | 0.73 | | | | | |
| Reach 1 | 1335 | | Q500 | 7380.00 | 9.50 | 19.61 | | 21.58 | 0.007513 |
| 11.27 | 658.95 | 85.25 | | 0.70 | | | | | |
| Reach 1 | 1185 | | Q100 | 5910.00 | 5.50 | 15.71 | 15.05 | 18.43 | 0.013216 |
| 13.23 | 446.60 | 64.07 | | 0.88 | | | | | |
| Reach 1 | 1185 | | Q1.1 | 1312.00 | 5.50 | 10.99 | | 11.81 | 0.008701 |
| 7.27 | 180.58 | 47.96 | | 0.66 | | | | | |
| Reach 1 | 1185 | | Q10 | 3850.00 | 5.50 | 14.07 | 13.16 | 16.00 | 0.011593 |
| 11.14 | 345.58 | 58.73 | | 0.81 | | | | | |
| Reach 1 | 1185 | | Q25 | 4148.00 | 5.50 | 14.34 | 13.46 | 16.38 | 0.011842 |
| 11.48 | 361.45 | 59.60 | | 0.82 | | | | | |
| Reach 1 | 1185 | | Q50 | 5290.00 | 5.50 | 15.28 | 14.52 | 17.75 | 0.012665 |
| 12.62 | 419.10 | 62.66 | | 0.86 | | | | | |
| Reach 1 | 1185 | | Q500 | 7380.00 | 5.50 | 16.59 | 16.20 | 19.92 | 0.014382 |
| 14.64 | 504.17 | 66.73 | | 0.93 | | | | | |
| Reach 1 | 1060 | | Q100 | 5910.00 | 5.00 | 13.60 | 13.60 | 16.72 | 0.013608 |
| 14.18 | 416.89 | 66.85 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q1.1 | 1312.00 | 5.00 | 8.85 | 8.85 | 10.26 | 0.017292 |
| 9.54 | 137.48 | 49.24 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q10 | 3850.00 | 5.00 | 11.83 | 11.83 | 14.32 | 0.014509 |
| 12.68 | 303.74 | 61.10 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q25 | 4148.00 | 5.00 | 12.11 | 12.11 | 14.70 | 0.014350 |
| 12.93 | 320.83 | 62.03 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q50 | 5290.00 | 5.00 | 13.10 | 13.10 | 16.05 | 0.013874 |
| 13.79 | 383.70 | 65.29 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q500 | 7380.00 | 5.00 | 14.68 | 14.68 | 18.19 | 0.013258 |
| 15.04 | 490.72 | 70.18 | | 1.00 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 960 | | Q100 | 5910.00 | 3.50 | 9.43 | 10.91 | 14.55 | 0.030767 |
| 18.60 | 341.13 | 76.49 | | 1.44 | | | | | |
| Reach 1 | 960 | | Q1.1 | 1312.00 | 3.50 | 6.44 | 6.75 | 8.04 | 0.029093 |
| 10.21 | 131.29 | 63.66 | | 1.21 | | | | | |
| Reach 1 | 960 | | Q10 | 3850.00 | 3.50 | 8.24 | 9.32 | 12.10 | 0.032272 |
| 16.02 | 253.19 | 71.40 | | 1.41 | | | | | |
| Reach 1 | 960 | | Q25 | 4148.00 | 3.50 | 8.43 | 9.57 | 12.48 | 0.032073 |
| 16.45 | 266.37 | 72.19 | | 1.42 | | | | | |
| Reach 1 | 960 | | Q50 | 5290.00 | 3.50 | 9.09 | 10.43 | 13.86 | 0.031227 |
| 17.91 | 315.39 | 75.04 | | 1.43 | | | | | |
| Reach 1 | 960 | | Q500 | 7380.00 | 3.50 | 10.20 | 11.80 | 16.05 | 0.029537 |
| 19.97 | 401.20 | 79.79 | | 1.44 | | | | | |
| Reach 1 | 935 | | Q100 | 5910.00 | 2.00 | 11.75 | 9.85 | 13.32 | 0.005265 |
| 10.42 | 658.53 | 132.90 | | 0.64 | | | | | |
| Reach 1 | 935 | | Q1.1 | 1312.00 | 2.00 | 7.09 | 5.89 | 7.58 | 0.004686 |
| 5.64 | 240.45 | 73.32 | | 0.53 | | | | | |
| Reach 1 | 935 | | Q10 | 3850.00 | 2.00 | 9.85 | 8.32 | 11.06 | 0.005604 |
| 9.03 | 456.63 | 83.52 | | 0.63 | | | | | |
| Reach 1 | 935 | | Q25 | 4148.00 | 2.00 | 10.11 | 8.55 | 11.40 | 0.005706 |
| 9.35 | 478.35 | 87.07 | | 0.64 | | | | | |
| Reach 1 | 935 | | Q50 | 5290.00 | 2.00 | 11.27 | 9.42 | 12.74 | 0.005275 |
| 10.02 | 598.64 | 119.63 | | 0.63 | | | | | |
| Reach 1 | 935 | | Q500 | 7380.00 | 2.00 | 12.97 | 11.03 | 14.57 | 0.004645 |
| 10.73 | 828.04 | 154.93 | | 0.62 | | | | | |
| Reach 1 | 895 | | Bridge | | | | | | |
| Reach 1 | 850 | | Q100 | 5910.00 | 1.00 | 11.15 | 9.23 | 12.78 | 0.004722 |
| 10.75 | 667.24 | 137.13 | | 0.64 | | | | | |
| Reach 1 | 850 | | Q1.1 | 1312.00 | 1.00 | 6.82 | 4.95 | 7.20 | 0.002613 |
| 5.07 | 272.29 | 70.41 | | 0.43 | | | | | |
| Reach 1 | 850 | | Q10 | 3850.00 | 1.00 | 9.32 | 7.59 | 10.54 | 0.004663 |
| 9.14 | 463.09 | 82.13 | | 0.61 | | | | | |
| Reach 1 | 850 | | Q25 | 4148.00 | 1.00 | 9.61 | 7.85 | 10.89 | 0.004678 |
| 9.41 | 487.02 | 83.49 | | 0.62 | | | | | |
| Reach 1 | 850 | | Q50 | 5290.00 | 1.00 | 10.56 | 8.76 | 12.19 | 0.005052 |
| 10.62 | 590.31 | 128.55 | | 0.66 | | | | | |
| Reach 1 | 850 | | Q500 | 7380.00 | 1.00 | 12.53 | 11.04 | 14.10 | 0.003944 |
| 10.84 | 851.33 | 153.61 | | 0.60 | | | | | |
| Reach 1 | 830 | | Q100 | 5910.00 | 1.00 | 11.26 | | 12.51 | 0.003074 |
| 9.22 | 746.99 | 159.08 | | 0.58 | | | | | |

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|---|---|---|---|---|---|---|---|---|
| Reach 1 | 830 | | Q1.1 | 1312.00 | 1.00 | 6.74 | 7.14 | 0.002907 |
| 5.12 | 257.05 | 77.73 | | 0.49 | | | | |
| Reach 1 | 830 | | Q10 | 3850.00 | 1.00 | 9.32 | 10.37 | 0.003638 |
| 8.31 | 491.60 | 104.93 | | 0.60 | | | | |
| Reach 1 | 830 | | Q25 | 4148.00 | 1.00 | 9.62 | 10.71 | 0.003539 |
| 8.47 | 524.13 | 108.28 | | 0.60 | | | | |
| Reach 1 | 830 | | Q50 | 5290.00 | 1.00 | 10.68 | 11.91 | 0.003296 |
| 9.08 | 657.87 | 145.20 | | 0.59 | | | | |
| Reach 1 | 830 | | Q500 | 7380.00 | 1.00 | 12.65 | 13.86 | 0.002508 |
| 9.28 | 978.53 | 170.35 | | 0.54 | | | | |
| Reach 1 | 821 | | Q100 | 5910.00 | 1.00 | 11.34 | 12.39 | 0.002923 |
| 8.30 | 780.65 | 173.08 | | 0.55 | | | | |
| Reach 1 | 821 | | Q1.1 | 1312.00 | 1.00 | 6.70 | 7.12 | 0.003264 |
| 5.17 | 253.80 | 80.33 | | 0.51 | | | | |
| Reach 1 | 821 | | Q10 | 3850.00 | 1.00 | 9.35 | 10.27 | 0.003921 |
| 7.69 | 503.45 | 110.72 | | 0.61 | | | | |
| Reach 1 | 821 | | Q25 | 4148.00 | 1.00 | 9.66 | 10.61 | 0.003709 |
| 7.79 | 539.38 | 118.32 | | 0.60 | | | | |
| Reach 1 | 821 | | Q50 | 5290.00 | 1.00 | 10.75 | 11.78 | 0.003187 |
| 8.18 | 685.57 | 152.72 | | 0.57 | | | | |
| Reach 1 | 821 | | Q500 | 7380.00 | 1.00 | 12.71 | 13.75 | 0.002344 |
| 8.38 | 1030.46 | 183.54 | | 0.51 | | | | |
| Reach 1 | 820 | | Q100 | 5910.00 | 1.00 | 11.43 | 12.34 | 0.003087 |
| 7.69 | 803.42 | 172.37 | | 0.55 | | | | |
| Reach 1 | 820 | | Q1.1 | 1312.00 | 1.00 | 6.70 | 7.11 | 0.003278 |
| 5.18 | 253.43 | 80.29 | | 0.51 | | | | |
| Reach 1 | 820 | | Q10 | 3850.00 | 1.00 | 9.35 | 10.26 | 0.004413 |
| 7.66 | 502.71 | 110.46 | | 0.63 | | | | |
| Reach 1 | 820 | | Q25 | 4148.00 | 1.00 | 9.68 | 10.59 | 0.004433 |
| 7.68 | 540.00 | 118.58 | | 0.63 | | | | |
| Reach 1 | 820 | | Q50 | 5290.00 | 1.00 | 10.83 | 11.74 | 0.003558 |
| 7.69 | 703.59 | 154.57 | | 0.58 | | | | |
| Reach 1 | 820 | | Q500 | 7380.00 | 1.00 | 12.85 | 13.69 | 0.002211 |
| 7.50 | 1166.68 | 280.88 | | 0.49 | | | | |
| Reach 1 | 725 | | Q100 | 5910.00 | 2.50 | 10.98 | 12.00 | 0.003914 |
| 8.16 | 775.07 | 173.76 | | 0.55 | | | | |
| Reach 1 | 725 | | Q1.1 | 1312.00 | 2.50 | 6.19 | 6.68 | 0.006471 |
| 5.62 | 233.26 | 89.27 | | 0.61 | | | | |
| Reach 1 | 725 | | Q10 | 3850.00 | 2.50 | 8.76 | 9.76 | 0.006140 |
| 8.02 | 480.32 | 102.99 | | 0.65 | | | | |
| Reach 1 | 725 | | Q25 | 4148.00 | 2.50 | 9.10 | 10.10 | 0.005766 |
| 8.05 | 515.12 | 107.22 | | 0.64 | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 725 | | Q50 | 5290.00 | 2.50 | 10.32 | | 11.35 | 0.004495 |
| 8.17 | 669.44 | 147.09 | | 0.58 | | | | | |
| Reach 1 | 725 | | Q500 | 7380.00 | 2.50 | 12.49 | | 13.44 | 0.002895 |
| 8.03 | 1085.64 | 233.36 | | 0.49 | | | | | |
| Reach 1 | 575 | | Q100 | 5910.00 | 1.50 | 10.82 | | 11.46 | 0.002176 |
| 6.47 | 970.39 | 205.77 | | 0.42 | | | | | |
| Reach 1 | 575 | | Q1.1 | 1312.00 | 1.50 | 4.64 | | 5.33 | 0.012975 |
| 6.65 | 197.15 | 99.11 | | 0.83 | | | | | |
| Reach 1 | 575 | | Q10 | 3850.00 | 1.50 | 8.32 | | 8.96 | 0.003596 |
| 6.43 | 598.52 | 119.69 | | 0.51 | | | | | |
| Reach 1 | 575 | | Q25 | 4148.00 | 1.50 | 8.71 | | 9.35 | 0.003312 |
| 6.42 | 645.83 | 122.16 | | 0.49 | | | | | |
| Reach 1 | 575 | | Q50 | 5290.00 | 1.50 | 10.10 | | 10.75 | 0.002487 |
| 6.46 | 838.34 | 163.32 | | 0.44 | | | | | |
| Reach 1 | 575 | | Q500 | 7380.00 | 1.50 | 12.41 | | 13.01 | 0.001633 |
| 6.39 | 1361.35 | 268.56 | | 0.38 | | | | | |
| Reach 1 | 425 | | Q100 | 5910.00 | 0.00 | 10.51 | | 11.16 | 0.001827 |
| 6.49 | 979.22 | 227.41 | | 0.39 | | | | | |
| Reach 1 | 425 | | Q1.1 | 1312.00 | 0.00 | 3.64 | | 4.09 | 0.005159 |
| 5.43 | 241.53 | 81.94 | | 0.56 | | | | | |
| Reach 1 | 425 | | Q10 | 3850.00 | 0.00 | 7.94 | | 8.51 | 0.002359 |
| 6.06 | 635.41 | 100.05 | | 0.42 | | | | | |
| Reach 1 | 425 | | Q25 | 4148.00 | 0.00 | 8.34 | | 8.93 | 0.002277 |
| 6.14 | 676.07 | 101.58 | | 0.42 | | | | | |
| Reach 1 | 425 | | Q50 | 5290.00 | 0.00 | 9.77 | | 10.41 | 0.002010 |
| 6.41 | 837.36 | 138.26 | | 0.40 | | | | | |
| Reach 1 | 425 | | Q500 | 7380.00 | 0.00 | 12.18 | | 12.79 | 0.001414 |
| 6.42 | 1401.34 | 260.97 | | 0.35 | | | | | |
| Reach 1 | 335 | | Q100 | 5910.00 | -2.00 | 9.90 | | 10.92 | 0.002776 |
| 8.11 | 744.20 | 116.89 | | 0.48 | | | | | |
| Reach 1 | 335 | | Q1.1 | 1312.00 | -2.00 | 3.18 | | 3.68 | 0.004046 |
| 5.66 | 231.87 | 61.02 | | 0.51 | | | | | |
| Reach 1 | 335 | | Q10 | 3850.00 | -2.00 | 7.40 | | 8.23 | 0.003241 |
| 7.34 | 524.52 | 77.52 | | 0.50 | | | | | |
| Reach 1 | 335 | | Q25 | 4148.00 | -2.00 | 7.79 | | 8.66 | 0.003199 |
| 7.47 | 555.22 | 79.02 | | 0.50 | | | | | |
| Reach 1 | 335 | | Q50 | 5290.00 | -2.00 | 9.18 | | 10.16 | 0.002961 |
| 7.92 | 669.58 | 90.38 | | 0.49 | | | | | |
| Reach 1 | 335 | | Q500 | 7380.00 | -2.00 | 11.57 | | 12.59 | 0.002277 |
| 8.24 | 1072.73 | 248.32 | | 0.45 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 262 | | Q100 | 5910.00 | -3.00 | 8.83 | | 10.57 | 0.005707 |
| 10.58 | 558.57 | 71.13 | | 0.67 | | | | | |
| Reach 1 | 262 | | Q1.1 | 1312.00 | -3.00 | 2.46 | | 3.27 | 0.006684 |
| 7.24 | 181.27 | 47.36 | | 0.65 | | | | | |
| Reach 1 | 262 | | Q10 | 3850.00 | -3.00 | 6.37 | | 7.85 | 0.006329 |
| 9.75 | 394.89 | 62.01 | | 0.68 | | | | | |
| Reach 1 | 262 | | Q25 | 4148.00 | -3.00 | 6.74 | | 8.27 | 0.006275 |
| 9.92 | 418.05 | 63.45 | | 0.68 | | | | | |
| Reach 1 | 262 | | Q50 | 5290.00 | -3.00 | 8.10 | | 9.79 | 0.005954 |
| 10.42 | 507.69 | 68.47 | | 0.67 | | | | | |
| Reach 1 | 262 | | Q500 | 7380.00 | -3.00 | 10.41 | | 12.27 | 0.004923 |
| 10.93 | 690.11 | 108.39 | | 0.63 | | | | | |
| | | | | | | | | | |
| Reach 1 | 187 | | Q100 | 5910.00 | -4.00 | 8.44 | 5.94 | 10.14 | 0.005330 |
| 10.46 | 564.77 | 68.82 | | 0.64 | | | | | |
| Reach 1 | 187 | | Q1.1 | 1312.00 | -4.00 | 2.11 | 0.60 | 2.80 | 0.005083 |
| 6.66 | 197.00 | 47.17 | | 0.57 | | | | | |
| Reach 1 | 187 | | Q10 | 3850.00 | -4.00 | 5.98 | 3.99 | 7.38 | 0.005674 |
| 9.50 | 405.37 | 60.48 | | 0.65 | | | | | |
| Reach 1 | 187 | | Q25 | 4148.00 | -4.00 | 6.34 | 4.29 | 7.80 | 0.005668 |
| 9.70 | 427.77 | 61.72 | | 0.65 | | | | | |
| Reach 1 | 187 | | Q50 | 5290.00 | -4.00 | 7.71 | 5.39 | 9.35 | 0.005505 |
| 10.27 | 515.03 | 66.29 | | 0.65 | | | | | |
| Reach 1 | 187 | | Q500 | 7380.00 | -4.00 | 10.07 | 7.13 | 11.90 | 0.004763 |
| 10.85 | 682.36 | 79.14 | | 0.62 | | | | | |
| | | | | | | | | | |
| Reach 1 | 166 | | | Bridge | | | | | |
| | | | | | | | | | |
| Reach 1 | 137 | | Q100 | 5910.00 | -4.00 | 7.97 | 5.85 | 9.84 | 0.006060 |
| 10.95 | 539.62 | 67.73 | | 0.68 | | | | | |
| Reach 1 | 137 | | Q1.1 | 1312.00 | -4.00 | 1.69 | 0.51 | 2.50 | 0.006412 |
| 7.23 | 181.49 | 45.77 | | 0.64 | | | | | |
| Reach 1 | 137 | | Q10 | 3850.00 | -4.00 | 5.44 | 3.89 | 7.04 | 0.006877 |
| 10.16 | 378.85 | 59.13 | | 0.71 | | | | | |
| Reach 1 | 137 | | Q25 | 4148.00 | -4.00 | 5.81 | 4.20 | 7.47 | 0.006819 |
| 10.35 | 400.81 | 60.38 | | 0.71 | | | | | |
| Reach 1 | 137 | | Q50 | 5290.00 | -4.00 | 7.20 | 5.30 | 9.02 | 0.006396 |
| 10.83 | 488.44 | 65.11 | | 0.70 | | | | | |
| Reach 1 | 137 | | Q500 | 7380.00 | -4.00 | 9.68 | 7.04 | 11.63 | 0.005108 |
| 11.21 | 660.26 | 73.78 | | 0.64 | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | | | Bridge | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 60 | | Q100 | 5910.00 | -5.00 | 7.40 | 4.37 | 9.20 | 0.003918 |
| 10.88 | 564.72 | 62.75 | | 0.59 | | | | | |
| Reach 1 | 60 | | Q1.1 | 1312.00 | -5.00 | 0.57 | -0.83 | 1.28 | 0.005264 |
| 6.74 | 194.86 | 47.86 | | 0.58 | | | | | |
| Reach 1 | 60 | | Q10 | 3850.00 | -5.00 | 4.61 | 2.44 | 6.06 | 0.004666 |
| 9.70 | 408.35 | 57.66 | | 0.61 | | | | | |
| Reach 1 | 60 | | Q25 | 4148.00 | -5.00 | 5.04 | 2.74 | 6.54 | 0.004524 |
| 9.90 | 432.34 | 58.37 | | 0.60 | | | | | |
| Reach 1 | 60 | | Q50 | 5290.00 | -5.00 | 6.60 | 3.80 | 8.30 | 0.004093 |
| 10.56 | 519.88 | 60.95 | | 0.59 | | | | | |
| Reach 1 | 60 | | Q500 | 7380.00 | -5.00 | 9.16 | 5.55 | 11.21 | 0.003631 |
| 11.60 | 663.58 | 65.97 | | 0.58 | | | | | |
| Reach 1 | 38 | | Q100 | 5910.00 | -4.50 | 6.79 | | 8.98 | 0.005186 |
| 11.95 | 514.38 | 58.84 | | 0.66 | | | | | |
| Reach 1 | 38 | | Q1.1 | 1312.00 | -4.50 | -0.42 | -0.59 | 0.91 | 0.014529 |
| 9.26 | 141.70 | 46.14 | | 0.93 | | | | | |
| Reach 1 | 38 | | Q10 | 3850.00 | -4.50 | 4.00 | | 5.82 | 0.006584 |
| 10.85 | 358.44 | 52.64 | | 0.71 | | | | | |
| Reach 1 | 38 | | Q25 | 4148.00 | -4.50 | 4.42 | | 6.31 | 0.006331 |
| 11.05 | 380.85 | 53.58 | | 0.70 | | | | | |
| Reach 1 | 38 | | Q50 | 5290.00 | -4.50 | 5.99 | | 8.08 | 0.005518 |
| 11.66 | 467.59 | 57.05 | | 0.67 | | | | | |
| Reach 1 | 38 | | Q500 | 7380.00 | -4.50 | 8.63 | | 11.01 | 0.004557 |
| 12.51 | 626.13 | 62.91 | | 0.64 | | | | | |
| Reach 1 | 0 | | Q100 | 5910.00 | -6.30 | 4.24 | 4.24 | 8.48 | 0.013662 |
| 16.53 | 360.07 | 44.32 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q1.1 | 1312.00 | -6.30 | -0.66 | | 0.42 | 0.008477 |
| 8.34 | 157.23 | 37.65 | | 0.72 | | | | | |
| Reach 1 | 0 | | Q10 | 3850.00 | -6.30 | 2.11 | 2.11 | 5.32 | 0.015198 |
| 14.38 | 267.79 | 42.20 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q25 | 4148.00 | -6.30 | 2.45 | 2.45 | 5.81 | 0.014853 |
| 14.71 | 282.09 | 42.54 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q50 | 5290.00 | -6.30 | 3.62 | 3.62 | 7.58 | 0.014135 |
| 15.97 | 332.50 | 43.70 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q500 | 7380.00 | -6.30 | 5.62 | 5.62 | 10.49 | 0.012870 |
| 17.73 | 422.22 | 45.70 | | 0.99 | | | | | |
| Reach 1 | -21 | | Q100 | 5910.00 | -7.00 | 1.82 | 3.29 | 7.91 | 0.024570 |
| 19.83 | 302.26 | 45.71 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q1.1 | 1312.00 | -7.00 | -0.51 | | 0.18 | 0.004483 |
| 6.67 | 197.87 | 43.72 | | 0.55 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | -21 | | Q10 | 3850.00 | -7.00 | 2.56 | 1.22 | 4.66 | 0.007551 |
| 11.64 | 336.22 | 46.34 | | 0.75 | | | | | |
| Reach 1 | -21 | | Q25 | 4148.00 | -7.00 | 0.34 | 1.55 | 5.24 | 0.026135 |
| 17.79 | 235.26 | 44.44 | | 1.35 | | | | | |
| Reach 1 | -21 | | Q50 | 5290.00 | -7.00 | 1.32 | 2.71 | 7.01 | 0.025006 |
| 19.16 | 279.48 | 45.28 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q500 | 7380.00 | -7.00 | 2.94 | 4.65 | 9.92 | 0.023784 |
| 21.24 | 353.85 | 46.66 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q100 | 5910.00 | -7.00 | 1.85 | 3.09 | 6.72 | 0.025698 |
| 17.70 | 333.87 | 61.41 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q1.1 | 1312.00 | -7.00 | -0.67 | | 0.02 | 0.005185 |
| 6.67 | 196.83 | 47.34 | | 0.58 | | | | | |
| Reach 1 | -54 | | Q10 | 3850.00 | -7.00 | 2.72 | | 4.25 | 0.006877 |
| 9.90 | 389.65 | 66.29 | | 0.71 | | | | | |
| Reach 1 | -54 | | Q25 | 4148.00 | -7.00 | 3.00 | 1.58 | 4.62 | 0.006950 |
| 10.20 | 408.26 | 67.84 | | 0.71 | | | | | |
| Reach 1 | -54 | | Q50 | 5290.00 | -7.00 | 3.93 | 2.59 | 5.91 | 0.007362 |
| 11.32 | 473.56 | 73.02 | | 0.75 | | | | | |
| Reach 1 | -54 | | Q500 | 7380.00 | -7.00 | 2.18 | 4.20 | 8.92 | 0.033780 |
| 20.84 | 354.12 | 63.23 | | 1.54 | | | | | |
| Reach 1 | -88 | | Q100 | 5910.00 | -6.00 | 3.18 | 3.18 | 6.13 | 0.013653 |
| 13.78 | 428.87 | 72.75 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q1.1 | 1312.00 | -6.00 | -1.87 | -1.87 | -0.35 | 0.017077 |
| 9.88 | 132.74 | 44.37 | | 1.01 | | | | | |
| Reach 1 | -88 | | Q10 | 3850.00 | -6.00 | 1.38 | 1.38 | 3.83 | 0.014466 |
| 12.56 | 306.55 | 62.61 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q25 | 4148.00 | -6.00 | 1.67 | 1.67 | 4.20 | 0.014320 |
| 12.77 | 324.94 | 64.23 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q50 | 5290.00 | -6.00 | 2.68 | 2.68 | 5.50 | 0.013858 |
| 13.46 | 393.12 | 69.94 | | 1.00 | | | | | |
| Reach 1 | -88 | | Q500 | 7380.00 | -6.00 | 4.25 | 4.25 | 7.51 | 0.013360 |
| 14.49 | 509.28 | 78.71 | | 1.00 | | | | | |
| Reach 1 | -143 | | Q100 | 5910.00 | -7.00 | 0.87 | 1.76 | 5.09 | 0.021059 |
| 16.49 | 361.15 | 66.47 | | 1.24 | | | | | |
| Reach 1 | -143 | | Q1.1 | 1312.00 | -7.00 | -2.10 | -2.96 | -1.26 | 0.007984 |
| 7.34 | 178.85 | 52.94 | | 0.70 | | | | | |
| Reach 1 | -143 | | Q10 | 3850.00 | -7.00 | -0.70 | 0.07 | 2.72 | 0.024042 |
| 14.84 | 259.99 | 62.65 | | 1.27 | | | | | |
| Reach 1 | -143 | | Q25 | 4148.00 | -7.00 | -0.46 | 0.32 | 3.10 | 0.023585 |
| 15.14 | 274.89 | 63.23 | | 1.26 | | | | | |
| Reach 1 | -143 | | Q50 | 5290.00 | -7.00 | 0.41 | 1.29 | 4.43 | 0.021991 |
| 16.10 | 330.63 | 65.34 | | 1.25 | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | -143 | | Q500 | 7380.00 | -7.00 | 1.94 | 2.81 | 6.52 | 0.018989 |
| 17.18 | 433.84 | 69.08 | | 1.20 | | | | | |

Profile Output Table - Six XS Bridge

| Reach | River Sta | | Profile | E.G. Elev | W.S. Elev | Crit W.S. | Frctn Loss | C & E Loss | Top Width |
|---|---|---|---|---|---|---|---|---|---|
| Q Left | Q Channel | Q Right | Vel Chnl | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| (cfs) | (cfs) | (cfs) | (ft/s) | | | | | | |
| Reach 1 | 960 | | Q100 | 14.55 | 9.43 | 10.91 | 1.97 | 0.20 | 76.49 |
| 168.11 | 5560.68 | 181.20 | 18.60 | | | | | | |
| Reach 1 | 960 | | Q1.1 | 8.04 | 6.44 | 6.75 | 2.21 | 0.02 | 63.66 |
| 8.13 | 1295.11 | 8.76 | 10.21 | | | | | | |
| Reach 1 | 960 | | Q10 | 12.10 | 8.24 | 9.32 | 2.09 | 0.13 | 71.40 |
| 74.85 | 3694.47 | 80.68 | 16.02 | | | | | | |
| Reach 1 | 960 | | Q25 | 12.48 | 8.43 | 9.57 | 2.07 | 0.14 | 72.19 |
| 86.43 | 3968.41 | 93.16 | 16.45 | | | | | | |
| Reach 1 | 960 | | Q50 | 13.86 | 9.09 | 10.43 | 2.00 | 0.18 | 75.04 |
| 136.92 | 5005.50 | 147.58 | 17.91 | | | | | | |
| Reach 1 | 960 | | Q500 | 16.05 | 10.20 | 11.80 | 1.90 | 0.23 | 79.79 |
| 252.32 | 6855.72 | 271.96 | 19.97 | | | | | | |
| Reach 1 | 935 | | Q100 | 13.32 | 11.75 | 9.85 | 0.06 | 0.02 | 132.90 |
| 174.05 | 5450.01 | 285.95 | 10.42 | | | | | | |
| Reach 1 | 935 | | Q1.1 | 7.58 | 7.09 | 5.89 | 0.05 | 0.01 | 73.32 |
| 7.25 | 1281.04 | 23.71 | 5.64 | | | | | | |
| Reach 1 | 935 | | Q10 | 11.06 | 9.85 | 8.32 | 0.06 | 0.02 | 83.52 |
| 74.51 | 3633.67 | 141.82 | 9.03 | | | | | | |
| Reach 1 | 935 | | Q25 | 11.40 | 10.11 | 8.55 | 0.06 | 0.01 | 87.07 |
| 86.27 | 3917.98 | 143.74 | 9.35 | | | | | | |
| Reach 1 | 935 | | Q50 | 12.74 | 11.27 | 9.42 | 0.06 | 0.02 | 119.63 |
| 143.42 | 4940.89 | 205.69 | 10.02 | | | | | | |
| Reach 1 | 935 | | Q500 | 14.57 | 12.97 | 11.03 | 0.05 | 0.03 | 154.93 |
| 255.06 | 6451.11 | 673.83 | 10.73 | | | | | | |
| Reach 1 | 895 | BR U | Q100 | 13.24 | 11.59 | 9.85 | 0.30 | 0.07 | 126.63 |
| 169.38 | 5469.50 | 271.13 | 10.66 | | | | | | |
| Reach 1 | 895 | BR U | Q1.1 | 7.52 | 7.01 | 5.89 | 0.22 | 0.07 | 72.99 |
| 6.75 | 1282.34 | 22.91 | 5.79 | | | | | | |
| Reach 1 | 895 | BR U | Q10 | 10.97 | 9.70 | 8.32 | 0.32 | 0.05 | 82.96 |
| 71.42 | 3640.63 | 137.95 | 9.27 | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 895 | BR U | Q25 | 11.33 | 9.99 | 8.55 | 0.32 | 0.05 | 84.05 | |
| 83.39 | 3907.93 | 156.69 | 9.50 | | | | | | | |
| Reach 1 | 895 | BR U | Q50 | 12.65 | 11.10 | 9.42 | 0.31 | 0.05 | 114.91 | |
| 138.86 | 4959.52 | 191.62 | 10.29 | | | | | | | |
| Reach 1 | 895 | BR U | Q500 | 14.49 | 12.79 | 11.03 | 0.27 | 0.07 | 128.71 | |
| 249.68 | 6504.94 | 625.38 | 11.04 | | | | | | | |
| Reach 1 | 895 | BR D | Q100 | 12.86 | 11.35 | 9.23 | 0.05 | 0.04 | 125.59 | |
| 147.25 | 5241.63 | 521.12 | 10.39 | | | | | | | |
| Reach 1 | 895 | BR D | Q1.1 | 7.23 | 6.85 | 4.95 | 0.03 | 0.00 | 70.59 | |
| 4.25 | 1261.45 | 46.30 | 5.03 | | | | | | | |
| Reach 1 | 895 | BR D | Q10 | 10.60 | 9.43 | 7.59 | 0.05 | 0.01 | 82.66 | |
| 57.10 | 3554.07 | 238.83 | 8.98 | | | | | | | |
| Reach 1 | 895 | BR D | Q25 | 10.96 | 9.72 | 7.85 | 0.05 | 0.01 | 84.03 | |
| 67.83 | 3810.80 | 269.38 | 9.24 | | | | | | | |
| Reach 1 | 895 | BR D | Q50 | 12.30 | 10.84 | 8.76 | 0.06 | 0.05 | 124.62 | |
| 119.05 | 4808.65 | 362.30 | 10.12 | | | | | | | |
| Reach 1 | 895 | BR D | Q500 | 14.15 | 12.58 | 10.97 | 0.05 | 0.00 | 127.89 | |
| 224.95 | 6197.70 | 957.35 | 10.81 | | | | | | | |
| Reach 1 | 850 | | Q100 | 12.78 | 11.15 | 9.23 | 0.08 | 0.19 | 137.13 | |
| 141.84 | 5300.11 | 468.05 | 10.75 | | | | | | | |
| Reach 1 | 850 | | Q1.1 | 7.20 | 6.82 | 4.95 | 0.06 | 0.01 | 70.41 | |
| 4.08 | 1262.17 | 45.75 | 5.07 | | | | | | | |
| Reach 1 | 850 | | Q10 | 10.54 | 9.32 | 7.59 | 0.08 | 0.08 | 82.13 | |
| 54.87 | 3560.66 | 234.48 | 9.14 | | | | | | | |
| Reach 1 | 850 | | Q25 | 10.89 | 9.61 | 7.85 | 0.08 | 0.10 | 83.49 | |
| 65.32 | 3818.07 | 264.61 | 9.41 | | | | | | | |
| Reach 1 | 850 | | Q50 | 12.19 | 10.56 | 8.76 | 0.08 | 0.20 | 128.55 | |
| 112.29 | 4883.80 | 293.91 | 10.62 | | | | | | | |
| Reach 1 | 850 | | Q500 | 14.10 | 12.53 | 11.04 | 0.06 | 0.18 | 153.61 | |
| 222.51 | 6183.78 | 973.71 | 10.84 | | | | | | | |
| Reach 1 | 830 | | Q100 | 12.51 | 11.26 | | 0.03 | 0.10 | 159.08 | |
| 126.11 | 5558.21 | 225.68 | 9.22 | | | | | | | |
| Reach 1 | 830 | | Q1.1 | 7.14 | 6.74 | | 0.03 | 0.00 | 77.73 | |
| 0.65 | 1311.35 | | 5.12 | | | | | | | |
| Reach 1 | 830 | | Q10 | 10.37 | 9.32 | | 0.03 | 0.07 | 104.93 | |
| 40.08 | 3767.76 | 42.16 | 8.31 | | | | | | | |
| Reach 1 | 830 | | Q25 | 10.71 | 9.62 | | 0.03 | 0.07 | 108.28 | |
| 49.98 | 4040.20 | 57.82 | 8.47 | | | | | | | |
| Reach 1 | 830 | | Q50 | 11.91 | 10.68 | | 0.03 | 0.10 | 145.20 | |
| 95.53 | 5063.76 | 130.71 | 9.08 | | | | | | | |
| Reach 1 | 830 | | Q500 | 13.86 | 12.65 | | 0.02 | 0.08 | 170.35 | |
| 212.46 | 6578.08 | 589.46 | 9.28 | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 262 | | Q100 | 10.57 | 8.83 | | 0.41 | 0.01 | 71.13 |
| | 5910.00 | | 10.58 | | | | | | |
| Reach 1 | 262 | | Q1.1 | 3.27 | 2.46 | | 0.44 | 0.04 | 47.36 |
| | 1312.00 | | 7.24 | | | | | | |
| Reach 1 | 262 | | Q10 | 7.85 | 6.37 | | 0.45 | 0.02 | 62.01 |
| | 3850.00 | | 9.75 | | | | | | |
| Reach 1 | 262 | | Q25 | 8.27 | 6.74 | | 0.45 | 0.02 | 63.45 |
| | 4148.00 | | 9.92 | | | | | | |
| Reach 1 | 262 | | Q50 | 9.79 | 8.10 | | 0.43 | 0.01 | 68.47 |
| | 5290.00 | | 10.42 | | | | | | |
| Reach 1 | 262 | | Q500 | 12.27 | 10.41 | | 0.36 | 0.01 | 108.39 |
| 1.31 | 7364.13 | 14.57 | 10.93 | | | | | | |
| Reach 1 | 187 | | Q100 | 10.14 | 8.44 | 5.94 | 0.12 | 0.01 | 68.82 |
| | 5910.00 | | 10.46 | | | | | | |
| Reach 1 | 187 | | Q1.1 | 2.80 | 2.11 | 0.60 | 0.11 | 0.01 | 47.17 |
| | 1312.00 | | 6.66 | | | | | | |
| Reach 1 | 187 | | Q10 | 7.38 | 5.98 | 3.99 | 0.13 | 0.01 | 60.48 |
| | 3850.00 | | 9.50 | | | | | | |
| Reach 1 | 187 | | Q25 | 7.80 | 6.34 | 4.29 | 0.12 | 0.01 | 61.72 |
| | 4148.00 | | 9.70 | | | | | | |
| Reach 1 | 187 | | Q50 | 9.35 | 7.71 | 5.39 | 0.12 | 0.01 | 66.29 |
| | 5290.00 | | 10.27 | | | | | | |
| Reach 1 | 187 | | Q500 | 11.90 | 10.07 | 7.13 | 0.10 | 0.01 | 79.14 |
| 0.51 | 7378.29 | 1.19 | 10.85 | | | | | | |
| Reach 1 | 166 | BR U | Q100 | 10.02 | 8.22 | 5.94 | 0.08 | 0.00 | 68.05 |
| | 5910.00 | | 10.75 | | | | | | |
| Reach 1 | 166 | BR U | Q1.1 | 2.68 | 1.93 | 0.59 | 0.08 | 0.00 | 46.51 |
| | 1312.00 | | 6.97 | | | | | | |
| Reach 1 | 166 | BR U | Q10 | 7.24 | 5.73 | 3.98 | 0.09 | 0.00 | 59.67 |
| | 3850.00 | | 9.85 | | | | | | |
| Reach 1 | 166 | BR U | Q25 | 7.67 | 6.10 | 4.29 | 0.09 | 0.00 | 60.90 |
| | 4148.00 | | 10.05 | | | | | | |
| Reach 1 | 166 | BR U | Q50 | 9.21 | 7.47 | 5.40 | 0.08 | 0.00 | 65.51 |
| | 5290.00 | | 10.59 | | | | | | |
| Reach 1 | 166 | BR U | Q500 | 11.78 | 9.88 | 7.13 | 0.07 | 0.00 | 74.14 |
| 0.28 | 7379.46 | 0.26 | 11.07 | | | | | | |
| Reach 1 | 166 | BR D | Q100 | 9.93 | 8.15 | 5.85 | 0.09 | 0.01 | 68.32 |
| | 5910.00 | | 10.71 | | | | | | |

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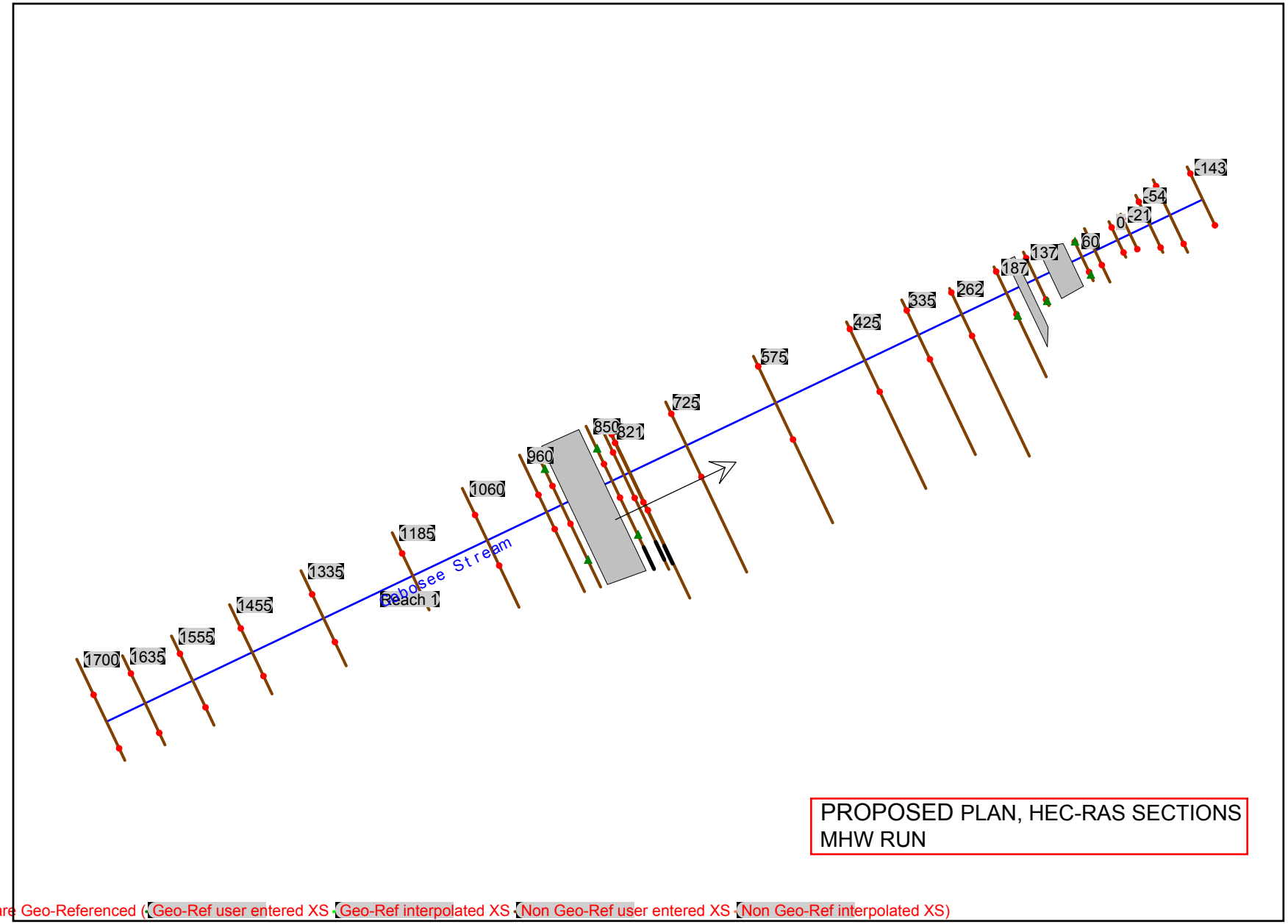
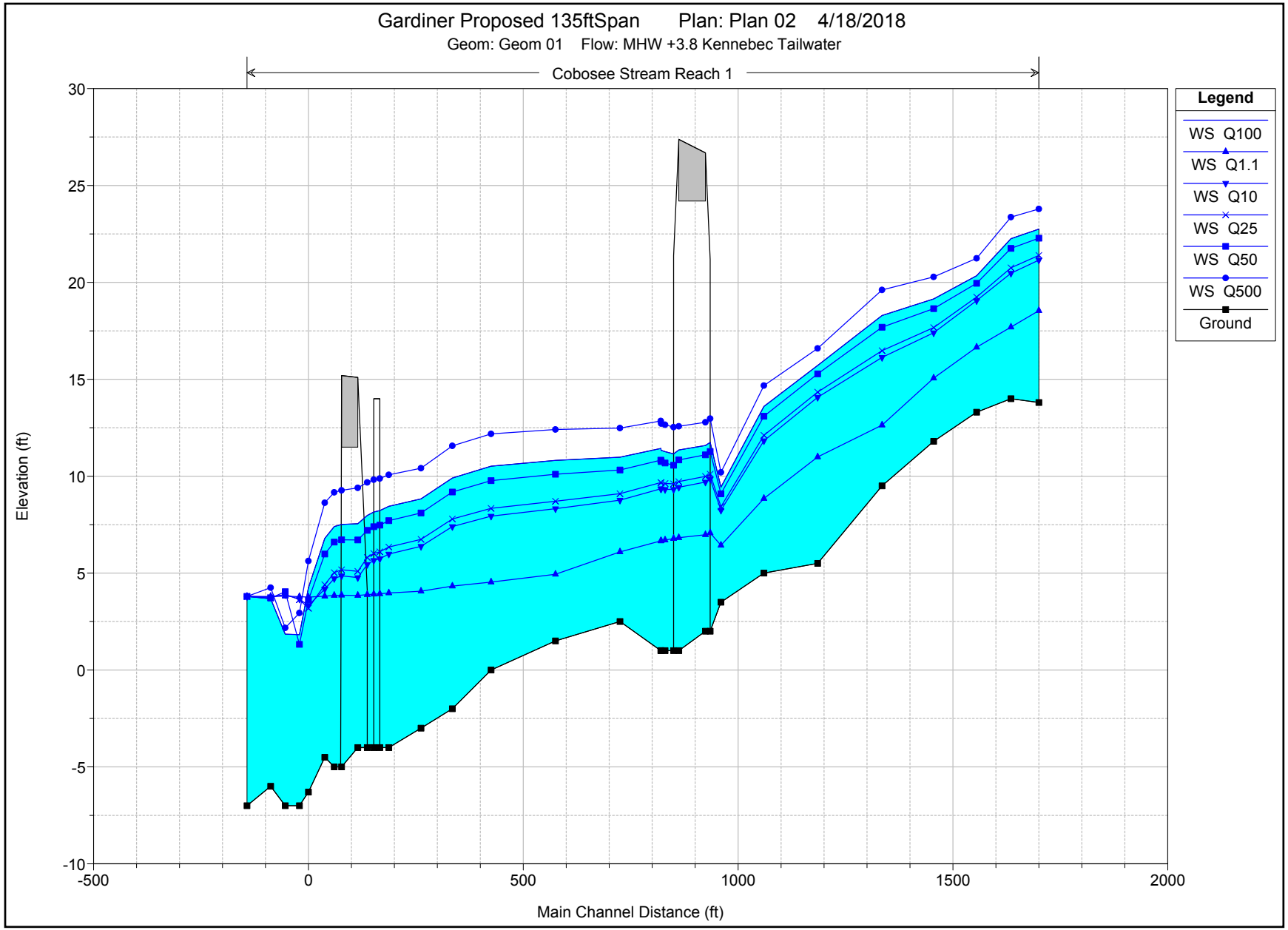
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 166 | BR D | Q1.1 | 2.60 | 1.85 | 0.50 | 0.09 | 0.01 | 46.39 |
| 1312.00 | | | 6.96 | | | | | | |
| Reach 1 | 166 | BR D | Q10 | 7.15 | 5.65 | 3.90 | 0.10 | 0.01 | 59.84 |
| 3850.00 | | | 9.84 | | | | | | |
| Reach 1 | 166 | BR D | Q25 | 7.58 | 6.01 | 4.20 | 0.10 | 0.01 | 61.09 |
| 4148.00 | | | 10.03 | | | | | | |
| Reach 1 | 166 | BR D | Q50 | 9.13 | 7.40 | 5.30 | 0.09 | 0.01 | 65.77 |
| 5290.00 | | | 10.56 | | | | | | |
| Reach 1 | 166 | BR D | Q500 | 11.71 | 9.82 | 7.04 | 0.07 | 0.01 | 73.66 |
| 2.44 | 7376.99 | 0.57 | 11.05 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 137 | | Q100 | 9.84 | 7.97 | 5.85 | 0.14 | 0.06 | 67.73 |
| 5910.00 | | | 10.95 | | | | | | |
| Reach 1 | 137 | | Q1.1 | 2.50 | 1.69 | 0.51 | 0.21 | 0.20 | 45.77 |
| 1312.00 | | | 7.23 | | | | | | |
| Reach 1 | 137 | | Q10 | 7.04 | 5.44 | 3.89 | 0.18 | 0.14 | 59.13 |
| 3850.00 | | | 10.16 | | | | | | |
| Reach 1 | 137 | | Q25 | 7.47 | 5.81 | 4.20 | 0.17 | 0.12 | 60.38 |
| 4148.00 | | | 10.35 | | | | | | |
| Reach 1 | 137 | | Q50 | 9.02 | 7.20 | 5.30 | 0.15 | 0.08 | 65.11 |
| 5290.00 | | | 10.83 | | | | | | |
| Reach 1 | 137 | | Q500 | 11.63 | 9.68 | 7.04 | 0.12 | 0.04 | 73.78 |
| 1.94 | 7377.72 | 0.34 | 11.21 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | BR U | Q100 | 9.62 | 7.55 | 5.85 | 0.19 | 0.16 | 66.28 |
| 5910.00 | | | 11.57 | | | | | | |
| Reach 1 | 98.5 | BR U | Q1.1 | 2.09 | 0.60 | 0.50 | 0.30 | 0.42 | 41.40 |
| 1312.00 | | | 9.80 | | | | | | |
| Reach 1 | 98.5 | BR U | Q10 | 6.73 | 4.66 | 3.90 | 0.24 | 0.34 | 56.49 |
| 3850.00 | | | 11.53 | | | | | | |
| Reach 1 | 98.5 | BR U | Q25 | 7.17 | 5.10 | 4.20 | 0.23 | 0.31 | 57.98 |
| 4148.00 | | | 11.56 | | | | | | |
| Reach 1 | 98.5 | BR U | Q50 | 8.79 | 6.71 | 5.30 | 0.20 | 0.21 | 63.44 |
| 5290.00 | | | 11.58 | | | | | | |
| Reach 1 | 98.5 | BR U | Q500 | 11.48 | 9.40 | 7.04 | 0.17 | 0.03 | 71.43 |
| 1.11 | 7378.89 | | 11.56 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | BR D | Q100 | 9.28 | 7.51 | 4.37 | 0.07 | 0.01 | 63.06 |
| 5779.31 | 130.69 | | 10.76 | | | | | | |
| Reach 1 | 98.5 | BR D | Q1.1 | 1.38 | 0.72 | -0.83 | 0.08 | 0.01 | 48.28 |
| 1311.73 | 0.27 | | 6.51 | | | | | | |
| Reach 1 | 98.5 | BR D | Q10 | 6.15 | 4.76 | 2.44 | 0.08 | 0.02 | 57.91 |
| 3807.03 | 42.97 | | 9.52 | | | | | | |
| Reach 1 | 98.5 | BR D | Q25 | 6.63 | 5.18 | 2.74 | 0.07 | 0.02 | 58.61 |
| 4093.75 | 54.26 | | 9.72 | | | | | | |

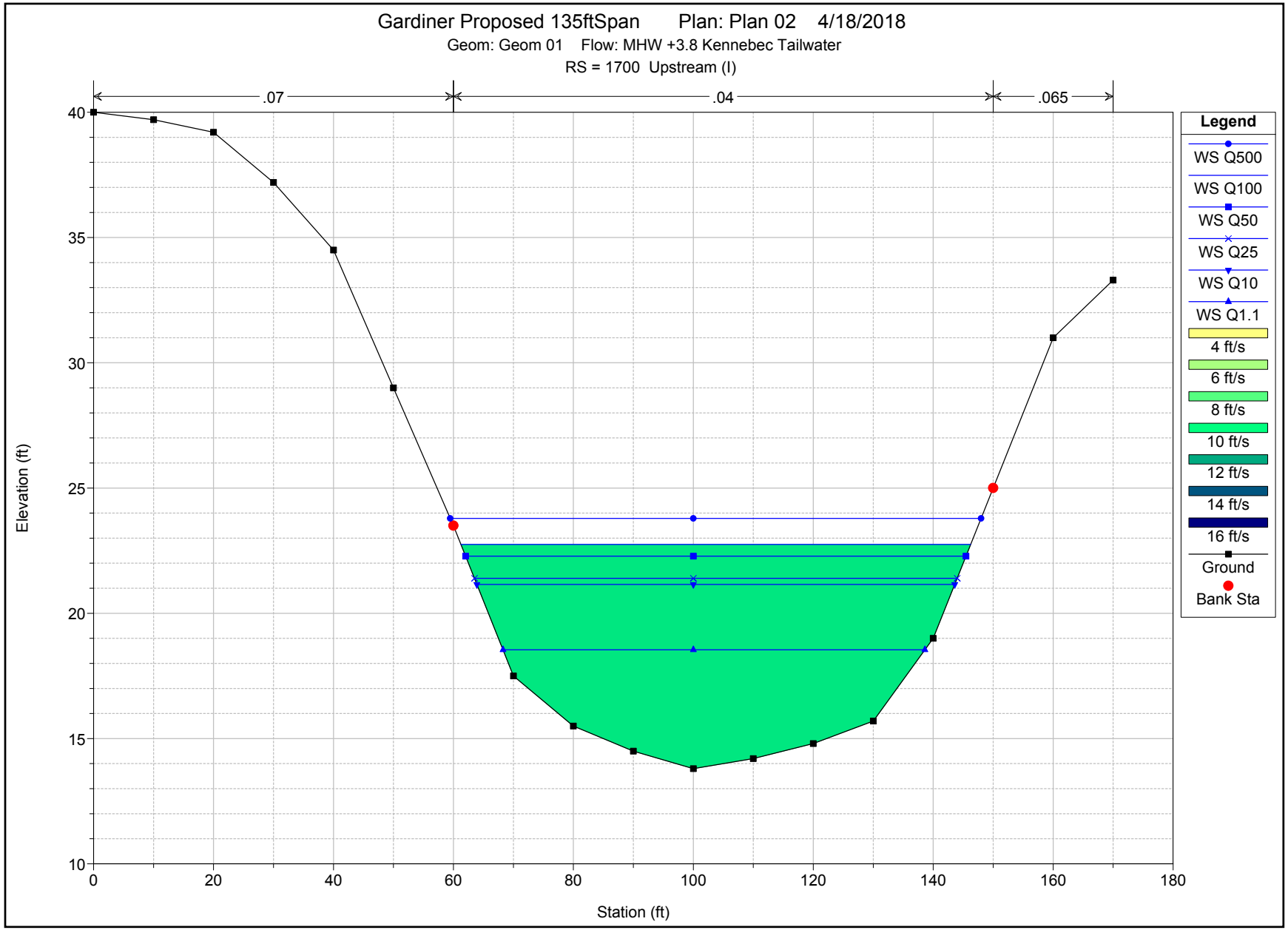
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 98.5 | BR D | Q50 | 8.38 | 6.72 | 3.80 | 0.07 | 0.01 | 61.15 | |
| | 5187.74 | 102.26 | 10.43 | | | | | | | |
| Reach 1 | 98.5 | BR D | Q500 | 11.27 | 9.27 | 5.55 | 0.06 | 0.01 | 65.27 | |
| | 7178.29 | 201.71 | 11.50 | | | | | | | |
| Reach 1 | 60 | | Q100 | 9.20 | 7.40 | 4.37 | 0.10 | 0.12 | 62.75 | |
| | 5781.54 | 128.46 | 10.88 | | | | | | | |
| Reach 1 | 60 | | Q1.1 | 1.28 | 0.57 | -0.83 | 0.18 | 0.19 | 47.86 | |
| | 1311.84 | 0.16 | 6.74 | | | | | | | |
| Reach 1 | 60 | | Q10 | 6.06 | 4.61 | 2.44 | 0.12 | 0.11 | 57.66 | |
| | 3809.73 | 40.27 | 9.70 | | | | | | | |
| Reach 1 | 60 | | Q25 | 6.54 | 5.04 | 2.74 | 0.12 | 0.12 | 58.37 | |
| | 4096.43 | 51.57 | 9.90 | | | | | | | |
| Reach 1 | 60 | | Q50 | 8.30 | 6.60 | 3.80 | 0.10 | 0.12 | 60.95 | |
| | 5190.07 | 99.93 | 10.56 | | | | | | | |
| Reach 1 | 60 | | Q500 | 11.21 | 9.16 | 5.55 | 0.09 | 0.10 | 65.97 | |
| | 7180.31 | 199.69 | 11.60 | | | | | | | |
| Reach 1 | 38 | | Q100 | 8.98 | 6.79 | | 0.30 | 0.20 | 58.84 | |
| 0.03 | 5839.64 | 70.33 | 11.95 | | | | | | | |
| Reach 1 | 38 | | Q1.1 | 0.91 | -0.42 | -0.59 | 0.41 | 0.07 | 46.14 | |
| | 1312.00 | | 9.26 | | | | | | | |
| Reach 1 | 38 | | Q10 | 5.82 | 4.00 | | 0.36 | 0.14 | 52.64 | |
| 0.01 | 3842.33 | 7.66 | 10.85 | | | | | | | |
| Reach 1 | 38 | | Q25 | 6.31 | 4.42 | | 0.35 | 0.15 | 53.58 | |
| 0.01 | 4135.47 | 12.53 | 11.05 | | | | | | | |
| Reach 1 | 38 | | Q50 | 8.08 | 5.99 | | 0.32 | 0.19 | 57.05 | |
| 0.02 | 5245.62 | 44.36 | 11.66 | | | | | | | |
| Reach 1 | 38 | | Q500 | 11.01 | 8.63 | | 0.27 | 0.25 | 62.91 | |
| 0.04 | 7223.42 | 156.53 | 12.51 | | | | | | | |

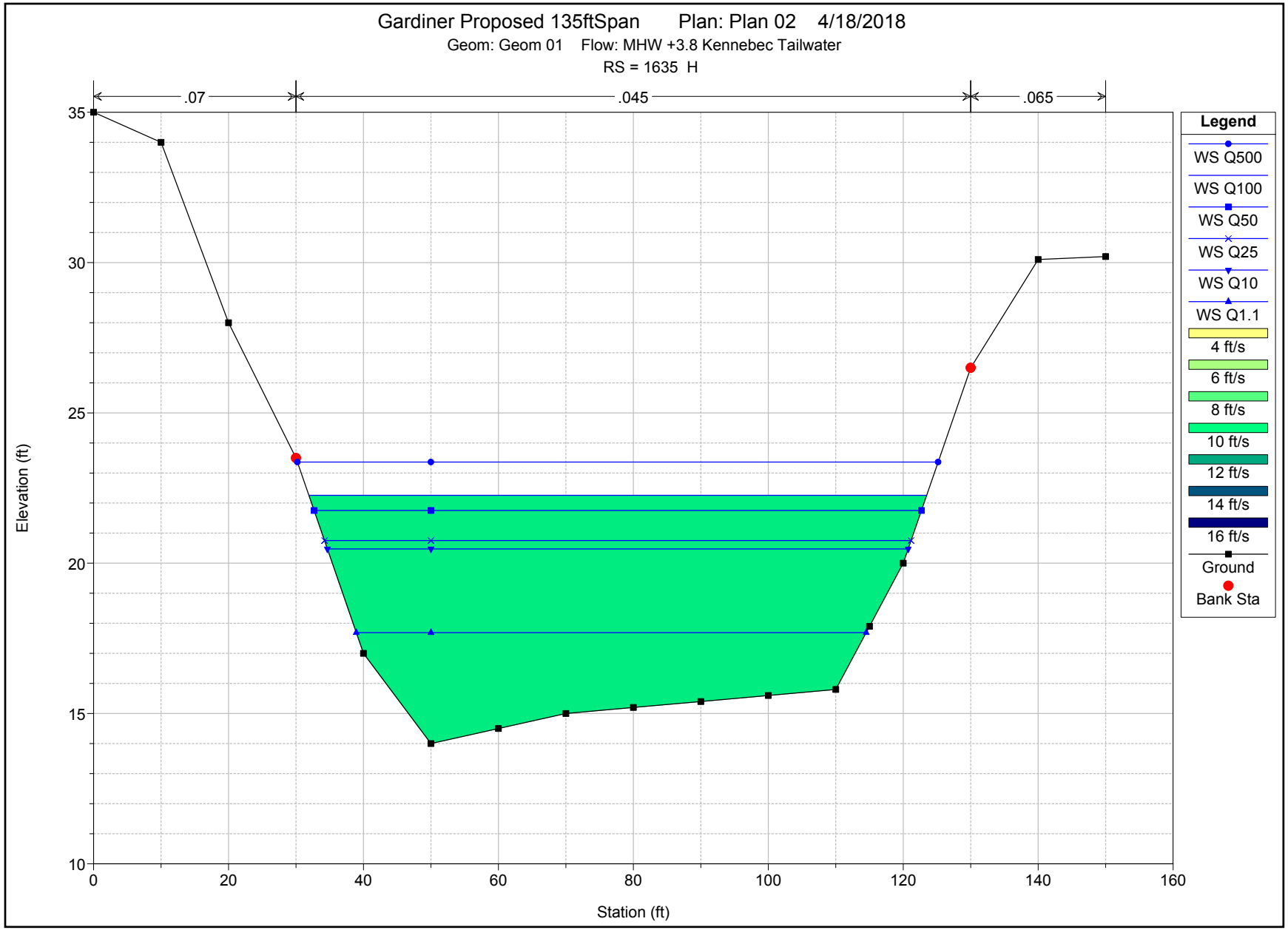
# APPENDIX G / HEC-RAS RESULTS FOR PROPOSED CONDITIONS AT MHW

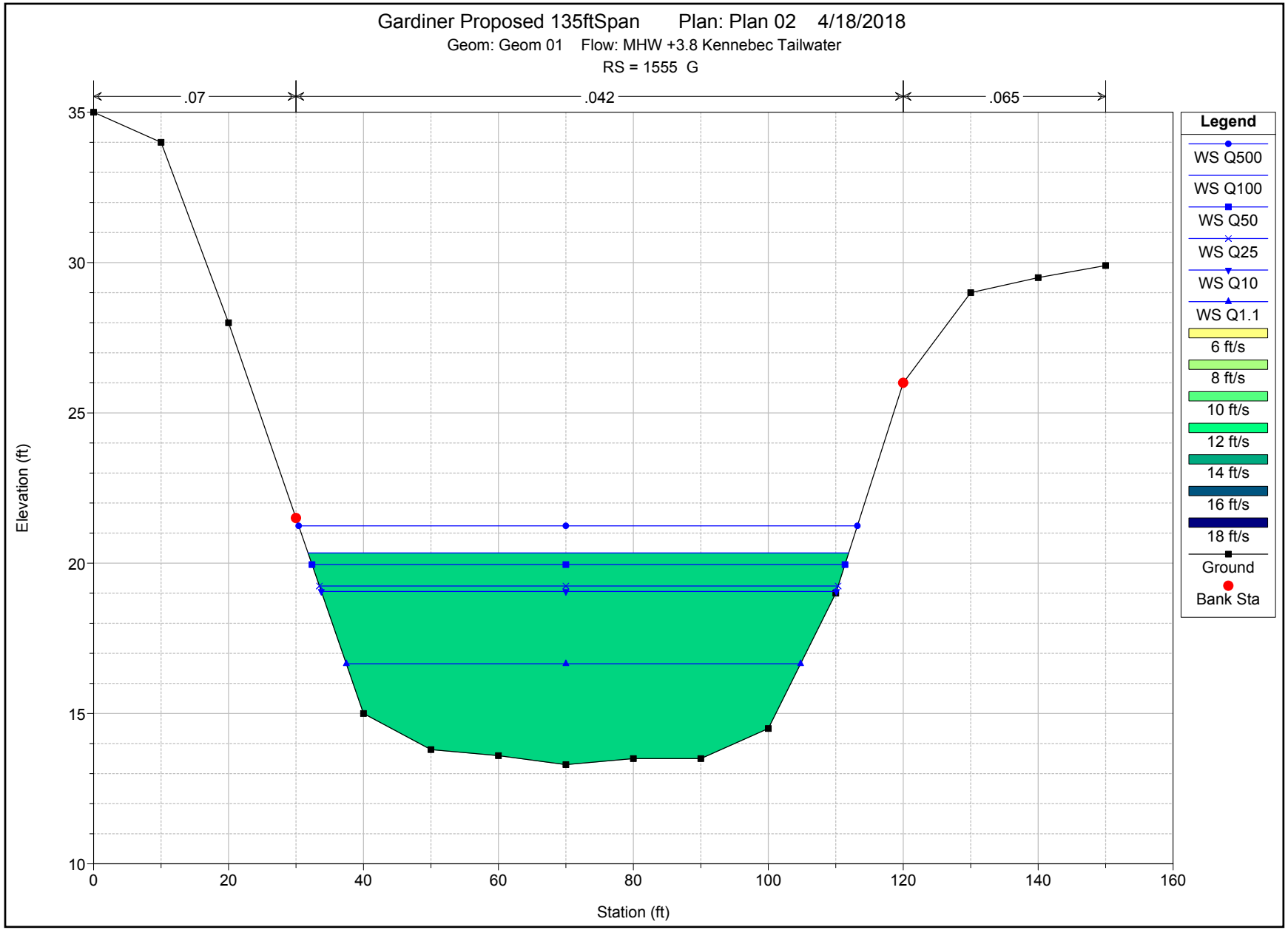


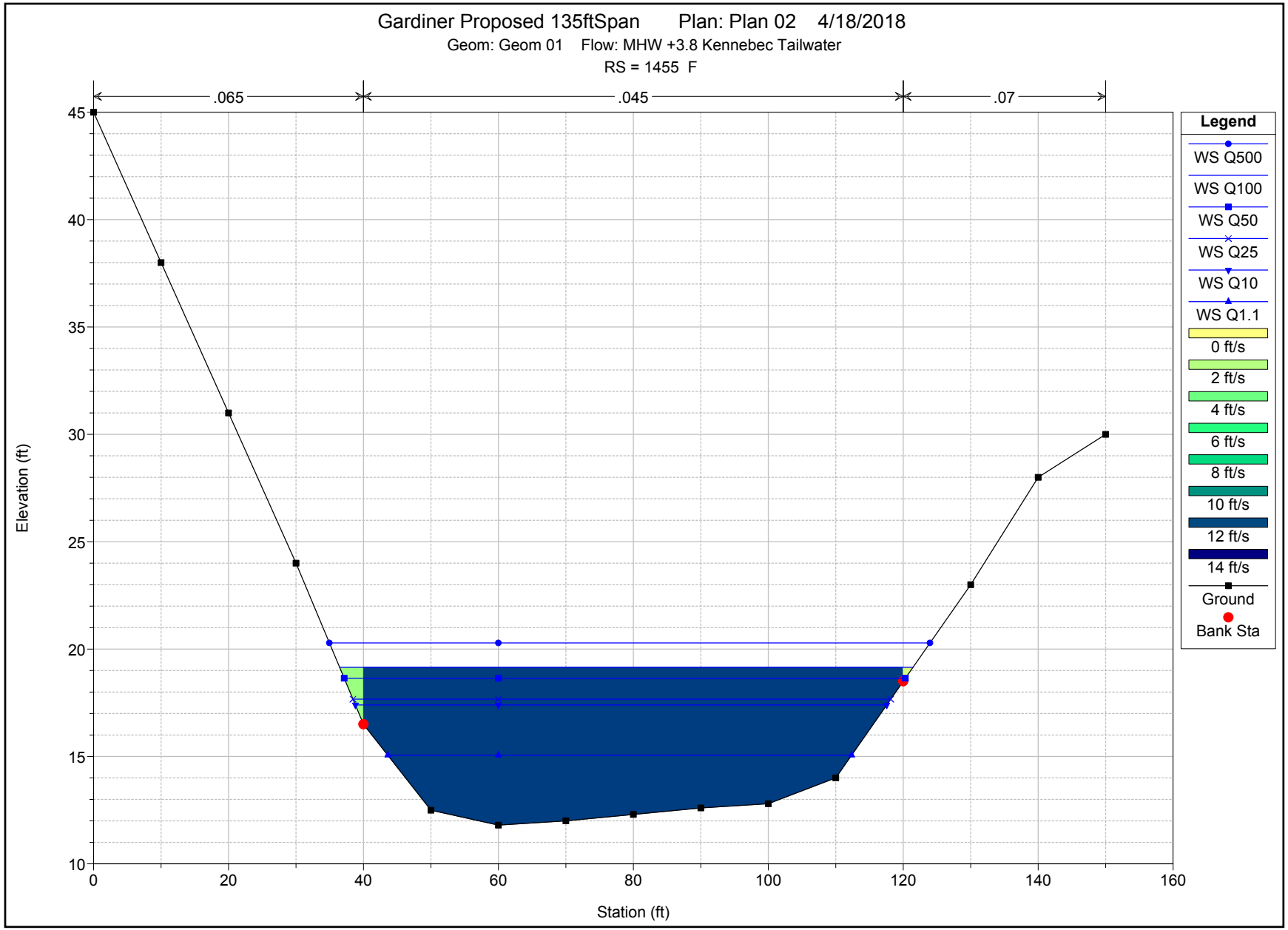

None of the XS's are Geo-Referenced (, Geo-Ref user entered XS , Geo-Ref interpolated XS , Non Geo-Ref user entered XS , Non Geo-Ref interpolated XS)

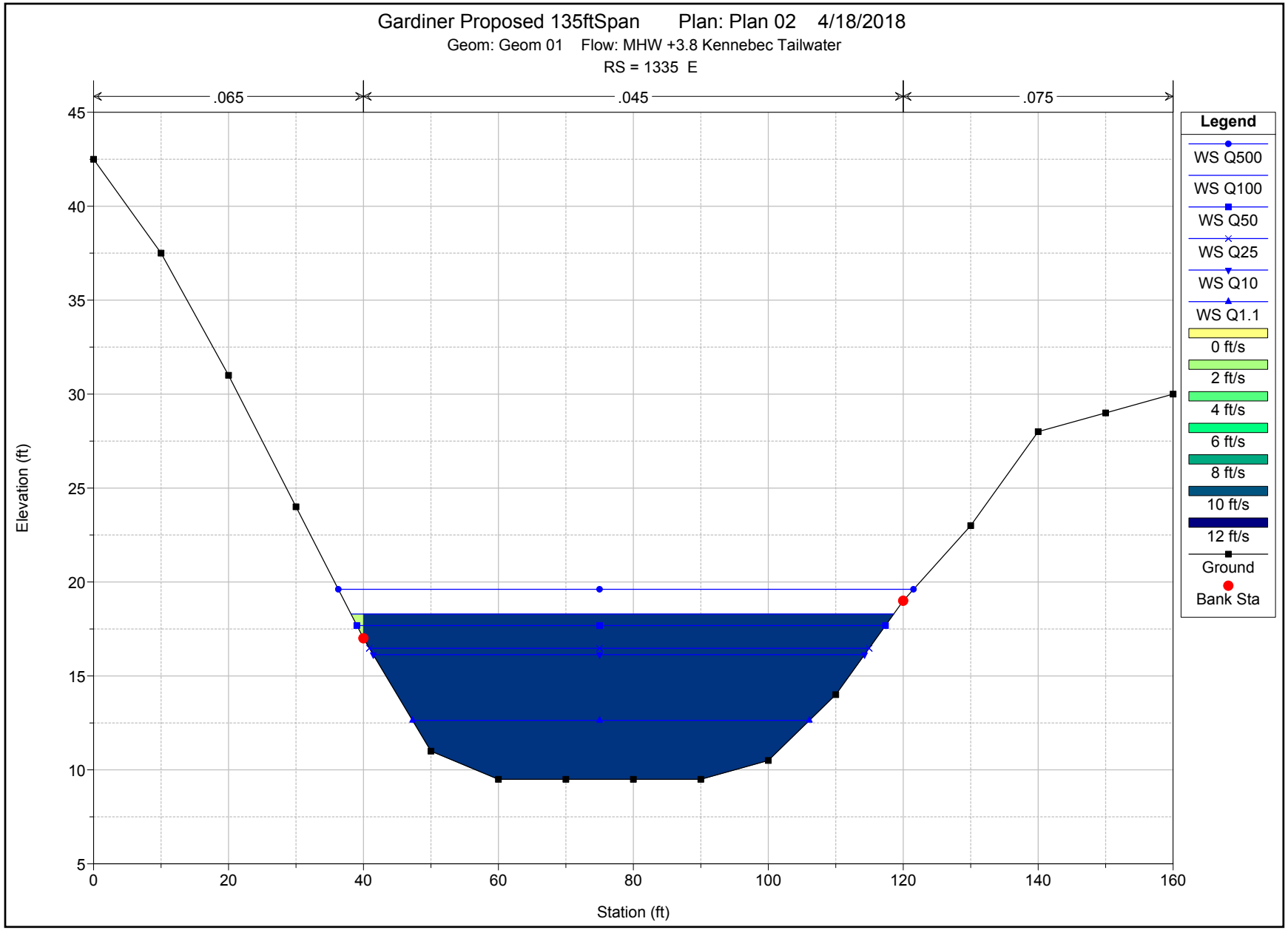

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
Cobosee Stream Reach 1
Legend
WS Q100
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q500
Ground
Elevation (ft)
Main Channel Distance (ft)
30
25
20
15
10
5
0
-5
-10
-500
0
500
1000
1500
2000

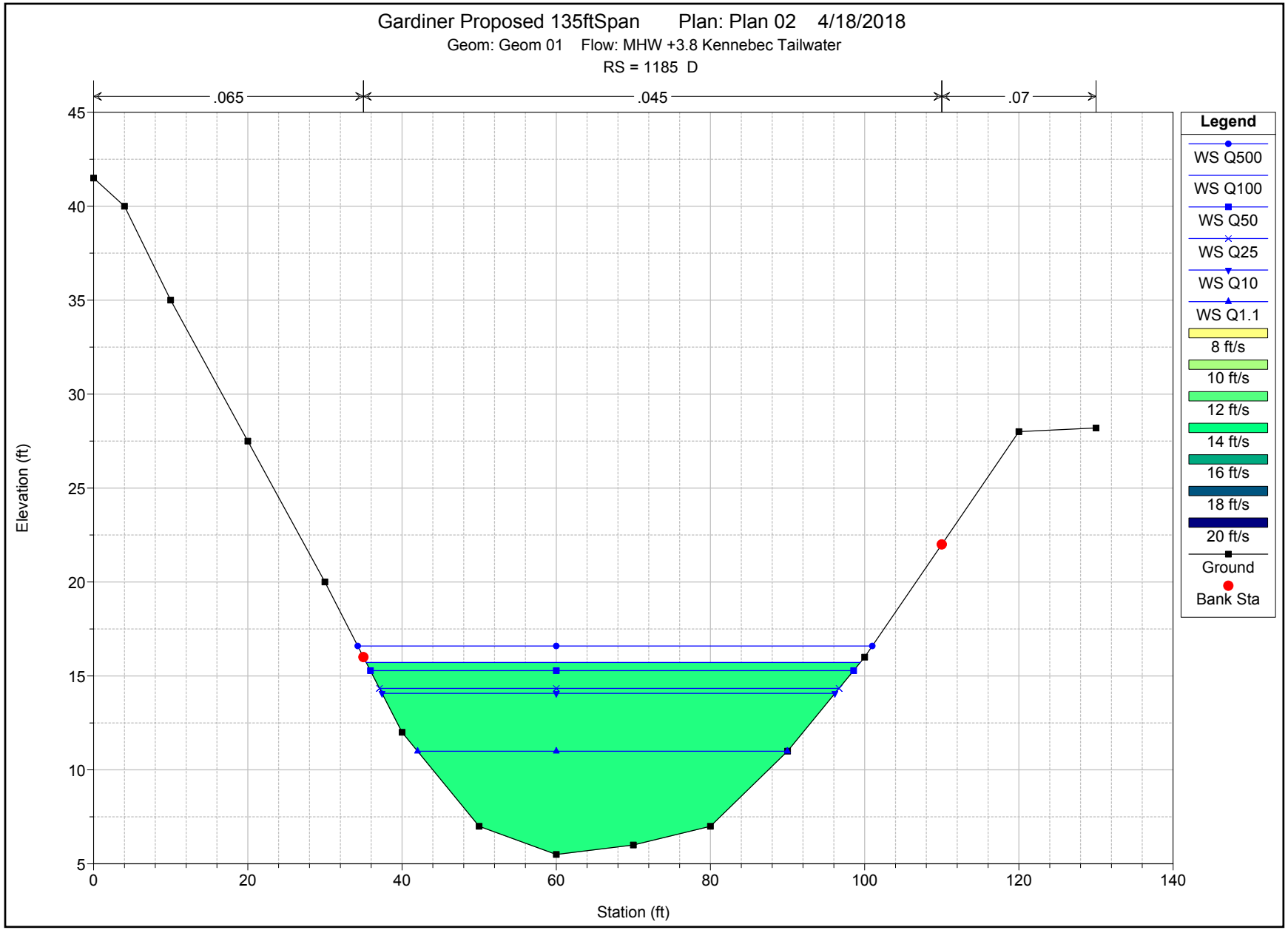

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1700 Upstream (I)
.07
.04
.065
Elevation (ft)
Station (ft)
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
180
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

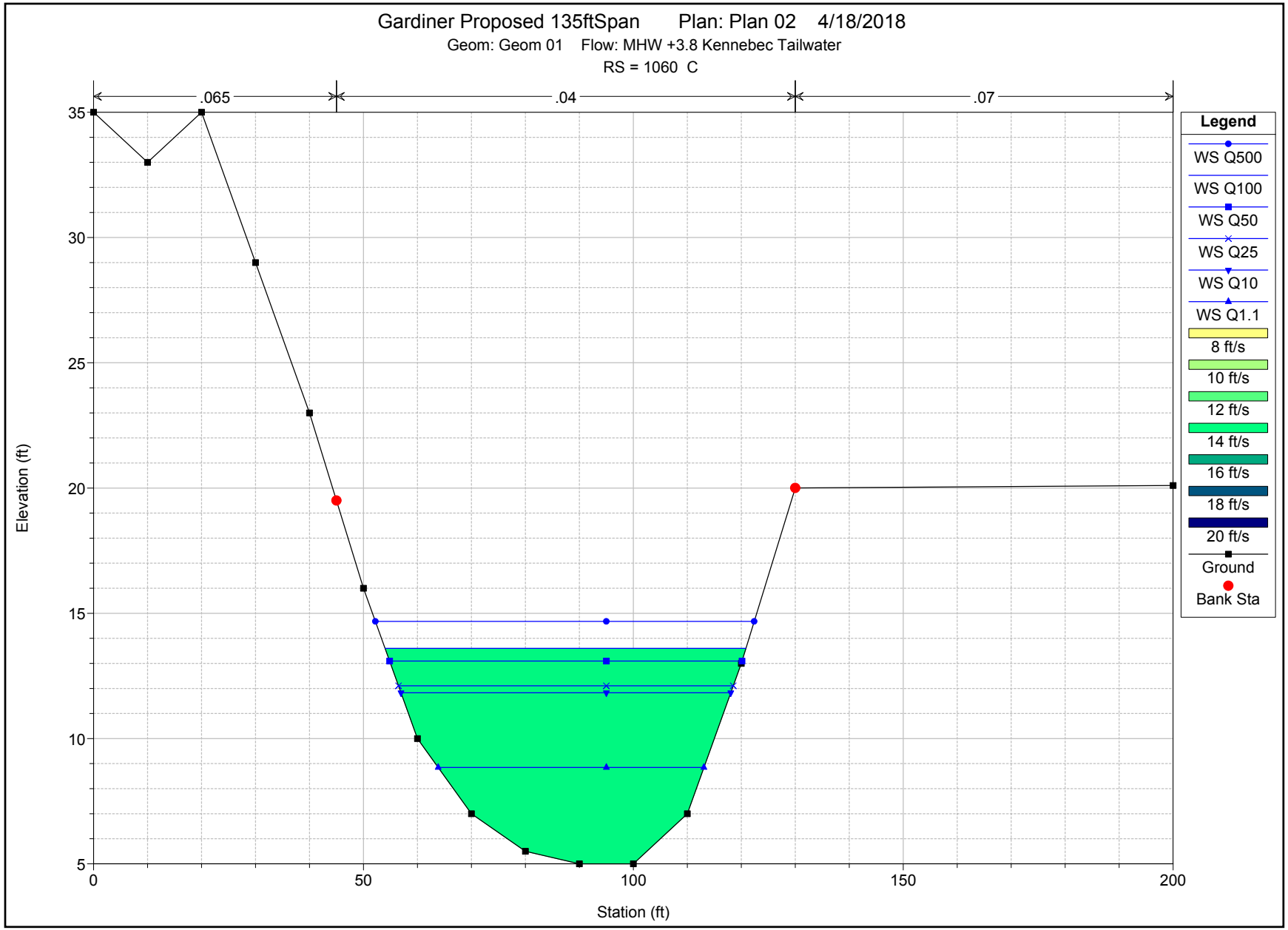

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1635 H
.07
.045
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

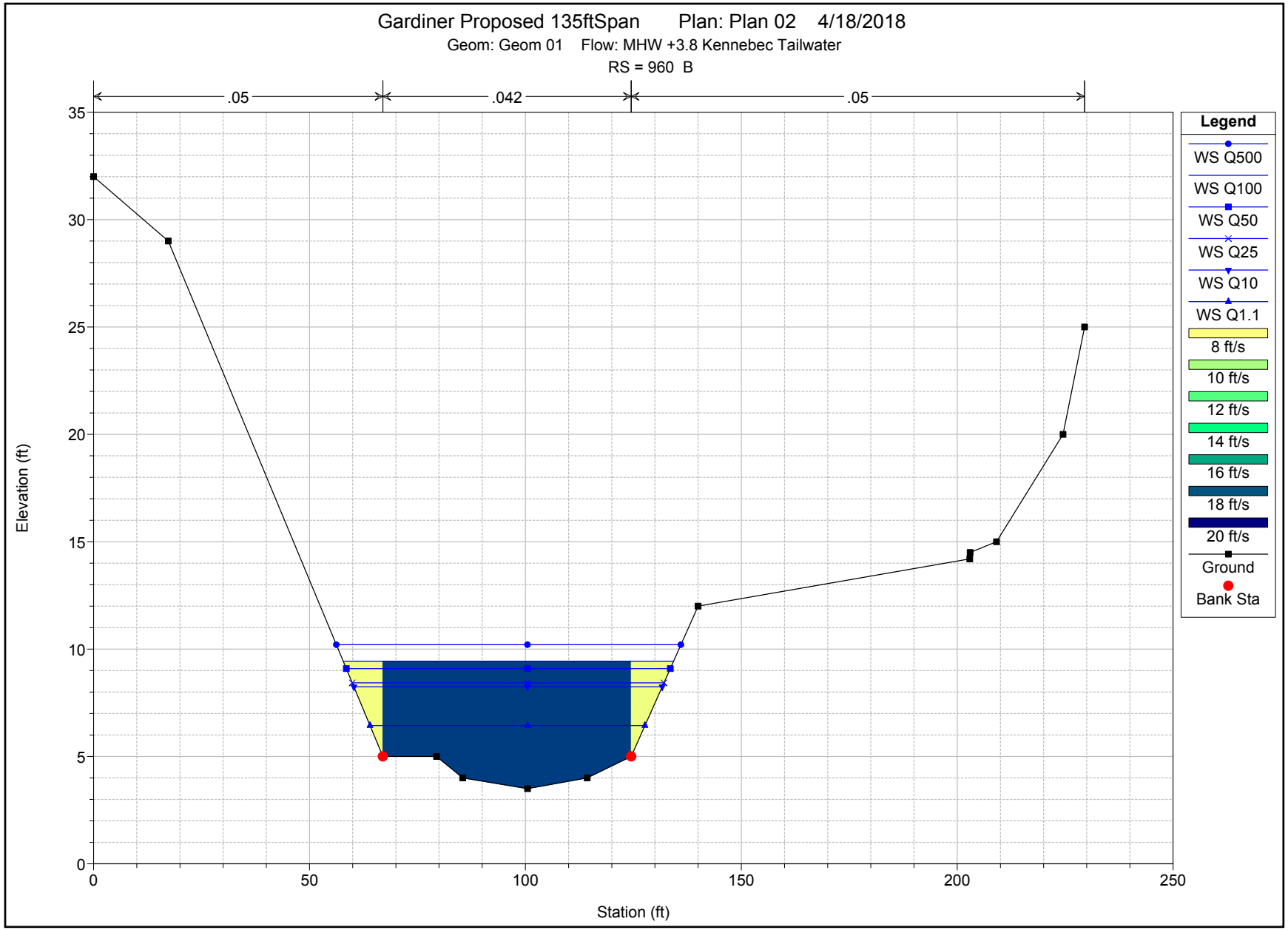

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1555 G
.07
.042
.065
Elevation (ft)
Station (ft)
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta

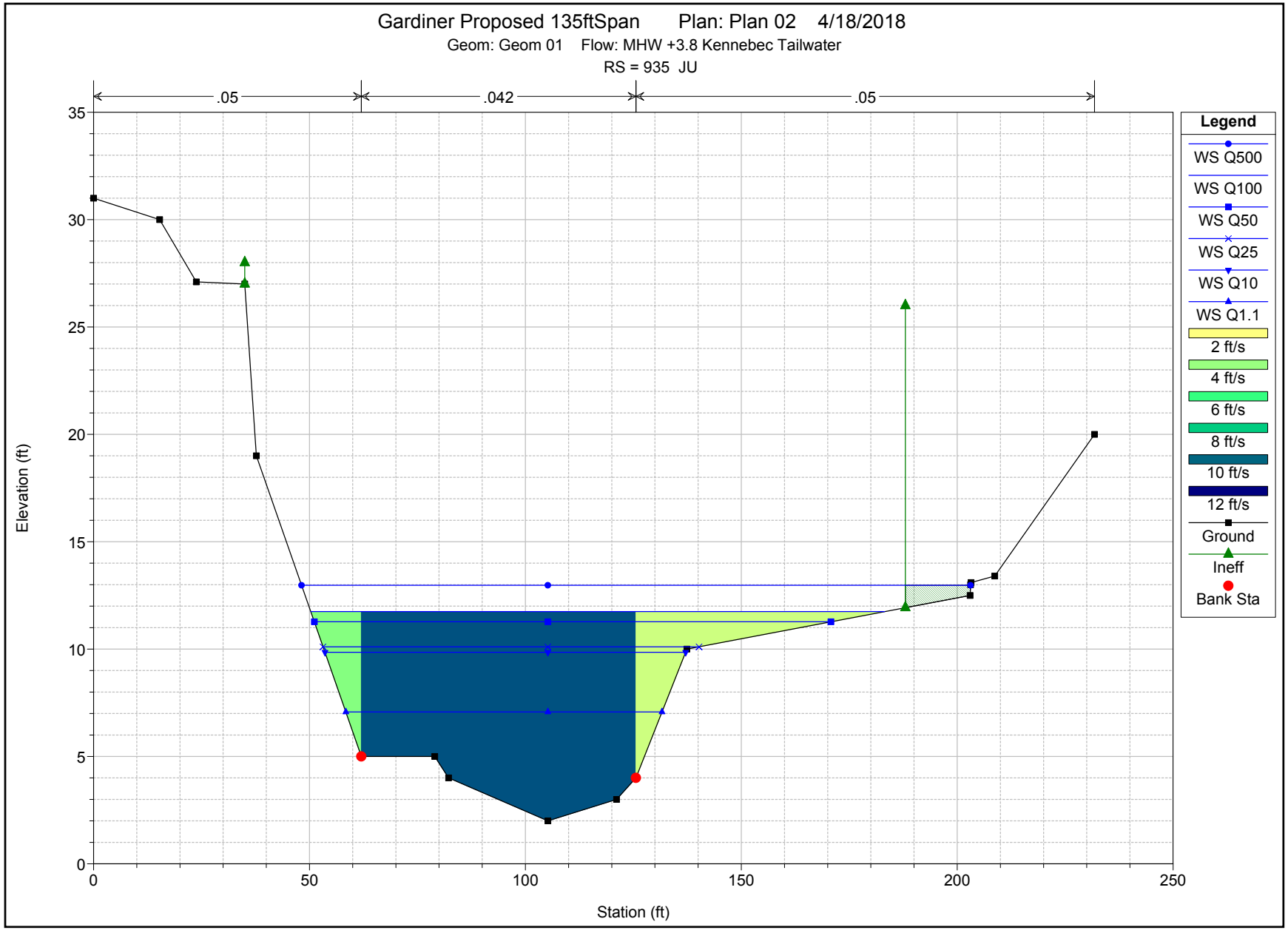

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1455 F
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
Ground
Bank Sta

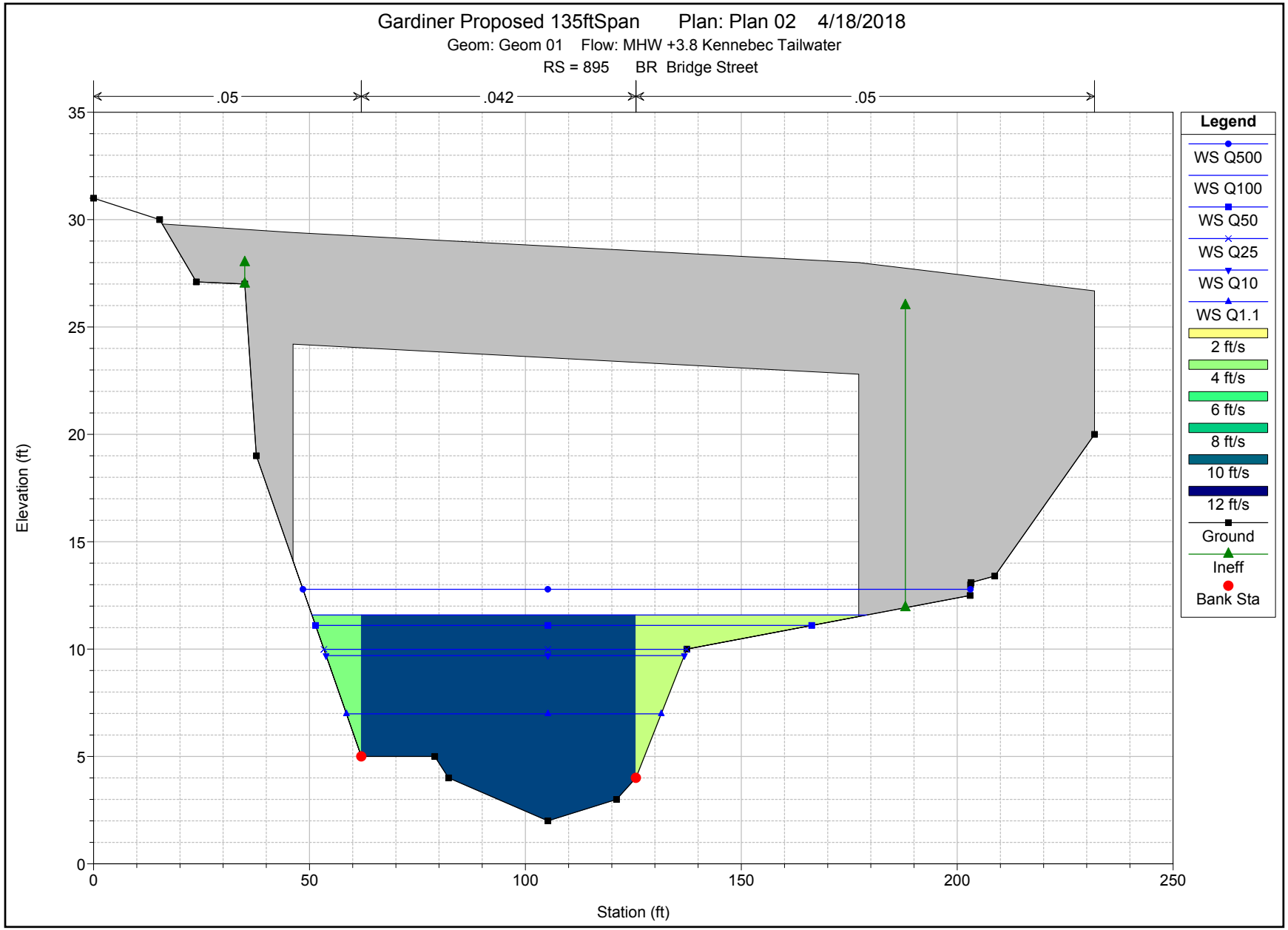

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1335 E
.065
.045
.075
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
160
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta

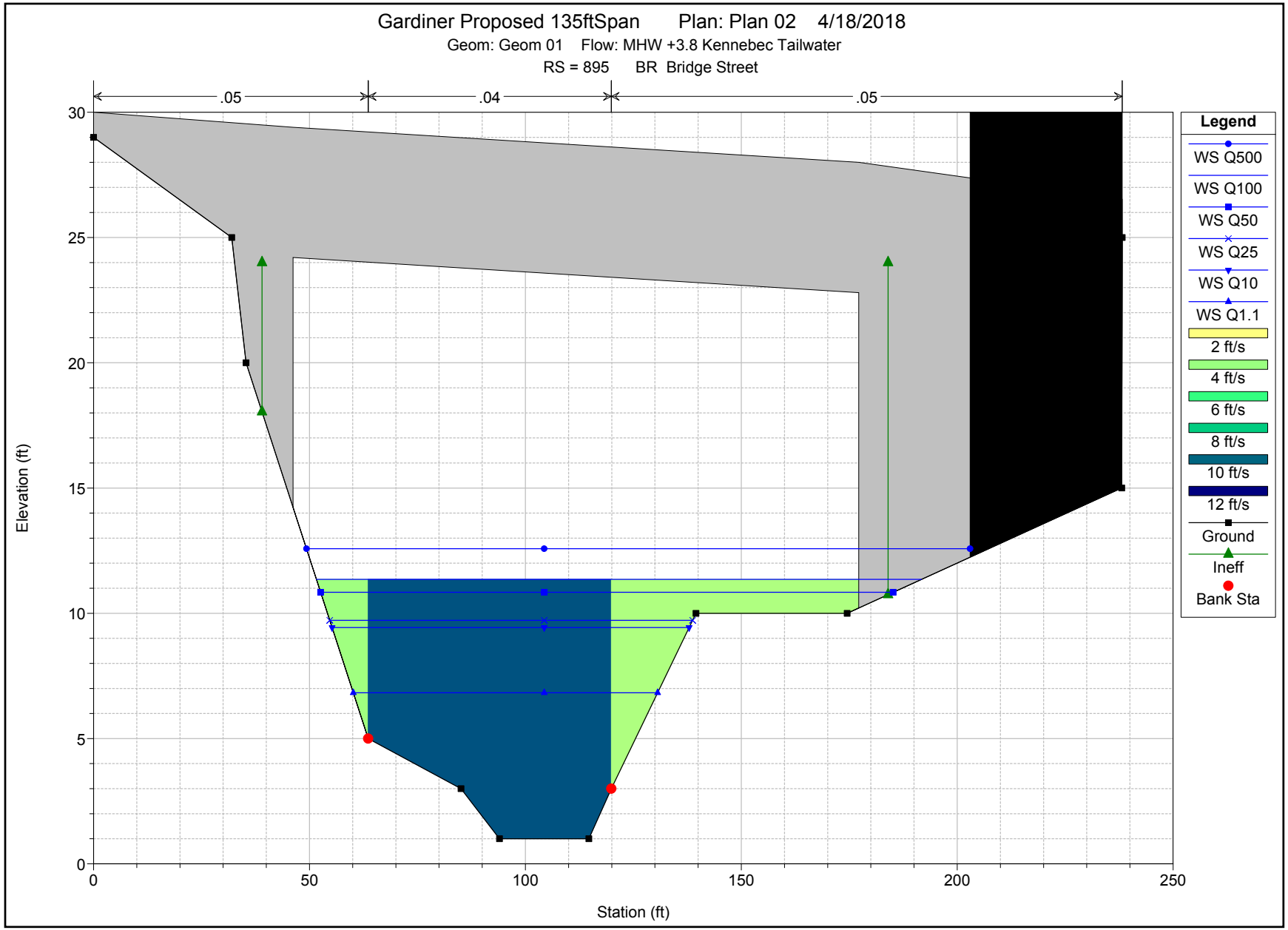

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1185 D
.065
.045
.07
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
10
5
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

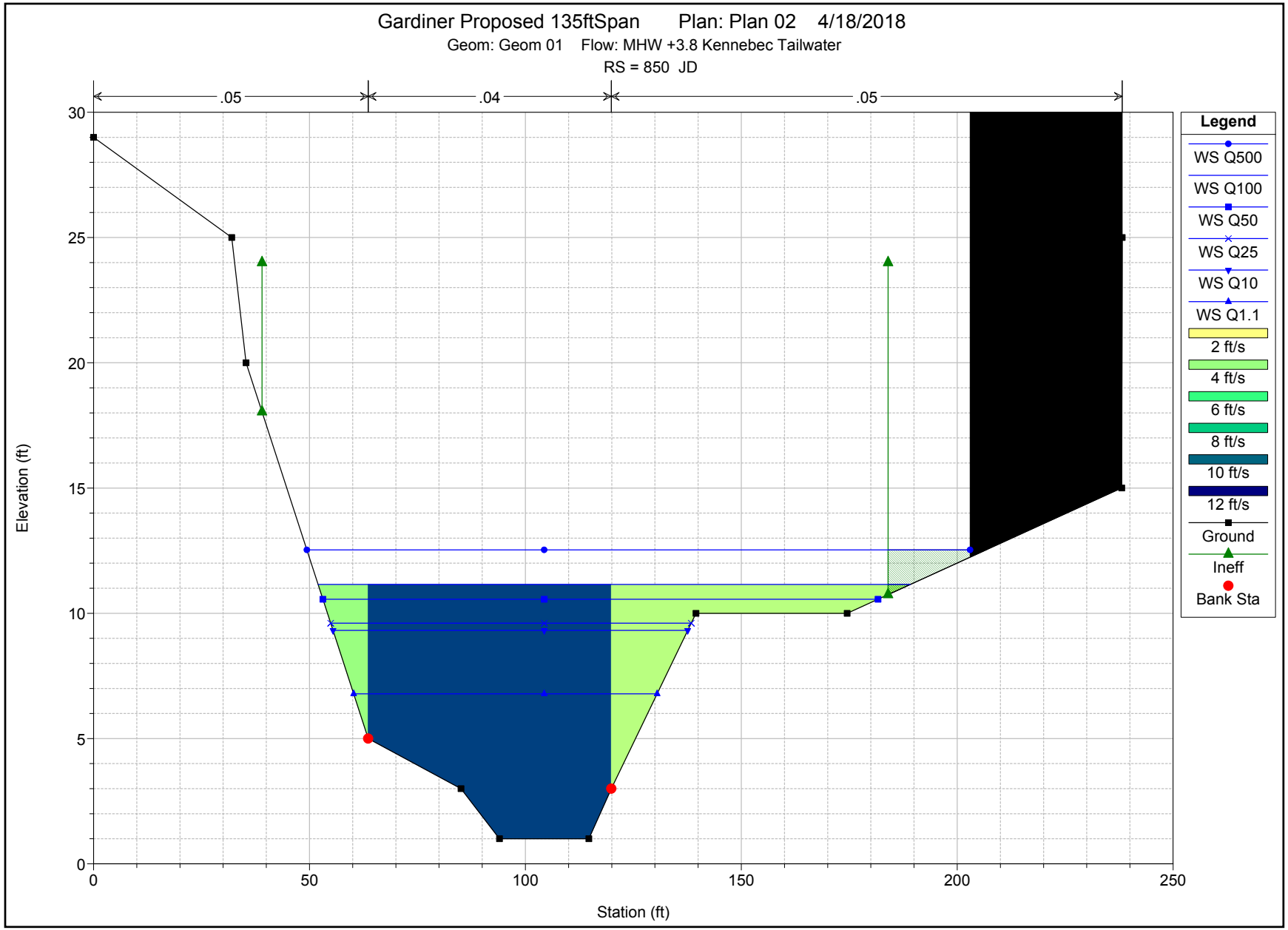

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 1060 C
.065
.04
.07
Elevation (ft)
Station (ft)
35
30
25
20
15
10
5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

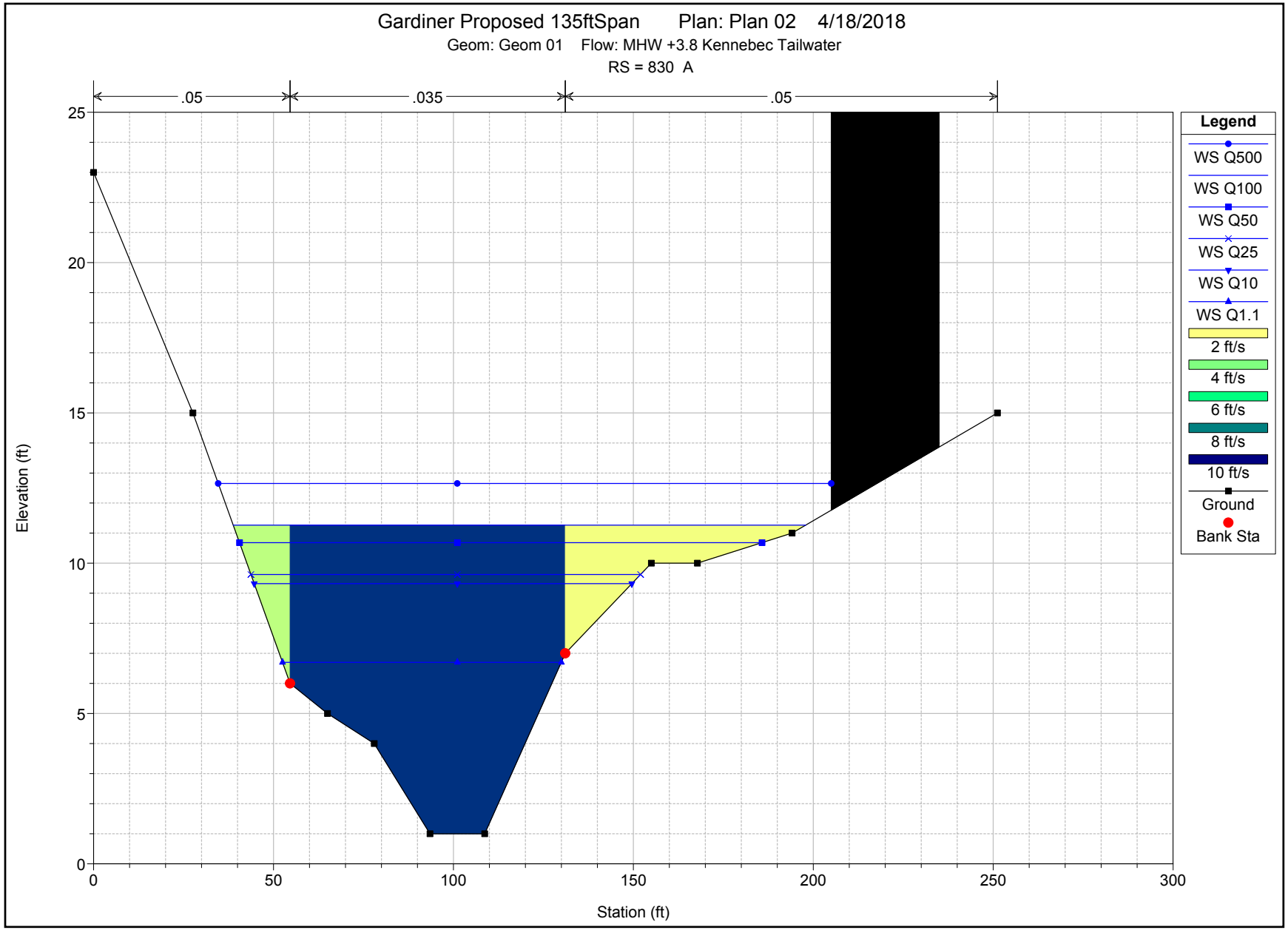

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 960 B
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
Ground
Bank Sta

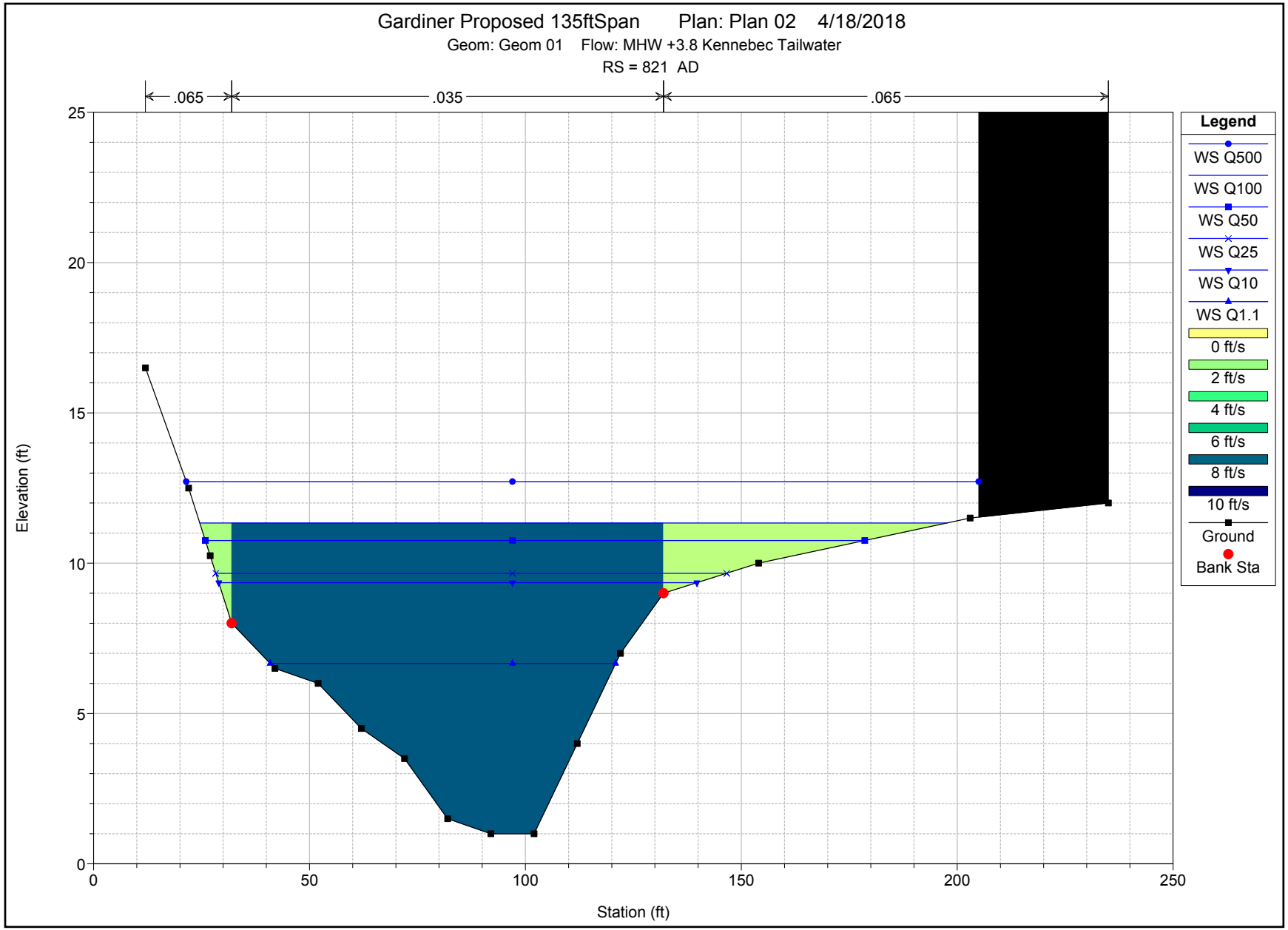

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 935 JU
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

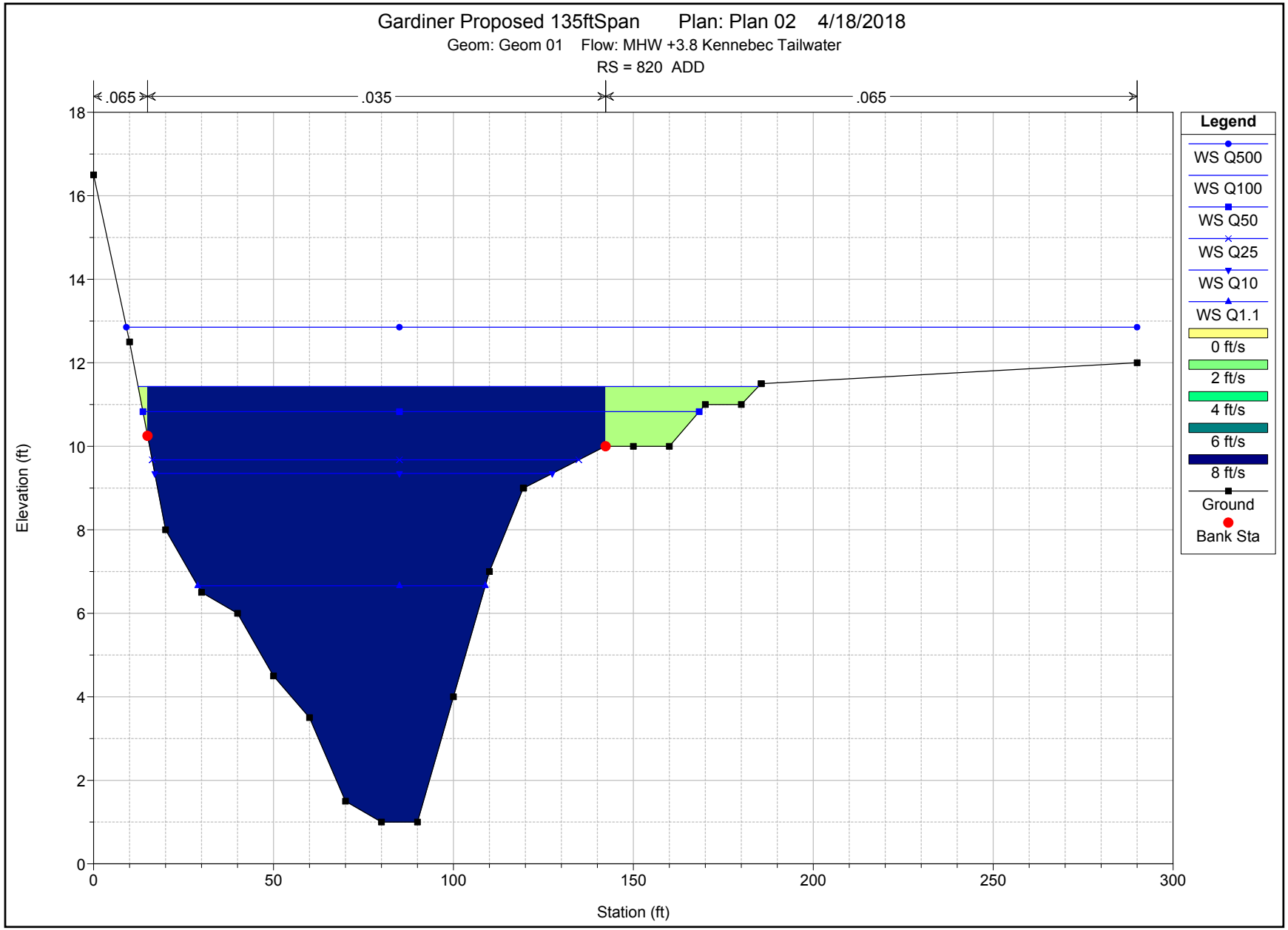

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 895 BR Bridge Street
.05
.042
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
35
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

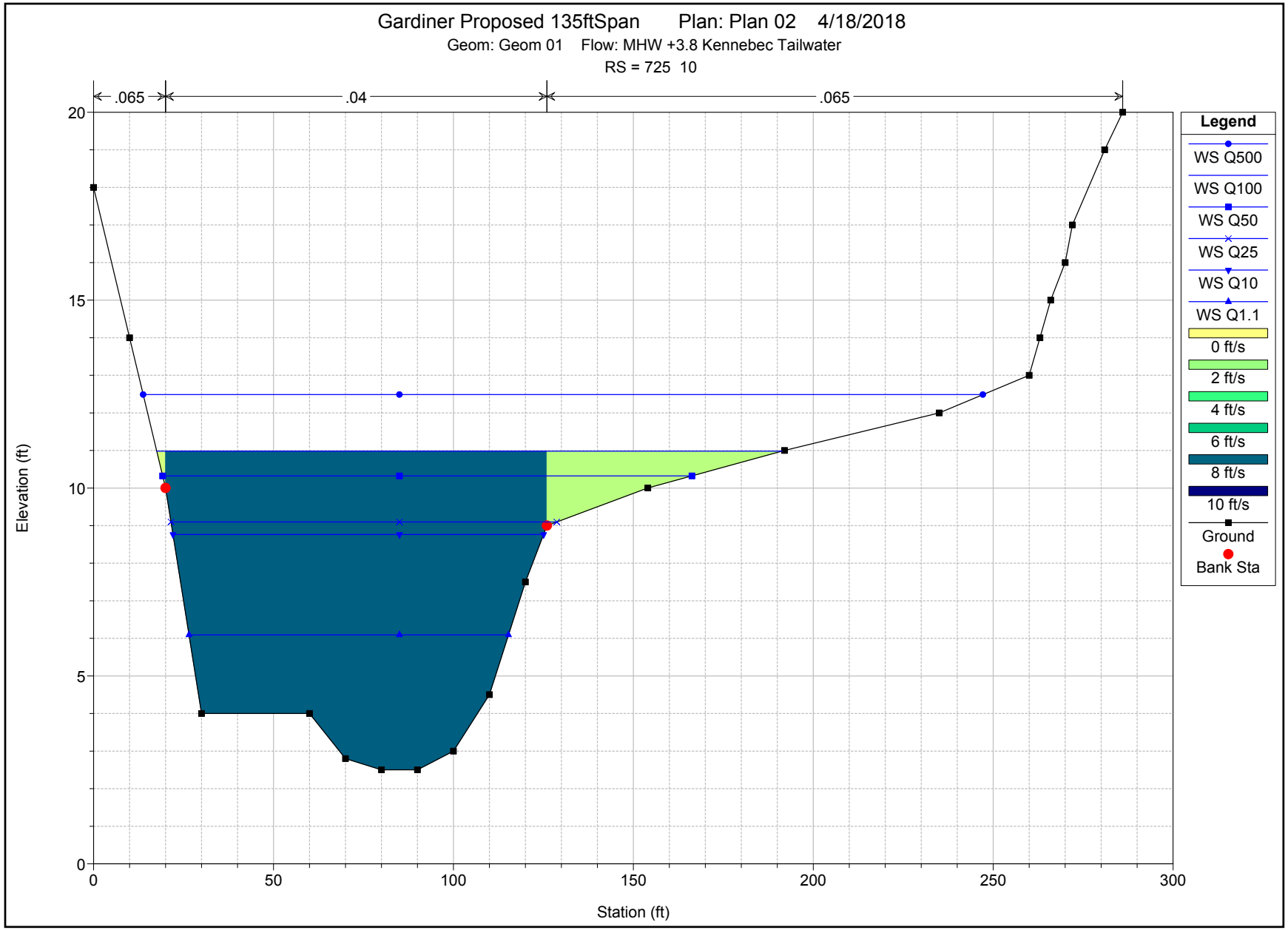

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 895 BR Bridge Street
.05
.04
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

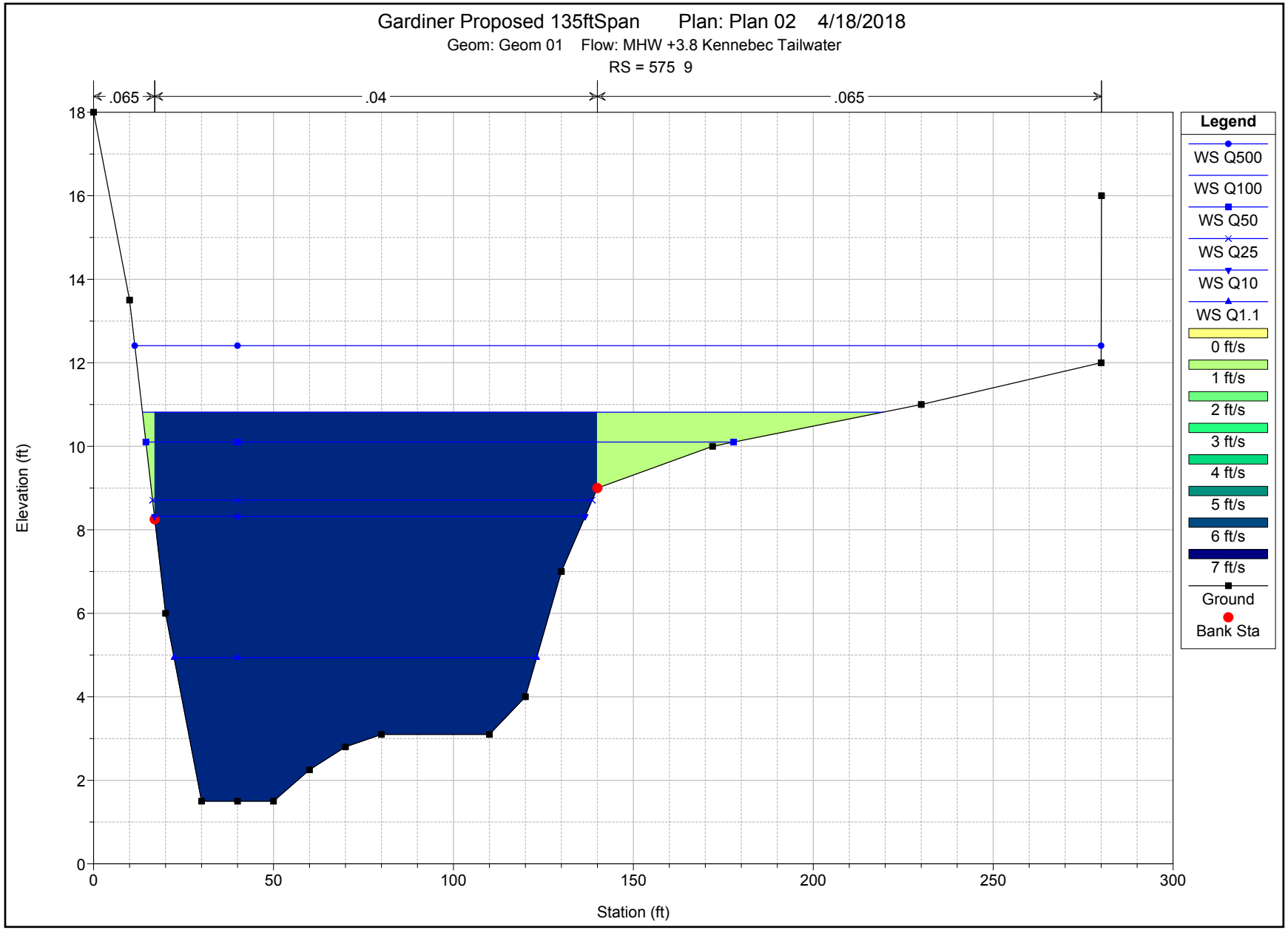

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 850 JD
.05
.04
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
30
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

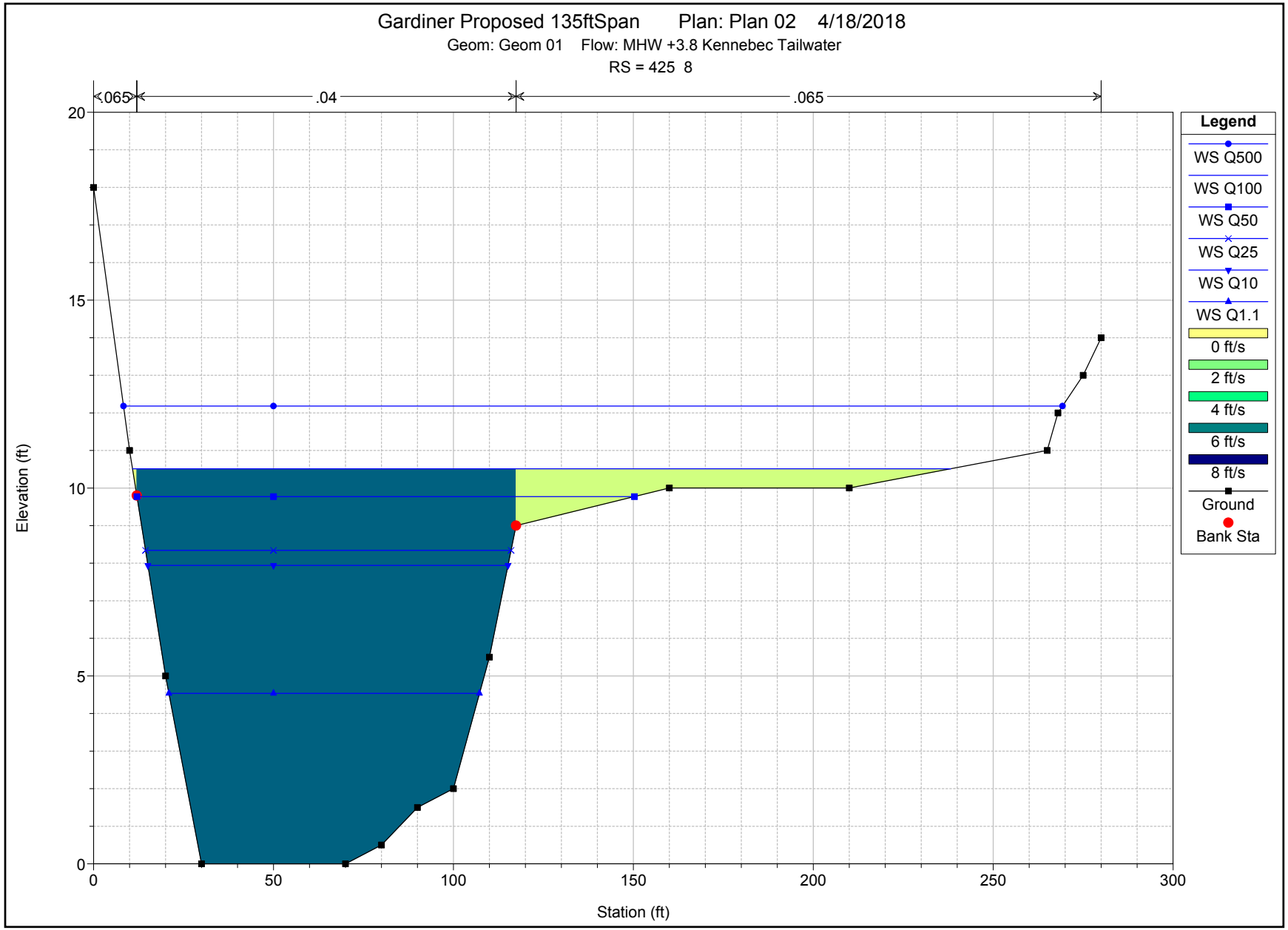

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 830 A
.05
.035
.05
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

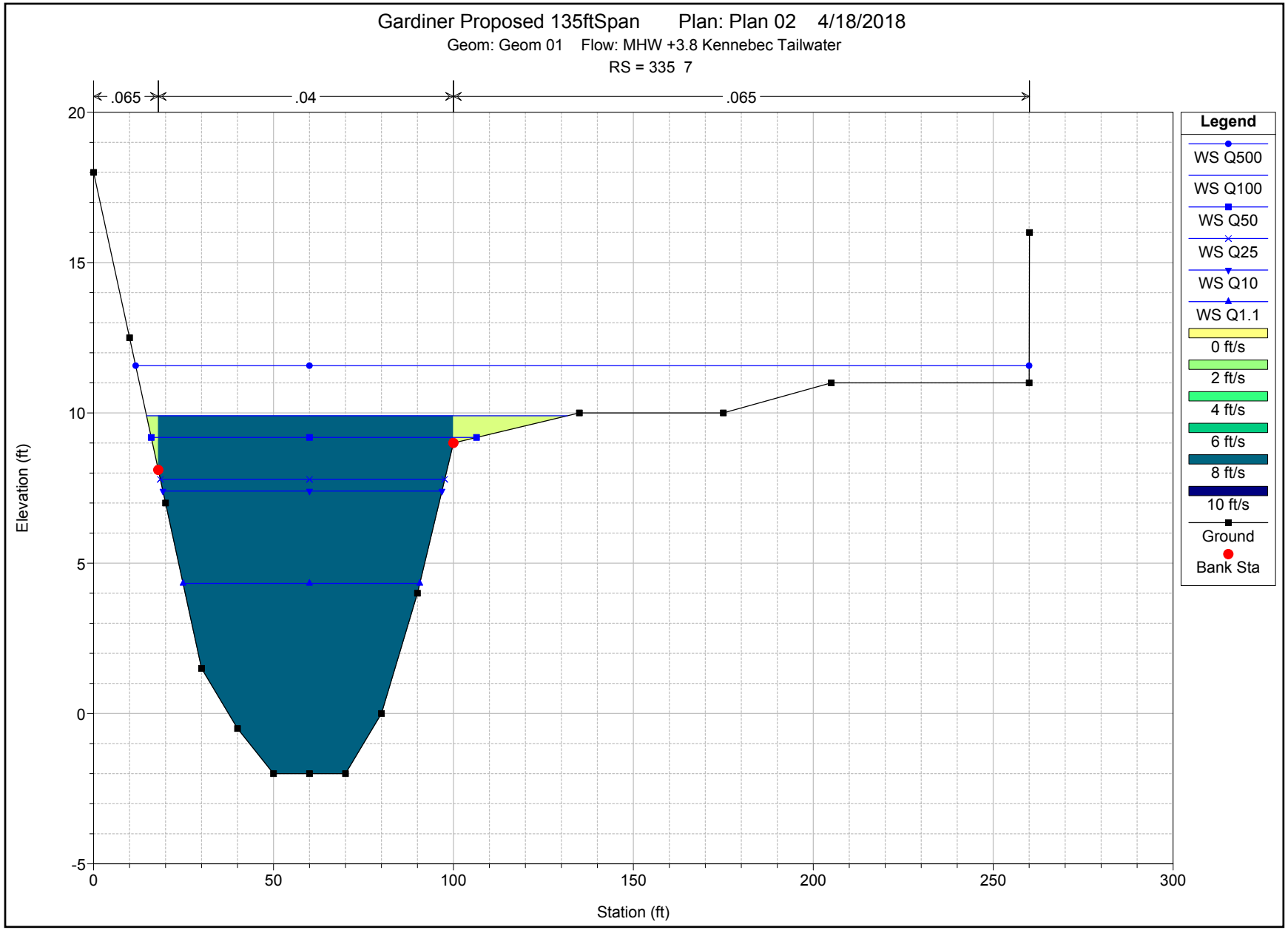

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 821 AD
.065
.035
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
25
0
50
100
150
200
250
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

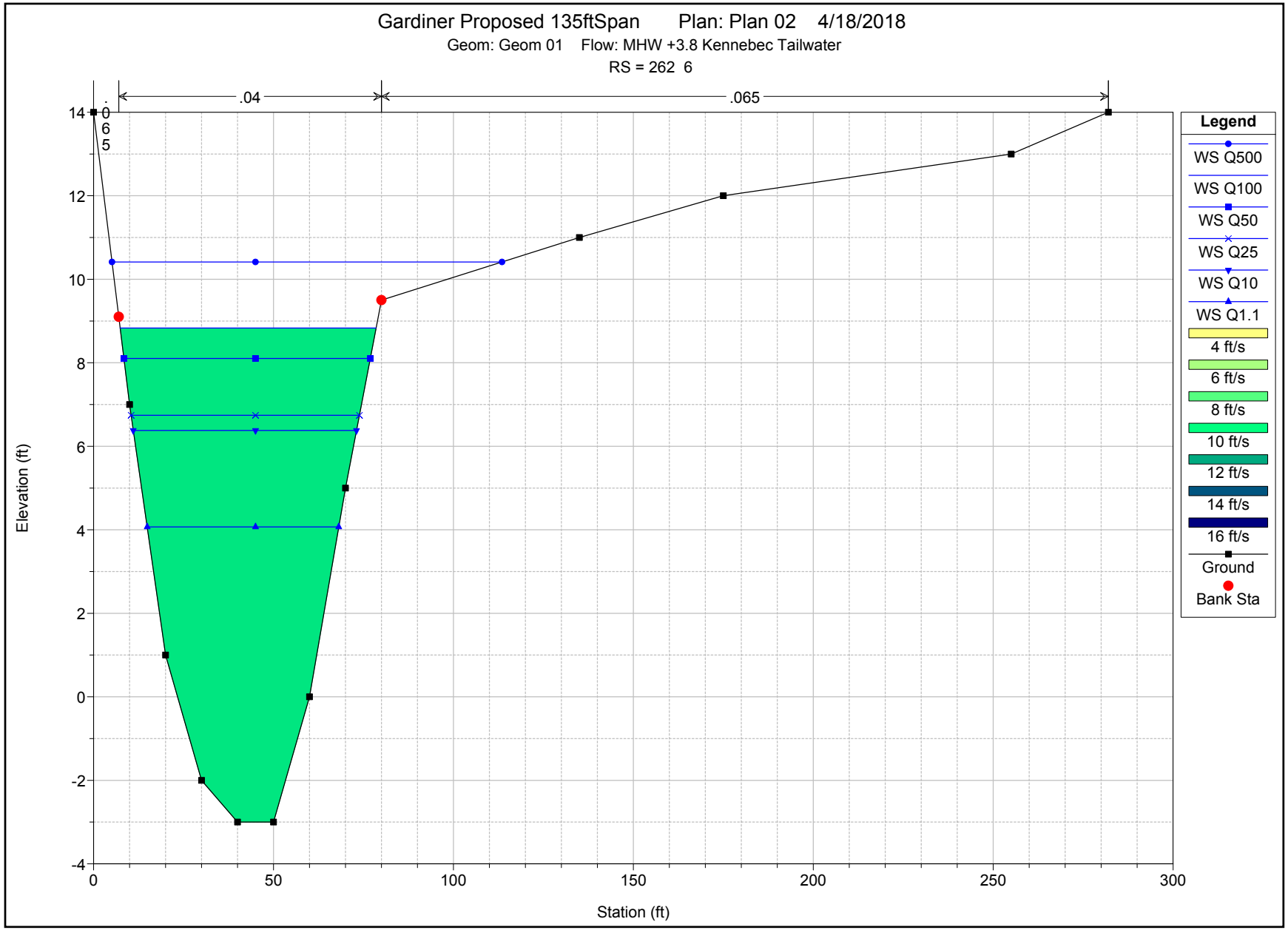

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 820 ADD
.065
.035
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

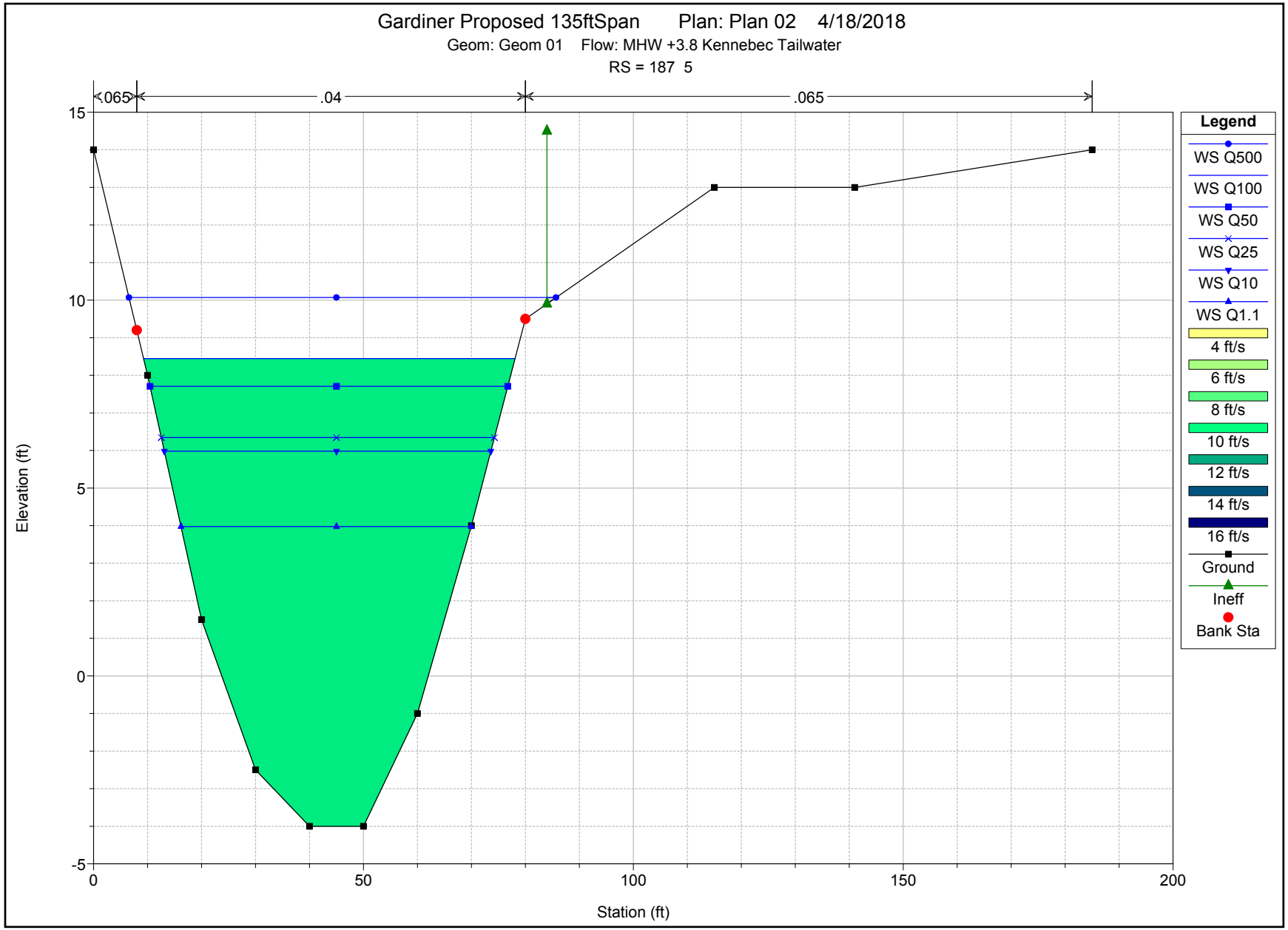

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 725 10
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

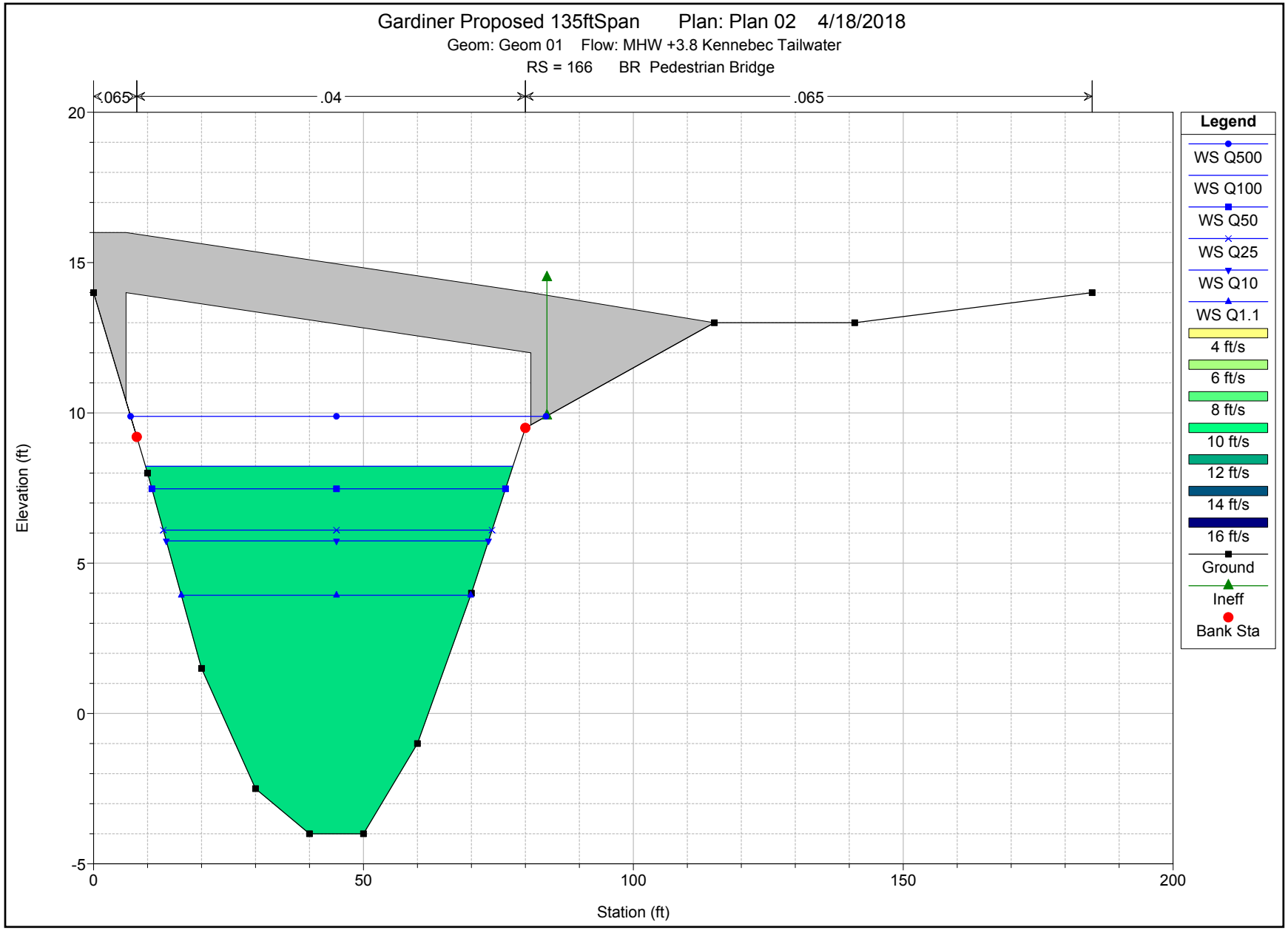

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 575 9
.065
.04
.065
Elevation (ft)
Station (ft)
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

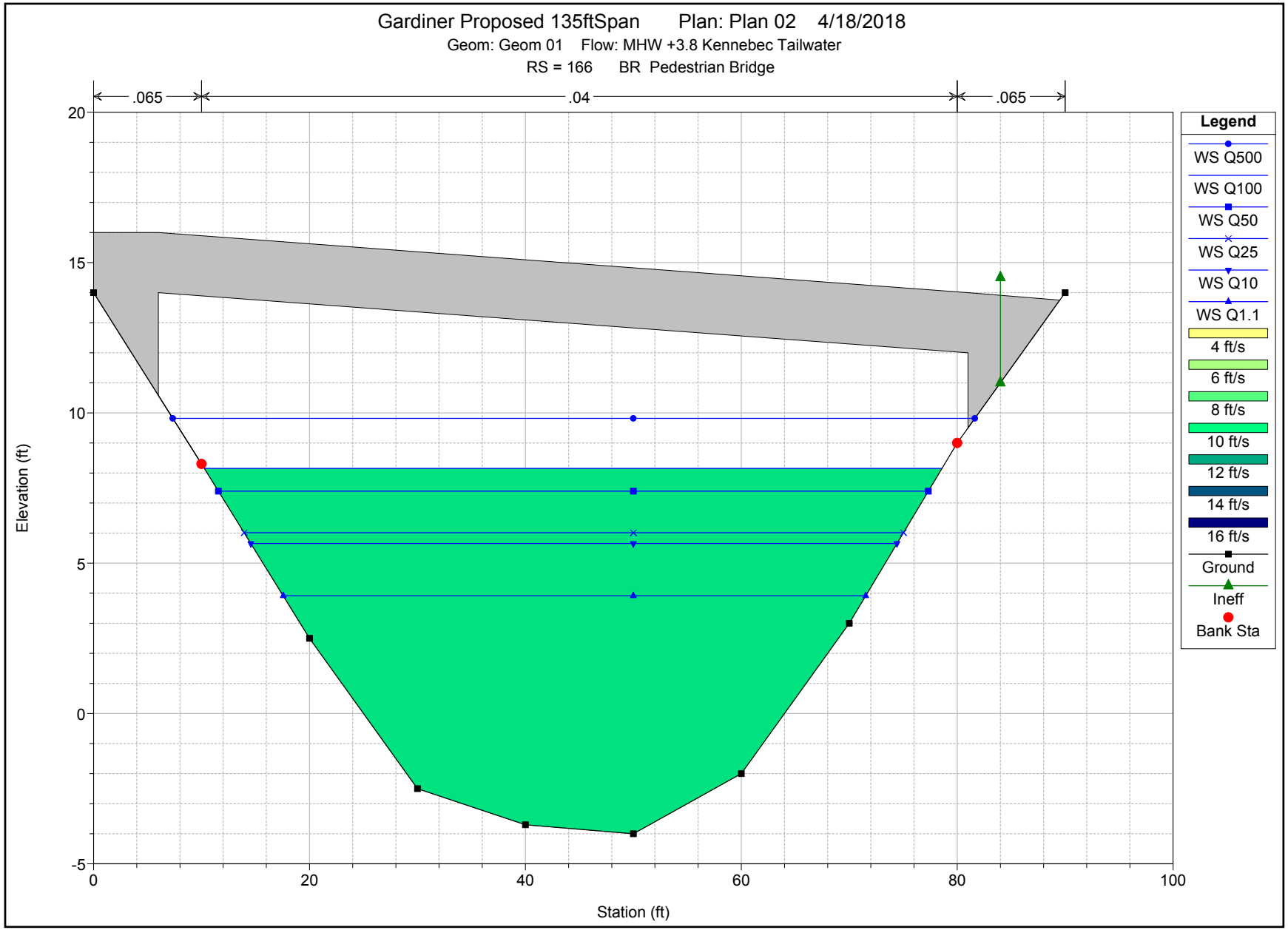

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 425 8
.065
.04
.065
Elevation (ft)
Station (ft)
0
5
10
15
20
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta

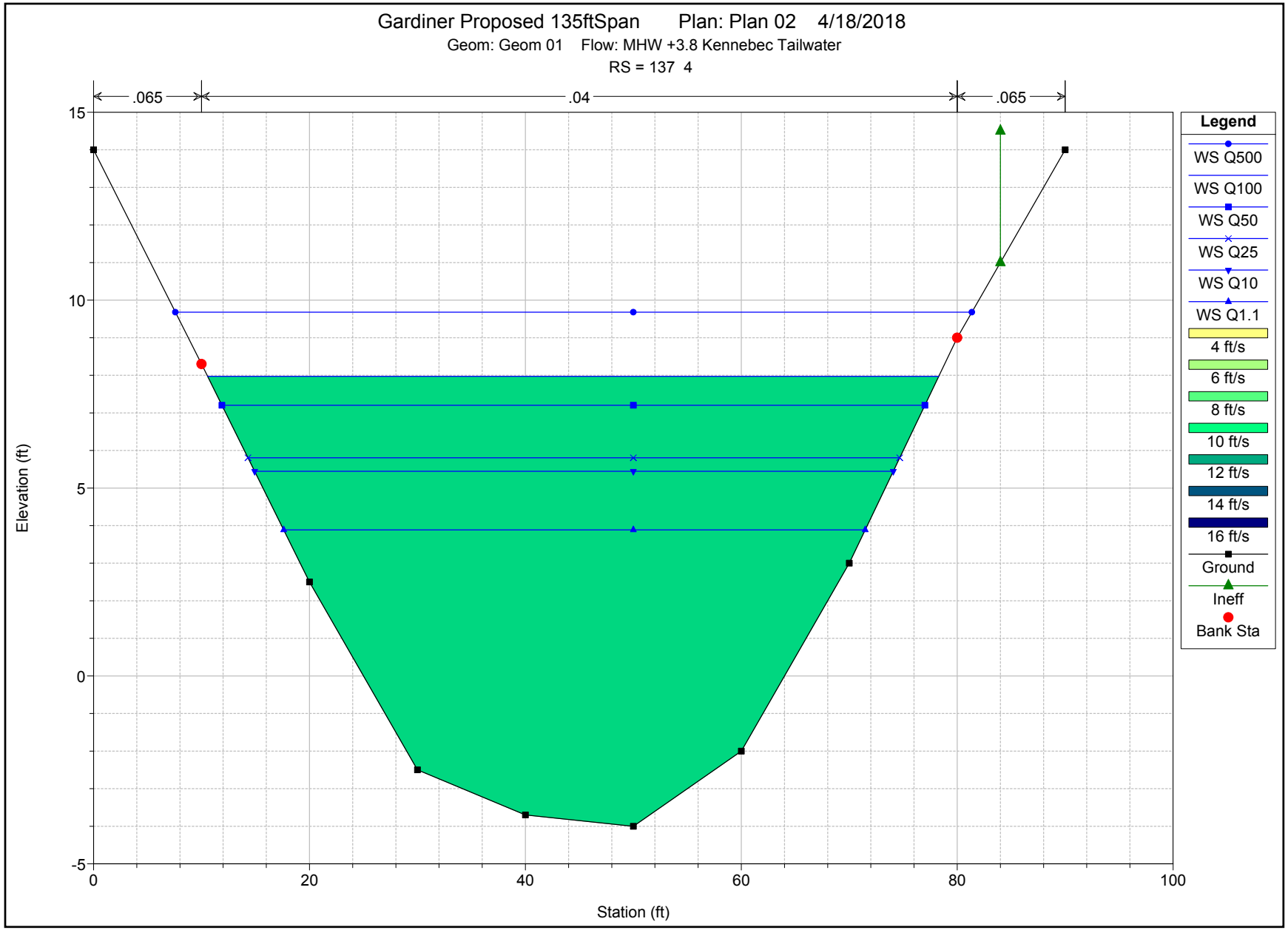

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 335 7
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
Ground
Bank Sta

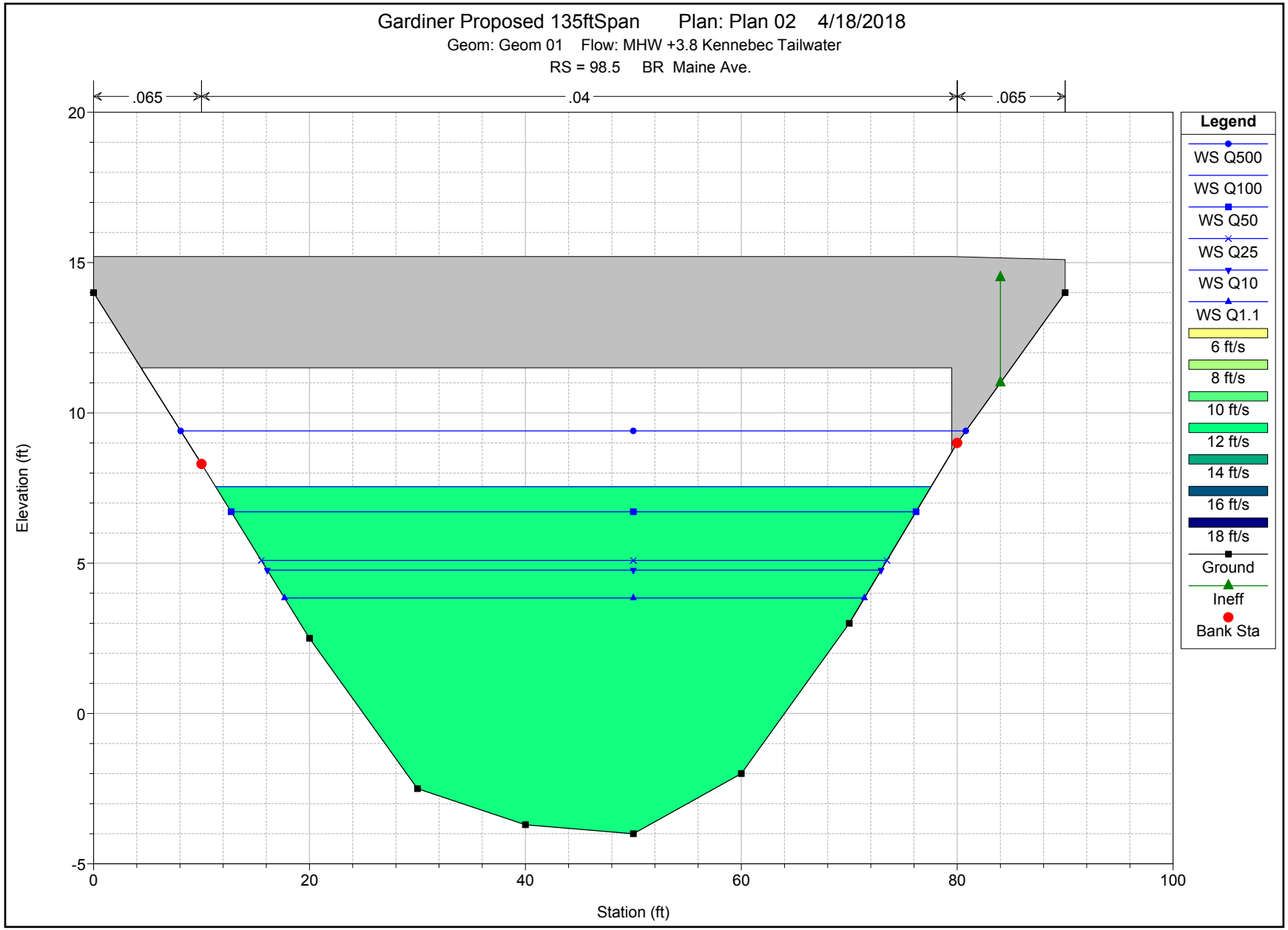

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 262 6
.04
.065
.0
6
5
Elevation (ft)
Station (ft)
14
12
10
8
6
4
2
0
-2
-4
0
50
100
150
200
250
300
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Bank Sta

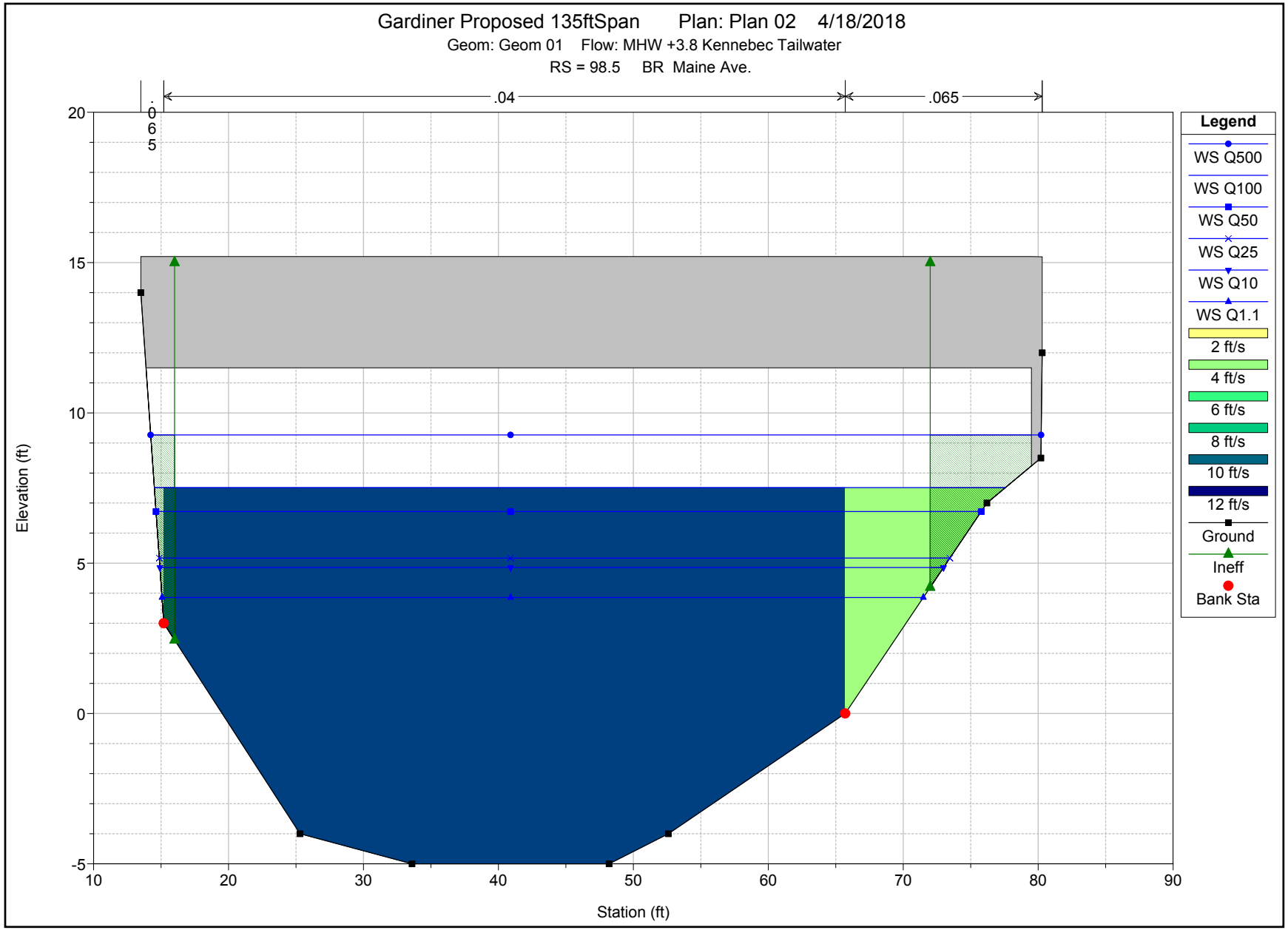

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 187 5
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

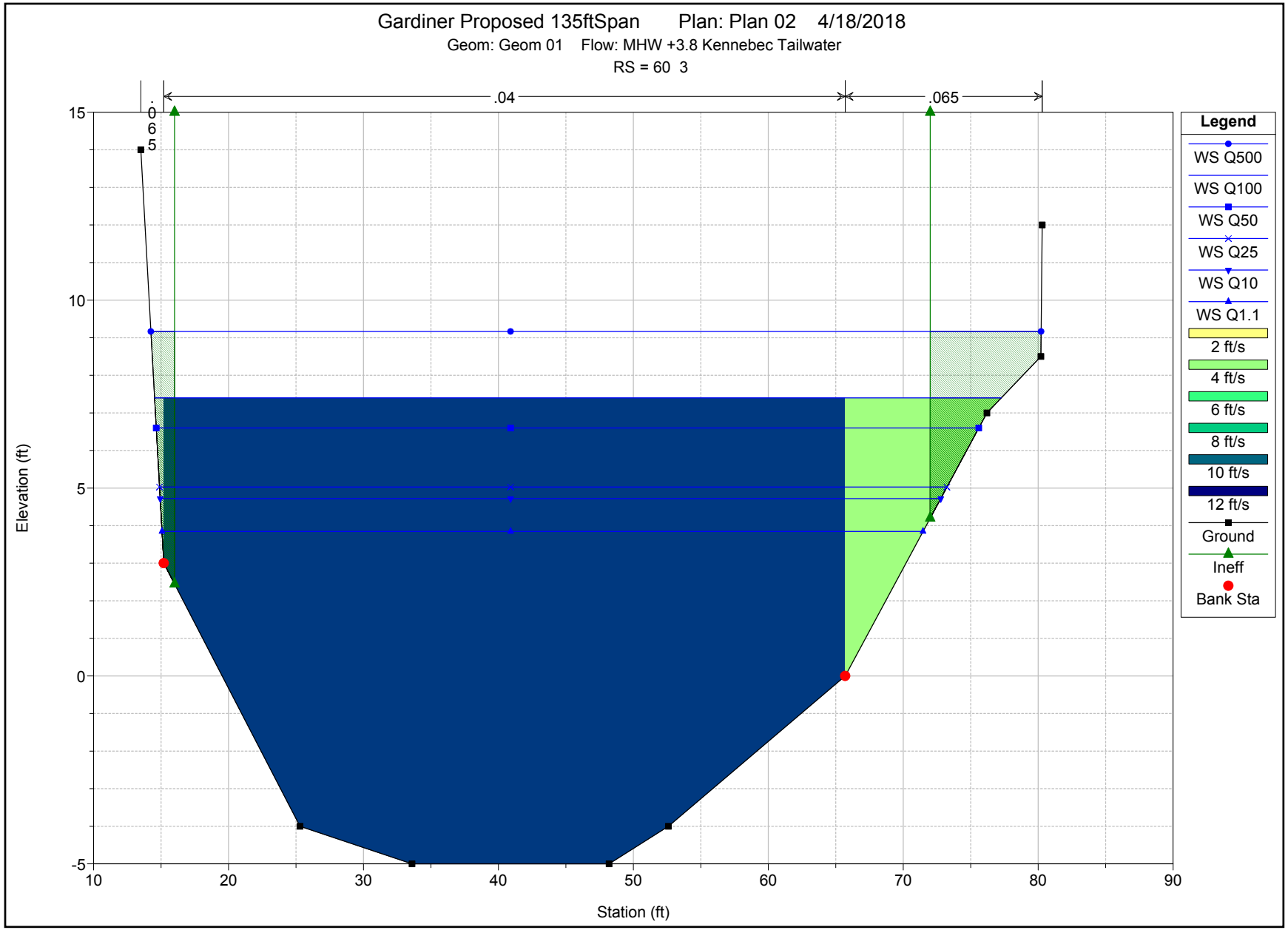

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 166 BR Pedestrian Bridge
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
50
100
150
200
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

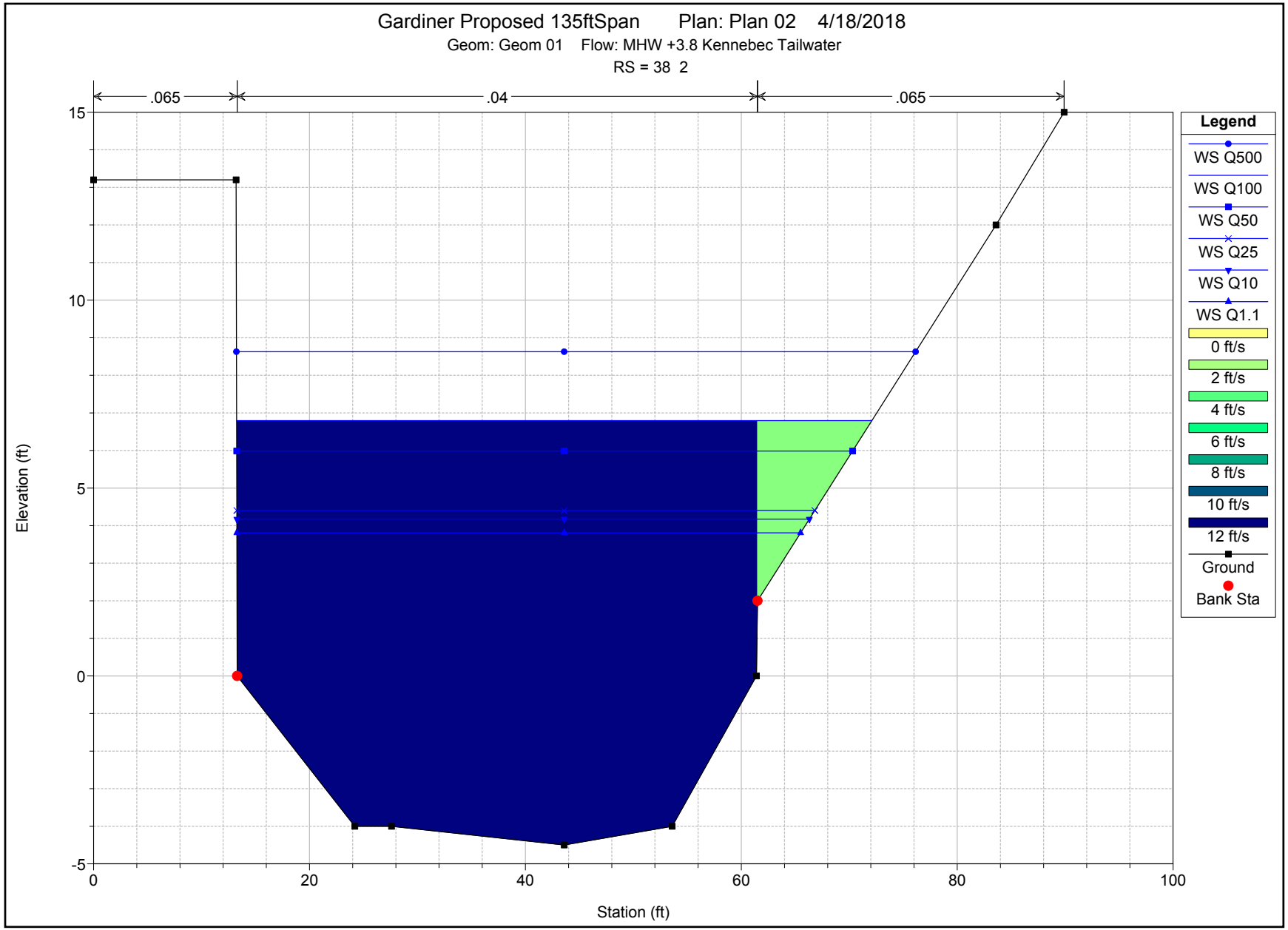

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 166 BR Pedestrian Bridge
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

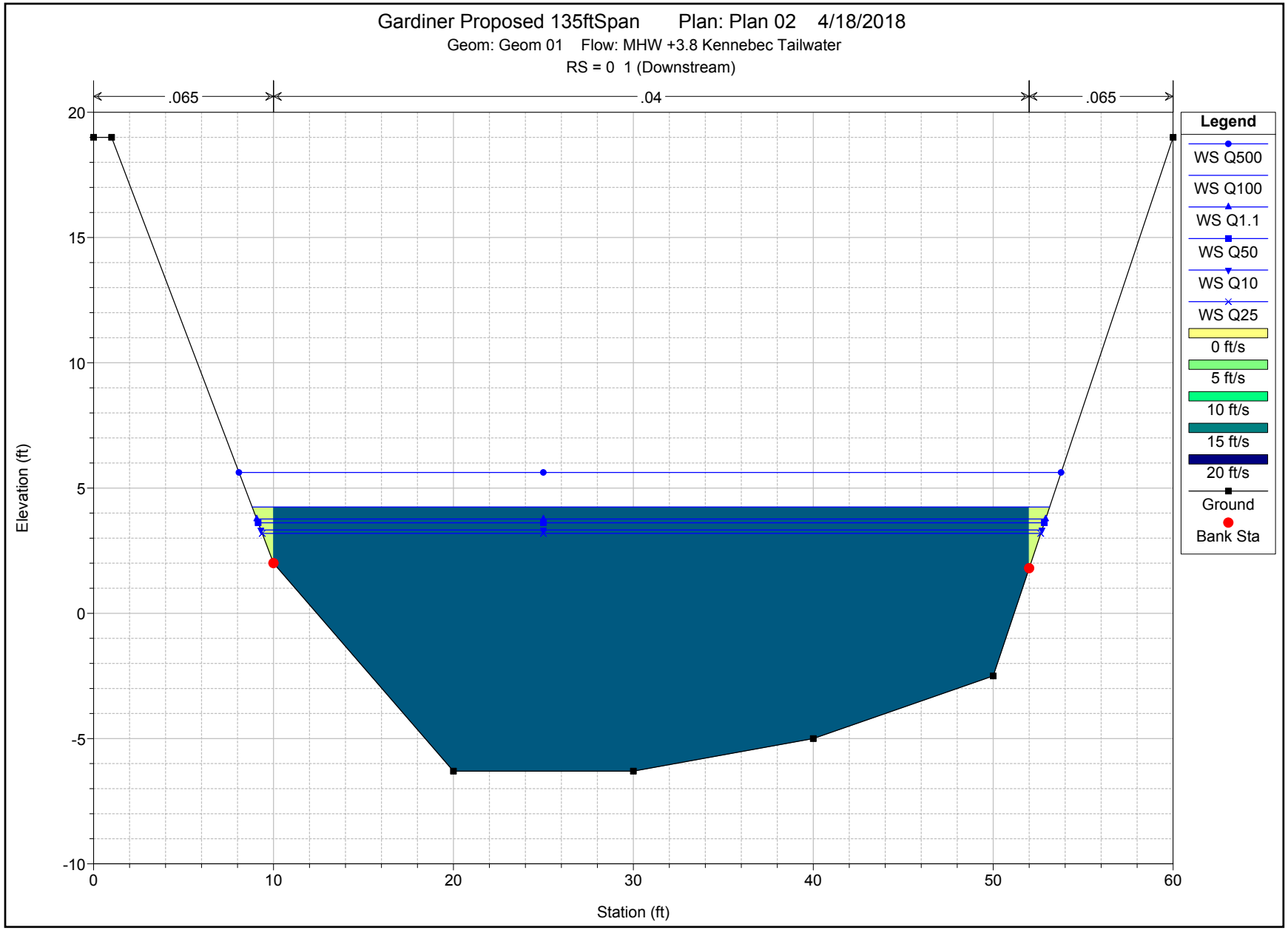

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 137 4
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
Ground
Ineff
Bank Sta

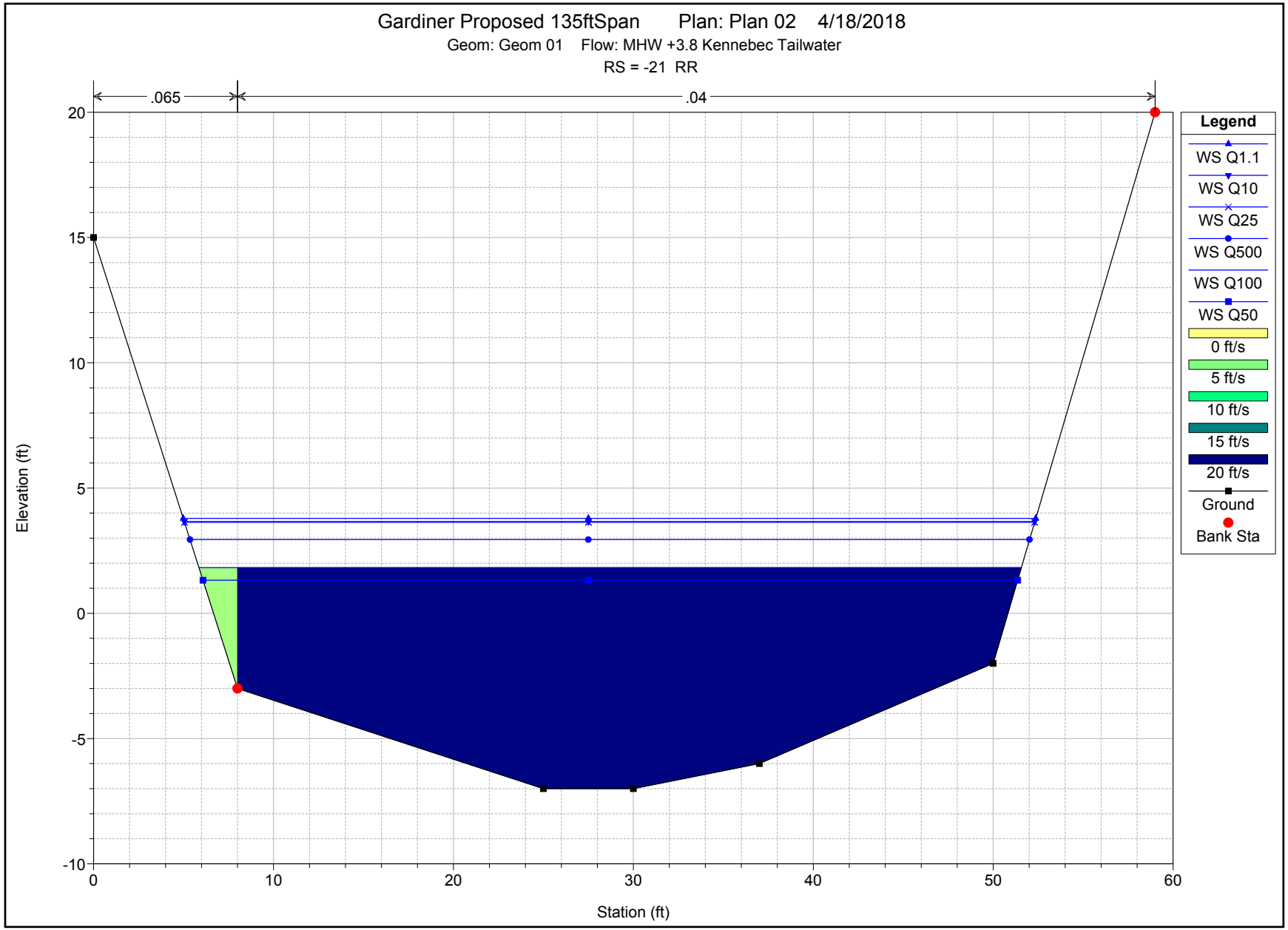

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Ineff
Bank Sta

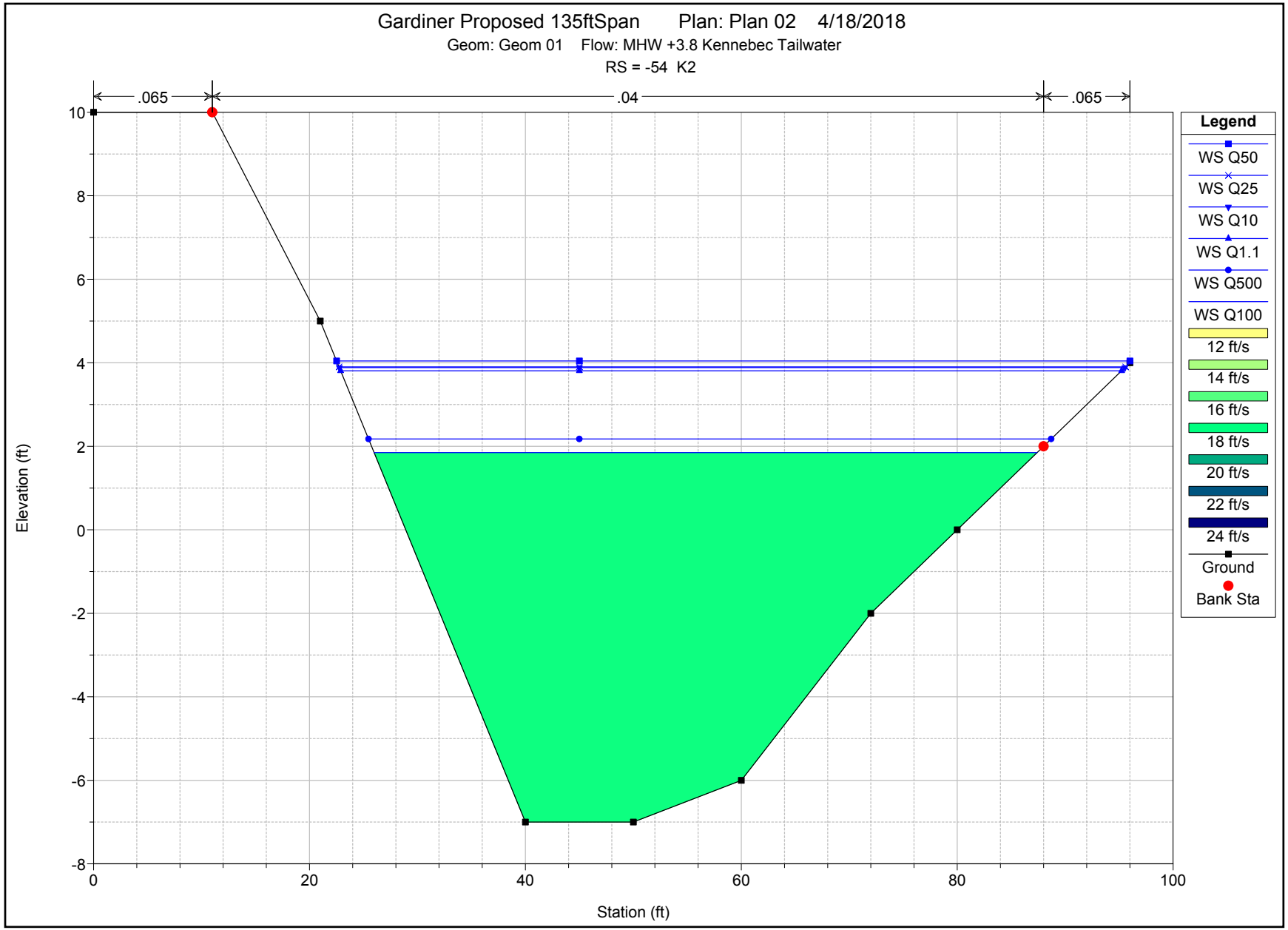

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 98.5 BR Maine Ave.
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
10
20
30
40
50
60
70
80
90
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

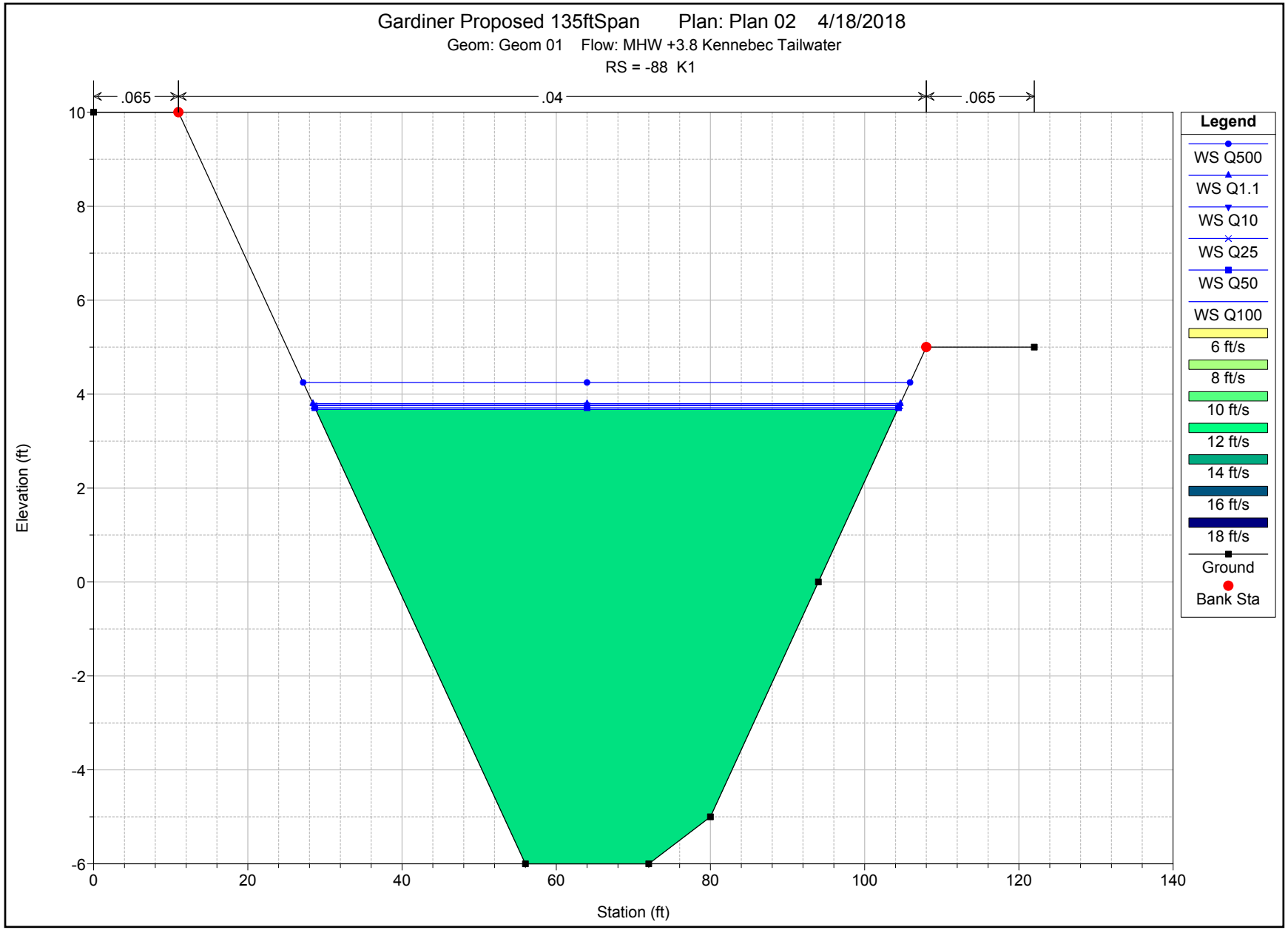

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 60 3
.04
.065
.
0
6
5
Elevation (ft)
Station (ft)
15
10
5
0
-5
10
20
30
40
50
60
70
80
90
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Ineff
Bank Sta

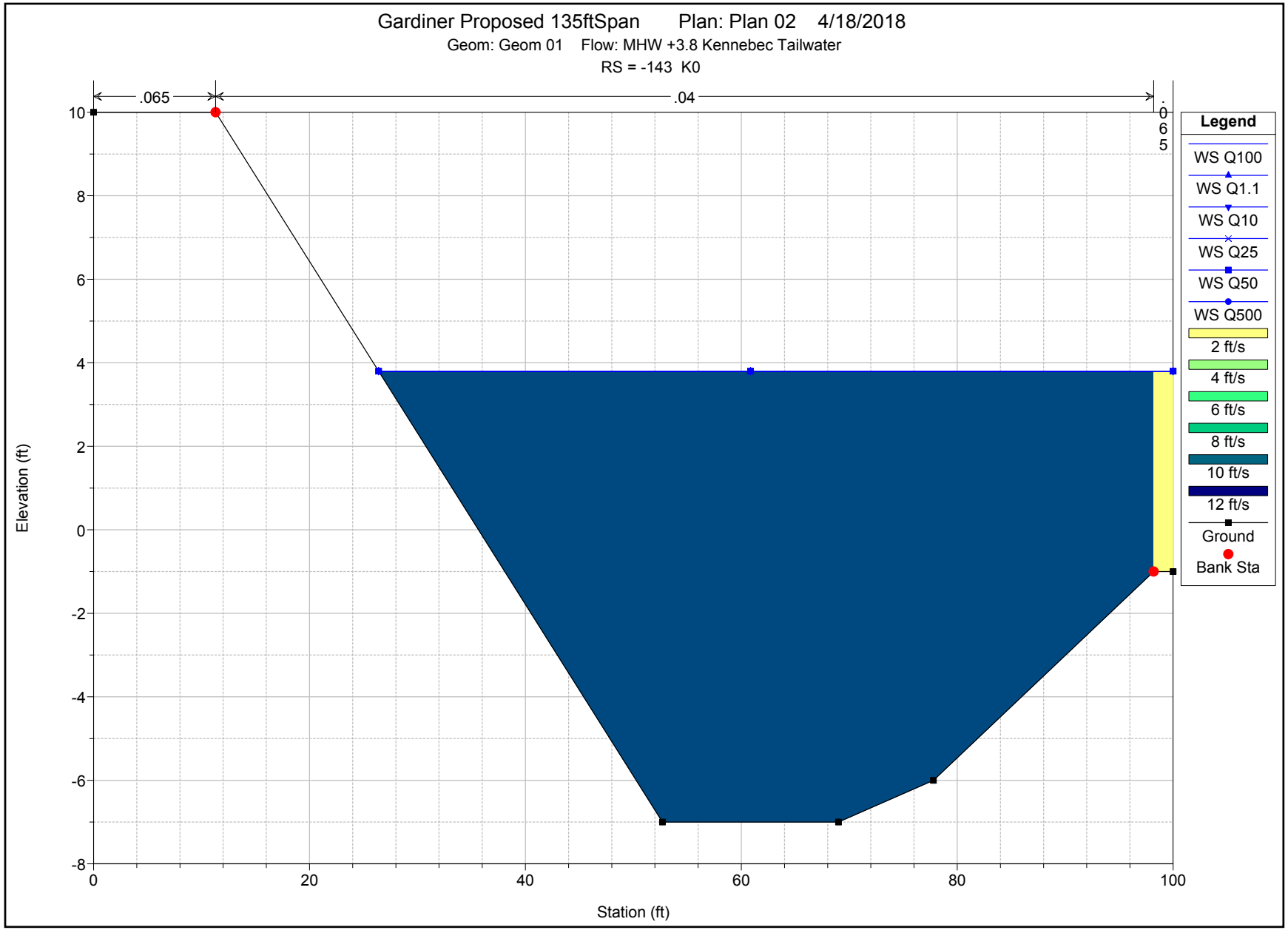

Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 38 2
.065
.04
.065
Elevation (ft)
Station (ft)
15
10
5
0
-5
0
20
40
60
80
100
Legend
WS Q500
WS Q100
WS Q50
WS Q25
WS Q10
WS Q1.1
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = 0 1 (Downstream)
.065
.04
.065
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Legend
WS Q500
WS Q100
WS Q1.1
WS Q50
WS Q10
WS Q25
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -21 RR
.065
.04
Legend
WS Q1.1
WS Q10
WS Q25
WS Q500
WS Q100
WS Q50
0 ft/s
5 ft/s
10 ft/s
15 ft/s
20 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -54 K2
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q50
WS Q25
WS Q10
WS Q1.1
WS Q500
WS Q100
12 ft/s
14 ft/s
16 ft/s
18 ft/s
20 ft/s
22 ft/s
24 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -88 K1
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
Legend
WS Q500
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q100
6 ft/s
8 ft/s
10 ft/s
12 ft/s
14 ft/s
16 ft/s
18 ft/s
Ground
Bank Sta


Gardiner Proposed 135ftSpan Plan: Plan 02 4/18/2018
Geom: Geom 01 Flow: MHW +3.8 Kennebec Tailwater
RS = -143 K0
.065
.04
.065
Elevation (ft)
Station (ft)
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
Legend
WS Q100
WS Q1.1
WS Q10
WS Q25
WS Q50
WS Q500
2 ft/s
4 ft/s
6 ft/s
8 ft/s
10 ft/s
12 ft/s
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
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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: Gardiner Proposed 135ftSpan
Project File : GardinerProposed5.prj
Run Date and Time: 4/18/2018 2:52:22 PM

Project in English units

PLAN DATA

Plan Title: Plan 02
Plan File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.p02

Geometry Title: Geom 01
Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.g01

Flow Title : MHW +3.8 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.f02

Plan Summary Information:
Number of: Cross Sections = 27 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 3 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: MHW +3.8 Kennebec Tailwater
Flow File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.f02

Flow Data (cfs)

| River | Reach | RS | Q100 | Q1.1 | Q10 | Q25 | Q50 | Q500 |
|---|---|---|---|---|---|---|---|---|
| Cobosee Stream | Reach 1 | 1700 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |
| Cobosee Stream | Reach 1 | -88 | 5910 | 1312 | 3850 | 4148 | 5290 | 7380 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Cobosee Stream | Reach 1 | Q100 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q1.1 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q10 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q25 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q50 | Critical | Known WS = 3.8 |
| Cobosee Stream | Reach 1 | Q500 | Critical | Known WS = 3.8 |

GEOMETRY DATA

Geometry Title: Geom 01

Geometry File : u:\195350266\transportation\calculations\hydraulics\Hec Ras\Final Models\Proposed\GardinerProposed5.g01

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1700

INPUT
Description: Upstream (I)
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 40 | 10 | 39.7 | 20 | 39.2 | 30 | 37.2 | 40 | 34.5 |
| 50 | 29 | 60 | 23.5 | 70 | 17.5 | 80 | 15.5 | 90 | 14.5 |
| 100 | 13.8 | 110 | 14.2 | 120 | 14.8 | 130 | 15.7 | 140 | 19 |
| 150 | 25 | 160 | 31 | 170 | 33.3 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 60 | .04 | 150 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 60 | 150 | 65 | 65 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.48 | Element | | | |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.75 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 21.32 | Flow Area (sq ft) | | 559.56 | |
| E.G. Slope (ft/ft) | 0.006899 | Area (sq ft) | | 559.56 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 84.99 | Top Width (ft) | | 84.99 | |
| Vel Total (ft/s) | 10.56 | Avg. Vel. (ft/s) | | 10.56 | |
| Max Chl Dpth (ft) | 8.95 | Hydr. Depth (ft) | | 6.58 | |
| Conv. Total (cfs) | 71151.3 | Conv. (cfs) | | 71151.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 88.36 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.73 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.19 | 24.45 | 1.09 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.10 | 3.41 | 1.11 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.04 | Element | | | |
| Vel Head (ft) | 0.50 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 18.54 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | 17.33 | Flow Area (sq ft) | | 231.75 | |
| E.G. Slope (ft/ft) | 0.004837 | Area (sq ft) | | 231.75 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 70.35 | Top Width (ft) | | 70.35 | |
| Vel Total (ft/s) | 5.66 | Avg. Vel. (ft/s) | | 5.66 | |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | | 3.29 | |
| Conv. Total (cfs) | 18865.3 | Conv. (cfs) | | 18865.3 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 71.44 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 0.98 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.51 | Cum Volume (acre-ft) | 0.02 | 10.26 | 0.06 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.02 | 2.83 | 0.04 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.15 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 19.81 | Flow Area (sq ft) | | 428.08 | |
| E.G. Slope (ft/ft) | 0.006488 | Area (sq ft) | | 428.08 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 79.67 | Top Width (ft) | | 79.67 | |
| Vel Total (ft/s) | 8.99 | Avg. Vel. (ft/s) | | 8.99 | |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 47797.5 | Conv. (cfs) | | 47797.5 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 82.15 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.11 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.08 | 17.99 | 0.17 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 3.23 | 0.07 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.73 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 21.40 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.05 | Flow Area (sq ft) | | 447.72 | |
| E.G. Slope (ft/ft) | 0.006586 | Area (sq ft) | | 447.72 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 80.49 | Top Width (ft) | | 80.49 | |
| Vel Total (ft/s) | 9.26 | Avg. Vel. (ft/s) | | 9.26 | |
| Max Chl Dpth (ft) | 7.60 | Hydr. Depth (ft) | | 5.56 | |
| Conv. Total (cfs) | 51113.2 | Conv. (cfs) | | 51113.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 83.10 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.53 | Cum Volume (acre-ft) | 0.09 | 18.96 | 0.19 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 3.28 | 0.09 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 22.28 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 20.89 | Flow Area (sq ft) | | 519.99 | |
| E.G. Slope (ft/ft) | 0.006865 | Area (sq ft) | | 519.99 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 83.43 | Top Width (ft) | | 83.43 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 63848.2 | Conv. (cfs) | | 63848.2 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | | 86.53 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.52 | Cum Volume (acre-ft) | 0.14 | 22.60 | 0.53 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.07 | 3.38 | 0.56 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.00 | Wt. n-Val. | 0.070 | 0.040 | |
| W.S. Elev (ft) | 23.79 | Reach Len. (ft) | 65.00 | 65.00 | 65.00 |
| Crit W.S. (ft) | 22.27 | Flow Area (sq ft) | 0.08 | 649.67 | |
| E.G. Slope (ft/ft) | 0.006886 | Area (sq ft) | 0.08 | 649.67 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.03 | 7379.97 | |
| Top Width (ft) | 88.50 | Top Width (ft) | 0.52 | 87.98 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 0.44 | 11.36 | |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 0.14 | 7.38 | |
| Conv. Total (cfs) | 88935.3 | Conv. (cfs) | 0.4 | 88934.8 | |
| Length Wtd. (ft) | 65.00 | Wetted Per. (ft) | 0.60 | 91.84 | |
| Min Ch El (ft) | 13.80 | Shear (lb/sq ft) | 0.05 | 3.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 170.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.50 | Cum Volume (acre-ft) | 0.36 | 28.96 | 3.67 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.16 | 3.46 | 2.01 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1635

INPUT
Description: H

Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 23.5 | 40 | 17 |
| 50 | 14 | 60 | 14.5 | 70 | 15 | 80 | 15.2 | 90 | 15.4 |
| 100 | 15.6 | 110 | 15.8 | 115 | 17.9 | 120 | 20 | 130 | 26.5 |
| 140 | 30.1 | 150 | 30.2 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .045 | 130 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 130 | 80 | 80 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.95 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 22.26 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 565.73 | |
| E.G. Slope (ft/ft) | 0.009287 | Area (sq ft) | | 565.73 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 91.56 | Top Width (ft) | | 91.56 | |
| Vel Total (ft/s) | 10.45 | Avg. Vel. (ft/s) | | 10.45 | |
| Max Chl Dpth (ft) | 8.26 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 61328.2 | Conv. (cfs) | | 61328.2 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 95.11 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.45 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.90 | Cum Volume (acre-ft) | 0.19 | 23.61 | 1.09 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.10 | 3.28 | 1.11 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 17.69 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.92 | |
| E.G. Slope (ft/ft) | 0.015059 | Area (sq ft) | | 181.92 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 75.56 | Top Width (ft) | | 75.56 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |

| | | | | | |
|---|---|---|---|---|---|
| Max Chl Dpth (ft) | 3.69 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 10691.3 | Conv. (cfs) | | 10691.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 76.62 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 2.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.04 | Cum Volume (acre-ft) | 0.02 | 9.95 | 0.06 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 2.72 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.47 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 407.41 | |
| E.G. Slope (ft/ft) | 0.010705 | Area (sq ft) | | 407.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 86.08 | Top Width (ft) | | 86.08 | |
| Vel Total (ft/s) | 9.45 | Avg. Vel. (ft/s) | | 9.45 | |
| Max Chl Dpth (ft) | 6.47 | Hydr. Depth (ft) | | 4.73 | |
| Conv. Total (cfs) | 37210.3 | Conv. (cfs) | | 37210.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 88.57 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.07 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.08 | 17.37 | 0.17 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 3.11 | 0.07 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.43 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 20.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 431.49 | |
| E.G. Slope (ft/ft) | 0.010420 | Area (sq ft) | | 431.49 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 86.93 | Top Width (ft) | | 86.93 | |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.61 | |
| Max Chl Dpth (ft) | 6.75 | Hydr. Depth (ft) | | 4.96 | |
| Conv. Total (cfs) | 40635.4 | Conv. (cfs) | | 40635.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 89.59 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.13 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | 0.09 | 18.30 | 0.19 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.04 | 3.15 | 0.09 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 23.36 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.61 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 21.75 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 520.12 | |
| E.G. Slope (ft/ft) | 0.009593 | Area (sq ft) | | 520.12 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 90.01 | Top Width (ft) | | 90.01 | |
| Vel Total (ft/s) | 10.17 | Avg. Vel. (ft/s) | | 10.17 | |
| Max Chl Dpth (ft) | 7.75 | Hydr. Depth (ft) | | 5.78 | |
| Conv. Total (cfs) | 54011.4 | Conv. (cfs) | | 54011.4 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 93.26 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.91 | Cum Volume (acre-ft) | 0.14 | 21.82 | 0.53 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.07 | 3.25 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 25.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.89 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 23.37 | Reach Len. (ft) | 80.00 | 80.00 | 80.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 669.19 | |
| E.G. Slope (ft/ft) | 0.008748 | Area (sq ft) | | 669.19 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 94.97 | Top Width (ft) | | 94.97 | |
| Vel Total (ft/s) | 11.03 | Avg. Vel. (ft/s) | | 11.03 | |
| Max Chl Dpth (ft) | 9.37 | Hydr. Depth (ft) | | 7.05 | |
| Conv. Total (cfs) | 78902.3 | Conv. (cfs) | | 78902.3 | |
| Length Wtd. (ft) | 80.00 | Wetted Per. (ft) | | 99.18 | |
| Min Ch El (ft) | 14.00 | Shear (lb/sq ft) | | 3.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.87 | Cum Volume (acre-ft) | 0.36 | 27.98 | 3.67 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.16 | 3.32 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1555

INPUT
Description: G
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 34 | 20 | 28 | 30 | 21.5 | 40 | 15 |
| 50 | 13.8 | 60 | 13.6 | 70 | 13.3 | 80 | 13.5 | 90 | 13.5 |
| 100 | 14.5 | 110 | 19 | 120 | 26 | 130 | 29 | 140 | 29.5 |
| 150 | 29.9 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .07 | 30 | .042 | 120 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 30 | 120 | 100 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.62 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 20.34 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 20.16 | Flow Area (sq ft) | | 455.11 | |
| E.G. Slope (ft/ft) | 0.013986 | Area (sq ft) | | 455.11 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 80.13 | Top Width (ft) | | 80.13 | |
| Vel Total (ft/s) | 12.99 | Avg. Vel. (ft/s) | | 12.99 | |
| Max Chl Dpth (ft) | 7.04 | Hydr. Depth (ft) | | 5.68 | |
| Conv. Total (cfs) | 49972.8 | Conv. (cfs) | | 49972.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 83.24 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.77 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.37 | Cum Volume (acre-ft) | 0.19 | 22.67 | 1.09 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.10 | 3.12 | 1.11 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.81 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 16.65 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 181.93 | |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.011277 | Area (sq ft) | | 181.93 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 67.33 | Top Width (ft) | | 67.33 | |
| Vel Total (ft/s) | 7.21 | Avg. Vel. (ft/s) | | 7.21 | |
| Max Chl Dpth (ft) | 3.35 | Hydr. Depth (ft) | | 2.70 | |
| Conv. Total (cfs) | 12355.0 | Conv. (cfs) | | 12355.0 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.41 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 1.87 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.02 | 9.61 | 0.06 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.02 | 2.59 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.06 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.65 | Flow Area (sq ft) | | 355.05 | |
| E.G. Slope (ft/ft) | 0.012593 | Area (sq ft) | | 355.05 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.34 | Top Width (ft) | | 76.34 | |
| Vel Total (ft/s) | 10.84 | Avg. Vel. (ft/s) | | 10.84 | |
| Max Chl Dpth (ft) | 5.76 | Hydr. Depth (ft) | | 4.65 | |
| Conv. Total (cfs) | 34308.4 | Conv. (cfs) | | 34308.4 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 78.66 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.55 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.08 | 16.67 | 0.17 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.04 | 2.96 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.96 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 18.89 | Flow Area (sq ft) | | 368.77 | |
| E.G. Slope (ft/ft) | 0.013023 | Area (sq ft) | | 368.77 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 76.87 | Top Width (ft) | | 76.87 | |
| Vel Total (ft/s) | 11.25 | Avg. Vel. (ft/s) | | 11.25 | |
| Max Chl Dpth (ft) | 5.94 | Hydr. Depth (ft) | | 4.80 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 36348.9 | Conv. (cfs) | | 36348.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 79.30 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 3.78 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.46 | Cum Volume (acre-ft) | 0.09 | 17.57 | 0.19 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.04 | 3.00 | 0.09 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.41 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 19.96 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 19.73 | Flow Area (sq ft) | | 424.40 | |
| E.G. Slope (ft/ft) | 0.013832 | Area (sq ft) | | 424.40 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 78.99 | Top Width (ft) | | 78.99 | |
| Vel Total (ft/s) | 12.46 | Avg. Vel. (ft/s) | | 12.46 | |
| Max Chl Dpth (ft) | 6.66 | Hydr. Depth (ft) | | 5.37 | |
| Conv. Total (cfs) | 44978.9 | Conv. (cfs) | | 44978.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 81.85 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 4.48 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.41 | Cum Volume (acre-ft) | 0.14 | 20.95 | 0.53 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.07 | 3.10 | 0.56 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 24.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.03 | Wt. n-Val. | | 0.042 | |
| W.S. Elev (ft) | 21.24 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 21.12 | Flow Area (sq ft) | | 528.57 | |
| E.G. Slope (ft/ft) | 0.013933 | Area (sq ft) | | 528.57 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 82.81 | Top Width (ft) | | 82.81 | |
| Vel Total (ft/s) | 13.96 | Avg. Vel. (ft/s) | | 13.96 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | | 6.38 | |
| Conv. Total (cfs) | 62522.2 | Conv. (cfs) | | 62522.2 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 86.46 | |
| Min Ch El (ft) | 13.30 | Shear (lb/sq ft) | | 5.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.36 | 26.88 | 3.67 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.16 | 3.16 | 2.01 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1455

INPUT
Description: F
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 45 | 10 | 38 | 20 | 31 | 30 | 24 | 40 | 16.5 |
| 50 | 12.5 | 60 | 11.8 | 70 | 12 | 80 | 12.3 | 90 | 12.6 |
| 100 | 12.8 | 110 | 14 | 120 | 18.5 | 130 | 23 | 140 | 28 |
| 150 | 30 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 120 | 120 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.52 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.37 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 19.15 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.73 | Flow Area (sq ft) | 4.68 | 476.91 | 0.47 |
| E.G. Slope (ft/ft) | 0.013371 | Area (sq ft) | 4.68 | 476.91 | 0.47 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 12.85 | 5896.64 | 0.51 |
| Top Width (ft) | 84.97 | Top Width (ft) | 3.53 | 80.00 | 1.44 |
| Vel Total (ft/s) | 12.26 | Avg. Vel. (ft/s) | 2.75 | 12.36 | 1.09 |
| Max Chl Dpth (ft) | 7.35 | Hydr. Depth (ft) | 1.32 | 5.96 | 0.32 |
| Conv. Total (cfs) | 51109.1 | Conv. (cfs) | 111.1 | 50993.5 | 4.4 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 4.41 | 81.85 | 1.58 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.88 | 4.86 | 0.25 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.18 | 21.60 | 1.09 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.09 | 2.94 | 1.10 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.04 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.06 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 14.87 | Flow Area (sq ft) | | 165.73 | |
| E.G. Slope (ft/ft) | 0.018077 | Area (sq ft) | | 165.73 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 68.77 | Top Width (ft) | | 68.77 | |
| Vel Total (ft/s) | 7.92 | Avg. Vel. (ft/s) | | 7.92 | |
| Max Chl Dpth (ft) | 3.26 | Hydr. Depth (ft) | | 2.41 | |
| Conv. Total (cfs) | 9758.3 | Conv. (cfs) | | 9758.3 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | | 69.60 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | | 2.69 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.24 | Cum Volume (acre-ft) | 0.02 | 9.22 | 0.06 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.02 | 2.43 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.01 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.40 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.28 | Flow Area (sq ft) | 0.54 | 338.38 | |
| E.G. Slope (ft/ft) | 0.017108 | Area (sq ft) | 0.54 | 338.38 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.82 | 3849.18 | |
| Top Width (ft) | 78.76 | Top Width (ft) | 1.20 | 77.56 | |
| Vel Total (ft/s) | 11.36 | Avg. Vel. (ft/s) | 1.51 | 11.38 | |
| Max Chl Dpth (ft) | 5.60 | Hydr. Depth (ft) | 0.45 | 4.36 | |
| Conv. Total (cfs) | 29434.8 | Conv. (cfs) | 6.3 | 29428.6 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.50 | 79.17 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.38 | 4.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.59 | Cum Volume (acre-ft) | 0.08 | 15.87 | 0.17 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.04 | 2.78 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.07 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.67 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 17.49 | Flow Area (sq ft) | 0.91 | 359.11 | |
| E.G. Slope (ft/ft) | 0.016461 | Area (sq ft) | 0.91 | 359.11 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 1.60 | 4146.40 | |
| Top Width (ft) | 79.70 | Top Width (ft) | 1.56 | 78.15 | |
| Vel Total (ft/s) | 11.52 | Avg. Vel. (ft/s) | 1.76 | 11.55 | |
| Max Chl Dpth (ft) | 5.87 | Hydr. Depth (ft) | 0.58 | 4.60 | |
| Conv. Total (cfs) | 32330.5 | Conv. (cfs) | 12.5 | 32318.0 | |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 1.94 | 79.81 | |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.48 | 4.62 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.53 | Cum Volume (acre-ft) | 0.09 | 16.73 | 0.19 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.04 | 2.83 | 0.09 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.27 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 18.65 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |
| Crit W.S. (ft) | 18.33 | Flow Area (sq ft) | 3.07 | 436.66 | 0.02 |
| E.G. Slope (ft/ft) | 0.014397 | Area (sq ft) | 3.07 | 436.66 | 0.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 7.60 | 5282.39 | 0.01 |
| Top Width (ft) | 83.19 | Top Width (ft) | 2.86 | 80.00 | 0.32 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 2.48 | 12.10 | 0.42 |
| Max Chl Dpth (ft) | 6.85 | Hydr. Depth (ft) | 1.07 | 5.46 | 0.07 |
| Conv. Total (cfs) | 44088.4 | Conv. (cfs) | 63.4 | 44024.9 | 0.1 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 3.58 | 81.85 | 0.36 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 0.77 | 4.80 | 0.06 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.34 | Cum Volume (acre-ft) | 0.14 | 19.97 | 0.53 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.07 | 2.91 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 22.87 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.58 | Wt. n-Val. | 0.065 | 0.045 | 0.070 |
| W.S. Elev (ft) | 20.28 | Reach Len. (ft) | 120.00 | 120.00 | 120.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.55 | 567.80 | 3.54 |
| E.G. Slope (ft/ft) | 0.011590 | Area (sq ft) | 9.55 | 567.80 | 3.54 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 30.99 | 7341.96 | 7.05 |
| Top Width (ft) | 89.01 | Top Width (ft) | 5.05 | 80.00 | 3.97 |
| Vel Total (ft/s) | 12.70 | Avg. Vel. (ft/s) | 3.24 | 12.93 | 1.99 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | 1.89 | 7.10 | 0.89 |
| Conv. Total (cfs) | 68552.3 | Conv. (cfs) | 287.9 | 68198.9 | 65.5 |
| Length Wtd. (ft) | 120.00 | Wetted Per. (ft) | 6.31 | 81.85 | 4.35 |
| Min Ch El (ft) | 11.80 | Shear (lb/sq ft) | 1.10 | 5.02 | 0.59 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 150.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.34 | 25.62 | 3.67 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.16 | 2.97 | 2.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1335

INPUT
Description: E
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 42.5 | 10 | 37.5 | 20 | 31 | 30 | 24 | 40 | 17 |
| 50 | 11 | 60 | 9.5 | 70 | 9.5 | 80 | 9.5 | 90 | 9.5 |
| 100 | 10.5 | 110 | 14 | 120 | 19 | 130 | 23 | 140 | 28 |
| 150 | 29 | 160 | 30 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 40 | .045 | 120 | .075 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 40 | 120 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 20.09 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.80 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 18.29 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.19 | 548.74 | |
| E.G. Slope (ft/ft) | 0.008433 | Area (sq ft) | 1.19 | 548.74 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.63 | 5908.37 | |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 80.42 | Top Width (ft) | 1.84 | 78.58 | |
| Vel Total (ft/s) | 10.75 | Avg. Vel. (ft/s) | 1.37 | 10.77 | |
| Max Chl Dpth (ft) | 8.79 | Hydr. Depth (ft) | 0.65 | 6.98 | |
| Conv. Total (cfs) | 64355.9 | Conv. (cfs) | 17.8 | 64338.2 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.25 | 82.01 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.28 | 3.52 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.56 | Cum Volume (acre-ft) | 0.17 | 20.19 | 1.09 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 0.09 | 2.72 | 1.10 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.14 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 12.63 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | 12.50 | Flow Area (sq ft) | | 152.87 | |
| E.G. Slope (ft/ft) | 0.019322 | Area (sq ft) | | 152.87 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 58.82 | Top Width (ft) | | 58.82 | |
| Vel Total (ft/s) | 8.58 | Avg. Vel. (ft/s) | | 8.58 | |
| Max Chl Dpth (ft) | 3.13 | Hydr. Depth (ft) | | 2.60 | |
| Conv. Total (cfs) | 9438.5 | Conv. (cfs) | | 9438.5 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 59.79 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.87 | Cum Volume (acre-ft) | 0.02 | 8.78 | 0.06 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.02 | 2.26 | 0.04 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.56 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.13 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 384.33 | |
| E.G. Slope (ft/ft) | 0.010509 | Area (sq ft) | | 384.33 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 72.81 | Top Width (ft) | | 72.81 | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Total (ft/s) | 10.02 | Avg. Vel. (ft/s) | | 10.02 | |
| Max Chl Dpth (ft) | 6.63 | Hydr. Depth (ft) | | 5.28 | |
| Conv. Total (cfs) | 37556.7 | Conv. (cfs) | | 37556.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 75.49 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.65 | Cum Volume (acre-ft) | 0.07 | 14.88 | 0.17 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.04 | 2.58 | 0.07 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.07 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 16.48 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 409.66 | |
| E.G. Slope (ft/ft) | 0.010113 | Area (sq ft) | | 409.66 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 74.08 | Top Width (ft) | | 74.08 | |
| Vel Total (ft/s) | 10.13 | Avg. Vel. (ft/s) | | 10.13 | |
| Max Chl Dpth (ft) | 6.98 | Hydr. Depth (ft) | | 5.53 | |
| Conv. Total (cfs) | 41247.6 | Conv. (cfs) | | 41247.6 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 76.94 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | | 3.36 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.64 | Cum Volume (acre-ft) | 0.08 | 15.67 | 0.19 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.04 | 2.62 | 0.09 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 17.68 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.34 | 501.53 | |
| E.G. Slope (ft/ft) | 0.008923 | Area (sq ft) | 0.34 | 501.53 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.31 | 5289.69 | |
| Top Width (ft) | 78.35 | Top Width (ft) | 0.98 | 77.37 | |
| Vel Total (ft/s) | 10.54 | Avg. Vel. (ft/s) | 0.93 | 10.55 | |
| Max Chl Dpth (ft) | 8.18 | Hydr. Depth (ft) | 0.34 | 6.48 | |
| Conv. Total (cfs) | 56001.4 | Conv. (cfs) | 3.3 | 55998.1 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 1.19 | 80.66 | |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.16 | 3.46 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.58 | Cum Volume (acre-ft) | 0.13 | 18.67 | 0.53 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.06 | 2.70 | 0.56 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 21.58 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.97 | Wt. n-Val. | 0.065 | 0.045 | 0.075 |
| W.S. Elev (ft) | 19.61 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.86 | 653.63 | 0.46 |
| E.G. Slope (ft/ft) | 0.007513 | Area (sq ft) | 4.86 | 653.63 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.06 | 7369.60 | 0.34 |
| Top Width (ft) | 85.25 | Top Width (ft) | 3.73 | 80.00 | 1.52 |
| Vel Total (ft/s) | 11.20 | Avg. Vel. (ft/s) | 2.07 | 11.27 | 0.74 |
| Max Chl Dpth (ft) | 10.11 | Hydr. Depth (ft) | 1.30 | 8.17 | 0.30 |
| Conv. Total (cfs) | 85143.6 | Conv. (cfs) | 116.1 | 85023.6 | 3.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.55 | 83.60 | 1.64 |
| Min Ch El (ft) | 9.50 | Shear (lb/sq ft) | 0.50 | 3.67 | 0.13 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 160.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.52 | Cum Volume (acre-ft) | 0.33 | 23.94 | 3.67 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.14 | 2.75 | 2.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1185

INPUT
Description: D
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 41.5 | 4 | 40 | 10 | 35 | 20 | 27.5 | 30 | 20 |
| 35 | 16 | 40 | 12 | 50 | 7 | 60 | 5.5 | 70 | 6 |
| 80 | 7 | 90 | 11 | 100 | 16 | 110 | 22 | 120 | 28 |
| 130 | 28.2 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 35 | .045 | 110 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 35 | 110 | 125 | 125 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.43 | | | | |
| Vel Head (ft) | 2.72 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.71 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 15.05 | Flow Area (sq ft) | | 446.60 | |
| E.G. Slope (ft/ft) | 0.013216 | Area (sq ft) | | 446.60 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 64.07 | Top Width (ft) | | 64.07 | |
| Vel Total (ft/s) | 13.23 | Avg. Vel. (ft/s) | | 13.23 | |
| Max Chl Dpth (ft) | 10.21 | Hydr. Depth (ft) | | 6.97 | |
| Conv. Total (cfs) | 51408.5 | Conv. (cfs) | | 51408.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 68.61 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 5.37 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.68 | Cum Volume (acre-ft) | 0.17 | 18.48 | 1.09 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.08 | 2.47 | 1.10 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.81 | | | | |
| Vel Head (ft) | 0.82 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 10.99 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 180.58 | |
| E.G. Slope (ft/ft) | 0.008701 | Area (sq ft) | | 180.58 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 47.96 | Top Width (ft) | | 47.96 | |
| Vel Total (ft/s) | 7.27 | Avg. Vel. (ft/s) | | 7.27 | |
| Max Chl Dpth (ft) | 5.49 | Hydr. Depth (ft) | | 3.77 | |
| Conv. Total (cfs) | 14065.5 | Conv. (cfs) | | 14065.5 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 49.85 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 1.97 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.49 | Cum Volume (acre-ft) | 0.02 | 8.20 | 0.06 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.02 | 2.07 | 0.04 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.93 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.07 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.16 | Flow Area (sq ft) | | 345.59 | |
| E.G. Slope (ft/ft) | 0.011592 | Area (sq ft) | | 345.59 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 58.73 | Top Width (ft) | | 58.73 | |
| Vel Total (ft/s) | 11.14 | Avg. Vel. (ft/s) | | 11.14 | |
| Max Chl Dpth (ft) | 8.57 | Hydr. Depth (ft) | | 5.88 | |
| Conv. Total (cfs) | 35758.2 | Conv. (cfs) | | 35758.2 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 62.30 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.01 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.62 | Cum Volume (acre-ft) | 0.07 | 13.62 | 0.17 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.04 | 2.35 | 0.07 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.05 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 14.34 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 13.46 | Flow Area (sq ft) | | 361.45 | |
| E.G. Slope (ft/ft) | 0.011842 | Area (sq ft) | | 361.45 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 59.60 | Top Width (ft) | | 59.60 | |
| Vel Total (ft/s) | 11.48 | Avg. Vel. (ft/s) | | 11.48 | |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 6.06 | |
| Conv. Total (cfs) | 38117.1 | Conv. (cfs) | | 38117.1 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 63.33 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.63 | Cum Volume (acre-ft) | 0.08 | 14.35 | 0.19 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.04 | 2.39 | 0.09 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 17.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.47 | Wt. n-Val. | | 0.045 | |
| W.S. Elev (ft) | 15.28 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 14.52 | Flow Area (sq ft) | | 419.10 | |
| E.G. Slope (ft/ft) | 0.012665 | Area (sq ft) | | 419.10 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 62.66 | Top Width (ft) | | 62.66 | |
| Vel Total (ft/s) | 12.62 | Avg. Vel. (ft/s) | | 12.62 | |
| Max Chl Dpth (ft) | 9.78 | Hydr. Depth (ft) | | 6.69 | |
| Conv. Total (cfs) | 47005.3 | Conv. (cfs) | | 47005.3 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | | 66.95 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | | 4.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.66 | Cum Volume (acre-ft) | 0.13 | 17.09 | 0.53 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.06 | 2.46 | 0.56 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 19.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.33 | Wt. n-Val. | 0.065 | 0.045 | |
| W.S. Elev (ft) | 16.59 | Reach Len. (ft) | 125.00 | 125.00 | 125.00 |
| Crit W.S. (ft) | 16.20 | Flow Area (sq ft) | 0.22 | 503.94 | |
| E.G. Slope (ft/ft) | 0.014382 | Area (sq ft) | 0.22 | 503.94 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.23 | 7379.77 | |
| Top Width (ft) | 66.73 | Top Width (ft) | 0.74 | 65.99 | |
| Vel Total (ft/s) | 14.64 | Avg. Vel. (ft/s) | 1.04 | 14.64 | |
| Max Chl Dpth (ft) | 11.09 | Hydr. Depth (ft) | 0.30 | 7.64 | |
| Conv. Total (cfs) | 61538.8 | Conv. (cfs) | 1.9 | 61536.9 | |
| Length Wtd. (ft) | 125.00 | Wetted Per. (ft) | 0.95 | 70.86 | |
| Min Ch El (ft) | 5.50 | Shear (lb/sq ft) | 0.21 | 6.39 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 130.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.73 | Cum Volume (acre-ft) | 0.32 | 21.94 | 3.66 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.14 | 2.50 | 2.00 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 1060

INPUT
Description: C
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 35 | 10 | 33 | 20 | 35 | 30 | 29 | 40 | 23 |
| 45 | 19.5 | 50 | 16 | 60 | 10 | 70 | 7 | 80 | 5.5 |
| 90 | 5 | 100 | 5 | 110 | 7 | 120 | 13 | 130 | 20 |
| 200 | 20.1 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 45 | .04 | 130 | .07 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 45 | 130 | 100 | 100 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.12 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.60 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.60 | Flow Area (sq ft) | | 416.89 | |
| E.G. Slope (ft/ft) | 0.013608 | Area (sq ft) | | 416.89 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 66.85 | Top Width (ft) | | 66.85 | |
| Vel Total (ft/s) | 14.18 | Avg. Vel. (ft/s) | | 14.18 | |
| Max Chl Dpth (ft) | 8.60 | Hydr. Depth (ft) | | 6.24 | |
| Conv. Total (cfs) | 50662.6 | Conv. (cfs) | | 50662.6 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 70.46 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.03 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.12 | Cum Volume (acre-ft) | 0.17 | 17.24 | 1.09 |
| C & E Loss (ft) | 0.22 | Cum SA (acres) | 0.08 | 2.28 | 1.10 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is

not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.41 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.85 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 8.85 | Flow Area (sq ft) | | 137.48 | |
| E.G. Slope (ft/ft) | 0.017292 | Area (sq ft) | | 137.48 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 49.24 | Top Width (ft) | | 49.24 | |
| Vel Total (ft/s) | 9.54 | Avg. Vel. (ft/s) | | 9.54 | |
| Max Chl Dpth (ft) | 3.85 | Hydr. Depth (ft) | | 2.79 | |
| Conv. Total (cfs) | 9977.1 | Conv. (cfs) | | 9977.1 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 50.35 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 2.95 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.51 | Cum Volume (acre-ft) | 0.02 | 7.75 | 0.06 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.02 | 1.93 | 0.04 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.32 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.49 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 11.83 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 11.83 | Flow Area (sq ft) | | 303.73 | |
| E.G. Slope (ft/ft) | 0.014510 | Area (sq ft) | | 303.73 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 61.10 | Top Width (ft) | | 61.10 | |
| Vel Total (ft/s) | 12.68 | Avg. Vel. (ft/s) | | 12.68 | |
| Max Chl Dpth (ft) | 6.83 | Hydr. Depth (ft) | | 4.97 | |
| Conv. Total (cfs) | 31961.2 | Conv. (cfs) | | 31961.2 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 63.71 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.32 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.27 | Cum Volume (acre-ft) | 0.07 | 12.69 | 0.17 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 2.18 | 0.07 |

Warning: The energy equation could not be balanced within the specified number of iterations. The

program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 12.11 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 12.11 | Flow Area (sq ft) | | 320.83 | |
| E.G. Slope (ft/ft) | 0.014350 | Area (sq ft) | | 320.83 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 62.03 | Top Width (ft) | | 62.03 | |
| Vel Total (ft/s) | 12.93 | Avg. Vel. (ft/s) | | 12.93 | |
| Max Chl Dpth (ft) | 7.11 | Hydr. Depth (ft) | | 5.17 | |
| Conv. Total (cfs) | 34626.6 | Conv. (cfs) | | 34626.6 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 64.79 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.44 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.26 | Cum Volume (acre-ft) | 0.08 | 13.37 | 0.19 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.04 | 2.21 | 0.09 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.95 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 13.10 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 13.10 | Flow Area (sq ft) | | 383.70 | |
| E.G. Slope (ft/ft) | 0.013874 | Area (sq ft) | | 383.70 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.29 | Top Width (ft) | | 65.29 | |
| Vel Total (ft/s) | 13.79 | Avg. Vel. (ft/s) | | 13.79 | |
| Max Chl Dpth (ft) | 8.10 | Hydr. Depth (ft) | | 5.88 | |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 44910.9 | Conv. (cfs) | | 44910.9 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 68.61 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 4.84 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.13 | Cum Volume (acre-ft) | 0.13 | 15.94 | 0.53 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.06 | 2.27 | 0.56 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 18.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 14.68 | Reach Len. (ft) | 100.00 | 100.00 | 100.00 |
| Crit W.S. (ft) | 14.68 | Flow Area (sq ft) | | 490.72 | |
| E.G. Slope (ft/ft) | 0.013258 | Area (sq ft) | | 490.72 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 70.18 | Top Width (ft) | | 70.18 | |
| Vel Total (ft/s) | 15.04 | Avg. Vel. (ft/s) | | 15.04 | |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | | 6.99 | |
| Conv. Total (cfs) | 64094.8 | Conv. (cfs) | | 64094.8 | |
| Length Wtd. (ft) | 100.00 | Wetted Per. (ft) | | 74.43 | |
| Min Ch El (ft) | 5.00 | Shear (lb/sq ft) | | 5.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 200.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.11 | Cum Volume (acre-ft) | 0.32 | 20.52 | 3.66 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.14 | 2.30 | 2.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 960

INPUT
Description: B
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 32 | 17.3 | 29 | 67 | 5 | 79.4 | 5 | 85.5 | 4 |
| 100.5 | 3.5 | 114.3 | 4 | 124.5 | 5 | 140 | 12 | 202.9 | 14.2 |
| 203 | 14.5 | 209.1 | 15 | 224.5 | 20 | 229.5 | 25 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 67 | .042 | 124.5 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 67 | 124.5 | 25 | 25 | .3 | .5 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.55 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 5.12 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.43 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.91 | Flow Area (sq ft) | 20.34 | 299.03 | 21.75 |
| E.G. Slope (ft/ft) | 0.030767 | Area (sq ft) | 20.34 | 299.03 | 21.75 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 168.11 | 5560.68 | 181.20 |
| Top Width (ft) | 76.49 | Top Width (ft) | 9.18 | 57.50 | 9.82 |
| Vel Total (ft/s) | 17.32 | Avg. Vel. (ft/s) | 8.26 | 18.60 | 8.33 |
| Max Chl Dpth (ft) | 5.93 | Hydr. Depth (ft) | 2.22 | 5.20 | 2.22 |
| Conv. Total (cfs) | 33693.3 | Conv. (cfs) | 958.4 | 31701.8 | 1033.1 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 10.19 | 57.65 | 10.77 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.83 | 9.96 | 3.88 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.97 | Cum Volume (acre-ft) | 0.15 | 16.42 | 1.07 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.07 | 2.14 | 1.09 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.04 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.60 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 6.44 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 6.75 | Flow Area (sq ft) | 2.14 | 126.86 | 2.29 |
| E.G. Slope (ft/ft) | 0.029093 | Area (sq ft) | 2.14 | 126.86 | 2.29 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 8.13 | 1295.11 | 8.76 |
| Top Width (ft) | 63.66 | Top Width (ft) | 2.98 | 57.50 | 3.18 |
| Vel Total (ft/s) | 9.99 | Avg. Vel. (ft/s) | 3.79 | 10.21 | 3.82 |
| Max Chl Dpth (ft) | 2.94 | Hydr. Depth (ft) | 0.72 | 2.21 | 0.72 |
| Conv. Total (cfs) | 7692.0 | Conv. (cfs) | 47.7 | 7593.0 | 51.4 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 3.31 | 57.65 | 3.49 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 1.18 | 4.00 | 1.19 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.21 | Cum Volume (acre-ft) | 0.02 | 7.44 | 0.06 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.01 | 1.81 | 0.04 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.85 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 8.24 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.32 | Flow Area (sq ft) | 10.89 | 230.65 | 11.65 |
| E.G. Slope (ft/ft) | 0.032272 | Area (sq ft) | 10.89 | 230.65 | 11.65 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 74.85 | 3694.47 | 80.68 |
| Top Width (ft) | 71.40 | Top Width (ft) | 6.72 | 57.50 | 7.18 |
| Vel Total (ft/s) | 15.21 | Avg. Vel. (ft/s) | 6.87 | 16.02 | 6.93 |
| Max Chl Dpth (ft) | 4.74 | Hydr. Depth (ft) | 1.62 | 4.01 | 1.62 |
| Conv. Total (cfs) | 21431.3 | Conv. (cfs) | 416.7 | 20565.5 | 449.1 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 7.46 | 57.65 | 7.88 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 2.94 | 8.06 | 2.98 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.09 | Cum Volume (acre-ft) | 0.06 | 12.08 | 0.15 |
| C & E Loss (ft) | 0.13 | Cum SA (acres) | 0.03 | 2.04 | 0.06 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.48 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.06 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 8.43 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 9.57 | Flow Area (sq ft) | 12.16 | 241.21 | 13.00 |
| E.G. Slope (ft/ft) | 0.032073 | Area (sq ft) | 12.16 | 241.21 | 13.00 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 86.43 | 3968.41 | 93.16 |
| Top Width (ft) | 72.19 | Top Width (ft) | 7.10 | 57.50 | 7.59 |
| Vel Total (ft/s) | 15.57 | Avg. Vel. (ft/s) | 7.11 | 16.45 | 7.16 |
| Max Chl Dpth (ft) | 4.93 | Hydr. Depth (ft) | 1.71 | 4.19 | 1.71 |
| Conv. Total (cfs) | 23161.7 | Conv. (cfs) | 482.6 | 22158.9 | 520.2 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 7.88 | 57.65 | 8.33 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.09 | 8.38 | 3.13 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.07 | Cum Volume (acre-ft) | 0.07 | 12.72 | 0.17 |
| C & E Loss (ft) | 0.14 | Cum SA (acres) | 0.03 | 2.08 | 0.08 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.76 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.09 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 10.43 | Flow Area (sq ft) | 17.35 | 279.49 | 18.55 |
| E.G. Slope (ft/ft) | 0.031227 | Area (sq ft) | 17.35 | 279.49 | 18.55 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 136.92 | 5005.50 | 147.58 |
| Top Width (ft) | 75.04 | Top Width (ft) | 8.48 | 57.50 | 9.06 |
| Vel Total (ft/s) | 16.77 | Avg. Vel. (ft/s) | 7.89 | 17.91 | 7.96 |
| Max Chl Dpth (ft) | 5.59 | Hydr. Depth (ft) | 2.05 | 4.86 | 2.05 |
| Conv. Total (cfs) | 29935.7 | Conv. (cfs) | 774.8 | 28325.7 | 835.2 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 9.41 | 57.65 | 9.94 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 3.59 | 9.45 | 3.64 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 2.00 | Cum Volume (acre-ft) | 0.11 | 15.18 | 0.51 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.05 | 2.13 | 0.55 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 16.05 | Element | | | |
| Vel Head (ft) | 5.85 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.20 | Reach Len. (ft) | 25.00 | 25.00 | 25.00 |
| Crit W.S. (ft) | 11.80 | Flow Area (sq ft) | 28.01 | 343.23 | 29.95 |
| E.G. Slope (ft/ft) | 0.029537 | Area (sq ft) | 28.01 | 343.23 | 29.95 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 252.32 | 6855.72 | 271.96 |
| Top Width (ft) | 79.79 | Top Width (ft) | 10.77 | 57.50 | 11.52 |
| Vel Total (ft/s) | 18.40 | Avg. Vel. (ft/s) | 9.01 | 19.97 | 9.08 |
| Max Chl Dpth (ft) | 6.70 | Hydr. Depth (ft) | 2.60 | 5.97 | 2.60 |
| Conv. Total (cfs) | 42940.8 | Conv. (cfs) | 1468.1 | 39890.3 | 1582.4 |
| Length Wtd. (ft) | 25.00 | Wetted Per. (ft) | 11.96 | 57.65 | 12.64 |
| Min Ch El (ft) | 3.50 | Shear (lb/sq ft) | 4.32 | 10.98 | 4.37 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 229.50 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.90 | Cum Volume (acre-ft) | 0.28 | 19.56 | 3.63 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | 0.12 | 2.16 | 1.99 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 935

INPUT
Description: JU
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 15.3 | 30 | 23.8 | 27.1 | 35 | 27 | 37.7 | 19 |
| 62 | 5 | 79 | 5 | 82.2 | 4 | 105.2 | 2 | 121.1 | 3 |
| 125.6 | 4 | 137.4 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 |
| 208.7 | 13.4 | 231.8 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 62 | .042 | 125.6 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 62 | 125.6 | 85 | 85 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 35 | 28 | F |
| 188 | 231.8 | 26 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.32 | Element | | | |
| Vel Head (ft) | 1.57 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.75 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 9.85 | Flow Area (sq ft) | 39.49 | 523.09 | 95.95 |
| E.G. Slope (ft/ft) | 0.005265 | Area (sq ft) | 39.49 | 523.09 | 95.95 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 174.05 | 5450.01 | 285.95 |
| Top Width (ft) | 132.90 | Top Width (ft) | 11.71 | 63.60 | 57.59 |
| Vel Total (ft/s) | 8.97 | Avg. Vel. (ft/s) | 4.41 | 10.42 | 2.98 |
| Max Chl Dpth (ft) | 9.75 | Hydr. Depth (ft) | 3.37 | 8.22 | 1.67 |
| Conv. Total (cfs) | 81446.2 | Conv. (cfs) | 2398.5 | 75107.0 | 3940.7 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 13.51 | 63.98 | 59.06 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.96 | 2.69 | 0.53 |
| Alpha | 1.26 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.13 | 16.18 | 1.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.07 | 2.11 | 1.07 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.56 | Element | | | |
| Vel Head (ft) | 0.49 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 7.07 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 5.89 | Flow Area (sq ft) | 3.73 | 225.92 | 9.28 |
| E.G. Slope (ft/ft) | 0.004779 | Area (sq ft) | 3.73 | 225.92 | 9.28 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 7.13 | 1281.35 | 23.52 |
| Top Width (ft) | 73.24 | Top Width (ft) | 3.60 | 63.60 | 6.04 |
| Vel Total (ft/s) | 5.49 | Avg. Vel. (ft/s) | 1.91 | 5.67 | 2.53 |
| Max Chl Dpth (ft) | 5.07 | Hydr. Depth (ft) | 1.04 | 3.55 | 1.54 |
| Conv. Total (cfs) | 18978.0 | Conv. (cfs) | 103.1 | 18534.7 | 340.3 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 4.15 | 63.98 | 6.78 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.27 | 1.05 | 0.41 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 0.01 | 7.34 | 0.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 1.78 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q10

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.06 | Element | | | |
| Vel Head (ft) | 1.21 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 9.85 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 8.32 | Flow Area (sq ft) | 20.42 | 402.58 | 33.66 |
| E.G. Slope (ft/ft) | 0.005603 | Area (sq ft) | 20.42 | 402.58 | 33.66 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 74.51 | 3633.66 | 141.83 |
| Top Width (ft) | 83.52 | Top Width (ft) | 8.42 | 63.60 | 11.51 |
| Vel Total (ft/s) | 8.43 | Avg. Vel. (ft/s) | 3.65 | 9.03 | 4.21 |
| Max Chl Dpth (ft) | 7.85 | Hydr. Depth (ft) | 2.43 | 6.33 | 2.93 |
| Conv. Total (cfs) | 51434.1 | Conv. (cfs) | 995.4 | 48543.9 | 1894.8 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 9.72 | 63.98 | 12.91 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.74 | 2.20 | 0.91 |
| Alpha | 1.09 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.05 | 11.89 | 0.14 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.02 | 2.01 | 0.06 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q25

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.40 | Element | | | |
| Vel Head (ft) | 1.30 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 10.11 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 8.55 | Flow Area (sq ft) | 22.63 | 418.90 | 36.81 |
| E.G. Slope (ft/ft) | 0.005706 | Area (sq ft) | 22.63 | 418.90 | 36.81 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 86.27 | 3917.98 | 143.75 |
| Top Width (ft) | 87.07 | Top Width (ft) | 8.86 | 63.60 | 14.60 |
| Vel Total (ft/s) | 8.67 | Avg. Vel. (ft/s) | 3.81 | 9.35 | 3.91 |
| Max Chl Dpth (ft) | 8.11 | Hydr. Depth (ft) | 2.55 | 6.59 | 2.52 |
| Conv. Total (cfs) | 54912.3 | Conv. (cfs) | 1142.1 | 51867.2 | 1903.0 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 10.23 | 63.98 | 16.04 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.79 | 2.33 | 0.82 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.06 | 12.53 | 0.16 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 2.04 | 0.07 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.47 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 11.27 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 9.42 | Flow Area (sq ft) | 34.13 | 492.93 | 71.59 |
| E.G. Slope (ft/ft) | 0.005275 | Area (sq ft) | 34.13 | 492.93 | 71.59 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 143.42 | 4940.89 | 205.69 |
| Top Width (ft) | 119.63 | Top Width (ft) | 10.88 | 63.60 | 45.15 |
| Vel Total (ft/s) | 8.84 | Avg. Vel. (ft/s) | 4.20 | 10.02 | 2.87 |
| Max Chl Dpth (ft) | 9.27 | Hydr. Depth (ft) | 3.14 | 7.75 | 1.59 |
| Conv. Total (cfs) | 72834.0 | Conv. (cfs) | 1974.7 | 68027.4 | 2832.0 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 12.56 | 63.98 | 46.61 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 0.89 | 2.54 | 0.51 |
| Alpha | 1.21 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.10 | 14.95 | 0.48 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.05 | 2.10 | 0.53 |

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.
Note:  Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.57 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | 0.050 | 0.042 | 0.050 |
| W.S. Elev (ft) | 12.97 | Reach Len. (ft) | 11.00 | 11.00 | 11.00 |
| Crit W.S. (ft) | 11.03 | Flow Area (sq ft) | 55.13 | 600.98 | 171.93 |
| E.G. Slope (ft/ft) | 0.004645 | Area (sq ft) | 55.13 | 600.98 | 183.29 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 255.06 | 6451.11 | 673.83 |
| Top Width (ft) | 154.93 | Top Width (ft) | 13.83 | 63.60 | 77.49 |
| Vel Total (ft/s) | 8.91 | Avg. Vel. (ft/s) | 4.63 | 10.73 | 3.92 |
| Max Chl Dpth (ft) | 10.97 | Hydr. Depth (ft) | 3.98 | 9.45 | 2.76 |
| Conv. Total (cfs) | 108286.3 | Conv. (cfs) | 3742.5 | 94656.7 | 9887.1 |
| Length Wtd. (ft) | 11.00 | Wetted Per. (ft) | 15.97 | 63.98 | 63.87 |
| Min Ch El (ft) | 2.00 | Shear (lb/sq ft) | 1.00 | 2.72 | 0.78 |
| Alpha | 1.29 | Stream Power (lb/ft s) | 231.80 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 0.26 | 19.29 | 3.57 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.12 | 2.12 | 1.96 |

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.
Note:  Hydraulic jump has occurred between this cross section and the previous upstream section.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 895

INPUT
Description: Bridge Street
Distance from Upstream XS = 11
Deck/Roadway Width = 62
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 46.2 | 29.4 | 0 |
| 46.2 | 29.4 | 24.2 | 177.2 | 28 | 22.8 |
| 177.2 | 28 | 0 | 260 | 26 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 31 | 15.3 | 30 | 23.8 | 27.1 | 35 | 27 | 37.7 | 19 |
| 62 | 5 | 79 | 5 | 82.2 | 4 | 105.2 | 2 | 121.1 | 3 |
| 125.6 | 4 | 137.4 | 10 | 203 | 12.5 | 203.1 | 13 | 203.2 | 13.1 |
| 208.7 | 13.4 | 231.8 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 62 | .042 | 125.6 | .05 |

Bank Sta: Left Right Coeff Contr. Expan.
62 125.6 .3 .5
Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 35 | 28 | F |
| 188 | 231.8 | 26 | F |

Downstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 30 | 0 | 46.2 | 29.4 | 0 |
| 46.2 | 29.4 | 24.2 | 177.2 | 28 | 22.8 |
| 177.2 | 28 | 0 | 260 | 26 | 0 |

Downstream Bridge Cross Section Data
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 29 | 32 | 25 | 35.3 | 20 | 63.6 | 5 | 85.1 | 3 |
| 94 | 1 | 114.7 | 1 | 119.9 | 3 | 139.5 | 10 | 174.5 | 10 |
| 238.1 | 15 | 238.2 | 25 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

```
       0     .05    63.6     .04   119.9     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          63.6   119.9            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      39      24       F
     184   238.2      24       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     203     240      30

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =      26
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #Q100

  E.G. US. (ft)                 13.32    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)                 11.75    E.G. Elev (ft)               13.24         12.86
  Q Total (cfs)               5910.00    W.S. Elev (ft)               11.59         11.35
  Q Bridge (cfs)              5910.00    Crit W.S. (ft)                9.85          9.23
  Q Weir (cfs)                           Max Chl Dpth (ft)             9.59         10.35
  Weir Sta Lft (ft)                      Vel Total (ft/s)              9.26          8.59
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           637.90        688.22
  Weir Submerg                           Froude # Chl                  0.59          0.54
  Weir Max Depth (ft)                    Specif Force (cu ft)        4208.66       4466.50
  Min El Weir Flow (ft)         27.39    Hydr Depth (ft)               5.04          5.48
  Min El Prs (ft)               24.20    W.P. Total (ft)             130.24        129.07
```

| | | | | |
|---|---|---|---|---|
| Delta EG (ft) | 0.53 | Conv. Total (cfs) | 78585.2 | 90366.7 |
| Delta WS (ft) | 0.60 | Top Width (ft) | 126.63 | 125.59 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.30 | 0.05 |
| BR Open Vel (ft/s) | 9.26 | C & E Loss (ft) | 0.07 | 0.04 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.73 | 1.42 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 7.56 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 7.07 | E.G. Elev (ft) | 7.50 | 7.21 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 6.98 | 6.83 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 5.89 | 4.95 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 4.98 | 5.83 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 5.65 | 4.80 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 232.30 | 273.11 |
| Weir Submerg | | Froude # Chl | 0.55 | 0.42 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 662.63 | 837.22 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 3.19 | 3.88 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 74.53 | 72.27 |
| Delta EG (ft) | 0.38 | Conv. Total (cfs) | 18157.0 | 25781.8 |
| Delta WS (ft) | 0.29 | Top Width (ft) | 72.90 | 70.46 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.22 | 0.03 |
| BR Open Vel (ft/s) | 5.65 | C & E Loss (ft) | 0.07 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.02 | 0.61 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.06 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 9.85 | E.G. Elev (ft) | 10.97 | 10.60 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 9.70 | 9.43 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 8.32 | 7.59 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.70 | 8.43 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 8.67 | 8.15 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 444.05 | 472.42 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.60 |

| | | | | |
|---|---|---|---|---|
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2415.24 | 2625.71 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.35 | 5.72 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 85.97 | 85.56 |
| Delta EG (ft) | 0.52 | Conv. Total (cfs) | 49306.0 | 58034.6 |
| Delta WS (ft) | 0.53 | Top Width (ft) | 82.96 | 82.66 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.32 | 0.05 |
| BR Open Vel (ft/s) | 8.67 | C & E Loss (ft) | 0.05 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.97 | 1.52 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.40 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 10.11 | E.G. Elev (ft) | 11.33 | 10.96 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 9.99 | 9.72 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 8.55 | 7.85 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.99 | 8.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 8.85 | 8.35 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 468.48 | 496.69 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.60 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2658.42 | 2876.18 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.57 | 5.91 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 87.20 | 87.05 |
| Delta EG (ft) | 0.51 | Conv. Total (cfs) | 53455.0 | 62392.7 |
| Delta WS (ft) | 0.50 | Top Width (ft) | 84.05 | 84.03 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.32 | 0.05 |
| BR Open Vel (ft/s) | 8.85 | C & E Loss (ft) | 0.05 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.02 | 1.57 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 12.74 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 11.27 | E.G. Elev (ft) | 12.65 | 12.30 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 11.10 | 10.84 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 9.42 | 8.76 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.10 | 9.84 |

| | | | | |
|---|---|---|---|---|
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.14 | 8.48 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 578.84 | 623.95 |
| Weir Submerg | | Froude # Chl | 0.66 | 0.54 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3673.21 | 3921.31 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 5.04 | 5.01 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 118.38 | 127.98 |
| Delta EG (ft) | 0.55 | Conv. Total (cfs) | 69944.6 | 79903.7 |
| Delta WS (ft) | 0.71 | Top Width (ft) | 114.91 | 124.62 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.31 | 0.06 |
| BR Open Vel (ft/s) | 9.14 | C & E Loss (ft) | 0.05 | 0.05 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.75 | 1.33 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 14.57 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 12.97 | E.G. Elev (ft) | 14.49 | 14.15 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 12.79 | 12.58 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 11.03 | 10.97 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.79 | 11.58 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.33 | 8.75 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 790.75 | 843.24 |
| Weir Submerg | | Froude # Chl | 0.56 | 0.52 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 5551.62 | 5877.45 |
| Min El Weir Flow (ft) | 27.39 | Hydr Depth (ft) | 6.14 | 6.59 |
| Min El Prs (ft) | 24.20 | W.P. Total (ft) | 132.64 | 131.68 |
| Delta EG (ft) | 0.46 | Conv. Total (cfs) | 103912.3 | 118131.2 |
| Delta WS (ft) | 0.44 | Top Width (ft) | 128.71 | 127.89 |
| BR Open Area (sq ft) | 2192.90 | Frctn Loss (ft) | 0.27 | 0.05 |
| BR Open Vel (ft/s) | 9.33 | C & E Loss (ft) | 0.07 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 1.88 | 1.56 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream

REACH: Reach 1 RS: 850

INPUT
Description: JD
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 29 | 32 | 25 | 35.3 | 20 | 63.6 | 5 | 85.1 | 3 |
| 94 | 1 | 114.7 | 1 | 119.9 | 3 | 139.5 | 10 | 174.5 | 10 |
| 238.1 | 15 | 238.2 | 25 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 63.6 | .04 | 119.9 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 63.6 | 119.9 | 20 | 20 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 39 | 24 | F |
| 184 | 238.2 | 24 | F |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 203 | 240 | 30 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.78 | Element | | | |
| Vel Head (ft) | 1.63 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 11.15 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 9.23 | Flow Area (sq ft) | 35.67 | 492.82 | 138.74 |
| E.G. Slope (ft/ft) | 0.004722 | Area (sq ft) | 35.67 | 492.82 | 139.77 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 141.84 | 5300.11 | 468.05 |
| Top Width (ft) | 137.13 | Top Width (ft) | 11.60 | 56.30 | 69.22 |
| Vel Total (ft/s) | 8.86 | Avg. Vel. (ft/s) | 3.98 | 10.75 | 3.37 |
| Max Chl Dpth (ft) | 10.15 | Hydr. Depth (ft) | 3.07 | 8.75 | 2.16 |
| Conv. Total (cfs) | 86009.0 | Conv. (cfs) | 2064.2 | 77133.2 | 6811.6 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 13.13 | 56.99 | 65.34 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.80 | 2.55 | 0.63 |
| Alpha | 1.34 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.06 | 15.19 | 0.80 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.04 | 1.99 | 0.96 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.18 | Element | | | |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.39 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 6.79 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 4.95 | Flow Area (sq ft) | 3.01 | 247.20 | 20.08 |
| E.G. Slope (ft/ft) | 0.002673 | Area (sq ft) | 3.01 | 247.20 | 20.08 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 3.95 | 1262.69 | 45.35 |
| Top Width (ft) | 70.27 | Top Width (ft) | 3.37 | 56.30 | 10.60 |
| Vel Total (ft/s) | 4.85 | Avg. Vel. (ft/s) | 1.31 | 5.11 | 2.26 |
| Max Chl Dpth (ft) | 5.79 | Hydr. Depth (ft) | 0.89 | 4.39 | 1.89 |
| Conv. Total (cfs) | 25378.8 | Conv. (cfs) | 76.5 | 24425.0 | 877.3 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 3.82 | 56.99 | 11.26 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.13 | 0.72 | 0.30 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.01 | 6.88 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.66 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.54 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.22 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 9.32 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.59 | Flow Area (sq ft) | 17.58 | 389.68 | 55.88 |
| E.G. Slope (ft/ft) | 0.004662 | Area (sq ft) | 17.58 | 389.68 | 55.88 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 54.88 | 3560.63 | 234.50 |
| Top Width (ft) | 82.13 | Top Width (ft) | 8.15 | 56.30 | 17.69 |
| Vel Total (ft/s) | 8.31 | Avg. Vel. (ft/s) | 3.12 | 9.14 | 4.20 |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.92 | 3.16 |
| Conv. Total (cfs) | 56389.2 | Conv. (cfs) | 803.7 | 52150.8 | 3434.6 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 9.22 | 56.99 | 18.78 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.56 | 1.99 | 0.87 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.02 | 11.12 | 0.05 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.01 | 1.89 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.29 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 9.61 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 7.85 | Flow Area (sq ft) | 20.01 | 405.90 | 61.09 |
| E.G. Slope (ft/ft) | 0.004678 | Area (sq ft) | 20.01 | 405.90 | 61.09 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 65.31 | 3818.08 | 264.60 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 83.49 | Top Width (ft) | 8.69 | 56.30 | 18.50 |
| Vel Total (ft/s) | 8.52 | Avg. Vel. (ft/s) | 3.26 | 9.41 | 4.33 |
| Max Chl Dpth (ft) | 8.61 | Hydr. Depth (ft) | 2.30 | 7.21 | 3.30 |
| Conv. Total (cfs) | 60644.0 | Conv. (cfs) | 954.9 | 55820.5 | 3868.5 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 9.83 | 56.99 | 19.64 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.59 | 2.08 | 0.91 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.02 | 11.73 | 0.06 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.01 | 1.92 | 0.04 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.63 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 10.56 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 8.76 | Flow Area (sq ft) | 29.19 | 459.78 | 101.34 |
| E.G. Slope (ft/ft) | 0.005052 | Area (sq ft) | 29.19 | 459.78 | 101.34 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 112.29 | 4883.80 | 293.91 |
| Top Width (ft) | 128.55 | Top Width (ft) | 10.50 | 56.30 | 61.76 |
| Vel Total (ft/s) | 8.96 | Avg. Vel. (ft/s) | 3.85 | 10.62 | 2.90 |
| Max Chl Dpth (ft) | 9.56 | Hydr. Depth (ft) | 2.78 | 8.17 | 1.64 |
| Conv. Total (cfs) | 74422.7 | Conv. (cfs) | 1579.8 | 68708.1 | 4134.8 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 11.88 | 56.99 | 62.99 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.78 | 2.54 | 0.51 |
| Alpha | 1.31 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.08 | Cum Volume (acre-ft) | 0.03 | 14.02 | 0.30 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.03 | 1.98 | 0.44 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 14.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.57 | Wt. n-Val. | 0.050 | 0.040 | 0.050 |
| W.S. Elev (ft) | 12.53 | Reach Len. (ft) | 20.00 | 20.00 | 20.00 |
| Crit W.S. (ft) | 11.04 | Flow Area (sq ft) | 53.50 | 570.57 | 227.26 |
| E.G. Slope (ft/ft) | 0.003944 | Area (sq ft) | 53.50 | 570.57 | 246.97 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 222.51 | 6183.78 | 973.71 |
| Top Width (ft) | 153.61 | Top Width (ft) | 14.21 | 56.30 | 83.10 |
| Vel Total (ft/s) | 8.67 | Avg. Vel. (ft/s) | 4.16 | 10.84 | 4.28 |
| Max Chl Dpth (ft) | 11.53 | Hydr. Depth (ft) | 3.77 | 10.13 | 3.55 |
| Conv. Total (cfs) | 117510.7 | Conv. (cfs) | 3543.0 | 98463.4 | 15504.2 |
| Length Wtd. (ft) | 20.00 | Wetted Per. (ft) | 16.08 | 56.99 | 65.34 |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.82 | 2.47 | 0.86 |
| Alpha | 1.35 | Stream Power (lb/ft s) | 238.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 0.16 | 18.15 | 3.20 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | 0.09 | 2.01 | 1.85 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 830

INPUT
Description: A
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 23 | 27.6 | 15 | 54.6 | 6 | 65 | 5 | 78 | 4 |
| 93.5 | 1 | 108.7 | 1 | 131.1 | 7 | 155 | 10 | 167.8 | 10 |
| 194.1 | 11 | 251.2 | 15 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .05 | 54.6 | .035 | 131.1 | .05 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 54.6 | 131.1 | 9 | 9 | .3 | .5 |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.25 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 11.26 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 41.58 | 602.52 | 102.89 |
| E.G. Slope (ft/ft) | 0.003074 | Area (sq ft) | 41.58 | 602.52 | 102.89 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 126.11 | 5558.21 | 225.68 |
| Top Width (ft) | 159.08 | Top Width (ft) | 15.79 | 76.50 | 66.78 |
| Vel Total (ft/s) | 7.91 | Avg. Vel. (ft/s) | 3.03 | 9.22 | 2.19 |
| Max Chl Dpth (ft) | 10.26 | Hydr. Depth (ft) | 2.63 | 7.88 | 1.54 |
| Conv. Total (cfs) | 106589.9 | Conv. (cfs) | 2274.5 | 100245.2 | 4070.2 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 16.65 | 77.66 | 67.00 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.48 | 1.49 | 0.29 |
| Alpha | 1.28 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.04 | 14.94 | 0.75 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.04 | 1.96 | 0.93 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.12 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.41 | Wt. n-Val. | 0.050 | 0.035 | |
| W.S. Elev (ft) | 6.70 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.74 | 253.75 | |
| E.G. Slope (ft/ft) | 0.002997 | Area (sq ft) | 0.74 | 253.75 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.58 | 1311.42 | |
| Top Width (ft) | 77.51 | Top Width (ft) | 2.11 | 75.39 | |
| Vel Total (ft/s) | 5.16 | Avg. Vel. (ft/s) | 0.78 | 5.17 | |
| Max Chl Dpth (ft) | 5.70 | Hydr. Depth (ft) | 0.35 | 3.37 | |
| Conv. Total (cfs) | 23967.0 | Conv. (cfs) | 10.6 | 23956.4 | |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 2.23 | 76.52 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 0.62 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 6.77 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.63 | 0.02 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.37 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.05 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 9.32 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 16.53 | 453.70 | 21.43 |
| E.G. Slope (ft/ft) | 0.003637 | Area (sq ft) | 16.53 | 453.70 | 21.43 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 40.09 | 3767.73 | 42.18 |
| Top Width (ft) | 104.94 | Top Width (ft) | 9.96 | 76.50 | 18.48 |
| Vel Total (ft/s) | 7.83 | Avg. Vel. (ft/s) | 2.43 | 8.30 | 1.97 |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 1.66 | 5.93 | 1.16 |
| Conv. Total (cfs) | 63842.0 | Conv. (cfs) | 664.9 | 62477.7 | 699.4 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 10.50 | 77.66 | 18.62 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.36 | 1.33 | 0.26 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 10.93 | 0.04 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 1.86 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.71 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.09 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 9.62 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 19.70 | 476.99 | 27.43 |
| E.G. Slope (ft/ft) | 0.003539 | Area (sq ft) | 19.70 | 476.99 | 27.43 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 49.98 | 4040.21 | 57.81 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 108.28 | Top Width (ft) | 10.87 | 76.50 | 20.90 |
| Vel Total (ft/s) | 7.91 | Avg. Vel. (ft/s) | 2.54 | 8.47 | 2.11 |
| Max Chl Dpth (ft) | 8.62 | Hydr. Depth (ft) | 1.81 | 6.24 | 1.31 |
| Conv. Total (cfs) | 69725.7 | Conv. (cfs) | 840.1 | 67913.8 | 971.8 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 11.46 | 77.66 | 21.07 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.38 | 1.36 | 0.29 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 11.53 | 0.04 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 1.89 | 0.03 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.23 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 10.68 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 32.89 | 557.96 | 67.02 |
| E.G. Slope (ft/ft) | 0.003296 | Area (sq ft) | 32.89 | 557.96 | 67.02 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 95.53 | 5063.76 | 130.71 |
| Top Width (ft) | 145.20 | Top Width (ft) | 14.05 | 76.50 | 54.65 |
| Vel Total (ft/s) | 8.04 | Avg. Vel. (ft/s) | 2.90 | 9.08 | 1.95 |
| Max Chl Dpth (ft) | 9.68 | Hydr. Depth (ft) | 2.34 | 7.29 | 1.23 |
| Conv. Total (cfs) | 92137.7 | Conv. (cfs) | 1663.9 | 88197.3 | 2276.6 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 14.81 | 77.66 | 54.85 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.46 | 1.48 | 0.25 |
| Alpha | 1.22 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.02 | 13.79 | 0.27 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.02 | 1.95 | 0.41 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.86 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.21 | Wt. n-Val. | 0.050 | 0.035 | 0.050 |
| W.S. Elev (ft) | 12.65 | Reach Len. (ft) | 9.00 | 9.00 | 9.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 66.36 | 708.58 | 203.58 |
| E.G. Slope (ft/ft) | 0.002508 | Area (sq ft) | 66.36 | 708.58 | 203.58 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 212.46 | 6578.08 | 589.46 |
| Top Width (ft) | 170.35 | Top Width (ft) | 19.95 | 76.50 | 73.90 |
| Vel Total (ft/s) | 7.54 | Avg. Vel. (ft/s) | 3.20 | 9.28 | 2.90 |
| Max Chl Dpth (ft) | 11.65 | Hydr. Depth (ft) | 3.33 | 9.26 | 2.75 |
| Conv. Total (cfs) | 147364.2 | Conv. (cfs) | 4242.5 | 131351.3 | 11770.4 |
| Length Wtd. (ft) | 9.00 | Wetted Per. (ft) | 21.03 | 77.66 | 75.02 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.49 | 1.43 | 0.42 |
| Alpha | 1.37 | Stream Power (lb/ft s) | 251.20 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.13 | 17.86 | 3.10 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.08 | 1.98 | 1.81 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 821

INPUT
Description: AD
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 16.5 | 22 | 12.5 | 27 | 10.25 | 32 | 8 | 42 | 6.5 |
| 52 | 6 | 62 | 4.5 | 72 | 3.5 | 82 | 1.5 | 92 | 1 |
| 102 | 1 | 112 | 4 | 122 | 7 | 132 | 9 | 154 | 10 |
| 203 | 11.5 | 235 | 12 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 12 | .065 | 32 | .035 | 132 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 32 | 132 | 1 | 1 | .1 | .3 |

Blocked Obstructions num= 1

| Sta L | Sta R | Elev |
|---|---|---|
| 205 | 235 | 25 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.39 | Element | | | |
| Vel Head (ft) | 1.05 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.34 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 12.37 | 698.68 | 69.60 |
| E.G. Slope (ft/ft) | 0.002923 | Area (sq ft) | 12.37 | 698.68 | 69.60 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 20.23 | 5800.40 | 89.38 |
| Top Width (ft) | 173.08 | Top Width (ft) | 7.42 | 100.00 | 65.67 |
| Vel Total (ft/s) | 7.57 | Avg. Vel. (ft/s) | 1.63 | 8.30 | 1.28 |
| Max Chl Dpth (ft) | 10.34 | Hydr. Depth (ft) | 1.67 | 6.99 | 1.06 |
| Conv. Total (cfs) | 109310.4 | Conv. (cfs) | 374.1 | 107283.2 | 1653.1 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 8.13 | 101.58 | 65.71 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.28 | 1.26 | 0.19 |
| Alpha | 1.18 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.03 | 14.80 | 0.73 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.03 | 1.94 | 0.92 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.09 | Element | | | |
| Vel Head (ft) | 0.42 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.67 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | | 250.98 | |
| E.G. Slope (ft/ft) | 0.003368 | Area (sq ft) | | 250.98 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 79.98 | Top Width (ft) | | 79.98 | |
| Vel Total (ft/s) | 5.23 | Avg. Vel. (ft/s) | | 5.23 | |
| Max Chl Dpth (ft) | 5.67 | Hydr. Depth (ft) | | 3.14 | |
| Conv. Total (cfs) | 22607.3 | Conv. (cfs) | | 22607.3 | |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | | 81.21 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.65 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 6.72 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.61 | 0.02 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 9.35 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.03 | 500.13 | 1.36 |
| E.G. Slope (ft/ft) | 0.003920 | Area (sq ft) | 2.03 | 500.13 | 1.36 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 2.10 | 3847.29 | 0.61 |
| Top Width (ft) | 110.73 | Top Width (ft) | 3.00 | 100.00 | 7.73 |
| Vel Total (ft/s) | 7.65 | Avg. Vel. (ft/s) | 1.04 | 7.69 | 0.45 |
| Max Chl Dpth (ft) | 8.35 | Hydr. Depth (ft) | 0.68 | 5.00 | 0.18 |
| Conv. Total (cfs) | 61495.0 | Conv. (cfs) | 33.6 | 61451.7 | 9.7 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 3.29 | 101.58 | 7.74 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.15 | 1.20 | 0.04 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 10.83 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.84 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.61 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.94 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 9.66 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 3.08 | 531.43 | 4.85 |
| E.G. Slope (ft/ft) | 0.003709 | Area (sq ft) | 3.08 | 531.43 | 4.85 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 3.57 | 4141.20 | 3.24 |
| Top Width (ft) | 118.31 | Top Width (ft) | 3.70 | 100.00 | 14.62 |
| Vel Total (ft/s) | 7.69 | Avg. Vel. (ft/s) | 1.16 | 7.79 | 0.67 |
| Max Chl Dpth (ft) | 8.66 | Hydr. Depth (ft) | 0.83 | 5.31 | 0.33 |
| Conv. Total (cfs) | 68107.5 | Conv. (cfs) | 58.5 | 67995.8 | 53.2 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 4.06 | 101.58 | 14.63 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.18 | 1.21 | 0.08 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 11.42 | 0.04 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.87 | 0.03 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.78 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 10.75 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 8.42 | 640.31 | 36.83 |
| E.G. Slope (ft/ft) | 0.003187 | Area (sq ft) | 8.42 | 640.31 | 36.83 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 12.65 | 5236.74 | 40.61 |
| Top Width (ft) | 152.72 | Top Width (ft) | 6.12 | 100.00 | 46.60 |
| Vel Total (ft/s) | 7.72 | Avg. Vel. (ft/s) | 1.50 | 8.18 | 1.10 |
| Max Chl Dpth (ft) | 9.75 | Hydr. Depth (ft) | 1.38 | 6.40 | 0.79 |
| Conv. Total (cfs) | 93710.0 | Conv. (cfs) | 224.0 | 92766.5 | 719.5 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 6.71 | 101.58 | 46.64 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.25 | 1.25 | 0.16 |
| Alpha | 1.11 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.01 | 13.66 | 0.25 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.02 | 1.93 | 0.40 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.04 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 12.71 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 24.70 | 836.41 | 169.35 |
| E.G. Slope (ft/ft) | 0.002344 | Area (sq ft) | 24.70 | 836.41 | 169.35 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 45.39 | 7009.82 | 324.79 |
| Top Width (ft) | 183.54 | Top Width (ft) | 10.54 | 100.00 | 73.00 |
| Vel Total (ft/s) | 7.16 | Avg. Vel. (ft/s) | 1.84 | 8.38 | 1.92 |
| Max Chl Dpth (ft) | 11.71 | Hydr. Depth (ft) | 2.34 | 8.36 | 2.32 |
| Conv. Total (cfs) | 152445.9 | Conv. (cfs) | 937.6 | 144799.3 | 6709.1 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 11.54 | 101.58 | 74.23 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.31 | 1.20 | 0.33 |
| Alpha | 1.30 | Stream Power (lb/ft s) | 235.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 0.12 | 17.70 | 3.06 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.08 | 1.96 | 1.80 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 820

INPUT
Description: ADD

Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 16.5 | 10 | 12.5 | 15 | 10.25 | 20 | 8 | 30 | 6.5 |
| 40 | 6 | 50 | 4.5 | 60 | 3.5 | 70 | 1.5 | 80 | 1 |
| 90 | 1 | 100 | 4 | 110 | 7 | 119.4 | 9 | 119.5 | 9 |
| 142.2 | 10 | 142.3 | 10 | 150 | 10 | 160 | 10 | 170 | 11 |
| 180 | 11 | 185.5 | 11.5 | 185.6 | 11.5 | 290 | 12 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 15 | .035 | 142.3 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15 | 142.3 | 95 | 95 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.34 | Element | | | |
| Vel Head (ft) | 0.91 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 11.43 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.55 | 761.88 | 40.00 |
| E.G. Slope (ft/ft) | 0.003087 | Area (sq ft) | 1.55 | 761.88 | 40.00 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.30 | 5859.92 | 48.78 |
| Top Width (ft) | 172.37 | Top Width (ft) | 2.63 | 127.30 | 42.45 |
| Vel Total (ft/s) | 7.36 | Avg. Vel. (ft/s) | 0.84 | 7.69 | 1.22 |
| Max Chl Dpth (ft) | 10.43 | Hydr. Depth (ft) | 0.59 | 5.98 | 0.94 |
| Conv. Total (cfs) | 106370.9 | Conv. (cfs) | 23.5 | 105469.6 | 877.9 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 2.88 | 129.39 | 42.52 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.10 | 1.13 | 0.18 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.03 | 14.79 | 0.73 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.03 | 1.94 | 0.92 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.09 | Element | | | |
| Vel Head (ft) | 0.43 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 6.66 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 250.60 | |
| E.G. Slope (ft/ft) | 0.003382 | Area (sq ft) | | 250.60 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 79.94 | Top Width (ft) | | 79.94 | |
| Vel Total (ft/s) | 5.24 | Avg. Vel. (ft/s) | | 5.24 | |
| Max Chl Dpth (ft) | 5.66 | Hydr. Depth (ft) | | 3.13 | |
| Conv. Total (cfs) | 22558.8 | Conv. (cfs) | | 22558.8 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 81.16 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 0.65 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.01 | 6.71 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.61 | 0.02 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.26 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.91 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.35 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 502.77 | |
| E.G. Slope (ft/ft) | 0.004412 | Area (sq ft) | | 502.77 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 110.47 | Top Width (ft) | | 110.47 | |
| Vel Total (ft/s) | 7.66 | Avg. Vel. (ft/s) | | 7.66 | |
| Max Chl Dpth (ft) | 8.35 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 57961.2 | Conv. (cfs) | | 57961.2 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 112.36 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.23 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.49 | Cum Volume (acre-ft) | 0.01 | 10.82 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.84 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.59 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | | 0.035 | |
| W.S. Elev (ft) | 9.68 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 539.98 | |
| E.G. Slope (ft/ft) | 0.004433 | Area (sq ft) | | 539.98 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 118.57 | Top Width (ft) | | 118.57 | |
| Vel Total (ft/s) | 7.68 | Avg. Vel. (ft/s) | | 7.68 | |
| Max Chl Dpth (ft) | 8.68 | Hydr. Depth (ft) | | 4.55 | |
| Conv. Total (cfs) | 62299.7 | Conv. (cfs) | | 62299.7 | |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | | 120.53 | |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | | 1.24 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.48 | Cum Volume (acre-ft) | 0.01 | 11.41 | 0.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 1.87 | 0.03 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.74 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.92 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |

| | | | | | |
|---|---|---|---|---|---|
| W.S. Elev (ft) | 10.83 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.37 | 685.12 | 18.10 |
| E.G. Slope (ft/ft) | 0.003558 | Area (sq ft) | 0.37 | 685.12 | 18.10 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.21 | 5270.42 | 19.37 |
| Top Width (ft) | 154.57 | Top Width (ft) | 1.29 | 127.30 | 25.99 |
| Vel Total (ft/s) | 7.52 | Avg. Vel. (ft/s) | 0.56 | 7.69 | 1.07 |
| Max Chl Dpth (ft) | 9.83 | Hydr. Depth (ft) | 0.29 | 5.38 | 0.70 |
| Conv. Total (cfs) | 88690.2 | Conv. (cfs) | 3.5 | 88361.8 | 324.8 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 1.41 | 129.39 | 26.03 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.06 | 1.18 | 0.15 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.01 | 13.65 | 0.25 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.02 | 1.93 | 0.40 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.69 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | 0.065 | 0.035 | 0.065 |
| W.S. Elev (ft) | 12.85 | Reach Len. (ft) | 95.00 | 95.00 | 95.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 7.54 | 942.66 | 216.48 |
| E.G. Slope (ft/ft) | 0.002211 | Area (sq ft) | 7.54 | 942.66 | 216.48 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 9.01 | 7071.98 | 299.01 |
| Top Width (ft) | 280.88 | Top Width (ft) | 5.88 | 127.30 | 147.70 |
| Vel Total (ft/s) | 6.33 | Avg. Vel. (ft/s) | 1.20 | 7.50 | 1.38 |
| Max Chl Dpth (ft) | 11.85 | Hydr. Depth (ft) | 1.28 | 7.41 | 1.47 |
| Conv. Total (cfs) | 156949.4 | Conv. (cfs) | 191.6 | 150398.7 | 6359.1 |
| Length Wtd. (ft) | 95.00 | Wetted Per. (ft) | 6.43 | 129.39 | 148.63 |
| Min Ch El (ft) | 1.00 | Shear (lb/sq ft) | 0.16 | 1.01 | 0.20 |
| Alpha | 1.35 | Stream Power (lb/ft s) | 290.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.12 | 17.68 | 3.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.08 | 1.95 | 1.79 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 725

INPUT
Description: 10
10
Station Elevation Data  num=  22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 14 | 20 | 10 | 30 | 4 | 60 | 4 |
| 70 | 2.8 | 80 | 2.5 | 90 | 2.5 | 100 | 3 | 110 | 4.5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 120 | 7.5 | 126 | 9 | 154 | 10 | 192 | 11 | 235 | 12 |
| 260 | 13 | 263 | 14 | 266 | 15 | 270 | 16 | 272 | 17 |
| 281 | 19 | 286 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 20 | .04 | 126 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 20 | 126 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.00 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.98 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.20 | 714.06 | 59.80 |
| E.G. Slope (ft/ft) | 0.003914 | Area (sq ft) | 1.20 | 714.06 | 59.80 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 1.02 | 5828.36 | 80.62 |
| Top Width (ft) | 173.76 | Top Width (ft) | 2.45 | 106.00 | 65.31 |
| Vel Total (ft/s) | 7.63 | Avg. Vel. (ft/s) | 0.85 | 8.16 | 1.35 |
| Max Chl Dpth (ft) | 8.48 | Hydr. Depth (ft) | 0.49 | 6.74 | 0.92 |
| Conv. Total (cfs) | 94467.6 | Conv. (cfs) | 16.3 | 93162.6 | 1288.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 2.64 | 108.49 | 65.34 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.11 | 1.61 | 0.22 |
| Alpha | 1.13 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.03 | 13.18 | 0.62 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.03 | 1.68 | 0.80 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.62 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.09 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 224.72 | |
| E.G. Slope (ft/ft) | 0.007271 | Area (sq ft) | | 224.72 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 88.79 | Top Width (ft) | | 88.79 | |
| Vel Total (ft/s) | 5.84 | Avg. Vel. (ft/s) | | 5.84 | |
| Max Chl Dpth (ft) | 3.59 | Hydr. Depth (ft) | | 2.53 | |
| Conv. Total (cfs) | 15386.6 | Conv. (cfs) | | 15386.6 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 89.81 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.14 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 1.16 | Cum Volume (acre-ft) | 0.01 | 6.19 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 1.43 | 0.02 |

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.
This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.76 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.00 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.76 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 480.41 | |
| E.G. Slope (ft/ft) | 0.006136 | Area (sq ft) | | 480.41 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 103.00 | Top Width (ft) | | 103.00 | |
| Vel Total (ft/s) | 8.01 | Avg. Vel. (ft/s) | | 8.01 | |
| Max Chl Dpth (ft) | 6.26 | Hydr. Depth (ft) | | 4.66 | |
| Conv. Total (cfs) | 49149.6 | Conv. (cfs) | | 49149.6 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 105.11 | |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.75 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.69 | Cum Volume (acre-ft) | 0.01 | 9.75 | 0.03 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.61 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.10 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.01 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.10 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 514.96 | 0.13 |
| E.G. Slope (ft/ft) | 0.005767 | Area (sq ft) | | 514.96 | 0.13 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4147.97 | 0.03 |
| Top Width (ft) | 107.21 | Top Width (ft) | | 104.50 | 2.72 |
| Vel Total (ft/s) | 8.05 | Avg. Vel. (ft/s) | | 8.05 | 0.23 |
| Max Chl Dpth (ft) | 6.60 | Hydr. Depth (ft) | | 4.93 | 0.05 |
| Conv. Total (cfs) | 54621.3 | Conv. (cfs) | | 54620.9 | 0.4 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 106.73 | 2.72 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | | 1.74 | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.64 | Cum Volume (acre-ft) | 0.01 | 10.26 | 0.04 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 0.00 | 1.63 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.32 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.13 | 644.27 | 25.04 |
| E.G. Slope (ft/ft) | 0.004495 | Area (sq ft) | 0.13 | 644.27 | 25.04 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.06 | 5262.01 | 27.94 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 147.09 | Top Width (ft) | 0.81 | 106.00 | 40.28 |
| Vel Total (ft/s) | 7.90 | Avg. Vel. (ft/s) | 0.43 | 8.17 | 1.12 |
| Max Chl Dpth (ft) | 7.82 | Hydr. Depth (ft) | 0.16 | 6.08 | 0.62 |
| Conv. Total (cfs) | 78903.6 | Conv. (cfs) | 0.8 | 78486.0 | 416.7 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.87 | 108.49 | 40.31 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.04 | 1.67 | 0.17 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.49 | Cum Volume (acre-ft) | 0.01 | 12.20 | 0.21 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.02 | 1.67 | 0.33 |

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.44 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.95 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.49 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 7.72 | 873.50 | 204.41 |
| E.G. Slope (ft/ft) | 0.002895 | Area (sq ft) | 7.72 | 873.50 | 204.41 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 10.45 | 7013.32 | 356.23 |
| Top Width (ft) | 233.36 | Top Width (ft) | 6.21 | 106.00 | 121.15 |
| Vel Total (ft/s) | 6.80 | Avg. Vel. (ft/s) | 1.35 | 8.03 | 1.74 |
| Max Chl Dpth (ft) | 9.99 | Hydr. Depth (ft) | 1.24 | 8.24 | 1.69 |
| Conv. Total (cfs) | 137168.8 | Conv. (cfs) | 194.3 | 130353.5 | 6621.0 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 6.69 | 108.49 | 121.20 |
| Min Ch El (ft) | 2.50 | Shear (lb/sq ft) | 0.21 | 1.46 | 0.30 |
| Alpha | 1.33 | Stream Power (lb/ft s) | 286.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.10 | 15.70 | 2.60 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.06 | 1.70 | 1.50 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1  RS: 575

INPUT
Description: 9
Station Elevation Data  num=  18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 13.5 | 17 | 8.25 | 20 | 6 | 30 | 1.5 |
| 40 | 1.5 | 50 | 1.5 | 60 | 2.25 | 70 | 2.8 | 80 | 3.1 |
| 110 | 3.1 | 120 | 4 | 130 | 7 | 140 | 9 | 172 | 10 |
| 230 | 11 | 280 | 12 | 280.1 | 16 | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 17 | .04 | 140 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 17 | 140 | 150 | 150 | 150 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.82 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.39 | 904.54 | 61.45 |
| E.G. Slope (ft/ft) | 0.002176 | Area (sq ft) | 4.39 | 904.54 | 61.45 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 4.76 | 5849.98 | 55.25 |
| Top Width (ft) | 205.77 | Top Width (ft) | 3.42 | 123.00 | 79.35 |
| Vel Total (ft/s) | 6.09 | Avg. Vel. (ft/s) | 1.09 | 6.47 | 0.90 |
| Max Chl Dpth (ft) | 9.32 | Hydr. Depth (ft) | 1.28 | 7.35 | 0.77 |
| Conv. Total (cfs) | 126703.0 | Conv. (cfs) | 102.1 | 125416.3 | 1184.5 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 4.28 | 125.44 | 79.37 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.14 | 0.98 | 0.11 |
| Alpha | 1.12 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.02 | 10.39 | 0.41 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.02 | 1.29 | 0.55 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.52 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.94 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 227.22 | |
| E.G. Slope (ft/ft) | 0.008276 | Area (sq ft) | | 227.22 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 100.78 | Top Width (ft) | | 100.78 | |
| Vel Total (ft/s) | 5.77 | Avg. Vel. (ft/s) | | 5.77 | |
| Max Chl Dpth (ft) | 3.44 | Hydr. Depth (ft) | | 2.25 | |
| Conv. Total (cfs) | 14421.7 | Conv. (cfs) | | 14421.7 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | | 101.74 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.15 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.58 | Cum Volume (acre-ft) | 0.01 | 5.41 | 0.03 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 1.10 | 0.02 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.000 | 0.040 | |
| W.S. Elev (ft) | 8.32 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.00 | 598.69 | |
| E.G. Slope (ft/ft) | 0.003593 | Area (sq ft) | 0.00 | 598.69 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.00 | 3850.00 | |
| Top Width (ft) | 119.70 | Top Width (ft) | 0.09 | 119.60 | |
| Vel Total (ft/s) | 6.43 | Avg. Vel. (ft/s) | 0.13 | 6.43 | |
| Max Chl Dpth (ft) | 6.82 | Hydr. Depth (ft) | 0.04 | 5.01 | |
| Conv. Total (cfs) | 64232.8 | Conv. (cfs) | 0.0 | 64232.8 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.12 | 121.98 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | | 1.10 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.01 | 7.89 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.22 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 8.71 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.14 | 645.64 | |
| E.G. Slope (ft/ft) | 0.003313 | Area (sq ft) | 0.14 | 645.64 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.06 | 4147.94 | |
| Top Width (ft) | 122.16 | Top Width (ft) | 0.61 | 121.55 | |
| Vel Total (ft/s) | 6.42 | Avg. Vel. (ft/s) | 0.43 | 6.42 | |
| Max Chl Dpth (ft) | 7.21 | Hydr. Depth (ft) | 0.23 | 5.31 | |
| Conv. Total (cfs) | 72066.6 | Conv. (cfs) | 1.0 | 72065.5 | |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 0.77 | 123.96 | |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.04 | 1.08 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 8.26 | 0.04 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 1.24 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.65 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.10 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.28 | 816.53 | 19.52 |
| E.G. Slope (ft/ft) | 0.002487 | Area (sq ft) | 2.28 | 816.53 | 19.52 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 2.13 | 5273.56 | 14.31 |
| Top Width (ft) | 163.32 | Top Width (ft) | 2.47 | 123.00 | 37.85 |
| Vel Total (ft/s) | 6.31 | Avg. Vel. (ft/s) | 0.93 | 6.46 | 0.73 |
| Max Chl Dpth (ft) | 8.60 | Hydr. Depth (ft) | 0.93 | 6.64 | 0.52 |
| Conv. Total (cfs) | 106074.6 | Conv. (cfs) | 42.7 | 105745.0 | 286.9 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 3.08 | 125.44 | 37.87 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.11 | 1.01 | 0.08 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | 0.01 | 9.68 | 0.13 |

| | | | | |
|---|---|---|---|---|
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.01 | 1.28 | 0.19 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 13.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.41 | Reach Len. (ft) | 150.00 | 150.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 11.53 | 1100.49 | 249.33 |
| E.G. Slope (ft/ft) | 0.001633 | Area (sq ft) | 11.53 | 1100.49 | 249.33 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 14.96 | 7027.33 | 337.70 |
| Top Width (ft) | 268.56 | Top Width (ft) | 5.55 | 123.00 | 140.01 |
| Vel Total (ft/s) | 5.42 | Avg. Vel. (ft/s) | 1.30 | 6.39 | 1.35 |
| Max Chl Dpth (ft) | 10.91 | Hydr. Depth (ft) | 2.08 | 8.95 | 1.78 |
| Conv. Total (cfs) | 182619.6 | Conv. (cfs) | 370.2 | 173892.8 | 8356.6 |
| Length Wtd. (ft) | 150.00 | Wetted Per. (ft) | 6.93 | 125.44 | 140.44 |
| Min Ch El (ft) | 1.50 | Shear (lb/sq ft) | 0.17 | 0.89 | 0.18 |
| Alpha | 1.32 | Stream Power (lb/ft s) | 280.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.23 | Cum Volume (acre-ft) | 0.07 | 12.30 | 1.82 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.04 | 1.31 | 1.05 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 425

INPUT
Description: 8
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 11 | 12 | 9.8 | 20 | 5 | 30 | 0 |
| 70 | 0 | 80 | .5 | 90 | 1.5 | 100 | 2 | 110 | 5.5 |
| 117.4 | 9 | 160 | 10 | 210 | 10 | 265 | 11 | 268 | 12 |
| 275 | 13 | 280 | 14 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 12 | .04 | 117.4 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 12 | 117.4 | 90 | 90 | 90 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.65 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.51 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |

| | | | | | |
|---|---|---|---|---|---|
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.42 | 902.74 | 76.06 |
| E.G. Slope (ft/ft) | 0.001827 | Area (sq ft) | 0.42 | 902.74 | 76.06 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.19 | 5855.22 | 54.59 |
| Top Width (ft) | 227.41 | Top Width (ft) | 1.19 | 105.40 | 120.82 |
| Vel Total (ft/s) | 6.04 | Avg. Vel. (ft/s) | 0.44 | 6.49 | 0.72 |
| Max Chl Dpth (ft) | 10.51 | Hydr. Depth (ft) | 0.36 | 8.56 | 0.63 |
| Conv. Total (cfs) | 138249.0 | Conv. (cfs) | 4.4 | 136967.6 | 1277.1 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 1.39 | 109.37 | 120.84 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.03 | 0.94 | 0.07 |
| Alpha | 1.14 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | 0.01 | 7.28 | 0.17 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.90 | 0.21 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.27 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.53 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 317.19 | |
| E.G. Slope (ft/ft) | 0.002240 | Area (sq ft) | | 317.19 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 86.31 | Top Width (ft) | | 86.31 | |
| Vel Total (ft/s) | 4.14 | Avg. Vel. (ft/s) | | 4.14 | |
| Max Chl Dpth (ft) | 4.53 | Hydr. Depth (ft) | | 3.67 | |
| Conv. Total (cfs) | 27723.5 | Conv. (cfs) | | 27723.5 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 87.89 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.50 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.18 | Cum Volume (acre-ft) | 0.01 | 4.48 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.78 | 0.02 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.57 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.94 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 635.59 | |
| E.G. Slope (ft/ft) | 0.002357 | Area (sq ft) | | 635.59 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 100.06 | Top Width (ft) | | 100.06 | |
| Vel Total (ft/s) | 6.06 | Avg. Vel. (ft/s) | | 6.06 | |
| Max Chl Dpth (ft) | 7.94 | Hydr. Depth (ft) | | 6.35 | |
| Conv. Total (cfs) | 79294.3 | Conv. (cfs) | | 79294.3 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 103.27 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.91 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.01 | 5.77 | 0.03 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.85 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.58 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.34 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 676.02 | |
| E.G. Slope (ft/ft) | 0.002277 | Area (sq ft) | | 676.02 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 101.58 | Top Width (ft) | | 101.58 | |
| Vel Total (ft/s) | 6.14 | Avg. Vel. (ft/s) | | 6.14 | |
| Max Chl Dpth (ft) | 8.34 | Hydr. Depth (ft) | | 6.66 | |
| Conv. Total (cfs) | 86918.0 | Conv. (cfs) | | 86918.0 | |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 104.99 | |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.92 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.01 | 5.99 | 0.04 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.00 | 0.86 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.41 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.64 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.77 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 824.66 | 12.71 |
| E.G. Slope (ft/ft) | 0.002010 | Area (sq ft) | | 824.66 | 12.71 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5283.10 | 6.90 |
| Top Width (ft) | 138.26 | Top Width (ft) | | 105.35 | 32.90 |
| Vel Total (ft/s) | 6.32 | Avg. Vel. (ft/s) | | 6.41 | 0.54 |
| Max Chl Dpth (ft) | 9.77 | Hydr. Depth (ft) | | 7.83 | 0.39 |
| Conv. Total (cfs) | 117990.1 | Conv. (cfs) | | 117836.1 | 154.0 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | | 109.31 | 32.91 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | | 0.95 | 0.05 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 0.01 | 6.86 | 0.07 |
| C & E Loss (ft) | 0.03 | Cum SA (acres) | 0.01 | 0.89 | 0.07 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.60 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 12.18 | Reach Len. (ft) | 90.00 | 90.00 | 90.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 4.56 | 1078.68 | 318.10 |
| E.G. Slope (ft/ft) | 0.001414 | Area (sq ft) | 4.56 | 1078.68 | 318.10 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 4.02 | 6928.81 | 447.16 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 260.97 | Top Width (ft) | 3.69 | 105.40 | 151.88 |
| Vel Total (ft/s) | 5.27 | Avg. Vel. (ft/s) | 0.88 | 6.42 | 1.41 |
| Max Chl Dpth (ft) | 12.18 | Hydr. Depth (ft) | 1.24 | 10.23 | 2.09 |
| Conv. Total (cfs) | 196291.8 | Conv. (cfs) | 107.0 | 184291.2 | 11893.6 |
| Length Wtd. (ft) | 90.00 | Wetted Per. (ft) | 4.39 | 109.37 | 152.07 |
| Min Ch El (ft) | 0.00 | Shear (lb/sq ft) | 0.09 | 0.87 | 0.18 |
| Alpha | 1.40 | Stream Power (lb/ft s) | 280.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.04 | 8.55 | 0.84 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.03 | 0.91 | 0.55 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 335

INPUT
Description: 7
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 12.5 | 18 | 8.1 | 20 | 7 | 30 | 1.5 |
| 40 | -.5 | 50 | -2 | 60 | -2 | 70 | -2 | 80 | 0 |
| 90 | 4 | 100 | 9 | 135 | 10 | 175 | 10 | 205 | 11 |
| 260 | 11 | 260.1 | 16 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 18 | .04 | 100 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 18 | 100 | 73 | 73 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.90 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 2.96 | 726.97 | 14.28 |
| E.G. Slope (ft/ft) | 0.002776 | Area (sq ft) | 2.96 | 726.97 | 14.28 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 3.04 | 5896.84 | 10.12 |
| Top Width (ft) | 116.89 | Top Width (ft) | 3.28 | 82.00 | 31.61 |
| Vel Total (ft/s) | 7.94 | Avg. Vel. (ft/s) | 1.03 | 8.11 | 0.71 |
| Max Chl Dpth (ft) | 11.90 | Hydr. Depth (ft) | 0.90 | 8.87 | 0.45 |
| Conv. Total (cfs) | 112178.6 | Conv. (cfs) | 57.8 | 111928.8 | 192.1 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 3.74 | 86.15 | 31.63 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.14 | 1.46 | 0.08 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.28 | Cum Volume (acre-ft) | 0.01 | 5.59 | 0.08 |

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.01 | 0.70 | 0.05 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.62 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.29 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.33 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 304.64 | |
| E.G. Slope (ft/ft) | 0.001816 | Area (sq ft) | | 304.64 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 65.80 | Top Width (ft) | | 65.80 | |
| Vel Total (ft/s) | 4.31 | Avg. Vel. (ft/s) | | 4.31 | |
| Max Chl Dpth (ft) | 6.33 | Hydr. Depth (ft) | | 4.63 | |
| Conv. Total (cfs) | 30789.6 | Conv. (cfs) | | 30789.6 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 67.89 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 0.51 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 3.83 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.62 | 0.02 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.24 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.84 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.40 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 524.70 | |
| E.G. Slope (ft/ft) | 0.003238 | Area (sq ft) | | 524.70 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 77.53 | Top Width (ft) | | 77.53 | |
| Vel Total (ft/s) | 7.34 | Avg. Vel. (ft/s) | | 7.34 | |
| Max Chl Dpth (ft) | 9.40 | Hydr. Depth (ft) | | 6.77 | |
| Conv. Total (cfs) | 67662.9 | Conv. (cfs) | | 67662.9 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 81.12 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.31 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.01 | 4.57 | 0.03 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.66 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.66 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.79 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 555.18 | |
| E.G. Slope (ft/ft) | 0.003200 | Area (sq ft) | | 555.18 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 79.01 | Top Width (ft) | | 79.01 | |
| Vel Total (ft/s) | 7.47 | Avg. Vel. (ft/s) | | 7.47 | |
| Max Chl Dpth (ft) | 9.79 | Hydr. Depth (ft) | | 7.03 | |
| Conv. Total (cfs) | 73332.1 | Conv. (cfs) | | 73332.1 | |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | | 82.80 | |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | | 1.34 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.01 | 4.71 | 0.04 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.67 | 0.02 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.16 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.97 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.18 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.07 | 667.92 | 0.59 |
| E.G. Slope (ft/ft) | 0.002961 | Area (sq ft) | 1.07 | 667.92 | 0.59 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.81 | 5289.04 | 0.15 |
| Top Width (ft) | 90.38 | Top Width (ft) | 1.97 | 82.00 | 6.41 |
| Vel Total (ft/s) | 7.90 | Avg. Vel. (ft/s) | 0.76 | 7.92 | 0.25 |
| Max Chl Dpth (ft) | 11.18 | Hydr. Depth (ft) | 0.54 | 8.15 | 0.09 |
| Conv. Total (cfs) | 97208.9 | Conv. (cfs) | 14.8 | 97191.4 | 2.7 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 2.25 | 86.15 | 6.41 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.09 | 1.43 | 0.02 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.01 | 5.32 | 0.06 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 0.00 | 0.69 | 0.03 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.59 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.02 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 11.57 | Reach Len. (ft) | 73.00 | 73.00 | 73.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.93 | 863.45 | 198.34 |
| E.G. Slope (ft/ft) | 0.002277 | Area (sq ft) | 10.93 | 863.45 | 198.34 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 15.76 | 7115.18 | 249.06 |
| Top Width (ft) | 248.32 | Top Width (ft) | 6.30 | 82.00 | 160.01 |
| Vel Total (ft/s) | 6.88 | Avg. Vel. (ft/s) | 1.44 | 8.24 | 1.26 |
| Max Chl Dpth (ft) | 13.57 | Hydr. Depth (ft) | 1.73 | 10.53 | 1.24 |
| Conv. Total (cfs) | 154651.5 | Conv. (cfs) | 330.3 | 149102.0 | 5219.2 |
| Length Wtd. (ft) | 73.00 | Wetted Per. (ft) | 7.20 | 86.15 | 160.60 |
| Min Ch El (ft) | -2.00 | Shear (lb/sq ft) | 0.22 | 1.42 | 0.18 |
| Alpha | 1.38 | Stream Power (lb/ft s) | 260.10 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.24 | Cum Volume (acre-ft) | 0.02 | 6.54 | 0.31 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.02 | 0.72 | 0.23 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 262

INPUT
Description: 6
6
6
Station Elevation Data num= 14

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 7 | 9.1 | 10 | 7 | 20 | 1 | 30 | -2 |
| 40 | -3 | 50 | -3 | 60 | 0 | 70 | 5 | 80 | 9.5 |
| 135 | 11 | 175 | 12 | 255 | 13 | 282 | 14 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 7 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 7 | 80 | 75 | 75 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.57 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.74 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.83 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 558.57 | |
| E.G. Slope (ft/ft) | 0.005707 | Area (sq ft) | | 558.57 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 71.13 | Top Width (ft) | | 71.13 | |
| Vel Total (ft/s) | 10.58 | Avg. Vel. (ft/s) | | 10.58 | |
| Max Chl Dpth (ft) | 11.83 | Hydr. Depth (ft) | | 7.85 | |
| Conv. Total (cfs) | 78231.2 | Conv. (cfs) | | 78231.2 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 76.30 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.61 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.41 | Cum Volume (acre-ft) | 0.01 | 4.52 | 0.07 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.57 | 0.02 |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.46 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.39 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.07 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 262.15 | |
| E.G. Slope (ft/ft) | 0.002317 | Area (sq ft) | | 262.15 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.25 | Top Width (ft) | | 53.25 | |
| Vel Total (ft/s) | 5.00 | Avg. Vel. (ft/s) | | 5.00 | |
| Max Chl Dpth (ft) | 7.07 | Hydr. Depth (ft) | | 4.92 | |
| Conv. Total (cfs) | 27253.9 | Conv. (cfs) | | 27253.9 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 55.99 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 0.68 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.01 | 3.36 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.52 | 0.02 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.85 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.47 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.38 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 395.14 | |
| E.G. Slope (ft/ft) | 0.006318 | Area (sq ft) | | 395.14 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 62.03 | Top Width (ft) | | 62.03 | |
| Vel Total (ft/s) | 9.74 | Avg. Vel. (ft/s) | | 9.74 | |
| Max Chl Dpth (ft) | 9.38 | Hydr. Depth (ft) | | 6.37 | |
| Conv. Total (cfs) | 48434.8 | Conv. (cfs) | | 48434.8 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 65.92 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.36 | |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.01 | 3.80 | 0.03 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.54 | 0.02 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.53 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.74 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 417.99 | |
| E.G. Slope (ft/ft) | 0.006278 | Area (sq ft) | | 417.99 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 63.44 | Top Width (ft) | | 63.44 | |
| Vel Total (ft/s) | 9.92 | Avg. Vel. (ft/s) | | 9.92 | |
| Max Chl Dpth (ft) | 9.74 | Hydr. Depth (ft) | | 6.59 | |
| Conv. Total (cfs) | 52350.5 | Conv. (cfs) | | 52350.5 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 67.52 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.43 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.45 | Cum Volume (acre-ft) | 0.01 | 3.90 | 0.04 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.55 | 0.02 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.10 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 507.69 | |
| E.G. Slope (ft/ft) | 0.005954 | Area (sq ft) | | 507.69 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 68.47 | Top Width (ft) | | 68.47 | |
| Vel Total (ft/s) | 10.42 | Avg. Vel. (ft/s) | | 10.42 | |
| Max Chl Dpth (ft) | 11.10 | Hydr. Depth (ft) | | 7.41 | |
| Conv. Total (cfs) | 68556.3 | Conv. (cfs) | | 68556.3 | |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | | 73.25 | |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | | 2.58 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.43 | Cum Volume (acre-ft) | 0.00 | 4.33 | 0.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.57 | 0.02 |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 12.27 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.85 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.41 | Reach Len. (ft) | 75.00 | 75.00 | 75.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 1.23 | 673.56 | 15.31 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.004923 | Area (sq ft) | 1.23 | 673.56 | 15.31 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 1.31 | 7364.13 | 14.57 |
| Top Width (ft) | 108.39 | Top Width (ft) | 1.88 | 73.00 | 33.51 |
| Vel Total (ft/s) | 10.69 | Avg. Vel. (ft/s) | 1.06 | 10.93 | 0.95 |
| Max Chl Dpth (ft) | 13.41 | Hydr. Depth (ft) | 0.66 | 9.23 | 0.46 |
| Conv. Total (cfs) | 105185.4 | Conv. (cfs) | 18.7 | 104959.1 | 207.6 |
| Length Wtd. (ft) | 75.00 | Wetted Per. (ft) | 2.29 | 78.40 | 33.52 |
| Min Ch El (ft) | -3.00 | Shear (lb/sq ft) | 0.17 | 2.64 | 0.14 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 282.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.01 | 5.25 | 0.13 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 0.59 | 0.06 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 187

INPUT
Description: 5
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 8 | 9.2 | 10 | 8 | 20 | 1.5 | 30 | -2.5 |
| 40 | -4 | 50 | -4 | 60 | -1 | 70 | 4 | 80 | 9.5 |
| 115 | 13 | 141 | 13 | 185 | 14 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 80 | 50 | 50 | .1 | .3 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 84 | 185 | 14.5 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.14 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.70 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 8.44 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.94 | Flow Area (sq ft) | | 564.77 | |
| E.G. Slope (ft/ft) | 0.005330 | Area (sq ft) | | 564.77 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 68.82 | Top Width (ft) | | 68.82 | |
| Vel Total (ft/s) | 10.46 | Avg. Vel. (ft/s) | | 10.46 | |
| Max Chl Dpth (ft) | 12.44 | Hydr. Depth (ft) | | 8.21 | |
| Conv. Total (cfs) | 80952.3 | Conv. (cfs) | | 80952.3 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 74.52 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.52 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 3.55 | 0.07 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.45 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.29 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.32 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.97 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 0.60 | Flow Area (sq ft) | | 290.86 | |
| E.G. Slope (ft/ft) | 0.001678 | Area (sq ft) | | 290.86 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.75 | Top Width (ft) | | 53.75 | |
| Vel Total (ft/s) | 4.51 | Avg. Vel. (ft/s) | | 4.51 | |
| Max Chl Dpth (ft) | 7.97 | Hydr. Depth (ft) | | 5.41 | |
| Conv. Total (cfs) | 32032.8 | Conv. (cfs) | | 32032.8 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 56.98 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 0.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 2.88 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.43 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.38 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.40 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.98 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.99 | Flow Area (sq ft) | | 405.67 | |
| E.G. Slope (ft/ft) | 0.005662 | Area (sq ft) | | 405.67 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 60.50 | Top Width (ft) | | 60.50 | |
| Vel Total (ft/s) | 9.49 | Avg. Vel. (ft/s) | | 9.49 | |
| Max Chl Dpth (ft) | 9.98 | Hydr. Depth (ft) | | 6.71 | |
| Conv. Total (cfs) | 51166.1 | Conv. (cfs) | | 51166.1 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 64.84 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.21 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 3.11 | 0.03 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.44 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.46 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 6.34 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.29 | Flow Area (sq ft) | | 427.69 | |
| E.G. Slope (ft/ft) | 0.005671 | Area (sq ft) | | 427.69 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 61.71 | Top Width (ft) | | 61.71 | |
| Vel Total (ft/s) | 9.70 | Avg. Vel. (ft/s) | | 9.70 | |
| Max Chl Dpth (ft) | 10.34 | Hydr. Depth (ft) | | 6.93 | |
| Conv. Total (cfs) | 55082.9 | Conv. (cfs) | | 55082.9 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 66.25 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.29 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 3.17 | 0.04 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.44 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.35 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.64 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.71 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.39 | Flow Area (sq ft) | | 515.03 | |
| E.G. Slope (ft/ft) | 0.005505 | Area (sq ft) | | 515.03 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 66.29 | Top Width (ft) | | 66.29 | |
| Vel Total (ft/s) | 10.27 | Avg. Vel. (ft/s) | | 10.27 | |
| Max Chl Dpth (ft) | 11.71 | Hydr. Depth (ft) | | 7.77 | |
| Conv. Total (cfs) | 71301.0 | Conv. (cfs) | | 71301.0 | |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | | 71.59 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.47 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.00 | 3.45 | 0.06 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.00 | 0.45 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT  Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.90 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.83 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 10.07 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 7.13 | Flow Area (sq ft) | 0.63 | 680.26 | 1.48 |
| E.G. Slope (ft/ft) | 0.004763 | Area (sq ft) | 0.63 | 680.26 | 1.62 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.51 | 7378.29 | 1.19 |
| Top Width (ft) | 79.14 | Top Width (ft) | 1.45 | 72.00 | 5.69 |
| Vel Total (ft/s) | 10.82 | Avg. Vel. (ft/s) | 0.82 | 10.85 | 0.81 |
| Max Chl Dpth (ft) | 14.07 | Hydr. Depth (ft) | 0.43 | 9.45 | 0.37 |
| Conv. Total (cfs) | 106933.9 | Conv. (cfs) | 7.4 | 106909.2 | 17.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.69 | 78.17 | 4.02 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.11 | 2.59 | 0.11 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 185.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.01 | 4.09 | 0.11 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 0.01 | 0.46 | 0.03 |

Note:  Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1  RS: 166

INPUT
Description: Pedestrian Bridge
Distance from Upstream XS =  21
Deck/Roadway Width  =  14
Weir Coefficient  =  2.6
Upstream  Deck/Roadway Coordinates
num=  6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 16 | 0 | 6 | 16 | 0 |
| 6 | 16 | 14 | 81 | 14 | 12 |
| 81 | 14 | 0 | 115 | 13 | 0 |

Upstream Bridge Cross Section Data
Station Elevation Data  num=  13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 8 | 9.2 | 10 | 8 | 20 | 1.5 | 30 | -2.5 |
| 40 | -4 | 50 | -4 | 60 | -1 | 70 | 4 | 80 | 9.5 |
| 115 | 13 | 141 | 13 | 185 | 14 | | | | |

Manning's n Values  num=  3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 80 | .065 |

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
            8      80            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
      84     185    14.5       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      16       0       6      16       0       6      16      14
      81      14      12      81      14       0     115      13       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      14      10     8.3      20     2.5      30    -2.5      40    -3.7
      50      -4      60      -2      70       3      80       9      90      14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .065      10     .04      80    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
           10      80            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
      84      90    14.5       F

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         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
```

Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 10.14 | Element | | |
| W.S. US. (ft) | 8.44 | E.G. Elev (ft) | 10.02 | 9.93 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 8.22 | 8.15 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 5.94 | 5.85 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 12.22 | 12.15 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.75 | 10.71 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 549.69 | 551.62 |
| Weir Submerg | | Froude # Chl | 0.67 | 0.66 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4682.83 | 4678.50 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 8.08 | 8.07 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 73.63 | 73.91 |
| Delta EG (ft) | 0.31 | Conv. Total (cfs) | 78001.3 | 78262.5 |
| Delta WS (ft) | 0.47 | Top Width (ft) | 68.05 | 68.32 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.08 | 0.09 |
| BR Open Vel (ft/s) | 10.75 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.68 | 2.66 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 4.29 | Element | | |
| W.S. US. (ft) | 3.97 | E.G. Elev (ft) | 4.25 | 4.23 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 3.93 | 3.91 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.59 | 0.50 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.93 | 7.91 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.54 | 4.48 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 288.70 | 292.67 |
| Weir Submerg | | Froude # Chl | 0.35 | 0.34 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 1118.01 | 1128.37 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 5.39 | 5.42 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 56.82 | 57.23 |
| Delta EG (ft) | 0.09 | Conv. Total (cfs) | 31698.2 | 32270.4 |
| Delta WS (ft) | 0.09 | Top Width (ft) | 53.61 | 53.96 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.02 | 0.02 |
| BR Open Vel (ft/s) | 4.54 | C & E Loss (ft) | 0.00 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 0.54 | 0.53 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.38 | Element | | |
| W.S. US. (ft) | 5.98 | E.G. Elev (ft) | 7.25 | 7.15 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 5.74 | 5.65 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.98 | 3.90 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.74 | 9.65 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 9.84 | 9.83 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 391.14 | 391.68 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.68 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2722.69 | 2714.74 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 6.55 | 6.54 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 63.90 | 64.08 |
| Delta EG (ft) | 0.33 | Conv. Total (cfs) | 48622.6 | 48640.4 |
| Delta WS (ft) | 0.54 | Top Width (ft) | 59.69 | 59.86 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.09 | 0.10 |
| BR Open Vel (ft/s) | 9.84 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.40 | 2.39 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.80 | Element | | |
| W.S. US. (ft) | 6.34 | E.G. Elev (ft) | 7.67 | 7.58 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 6.10 | 6.01 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.29 | 4.20 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.10 | 10.01 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.05 | 10.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 412.74 | 413.37 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.68 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2984.41 | 2976.50 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 6.78 | 6.77 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 65.30 | 65.49 |
| Delta EG (ft) | 0.34 | Conv. Total (cfs) | 52415.6 | 52444.4 |
| Delta WS (ft) | 0.54 | Top Width (ft) | 60.89 | 61.08 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.09 | 0.10 |

| | | | | |
|---|---|---|---|---|
| BR Open Vel (ft/s) | 10.05 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.47 | 2.46 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 9.35 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 7.71 | E.G. Elev (ft) | 9.21 | 9.13 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 7.47 | 7.40 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.40 | 5.30 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.47 | 11.40 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 10.59 | 10.56 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 499.65 | 501.01 |
| Weir Submerg | | Froude # Chl | 0.68 | 0.67 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4055.74 | 4049.51 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 7.63 | 7.62 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 70.67 | 70.93 |
| Delta EG (ft) | 0.32 | Conv. Total (cfs) | 68369.7 | 68513.6 |
| Delta WS (ft) | 0.50 | Top Width (ft) | 65.51 | 65.77 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.08 | 0.09 |
| BR Open Vel (ft/s) | 10.59 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.64 | 2.63 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.90 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 10.07 | E.G. Elev (ft) | 11.78 | 11.71 |
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 9.88 | 9.82 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 7.13 | 7.04 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.88 | 13.82 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.05 | 11.01 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 667.59 | 670.26 |
| Weir Submerg | | Froude # Chl | 0.52 | 0.52 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6253.85 | 6260.42 |
| Min El Weir Flow (ft) | 13.92 | Hydr Depth (ft) | 9.00 | 9.10 |
| Min El Prs (ft) | 14.00 | W.P. Total (ft) | 80.51 | 80.04 |

| | | | | |
|---|---|---|---|---|
| Delta EG (ft) | 0.26 | Conv. Total (cfs) | 103433.0 | 105776.4 |
| Delta WS (ft) | 0.39 | Top Width (ft) | 74.14 | 73.66 |
| BR Open Area (sq ft) | 901.15 | Frctn Loss (ft) | 0.07 | 0.07 |
| BR Open Vel (ft/s) | 11.05 | C & E Loss (ft) | 0.00 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.64 | 2.54 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 0.00 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 137

INPUT
Description: 4
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 80 | 77 | 77 | .3 | .5 |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 84 | 90 | 14.5 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.84 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.86 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.97 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.85 | Flow Area (sq ft) | | 539.62 | |
| E.G. Slope (ft/ft) | 0.006060 | Area (sq ft) | | 539.62 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 67.73 | Top Width (ft) | | 67.73 | |
| Vel Total (ft/s) | 10.95 | Avg. Vel. (ft/s) | | 10.95 | |
| Max Chl Dpth (ft) | 11.97 | Hydr. Depth (ft) | | 7.97 | |
| Conv. Total (cfs) | 75920.1 | Conv. (cfs) | | 75920.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 73.21 | |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.79 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | 0.01 | 2.92 | 0.07 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.38 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.20 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.32 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.89 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 0.51 | Flow Area (sq ft) | | 291.15 | |
| E.G. Slope (ft/ft) | 0.001678 | Area (sq ft) | | 291.15 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 53.87 | Top Width (ft) | | 53.87 | |
| Vel Total (ft/s) | 4.51 | Avg. Vel. (ft/s) | | 4.51 | |
| Max Chl Dpth (ft) | 7.89 | Hydr. Depth (ft) | | 5.40 | |
| Conv. Total (cfs) | 32032.5 | Conv. (cfs) | | 32032.5 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 57.12 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 0.53 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.04 | Cum Volume (acre-ft) | 0.01 | 2.55 | 0.03 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.37 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.60 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.45 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.89 | Flow Area (sq ft) | | 379.31 | |
| E.G. Slope (ft/ft) | 0.006854 | Area (sq ft) | | 379.31 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 59.16 | Top Width (ft) | | 59.16 | |
| Vel Total (ft/s) | 10.15 | Avg. Vel. (ft/s) | | 10.15 | |
| Max Chl Dpth (ft) | 9.45 | Hydr. Depth (ft) | | 6.41 | |
| Conv. Total (cfs) | 46503.2 | Conv. (cfs) | | 46503.2 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 63.26 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.57 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.01 | 2.66 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.37 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.47 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.66 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 5.80 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 400.69 | |
| E.G. Slope (ft/ft) | 0.006824 | Area (sq ft) | | 400.69 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 60.37 | Top Width (ft) | | 60.37 | |
| Vel Total (ft/s) | 10.35 | Avg. Vel. (ft/s) | | 10.35 | |
| Max Chl Dpth (ft) | 9.80 | Hydr. Depth (ft) | | 6.64 | |
| Conv. Total (cfs) | 50212.1 | Conv. (cfs) | | 50212.1 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 64.67 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.64 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.01 | 2.69 | 0.04 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.37 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.02 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.82 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 7.20 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.30 | Flow Area (sq ft) | | 488.44 | |
| E.G. Slope (ft/ft) | 0.006396 | Area (sq ft) | | 488.44 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 65.11 | Top Width (ft) | | 65.11 | |
| Vel Total (ft/s) | 10.83 | Avg. Vel. (ft/s) | | 10.83 | |
| Max Chl Dpth (ft) | 11.20 | Hydr. Depth (ft) | | 7.50 | |
| Conv. Total (cfs) | 66144.0 | Conv. (cfs) | | 66144.0 | |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 70.18 | |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | | 2.78 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.00 | 2.87 | 0.06 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 0.38 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.63 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.95 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.68 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 7.04 | Flow Area (sq ft) | 1.67 | 658.13 | 0.46 |
| E.G. Slope (ft/ft) | 0.005108 | Area (sq ft) | 1.67 | 658.13 | 0.46 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 1.94 | 7377.72 | 0.34 |
| Top Width (ft) | 73.78 | Top Width (ft) | 2.42 | 70.00 | 1.36 |
| Vel Total (ft/s) | 11.18 | Avg. Vel. (ft/s) | 1.16 | 11.21 | 0.74 |
| Max Chl Dpth (ft) | 13.68 | Hydr. Depth (ft) | 0.69 | 9.40 | 0.34 |
| Conv. Total (cfs) | 103257.5 | Conv. (cfs) | 27.2 | 103225.6 | 4.8 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | 2.79 | 75.86 | 1.52 |
| Min Ch El (ft) | -4.00 | Shear (lb/sq ft) | 0.19 | 2.77 | 0.10 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 90.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 3.32 | 0.11 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 0.01 | 0.38 | 0.03 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: Cobosee Stream
REACH: Reach 1 RS: 98.5

INPUT
Description: Maine Ave.
Distance from Upstream XS = 22
Deck/Roadway Width = 38
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

| Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord | Sta Hi Cord | Lo Cord |
|---|---|---|---|---|---|
| 0 | 15.2 | -10 | 4.5 | 15.2 | -10 |
| 4.5 | 15.2 | 11.5 | 79.5 | 15.2 | -10 |
| 100 | 15 | -10 | | | |

Upstream Bridge Cross Section Data
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | 10 | 8.3 | 20 | 2.5 | 30 | -2.5 | 40 | -3.7 |
| 50 | -4 | 60 | -2 | 70 | 3 | 80 | 9 | 90 | 14 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 80 | .065 |

Bank Sta: Left Right Coeff Contr. Expan.

```
           10      80              .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
      84      90    14.5       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0    15.2     -10     4.5    15.2     -10     4.5    15.2    11.5
    79.5    15.2    11.5    79.5    15.2     -10     100      15     -10

Downstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    13.5      14    15.2       3    25.3      -4    33.6      -5    48.2      -5
    52.6      -4    65.7       0    76.2       7    80.2     8.5    80.3      12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    13.5    .065    15.2     .04    65.7    .065

Bank Sta: Left   Right    Coeff Contr.   Expan.
          15.2    65.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    13.5      16      15       F
      72    80.3      15       F

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =      .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
```

inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Q100

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 9.84 | Element | | |
| W.S. US. (ft) | 7.97 | E.G. Elev (ft) | 9.62 | 9.28 |
| Q Total (cfs) | 5910.00 | W.S. Elev (ft) | 7.55 | 7.51 |
| Q Bridge (cfs) | 5910.00 | Crit W.S. (ft) | 5.85 | 4.37 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 11.55 | 12.51 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.57 | 10.35 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 510.99 | 571.03 |
| Weir Submerg | | Froude # Chl | 0.73 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 4514.16 | 5040.94 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 7.71 | 10.20 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 71.53 | 60.06 |
| Delta EG (ft) | 0.63 | Conv. Total (cfs) | 70410.5 | 96122.0 |
| Delta WS (ft) | 0.57 | Top Width (ft) | 66.28 | 63.06 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.19 | 0.07 |
| BR Open Vel (ft/s) | 11.57 | C & E Loss (ft) | 0.16 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.14 | 2.24 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q1.1

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 4.20 | Element | | |
| W.S. US. (ft) | 3.89 | E.G. Elev (ft) | 4.16 | 4.07 |
| Q Total (cfs) | 1312.00 | W.S. Elev (ft) | 3.84 | 3.86 |
| Q Bridge (cfs) | 1312.00 | Crit W.S. (ft) | 0.50 | -0.83 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 7.84 | 8.86 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 4.54 | 3.58 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 288.84 | 366.52 |
| Weir Submerg | | Froude # Chl | 0.35 | 0.24 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 1110.10 | 1529.48 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 5.38 | 6.61 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 56.95 | 59.44 |
| Delta EG (ft) | 0.15 | Conv. Total (cfs) | 31672.6 | 47593.6 |
| Delta WS (ft) | 0.04 | Top Width (ft) | 53.72 | 56.42 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.04 | 0.01 |
| BR Open Vel (ft/s) | 4.54 | C & E Loss (ft) | 0.06 | 0.00 |
| Coef of Q | | Shear Total (lb/sq ft) | 0.54 | 0.29 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q10

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.05 | Element | | |
| W.S. US. (ft) | 5.45 | E.G. Elev (ft) | 6.76 | 6.21 |
| Q Total (cfs) | 3850.00 | W.S. Elev (ft) | 4.77 | 4.86 |
| Q Bridge (cfs) | 3850.00 | Crit W.S. (ft) | 3.90 | 2.44 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 8.77 | 9.86 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.32 | 9.11 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 339.99 | 422.38 |
| Weir Submerg | | Froude # Chl | 0.82 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2569.60 | 2888.97 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 5.98 | 7.54 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 60.60 | 60.06 |
| Delta EG (ft) | 0.92 | Conv. Total (cfs) | 39879.5 | 59442.7 |
| Delta WS (ft) | 0.73 | Top Width (ft) | 56.86 | 58.07 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.23 | 0.07 |
| BR Open Vel (ft/s) | 11.32 | C & E Loss (ft) | 0.32 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.26 | 1.84 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q25

| | | | Inside BR US | Inside BR DS |
|---|---|---|---|---|
| E.G. US. (ft) | 7.47 | Element | | |
| W.S. US. (ft) | 5.80 | E.G. Elev (ft) | 7.17 | 6.63 |
| Q Total (cfs) | 4148.00 | W.S. Elev (ft) | 5.09 | 5.17 |
| Q Bridge (cfs) | 4148.00 | Crit W.S. (ft) | 4.20 | 2.74 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 9.09 | 10.17 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.57 | 9.43 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 358.46 | 439.99 |
| Weir Submerg | | Froude # Chl | 0.82 | 0.59 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 2818.68 | 3152.73 |

| | | | | |
|---|---|---|---|---|
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 6.19 | 7.86 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 61.86 | 60.06 |
| Delta EG (ft) | 0.93 | Conv. Total (cfs) | 42958.7 | 63405.0 |
| Delta WS (ft) | 0.78 | Top Width (ft) | 57.95 | 58.59 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.23 | 0.07 |
| BR Open Vel (ft/s) | 11.57 | C & E Loss (ft) | 0.31 | 0.02 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.37 | 1.96 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q50

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 9.02 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 7.20 | E.G. Elev (ft) | 8.79 | 8.38 |
| Q Total (cfs) | 5290.00 | W.S. Elev (ft) | 6.71 | 6.72 |
| Q Bridge (cfs) | 5290.00 | Crit W.S. (ft) | 5.30 | 3.80 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 10.71 | 11.72 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.58 | 10.05 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 456.68 | 526.54 |
| Weir Submerg | | Froude # Chl | 0.76 | 0.58 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 3889.39 | 4348.86 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 7.20 | 9.40 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 68.23 | 60.06 |
| Delta EG (ft) | 0.72 | Conv. Total (cfs) | 60250.1 | 84392.2 |
| Delta WS (ft) | 0.60 | Top Width (ft) | 63.44 | 61.15 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.20 | 0.07 |
| BR Open Vel (ft/s) | 11.58 | C & E Loss (ft) | 0.21 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 3.22 | 2.15 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #Q500

| | | | | |
|---|---|---|---|---|
| E.G. US. (ft) | 11.63 | Element | Inside BR US | Inside BR DS |
| W.S. US. (ft) | 9.68 | E.G. Elev (ft) | 11.48 | 11.27 |

| | | | | |
|---|---|---|---|---|
| Q Total (cfs) | 7380.00 | W.S. Elev (ft) | 9.40 | 9.27 |
| Q Bridge (cfs) | 7380.00 | Crit W.S. (ft) | 7.04 | 5.55 |
| Q Weir (cfs) | | Max Chl Dpth (ft) | 13.40 | 14.27 |
| Weir Sta Lft (ft) | | Vel Total (ft/s) | 11.54 | 11.03 |
| Weir Sta Rgt (ft) | | Flow Area (sq ft) | 639.25 | 669.32 |
| Weir Submerg | | Froude # Chl | 0.56 | 0.57 |
| Weir Max Depth (ft) | | Specif Force (cu ft) | 6105.25 | 6773.86 |
| Min El Weir Flow (ft) | 15.20 | Hydr Depth (ft) | 8.95 | 11.95 |
| Min El Prs (ft) | 11.50 | W.P. Total (ft) | 77.49 | 60.06 |
| Delta EG (ft) | 0.43 | Conv. Total (cfs) | 98586.1 | 124198.6 |
| Delta WS (ft) | 0.52 | Top Width (ft) | 71.43 | 65.27 |
| BR Open Area (sq ft) | 793.15 | Frctn Loss (ft) | 0.17 | 0.06 |
| BR Open Vel (ft/s) | 11.54 | C & E Loss (ft) | 0.03 | 0.01 |
| Coef of Q | | Shear Total (lb/sq ft) | 2.89 | 2.46 |
| Br Sel Method | Energy only | Power Total (lb/ft s) | 0.00 | 13.50 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 60

INPUT
Description: 3
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 13.5 | 14 | 15.2 | 3 | 25.3 | -4 | 33.6 | -5 | 48.2 | -5 |
| 52.6 | -4 | 65.7 | 0 | 76.2 | 7 | 80.2 | 8.5 | 80.3 | 12 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 13.5 | .065 | 15.2 | .04 | 65.7 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 15.2 | 65.7 | 22 | 22 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 13.5 | 16 | 15 | F |
| 72 | 80.3 | 15 | F |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.20 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.80 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 7.40 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 4.37 | Flow Area (sq ft) | | 531.34 | 33.39 |
| E.G. Slope (ft/ft) | 0.003918 | Area (sq ft) | 1.50 | 535.08 | 41.16 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5781.54 | 128.46 |
| Top Width (ft) | 62.75 | Top Width (ft) | 0.68 | 50.50 | 11.57 |
| Vel Total (ft/s) | 10.47 | Avg. Vel. (ft/s) | | 10.88 | 3.85 |
| Max Chl Dpth (ft) | 12.40 | Hydr. Depth (ft) | | 10.69 | 5.30 |
| Conv. Total (cfs) | 94422.3 | Conv. (cfs) | | 92369.9 | 2052.4 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.48 | 1.08 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.00 | 1.98 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.27 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.05 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.21 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.84 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | -0.83 | Flow Area (sq ft) | | 354.65 | 11.09 |
| E.G. Slope (ft/ft) | 0.000765 | Area (sq ft) | 0.06 | 355.55 | 11.09 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1302.41 | 9.59 |
| Top Width (ft) | 56.40 | Top Width (ft) | 0.13 | 50.50 | 5.77 |
| Vel Total (ft/s) | 3.59 | Avg. Vel. (ft/s) | | 3.67 | 0.86 |
| Max Chl Dpth (ft) | 8.84 | Hydr. Depth (ft) | | 7.14 | 1.92 |
| Conv. Total (cfs) | 47435.9 | Conv. (cfs) | | 47089.3 | 346.6 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 6.93 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 0.32 | 0.08 |
| Alpha | 1.04 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.01 | 1.98 | 0.02 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.41 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.72 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.44 | Flow Area (sq ft) | | 398.14 | 16.50 |
| E.G. Slope (ft/ft) | 0.004447 | Area (sq ft) | 0.23 | 399.74 | 16.71 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3807.71 | 42.29 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 57.85 | Top Width (ft) | 0.27 | 50.50 | 7.08 |
| Vel Total (ft/s) | 9.29 | Avg. Vel. (ft/s) | | 9.56 | 2.56 |
| Max Chl Dpth (ft) | 9.72 | Hydr. Depth (ft) | | 8.01 | 2.62 |
| Conv. Total (cfs) | 57734.9 | Conv. (cfs) | | 57100.6 | 634.2 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.11 | 0.61 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.11 | Cum Volume (acre-ft) | 0.01 | 1.99 | 0.02 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 0.28 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.51 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.03 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 2.74 | Flow Area (sq ft) | | 413.42 | 18.44 |
| E.G. Slope (ft/ft) | 0.004540 | Area (sq ft) | 0.32 | 415.26 | 18.95 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4096.59 | 51.41 |
| Top Width (ft) | 58.35 | Top Width (ft) | 0.31 | 50.50 | 7.54 |
| Vel Total (ft/s) | 9.61 | Avg. Vel. (ft/s) | | 9.91 | 2.79 |
| Max Chl Dpth (ft) | 10.03 | Hydr. Depth (ft) | | 8.32 | 2.93 |
| Conv. Total (cfs) | 61561.6 | Conv. (cfs) | | 60798.6 | 763.0 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.23 | 0.69 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.12 | Cum Volume (acre-ft) | 0.01 | 2.00 | 0.02 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.27 | 0.01 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.30 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.70 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.60 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 3.80 | Flow Area (sq ft) | | 491.54 | 28.34 |
| E.G. Slope (ft/ft) | 0.004093 | Area (sq ft) | 1.00 | 494.64 | 32.66 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5190.07 | 99.93 |
| Top Width (ft) | 60.95 | Top Width (ft) | 0.56 | 50.50 | 9.90 |
| Vel Total (ft/s) | 10.18 | Avg. Vel. (ft/s) | | 10.56 | 3.53 |
| Max Chl Dpth (ft) | 11.60 | Hydr. Depth (ft) | | 9.89 | 4.50 |
| Conv. Total (cfs) | 82690.9 | Conv. (cfs) | | 81128.9 | 1562.0 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.39 | 0.96 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.10 | Cum Volume (acre-ft) | 0.00 | 2.02 | 0.03 |
| C & E Loss (ft) | 0.12 | Cum SA (acres) | 0.00 | 0.27 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.21 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.04 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 9.16 | Reach Len. (ft) | 22.00 | 22.00 | 22.00 |
| Crit W.S. (ft) | 5.55 | Flow Area (sq ft) | | 619.07 | 44.51 |
| E.G. Slope (ft/ft) | 0.003631 | Area (sq ft) | 2.94 | 624.23 | 65.15 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7180.31 | 199.69 |
| Top Width (ft) | 65.97 | Top Width (ft) | 0.95 | 50.50 | 14.52 |
| Vel Total (ft/s) | 11.12 | Avg. Vel. (ft/s) | | 11.60 | 4.49 |
| Max Chl Dpth (ft) | 14.16 | Hydr. Depth (ft) | | 12.46 | 7.06 |
| Conv. Total (cfs) | 122479.0 | Conv. (cfs) | | 119165.0 | 3314.1 |
| Length Wtd. (ft) | 22.00 | Wetted Per. (ft) | | 52.48 | 7.57 |
| Min Ch El (ft) | -5.00 | Shear (lb/sq ft) | | 2.67 | 1.33 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 80.30 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.09 | Cum Volume (acre-ft) | 0.01 | 2.20 | 0.06 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 0.00 | 0.28 | 0.02 |

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 38

INPUT
Description: 2
Station Elevation Data num= 11

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.2 | 13.2 | 13.2 | 13.3 | 0 | 24.2 | -4 | 27.6 | -4 |
| 43.6 | -4.5 | 53.6 | -4 | 61.4 | 0 | 61.5 | 2 | 83.6 | 12 |
| 89.9 | 15 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 13.3 | .04 | 61.5 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 13.3 | 61.5 | 38 | 38 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.98 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.19 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 6.79 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.17 | 488.82 | 25.39 |
| E.G. Slope (ft/ft) | 0.005186 | Area (sq ft) | 0.17 | 488.82 | 25.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 0.03 | 5839.64 | 70.33 |
| Top Width (ft) | 58.84 | Top Width (ft) | 0.05 | 48.20 | 10.59 |
| Vel Total (ft/s) | 11.49 | Avg. Vel. (ft/s) | 0.14 | 11.95 | 2.77 |
| Max Chl Dpth (ft) | 11.29 | Hydr. Depth (ft) | 3.40 | 10.14 | 2.40 |
| Conv. Total (cfs) | 82068.1 | Conv. (cfs) | 0.3 | 81091.1 | 976.7 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 6.79 | 51.80 | 11.63 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 3.06 | 0.71 |
| Alpha | 1.07 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.30 | Cum Volume (acre-ft) | 0.00 | 1.72 | 0.02 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.03 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.22 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.81 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.05 | 344.90 | 3.61 |
| E.G. Slope (ft/ft) | 0.000834 | Area (sq ft) | 0.05 | 344.90 | 3.61 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.00 | 1309.91 | 2.09 |
| Top Width (ft) | 52.22 | Top Width (ft) | 0.03 | 48.20 | 3.99 |
| Vel Total (ft/s) | 3.76 | Avg. Vel. (ft/s) | 0.04 | 3.80 | 0.58 |
| Max Chl Dpth (ft) | 8.31 | Hydr. Depth (ft) | 1.90 | 7.16 | 0.90 |
| Conv. Total (cfs) | 45419.6 | Conv. (cfs) | 0.1 | 45347.0 | 72.5 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 3.81 | 51.80 | 4.38 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.00 | 0.35 | 0.04 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 0.01 | 1.81 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.91 | Element | Left OB | Channel | Right OB |

| | | | | | |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.74 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.17 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.07 | 362.58 | 5.22 |
| E.G. Slope (ft/ft) | 0.006073 | Area (sq ft) | 0.07 | 362.58 | 5.22 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.01 | 3840.75 | 9.24 |
| Top Width (ft) | 53.04 | Top Width (ft) | 0.03 | 48.20 | 4.80 |
| Vel Total (ft/s) | 10.47 | Avg. Vel. (ft/s) | 0.11 | 10.59 | 1.77 |
| Max Chl Dpth (ft) | 8.67 | Hydr. Depth (ft) | 2.09 | 7.52 | 1.09 |
| Conv. Total (cfs) | 49405.7 | Conv. (cfs) | 0.1 | 49287.0 | 118.6 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 4.17 | 51.80 | 5.27 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.65 | 0.38 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.80 | 0.01 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.30 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.90 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.40 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.07 | 373.66 | 6.38 |
| E.G. Slope (ft/ft) | 0.006369 | Area (sq ft) | 0.07 | 373.66 | 6.38 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.01 | 4135.62 | 12.37 |
| Top Width (ft) | 53.55 | Top Width (ft) | 0.03 | 48.20 | 5.31 |
| Vel Total (ft/s) | 10.91 | Avg. Vel. (ft/s) | 0.12 | 11.07 | 1.94 |
| Max Chl Dpth (ft) | 8.90 | Hydr. Depth (ft) | 2.20 | 7.75 | 1.20 |
| Conv. Total (cfs) | 51976.8 | Conv. (cfs) | 0.1 | 51821.7 | 155.1 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 4.40 | 51.80 | 5.83 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.87 | 0.44 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.31 | Cum Volume (acre-ft) | 0.01 | 1.80 | 0.01 |
| C & E Loss (ft) | 0.08 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.08 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.09 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.99 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.14 | 449.90 | 17.55 |
| E.G. Slope (ft/ft) | 0.005518 | Area (sq ft) | 0.14 | 449.90 | 17.55 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.02 | 5245.62 | 44.36 |

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 57.05 | Top Width (ft) | 0.05 | 48.20 | 8.81 |
| Vel Total (ft/s) | 11.31 | Avg. Vel. (ft/s) | 0.14 | 11.66 | 2.53 |
| Max Chl Dpth (ft) | 10.49 | Hydr. Depth (ft) | 2.99 | 9.33 | 1.99 |
| Conv. Total (cfs) | 71215.8 | Conv. (cfs) | 0.2 | 70618.4 | 597.2 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 5.99 | 51.80 | 9.67 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 2.99 | 0.63 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.32 | Cum Volume (acre-ft) | 0.00 | 1.79 | 0.02 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 11.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.38 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 8.63 | Reach Len. (ft) | 38.00 | 38.00 | 38.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.28 | 577.30 | 48.55 |
| E.G. Slope (ft/ft) | 0.004557 | Area (sq ft) | 0.28 | 577.30 | 48.55 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 0.04 | 7223.42 | 156.53 |
| Top Width (ft) | 62.91 | Top Width (ft) | 0.07 | 48.20 | 14.65 |
| Vel Total (ft/s) | 11.79 | Avg. Vel. (ft/s) | 0.16 | 12.51 | 3.22 |
| Max Chl Dpth (ft) | 13.13 | Hydr. Depth (ft) | 4.31 | 11.98 | 3.31 |
| Conv. Total (cfs) | 109319.4 | Conv. (cfs) | 0.7 | 107000.0 | 2318.7 |
| Length Wtd. (ft) | 38.00 | Wetted Per. (ft) | 8.63 | 51.80 | 16.08 |
| Min Ch El (ft) | -4.50 | Shear (lb/sq ft) | 0.01 | 3.17 | 0.86 |
| Alpha | 1.10 | Stream Power (lb/ft s) | 89.90 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.89 | 0.03 |
| C & E Loss (ft) | 0.25 | Cum SA (acres) | 0.00 | 0.25 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: 0

INPUT
Description: 1 (Downstream)
Station Elevation Data num= 9

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 19 | 1 | 19 | 10 | 2 | 20 | -6.3 | 30 | -6.3 |
| 40 | -5 | 50 | -2.5 | 52 | 1.8 | 60 | 19 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 10 | .04 | 52 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 10 | 52 | 21 | 21 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.48 | Element | | | |
| Vel Head (ft) | 4.24 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.24 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 4.24 | Flow Area (sq ft) | 1.33 | 357.35 | 1.39 |
| E.G. Slope (ft/ft) | 0.013662 | Area (sq ft) | 1.33 | 357.35 | 1.39 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 2.31 | 5905.31 | 2.38 |
| Top Width (ft) | 44.32 | Top Width (ft) | 1.19 | 42.00 | 1.14 |
| Vel Total (ft/s) | 16.41 | Avg. Vel. (ft/s) | 1.74 | 16.53 | 1.72 |
| Max Chl Dpth (ft) | 10.54 | Hydr. Depth (ft) | 1.12 | 8.51 | 1.22 |
| Conv. Total (cfs) | 50562.8 | Conv. (cfs) | 19.8 | 50522.7 | 20.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 2.54 | 48.13 | 2.69 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.45 | 6.33 | 0.44 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.28 | Cum Volume (acre-ft) | 0.00 | 1.35 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.00 | Element | | | |
| Vel Head (ft) | 0.23 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.82 | 337.25 | 0.90 |
| E.G. Slope (ft/ft) | 0.000817 | Area (sq ft) | 0.82 | 337.25 | 0.90 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 0.30 | 1311.38 | 0.33 |
| Top Width (ft) | 43.85 | Top Width (ft) | 0.93 | 42.00 | 0.91 |
| Vel Total (ft/s) | 3.87 | Avg. Vel. (ft/s) | 0.36 | 3.89 | 0.36 |
| Max Chl Dpth (ft) | 10.06 | Hydr. Depth (ft) | 0.88 | 8.03 | 0.98 |

| | | | | | |
|---|---|---|---|---|---|
| Conv. Total (cfs) | 45896.4 | Conv. (cfs) | 10.4 | 45874.6 | 11.4 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.99 | 48.13 | 2.16 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.02 | 0.36 | 0.02 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 0.01 | 1.51 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.59 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.26 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.33 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.47 | 318.94 | 0.54 |
| E.G. Slope (ft/ft) | 0.008479 | Area (sq ft) | 0.47 | 318.94 | 0.54 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 0.45 | 3849.01 | 0.54 |
| Top Width (ft) | 43.41 | Top Width (ft) | 0.70 | 42.00 | 0.71 |
| Vel Total (ft/s) | 12.03 | Avg. Vel. (ft/s) | 0.97 | 12.07 | 0.99 |
| Max Chl Dpth (ft) | 9.63 | Hydr. Depth (ft) | 0.66 | 7.59 | 0.76 |
| Conv. Total (cfs) | 41810.6 | Conv. (cfs) | 4.9 | 41799.9 | 5.8 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.50 | 48.13 | 1.68 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.16 | 3.51 | 0.17 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.13 | Cum Volume (acre-ft) | 0.01 | 1.50 | 0.01 |
| C & E Loss (ft) | 0.20 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.91 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.72 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.19 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 2.45 | Flow Area (sq ft) | 0.37 | 313.06 | 0.45 |
| E.G. Slope (ft/ft) | 0.010473 | Area (sq ft) | 0.37 | 313.06 | 0.45 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | 0.37 | 4147.17 | 0.46 |
| Top Width (ft) | 43.27 | Top Width (ft) | 0.63 | 42.00 | 0.65 |
| Vel Total (ft/s) | 13.22 | Avg. Vel. (ft/s) | 1.00 | 13.25 | 1.03 |
| Max Chl Dpth (ft) | 9.49 | Hydr. Depth (ft) | 0.59 | 7.45 | 0.69 |
| Conv. Total (cfs) | 40532.0 | Conv. (cfs) | 3.6 | 40523.9 | 4.5 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.34 | 48.13 | 1.53 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.18 | 4.25 | 0.19 |
| Alpha | 1.00 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.16 | Cum Volume (acre-ft) | 0.01 | 1.50 | 0.01 |
| C & E Loss (ft) | 0.26 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.58 | Element | | | |
| Vel Head (ft) | 3.96 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 3.62 | Flow Area (sq ft) | 0.69 | 331.05 | 0.77 |
| E.G. Slope (ft/ft) | 0.014135 | Area (sq ft) | 0.69 | 331.05 | 0.77 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 0.98 | 5287.92 | 1.10 |
| Top Width (ft) | 43.70 | Top Width (ft) | 0.86 | 42.00 | 0.84 |
| Vel Total (ft/s) | 15.91 | Avg. Vel. (ft/s) | 1.42 | 15.97 | 1.43 |
| Max Chl Dpth (ft) | 9.92 | Hydr. Depth (ft) | 0.81 | 7.88 | 0.91 |
| Conv. Total (cfs) | 44494.8 | Conv. (cfs) | 8.3 | 44477.3 | 9.2 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 1.83 | 48.13 | 2.00 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.33 | 6.07 | 0.34 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.25 | Cum Volume (acre-ft) | 0.00 | 1.44 | 0.01 |
| C & E Loss (ft) | 0.24 | Cum SA (acres) | 0.00 | 0.21 | 0.01 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #Q500

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 10.49 | Element | | | |
| Vel Head (ft) | 4.87 | Wt. n-Val. | 0.065 | 0.040 | 0.065 |
| W.S. Elev (ft) | 5.62 | Reach Len. (ft) | 21.00 | 21.00 | 21.00 |
| Crit W.S. (ft) | 5.62 | Flow Area (sq ft) | 3.47 | 415.35 | 3.40 |
| E.G. Slope (ft/ft) | 0.012870 | Area (sq ft) | 3.47 | 415.35 | 3.40 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 8.07 | 7364.30 | 7.63 |
| Top Width (ft) | 45.70 | Top Width (ft) | 1.92 | 42.00 | 1.78 |
| Vel Total (ft/s) | 17.48 | Avg. Vel. (ft/s) | 2.32 | 17.73 | 2.25 |
| Max Chl Dpth (ft) | 11.92 | Hydr. Depth (ft) | 1.81 | 9.89 | 1.91 |
| Conv. Total (cfs) | 65054.0 | Conv. (cfs) | 71.1 | 64915.6 | 67.3 |
| Length Wtd. (ft) | 21.00 | Wetted Per. (ft) | 4.10 | 48.13 | 4.22 |
| Min Ch El (ft) | -6.30 | Shear (lb/sq ft) | 0.68 | 6.93 | 0.65 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 60.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.27 | Cum Volume (acre-ft) | 0.01 | 1.46 | 0.01 |
| C & E Loss (ft) | 0.06 | Cum SA (acres) | 0.00 | 0.21 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -21

INPUT
Description: RR
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 15 | 8 | -3 | 25 | -7 | 30 | -7 | 37 | -6 |
| 50 | -2 | 59 | 20 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 8 | .04 | 59 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 8 | 59 | 33 | 33 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.91 | Element | | | |
| Vel Head (ft) | 6.09 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.82 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 3.29 | Flow Area (sq ft) | 5.17 | 297.09 | |
| E.G. Slope (ft/ft) | 0.024570 | Area (sq ft) | 5.17 | 297.09 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | 18.28 | 5891.73 | |
| Top Width (ft) | 45.71 | Top Width (ft) | 2.14 | 43.56 | |
| Vel Total (ft/s) | 19.55 | Avg. Vel. (ft/s) | 3.53 | 19.83 | |
| Max Chl Dpth (ft) | 8.82 | Hydr. Depth (ft) | 2.41 | 6.82 | |
| Conv. Total (cfs) | 37703.4 | Conv. (cfs) | 116.6 | 37586.8 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 5.28 | 47.27 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.50 | 9.64 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.38 | Cum Volume (acre-ft) | 0.00 | 1.20 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.97 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.18 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.79 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 10.24 | 383.45 | |
| E.G. Slope (ft/ft) | 0.000546 | Area (sq ft) | 10.24 | 383.45 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | 6.78 | 1305.22 | |
| Top Width (ft) | 47.38 | Top Width (ft) | 3.02 | 44.37 | |
| Vel Total (ft/s) | 3.33 | Avg. Vel. (ft/s) | 0.66 | 3.40 | |
| Max Chl Dpth (ft) | 10.79 | Hydr. Depth (ft) | 3.39 | 8.64 | |
| Conv. Total (cfs) | 56140.0 | Conv. (cfs) | 289.9 | 55850.1 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.43 | 49.39 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.05 | 0.26 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

CROSS SECTION OUTPUT  Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.25 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.59 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.67 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.87 | 378.00 | |
| E.G. Slope (ft/ft) | 0.004917 | Area (sq ft) | 9.87 | 378.00 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | 19.36 | 3830.64 | |
| Top Width (ft) | 47.28 | Top Width (ft) | 2.96 | 44.32 | |
| Vel Total (ft/s) | 9.93 | Avg. Vel. (ft/s) | 1.96 | 10.13 | |
| Max Chl Dpth (ft) | 10.67 | Hydr. Depth (ft) | 3.33 | 8.53 | |
| Conv. Total (cfs) | 54907.0 | Conv. (cfs) | 276.1 | 54630.9 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.29 | 49.26 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.42 | 2.36 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.16 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.49 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.86 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 3.63 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.78 | 376.58 | |
| E.G. Slope (ft/ft) | 0.005774 | Area (sq ft) | 9.78 | 376.58 | |

| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 4148.00 | Flow (cfs) | 20.72 | 4127.29 | |
| Top Width (ft) | 47.25 | Top Width (ft) | 2.95 | 44.30 | |
| Vel Total (ft/s) | 10.74 | Avg. Vel. (ft/s) | 2.12 | 10.96 | |
| Max Chl Dpth (ft) | 10.63 | Hydr. Depth (ft) | 3.32 | 8.50 | |
| Conv. Total (cfs) | 54587.4 | Conv. (cfs) | 272.6 | 54314.8 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 7.26 | 49.22 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 0.49 | 2.76 | |
| Alpha | 1.04 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | 0.00 | 1.33 | 0.01 |
| C & E Loss (ft) | 0.19 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.01 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 5.69 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 1.32 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 2.71 | Flow Area (sq ft) | 4.15 | 275.33 | |
| E.G. Slope (ft/ft) | 0.025006 | Area (sq ft) | 4.15 | 275.33 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | 13.76 | 5276.24 | |
| Top Width (ft) | 45.28 | Top Width (ft) | 1.92 | 43.36 | |
| Vel Total (ft/s) | 18.93 | Avg. Vel. (ft/s) | 3.31 | 19.16 | |
| Max Chl Dpth (ft) | 8.32 | Hydr. Depth (ft) | 2.16 | 6.35 | |
| Conv. Total (cfs) | 33452.7 | Conv. (cfs) | 87.0 | 33365.6 | |
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 4.73 | 46.73 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.37 | 9.20 | |
| Alpha | 1.02 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.39 | Cum Volume (acre-ft) | 0.00 | 1.30 | 0.01 |
| C & E Loss (ft) | 0.17 | Cum SA (acres) | 0.00 | 0.19 | 0.01 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 9.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.98 | Wt. n-Val. | 0.065 | 0.040 | |
| W.S. Elev (ft) | 2.94 | Reach Len. (ft) | 33.00 | 33.00 | 33.00 |
| Crit W.S. (ft) | 4.65 | Flow Area (sq ft) | 7.84 | 346.01 | |
| E.G. Slope (ft/ft) | 0.023784 | Area (sq ft) | 7.84 | 346.01 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | 31.34 | 7348.67 | |
| Top Width (ft) | 46.66 | Top Width (ft) | 2.64 | 44.02 | |
| Vel Total (ft/s) | 20.86 | Avg. Vel. (ft/s) | 4.00 | 21.24 | |
| Max Chl Dpth (ft) | 9.94 | Hydr. Depth (ft) | 2.97 | 7.86 | |
| Conv. Total (cfs) | 47853.6 | Conv. (cfs) | 203.2 | 47650.5 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 33.00 | Wetted Per. (ft) | 6.50 | 48.48 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | 1.79 | 10.60 | |
| Alpha | 1.03 | Stream Power (lb/ft s) | 59.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.36 | Cum Volume (acre-ft) | 0.00 | 1.28 | 0.01 |
| C & E Loss (ft) | 0.21 | Cum SA (acres) | 0.00 | 0.19 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -54

INPUT
Description: K2
Station Elevation Data num= 10

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 21 | 5 | 40 | -7 | 50 | -7 |
| 60 | -6 | 72 | -2 | 80 | 0 | 88 | 2 | 96 | 4 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 88 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 88 | 34 | 34 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.72 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 4.87 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 1.85 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 3.09 | Flow Area (sq ft) | | 333.87 | |
| E.G. Slope (ft/ft) | 0.025698 | Area (sq ft) | | 333.87 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 61.41 | Top Width (ft) | | 61.41 | |
| Vel Total (ft/s) | 17.70 | Avg. Vel. (ft/s) | | 17.70 | |
| Max Chl Dpth (ft) | 8.85 | Hydr. Depth (ft) | | 5.44 | |
| Conv. Total (cfs) | 36867.0 | Conv. (cfs) | | 36867.0 | |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 65.15 | |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 8.22 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.83 | Cum Volume (acre-ft) | | 0.96 | 0.01 |
| C & E Loss (ft) | 0.37 | Cum SA (acres) | | 0.15 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.93 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.13 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.81 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 458.26 | 6.54 |
| E.G. Slope (ft/ft) | 0.000478 | Area (sq ft) | | 458.26 | 6.54 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1309.01 | 2.99 |
| Top Width (ft) | 72.34 | Top Width (ft) | | 65.11 | 7.23 |
| Vel Total (ft/s) | 2.82 | Avg. Vel. (ft/s) | | 2.86 | 0.46 |
| Max Chl Dpth (ft) | 10.81 | Hydr. Depth (ft) | | 7.04 | 0.90 |
| Conv. Total (cfs) | 60036.6 | Conv. (cfs) | | 59899.7 | 136.9 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.43 | 7.45 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 0.20 | 0.03 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | | 1.02 | 0.01 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.95 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.06 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.88 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 463.27 | 7.11 |
| E.G. Slope (ft/ft) | 0.003975 | Area (sq ft) | | 463.27 | 7.11 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3840.35 | 9.65 |
| Top Width (ft) | 72.77 | Top Width (ft) | | 65.23 | 7.54 |
| Vel Total (ft/s) | 8.18 | Avg. Vel. (ft/s) | | 8.29 | 1.36 |
| Max Chl Dpth (ft) | 10.88 | Hydr. Depth (ft) | | 7.10 | 0.94 |
| Conv. Total (cfs) | 61062.8 | Conv. (cfs) | | 60909.8 | 153.0 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.58 | 7.77 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.65 | 0.23 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.14 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.13 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.23 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.90 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 464.35 | 7.23 |

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.004581 | Area (sq ft) | | 464.35 | 7.23 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4137.40 | 10.60 |
| Top Width (ft) | 72.87 | Top Width (ft) | | 65.26 | 7.61 |
| Vel Total (ft/s) | 8.80 | Avg. Vel. (ft/s) | | 8.91 | 1.47 |
| Max Chl Dpth (ft) | 10.90 | Hydr. Depth (ft) | | 7.12 | 0.95 |
| Conv. Total (cfs) | 61285.1 | Conv. (cfs) | | 61128.5 | 156.6 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.61 | 7.84 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.91 | 0.26 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.92 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 4.04 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 2.59 | Flow Area (sq ft) | | 473.69 | 8.35 |
| E.G. Slope (ft/ft) | 0.007001 | Area (sq ft) | | 473.69 | 8.35 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5273.94 | 16.06 |
| Top Width (ft) | 73.49 | Top Width (ft) | | 65.49 | 8.00 |
| Vel Total (ft/s) | 10.97 | Avg. Vel. (ft/s) | | 11.13 | 1.92 |
| Max Chl Dpth (ft) | 11.04 | Hydr. Depth (ft) | | 7.23 | 1.04 |
| Conv. Total (cfs) | 63222.0 | Conv. (cfs) | | 63030.0 | 192.0 |
| Length Wtd. (ft) | 34.00 | Wetted Per. (ft) | | 69.87 | 8.29 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.96 | 0.44 |
| Alpha | 1.03 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.26 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.15 | 0.00 |

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 8.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 6.75 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 2.18 | Reach Len. (ft) | 34.00 | 34.00 | 34.00 |
| Crit W.S. (ft) | 4.20 | Flow Area (sq ft) | | 354.06 | 0.06 |
| E.G. Slope (ft/ft) | 0.033780 | Area (sq ft) | | 354.06 | 0.06 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7379.95 | 0.05 |
| Top Width (ft) | 63.23 | Top Width (ft) | | 62.53 | 0.70 |
| Vel Total (ft/s) | 20.84 | Avg. Vel. (ft/s) | | 20.84 | 0.81 |
| Max Chl Dpth (ft) | 9.18 | Hydr. Depth (ft) | | 5.66 | 0.09 |
| Conv. Total (cfs) | 40153.7 | Conv. (cfs) | | 40153.5 | 0.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 66.37 | 0.72 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 11.25 | 0.18 |

| | | | | | |
|---|---|---|---|---|---|
| Alpha | 1.00 | Stream Power (lb/ft s) | 96.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.93 | Cum Volume (acre-ft) | | 1.01 | 0.01 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | | 0.15 | 0.00 |

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -88

INPUT
Description: K1
Station Elevation Data num= 8

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 10 | 56 | -6 | 72 | -6 | 80 | -5 |
| 94 | 0 | 108 | 5 | 122 | 5 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11 | .04 | 108 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11 | 108 | 55 | 55 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.18 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.51 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.67 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 3.18 | Flow Area (sq ft) | | 465.10 | |
| E.G. Slope (ft/ft) | 0.010956 | Area (sq ft) | | 465.10 | |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5910.00 | |
| Top Width (ft) | 75.49 | Top Width (ft) | | 75.49 | |
| Vel Total (ft/s) | 12.71 | Avg. Vel. (ft/s) | | 12.71 | |
| Max Chl Dpth (ft) | 9.67 | Hydr. Depth (ft) | | 6.16 | |
| Conv. Total (cfs) | 56462.2 | Conv. (cfs) | | 56462.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 78.73 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 4.04 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.42 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.23 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.92 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.12 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 474.41 | |
| E.G. Slope (ft/ft) | 0.000512 | Area (sq ft) | | 474.41 | |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1312.00 | |
| Top Width (ft) | 76.18 | Top Width (ft) | | 76.18 | |
| Vel Total (ft/s) | 2.77 | Avg. Vel. (ft/s) | | 2.77 | |
| Max Chl Dpth (ft) | 9.80 | Hydr. Depth (ft) | | 6.23 | |
| Conv. Total (cfs) | 58000.7 | Conv. (cfs) | | 58000.7 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.46 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 0.19 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.80 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.03 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 471.96 | |
| E.G. Slope (ft/ft) | 0.004468 | Area (sq ft) | | 471.96 | |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3850.00 | |
| Top Width (ft) | 76.00 | Top Width (ft) | | 76.00 | |
| Vel Total (ft/s) | 8.16 | Avg. Vel. (ft/s) | | 8.16 | |
| Max Chl Dpth (ft) | 9.76 | Hydr. Depth (ft) | | 6.21 | |
| Conv. Total (cfs) | 57595.2 | Conv. (cfs) | | 57595.2 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.27 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 1.66 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.17 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.96 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.20 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.76 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 471.34 | |
| E.G. Slope (ft/ft) | 0.005206 | Area (sq ft) | | 471.34 | |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4148.00 | |
| Top Width (ft) | 75.96 | Top Width (ft) | | 75.96 | |
| Vel Total (ft/s) | 8.80 | Avg. Vel. (ft/s) | | 8.80 | |
| Max Chl Dpth (ft) | 9.76 | Hydr. Depth (ft) | | 6.21 | |
| Conv. Total (cfs) | 57491.9 | Conv. (cfs) | | 57491.9 | |

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 79.22 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 1.93 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.20 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | | 0.09 | 0.00 |

CROSS SECTION OUTPUT  Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.70 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.98 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 3.71 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 467.88 | |
| E.G. Slope (ft/ft) | 0.008637 | Area (sq ft) | | 467.88 | |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5290.00 | |
| Top Width (ft) | 75.70 | Top Width (ft) | | 75.70 | |
| Vel Total (ft/s) | 11.31 | Avg. Vel. (ft/s) | | 11.31 | |
| Max Chl Dpth (ft) | 9.71 | Hydr. Depth (ft) | | 6.18 | |
| Conv. Total (cfs) | 56921.1 | Conv. (cfs) | | 56921.1 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 78.95 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 3.20 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.33 | Cum Volume (acre-ft) | | 0.65 | 0.01 |
| C & E Loss (ft) | 0.18 | Cum SA (acres) | | 0.09 | 0.00 |

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 7.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 3.26 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 4.25 | Reach Len. (ft) | 55.00 | 55.00 | 55.00 |
| Crit W.S. (ft) | 4.25 | Flow Area (sq ft) | | 509.28 | |
| E.G. Slope (ft/ft) | 0.013360 | Area (sq ft) | | 509.28 | |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7380.00 | |
| Top Width (ft) | 78.71 | Top Width (ft) | | 78.71 | |
| Vel Total (ft/s) | 14.49 | Avg. Vel. (ft/s) | | 14.49 | |
| Max Chl Dpth (ft) | 10.25 | Hydr. Depth (ft) | | 6.47 | |
| Conv. Total (cfs) | 63848.9 | Conv. (cfs) | | 63848.9 | |
| Length Wtd. (ft) | 55.00 | Wetted Per. (ft) | | 82.14 | |
| Min Ch El (ft) | -6.00 | Shear (lb/sq ft) | | 5.17 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | 122.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | 0.67 | 0.01 |
| C & E Loss (ft) | | Cum SA (acres) | | 0.10 | 0.00 |

Warning: The energy equation could not be balanced within the specified number of iterations.  The

program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Cobosee Stream
REACH: Reach 1 RS: -143

INPUT
Description: K0
Station Elevation Data num= 7

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11.3 | 10 | 52.7 | -7 | 69 | -7 | 77.8 | -6 |
| 98.2 | -1 | 100 | -1 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .065 | 11.3 | .04 | 98.2 | .065 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 11.3 | 98.2 | 0 | 0 | .1 | .3 |

CROSS SECTION OUTPUT Profile #Q100

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.73 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.75 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.005536 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 5910.00 | Flow (cfs) | | 5892.41 | 17.59 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 10.44 | Avg. Vel. (ft/s) | | 10.57 | 2.04 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.58 | 0.45 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q1.1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 3.89 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.09 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | -2.96 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.000273 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 1312.00 | Flow (cfs) | | 1308.10 | 3.90 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 2.32 | Avg. Vel. (ft/s) | | 2.35 | 0.45 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 0.13 | 0.02 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q10

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.53 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.73 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.05 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.002349 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 3850.00 | Flow (cfs) | | 3838.54 | 11.46 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 6.80 | Avg. Vel. (ft/s) | | 6.88 | 1.33 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.10 | 0.19 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q25

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 4.65 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.85 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 0.32 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.002727 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 4148.00 | Flow (cfs) | | 4135.66 | 12.34 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 7.33 | Avg. Vel. (ft/s) | | 7.42 | 1.43 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |

| | | | | | |
|---|---|---|---|---|---|
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 1.27 | 0.22 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q50

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 5.19 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.39 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 1.29 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.004435 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 5290.00 | Flow (cfs) | | 5274.26 | 15.74 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 9.34 | Avg. Vel. (ft/s) | | 9.46 | 1.82 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 2.07 | 0.36 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

CROSS SECTION OUTPUT Profile #Q500

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 6.50 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 2.70 | Wt. n-Val. | | 0.040 | 0.065 |
| W.S. Elev (ft) | 3.80 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 2.81 | Flow Area (sq ft) | | 557.63 | 8.64 |
| E.G. Slope (ft/ft) | 0.008632 | Area (sq ft) | | 557.63 | 8.64 |
| Q Total (cfs) | 7380.00 | Flow (cfs) | | 7358.04 | 21.96 |
| Top Width (ft) | 73.60 | Top Width (ft) | | 71.80 | 1.80 |
| Vel Total (ft/s) | 13.03 | Avg. Vel. (ft/s) | | 13.20 | 2.54 |
| Max Chl Dpth (ft) | 10.80 | Hydr. Depth (ft) | | 7.77 | 4.80 |
| Conv. Total (cfs) | 79433.6 | Conv. (cfs) | | 79197.2 | 236.4 |
| Length Wtd. (ft) | | Wetted Per. (ft) | | 74.59 | 6.60 |
| Min Ch El (ft) | -7.00 | Shear (lb/sq ft) | | 4.03 | 0.71 |
| Alpha | 1.02 | Stream Power (lb/ft s) | 100.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:Cobosee Stream

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| Reach 1 | 1700 | .07 | .04 | .065 |
| Reach 1 | 1635 | .07 | .045 | .065 |
| Reach 1 | 1555 | .07 | .042 | .065 |
| Reach 1 | 1455 | .065 | .045 | .07 |
| Reach 1 | 1335 | .065 | .045 | .075 |
| Reach 1 | 1185 | .065 | .045 | .07 |
| Reach 1 | 1060 | .065 | .04 | .07 |
| Reach 1 | 960 | .05 | .042 | .05 |
| Reach 1 | 935 | .05 | .042 | .05 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | .05 | .04 | .05 |
| Reach 1 | 830 | .05 | .035 | .05 |
| Reach 1 | 821 | .065 | .035 | .065 |
| Reach 1 | 820 | .065 | .035 | .065 |
| Reach 1 | 725 | .065 | .04 | .065 |
| Reach 1 | 575 | .065 | .04 | .065 |
| Reach 1 | 425 | .065 | .04 | .065 |
| Reach 1 | 335 | .065 | .04 | .065 |
| Reach 1 | 262 | .065 | .04 | .065 |
| Reach 1 | 187 | .065 | .04 | .065 |
| Reach 1 | 166 | Bridge | | |
| Reach 1 | 137 | .065 | .04 | .065 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | .065 | .04 | .065 |
| Reach 1 | 38 | .065 | .04 | .065 |
| Reach 1 | 0 | .065 | .04 | .065 |
| Reach 1 | -21 | .065 | .04 | .065 |
| Reach 1 | -54 | .065 | .04 | .065 |
| Reach 1 | -88 | .065 | .04 | .065 |
| Reach 1 | -143 | .065 | .04 | .065 |

SUMMARY OF REACH LENGTHS

River: Cobosee Stream

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| Reach 1 | 1700 | 65 | 65 | 65 |
| Reach 1 | 1635 | 80 | 80 | 80 |
| Reach 1 | 1555 | 100 | 100 | 100 |
| Reach 1 | 1455 | 120 | 120 | 120 |

| | | | | |
|---|---|---|---|---|
| Reach 1 | 1335 | 150 | 150 | 150 |
| Reach 1 | 1185 | 125 | 125 | 125 |
| Reach 1 | 1060 | 100 | 100 | 100 |
| Reach 1 | 960 | 25 | 25 | 25 |
| Reach 1 | 935 | 85 | 85 | 85 |
| Reach 1 | 895 | Bridge | | |
| Reach 1 | 850 | 20 | 20 | 20 |
| Reach 1 | 830 | 9 | 9 | 9 |
| Reach 1 | 821 | 1 | 1 | 1 |
| Reach 1 | 820 | 95 | 95 | 95 |
| Reach 1 | 725 | 150 | 150 | 150 |
| Reach 1 | 575 | 150 | 150 | 150 |
| Reach 1 | 425 | 90 | 90 | 90 |
| Reach 1 | 335 | 73 | 73 | 73 |
| Reach 1 | 262 | 75 | 75 | 75 |
| Reach 1 | 187 | 50 | 50 | 50 |
| Reach 1 | 166 | Bridge | | |
| Reach 1 | 137 | 77 | 77 | 77 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | 22 | 22 | 22 |
| Reach 1 | 38 | 38 | 38 | 38 |
| Reach 1 | 0 | 21 | 21 | 21 |
| Reach 1 | -21 | 33 | 33 | 33 |
| Reach 1 | -54 | 34 | 34 | 34 |
| Reach 1 | -88 | 55 | 55 | 55 |
| Reach 1 | -143 | 0 | 0 | 0 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Cobosee Stream

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| Reach 1 | 1700 | .1 | .3 |
| Reach 1 | 1635 | .1 | .3 |
| Reach 1 | 1555 | .1 | .3 |
| Reach 1 | 1455 | .1 | .3 |
| Reach 1 | 1335 | .1 | .3 |
| Reach 1 | 1185 | .1 | .3 |
| Reach 1 | 1060 | .1 | .3 |
| Reach 1 | 960 | .3 | .5 |
| Reach 1 | 935 | .3 | .5 |
| Reach 1 | 895 | Bridge | |
| Reach 1 | 850 | .3 | .5 |
| Reach 1 | 830 | .3 | .5 |
| Reach 1 | 821 | .1 | .3 |

| | | | | |
|---|---|---|---|---|
| Reach 1 | 820 | | .1 | .3 |
| Reach 1 | 725 | | .1 | .3 |
| Reach 1 | 575 | | .1 | .3 |
| Reach 1 | 425 | | .1 | .3 |
| Reach 1 | 335 | | .1 | .3 |
| Reach 1 | 262 | | .1 | .3 |
| Reach 1 | 187 | | .1 | .3 |
| Reach 1 | 166 | Bridge | | |
| Reach 1 | 137 | | .3 | .5 |
| Reach 1 | 98.5 | Bridge | | |
| Reach 1 | 60 | | .3 | .5 |
| Reach 1 | 38 | | .1 | .3 |
| Reach 1 | 0 | | .1 | .3 |
| Reach 1 | -21 | | .1 | .3 |
| Reach 1 | -54 | | .1 | .3 |
| Reach 1 | -88 | | .1 | .3 |
| Reach 1 | -143 | | .1 | .3 |

Profile Output Table - Standard Table 1

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1700 | Q100 | 5910.00 | 13.80 | 22.75 | 21.32 | 24.48 | 0.006899 | 10.56 | 559.56 | 84.99 | 0.73 |
| Reach 1 | 1700 | Q1.1 | 1312.00 | 13.80 | 18.54 | 17.33 | 19.04 | 0.004837 | 5.66 | 231.75 | 70.35 | 0.55 |
| Reach 1 | 1700 | Q10 | 3850.00 | 13.80 | 21.15 | 19.81 | 22.41 | 0.006488 | 8.99 | 428.08 | 79.67 | 0.68 |
| Reach 1 | 1700 | Q25 | 4148.00 | 13.80 | 21.40 | 20.05 | 22.73 | 0.006586 | 9.26 | 447.72 | 80.49 | 0.69 |
| Reach 1 | 1700 | Q50 | 5290.00 | 13.80 | 22.28 | 20.89 | 23.89 | 0.006865 | 10.17 | 519.99 | 83.43 | 0.72 |
| Reach 1 | 1700 | Q500 | 7380.00 | 13.80 | 23.79 | 22.27 | 25.79 | 0.006886 | 11.36 | 649.74 | 88.50 | 0.74 |
| Reach 1 | 1635 | Q100 | 5910.00 | 14.00 | 22.26 | | 23.95 | 0.009287 | 10.45 | 565.73 | 91.56 | 0.74 |
| Reach 1 | 1635 | Q1.1 | 1312.00 | 14.00 | 17.69 | | 18.50 | 0.015059 | 7.21 | 181.92 | 75.56 | 0.82 |
| Reach 1 | 1635 | Q10 | 3850.00 | 14.00 | 20.47 | | 21.86 | 0.010705 | 9.45 | 407.41 | 86.08 | 0.77 |
| Reach 1 | 1635 | Q25 | 4148.00 | 14.00 | 20.75 | | 22.19 | 0.010420 | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9.61 | 431.49 | 86.93 | | 0.76 | | | | | |
| Reach 1 | 1635 | | Q50 | 5290.00 | 14.00 | 21.75 | | 23.36 | 0.009593 |
| 10.17 | 520.12 | 90.01 | | 0.75 | | | | | |
| Reach 1 | 1635 | | Q500 | 7380.00 | 14.00 | 23.37 | | 25.25 | 0.008748 |
| 11.03 | 669.19 | 94.97 | | 0.73 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1555 | | Q100 | 5910.00 | 13.30 | 20.34 | 20.16 | 22.96 | 0.013986 |
| 12.99 | 455.11 | 80.13 | | 0.96 | | | | | |
| Reach 1 | 1555 | | Q1.1 | 1312.00 | 13.30 | 16.65 | | 17.46 | 0.011277 |
| 7.21 | 181.93 | 67.33 | | 0.77 | | | | | |
| Reach 1 | 1555 | | Q10 | 3850.00 | 13.30 | 19.06 | 18.65 | 20.89 | 0.012593 |
| 10.84 | 355.05 | 76.34 | | 0.89 | | | | | |
| Reach 1 | 1555 | | Q25 | 4148.00 | 13.30 | 19.24 | 18.89 | 21.21 | 0.013023 |
| 11.25 | 368.77 | 76.87 | | 0.91 | | | | | |
| Reach 1 | 1555 | | Q50 | 5290.00 | 13.30 | 19.96 | 19.73 | 22.37 | 0.013832 |
| 12.46 | 424.40 | 78.99 | | 0.95 | | | | | |
| Reach 1 | 1555 | | Q500 | 7380.00 | 13.30 | 21.24 | 21.12 | 24.27 | 0.013933 |
| 13.96 | 528.57 | 82.81 | | 0.97 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1455 | | Q100 | 5910.00 | 11.80 | 19.15 | 18.73 | 21.52 | 0.013371 |
| 12.36 | 482.06 | 84.97 | | 0.89 | | | | | |
| Reach 1 | 1455 | | Q1.1 | 1312.00 | 11.80 | 15.06 | 14.87 | 16.04 | 0.018077 |
| 7.92 | 165.73 | 68.77 | | 0.90 | | | | | |
| Reach 1 | 1455 | | Q10 | 3850.00 | 11.80 | 17.40 | 17.28 | 19.41 | 0.017108 |
| 11.38 | 338.92 | 78.76 | | 0.96 | | | | | |
| Reach 1 | 1455 | | Q25 | 4148.00 | 11.80 | 17.67 | 17.49 | 19.74 | 0.016461 |
| 11.55 | 360.02 | 79.70 | | 0.95 | | | | | |
| Reach 1 | 1455 | | Q50 | 5290.00 | 11.80 | 18.65 | 18.33 | 20.92 | 0.014397 |
| 12.10 | 439.76 | 83.19 | | 0.91 | | | | | |
| Reach 1 | 1455 | | Q500 | 7380.00 | 11.80 | 20.28 | | 22.87 | 0.011590 |
| 12.93 | 580.89 | 89.01 | | 0.86 | | | | | |
| | | | | | | | | | |
| Reach 1 | 1335 | | Q100 | 5910.00 | 9.50 | 18.29 | | 20.09 | 0.008433 |
| 10.77 | 549.92 | 80.42 | | 0.72 | | | | | |
| Reach 1 | 1335 | | Q1.1 | 1312.00 | 9.50 | 12.63 | 12.50 | 13.78 | 0.019322 |
| 8.58 | 152.87 | 58.82 | | 0.94 | | | | | |
| Reach 1 | 1335 | | Q10 | 3850.00 | 9.50 | 16.13 | | 17.69 | 0.010509 |
| 10.02 | 384.33 | 72.81 | | 0.77 | | | | | |
| Reach 1 | 1335 | | Q25 | 4148.00 | 9.50 | 16.48 | | 18.07 | 0.010113 |
| 10.13 | 409.66 | 74.08 | | 0.76 | | | | | |
| Reach 1 | 1335 | | Q50 | 5290.00 | 9.50 | 17.68 | | 19.41 | 0.008923 |
| 10.55 | 501.86 | 78.35 | | 0.73 | | | | | |
| Reach 1 | 1335 | | Q500 | 7380.00 | 9.50 | 19.61 | | 21.58 | 0.007513 |
| 11.27 | 658.95 | 85.25 | | 0.70 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 1185 | | Q100 | 5910.00 | 5.50 | 15.71 | 15.05 | 18.43 | 0.013216 |
| 13.23 | 446.60 | 64.07 | | 0.88 | | | | | |
| Reach 1 | 1185 | | Q1.1 | 1312.00 | 5.50 | 10.99 | | 11.81 | 0.008701 |
| 7.27 | 180.58 | 47.96 | | 0.66 | | | | | |
| Reach 1 | 1185 | | Q10 | 3850.00 | 5.50 | 14.07 | 13.16 | 16.00 | 0.011592 |
| 11.14 | 345.59 | 58.73 | | 0.81 | | | | | |
| Reach 1 | 1185 | | Q25 | 4148.00 | 5.50 | 14.34 | 13.46 | 16.38 | 0.011842 |
| 11.48 | 361.45 | 59.60 | | 0.82 | | | | | |
| Reach 1 | 1185 | | Q50 | 5290.00 | 5.50 | 15.28 | 14.52 | 17.75 | 0.012665 |
| 12.62 | 419.10 | 62.66 | | 0.86 | | | | | |
| Reach 1 | 1185 | | Q500 | 7380.00 | 5.50 | 16.59 | 16.20 | 19.92 | 0.014382 |
| 14.64 | 504.17 | 66.73 | | 0.93 | | | | | |
| Reach 1 | 1060 | | Q100 | 5910.00 | 5.00 | 13.60 | 13.60 | 16.72 | 0.013608 |
| 14.18 | 416.89 | 66.85 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q1.1 | 1312.00 | 5.00 | 8.85 | 8.85 | 10.26 | 0.017292 |
| 9.54 | 137.48 | 49.24 | | 1.01 | | | | | |
| Reach 1 | 1060 | | Q10 | 3850.00 | 5.00 | 11.83 | 11.83 | 14.32 | 0.014510 |
| 12.68 | 303.73 | 61.10 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q25 | 4148.00 | 5.00 | 12.11 | 12.11 | 14.70 | 0.014350 |
| 12.93 | 320.83 | 62.03 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q50 | 5290.00 | 5.00 | 13.10 | 13.10 | 16.05 | 0.013874 |
| 13.79 | 383.70 | 65.29 | | 1.00 | | | | | |
| Reach 1 | 1060 | | Q500 | 7380.00 | 5.00 | 14.68 | 14.68 | 18.19 | 0.013258 |
| 15.04 | 490.72 | 70.18 | | 1.00 | | | | | |
| Reach 1 | 960 | | Q100 | 5910.00 | 3.50 | 9.43 | 10.91 | 14.55 | 0.030767 |
| 18.60 | 341.13 | 76.49 | | 1.44 | | | | | |
| Reach 1 | 960 | | Q1.1 | 1312.00 | 3.50 | 6.44 | 6.75 | 8.04 | 0.029093 |
| 10.21 | 131.29 | 63.66 | | 1.21 | | | | | |
| Reach 1 | 960 | | Q10 | 3850.00 | 3.50 | 8.24 | 9.32 | 12.10 | 0.032272 |
| 16.02 | 253.19 | 71.40 | | 1.41 | | | | | |
| Reach 1 | 960 | | Q25 | 4148.00 | 3.50 | 8.43 | 9.57 | 12.48 | 0.032073 |
| 16.45 | 266.37 | 72.19 | | 1.42 | | | | | |
| Reach 1 | 960 | | Q50 | 5290.00 | 3.50 | 9.09 | 10.43 | 13.86 | 0.031227 |
| 17.91 | 315.39 | 75.04 | | 1.43 | | | | | |
| Reach 1 | 960 | | Q500 | 7380.00 | 3.50 | 10.20 | 11.80 | 16.05 | 0.029537 |
| 19.97 | 401.20 | 79.79 | | 1.44 | | | | | |
| Reach 1 | 935 | | Q100 | 5910.00 | 2.00 | 11.75 | 9.85 | 13.32 | 0.005265 |
| 10.42 | 658.53 | 132.90 | | 0.64 | | | | | |
| Reach 1 | 935 | | Q1.1 | 1312.00 | 2.00 | 7.07 | 5.89 | 7.56 | 0.004779 |
| 5.67 | 238.94 | 73.24 | | 0.53 | | | | | |
| Reach 1 | 935 | | Q10 | 3850.00 | 2.00 | 9.85 | 8.32 | 11.06 | 0.005603 |
| 9.03 | 456.65 | 83.52 | | 0.63 | | | | | |
| Reach 1 | 935 | | Q25 | 4148.00 | 2.00 | 10.11 | 8.55 | 11.40 | 0.005706 |

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9.35      478.34      87.07          0.64
  Reach 1       935          Q50      5290.00       2.00      11.27       9.42      12.74     0.005275
10.02      598.64     119.63          0.63
  Reach 1       935          Q500     7380.00       2.00      12.97      11.03      14.57     0.004645
10.73      828.04     154.93          0.62


  Reach 1       895                    Bridge



  Reach 1       850          Q100     5910.00       1.00      11.15       9.23      12.78     0.004722
10.75      667.24     137.13          0.64
  Reach 1       850          Q1.1     1312.00       1.00       6.79       4.95       7.18     0.002673
5.11      270.29      70.27          0.43
  Reach 1       850          Q10      3850.00       1.00       9.32       7.59      10.54     0.004662
9.14      463.14      82.13          0.61
  Reach 1       850          Q25      4148.00       1.00       9.61       7.85      10.89     0.004678
9.41      487.00      83.49          0.62
  Reach 1       850          Q50      5290.00       1.00      10.56       8.76      12.19     0.005052
10.62      590.31     128.55          0.66
  Reach 1       850          Q500     7380.00       1.00      12.53      11.04      14.10     0.003944
10.84      851.33     153.61          0.60


  Reach 1       830          Q100     5910.00       1.00      11.26                  12.51     0.003074
9.22      746.99     159.08          0.58
  Reach 1       830          Q1.1     1312.00       1.00       6.70                   7.12     0.002997
5.17      254.49      77.51          0.50
  Reach 1       830          Q10      3850.00       1.00       9.32                  10.37     0.003637
8.30      491.66     104.94          0.60
  Reach 1       830          Q25      4148.00       1.00       9.62                  10.71     0.003539
8.47      524.11     108.28          0.60
  Reach 1       830          Q50      5290.00       1.00      10.68                  11.91     0.003296
9.08      657.87     145.20          0.59
  Reach 1       830          Q500     7380.00       1.00      12.65                  13.86     0.002508
9.28      978.53     170.35          0.54


  Reach 1       821          Q100     5910.00       1.00      11.34                  12.39     0.002923
8.30      780.65     173.08          0.55
  Reach 1       821          Q1.1     1312.00       1.00       6.67                   7.09     0.003368
5.23      250.98      79.98          0.52
  Reach 1       821          Q10      3850.00       1.00       9.35                  10.27     0.003920
7.69      503.51     110.73          0.61
  Reach 1       821          Q25      4148.00       1.00       9.66                  10.61     0.003709
7.79      539.36     118.31          0.60
  Reach 1       821          Q50      5290.00       1.00      10.75                  11.78     0.003187
8.18      685.57     152.72          0.57
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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 821 | | Q500 | 7380.00 | 1.00 | 12.71 | | 13.75 | 0.002344 |
| 8.38 | 1030.46 | 183.54 | | 0.51 | | | | | |
| Reach 1 | 820 | | Q100 | 5910.00 | 1.00 | 11.43 | | 12.34 | 0.003087 |
| 7.69 | 803.42 | 172.37 | | 0.55 | | | | | |
| Reach 1 | 820 | | Q1.1 | 1312.00 | 1.00 | 6.66 | | 7.09 | 0.003382 |
| 5.24 | 250.60 | 79.94 | | 0.52 | | | | | |
| Reach 1 | 820 | | Q10 | 3850.00 | 1.00 | 9.35 | | 10.26 | 0.004412 |
| 7.66 | 502.77 | 110.47 | | 0.63 | | | | | |
| Reach 1 | 820 | | Q25 | 4148.00 | 1.00 | 9.68 | | 10.59 | 0.004433 |
| 7.68 | 539.98 | 118.57 | | 0.63 | | | | | |
| Reach 1 | 820 | | Q50 | 5290.00 | 1.00 | 10.83 | | 11.74 | 0.003558 |
| 7.69 | 703.59 | 154.57 | | 0.58 | | | | | |
| Reach 1 | 820 | | Q500 | 7380.00 | 1.00 | 12.85 | | 13.69 | 0.002211 |
| 7.50 | 1166.68 | 280.88 | | 0.49 | | | | | |
| Reach 1 | 725 | | Q100 | 5910.00 | 2.50 | 10.98 | | 12.00 | 0.003914 |
| 8.16 | 775.07 | 173.76 | | 0.55 | | | | | |
| Reach 1 | 725 | | Q1.1 | 1312.00 | 2.50 | 6.09 | | 6.62 | 0.007271 |
| 5.84 | 224.72 | 88.79 | | 0.65 | | | | | |
| Reach 1 | 725 | | Q10 | 3850.00 | 2.50 | 8.76 | | 9.76 | 0.006136 |
| 8.01 | 480.41 | 103.00 | | 0.65 | | | | | |
| Reach 1 | 725 | | Q25 | 4148.00 | 2.50 | 9.10 | | 10.10 | 0.005767 |
| 8.05 | 515.09 | 107.21 | | 0.64 | | | | | |
| Reach 1 | 725 | | Q50 | 5290.00 | 2.50 | 10.32 | | 11.35 | 0.004495 |
| 8.17 | 669.44 | 147.09 | | 0.58 | | | | | |
| Reach 1 | 725 | | Q500 | 7380.00 | 2.50 | 12.49 | | 13.44 | 0.002895 |
| 8.03 | 1085.64 | 233.36 | | 0.49 | | | | | |
| Reach 1 | 575 | | Q100 | 5910.00 | 1.50 | 10.82 | | 11.46 | 0.002176 |
| 6.47 | 970.39 | 205.77 | | 0.42 | | | | | |
| Reach 1 | 575 | | Q1.1 | 1312.00 | 1.50 | 4.94 | | 5.46 | 0.008276 |
| 5.77 | 227.22 | 100.78 | | 0.68 | | | | | |
| Reach 1 | 575 | | Q10 | 3850.00 | 1.50 | 8.32 | | 8.96 | 0.003593 |
| 6.43 | 598.70 | 119.70 | | 0.51 | | | | | |
| Reach 1 | 575 | | Q25 | 4148.00 | 1.50 | 8.71 | | 9.35 | 0.003313 |
| 6.42 | 645.78 | 122.16 | | 0.49 | | | | | |
| Reach 1 | 575 | | Q50 | 5290.00 | 1.50 | 10.10 | | 10.75 | 0.002487 |
| 6.46 | 838.34 | 163.32 | | 0.44 | | | | | |
| Reach 1 | 575 | | Q500 | 7380.00 | 1.50 | 12.41 | | 13.01 | 0.001633 |
| 6.39 | 1361.35 | 268.56 | | 0.38 | | | | | |
| Reach 1 | 425 | | Q100 | 5910.00 | 0.00 | 10.51 | | 11.16 | 0.001827 |
| 6.49 | 979.22 | 227.41 | | 0.39 | | | | | |
| Reach 1 | 425 | | Q1.1 | 1312.00 | 0.00 | 4.53 | | 4.80 | 0.002240 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4.14 | 317.19 | 86.31 | | 0.38 | | | | | |
| Reach 1 | 425 | | Q10 | 3850.00 | 0.00 | 7.94 | | 8.51 | 0.002357 |
| 6.06 | 635.59 | 100.06 | | 0.42 | | | | | |
| Reach 1 | 425 | | Q25 | 4148.00 | 0.00 | 8.34 | | 8.93 | 0.002277 |
| 6.14 | 676.02 | 101.58 | | 0.42 | | | | | |
| Reach 1 | 425 | | Q50 | 5290.00 | 0.00 | 9.77 | | 10.41 | 0.002010 |
| 6.41 | 837.36 | 138.26 | | 0.40 | | | | | |
| Reach 1 | 425 | | Q500 | 7380.00 | 0.00 | 12.18 | | 12.79 | 0.001414 |
| 6.42 | 1401.34 | 260.97 | | 0.35 | | | | | |
| Reach 1 | 335 | | Q100 | 5910.00 | -2.00 | 9.90 | | 10.92 | 0.002776 |
| 8.11 | 744.20 | 116.89 | | 0.48 | | | | | |
| Reach 1 | 335 | | Q1.1 | 1312.00 | -2.00 | 4.33 | | 4.62 | 0.001816 |
| 4.31 | 304.64 | 65.80 | | 0.35 | | | | | |
| Reach 1 | 335 | | Q10 | 3850.00 | -2.00 | 7.40 | | 8.24 | 0.003238 |
| 7.34 | 524.70 | 77.53 | | 0.50 | | | | | |
| Reach 1 | 335 | | Q25 | 4148.00 | -2.00 | 7.79 | | 8.66 | 0.003200 |
| 7.47 | 555.18 | 79.01 | | 0.50 | | | | | |
| Reach 1 | 335 | | Q50 | 5290.00 | -2.00 | 9.18 | | 10.16 | 0.002961 |
| 7.92 | 669.58 | 90.38 | | 0.49 | | | | | |
| Reach 1 | 335 | | Q500 | 7380.00 | -2.00 | 11.57 | | 12.59 | 0.002277 |
| 8.24 | 1072.73 | 248.32 | | 0.45 | | | | | |
| Reach 1 | 262 | | Q100 | 5910.00 | -3.00 | 8.83 | | 10.57 | 0.005707 |
| 10.58 | 558.57 | 71.13 | | 0.67 | | | | | |
| Reach 1 | 262 | | Q1.1 | 1312.00 | -3.00 | 4.07 | | 4.46 | 0.002317 |
| 5.00 | 262.15 | 53.25 | | 0.40 | | | | | |
| Reach 1 | 262 | | Q10 | 3850.00 | -3.00 | 6.38 | | 7.85 | 0.006318 |
| 9.74 | 395.14 | 62.03 | | 0.68 | | | | | |
| Reach 1 | 262 | | Q25 | 4148.00 | -3.00 | 6.74 | | 8.27 | 0.006278 |
| 9.92 | 417.99 | 63.44 | | 0.68 | | | | | |
| Reach 1 | 262 | | Q50 | 5290.00 | -3.00 | 8.10 | | 9.79 | 0.005954 |
| 10.42 | 507.69 | 68.47 | | 0.67 | | | | | |
| Reach 1 | 262 | | Q500 | 7380.00 | -3.00 | 10.41 | | 12.27 | 0.004923 |
| 10.93 | 690.11 | 108.39 | | 0.63 | | | | | |
| Reach 1 | 187 | | Q100 | 5910.00 | -4.00 | 8.44 | 5.94 | 10.14 | 0.005330 |
| 10.46 | 564.77 | 68.82 | | 0.64 | | | | | |
| Reach 1 | 187 | | Q1.1 | 1312.00 | -4.00 | 3.97 | 0.60 | 4.29 | 0.001678 |
| 4.51 | 290.86 | 53.75 | | 0.34 | | | | | |
| Reach 1 | 187 | | Q10 | 3850.00 | -4.00 | 5.98 | 3.99 | 7.38 | 0.005662 |
| 9.49 | 405.67 | 60.50 | | 0.65 | | | | | |
| Reach 1 | 187 | | Q25 | 4148.00 | -4.00 | 6.34 | 4.29 | 7.80 | 0.005671 |
| 9.70 | 427.69 | 61.71 | | 0.65 | | | | | |
| Reach 1 | 187 | | Q50 | 5290.00 | -4.00 | 7.71 | 5.39 | 9.35 | 0.005505 |
| 10.27 | 515.03 | 66.29 | | 0.65 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 187 | | Q500 | 7380.00 | -4.00 | 10.07 | 7.13 | 11.90 | 0.004763 |
| 10.85 | 682.36 | 79.14 | | 0.62 | | | | | |
| Reach 1 | 166 | | Bridge | | | | | | |
| Reach 1 | 137 | | Q100 | 5910.00 | -4.00 | 7.97 | 5.85 | 9.84 | 0.006060 |
| 10.95 | 539.62 | 67.73 | | 0.68 | | | | | |
| Reach 1 | 137 | | Q1.1 | 1312.00 | -4.00 | 3.89 | 0.51 | 4.20 | 0.001678 |
| 4.51 | 291.15 | 53.87 | | 0.34 | | | | | |
| Reach 1 | 137 | | Q10 | 3850.00 | -4.00 | 5.45 | 3.89 | 7.05 | 0.006854 |
| 10.15 | 379.31 | 59.16 | | 0.71 | | | | | |
| Reach 1 | 137 | | Q25 | 4148.00 | -4.00 | 5.80 | 4.20 | 7.47 | 0.006824 |
| 10.35 | 400.69 | 60.37 | | 0.71 | | | | | |
| Reach 1 | 137 | | Q50 | 5290.00 | -4.00 | 7.20 | 5.30 | 9.02 | 0.006396 |
| 10.83 | 488.44 | 65.11 | | 0.70 | | | | | |
| Reach 1 | 137 | | Q500 | 7380.00 | -4.00 | 9.68 | 7.04 | 11.63 | 0.005108 |
| 11.21 | 660.26 | 73.78 | | 0.64 | | | | | |
| Reach 1 | 98.5 | | Bridge | | | | | | |
| Reach 1 | 60 | | Q100 | 5910.00 | -5.00 | 7.40 | 4.37 | 9.20 | 0.003918 |
| 10.88 | 564.72 | 62.75 | | 0.59 | | | | | |
| Reach 1 | 60 | | Q1.1 | 1312.00 | -5.00 | 3.84 | -0.83 | 4.05 | 0.000765 |
| 3.67 | 365.74 | 56.40 | | 0.24 | | | | | |
| Reach 1 | 60 | | Q10 | 3850.00 | -5.00 | 4.72 | 2.44 | 6.13 | 0.004447 |
| 9.56 | 414.64 | 57.85 | | 0.60 | | | | | |
| Reach 1 | 60 | | Q25 | 4148.00 | -5.00 | 5.03 | 2.74 | 6.53 | 0.004540 |
| 9.91 | 431.86 | 58.35 | | 0.61 | | | | | |
| Reach 1 | 60 | | Q50 | 5290.00 | -5.00 | 6.60 | 3.80 | 8.30 | 0.004093 |
| 10.56 | 519.88 | 60.95 | | 0.59 | | | | | |
| Reach 1 | 60 | | Q500 | 7380.00 | -5.00 | 9.16 | 5.55 | 11.21 | 0.003631 |
| 11.60 | 663.58 | 65.97 | | 0.58 | | | | | |
| Reach 1 | 38 | | Q100 | 5910.00 | -4.50 | 6.79 | | 8.98 | 0.005186 |
| 11.95 | 514.38 | 58.84 | | 0.66 | | | | | |
| Reach 1 | 38 | | Q1.1 | 1312.00 | -4.50 | 3.81 | | 4.03 | 0.000834 |
| 3.80 | 348.57 | 52.22 | | 0.25 | | | | | |
| Reach 1 | 38 | | Q10 | 3850.00 | -4.50 | 4.17 | | 5.91 | 0.006073 |
| 10.59 | 367.87 | 53.04 | | 0.68 | | | | | |
| Reach 1 | 38 | | Q25 | 4148.00 | -4.50 | 4.40 | | 6.30 | 0.006369 |
| 11.07 | 380.12 | 53.55 | | 0.70 | | | | | |
| Reach 1 | 38 | | Q50 | 5290.00 | -4.50 | 5.99 | | 8.08 | 0.005518 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11.66 | 467.59 | 57.05 | | 0.67 | | | | | |
| Reach 1 | 38 | | Q500 | 7380.00 | -4.50 | 8.63 | | 11.01 | 0.004557 |
| 12.51 | 626.13 | 62.91 | | 0.64 | | | | | |
| Reach 1 | 0 | | Q100 | 5910.00 | -6.30 | 4.24 | 4.24 | 8.48 | 0.013662 |
| 16.53 | 360.07 | 44.32 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q1.1 | 1312.00 | -6.30 | 3.76 | | 4.00 | 0.000817 |
| 3.89 | 338.97 | 43.85 | | 0.24 | | | | | |
| Reach 1 | 0 | | Q10 | 3850.00 | -6.30 | 3.33 | | 5.59 | 0.008479 |
| 12.07 | 319.95 | 43.41 | | 0.77 | | | | | |
| Reach 1 | 0 | | Q25 | 4148.00 | -6.30 | 3.19 | 2.45 | 5.91 | 0.010473 |
| 13.25 | 313.88 | 43.27 | | 0.86 | | | | | |
| Reach 1 | 0 | | Q50 | 5290.00 | -6.30 | 3.62 | 3.62 | 7.58 | 0.014135 |
| 15.97 | 332.50 | 43.70 | | 1.00 | | | | | |
| Reach 1 | 0 | | Q500 | 7380.00 | -6.30 | 5.62 | 5.62 | 10.49 | 0.012870 |
| 17.73 | 422.22 | 45.70 | | 0.99 | | | | | |
| Reach 1 | -21 | | Q100 | 5910.00 | -7.00 | 1.82 | 3.29 | 7.91 | 0.024570 |
| 19.83 | 302.26 | 45.71 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q1.1 | 1312.00 | -7.00 | 3.79 | | 3.97 | 0.000546 |
| 3.40 | 393.69 | 47.38 | | 0.20 | | | | | |
| Reach 1 | -21 | | Q10 | 3850.00 | -7.00 | 3.67 | | 5.25 | 0.004917 |
| 10.13 | 387.87 | 47.28 | | 0.61 | | | | | |
| Reach 1 | -21 | | Q25 | 4148.00 | -7.00 | 3.63 | | 5.49 | 0.005774 |
| 10.96 | 386.36 | 47.25 | | 0.66 | | | | | |
| Reach 1 | -21 | | Q50 | 5290.00 | -7.00 | 1.32 | 2.71 | 7.01 | 0.025006 |
| 19.16 | 279.48 | 45.28 | | 1.34 | | | | | |
| Reach 1 | -21 | | Q500 | 7380.00 | -7.00 | 2.94 | 4.65 | 9.92 | 0.023784 |
| 21.24 | 353.85 | 46.66 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q100 | 5910.00 | -7.00 | 1.85 | 3.09 | 6.72 | 0.025698 |
| 17.70 | 333.87 | 61.41 | | 1.34 | | | | | |
| Reach 1 | -54 | | Q1.1 | 1312.00 | -7.00 | 3.81 | | 3.93 | 0.000478 |
| 2.86 | 464.80 | 72.34 | | 0.19 | | | | | |
| Reach 1 | -54 | | Q10 | 3850.00 | -7.00 | 3.88 | | 4.95 | 0.003975 |
| 8.29 | 470.37 | 72.77 | | 0.55 | | | | | |
| Reach 1 | -54 | | Q25 | 4148.00 | -7.00 | 3.90 | | 5.13 | 0.004581 |
| 8.91 | 471.58 | 72.87 | | 0.59 | | | | | |
| Reach 1 | -54 | | Q50 | 5290.00 | -7.00 | 4.04 | 2.59 | 5.96 | 0.007001 |
| 11.13 | 482.04 | 73.49 | | 0.73 | | | | | |
| Reach 1 | -54 | | Q500 | 7380.00 | -7.00 | 2.18 | 4.20 | 8.92 | 0.033780 |
| 20.84 | 354.12 | 63.23 | | 1.54 | | | | | |
| Reach 1 | -88 | | Q100 | 5910.00 | -6.00 | 3.67 | 3.18 | 6.18 | 0.010956 |
| 12.71 | 465.10 | 75.49 | | 0.90 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | -88 | | Q1.1 | 1312.00 | -6.00 | 3.80 | | 3.92 | 0.000512 |
| 2.77 | 474.41 | 76.18 | | 0.20 | | | | | |
| Reach 1 | -88 | | Q10 | 3850.00 | -6.00 | 3.76 | | 4.80 | 0.004468 |
| 8.16 | 471.96 | 76.00 | | 0.58 | | | | | |
| Reach 1 | -88 | | Q25 | 4148.00 | -6.00 | 3.76 | | 4.96 | 0.005206 |
| 8.80 | 471.34 | 75.96 | | 0.62 | | | | | |
| Reach 1 | -88 | | Q50 | 5290.00 | -6.00 | 3.71 | | 5.70 | 0.008637 |
| 11.31 | 467.88 | 75.70 | | 0.80 | | | | | |
| Reach 1 | -88 | | Q500 | 7380.00 | -6.00 | 4.25 | 4.25 | 7.51 | 0.013360 |
| 14.49 | 509.28 | 78.71 | | 1.00 | | | | | |
| Reach 1 | -143 | | Q100 | 5910.00 | -7.00 | 3.80 | 1.75 | 5.53 | 0.005536 |
| 10.57 | 566.27 | 73.60 | | 0.67 | | | | | |
| Reach 1 | -143 | | Q1.1 | 1312.00 | -7.00 | 3.80 | -2.96 | 3.89 | 0.000273 |
| 2.35 | 566.27 | 73.60 | | 0.15 | | | | | |
| Reach 1 | -143 | | Q10 | 3850.00 | -7.00 | 3.80 | 0.05 | 4.53 | 0.002349 |
| 6.88 | 566.27 | 73.60 | | 0.44 | | | | | |
| Reach 1 | -143 | | Q25 | 4148.00 | -7.00 | 3.80 | 0.32 | 4.65 | 0.002727 |
| 7.42 | 566.27 | 73.60 | | 0.47 | | | | | |
| Reach 1 | -143 | | Q50 | 5290.00 | -7.00 | 3.80 | 1.29 | 5.19 | 0.004435 |
| 9.46 | 566.27 | 73.60 | | 0.60 | | | | | |
| Reach 1 | -143 | | Q500 | 7380.00 | -7.00 | 3.80 | 2.81 | 6.50 | 0.008632 |
| 13.20 | 566.27 | 73.60 | | 0.83 | | | | | |

Profile Output Table - Six XS Bridge

| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Crit W.S. | Frctn Loss | C & E Loss | Top Width |
|---|---|---|---|---|---|---|---|---|
| Q Left | Q Channel Q Right | Vel Chnl | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) |
| (cfs) | (cfs) (cfs) | (ft/s) | | | | | | |
| Reach 1 | 960 | Q100 | 14.55 | 9.43 | 10.91 | 1.97 | 0.20 | 76.49 |
| 168.11 | 5560.68 181.20 | 18.60 | | | | | | |
| Reach 1 | 960 | Q1.1 | 8.04 | 6.44 | 6.75 | 2.21 | 0.02 | 63.66 |
| 8.13 | 1295.11 8.76 | 10.21 | | | | | | |
| Reach 1 | 960 | Q10 | 12.10 | 8.24 | 9.32 | 2.09 | 0.13 | 71.40 |
| 74.85 | 3694.47 80.68 | 16.02 | | | | | | |
| Reach 1 | 960 | Q25 | 12.48 | 8.43 | 9.57 | 2.07 | 0.14 | 72.19 |
| 86.43 | 3968.41 93.16 | 16.45 | | | | | | |
| Reach 1 | 960 | Q50 | 13.86 | 9.09 | 10.43 | 2.00 | 0.18 | 75.04 |
| 136.92 | 5005.50 147.58 | 17.91 | | | | | | |
| Reach 1 | 960 | Q500 | 16.05 | 10.20 | 11.80 | 1.90 | 0.23 | 79.79 |
| 252.32 | 6855.72 271.96 | 19.97 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 935 | | Q100 | 13.32 | 11.75 | 9.85 | 0.06 | 0.02 | 132.90 |
| 174.05 | 5450.01 | 285.95 | 10.42 | | | | | | |
| Reach 1 | 935 | | Q1.1 | 7.56 | 7.07 | 5.89 | 0.05 | 0.01 | 73.24 |
| 7.13 | 1281.35 | 23.52 | 5.67 | | | | | | |
| Reach 1 | 935 | | Q10 | 11.06 | 9.85 | 8.32 | 0.06 | 0.02 | 83.52 |
| 74.51 | 3633.66 | 141.83 | 9.03 | | | | | | |
| Reach 1 | 935 | | Q25 | 11.40 | 10.11 | 8.55 | 0.06 | 0.01 | 87.07 |
| 86.27 | 3917.98 | 143.75 | 9.35 | | | | | | |
| Reach 1 | 935 | | Q50 | 12.74 | 11.27 | 9.42 | 0.06 | 0.02 | 119.63 |
| 143.42 | 4940.89 | 205.69 | 10.02 | | | | | | |
| Reach 1 | 935 | | Q500 | 14.57 | 12.97 | 11.03 | 0.05 | 0.03 | 154.93 |
| 255.06 | 6451.11 | 673.83 | 10.73 | | | | | | |
| Reach 1 | 895 | BR U | Q100 | 13.24 | 11.59 | 9.85 | 0.30 | 0.07 | 126.63 |
| 169.38 | 5469.50 | 271.13 | 10.66 | | | | | | |
| Reach 1 | 895 | BR U | Q1.1 | 7.50 | 6.98 | 5.89 | 0.22 | 0.07 | 72.90 |
| 6.61 | 1282.69 | 22.70 | 5.83 | | | | | | |
| Reach 1 | 895 | BR U | Q10 | 10.97 | 9.70 | 8.32 | 0.32 | 0.05 | 82.96 |
| 71.43 | 3640.61 | 137.96 | 9.26 | | | | | | |
| Reach 1 | 895 | BR U | Q25 | 11.33 | 9.99 | 8.55 | 0.32 | 0.05 | 84.05 |
| 83.38 | 3907.93 | 156.68 | 9.50 | | | | | | |
| Reach 1 | 895 | BR U | Q50 | 12.65 | 11.10 | 9.42 | 0.31 | 0.05 | 114.91 |
| 138.86 | 4959.52 | 191.62 | 10.29 | | | | | | |
| Reach 1 | 895 | BR U | Q500 | 14.49 | 12.79 | 11.03 | 0.27 | 0.07 | 128.71 |
| 249.68 | 6504.94 | 625.38 | 11.04 | | | | | | |
| Reach 1 | 895 | BR D | Q100 | 12.86 | 11.35 | 9.23 | 0.05 | 0.04 | 125.59 |
| 147.25 | 5241.63 | 521.12 | 10.39 | | | | | | |
| Reach 1 | 895 | BR D | Q1.1 | 7.21 | 6.83 | 4.95 | 0.03 | 0.00 | 70.46 |
| 4.13 | 1261.95 | 45.92 | 5.06 | | | | | | |
| Reach 1 | 895 | BR D | Q10 | 10.60 | 9.43 | 7.59 | 0.05 | 0.01 | 82.66 |
| 57.11 | 3554.04 | 238.85 | 8.97 | | | | | | |
| Reach 1 | 895 | BR D | Q25 | 10.96 | 9.72 | 7.85 | 0.05 | 0.01 | 84.03 |
| 67.82 | 3810.81 | 269.37 | 9.24 | | | | | | |
| Reach 1 | 895 | BR D | Q50 | 12.30 | 10.84 | 8.76 | 0.06 | 0.05 | 124.62 |
| 119.05 | 4808.65 | 362.30 | 10.12 | | | | | | |
| Reach 1 | 895 | BR D | Q500 | 14.15 | 12.58 | 10.97 | 0.05 | 0.00 | 127.89 |
| 224.95 | 6197.70 | 957.35 | 10.81 | | | | | | |
| Reach 1 | 850 | | Q100 | 12.78 | 11.15 | 9.23 | 0.08 | 0.19 | 137.13 |
| 141.84 | 5300.11 | 468.05 | 10.75 | | | | | | |
| Reach 1 | 850 | | Q1.1 | 7.18 | 6.79 | 4.95 | 0.06 | 0.01 | 70.27 |
| 3.95 | 1262.69 | 45.35 | 5.11 | | | | | | |
| Reach 1 | 850 | | Q10 | 10.54 | 9.32 | 7.59 | 0.08 | 0.08 | 82.13 |
| 54.88 | 3560.63 | 234.50 | 9.14 | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 850 | | Q25 | 10.89 | 9.61 | 7.85 | 0.08 | 0.10 | 83.49 |
| 65.31 | 3818.08 | 264.60 | 9.41 | | | | | | |
| Reach 1 | 850 | | Q50 | 12.19 | 10.56 | 8.76 | 0.08 | 0.20 | 128.55 |
| 112.29 | 4883.80 | 293.91 | 10.62 | | | | | | |
| Reach 1 | 850 | | Q500 | 14.10 | 12.53 | 11.04 | 0.06 | 0.18 | 153.61 |
| 222.51 | 6183.78 | 973.71 | 10.84 | | | | | | |
| Reach 1 | 830 | | Q100 | 12.51 | 11.26 | | 0.03 | 0.10 | 159.08 |
| 126.11 | 5558.21 | 225.68 | 9.22 | | | | | | |
| Reach 1 | 830 | | Q1.1 | 7.12 | 6.70 | | 0.03 | 0.00 | 77.51 |
| 0.58 | 1311.42 | | 5.17 | | | | | | |
| Reach 1 | 830 | | Q10 | 10.37 | 9.32 | | 0.03 | 0.07 | 104.94 |
| 40.09 | 3767.73 | 42.18 | 8.30 | | | | | | |
| Reach 1 | 830 | | Q25 | 10.71 | 9.62 | | 0.03 | 0.07 | 108.28 |
| 49.98 | 4040.21 | 57.81 | 8.47 | | | | | | |
| Reach 1 | 830 | | Q50 | 11.91 | 10.68 | | 0.03 | 0.10 | 145.20 |
| 95.53 | 5063.76 | 130.71 | 9.08 | | | | | | |
| Reach 1 | 830 | | Q500 | 13.86 | 12.65 | | 0.02 | 0.08 | 170.35 |
| 212.46 | 6578.08 | 589.46 | 9.28 | | | | | | |
| Reach 1 | 262 | | Q100 | 10.57 | 8.83 | | 0.41 | 0.01 | 71.13 |
| | 5910.00 | | 10.58 | | | | | | |
| Reach 1 | 262 | | Q1.1 | 4.46 | 4.07 | | 0.15 | 0.02 | 53.25 |
| | 1312.00 | | 5.00 | | | | | | |
| Reach 1 | 262 | | Q10 | 7.85 | 6.38 | | 0.45 | 0.02 | 62.03 |
| | 3850.00 | | 9.74 | | | | | | |
| Reach 1 | 262 | | Q25 | 8.27 | 6.74 | | 0.45 | 0.02 | 63.44 |
| | 4148.00 | | 9.92 | | | | | | |
| Reach 1 | 262 | | Q50 | 9.79 | 8.10 | | 0.43 | 0.01 | 68.47 |
| | 5290.00 | | 10.42 | | | | | | |
| Reach 1 | 262 | | Q500 | 12.27 | 10.41 | | 0.36 | 0.01 | 108.39 |
| 1.31 | 7364.13 | 14.57 | 10.93 | | | | | | |
| Reach 1 | 187 | | Q100 | 10.14 | 8.44 | 5.94 | 0.12 | 0.01 | 68.82 |
| | 5910.00 | | 10.46 | | | | | | |
| Reach 1 | 187 | | Q1.1 | 4.29 | 3.97 | 0.60 | 0.04 | 0.00 | 53.75 |
| | 1312.00 | | 4.51 | | | | | | |
| Reach 1 | 187 | | Q10 | 7.38 | 5.98 | 3.99 | 0.13 | 0.01 | 60.50 |
| | 3850.00 | | 9.49 | | | | | | |
| Reach 1 | 187 | | Q25 | 7.80 | 6.34 | 4.29 | 0.13 | 0.01 | 61.71 |
| | 4148.00 | | 9.70 | | | | | | |
| Reach 1 | 187 | | Q50 | 9.35 | 7.71 | 5.39 | 0.12 | 0.01 | 66.29 |
| | 5290.00 | | 10.27 | | | | | | |
| Reach 1 | 187 | | Q500 | 11.90 | 10.07 | 7.13 | 0.10 | 0.01 | 79.14 |

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|---|---|---|---|---|---|---|---|---|---|
| 0.51 | 7378.29 | 1.19 | 10.85 | | | | | | |
| Reach 1 | 166 | BR U | Q100 | 10.02 | 8.22 | 5.94 | 0.08 | 0.00 | 68.05 |
| | 5910.00 | | 10.75 | | | | | | |
| Reach 1 | 166 | BR U | Q1.1 | 4.25 | 3.93 | 0.59 | 0.02 | 0.00 | 53.61 |
| | 1312.00 | | 4.54 | | | | | | |
| Reach 1 | 166 | BR U | Q10 | 7.25 | 5.74 | 3.98 | 0.09 | 0.00 | 59.69 |
| | 3850.00 | | 9.84 | | | | | | |
| Reach 1 | 166 | BR U | Q25 | 7.67 | 6.10 | 4.29 | 0.09 | 0.00 | 60.89 |
| | 4148.00 | | 10.05 | | | | | | |
| Reach 1 | 166 | BR U | Q50 | 9.21 | 7.47 | 5.40 | 0.08 | 0.00 | 65.51 |
| | 5290.00 | | 10.59 | | | | | | |
| Reach 1 | 166 | BR U | Q500 | 11.78 | 9.88 | 7.13 | 0.07 | 0.00 | 74.14 |
| 0.28 | 7379.46 | 0.26 | 11.07 | | | | | | |
| Reach 1 | 166 | BR D | Q100 | 9.93 | 8.15 | 5.85 | 0.09 | 0.01 | 68.32 |
| | 5910.00 | | 10.71 | | | | | | |
| Reach 1 | 166 | BR D | Q1.1 | 4.23 | 3.91 | 0.50 | 0.02 | 0.00 | 53.96 |
| | 1312.00 | | 4.48 | | | | | | |
| Reach 1 | 166 | BR D | Q10 | 7.15 | 5.65 | 3.90 | 0.10 | 0.01 | 59.86 |
| | 3850.00 | | 9.83 | | | | | | |
| Reach 1 | 166 | BR D | Q25 | 7.58 | 6.01 | 4.20 | 0.10 | 0.01 | 61.08 |
| | 4148.00 | | 10.03 | | | | | | |
| Reach 1 | 166 | BR D | Q50 | 9.13 | 7.40 | 5.30 | 0.09 | 0.01 | 65.77 |
| | 5290.00 | | 10.56 | | | | | | |
| Reach 1 | 166 | BR D | Q500 | 11.71 | 9.82 | 7.04 | 0.07 | 0.01 | 73.66 |
| 2.44 | 7376.99 | 0.57 | 11.05 | | | | | | |
| Reach 1 | 137 | | Q100 | 9.84 | 7.97 | 5.85 | 0.14 | 0.06 | 67.73 |
| | 5910.00 | | 10.95 | | | | | | |
| Reach 1 | 137 | | Q1.1 | 4.20 | 3.89 | 0.51 | 0.04 | 0.00 | 53.87 |
| | 1312.00 | | 4.51 | | | | | | |
| Reach 1 | 137 | | Q10 | 7.05 | 5.45 | 3.89 | 0.17 | 0.12 | 59.16 |
| | 3850.00 | | 10.15 | | | | | | |
| Reach 1 | 137 | | Q25 | 7.47 | 5.80 | 4.20 | 0.17 | 0.12 | 60.37 |
| | 4148.00 | | 10.35 | | | | | | |
| Reach 1 | 137 | | Q50 | 9.02 | 7.20 | 5.30 | 0.15 | 0.08 | 65.11 |
| | 5290.00 | | 10.83 | | | | | | |
| Reach 1 | 137 | | Q500 | 11.63 | 9.68 | 7.04 | 0.12 | 0.04 | 73.78 |
| 1.94 | 7377.72 | 0.34 | 11.21 | | | | | | |
| Reach 1 | 98.5 | BR U | Q100 | 9.62 | 7.55 | 5.85 | 0.19 | 0.16 | 66.28 |
| | 5910.00 | | 11.57 | | | | | | |
| Reach 1 | 98.5 | BR U | Q1.1 | 4.16 | 3.84 | 0.50 | 0.04 | 0.06 | 53.72 |
| | 1312.00 | | 4.54 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reach 1 | 98.5 | BR U | Q10 | 6.76 | 4.77 | 3.90 | 0.23 | 0.32 | 56.86 |
| | 3850.00 | | 11.32 | | | | | | |
| Reach 1 | 98.5 | BR U | Q25 | 7.17 | 5.09 | 4.20 | 0.23 | 0.31 | 57.95 |
| | 4148.00 | | 11.57 | | | | | | |
| Reach 1 | 98.5 | BR U | Q50 | 8.79 | 6.71 | 5.30 | 0.20 | 0.21 | 63.44 |
| | 5290.00 | | 11.58 | | | | | | |
| Reach 1 | 98.5 | BR U | Q500 | 11.48 | 9.40 | 7.04 | 0.17 | 0.03 | 71.43 |
| 1.11 | 7378.89 | | 11.56 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 98.5 | BR D | Q100 | 9.28 | 7.51 | 4.37 | 0.07 | 0.01 | 63.06 |
| | 5779.31 | 130.69 | 10.76 | | | | | | |
| Reach 1 | 98.5 | BR D | Q1.1 | 4.07 | 3.86 | -0.83 | 0.01 | 0.00 | 56.42 |
| | 1302.35 | 9.65 | 3.66 | | | | | | |
| Reach 1 | 98.5 | BR D | Q10 | 6.21 | 4.86 | 2.44 | 0.07 | 0.01 | 58.07 |
| | 3805.25 | 44.75 | 9.40 | | | | | | |
| Reach 1 | 98.5 | BR D | Q25 | 6.63 | 5.17 | 2.74 | 0.07 | 0.02 | 58.59 |
| | 4093.89 | 54.11 | 9.73 | | | | | | |
| Reach 1 | 98.5 | BR D | Q50 | 8.38 | 6.72 | 3.80 | 0.07 | 0.01 | 61.15 |
| | 5187.74 | 102.26 | 10.43 | | | | | | |
| Reach 1 | 98.5 | BR D | Q500 | 11.27 | 9.27 | 5.55 | 0.06 | 0.01 | 65.27 |
| | 7178.29 | 201.71 | 11.50 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 60 | | Q100 | 9.20 | 7.40 | 4.37 | 0.10 | 0.12 | 62.75 |
| | 5781.54 | 128.46 | 10.88 | | | | | | |
| Reach 1 | 60 | | Q1.1 | 4.05 | 3.84 | -0.83 | 0.02 | 0.00 | 56.40 |
| | 1302.41 | 9.59 | 3.67 | | | | | | |
| Reach 1 | 60 | | Q10 | 6.13 | 4.72 | 2.44 | 0.11 | 0.10 | 57.85 |
| | 3807.71 | 42.29 | 9.56 | | | | | | |
| Reach 1 | 60 | | Q25 | 6.53 | 5.03 | 2.74 | 0.12 | 0.12 | 58.35 |
| | 4096.59 | 51.41 | 9.91 | | | | | | |
| Reach 1 | 60 | | Q50 | 8.30 | 6.60 | 3.80 | 0.10 | 0.12 | 60.95 |
| | 5190.07 | 99.93 | 10.56 | | | | | | |
| Reach 1 | 60 | | Q500 | 11.21 | 9.16 | 5.55 | 0.09 | 0.10 | 65.97 |
| | 7180.31 | 199.69 | 11.60 | | | | | | |
| | | | | | | | | | |
| Reach 1 | 38 | | Q100 | 8.98 | 6.79 | | 0.30 | 0.20 | 58.84 |
| 0.03 | 5839.64 | 70.33 | 11.95 | | | | | | |
| Reach 1 | 38 | | Q1.1 | 4.03 | 3.81 | | 0.03 | 0.00 | 52.22 |
| 0.00 | 1309.91 | 2.09 | 3.80 | | | | | | |
| Reach 1 | 38 | | Q10 | 5.91 | 4.17 | | 0.27 | 0.05 | 53.04 |
| 0.01 | 3840.75 | 9.24 | 10.59 | | | | | | |
| Reach 1 | 38 | | Q25 | 6.30 | 4.40 | | 0.31 | 0.08 | 53.55 |
| 0.01 | 4135.62 | 12.37 | 11.07 | | | | | | |
| Reach 1 | 38 | | Q50 | 8.08 | 5.99 | | 0.32 | 0.19 | 57.05 |
| 0.02 | 5245.62 | 44.36 | 11.66 | | | | | | |
| Reach 1 | 38 | | Q500 | 11.01 | 8.63 | | 0.27 | 0.25 | 62.91 |

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|---|---|---|---|
| 0.04 | 7223.42 | 156.53 | 12.51 |